

THE STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR SITE LOCATION OF DEVELOPMENT ACT PERMIT
AND NATURAL RESOURCES PROTECTION ACT PERMIT
FOR THE NEW ENGLAND CLEAN ENERGY CONNECT
FROM QUÉBEC-MAINE BORDER TO LEWISTON
AND RELATED NETWORK UPGRADES

PRE-FILED DIRECT TESTIMONY OF

CHRIS RUSSELL

FEBRUARY 28, 2019

TESTIMONY OF CHRIS RUSSELL

1 **Please state your name and address.**

2 My name is Chris Russell and I live at 111 Main Street in Caratunk, Maine.

3 **What is the name of your organization and business address?**

4 The name of my business is Kennebec River Angler Guide Service, PO Box 59,
5 Caratunk, ME 04925.

6 **What is your current position?**

7 I am the owner and head fishing guide for Kennebec River Angler.

8 **What other occupations have you had in the greater Forks area?**

9 I have been a registered Maine whitewater guide since 1986 and guided rafters on the
10 Kennebec River full time from 1991 to 2009. In 1997 I helped co-found Adventure
11 Bound, a rafting company based in Caratunk, ME and was the General Manager until
12 2009 when I started Kennebec River Angler. As a Master Maine Guide I continue to
13 also guide trips with snowmobiles, ATVs, kayaking, hiking, canoeing, photography
14 and a variety of hunting trips. I have many years of teaching outdoor education
15 classes to both children and adults in the Somerset County community as well.

16 **Why did you intervene in these proceedings?**

17 I have made a living utilizing the outdoor resources in this area since 1986 and feel
18 this current project will severely affect my livelihood in a negative manner. As a
19 fishing guide service that focuses on guiding our clients to catching native brook
20 trout, we are seriously concerned with the cumulative effects that this project will
21 have on this fragile and valuable species and its habitat within northern Somerset

1 County. Spawning, rearing, feeding and refuge habitat all will be altered in some
2 manner with the results of this project.

3 A proposed three-hundred-foot-wide canopy removal over small, low volume brooks
4 will undoubtedly increase water temperatures and lower dissolved oxygen levels.
5 Brook trout are very temperature sensitive and begin to be stressed when water
6 temperatures exceed 74 degrees Fahrenheit for extended periods of time.

7 Removing the canopy to accommodate this powerline corridor will expose, at the
8 very least, 300 feet of streambed to sunlight and conductive heating at each crossing.

9 In most cases, the length of 300 feet would only be seen in direct, straight line
10 perpendicular crossing. The majority of exposure will exceed 300 feet of streambed
11 at each crossing due to the route of the stream not being exactly perpendicular to the
12 corridor nor in a straight line. Each exposure to sunlight will increase the water
13 temperature. In some cases, one stream could undergo several passes under this line,
14 multiplying the temp increase with each exposure. We would like to see more
15 studies done to show how much water temperature will be changed from headwater
16 brooks such as Tomhegan Stream, Mountain Brook and other key tributaries to the
17 lower reaches of Cold Stream, a proven spawning, rearing and refuge area for our
18 native brook trout.

19 We are also concerned about the long term, cumulative effects of increased
20 sedimentation into all stream habitat that could be detrimental to brook trout habitat. To
21 build this corridor, wider roads, roadside ditching, larger culverts, clearings, skid
22 trails and gravel fill will likely be used for a variety of construction purposes. We

1 feel this will cause increased sedimentation into these brooks and streams over years
2 and years, potentially choking out key spawning gravel and rearing habitat.

3 Increased sedimentation to streambeds could also change the nature of certain insect
4 life which is a key food source for these fish, but I'll defer that testimony to the
5 invertebrate experts.

6 At the very minimum, we would like to see water quality monitoring along these
7 watersheds to begin this spring. A yearlong baseline temperature profile as well as a
8 complete water quality workup should be established and monitored prior to the start
9 of any construction on the NECEC project in key streams and tributaries.

Date: 2/26/19

Respectfully submitted,

By: *Chris Russell*
Print Name: Christopher C. Russell

STATE OF Maine
COUNTY OF Somerset

Personally appeared before me on the above- named Chris Russell, who being duly sworn, did testify that the foregoing testimony was true and correct to the best of his/her knowledge and belief.

Before me,

Holly R. Towle

Notary Public/ Attorney at Law

My Commission expires _____ HOLLY R. TOWLE

Notary Public Maine

My Commission Expires November 9, 2022



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PRE-FILED DIRECT TESTIMONY OF

ERIC S. SHERMAN

FEBRUARY 28, 2019

TESTIMONY OF ERIC J. SHERMAN

1 **Please state your name and address.**

2 My name is Eric J. Sherman. I was born in Greenville and have lived in Maine all
3 but four of my 56 years. I live at 23 Birch Point Road in Greenville.

4 **What is the name of your organization and business address?**

5 I am a private citizen.

6 **What is your current position?**

7 I am a classroom teacher at Greenville Consolidated School located at 130 Pritham
8 Avenue in Greenville.

9 **What other occupations have you had in the greater Forks area?**

10 I am entering my thirty-fifth year as an active registered Maine Whitewater Guide,
11 and I have been a Registered Maine Recreational Guide for over twenty years.

12 **Why did you intervene in these proceedings?**

13 I became an intervenor because I hike, bike, ski, snowshoe, kayak, canoe, and raft in
14 Maine's vast wilderness. I climbed Williams Mountain and Number 5 Mountain a
15 few years ago; they are located in the proposed view shed of the NECEC, near Route
16 201 and Route 15 in the Rockwood/Jackman/Parlin area, and I took photographs from
17 the fire towers. The NECEC transmission line will be visible from these mountains.
18 Should the NECEC be approved, these are just two of the dozens of negative visual
19 impacts it will cause. I spend a large portion of time from May through October
20 working on the Kennebec and Dead rivers in The Forks area. I love Maine's
21 wilderness, and I love sharing it with the people who come to this area for rafting,
22 camping, sightseeing, and vacationing. I have concerns for the experiences of the

1 guests who book raft trips on the Kennebec River, concerns for the other waterways
2 and wildlife that will be affected, concerns that CMP/Avangrid/Iberdrola is touting
3 this project as “green” and that it in fact is not guaranteed green and that Hydro-
4 Quebec has been suspiciously absent from all proceedings, I have concerns that if
5 this project happens, the North Maine woods as we know them will disappear
6 because they will be open to more development, and finally, concerns that existing
7 and future renewable energy projects in Maine could be eliminated because of the
8 NECEC. Ironically all of my concerns are irrelevant in light of the fact that there is
9 no public need in Maine for the NECEC as Maine generates more electricity than it
10 consumes.

11 Before I elaborate on my concerns, in reviewing the mission, values, vision, and
12 customer service commitment statements on the DEP mission statement, I cannot see
13 how the DEP members and LUPC members involved can give the NECEC a go
14 ahead. I have underlined language that directly addresses the issues that all of you
15 are charged with. I cannot underscore the enormity of the decision if you should vote
16 to approve the NECEC. The mission statement for the DEP states:

17 “Legislative mandate directs DEP to prevent, abate and control the pollution of the air,
18 Water and land. The charge is to preserve, improve and prevent diminution of the natural
19 environment of the State. The Department is also directed to protect and enhance
20 the public’s right to use and enjoy the State’s natural resources. The Department
21 administers programs, educates and makes regulatory decisions that contribute to
22 the achievement of this mission. In pursuing this mission, it is the policy of the
23 Department to treat its employees and the public with courtesy, respect and

1 *consideration and to be fair and honest in its dealings, and to be mindful of the*
 2 *special qualities that make Maine a unique place to live and work.”*
 3 *DEP VALUES: #1- We value a clean environment where public health and*
 4 *natural heritage are protected. DEP VISION: #1- A Maine where people include, in every*
 5 *aspect of their daily lives, a commitment to the protection and enhancement of our*
 6 *environment.*
 7 *DEP VISION: #2- A Maine where stewardship of natural resources ensures a*
 8 *sustainable economy for future generations.¹*

9 Likewise, the LUPC’s “About Us” statement mirrors the DEP’s in that it
 10 promises to protect Maine’s natural assets; it reads: “*Along with carrying out its planning*
 11 *and zoning responsibilities, the LUPC... For larger development projects requiring DEP*
 12 *review under the Site Location and Development Law, the LUPC certifies that the*
 13 *proposed land uses are allowed and that proposed development activities comply*
 14 *with applicable LUPC land use standards... The unorganized and deorganized areas*
 15 *include...the western mountains and up to the Canadian border. These areas are*
 16 *important to the vitality of both the State and local economies, are home to many*
 17 *Mainers, and are enjoyed by Maine residents and visitors in pursuit of outdoor*
 18 *recreation activities including hunting, fishing, boating, hiking, and camping.*
 19 *The Legislature created the Commission to extend principles of sound*
 20 *planning, zoning and development to the unorganized and deorganized areas of the*
 21 *State to:*
 22

- *Preserve public health, safety and general welfare;*

 23 - *Support and encourage Maine’s natural resource-based economy and*

¹ <https://www.maine.gov/dep/about/index.html> (last visited February 27, 2019)

1 strong environmental protections;

2 ● Encourage appropriate residential, recreational, commercial and

3 industrial land uses;

4 ● Honor the rights and participation of residents and property owners

5 in the unorganized and deorganized areas while recognizing the

6 unique value of these lands and waters to the State;

7 ● Prevent residential, recreational, commercial and industrial uses

8 detrimental to the long-term health, use and value of these areas and

9 to Maine’s natural resource-based economy;

10 ● Discourage the intermixing of incompatible industrial, commercial,

11 residential and recreational activities;

12 ● Prevent the development in these areas of substandard structures or

13 structures located unduly proximate to waters or roads;

14 ● Prevent the despoliation (plundering), pollution and detrimental uses

15 of the water in these areas; and

16 ● Conserve ecological and natural values.”²

17 When I bring my crew to where we load the rafts at Harris Station Dam, my crews
18 (and I) are awestruck at the enormity of the dam. I share with them the history of the
19 dam, the natural history of the area, and the specifics of the hydropower generation
20 of Harris Station. Believe me, the irony that a dam which drastically altered the
21 landscape 65+ years ago is not lost on me in my protest against the NECEC. But that
22 is history, and I’m looking ahead to the future which can avoid more destruction of

² <https://www.maine.gov/dacf/lupc/about/index.shtml> (last visited February 27, 2019)

1 our natural resources by dividing the forest from the Canadian border to the Forks.
2 Except for the stairs at Carry Brook (which were constructed for safety reasons),
3 once we leave Harris Station Dam, people don't see a man-made structure until we
4 hit the ball field at West Forks where we see the Moxie Road briefly, the bridge, and
5 some houses. The company I've worked for since 2001, Moxie Outdoor Adventures,
6 has its lunch site just upstream of where the proposed lines will cross either over or
7 under the river. In either scenario, those lines will be visible from our lunch site, and
8 will be an eyesore that detracts from the wilderness experience of my guests, the
9 other guests, the other guides, and me. If the lines go over the river (I'm aware that
10 CMP/Avangrid/Iberdrola has said they will go under it), the lines will be right there
11 for us to view for the duration of our lunch. If they drill under the river, which does
12 not seem eco-friendly, we will still be able to see the lines running to the towers on
13 the west side of the river coming from the north, and the lines going from the towers
14 on the east side of the river running toward the southeast. I am aware that
15 CMP/Avangrid/Iberdrola says they will leave a buffer zone along the river to
16 minimize the scenic impact from the river, but from our lunch site, we will again be
17 able to see the towers on both sides of the river from our upstream vantage point.
18 From what I understand, going under the river will entail having some sort of
19 stations on both sides of the river that will have driving access. This will open up
20 this area to ATV and other traffic, and who wants to listen to the hum of ATVs and
21 other vehicles while they eat lunch on their rafting trip?
22 The other river view of the power lines that CMP/Avangrid/Iberdrola has not
23 addressed are from downriver looking back upriver. Once the lines are passed,

1 there's a left turn in the river, a straight stretch where the confluence of Moxie
2 Stream is passed, then a right turn in the river, and a long straight stretch from which
3 the power lines will be able to be seen. These scenarios are unacceptable. People
4 don't leave their homes in Boston and its suburbs and in Southern Maine and its
5 developed areas to visit a place that looks like an industrial park, especially when
6 they expect a wilderness experience.

7 The spot where the NECEC will cross Moxie Stream is a quiet, closed in area where
8 the dense trees and bushes grow right to the stream's edge. Here it will open up a
9 300-foot-wide swath that will destroy the character of this beautiful place. It clearly
10 states on the LUPC About Us page:

- 11 • Prevent the development in these areas of substandard structures or
12 structures located unduly proximate to waters or roads;
- 13 • Prevent the despoliation (plundering), pollution and detrimental uses
14 of the water in these areas³

15 I am very concerned for the wilderness, waterways, and wildlife that the powerline
16 will affect from the Maine/Canada border all the way to Lewiston. I read an article
17 that summarized the following about CMP/Avangrid/Iberdrola's plan:

18 "CMP/Avangrid/Iberdrola's proposed line includes above-ground transmission lines
19 across 263 wetlands, 115 streams, 12 inland waterfowl and wading bird habitat areas,
20 the Kennebec River Gorge, the Appalachian Trail, and near Beattie Pond, a Class 6
21 remote pond.⁴" In actuality, these figures should be much higher as they do not
22 include the roads which will need to be built to the construction sites. This is

³ *Id.*

⁴ <https://www.nrcm.org/projects/climate/proposed-cmp-transmission-line-bad-deal-maine/> (last visited February 27, 2019)

1 unacceptable. My family owns a camp on Moosehead Lake, and we are not allowed
2 to cut a six-inch diameter tree within 100 feet of the lake due to LUPC laws that say
3 there will be a negative impact on the water and wildlife. How can the corporate
4 backed NECEC be approved when laws are so strict for private citizens? If it does
5 get your agencies' approval, then there is a double standard that needs to be
6 addressed.

7 Additionally, there will be a negative impact on the deer herd in the area of the new
8 53.5 miles of corridor. We already know that if this power line comes to fruition, the
9 cut will go through some deer wintering yards, and that is a definite detriment to
10 them. However, we need to consider the fact that having all of that area opened up
11 will dramatically increase the kill both during and outside of hunting seasons. The
12 number of deer taken on existing power lines is very high compared to that of forest
13 kills. It's wide open and ATV or other vehicular access to those areas will increase
14 the number of hunters that will go there, and the deer are sitting ducks. With this
15 wide-open space interspersed between and among deer wintering yards, the coyotes
16 will feast when deer get bogged down in deep snow under the transmission line. I'm
17 sure the area's moose population will suffer similar fates. The native brook trout and
18 other fish that live in the 115 streams, the waterfowl, wading birds, amphibians, and
19 other species that live in the 263 wetlands will be adversely affected when the
20 canopy of the trees is permanently removed. How can anyone justify the devastation
21 that the 145-mile NECEC project will cause to the environment, when a single tree
22 cut too close to Moosehead's shoreline causes a fine?

23 I am also concerned that if the power line is allowed, then a precedent will have been

1 set. What will stop developers from building more transmission lines, gas lines,
2 wind turbines, roads, bridges, cabins, condominiums, and who knows what else in
3 this wilderness area? The NECEC may well be the beginning of the end of the
4 wilderness feel and character of Maine's precious woods. There are people who live
5 and work in the footprint of the proposed transmission line. The traditional jobs that
6 are performed here are tourism based because of what this area has to offer: fishing,
7 hunting, bird watching, moose watching, hiking, camping, rafting, canoeing,
8 kayaking, snowmobiling, skiing, a get away from the hustle and bustle of city life,
9 and yes, logging. But Maine laws control the actions of loggers, and the land that's
10 cut grows back; it's not permanent like the NECEC will be. When this area looks
11 like suburban Portland, who will want to visit and spend their money here? Why has
12 there not been an economic impact study for this area before the proposed NECEC is
13 built? Will there be a full environmental impact study for this area? Before permits
14 are issued, these studies must be required. Your charge is "to preserve, improve and
15 prevent diminution of the natural environment of the State." Do not just let the
16 NECEC pass without thorough, fine-tooth combing of its serious effects.
17 Finally, the issue here is Maine- what Maine needs, not what
18 CMP/Avangrid/Iberdrola and the Massachusetts legislature WANTS.
19 CMP/Avangrid/Iberdrola has not demonstrated a public need in Maine for this
20 project. Maine consistently generates more electricity than it consumes. Log in to
21 the USGS Water Information System: Web Interface, and view the water flows from
22 summer 2018⁵. Even on the hottest days when power was at its highest

5

https://nwis.waterdata.usgs.gov/me/nwis/uv/?cb_00060=on&cb_00065=on&format=gif_default&site_no=01042500&period=&begin_date=2018-08-16&end_date=2018-08-16 (last visited February 27, 2019)

1 demand in New England (except for one afternoon, August 16, 2018), Harris Station Dam
2 did not generate electricity at its maximum capacity to send into the New England power
3 grid. If electricity was truly needed on those hottest of days, there was the potential
4 to generate it right here in Maine. Contact ISO New England and ask for the number
5 of times they've called existing hydropower producers and told them to stop
6 producing electricity because the grid can't handle it. It's called CURTAILMENT,
7 and it happens frequently. Will local producers be pushed out because Canadian
8 power will be used first? It seems instead of importing unnecessary electricity from
9 Canada, the existing power grid needs to be updated so LOCAL suppliers can get
10 their electricity to market. Has CMP/Avangrid/Iberdrola and Massachusetts
11 considered whether other projects within Maine, New Hampshire, Vermont, New
12 York, Connecticut, Rhode Island, and Massachusetts itself can address demand for
13 clean, renewable energy with a smaller environmental footprint than that of the
14 NECEC project? There are solar projects awaiting utilization. For example, a dairy
15 farmer on the mid-coast is exploring solar possibilities for his soon-to-be defunct
16 dairy farm. He has acres and acres of open fields available; no existing forests will
17 need to be permanently cut as it's already pastureland. If the NECEC goes through,
18 will his solar project ever be a possibility? Can't projects like this dairy farmer's put
19 Mainers to work long-term in order to supply the New England power grid, i.e.
20 Massachusetts, with renewable energy? The promised 1,700 jobs touted in
21 construction and maintenance of the transmission line are mostly temporary. When
22 the NECEC is built, those jobs will disappear. Other local renewable energy
23 projects, such as the dairy farm mentioned, won't be built, and real, permanent jobs

1 for Mainers won't be created- Canadians benefit. In fact, those jobs could be
2 eliminated altogether because the NECEC will obstruct transmission lines for those
3 projects and glut the power market with electricity. To me it makes more sense to
4 invest in clean, renewable energy projects based in Maine rather than import
5 Canadian energy that will block out those Maine projects.

6 All you need to do is read your DEP Mission Statements and LUPC About Us
7 statements and see that the NECEC does NOT meet the standards according to them.
8 The people who live and work in this region want to protect this beautiful area's
9 rivers, streams, wildlife, and the way we make our living. You get to decide whether
10 CMP/Avangrid/Iberdrola's profits are more important than the values of the people
11 who live in its path. Do not allow the nonessential NECEC project to come to
12 fruition. Maine's wilderness, wildlife, and waterways must be preserved. And the
13 people who live in and make their living in and from the Maine woods deserve to
14 have a wilderness free of development to continue making that living. Thank you.

COMMENTS ON NON-HEARING TOPICS

I am also concerned that NECEC will not reduce global CO2 emissions. There are fundamental problems with the source of the hydropower coming from a newer reservoir that emit a high percentage of CO2. MIT Professor of Earth Sciences, Dr. Brad Hager, writes about Hydro-Quebec that, "the extent to which some of the scientifically proven facts about hydropower get twisted and distorted is deplorable." But HQ itself twisted the facts, emphasizing information irrelevant to NECEC. Although their older reservoirs that provide power for Quebec may be clean, newer impoundments flooded to provide power for export are not. It is the CO2 emissions of these newer reservoirs that pertain to NECEC. Hydro-Quebec scientists published an impressive study of the CO2 emissions caused by creation of their new Eastmain-1 reservoir.

Quoting from their 2012 paper

(https://www.google.com/url?q=https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011GB004187?fbclid%3DIwAR1WC60LTNoY0S_XYRktfle-

[z7tn9d_i7uzdmsQPH5CoKjvb7JjXa5jW3I4&source=gmail&ust=1551434745346000&usg=AFQjCNFOY](https://www.google.com/url?q=https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011GB004187?fbclid%3DIwAR1WC60LTNoY0S_XYRktfle-z7tn9d_i7uzdmsQPH5CoKjvb7JjXa5jW3I4&source=gmail&ust=1551434745346000&usg=AFQjCNFOY)

[FHtg4IjHqjjAmeZNd2Z8B6a5g](https://www.google.com/url?q=https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011GB004187?fbclid%3DIwAR1WC60LTNoY0S_XYRktfle-z7tn9d_i7uzdmsQPH5CoKjvb7JjXa5jW3I4&source=gmail&ust=1551434745346000&usg=AFQjCNFOY)) comparing the emissions of this project to those from Natural Gas

Combined Cycle (NGCC) power: “. . . during the first year, the Eastmain-1 reservoir was emitting up to

77% more C than NGCC, . . . after 25 years, reservoir emissions will be 50% lower than those of NGCC.”

In other words, the power from the new Eastmain-1 project was initially 90 times more CO₂ intensive than

the HQ average, but is expected to drop to “only” 25 times higher than that from older reservoirs. Why is

this new power so dirty? As always happens, HQ dammed the best sites first, impounding narrow, deep

valleys to provide power for Quebec. Later, anticipating a market for export, they dammed the poorer sites,

building low impoundments that flooded broad lowlands. The CO₂ footprint of a hydroelectric reservoir

depends on its area divided by its depth. Old reservoirs that dam narrow, deep valleys, result in low CO₂

per GWh. For newer reservoirs like Eastmain-1, the opposite occurs. The increase in hydropower

generation for export comes at a cost of far higher CO₂ emissions than the norm for Hydro-Quebec power.

In evaluating NECEC, the system-average CO₂/GWh is irrelevant. We must examine the impact of the

additional generation from less efficient reservoirs developed for export capacity. Otherwise we are fooling

ourselves." (See Attachment A, 1-21-19 email from Brad Hager to Sandra Howard)

In addition, there is concern that the Hydro-Quebec “built dams discharging waters depleted of dissolved silicate, and thereby, polluting the waters of the Gulf of Maine by starving them of the essential

nutrients that support phytoplankton growth.” (See Attachment B, Kasprzak 11-28-18 report) Mr. Kasprzak

calls attention to the fact that if a company wished to construct dams and reservoirs here in the United States

such as Hydro-Quebec has done in Canada, they would not pass the environmental laws we have in place.

We must not reward Hydro-Quebec's irresponsible environmental practices by encouraging them to continue

such methods. (See Attachment C, Kasprzak 10-15-18 Report and Attachment D, Kasprzak 1-15-19 report).

CMP/Avangrid/Iberdrola has not presented any evidence of a reduction in greenhouse gas emissions.

This is not a clean energy project. Why has Hydro- Quebec refused to be cross examined in the hearings that

have been held? This is a big red flag! Hydro-Quebec may send electricity generated by hydropower dams

through the NECEC, but they will use coal and/or oil to supply Ontario, New York, New Brunswick, and

Quebec itself when demand is high, or when hydro dams are out of commission, or when there is a drought in the future; they cannot guarantee that this will reduce carbon emissions, though they are claiming it will. If they don't deliver the electricity they have contracted to send to Massachusetts, they will face stiff fines for it. Again, why hasn't Hydro-Quebec sent representatives to any of the informational meetings that CMP/Avangrid/Iberdrola has held, and why aren't they being subpoenaed to appear before the PUC, DEP, and LUPC and answer questions under oath? The fact that they have been absent during all of these proceedings should raise suspicion and doubt about what Hydro-Quebec and CMP/Avangrid/Iberdrola are up to.

Date: 2/20/19

Respectfully submitted,

By: Eric J. Sherman
Print Name: Eric J. Sherman

STATE OF Maine
COUNTY OF Piscataquis

Personally appeared before me on the above-named Eric Sherman, who being duly sworn, did testify that the foregoing testimony was true and correct to the best of his/her knowledge and belief.

Before me,

Kathleen Bishop

Notary Public/ Attorney at Law

My Commission expires 6/19/2023



Hydro-Quebec [writes](#): “The extent to which some of the scientifically proven facts about hydropower get twisted and distorted is deplorable.” But HQ itself twisted the facts, emphasizing information irrelevant to NECEC. Although their older reservoirs that provide power for Quebec may be clean, newer impoundments flooded to provide power for export are not. It is the CO2 emissions of these newer reservoirs that pertain to NECEC.

Hydro-Quebec scientists published an impressive study of the CO2 emissions caused by creation of their new Eastmain-1 reservoir. Quoting from their [2012 paper](#) comparing the emissions of this project to those from Natural Gas Combined Cycle (NGCC) power: “. . . during the first year, the Eastmain-1 reservoir was emitting up to 77% more C than NGCC, . . . after 25 years, reservoir emissions will be 50% lower than those of NGCC.” In other words, the power from the new Eastmain-1 project was initially 90 times more CO2 intensive than the HQ average, but is expected to drop to “only” 25 times higher than that from older reservoirs.

Why is this new power so dirty? As always happens, HQ dammed the best sites first, impounding narrow, deep valleys to provide power for Quebec. Later, anticipating a market for export, they dammed the poorer sites, building low impoundments that flooded broad lowlands. The CO2 footprint of a hydroelectric reservoir depends on its area divided by its depth. Old reservoirs that dam narrow, deep valleys, result in low CO2 per GWh. For newer reservoirs like Eastmain-1, the opposite occurs.

The increase in hydropower generation for export comes at a cost of far higher CO2 emissions than the norm for Hydro-Quebec power. In evaluating NECEC, the system-average CO2/GWh is irrelevant. We must examine the impact of the additional generation from less efficient reservoirs developed for export capacity. Otherwise we are fooling ourselves.

Brad Hager, Ph.D.
Cecil and Ida Green Professor of Earth Sciences
MIT School of Science
bhhager@mit.edu

1-21-19 sent by email to Sandra Howard

Reservoir Hydroelectric Dams

Silica Depletion



Silica Shelled Diatom Phytoplankton

A Gulf of Maine Catastrophe

Stephen M. Kasprzak
November 28, 2018

INTRODUCTION

I wrote a Report The Problem is the Lack of Silica on October 15, 2018 and submitted it at a public hearing by Maine's Public Utility Commission on the proposed New England Clean Energy Connect (NECEC) by Avangrid/Central Maine Power (CMP). This Report documented how Hydro-Quebec has significantly reduced the annual budget of dissolved silica to the northwest Atlantic and Gulf of Maine and how this reduction is the major driver in the starvation of many of the fisheries in these waters.

I handed out over 30 copies of this Report at the hearing and e-mailed more copies to interested parties. Someone shared my report with a scientist who commented "*the Gulf of Maine is too big to be affected by the releases from Hydro-Quebec's reservoir hydroelectric dams.*"

This Report has been written to not only respond to the above observation, but also to the claim of Maine Marine Resources that "*Climate change is driving the decline in the shrimp fishery.*"

The major source of the annual budget of fresh water and dissolved silicate to the Gulf of Maine is the St. Lawrence River, whose head waters are Lake Michigan, which is the fifth largest water body in the world. The St. Lawrence is the 27th largest river in the world, and its daily water flows of 300,000 to 500,000 cubic feet (ft.³) per second dwarf the flows of Maine's largest rivers (see Graphs 1 and 2 on page 4).

The proliferation (see Maps 1 & 2 on pages 3 & 5 and Tables 1-3 on pages 6 & 11) of Hydro-Quebec's reservoir hydroelectric facilities on the major rivers discharging into the St. Lawrence River, James Bay, Hudson Bay and Labrador Current have significantly altered the natural hydrologic cycle and silica cycle, which has starved the silica encased diatom phytoplankton in the Gulf of Maine of dissolved silicate. Diatom phytoplankton is the essential basis of the marine food web, including Maine's shrimp.

The building of these dams would have violated section 401 of the Clean Waters Act and Maine's Natural Resources Act and never could have been built in Maine. These reservoir dams have been built not only on all of the major rivers, but also on many of the tributaries and outlets of thousands of lakes and ponds in the watersheds of these major rivers.

These rivers and water bodies are all part of the Gulf of Maine's ecosystem and for over 70 years Maine officials have stayed silent while Hydro-Quebec built dams discharging waters depleted of dissolved silicate, and thereby, polluting the waters of the Gulf of Maine by starving them of the essential nutrients that support phytoplankton growth.

In the late 1950's there was a major decline in the annual load of dissolved silicate transported to the Gulf of Maine via the St. Lawrence River. This decline was brought on, not by dams, but by a silica limitation in Lake Michigan, which is the head waters of St. Lawrence River.

A 1970's study on the eutrophication of Lake Michigan was done by Claire Schelsky and Eugene Stoermer and was summarized in *Silica Stories by Conley and DeLaRocha*, in 2017 (see Attachment 1).

I believe the cumulative impact of this annual silica limitation in Lake Michigan was the driving force behind the first red tide event in 1958 in the Gulf of Maine. **Coincidence, I don't think so. See Attachment #1 and look at the graph in Case Study #1 and the huge increase in silica burial in Lake Michigan from 1930 on. Please note that this has never happened before in Lake Michigan's 14,000 year history.**

"Thirty years ago paralytic shellfish poisoning (PSP) was virtually unknown in New England, yet now, significant portions of the region's intertidal shellfish resources are closed annually to harvesting because of toxicity. A further expansion of the problem occurred in 1989 when off-shore shellfish resources on George's Bank and Nantucket Shoals were shown to contain dangerous levels of toxin. (White et.al. 1993)

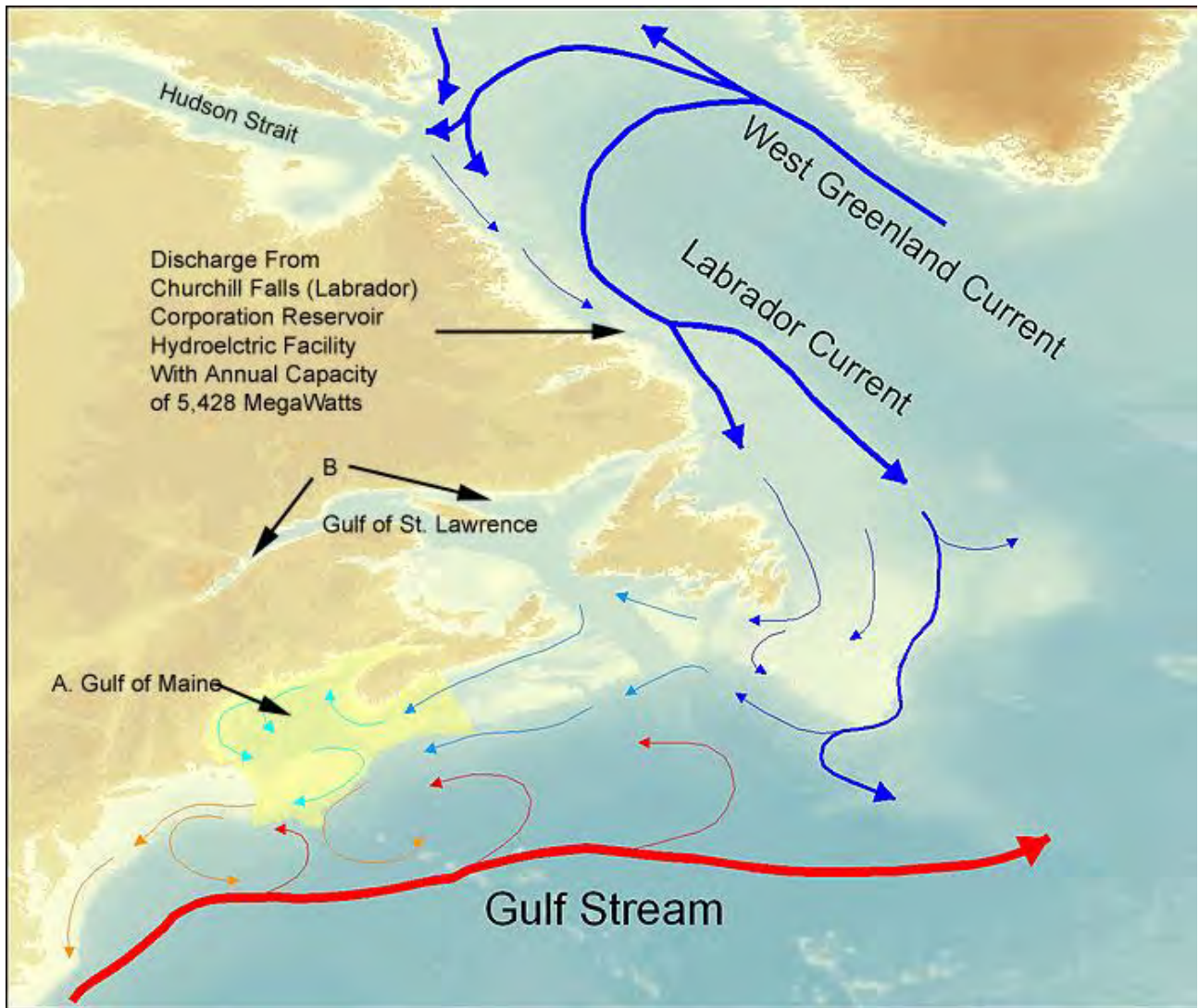
The following is the last paragraph of the Case Study #1:

*"Overall, diatoms getting shut out of the latter part of the growing season in Lake Michigan while there is still plenty of nitrogen and phosphorus available for growth is a bad thing. It means a decrease in the flow of energy and materials through diatom-based food webs, which generally efficiently lead to fish, and an **increase in the growth of noxious plankton species like dinoflagellates.**"* Worse yet, what happens in Lake Michigan doesn't stay in Lake Michigan. Now stripped of their dissolved silica, the waters of Lake Michigan flow into Lake Huron and then Lake Erie, go over Niagara Falls, flow into Lake Ontario, and then via the Saint Lawrence River, arrive at the Atlantic Ocean at the Gulf of Saint Lawrence in all the full glory of their silica deficiency. **You can almost hear the coastal diatoms screaming."** (*Silica Stories, Conley et. al. 2017.*)

On November 16, 2018, the Atlantic States Maine Fisheries Commission voted to close the Gulf of Maine winter shrimp season for three years. This agency said: *"The stock has shown very little signs of recovery. It's considered a depleted resource."*

With complete respect for these officials, the shrimp have become a depleted resource because we have allowed reservoir hydroelectric facilities to change the historic (before dams) natural silica cycle. This has depleted the essential nutrient dissolved silica from the waters of the Gulf of Maine and northwest Atlantic during the growing season of silica encased diatom phytoplankton.

Many of the major rivers now have more than one reservoir on them, which only compounds the negative impacts described above of captured dissolved silicate in the spring and the sinking and burying of biogenic silica in the reservoirs through the process of eutrophication.

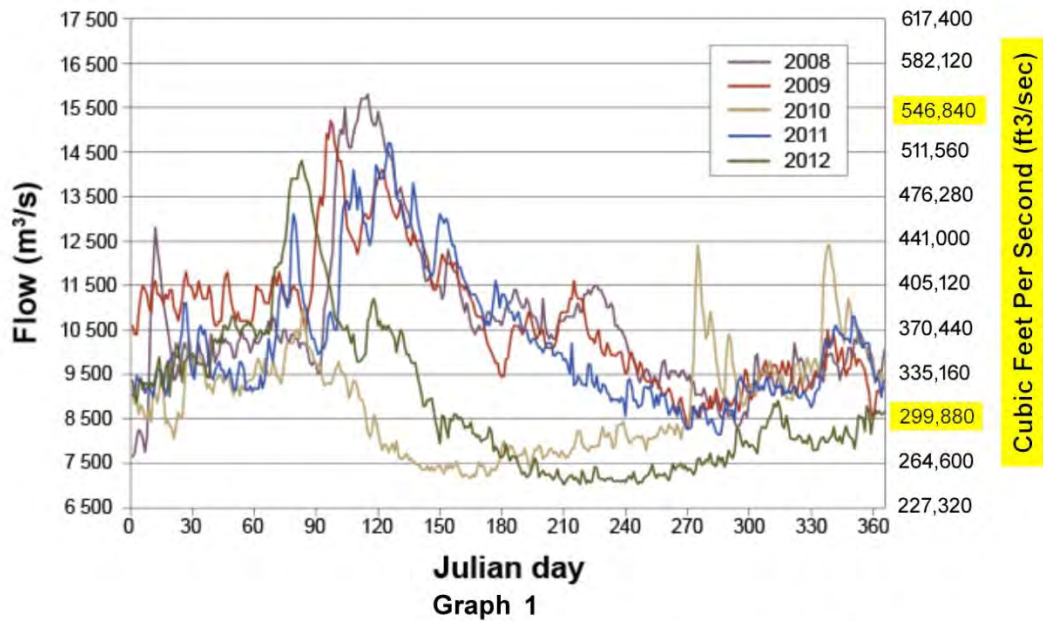


Map 1

- A. Maine's six major rivers (see Graph 2 on page 4) discharge into the Gulf of Maine in the above area marked "A". The hydroelectric facilities on these rivers typically operate in a "run of river" mode and have an annual capacity of 526 MW. Maine's total capacity is only 723MW.
- B. In the area marked "B," Hydro-Quebec has 16 reservoir hydroelectric facilities built on 9 rivers discharging into the St. Lawrence River and /or its Gulf (see Map 2 on page 5 for more details). These facilities have annual capacity of 12,749 MW (see Table I on page 6).

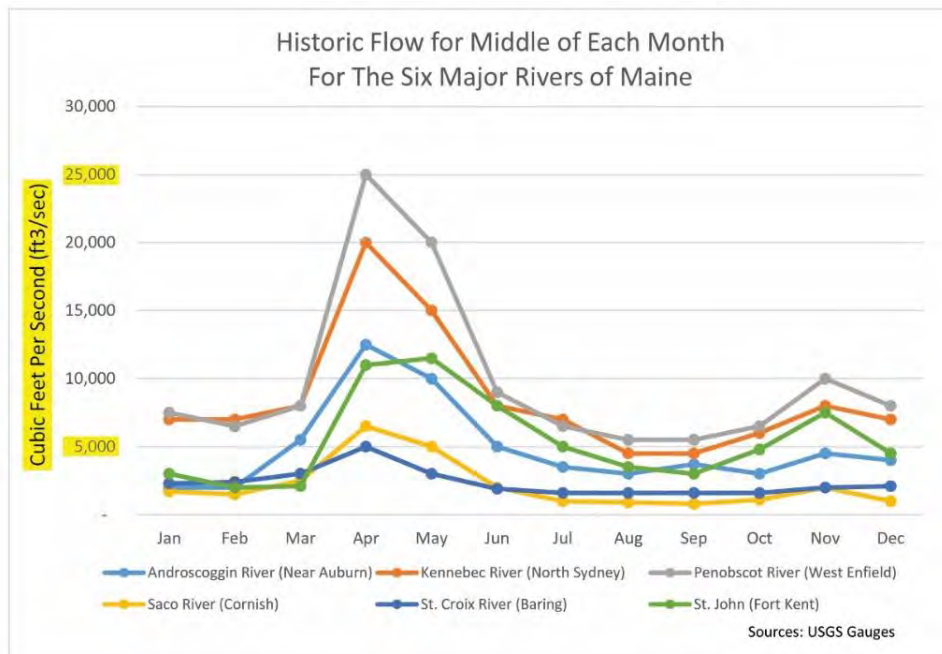
THE ST. LAWRENCE RIVER IS THE 27TH LARGEST RIVER IN THE WORLD AND HISTORICALLY TRANSPORTED WITHIN DAYS THE DISSOLVED SILICATE FROM ITS TRIBUTARIES INTO THE GULF OF MAINE.

Water Flows of St. Lawrence River at Sorel Quebec



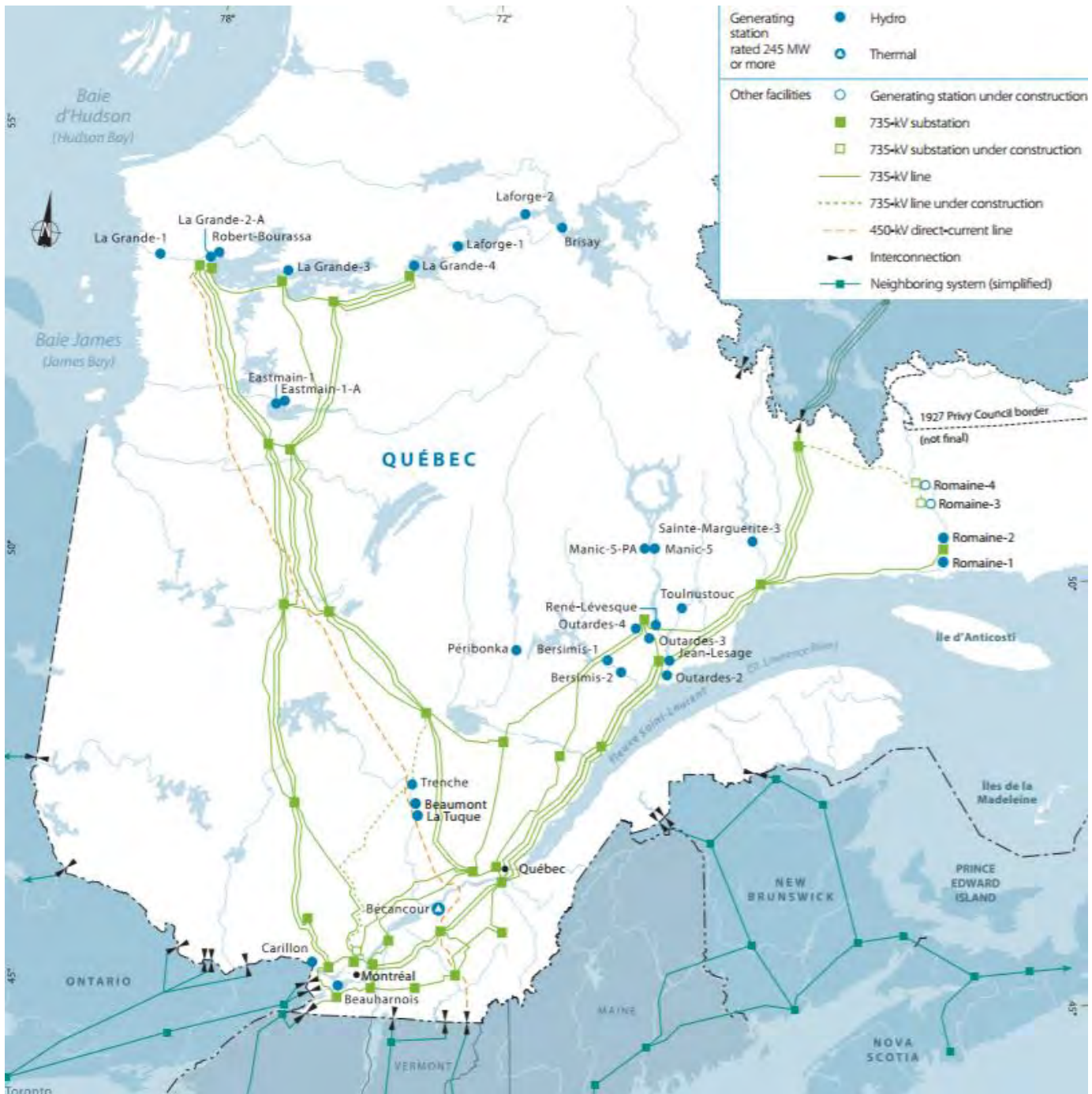
Source: St. Lawrence Action Plan 2011-2026

Water flows of St. Lawrence River dwarf the flows of Maine six major rivers



Graph 2

HYDRO-QUEBEC HAS BUILT 16 RESERVOIR FACILITIES ON 9 RIVERS IN SOUTHEAST QUEBEC THAT FLOW INTO THE ST. LAWRENCE RIVER. THESE 16 FACILITIES HAVE AN ANNUAL CAPACITY OF 12,749 MEGAWATTS (MW), COMPARED TO MAINE'S ANNUAL CAPACITY OF 753 MW.



Map 2

Table I

Reservoir Hydroelectric Generating Stations
Discharging into St. Lawrence River or Gulf

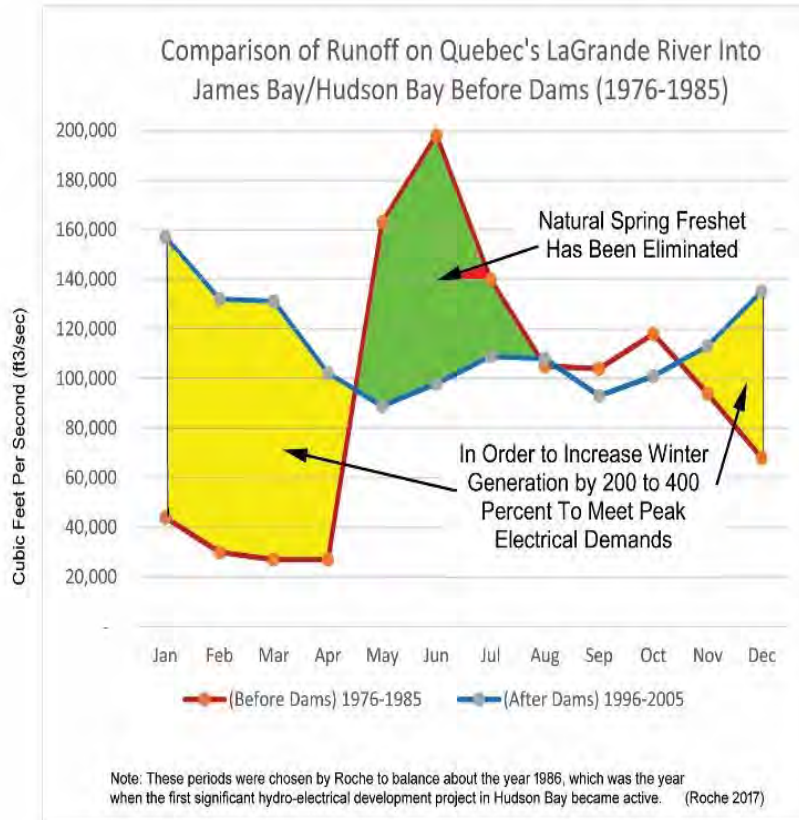
Owner	Name	Capacity In Megawatts (MW)	Commissioned	Watershed
Hydro-Quebec	Rapids Blanc	204	1934-35	St. Maurice
Hydro-Quebec	Bersimis-1	1,178	1956	Betsiamites
Hydro-Quebec	Bersimis-2	869	1959	Betsiamites
Hydro-Quebec	Jean-Lesage (Manic-2)	1,145	1965-67	Manicouagan
Hydro-Quebec	Outardes-4	785	1969	Outardes
Hydro-Quebec	Outardes-3	1,023	1969	Outardes
Hydro-Quebec	Outardes-2	523	1978	Outardes
Hydro-Quebec	Manic-5	1,596	1970	Manicouagan
Hydro-Quebec	Rene-Levesque (Manic-3)	1,244	1975-76	Manicouagan
Hydro-Quebec	Manic-5-PA	1,064	1989	Manicouagan
Hydro-Quebec	Sainte-Marguerite	882	2003	Saint-Marguerite
Hydro-Quebec	Touinstouc	526	2005	Touinstouc
Hydro-Quebec	Peribonka	405	2007-08	Peribonka
Hydro-Quebec	Romaine-2	640	2014	Romaine
Hydro-Quebec	Romaine-1	270	2015-16	Romaine
Hydro-Quebec	Romaine-3	<u>395</u>	2017	Romaine
		12,749		

Discharging into Labrador Current

Churchill Falls (Labrador) Corp.	Churchill Falls	5,428	1971-74	Churchill
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THESE RESERVOIR DAMS HAVE CHANGED THE HYDROLOGIC CYCLE AND SILICA CYCLE FOR THE GULF OF MAINE BY CAPTURING AND STORING THE WATERS OF THE SPRING FRESHET IN ORDER TO MEET PEAK WINTER DEMAND FOR ELECTRICITY

I have plotted on Graph No. 1 the monthly flow curve of the LaGrande River before damming (1976-1985) and the flow curve after damming (1996-2005) (Roche 2017). I converted the water flows in Roche 2007 Report from KM³/month to ft. ³/sec.



Graph 3

Most of the hydroelectric facilities on Maine’s rivers are operated in a “run of river” mode and have not eliminated the spring freshet. “Run of river” facilities have very little storage capability. Storage is typically measured in hours unlike large reservoir facilities which can store water for six months or more.

A HEALTHY FISHERY IN THE GULF OF MAINE AND NORTHWEST ATLANTIC IS BASED ON “THREE NUTRIENT-ENRICHMENT PROCESSES: COASTAL UPWELLING, TIDAL MIXING AND LAND-BASED RUNOFF, INCLUDING MAJOR RIVER OUTFLOW” (CADDY AND BAKUN, 1994).

The delivery of nutrients to coastal waters via upwelling is a hypothesis, and “*there is a caveat to this mechanism: nutrients in the up welled waters must be continually replenished in order for this transient upwelling to sustain phytoplankton growth over the long term,*” and “*this supply is only effective as long as there is a mechanism by which nutrients are replenished in the upper thermo cline.*” (Williams and Fallows, 2011.) **This mechanism was the historic (before dams) silica cycle.**

“EIGHTY PERCENT OF THE ANNUAL INPUT OF DISSOLVED SILICATE TO THE OCEAN IS TRANSPORTED VIA OUR RIVERS AND STREAMS.”(PAUL TREGUER ET. AL. 1995). In the Gulf of Maine, the majority of this annual budget was historically delivered by the roaring rivers of the spring freshet, which Hydro-Quebec has now eliminated.

“Reservoirs built in those cool, temperate zones that play host to much of Europe, Asia, and North America and therefore a large percent of the world’s industrialized nations are the worst, retaining nearly half of this region’s seaward sediment flux. Nearly half! This enormous retention of sediment occurs because there are a lot of dams in these regions and is made worse by cool, temperate zone rivers tending to be turbid (full of particles.).

Less obvious to the naked eye is the deprivation of downstream areas of dissolved silica. This deprivation occurs because a portion of the suspended material normally transported by a river dissolves en route, releasing dissolved silica into the river system to be delivered to the sea. But once particles are buried in a reservoir sealed in their sedimentary tomb, there is little chance of this happening. This is one way that dams starve downstream areas of dissolved silica that would normally have been used to fuel the growth of diatoms, reeds and grasses, and other silica-producing organisms.

But there is a second process at work behind dams that is even more insidiously silica-stealing: diatom blooms. *When the moving water of the river hits a reservoir and slows down and all those particles that were in suspension sink out, the water becomes a lot more clear. This means light can penetrate into the water more than the couple of feet or inches it could before and that means photosynthetic plankton living in the water can suddenly make a good living. Phytoplankton can finally fix carbon into organic matter faster they respire it away. They can begin to grow.*

But a dam means not only light, but also the time to put it to good use. Water that would have shot through that stretch of river in hours to days will now spend weeks to months to years in the extra reservoir volume. ***That’s ample opportunity for phytoplankton like diatoms to build up biomass into thick blooms and to remove almost all the dissolved silica in the water. And because these stretches of quiet water with an enormously tall concrete wall at the downstream end are great places to build up sediments, the biogenic silica that has been produced stands a very good chance of sinking down and getting buried. The buck stops here, as they say, and as a result of downstream areas are starved of silica.”*** (Silica Stories Conley et. al. 2017).

HYDRO QUEBEC AND THE ADVOCATES OF HYDROELECTRICITY CLAIM IT IS A POWER SOURCE THAT IS CLEAN AND RENEWABLE BECAUSE IT USES THE EARTH'S ANNUAL WATER CYCLE TO GENERATE ELECTRICITY. THERE IS SOME TRUTH TO THIS CLAIM, AS IT PERTAINS TO "RUN OF RIVER" HYDROELECTRIC DAMS, BUT IS A FALSEHOOD WHEN IT COMES TO LARGE RESERVOIR DAMS BECAUSE THEY HAVE ALTERED THE "HYDROLOGIC CYCLE," WHICH IS DEFINED AS FOLLOWS BY BRITANNICA:

"Water on earth exists in all three of its phases-solid, liquid and gaseous. The liquid phase predominates. By Volume, 97.957 percent of the water on earth exists as oceanic water and associated sea ice. The gaseous phase and droplet water in the atmosphere constitutes 0.001 percent. Fresh water in lakes and streams makes up 0.036 percent, while groundwater is 10 times more abundant at 0.365 percent.

Each of the above is considered to be a reservoir of water. Water continuously circulates between these reservoirs in what is called the "hydrologic cycle," which is driven by energy from the sun, evaporation, precipitation, movement of the atmosphere, and the downhill flow of river water, glaciers, and groundwater keep water in motion between the reservoirs and maintains the hydrologic cycle."

The construction and management of reservoir dams by Hydro Quebec not only has significantly altered the hydrologic cycle, but also negatively impacted the silica cycle.

"Today, rivers and the release of groundwater through submarine springs deliver 85% of the reactive silica that enters the oceans.

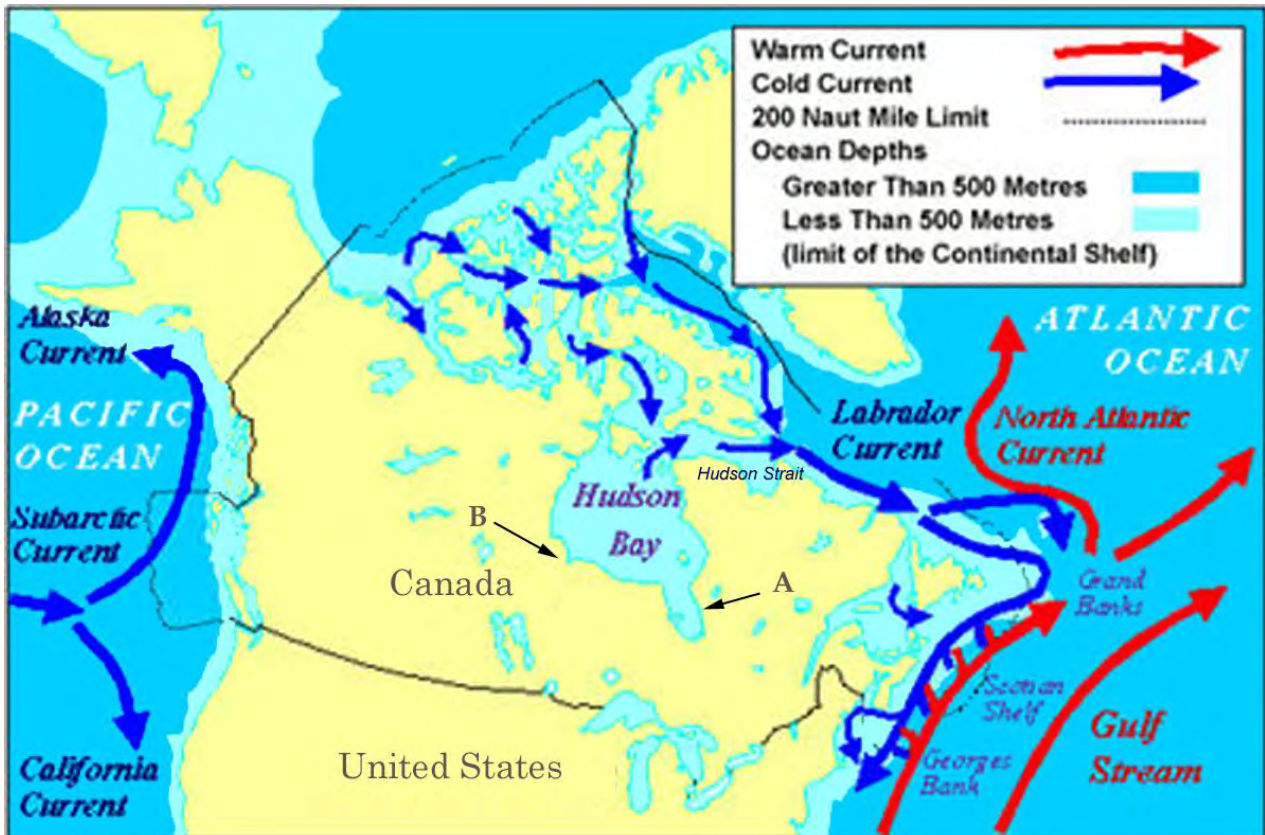
Up at the top of the ocean, dissolved silica taken up by silica biomineralizers like diatoms becomes incorporated into biogenic silica, most of which dissolved before it manages to sink all the way to the seafloor.

Once added to the ocean, dissolved silica is available for use by silica biomineralizers such as diatoms. Furthermore, because our friends the diatoms are impressively numerous, fast-growing, and notably siliceous, it is a safe bet that most of the 240 teramoles (240×10^{12} mol aka 1.4×10^{10} metric tons) of biogenic silica produced in the upper ocean each year is being produced by diatoms. Thus the production of biogenic silica in the oceans is depicted in the upper part of the ocean on the silica cycle.

The fate of almost all of this biogenic silica that is made each year is to rapidly dissolve. The modern day ocean is after all extremely undersaturated with respect to noncrystalline silica. So strong is the power of this undersaturation, slightly more than half of the biogenic silica produced each year dissolved even before it has had time to sink only 100 to 200 meters. In the end only 2-3% of the biogenic silica produced in the oceans each year becomes permanently buried in ocean sediments.

But permanent export of 2-3% of each year's crop of biogenic silica is enough to (more or less) equal the amount of reactive silica coming in to the ocean via rivers, submarine groundwater springs, and mid-ocean ridge hydrothermal fluids. And because the gross amount of biogenic silica production is so high, a removal efficiency of 2-3% is enough to keep ocean waters all but entirely depleted of dissolved silica." (Silica Stories, Conley et.al. 2017).

IN A RECENT CANADIAN STUDY OF TRENDS IN RIVER DISCHARGE FROM 1964-2014, THE AUTHORS FOUND: *THAT THERE HAS BEEN A THREE-FOLD INCREASE IN RIVER DISCHARGE DURING WINTER, WHEN ELECTRIC DEMAND PEAKS, INTO THE ESTUARIES OF LABRADOR SEA AND EASTERN HUDSON BAY FOR THE 2006-2013 PERIOD COMPARED TO 1964-1971 AND A FORTY PERCENT REDUCTION IN DISCHARGE DURING THE SUMMER.* (Recent Trends and Variability in River Discharges Across Northern Canada, Dery et. al. 2016).



Map 3

- A. In this area marked "A," Hydro Quebec has 9 reservoir hydroelectric facilities in the watershed of the LaGrande River and 2 on the Eastmain River. The annual capacity of these 11 facilities is 17,383 MW (see Map 2 on page 5 and Tables 2 and 3 on page 11 for more detail).
- B. In the area marked "B," Manitoba Hydro has 4 reservoir hydroelectric facilities in the watershed of the Nelson River with an annual capacity of 3,837 MW (see Tables 2 and 3 for more details).
- C. The proliferation of these reservoir hydroelectric facilities in the Gulf of Maine's ecosystem over the past 70 years is summarized in the next two Tables. I did not include facilities with an annual capacity of less than 200 MW. There are thousands of them also altering the silica cycle.

Table 2

Reservoir Hydroelectric Generating Stations Discharging
Into James Bay and Hudson Bay

Owner	Name	Capacity in	Commissioned	Watershed
		Megawatts MW		
Manitoba hydro	Kelsey	287	1957	Nelson
Manitoba Hydro	Kettle	1,220	1970	Nelson
Manitoba-Hydro	Lang-Spruce	980	1977	Nelson
Hydro Quebec	Robert-Bourassa	5,616	1979-81	LaGrande
Hydro Quebec	LaGrande-3	2,417	1982-84	LaGrande
Hydro Quebec	LaGrande-4	2,779	1984-86	LaGrande
Manitoba-Hydro	Limestone	1,350	1990	Nelson
Hydro-Quebec	Brisay	469	1993	Caniapiscau
Hydro Quebec	LaGrande-2-A	2,106	1991-92	LaGrande
Hydro Quebec	Laforge-1	878	1993-94	Laforge
Hydro Quebec	LaGrande-1	1,463	1994-95	LaGrande
Hydro Quebec	Laforge-2	319	1996	Laforge
Hydro Quebec	Eastmain-1	507	2006	Eastmain
Hydro Quebec	Eastmain-1-A	<u>829</u>	2011-12	Eastmain
		21,220		

Table 3

Summary of Tables 1 & 2

Annual Capacity in Mega Watts (MW) of Reservoir Hydroelectric
Generating Stations Discharging Into

	James Bay and Hudson Bay	St. Lawrence River	Labrador Current	Total
1930-39				
1940-49		204		204
1950-59	2,334	2,047		2,334
1960-69		2,953		2,953
1970-79	2,200	3,363	5,428	10,991
1980-89	10,812	1,064		11,876
1990-99	6,116	469		6,585
2000-2009	507	1,813		2,320
2010-2018	<u>829</u>	<u>1,305</u>		<u>2,134</u>
	21,220	12,749	5,428	39,397

ACCORDING TO A 2007 REPORT BY STRANEO AND SOUCIER: "OUR RESULTS SUGGEST THAT APPROXIMATELY 15% OF THE VOLUME AND 50% THE FRESHWATER CARRIED BY THE LABRADOR CURRENT IS DUE TO HUDSON STRAIT OUTFLOW."

The St. Lawrence River is the largest river in Quebec, and the second largest is the LaGrande, which flows into James Bay/Hudson Bay. Hudson Bay flows into Hudson Strait and continues south into the Labrador Current.

The Labrador Current is 6 to 12 miles wide and transports approximately 6 million cubic meters of fresh water each second southward, which is approximately 10% of the volume of the Labrador Current. This fresh water is carrying dissolved silica and other essential nutrients which stimulate biological productivity in the coastal waters of Labrador, which becomes progressively more productive from north to south.

Further south an inshore branch of the Labrador Current continues around the southern shore of Newfoundland and enters the Gulf of St. Lawrence (see Map 3 on page 10). The outflow of the St. Lawrence tends to follow the south shore and mixes with the Labrador Current. The circulation on the Scotia Shelf is dominated by a southwestward coastal current flowing from the Gulf of St. Lawrence to the Gulf of Maine.

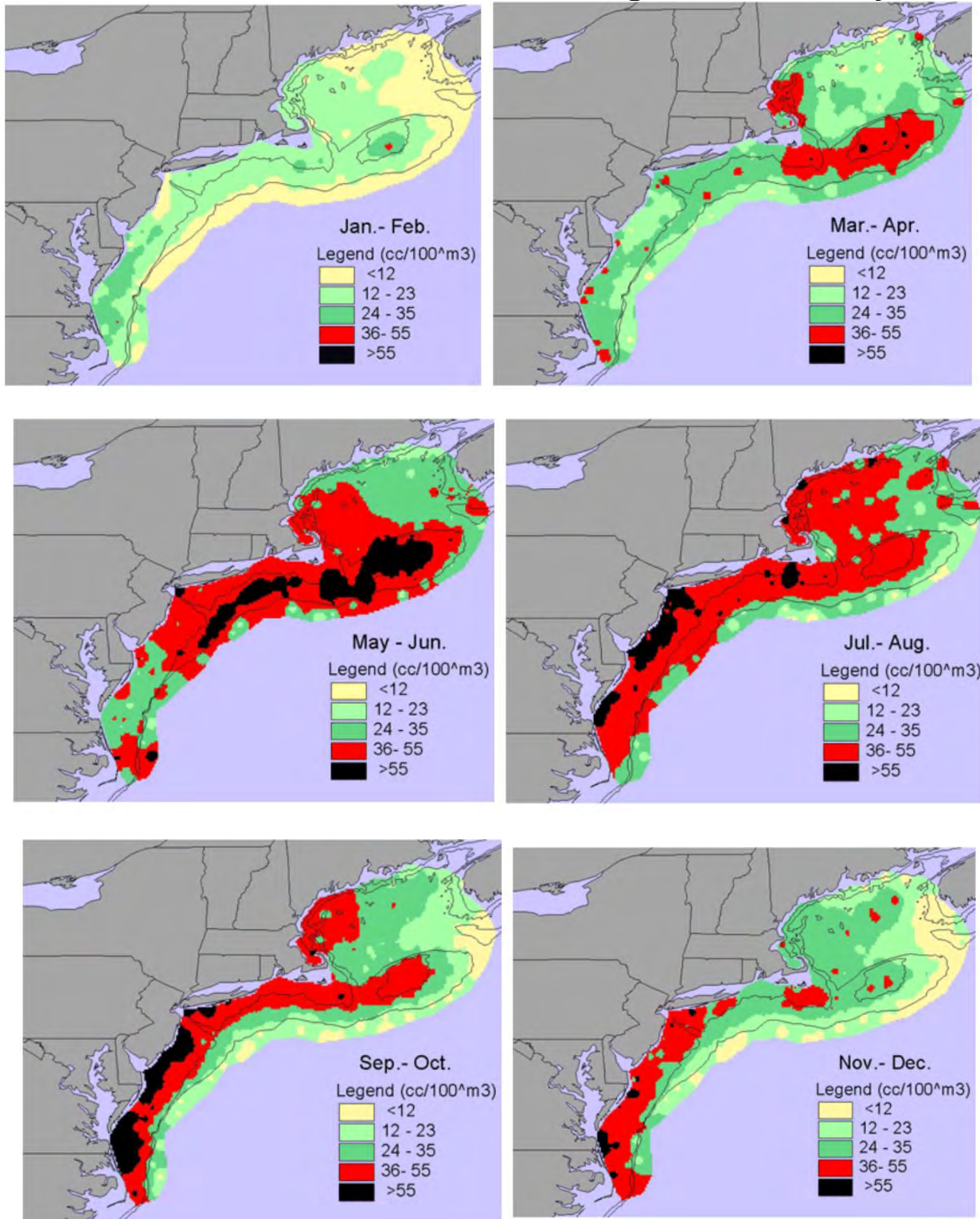
Silica-encased phytoplankton is the foundation of the aquatic food web, the primary producers, feeding everything from microscopic animal-like zooplankton to multi-ton whales. Small fish and invertebrates also graze on the plant-like organisms, and then those smaller animals are eaten by bigger ones. Phytoplankton is responsible for most of the transfer of carbon dioxide from the atmosphere to the ocean.

On the next page are satellite images showing how the pastures of zooplankton start blooming during the March through June period, in conjunction with the March/June period of the spring freshet of Maine's rivers discharging into the Gulf of Maine (see Map 1 on page 3 and Graph No.2 on page 4).

BEFORE RESERVOIR DAMS THE GULF OF MAINE WAS THE BENEFICIARY OF A PROLONGED SPRING FRESHET FROM ITS RIVERS, THE ST. LAWRENCE RIVER AND ITS TRIBUTARIES, AND THEN THE RIVERS OF NL, NORTHWEST QUEBEC AND MANITOBA VIA THE LABRADOR CURRENT.

Hydro-Quebec has eliminated the historical (before reservoir dams) spring freshet from the major rivers into the St. Lawrence River. This freshet occurred during the April/June period, and the dissolved silicate in this freshet was quickly transported to the Gulf of Maine via the high river flows of the St. Lawrence River as measured at Sorel, Quebec in Graph No. 1 on page 3.

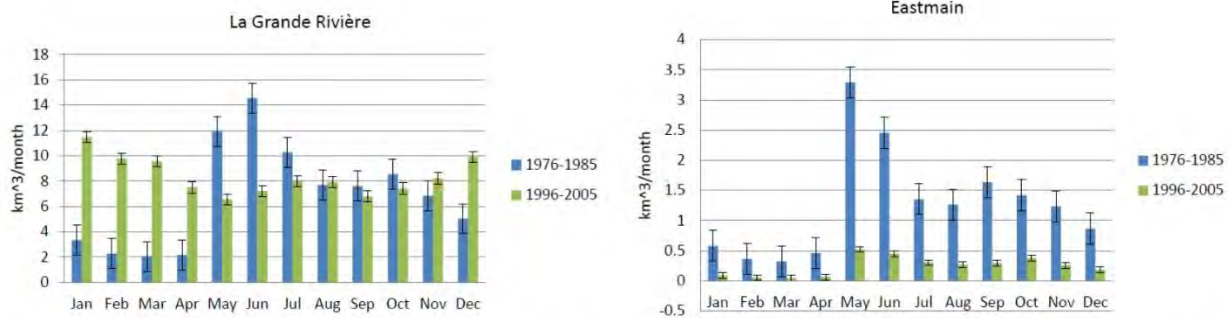
Biovolume of Zooplankton Northeast U.S. Continental Shelf Large Marine Ecosystem



Source: NOAA – Northeast Fisheries Science Center

Roche wrote the following in his 2007 Report:

“In 1980, 80% of the flow from the Eastmain River was diverted in the LaGrande River, and seasonal runoff was impounded so that it could be released to produce electricity in the winter; consequently, the natural spring freshet into James Bay does not occur at either river. The plume from the Eastmain River is now much smaller and the size and shape of the summer plume from the LaGrande River are essentially unchanged; however, the area of the under-ice plume from the LaGrande River has trebled (Figure 3.1) and can now extend 100 km (62 miles) northward under the land fast ice of James Bay.”



Comparison of runoff from two of the major rivers most affected by damming or diversion for the pre-1986 and post-1986 periods.

Source: Ray Roche (2017)

The high influx of dissolved silicate from LaGrande and Eastmain Rivers during the spring freshet is no longer available to be transported via the Labrador Current to the Gulf of Maine.

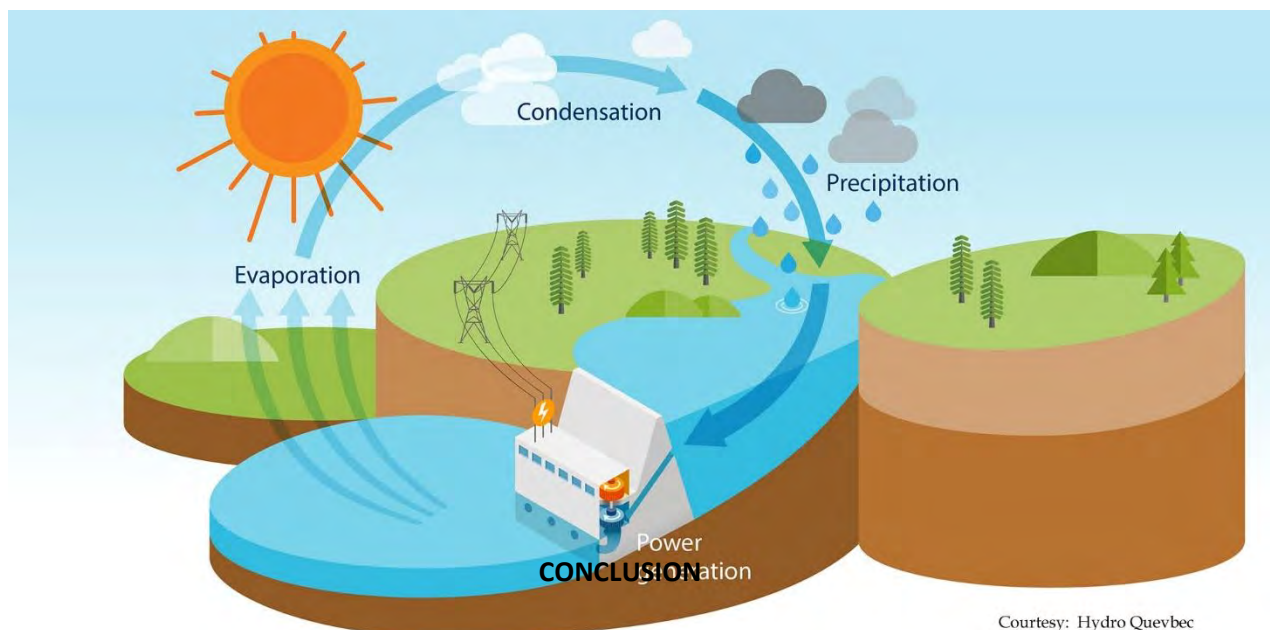
WHO DO YOU BELIEVE, THE AUTHORS OF SILICA STORIES OR HYDRO-QUEBEC?

“Dams in particular have had huge effects on the biogeochemistry, ecology and silica cycling of watersheds, creating lakes where there were not lakes before, trapping particles that would have otherwise been transported downstream, and obliterating seasonal flooding in favor of regulated year-round flow. Altogether this means most rivers of any note have multiple dams upon them and clogging up their spider vein watersheds. This has had a massive effect on the silica cycle, taking a lot of silica entirely out of the game before it can be transported downstream to coastal waterways.

Worse yet, in our humble opinion as silica fans, nitrogen and phosphorus eutrophication frees up diatoms in lakes, ponds, and reservoirs to grow-grow-grow and in so doing strip out incredible amounts of dissolved silica from the water. This is a major double whammy. This silica, now bound up in the beautiful frustules of biogenic silica that diatoms produce, ends up being buried in the sediments accumulating in lakes, ponds, and reservoirs instead of supporting diatom growth in estuaries and the ocean. That represents a serious break in the silica cycle that carried silica, weathered from silicate rocks, out to the ocean to support silica biomineralizers in the sea and the profundity of food webs based upon them.” (Silica Stories by Conley et.al. 2017).

Hydropower is renewed through the natural water cycle

Hydropower starts with energy from the sun. The sun’s heat causes water to evaporate and rise into the atmosphere, where it condenses and turns into clouds that are blown about by the wind. When the droplets and ice crystals that form clouds become too heavy, they fall back onto the ground as rain or snow. The water then flows through the rivers, and generating stations harness this cycle to produce electricity.



Courtesy: Hydro Quebec

CONCLUSION

Quebec Hydro paints a benign picture of hydropower as renewable but fails to mention how it wrecks the silica cycle and the natural flow of water and nutrients especially dissolved silica which is critical for healthy fisheries and mediation of climate change.

The coastal diatoms of the Gulf of Maine have never stopped screaming for more dissolved silicate. The depletion of the shrimp, cod and other fisheries in the Gulf are the canaries in the coal mine who have been telling us for decades that there is a silica limitation in the Gulf of Maine.

This limitation has been caused by the proliferation of reservoir hydroelectric dams over the past 50 years on the major Canadian rivers, which for millennia have supplied nutrients to the Gulf.

For the Gulf of Maine's fisheries and mediating climate change nothing could be more important than restoring the natural timing, duration and quantity of fresh water flows transporting the annual load of dissolved silicate to the Gulf.

"But a lot of the excessive biogenic silica that freshwater diatoms are now able to produce gets buried in reservoirs and lakes, preventing its delivery downstream to the sea.

Scientifically speaking, it took us some time to notice that dissolved silica was disappearing and yet some more time to grasp why. Of course, in retrospect, it's totally obvious. Of course this is what happened when we overloaded waterways with nitrogen and phosphorus. But in the beginning, we were probably too shocked by the eutrophication-fueled overgrowth of phytoplankton in general and all of the clogging and fouling of waterways and all of the fish-killing it was doing. Plus who would expect excessive nutrient addition to result in nutrient loss?

And hardly anyone had the cleverness to foresee that dams would sequester silica.

It took study of three different systems over an embarrassingly large number of decades for us to figure out what has been going on." (Silica Stories by Conley & DeLaRocha 2017)

In Attachment 1 of this Report are these three case studies (referred to above) from Silica Stories by Conley and DeLaRocha 2017.

ATTACHMENT 1

**EXCERPTS FROM SILICA STORIES, by DANIEL J. CONLEY
and CHRISTINE DE LARROCHA 2017**

But natural is not the state of many rivers on Earth at this point. Never mind everything else we've done to them, for the last hundred or more years we've been continuously adding mind-boggling amounts nitrogen and phosphorus to rivers, groundwater, and lakes. The main culprits are fertilizers and animal waste flowing out of farms and off of fields, and poorly treated sewage (containing human waste and phosphate-containing detergents) from our houses, villages, towns, cities, and other settlements. As there is no equivalent addition of silica to balance things, the ratios of nitrogen to silica and of phosphate to silica in inland waterways have dramatically shifted against silica.

Thanks to our messiness, for the last few decades, diatoms in eutrophic systems *have not* been limited by nitrogen or phosphorus. They have been able to bloom until they have removed nearly all of the dissolved silica from the lake or river or pond or reservoir they are growing in. Some of this silica has recycled back into the water because some biogenic silica inevitably dissolves after the death of the diatom that made it. But a lot of the excessive biogenic silica that freshwater diatoms are now able to produce gets buried in reservoirs and lakes, preventing its delivery downstream to the sea.

Scientifically speaking, it took us some time to notice that dissolved silica was disappearing and yet some more time to grasp why. Of course, in retrospect, it's totally obvious. Of course this is what happened when we overloaded waterways with nitrogen and phosphorus. But in the beginning, we were probably too shocked by the eutrophication-fueled overgrowth of phytoplankton in general and all of the clogging and fouling of waterways and all of the fish-killing it was doing. Plus who would expect excessive nutrient addition to result in nutrient loss?

And hardly anyone had the cleverness to foresee that dams would sequester silica.

It took study of three different systems over an embarrassingly large number of decades for us to figure out what has been going on.

8.5 Case Study #1: The Laurentian Great Lakes

The first case that came to light of how we're screwing up the silica cycle has nothing to do with a dam, but strictly with eutrophication. It was also our first inkling that freshwater ecosystems were being shifted into silica limitation as a side effect of all the phosphorus and/or nitrogen we were spilling into waterways.

The time was the 1970s. Two to-be-giants in the field of limnology⁷, Claire Schelske and Eugene Stoermer⁸, both of the University of Michigan, had been

⁷Limnology is the study of inland waters, including rivers, ponds, lakes, reservoirs, wetlands, estuaries, and groundwater, with focus on the interactions between organisms and their environment.

⁸Incidentally, Eugene Stoermer was also the co-namer of the Anthropocene.

studying the Laurentian Great Lakes that lie along the US-Canadian border. Before they started this work, a series of measurements on the intake waters of filtration plants serving the city of Chicago had shown that dissolved silica concentrations in Lake Michigan were decreasing. Claire and Eugene quickly discovered that the situation had escalated to the point where diatoms in Lake Michigan were running out of dissolved silica before the end of summer. This caused the growth of diatoms to screech to a halt several months before the end of their natural growing season, which had previously extended into autumn. Because diatoms serve as the base of key food webs, the knock on effect of premature stoppage in their growth was food shortage for fish and invertebrates in autumn in Lake Michigan.

One of the first things Claire and Eugene wondered was whether the mid-summer silica depletion was something new or if it had merely previously escaped notice. The two of them sleuthed through what old, patchy datasets they could dig up from various water quality agencies. The resulting data, plotted in Fig. 8.2, revealed that the mid-summer exhaustion of dissolved silica was new. It had first showed up in Lake Michigan and settled itself fully in sometime between 1955 and 1969.

Now all they had to do was figure out why it was happening.

At first it must have been a head-scratcher. The decades leading up to and including the one that they were in had seen an explosive growth of algae beginning

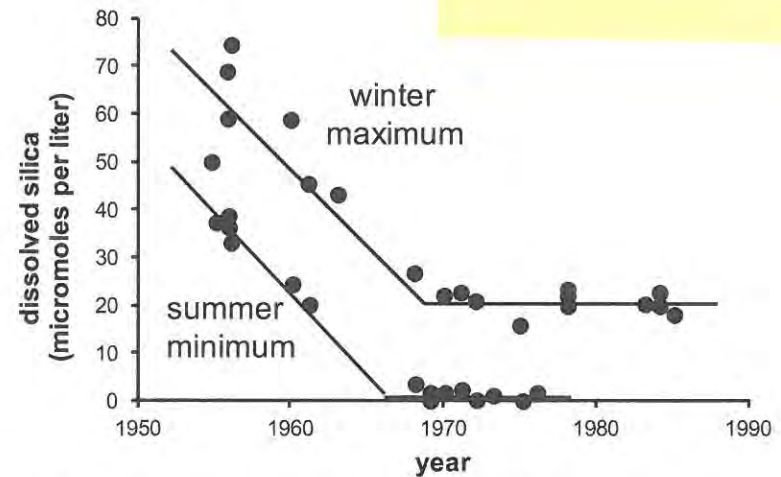


Fig. 8.2 The typical maximal concentrations of dissolved silica in winter and the typical minimum concentrations in summer in the surface waters of Lake Michigan significantly decreased during the 1950s and 1960s. This was due to excess production of biogenic silica fueled by phosphorus eutrophication. This figure has been redrawn from *Internationale Revue der gesamten Hydrobiologie und Hydrologie* 73, Schelske CL, Historic trends in Lake Michigan silica concentrations, 559–591, (1988), copyright © 1988 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, with permission from Wiley

to choke freshwaters across the globe. Diatom populations hitting the wall due to silica scarcity flew against the grain of this trend. It was out of step with everything turning most rather unexpectedly, unprecedentedly green.

But, when Claire and Eugene sat down and thought about it, the answer became obvious. There was a growing understanding, all over the world, that lakes, ponds, rivers, and estuaries were clogging up with excess algal growth because their concentrations of nitrogenous and phosphatic nutrients (that all phytoplankton, including diatoms, need in order to grow) were going off the charts. One reason, very well accepted at that point, was agricultural runoff that was full of biologically utilizable nitrogen and phosphorus from all the manure produced by livestock and from fertilizers applied to fields. The other widely acknowledged cause for eutrophication was human-generated sewage. But neither of these things, though, was adding much in the way of dissolved silica.

What Claire and Eugene also quickly came to realize was that, in the Great Lakes' case, the problem wasn't so much one of agricultural runoff nor was it one of too many people generating too much sewage. The problem was detergents that contained a lot of phosphate.

Detergents are crafty chemicals. One side of them is good at binding oils and fats (which, on their own, are insoluble in water) and another side of them is good at being dissolved in water. When detergents bind an oil or a fat, they thus drag it into solution. That is their cleaning power.

But detergents are not as effective in hard water, which is water that has a lot of calcium and magnesium dissolved in it. The doubly charged cations of Ca^{2+} and Mg^{2+} bind to detergents, precipitating them. Instead of foaming and doing a spanking great job of cleaning, in hard water, detergents form stubborn scum.

Most store-bought detergents have a water softener included in them to chemically preoccupy Ca^{2+} and Mg^{2+} so the detergent can do what a detergent's gotta do. Starting from about the 1950s and still in many cheaper detergents sold today, that water softener has been a phosphate such as trisodium phosphate or sodium hexametaphosphate (pronounced hexa-meta-phosphate).⁹ Washing such phosphate-containing detergent down the drain, especially in areas lacking effective sewage treatment facilities, drains that phosphate straight into the nearest lake, river, or ocean, where it can feed the algae.

Take yourself back to the middle years of the twentieth century, when the human population was just beginning to embark upon the steep, wild, and crazy part of its exponential increase. At the same time modernization was marching along, introducing the washing machine and the dishwasher and then boosting their use. So not

⁹These days we are tending towards using zeolites instead because they don't add massive amounts of a major nutrient to the water, although by even this very late date, there are few national laws against the use of phosphate in detergents.

only were there vastly more people than ever before living along the shores of the Great Lakes, flushing toilets and generating agricultural runoff, they were also enthusiastically doing laundry and washing dishes and the detergents they were using consisted of up to 50% phosphate.

There is only so much even a Great Lake can take, even if it is the fifth largest lake in the world. For Lake Michigan, this was the waste water from millions of loads of laundry and dishes done each week by the people of Chicago, Milwaukee, Green Bay, and other sites on the shore on top of all the other sewage and agricultural runoff. Algae began growing like gangbusters.

As we've said before, Claire Schelske and Eugene Stoermer realized that this phosphorus eutrophication was the key to the disappearance of the silica from Lake Michigan. With the phosphorus brakes released on their growth, diatoms in Lake Michigan could grow until they had converted basically all of the dissolved silica in the lake's sunlit surface waters into diatom frustules that ended up in the sediments.

In other words, dissolved silica was disappearing from Lake Michigan because it was being turned into particulate silica by diatoms growing in the surface waters of the lake and exported, via sinking, to the bottom of the lake.

Ecologically speaking, this was dire news, but intellectually it was kind of cool. Phosphorus eutrophication was leading to silica oligotrophication, a paradox that made perfect sense. And, as ideas go, it was one that Claire and Eugene could test.

Even long-lived lakes are only temporary features of the landscape; they're busy filling up with layer upon layer of sediment. You can take advantage of this if you want to learn about the history of a lake, ecologically and climatically speaking. All you need to do is carefully take a sediment core, slice it lengthwise in half, and, moving downwards from the top of the core, begin your journey back through time.

The core that Claire Schelske, Eugene Stoermer, and their collaborators took in the middle of the deepest part of Lake Michigan (which is found within Grand Traverse Bay) was 40 centimeters long (about 16 inches) and, based on radiometric dating¹⁰, covered the last century and a half. The milligrams of biogenic silica to be found per gram of core versus depth within the sediment core are shown in Fig. 8.3 and that's all that is needed to show the story.

Before 1920 or 1930, only 10 milligrams of every gram of sediment that was accumulating on the lakebed was biogenic silica, a content that can also be expressed as 10 parts per thousand, or 1% biogenic silica. As biogenic silica accumulation rates go, that's pathetic. Those pre-postmodern Lake Michigan diatoms should hang their heads in shame at the poor job they were doing of exporting silica to the sediments. Or maybe they should be proud, because this is the level of export of silica that the lake could maintain, given the amount that was being delivered to it each year in runoff.

¹⁰Using the isotope lead-210 (^{210}Pb), which has a half-life of 22 years and is a particulate material which is continually falling out of the atmosphere following its production by the decay of radioactive radon gas.

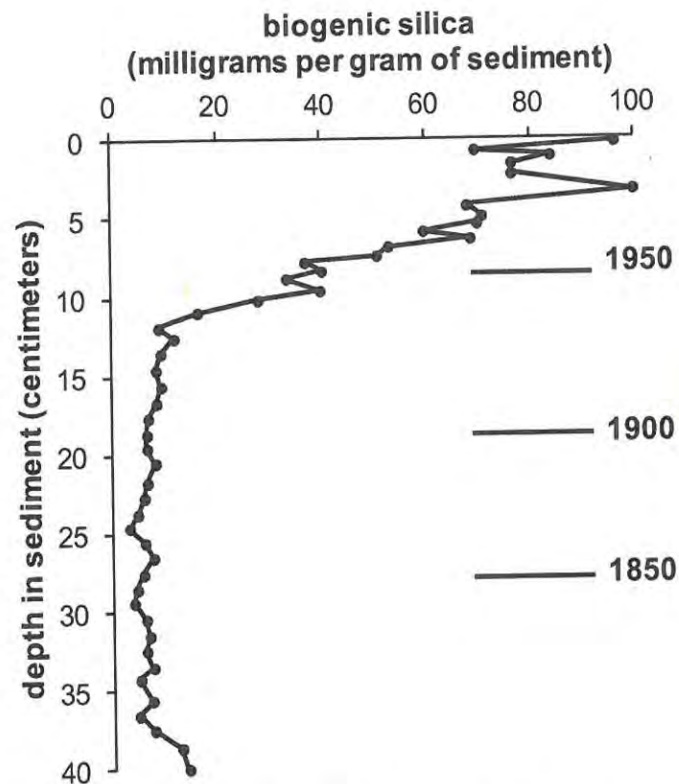


Fig. 8.3 Biogenic silica concentration versus depth in a core from Grand Traverse Bay, Lake Michigan records the transfer of Lake Michigan's silica into the sediments during the twentieth century's explosion in the use of phosphate detergents and fertilizers. This figure has been redrawn from *Hydrobiologica* 143, Schelske CL, Conley DJ, Stoermer EF, Newberry TL, Campbell CD, Biogenic silica and phosphorus accumulation in sediments as indices of eutrophication in the Laurentian Great Lakes, 79–86, (1986), copyright © Dr W. Junk Publishers, Dordrecht, with permission from Springer

As you move forward in time in the sediment core from 1930 it is like running up a ramp. The biogenic silica content of the sediments steadily climbs, reaching a peak of 100 milligrams of biogenic silica per gram of sediment (or 10% biogenic silica) by 1970. This you can see clearly in Fig. 8.3. What Fig. 8.3 does not show is what you would see if you made this measurement on lake sediments stretching back to the birth of Lake Michigan. The biogenic silica content of the older sediments (not shown here) reveal that such an astonishing change in silica burial had never happened before, not once in Lake Michigan's 14,000 year history.

Thus Claire and Eugene had managed to show that the disappearance of dissolved silica was due to excessive production of biogenic silica and that this excessive production of biogenic silica had never happened before people moved in by the tens of millions and started doing a lot of laundry in cities and towns along the shore of Lake Michigan.

There is another big detail of the shift that is revealed by the sedimentary record—the shift in the composition of the diatom population with the eutrophication of Lake Michigan. Diatom frustules are, after all, quite distinctive, and can be used to tell one diatom species from another.

Sediments older than the expansion of European settlements around Lake Michigan in the 1800s had a lot of different diatom species in them, representing a wide range of ecological niches (high light, low light, high silica, low silica, benthic, planktonic, spring growing, summer growing, autumn growing, etc.). But as phosphorus eutrophication (and silica depletion) increased, the variety of diatoms in the sediments narrowed to only those species that grow in late winter/early spring. This is the very start of each year's growing season, when dissolved silica concentrations are still high from winter mixing. Diatoms that would have grown later in the year were missing because by the time it was their turn to grow, there was no dissolved silica left for them to use. Benthic diatom species, meaning those that grow on the bottom of the lake (in shallow waters), also disappeared, most likely because the overgrowth of plankton due to eutrophication made it too dark down there for them to grow.

Overall, diatoms getting shut out of the latter part of the growing season in Lake Michigan while there is still plenty of nitrogen and phosphorus available for growth is a bad thing. It means a decrease in the flow of energy and materials through diatom-based food webs, which generally efficiently lead to fish, and an increase in the growth of noxious plankton species like dinoflagellates.¹¹ Worse yet, what happens in Lake Michigan doesn't stay in Lake Michigan. Now stripped of their dissolved silica, the waters of Lake Michigan flow into Lake Huron and then Lake Erie, go over Niagara Falls, flow into Lake Ontario, and then via the Saint Lawrence River, arrive at the Atlantic Ocean at the Gulf of Saint Lawrence in all the full glory of their silica deficiency. You can almost hear the coastal diatoms screaming.

¹¹The addendum here is that the water quality (and dissolved silica content) began improving in the first decades of the twenty-first century due to improvements in sewage treatment and to the phasing out of phosphate detergents. Then the quagga mussel invaded, via larval stages that most likely arrived in water released from the ballast tanks of transoceanic shipping vessels. The quagga and its relatives are voracious filter feeders and they've colonized enough of Lake Michigan to keep the waters clear of algal blooms, regardless of the lake's nutrient status. Unfortunately, this means that phytoplankton still aren't making it into the food chains that lead to fish, causing a collapse in the lake's fisheries. Poor Lake Michigan can't catch a break from the trouble caused by human beings.

8.6 Case Study #2: The Baltic Sea

Once the research on Lake Michigan became known, people started to have a look at other large inland bodies of water to see if the same things were happening to their local silica cycles. One of the more recent and most intensively investigated places has been the Baltic Sea.

Lake Michigan is big, but the Baltic Sea is massive. It is that large inland sea that sits in the midst of northern Europe. You could think that the Baltic Sea is too big to be notably affected by the activities of humankind. But once you start paying attention, you quickly come to pity the Baltic Sea. All but entirely encircled by Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Germany, and Denmark and additionally containing portions of Belarus, Ukraine, Norway, Slovakia, and the Czech Republic in its watershed, the Baltic Sea is subject to continual insult by the agriculture and sewage of 90 million people. This insult, which comes partly in the form of four to eight times more nitrogen and phosphorus than it tended to receive a century ago, is delivered in 16,000 metric tons of freshwater *per second* flowing off the land. Consequently, concentrations of nitrate and phosphate in the Baltic Sea have increased over the last century.

But concentrations of dissolved silica have declined. This decline has been severe. For example, concentrations of dissolved silica in subsurface waters in a central area of the Baltic Sea have decreased by one-third to two-thirds since the late 1960s, the time when monitoring began at that location.

So far so Great Lakes? It seems pretty similar. Just add eutrophication and watch those diatoms go (until they run out of dissolved silica).

Maybe. But maybe not.

There is a certain key difference in the situation of Lake Michigan and the Baltic Sea. Excess phosphorus is mainly delivered to Lake Michigan directly, from sources that originate along the shore. But the Baltic Sea is receiving waters high in phosphorus and nitrogen via rivers that travel great distances to get to the Baltic Sea and generally encounter multiple lakes and dams along the way. This gives silica plenty of opportunity to be removed and trapped in sediments long before it arrives into the Baltic Sea itself. So maybe excess production of biogenic silica within the Baltic Sea itself is stripping dissolved silica out of its waters. But maybe that silica is being removed upstream and because the Baltic Sea is being thus deprived of dissolved silica, its poor diatoms aren't growing (or producing biogenic silica) much at all. If we want to help solve the problem (in part because we'd like to get the Baltic back to supporting food webs that produce something besides enormous swarms of jellyfish) we need to know which one is going on. Plus we're just plain old curious.

The first question to tackle: do outputs of silica from exceed inputs of silica to the Baltic Sea? If so, at least some of the problem is due to eutrophication-fueled diatom growth within the Baltic itself. The straightforward way to answer the question is to put together a silica budget with inputs on one side and outputs on the other.

For a small reservoir or lake, this should be easy. You need to measure three things. One is the amount of dissolved silica flowing in with water flowing in from rivers and streams. Another is the amount of biogenic silica accumulating on the lake bed. The third is the amount of dissolved silica flowing out in the stream that serves as the lake's outflow.

But the Baltic Sea is no little lake. Nearly 100 rivers of note flow into the Baltic Sea and you'd have to monitor each one for several years. There is at least only one outflow of water from the Baltic Sea (aside from evaporation): water leaves via the Denmark Straits to the Atlantic Ocean. But sometimes, because of storms, winds, currents, and tides, the water flows in instead, bringing dissolved (and biogenic) silica with it. As far as measuring how much biogenic silica is getting buried in Baltic Sea sediments, the complication here is that the Baltic Sea is made up of numerous basins, such as Bothnian Bay, the Bothnian Sea, the Gulf of Finland, the Baltic Proper, the Gulf of Riga, the Denmark Straits, and the Kattegat, and they all behave differently (and exchange water with each other). Figuring out how much biogenic silica is accumulating in the sediments requires careful study of sediment accumulation rates (and correction for sediment winnowing and focusing due to currents) in all of these regions.

Despite the near impossibility of the task of determining whether more silica is leaving the Baltic Sea than is coming in, there have been several attempts to put together silica budgets for the Baltic Sea. (Scientists do love them a challenge.)

In their quest, two different groups of researchers have fed monthly measurements of dissolved silica from the major rivers flowing into the Baltic and measurements of wintertime dissolved silica concentrations at various locations within the Baltic Sea into a computer model of Baltic Sea circulation in order to calculate how much dissolved silica is disappearing from Baltic Sea water as it flows out to the North Atlantic. Both groups came up with much the same result, that recently roughly 1,300,000 tons of silica has been accumulating in the sediments of the Baltic Sea each year. As both modeling efforts produced a Baltic Sea whose dissolved silica concentrations decreased from year to year during the model runs, an export of 1,300,000 tons of biogenic silica to the sediments must be enough for the total export of silica from the Baltic Sea to be exceeding silica's input.

So the Baltic Sea is probably at least a little bit like Lake Michigan. Eutrophication is causing it to overproduce biogenic silica. But when you actually look at the data that were fed into the models, you realize that something else pretty major is going on.

Many of the major rivers flowing into the Baltic Sea have concentrations of dissolved silica that are, frankly, shocking.

The Neva River, which is the greatest of the rivers flowing into the Baltic Sea, contains 8 micromoles of dissolved silica per liter when it reaches the Baltic Sea. Can you hear the diatoms weeping? No self-respecting river should contain such a measly amount of dissolved silica. An *average* (as in mediocre, hum-drum, run-of-the-mill) river has 160 micromoles of dissolved silica per liter and an overachiever has 1000 micromoles of dissolved silica per liter. A number like 8 is

almost unfathomable. To yield up only 8 micromoles per liter dissolved silica, the Neva River's catchment is only producing a net 63 kilograms of silica per square kilometer of catchment area per year, another number to make a diatom cry.

The Vistula, the Baltic Sea's number two river in terms of the delivery of water, is better, but at 119 micromoles of dissolved silica per liter and 580 kilograms of silica produced per square kilometer, still below average. The number three river, the Daugava, averages around 60 micromoles of dissolved silica per liter, a yield of 411 kilograms of silica per square kilometer, more dismal numbers.

But if you look at the rivers draining into the Baltic Sea from the emptier, more northern areas of the catchment, you'll find that they are not like this. The Närpiönjoki in Finland has an average dissolved silica content of 267 micromoles of dissolved silica per liter, representing a catchment yield of 2285 kilograms of silica per square kilometer. The numbers for the Isojoki, also in Finland, are similar: 195 micromoles of dissolved silica per liter and 2105 kilograms of silica per square kilometer.

What's the difference between the respectably silica-containing rivers and the failures? The silica-poor rivers draining into the Baltic Sea are found in more heavily populated areas while the silica-rich rivers are running wild. The silica-poor rivers are suffering from notably greater eutrophication and they contain much greater (natural and manmade) reservoir volume.

Take that astonishingly low-silica river, the Neva River, for example. Just upstream of St Petersburg (not so far from the Baltic shore), it runs through Lake Ladoga, one of the largest lakes in Europe. Lake Ladoga has been heavily eutrophicated since the 1960s. You can all but walk on the phytoplankton blooms, they grow so thick. This is where a lot of the Baltic Sea's silica is ending up. Buried in Lake Ladoga's sediments.

Similar, although less severe losses of silica must be occurring in lakes and reservoirs along other eutrophicated rivers that feed into the Baltic Sea.

Once you have data (on silica concentrations, water flows, surface area of river catchments, and so on), you can cross-examine them to tease out the combined effects of eutrophication and damming on the silica content of rivers draining into the Baltic Sea. You could, for example, plot the concentration of dissolved silica in a river (or, if you'd prefer, its yield of dissolved silica per catchment area) versus the amount of time water spends in the river's catchment area. Dams and natural lakes both increase the residence time of the water within the catchment. Thus a long residence time indicates the water spends a lot of time in places favorable to diatom blooms and export of silica to sediments.

In practice, residence time of water in a river catchment is not an easy thing to measure. So you can try to use a proxy, some other more easily or accurately measurable factor that is relatable enough to residence time that it can serve as a stand in. You might try hydraulic load, the amount of water, expressed as meters of height, that passes over a point in the river system each year. High hydraulic loads

are associated with short residence times (fast flowing water) while low hydraulic loads indicate long ones (fairly slow, stagnant flow).

The result? The lower the hydraulic load (and the longer the residence time of water in the river system), the lower the catchment's dissolved silica yield per area and the lower the concentration of dissolved silica in the river. This is true for all types of river feeding into the Baltic Sea, meaning that reservoir volume (be it natural lakes or manmade due to damming) is giving diatoms a chance to bloom and remove silica before the silica reaches the Baltic Sea. That the problem is worse in eutrophicated river systems is also clear because concentrations of dissolved silica are lower in these rivers regardless of their hydraulic load.

This is all illustrated nicely in Fig. 8.4. The yields of dissolved silica per catchment area from a subset of the Baltic Sea catchments that are not eutrophicated and whose flows are not interrupted by dams (represented on the plot by the black triangles) range from 800 to almost 1300 kilograms of silica per square kilometer. These highest silica yields belong to fairly pristine catchments where water doesn't spend too much time hanging around. There is neither the time nor the added nitrogen and phosphorus for diatoms to bloom and remove dissolved silica. These rivers hit the Baltic Sea with a healthy load of dissolved silica and this most likely represents the natural state of the system.

The subset of the Baltic Sea catchments that are not eutrophicated but are subjected to damming (represented by the black circles on Fig. 8.4) give yields of 280 to 1100 kilograms of silica per square kilometer and the yields clearly decrease as the residence time of water in the watershed increases because waters are detained in lakes and reservoirs on their way to the Baltic Sea. There is just enough naturally occurring nitrate and phosphate for diatoms to bloom and remove some dissolved silica from the river system, thus preventing it from reaching the Baltic Sea.

The subset of the Baltic Sea catchments investigated that are both eutrophicated and dammed (the gray circles on Fig. 8.4) have yields of 60 to 600 kilograms of silica per square kilometer. There are two things going on here. Eutrophication in general is keeping the yields low because diatoms are growing and removing silica. But the lowest of the low yields are occurring in catchments where the residence time of the water is the greatest and this is because of lakes and by reservoirs produced by damming.

These are, you might say, damming results for both eutrophication and damming. Worse, we're starting to suspect that there is another process contributing to the problem. Rates of silicate weathering within dammed catchment areas are probably lower than in non-dammed catchments. When you build a dam, a lot of what used to be the soils of grasslands and forests becomes the bottom of a reservoir. Weathering reactions tend to be vigorous in the soils of grasslands and forests and the dissolved silica the weathering produces is efficiently flushed into rivers when it rains. But not much silicate weathering is going to be going on at the bottom of a reservoir. As a result, not only is the reservoir sequestering silica that used to flow onwards to the ocean, it is also preventing some silica from being added to the river in the first place.

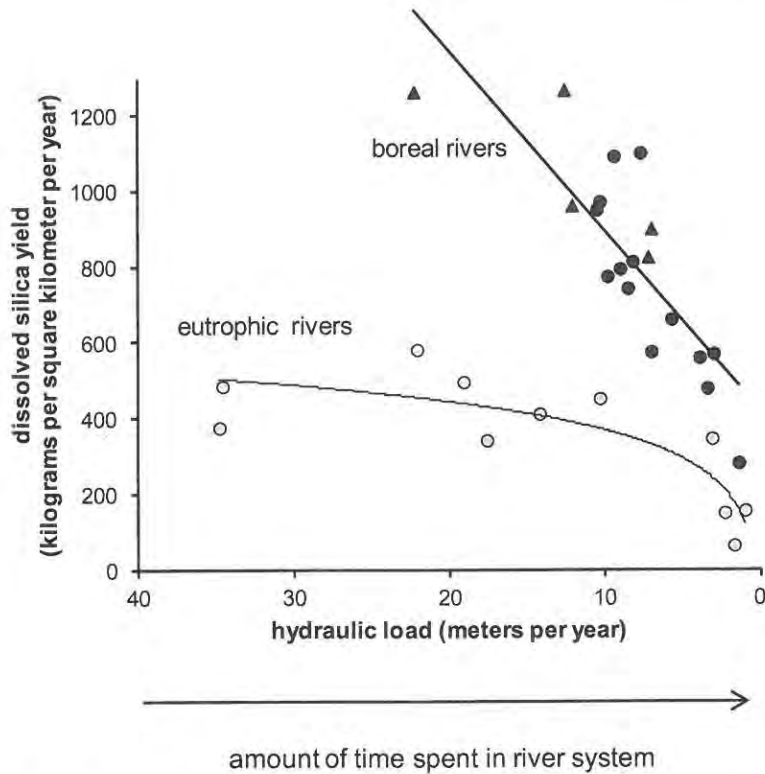


Fig. 8.4 Yield of dissolved silica compared to hydraulic load for pristine boreal rivers (*black triangles*), eutrophicated but undammed boreal rivers (*black circles*), and heavily eutrophicated and dammed rivers (*gray circles*) draining into the Baltic Sea. Hydraulic load serves as a proxy for residence time, with residence time increasing to the *right* of the figure. This figure has been redrawn from *Journal of Marine Systems* 73, Humborg C, Smedberg E, Medina MA, Mörth C-M, Changes in dissolved silicate loads to the Baltic Sea—the effects of lakes and reservoirs, 223–235, (2008), copyright © 2007 Elsevier B.V., with permission from Elsevier

The patterns revealed by the set of river catchments of Fig. 8.4 can be used to estimate that the combination of eutrophication and damming has decreased the amount of dissolved silica delivered into the Baltic Sea by 30–40% during the last century.

That is the sort of number that you should not announce to a silica enthusiast unless you've taken the precaution of sitting them down in a chair.

In other words, right now is a really lousy time to be a Baltic Sea diatom. All those dams we've built within the Baltic Sea catchment area and all the nitrogen and phosphorus we're pouring into it too... We're denying Baltic Sea diatoms the silica they need to survive.

8.7 Case Study #3: The Black Sea

The same sort of thing has been going on in the Black Sea. But it took us some time to understand the problem here because we got hung up on the idea that the Black Sea's silica problems stemmed from one single spot on the Danube River. It was at the time a compelling story, though, and it got a lot of people interested in the problem of silica and dams.

The Danube River, the second longest river in Europe, arises in the Black Forest, meanders through or along Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Moldova, Ukraine, and Romania, collecting water from an even greater portion of Europe, and then pours into the Black Sea. Like the also enormous catchments of the two other major rivers that flow into the Black Sea (the Don and the Dieper), the Danube River catchment was dammed to the hilt between the 1960s and the present day and eutrophication is a serious problem.

At this point, you will probably nod knowingly when we tell you that for decades phytoplankton overgrowth in the Black Sea has been common and concentrations of dissolved silica have declined and that all of this has occurred alongside shifts in the composition of photosynthetic populations away from diatoms. Populations of benthic macrophytes such as seagrasses and macroalgae have also taken a serious hit and anoxia has become more widespread. This is bad, not only for Turkey's Black Sea anchovy fishery, but also for entire Black Sea beach resort industry that is important to the economies and vacations of Turkey, Bulgaria, Romania, Ukraine, Russia, and Georgia.

By 1997, which was long after Claire Schelske's and Eugene Stoermer's groundbreaking discovery that eutrophication resulted in silica removal within the Laurentian Great Lakes but a few years before the work on the Baltic Sea described in the previous section, it became clear that the Black Sea was missing a lot of dissolved silica. Monitoring that had begun in 1960 had revealed that dissolved silica concentrations had briefly shot up and then steadily dived in the Black Sea, dropping from an average of about 60 micromoles of silica per liter in the mid-1970s down to below 10 by about 1995. It was as if some single abrupt change in the system kicked off a dramatic disappearance of silica.

Enter the Iron Gate dam.

Iron Gate I runs across the Danube along a stretch that serves as the Romanian-Serbian border and is a hydroelectric generation plant. It's also the largest dam on the Danube River. It was so very most suspiciously completed in 1972, right before dissolved silica went into its dive. The obvious explanation was that the dissolved silica that was now missing from the Black Sea was accumulating as 1.3 million kilograms of biogenic silica accumulating in the sediments trapped by Iron Gate I every year. It had to be the case! The circumstantial evidence was screaming.

Simple stories are seductive. Impound a single dam on a major tributary of a fair-sized sea and send the downstream coastal areas into silica freefall. Even scientists can get enthusiastic over ideas that are too good to be true.

Of course the story turned out to be wrong, but it also turned out to be the story that got researchers interested in the effect of dams on silica. Although the problem of dams resulting in downstream waters depleted of dissolved silica had first come to light in a well-researched and well-written 1980 publication in a top-notch scientific journal by top-notch scientific researchers¹², somehow the news hadn't sunk in.

The dam's name probably helped too. With a name like that (Iron Gate) the dam had to be: Huge! Solid! Fearsome! Authoritarian! And rather like the Iron Curtain. Nothing, not even silica, could get through. Even silica scientists (initially) felt swayed. Damn that dam for stealing all the Black Sea's silica.

However, the name was merely an accident of history. Iron Gate I and its younger sibling, Iron Gate II, were not named for their formidability. They were named for their locality.

The Iron Gates are a picturesque series of gorges that the Danube runs through. That narrowed stretch of river is over a hundred miles long and its name may have originated from a number of pestilential bedrocks shoals, now long since removed, that could rip apart the hulls of ships that failed to steer around them. Perhaps hundreds of years ago, a person with poetry in their heart likened them to the spikes on an iron gate. In an alternate universe, one with a shortage of poets, there may be two Damned Shoals dams instead and nobody who thinks that particulate silica is piling up behind them.

In this universe, at least, biogeochemists eventually decided to put the hypothesis to the test.

One of the first things they noted was that, yes, the reservoir upstream of Iron Gate I is nothing to sneeze at. It is 120 kilometers (75 miles) long and holds 2.4 billion cubic meters of water. But this has more to do with the river than the dam. The Danube River carries so much water by the time it reaches the Iron Gates, the Iron Gate I dam needs 1100 meters of length in order to span the river. That's 3600 feet. So it doesn't take much diminishment in flow (or increase in water residence time) to create a large reservoir volume at this location.

Indeed, the Iron Gate dams do not significantly increase the residence time of water along this stretch of the Danube. Iron Gate I, like Iron Gate II, is a hydroelectric power generating station. Water flows FAST through the dam. It has to turn turbines.

When you measure how long the water spends in this reservoir (plus in the much smaller one downstream of it now that they've built Iron Gate II), you find that it's six and a half days, which is hardly any time at all. If we were a diatom bloom, we'd file a complaint. It's not enough time to get our work done.

¹²Larry Mayer and Steven Gloss, two widely known and respected biogeochemists, had first noted the effect on dams on dissolved silica in 1980 in a published paper on the Colorado River in Arizona before and after the construction of Edward Abbey's favorite of favorites, the Glen Canyon Dam.

Silica budgets constructed for Iron Gate I, its reservoir, and its sediments have confirmed this. The Iron Gate dams are not a big trap for silica. It looks like about 850,000 tons of silica flows into the reservoir as dissolved silica each year and 810,000 tons flows out. The 40,000 tons of silica trapped is not nothing but it is well short of the postulated 600,000 tons.

Now that the research on silica losses in the Baltic Sea catchment area has been done, it's clear that the disappearance of silica from the Black Sea isn't the work of one fearsome dam. It's due to the tens of thousands of dams that have been built along the often eutrophicated rivers that head ultimately to the Black Sea. And of course, the eutrophication-fueled overgrowth of diatoms within the Black Sea itself has probably contributed to the decades-long decline in dissolved silica concentrations that has occurred within the Black Sea. This isn't as superficially exciting a story as one single dam having an impact so severe it was changing the ecology and biogeochemistry of the entire Black Sea, but it is profound.

8.8 The Global View

The Laurentian Great Lakes, the Baltic Sea, and the Black Sea are all major bodies of water, but they are still just a drop in a bucket compared to all the fresh and salt water on Earth. But they represent a crisis that is unfolding across the Earth.

Those 850,000 dams we currently have, about 60,000 of them large, disrupt flow on more than half of all river systems. Various different modeling studies have calculated that altogether these dams decrease the total global flux of dissolved silica to the ocean by 5%.

Does that seem small?

It isn't. Five percent represents a deficit that adds up year after year into enough of an enormous lack of dissolved silica that diatoms in estuaries and the coastal ocean, where they are most needed to support fisheries, could be operating at a disadvantage.

Natural but now eutrophicated lakes are even worse than reservoirs, in that they seem to be better at retaining silica in their sediments. Including them in the global estimate would bring the total amount of silica flux diminished to nearly 30%, a truly apocalyptic number.

The next time you're down at the beach, you may want to hug a diatom. They could certainly use the moral support. But they'd like it even more if you pushed your legislatures for laws requiring that detergents to be sold phosphate-free. This needs to include dishwasher detergents (which, in many places, are exempt from restrictions). Our diatom friends could also use more and better sewage treatment plants, incentives and support for farmers to do something about the millions of tons of phosphate and nitrogen fertilizers and animal waste flowing off of their lands, the removal of dams no longer needed, and some serious, sober second thoughts about building any more.

THE PROBLEM IS THE LACK OF SILICA

Silica Shelled Diatom Phytoplankton



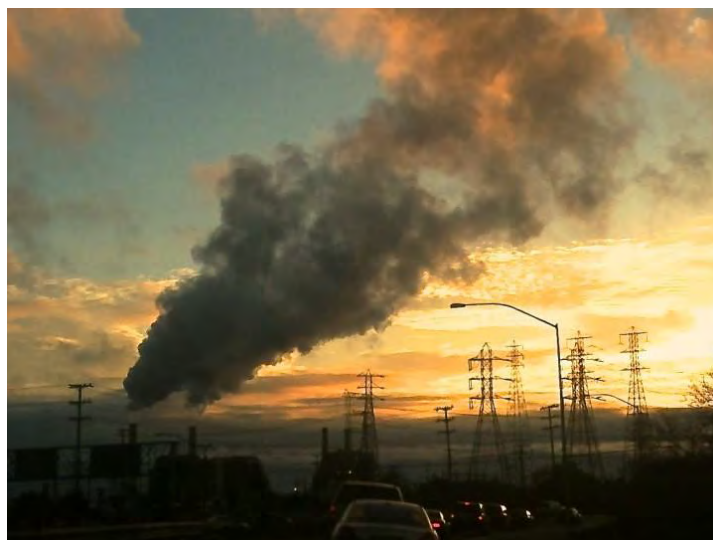
Atlantic Cod

The Foundation of the Aquatic Food Web



Atlantic Salmon

“Diatoms are at the bottom of the food chain and suck up nearly a quarter of the atmosphere’s carbon dioxide . . . Size matters for the creatures that eat them and also for carbon sequestration, as large diatoms are more likely to sink when they die . . . If smaller size diatoms dominate, then carbon sequestration becomes less efficient, and there may be more carbon dioxide in the atmosphere, which would exacerbate global warming. “ (Litchman et. Al. 2000).



This Report is being written as a supplement to the editorial “*Reject CMP Power Line Because Hydro-Quebec Facilities Damage Ecosystem,*” which was published in the Portland Press Herald on October 9, 2018 (see Attachment 1). It also documents how Hydro-Quebec has significantly contributed to the lack of silica in northwest Atlantic and Gulf of Maine.

ABSTRACT

There is a commonly held belief that climate change is the driving force behind the decline in the population of cod, salmon, capelin and other fisheries in the Gulf of Maine and northwest Atlantic, as well as warming their waters.

There is another factor, namely, the lack of silica!

This Report documents how the lack of silica is the driving force in the decline of the fisheries and not overfishing. The following two quotes are consistent with my claim that the fisheries are being starved:

Research scientist with the Department of Fisheries and Oceans (DFO) Dr. Mariano Koen-Alonso says the sudden and sharp decline in cod stock is something being seen across the ecosystem.

“We’ve seen very important reductions in biomass of many species across the board,” said Koen-Alonso. “We have to look at the big picture here, there are several factors and species involved.”

“With reductions in the biomass of the cod’s food sources such as shrimp and capelin, Koen-Alonso says the cause of the cod’s decline appears to be more bottom-up than top-down. Bottom-up meaning that a lack of food and poor conditions are the driving force in the shrinking biomass, rather than predators or overfishing which are chief factors in a top-down cause of depletion.

Koen-Alonso says the signs show the capelin’s declining numbers can also be traced to the food chain.” (Northern Pen May 10, 2018).

and

“Atlantic ocean plant life, the phytoplankton, has been observed to be in tremendous decline. International science teams have measured more than 26% lost in the last 30 years. How bad is 26%? Remember when we destroy just 1 in 10 of any form of life we say that we have decimated that life. It’s bad. Very bad. And the starvation and disappearance of Atlantic Cod stand as testimony to the collapse of the Atlantic Ocean pastures. Ocean pasture grass is plankton.” (Russ 2014).

The building and management of Quebec Hydropower’s reservoir hydroelectric facilities have reduced river discharge during spring freshet into Eastern Hudson Bay and Labrador Sea by forty to fifty percent and increased winter discharge by 300 percent.

“Eighty percent of the annual input of dissolved silicate to the ocean is transported via our rivers and streams.” (Paul Treguer et. al. 1995). In our northern latitudes, the majority of this annual budget is delivered by the roaring waters of the spring freshet.

Less dissolved silicon, during spring months, is starving the silicon diatom phytoplankton blooms, which are the essential basis of marine food web.

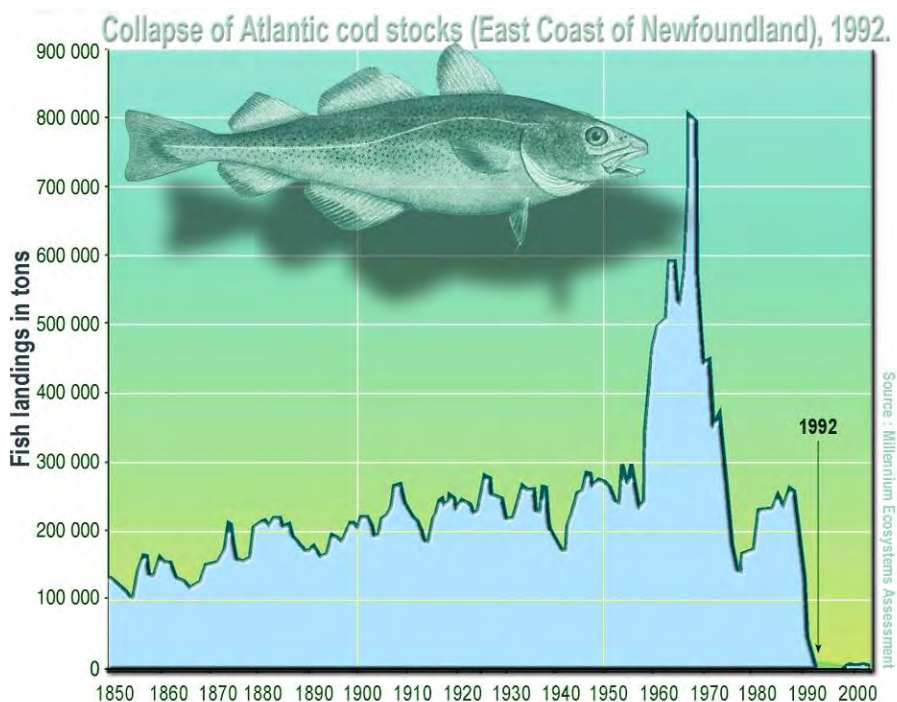
The advocates of hydroelectricity claim it is a power source that is clean and renewable because it uses the earth’s annual water cycle to generate electricity.

They fail to mention that hydroelectric reservoir facilities have changed the seasonal pattern of annual natural water cycle by significantly reducing the spring run-off and summer outflows and using the captured waters to double and triple the winter outflows, due to high winter demand for electricity.

This is just the opposite to a typical unregulated river, which experiences low flows in winter when water is stored in the seasonal snowpack, then high flows during the snowmelt-driven freshet in spring and early summer.

STARVATION OF ATLANTIC NORTHWEST COD FISHERY

There have been two collapses of the Atlantic northwest cod fishery in the past fifty years, and they are illustrated in the graph below. Both collapses have been analyzed as one and the cause blamed on overfishing and global warming.



There is no doubt that overfishing caused the spike in cod landings during the 1960's and the subsequent decline in the 1970's.

However, the second and more lasting decline occurred in the 1989-1991 period. The major factor of this decline has been the lack of silica caused by the capture of the spring freshet in the reservoirs of hydroelectric facilities owned by Quebec Hydropower. These facilities have significantly reduced the transport of dissolved silica and other nutrients needed for healthy spring and summer diatom phytoplankton blooms in the northwest Atlantic and Gulf of Maine.

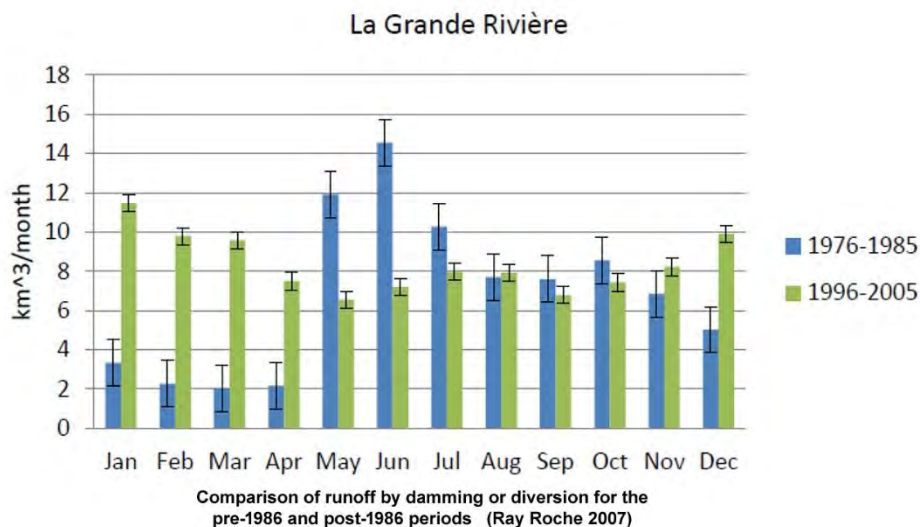
“The growth rate of diatoms (silica-shelled phytoplankton) are determined by the supply of silicate.”
(Venugopalan Ittekkot et. al. 2000).

“Diatom phytoplankton populations are the usual food for zooplankton and filter feeding fishes and contribute in a direct way to the large fishable populations in coastal zones.” (C.B. Officer et. al. 1980).

“The lack of silica can change aquatic ecosystems from those dominated by diatoms to non-diatom based aquatic ecosystems usually dominated by flagellates.”(E. Struyf 2009).

QUEBEC HYDROPOWER HAS REDUCED SPRING FRESHET RIVER FLOWS BY 40 TO 50 PERCENT

A good example is the three LaGrande reservoir hydroelectric facilities, which have an annual capacity of 7,302 megawatt (MW). Two of the reservoir facilities went online in 1986 and the third in the early 1990's. The graph below illustrates how the dams have been used to capture the waters of the spring freshet which are then used to increase winter outflows by more than 300%.



The following points should help put into perspective the scale of this facility:

1. Maine's annual hydroelectric generating capacity is 723 MW, compared to 7382 at LaGrande
2. The June outflow (1976-1985) of 14.5 cubic kilometers (KM³)/month has been reduced to 7.0 KM³./month (1996-2005). This reduction of 7.5 KM³/month equals 102,129 cubic feet (ft.³)/sec
3. The historic median flow in June on the Penobscot River at W. Enfield in Maine is 10,000 ft³/sec
4. This June reduction in outflows from the LaGrande River into Hudson Bay would be analogous to eliminating 10 Penobscot Rivers flowing into the Gulf of Maine in June
5. The May reduction in outflows of 5.5KM³/month would be analogous to eliminating 7 Penobscot Rivers flowing into the Gulf during May

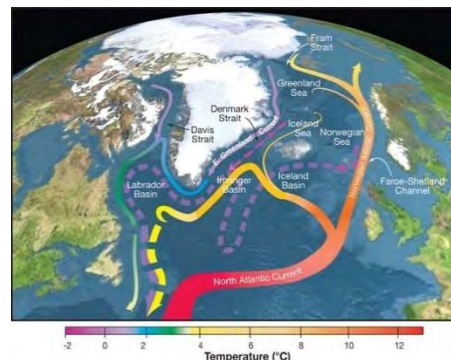
QUEBEC HYDROPOWER IS USING THE CAPTURED WATERS OF THE SPRING FRESHET TO INCREASE WINTER RIVER DISCHARGE THREE-FOLD

In a recent Canadian study of trends in river discharge from 1964-2013, the authors found: ***“that there has been a three-fold increase in river discharge during winter, when electric demand peaks, into the estuaries of Labrador Sea and Eastern Hudson Bay for the 2006-2013 period compared to 1964-1971 and a forty percent reduction in discharge during the summer.”*** (Recent Trends and Variability in River Discharges Across Northern Canada Dery et. al. 2016).

The earlier LaGrande Riverine Graph shows January-April outflows have been increased four-fold on average. Before reservoir hydroelectric facilities were built in Quebec and Newfoundland/Labrador (NL), the brooks, streams and rivers in these watersheds freely and naturally transported 80% of the annual budget of dissolved silica and other nutrients to the ocean.

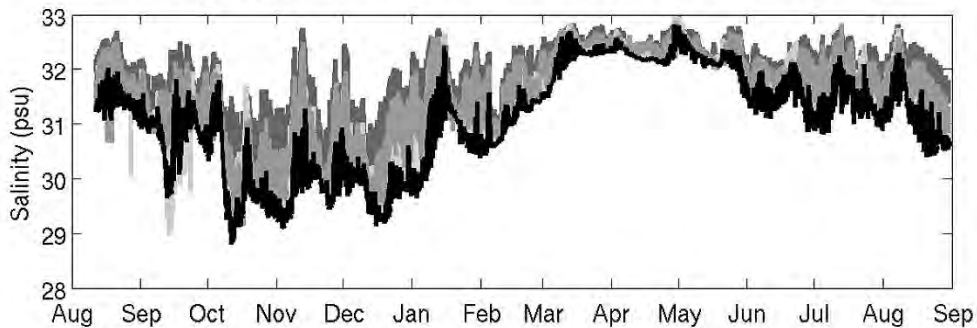
The riverine spring freshet historically transported the majority of the annual load of silica and other nutrients into the Hudson Bay and eventually the Labrador Sea and Current via the Hudson Strait and then into the Gulf of Maine via the Labrador Current. These captured waters of the spring freshet are now being saved and historic summer generation reduced by forty percent in order to increase winter generation by threefold or more.

ATLANTIC MERIDIONAL OVERTURNING CIRCULATION



THE OUTFLOWS FROM THESE RESERVOIR DAMS ARE SO LARGE THAT SALINITY LEVELS IN HUDSON STRAIT ARE IMPACTED, AS SHOWN IN THE FOLLOWING GRAPH FROM A 2007 STUDY, THE OUTFLOW FROM HUDSON STRAIT AND ITS CONTRIBUTION TO THE LABRADOR CURRENT, BY STRANEO AND SAUCIER.

Salinity from the Microcats on moorings B and C



Source: Straneo & Saucier Nov. 2007

This graph shows the waters with the highest salinity flow past the moorings in the Hudson Strait during the mid-March through June period. Historically (pre-1970) this time period would have had the lowest salinity waters because of the high flows of the natural spring freshet flowing into Hudson Bay and then into Hudson Strait. This finding is another piece of evidence that these dams are starving the silica diatom phytoplankton of silica and other nutrients during the spring and summer.

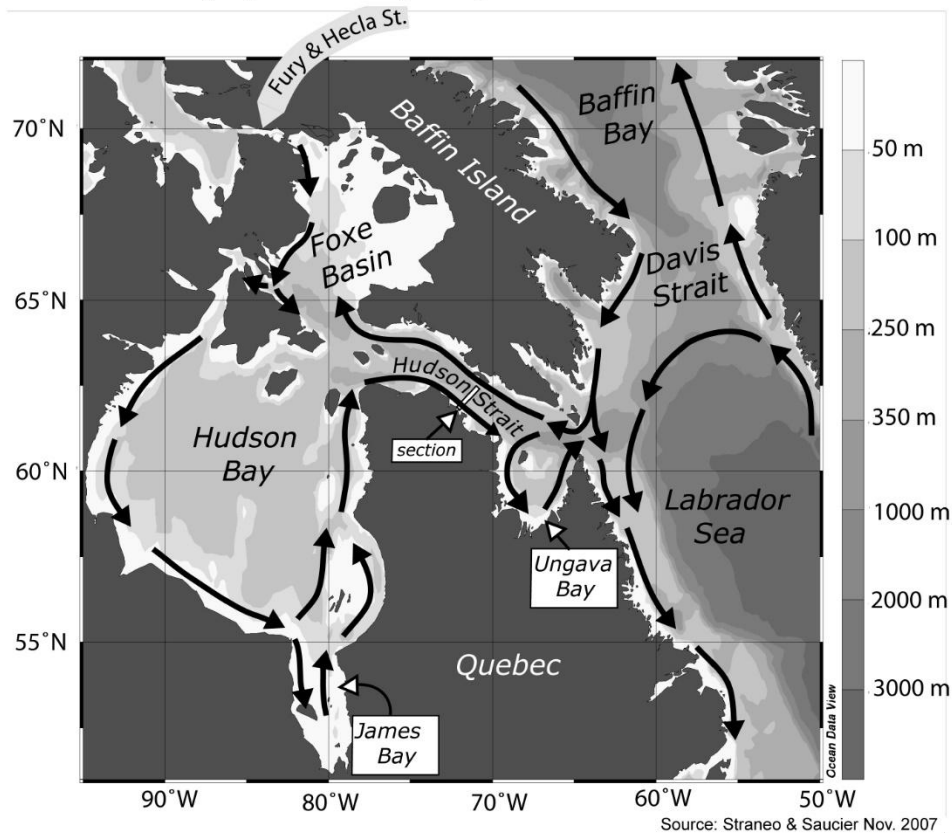
The threefold increase in winter discharge from the dams results in waters with the lowest salinity from mid-October through mid-January.

Straneo and Saucier wrote the following in their 2007 Report:

“Our results suggest that approximately 15% of the volume and 50% of the fresh water carried by the Labrador Current is due to Hudson Strait outflow. This is a striking new result, which suggests that we need to rethink the source waters for the Labrador Current and, in general, the fresh water pathways into the sub polar North Atlantic. They indicate that the role of Hudson Strait had been previously overlooked due to the absence of direct measurements from the Strait.”

The surface area of water in Maine is only 4,537 square miles, compared to Quebec with 68,312 square miles and NL with 12,100 square miles. It is obvious that the Gulf of Maine is very dependent on the dissolved silica and nutrients transported by the rivers of these provinces during the spring freshet to fuel the Gulf’s diatom phytoplankton blooms.

Hudson Bay System: bathymetry and schematic circulation



These blooms are the essential basis of the marine food web and their decline in both size and quantity are starving all the fisheries.

QUEBEC HYDROPOWER HAS SIGNIFICANTLY REDUCED SILICA AND NUTRIENT-ENRICHMENT ATTRIBUTED TO LAND BASED RUNOFF AND COASTAL UPWELLING IN HUDSON BAY AND LABRADOR SEA

“Most fisheries production world-wide is associated with three nutrient-enrichment processes: coastal upwelling, tidal mixing and land-based runoff, including major river outflow” (Caddy and Bakun, 1994).

“Many documented reductions in fisheries production have been attributed to river regulation, modifying natural variation in freshwater flow. Protecting natural flow regimes is likely to be an effective management strategy to maintain the production of estuarine and coastal fisheries” (Gillson, 2011).

Land based runoff has been significantly reduced as Quebec Hydropower manages its reservoir dams to capture the spring freshet and reduced summer outflows. Compounding this reduction in annual input of silica and other nutrients from land based runoff is the fact that nutrient enrichment from coastal upwelling is so limited in Hudson Bay.

The following was written in Bay Sys 2016 Mooring Program Cruise Report by Claire Hornby: *“The high riverine freshwater input in James Bay is causing a strong thermohaline stratification at the entrance to Hudson Bay,”*

and

“In Hudson Bay, a massive freshwater input by river runoff causes a strong stratification restricting upward nutrient flux into the surface layer and limiting phytoplankton production particularly in summer.”

This is a double whammy negatively impacting the abundance of silica shelled diatom phytoplankton.

ABUNDANCE OF DIATOM PHYTIOPANKTON HAS DECLINED

The results of a 2010 Study by Daniel Boyce using a 100-year data set concluded that the abundance of diatom phytoplankton had declined by 40% since 1950, and in a recent NASA study in “Global Biogeochemical Cycles,” the authors have concluded the global diatom populations have declined by 1% per year from 1998 to 2012.

“Atlantic ocean plant life, the phytoplankton, has been observed to be in tremendous decline. International science teams have measured more than a 26% loss in the last 30 years. How bad is 26%? Remember when we destroy just 1 in 10 of any form of life we say that we have decimated that life. It’s bad. Very bad. And the starvation and disappearance of Atlantic Cod stand as testimony to the collapse of the Atlantic Ocean pastures. Ocean pasture grass is plankton.” (Russ 2014).

I offer the following analogy to help understand these spring blooms of the silicon diatom phytoplankton pastures and their dependence on the timely deliverance of this essential nutrient.

In the winter our lawns and fields are brown and barren. Spring heralds in more sunlight and the ground warms up. After the first rains deliver much needed nutrients to the lawns and fields, they seem to green up almost overnight. The farm animals begin grazing on the fresh and luscious grass, and the grasses begin transferring through photosynthesis carbon dioxide out of the atmosphere.

Out on the ocean, silica diatom phytoplankton are the pastures of the aquatic food web and one of earth’s atmospheric thermostats for carbon levels. During late fall and through the winter these phytoplankton pastures are barren.

Spring heralds in more sunlight, and the oceans warm up. As the snow melts and rain falls on the landscape, the spring freshet begins to flow through our brooks and streams turning the rivers into a tumultuous roar.

These roaring waters are scrubbing silica, which is the second most common element, from the earth's crust.

Quebec Hydropower manages its reservoir hydroelectric generating facilities to capture the spring freshet. Spring discharges are now only 40% to 50% of historic (before reservoir damming) flows and silica diatoms are being starved of silica and other nutrients at this critical time of the growing season.

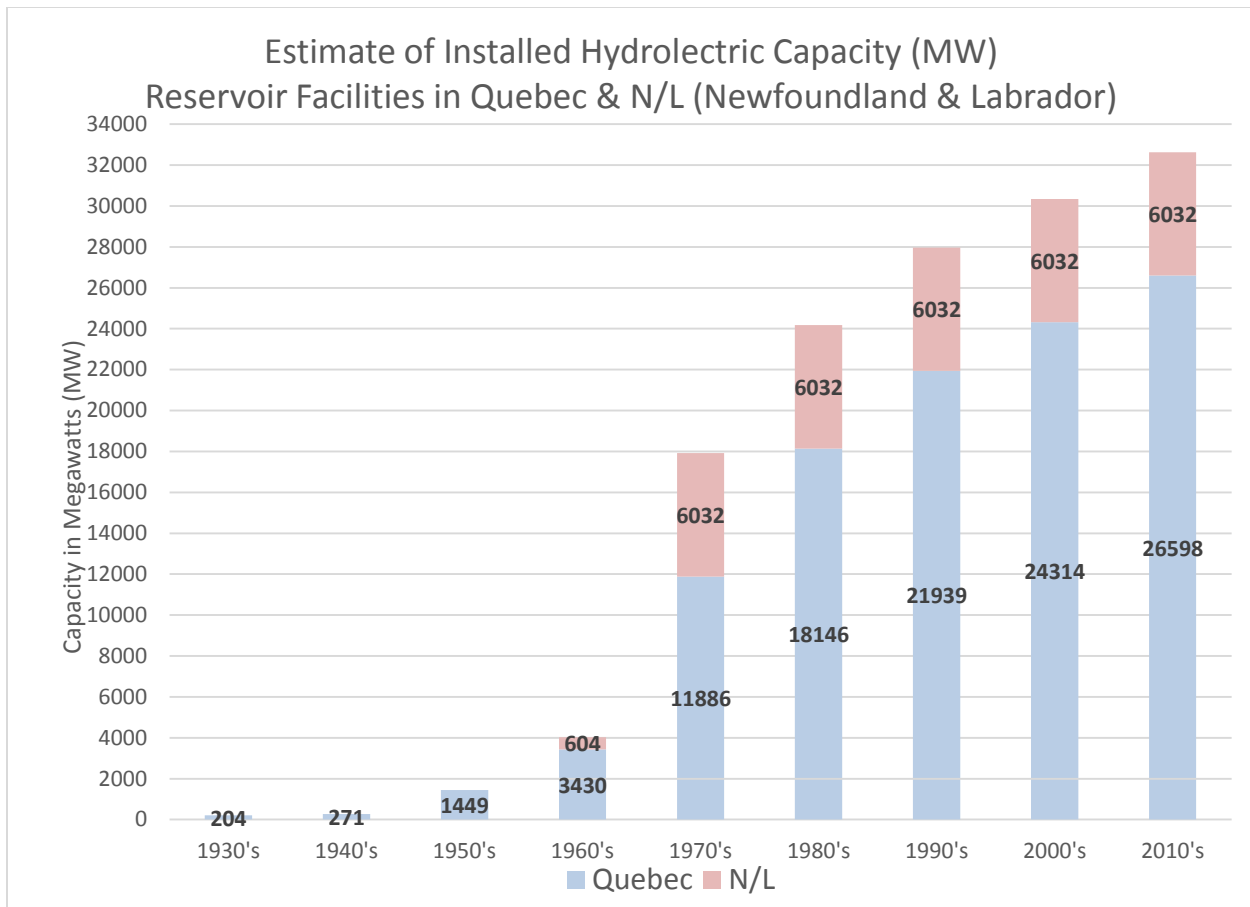
Starving the diatoms of silica means Quebec Hydropower's actions are starving the fisheries and maybe contributing to the increasing levels of carbon in our atmosphere.

Historically (thousands of years) if there was too much carbon in the atmosphere, then the atmosphere and oceans would warm up. This was followed by more evaporation and increased rainfall and snow, which resulted in roaring rivers transporting more silica to the oceans. This increased the size and abundance of silica diatom phytoplankton blooms, which provided more food for the fisheries and increased transference of carbon dioxide to the oceans. This, in turn, cooled off the atmosphere and oceans.

THE PROLIFERATION OF RESERVOIR HYDROELECTRIC FACILITIES OVER THE LAST FIFTY YEARS HAS PRODUCED A LACK OF SILICA WHICH HAS NEGATIVELY IMPACTED THE ABUNDANCE OF DIATOM PHYTOPLANKTON AND STARVED THE FISHERIES AND MAY BE CONTRIBUTING TO CLIMATE CHANGE

Quebec Hydropower not only built huge reservoir hydroelectric facilities throughout Quebec, but also built the 5,428 (MW) Churchill Falls Generating Station in Newfoundland and Labrador (NL).

The graph below illustrates how the annual capacity in MW's from Quebec Hydropower's reservoir hydroelectric facilities increased by 450 percent from 4,034 MW in the 1960's to 17,918 in the 1970's. and by another 200% in the 2010's to 32,630 MW.



Earlier I used an analogy to show how the reduction in May and June outflows from the LaGrande facilities is equivalent to eliminating 7 Penobscot Rivers flowing into the Gulf of Maine during May and 10 Penobscots flowing into the Gulf in June.

The LaGrande facilities have 3 reservoir facilities and one Run of the River, and their total annual capacity is 8,738 MW.

The graph above shows a total annual capacity for reservoir facilities of 32,630 MW.

It would not be unreasonable to estimate that the reduced May and June outflows from these facilities would be the equivalent of eliminating 26 (7 Penobscots x 32,630 MW ÷ by 8,738 MW) Penobscot Rivers flowing into Gulf during May and 37 in June.

These estimates are conservative as I did not include, in the above graph, facilities in Manitoba and Ontario.



THE CUMULATIVE EFFECT OF FIFTY-PLUS YEARS OF REDUCED ANNUAL INPUT OF DISSOLVED SILICATE FROM ALL THESE DAMS IS DESTROYING BOTH THE FISHERIES AND ECOSYSTEM OF GULF OF MAINE

The following quotes from a scientific report, *Hydrological Alterations and Marine Biogeochemistry: A Silicate Issue?*, by Ittekkat et. al. (2000) describes some of the processes that are responsible for the decline we are seeing in the ecosystem and fisheries of Gulf of Maine and Northwest Atlantic.

“Freshwater and sediment inputs from rivers play a major role in sustaining estuarine and coastal ecosystems. Nutrients from rivers promote biological productivity in estuaries and coastal waters . . . and help to maintain ecosystems along the periphery of land masses.”

“Most studies addressing the causes of eutrophication have concentrated on the elements nitrogen and phosphorus, mainly because both these nutrients are discharge by human activities. Silicate, however, also plays a crucial role in algal growth and species composition.”

“The source, transport and sink characteristics of silicate, as they relate to change in the hydrology of rivers, are distinct from those of nitrogen and phosphorus. Large-scale hydrological alterations on land, such as river damming and river diversion, could cause reductions of silicate inputs to the sea (Humbug et al 1997). By contrast, although all nutrients (nitrogen, phosphorus and silicon) get trapped in reservoirs behind dams, nitrate and phosphate discharged from human activities downstream of the dam more than make up for what is trapped in reservoirs, for silicate, there is no such compensation. The resulting alteration in the nutrient mix reaching the sea could also exacerbate the effect of eutrophication—that is, silicate limitation in perturbed water bodies can set in much more rapidly than under pristine conditions, leading to changes in the composition of phytoplankton in coastal waters.”

QUEBEC HYDROPOWER’S RESERVOIR FACILITIES AND OPERATIONS ARE INCONSISTENT WITH MAINE’S NATURAL RESOURCES PROTECTION ACT

The proliferation of large reservoir hydroelectric dams by Quebec Hydropower over the last 50 years never would have been allowed in Maine because the construction and management of these dams would have violated Section 401 of the Clean Waters Act and Maine’s Natural Resources Protection Act.

To put this in perspective, Quebec Hydropower has 66 hydropower generating sites, and 38 are Run of River with a total capacity of 11,100 megawatts (MW), and 28 are reservoirs with a total capacity of 26,800 MW.

Maine’s annual hydropower generating capacity is only 723 MW.

Quebec Hydropower’s reservoir facilities have basically eliminated the spring freshet on these rivers by capturing and storing the spring run-off.

This would be an act of pollution on Maine’s rivers under the Clean Waters Act, because the storage of these free-flowing cold waters has reduced by 40% to 50% the historic and natural delivery of the annual budget of dissolved silicate to the Gulf of Maine via the waters flowing through the Hudson Strait and the Labrador current.

In 2006, the Maine Department of Environmental Protection (MeDEP) and S. D. Warren argued before the U. S. Supreme Court over whether S. D. Warren was polluting the Presumpscot River and violating Section 401 of the Clean Water Act (CWA), because it was using too low a minimum flow during hot summer months.

MeDEP argued that dissolved oxygen levels were too low in the river downstream of the Eel Weir Dam and a higher flow was needed to provide more dissolved oxygen for aquatic life.

The Supreme Court agreed with MeDEP in a 9 to 0 decision, and Justice Souter wrote ***“The decision interprets term “discharge” according to its “ordinary and natural meaning”*** and rejects efforts by S. D. Warren to have the Court read into CWA Section 401 any requirement that the regulated activity result in the ***“addition of a pollutant.”***

In other words, holding back clean water laden with dissolved oxygen was polluting downstream water, which did not have enough dissolved oxygen to support the river’s fisheries and aquatic life.

Furthermore, the construction of these reservoirs have not only flooded and eliminated the functions and values of hundreds of thousands of acres of wetlands, but have also captured the cold and free-flowing water of thousands of miles of brooks, streams and rivers in these reservoirs, along with the dissolved silica, which was being transported in the spring freshet by these once naturally free-flowing water bodies.

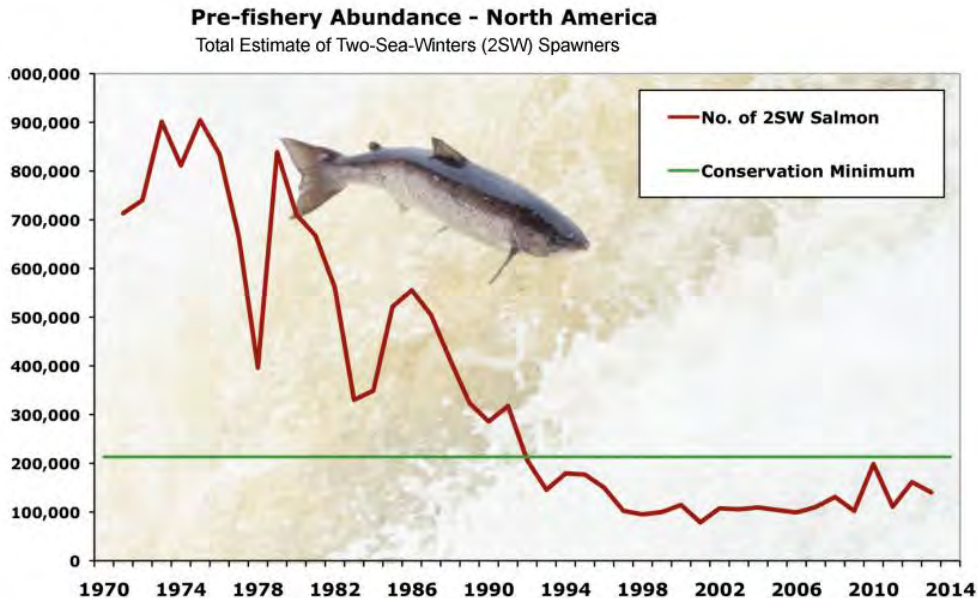
Quebec Hydropower’s reduction of spring and summer outflows is polluting Hudson Bay, Labrador Sea and the Gulf of Maine by depriving the silica encased diatom phytoplankton population of its much needed dissolved silica during its growing season.

Diatoms are algae cells enclosed with cell walls made of silica, and their growth rate and size are determined by the availability of dissolved silica and the temperature of the water. In March, with more daylight hours, the diatom population increases its rate of photosynthesis enabling it to start dividing and multiplying into a healthy diatom bloom and the more silica, the bigger the diatoms and bloom.

These reservoirs prevent the cold natural waters of the spring freshet from reaching the coastal estuaries, and these retained waters are then exposed to “aging” as the water temperature quickly rises and changes in its biochemistry occur before being discharged from the dam.

The Gulf of Maine is one of the most important oxygen producing ocean “rain forests” in the world, and its diatom rich ecosystem is responsible for superior fisheries, ameliorating ocean acidification and regulating climate change. The cumulative effect and the proliferation of reservoir hydropower in its ecosystem are destroying it.

QUEBEC HYDROPOWER RESERVOIR FACILITIES ARE NOT ONLY STARVING THE SILICA DIATOM PHYTOPLANKTON POPULATION, BUT ALSO THE ATLANTIC SALMON FISHERY (SEE GRAPH BELOW)



Pre-fishery Abundance (PFA) graph for North American 2SW salmon showing the total number needed to meet the total Minimum Conservation Limit in North American rivers in green (corrected for 11 months of natural mortality). The PFA numbers are those 11 months before they return to their home rivers in North America.

Source: Atlantic Salmon Federation 2015

IT IS NO LONGER A QUESTION OF MAY!

There were early warning signals that the proliferation of these reservoir hydroelectric facilities may have a negative impact on the food chain in the northwest Atlantic and Gulf of Maine.

Sutcliffe et. El. (1983) hypothesized that reducing the spring freshet by hydroelectric regulation in the Hudson Bay area may affect northern cod populations along the Labrador coast.

The following was written in a 1998 Canadian study:

- a. *“Hydroelectric development on major rivers is seasonally altering the physical structure of the water column in coastal waters,”* and *“the implications of these hydro developments on the marine environment are not fully understood.”* (Harding 1992)
- b. *“Hydroelectric development has markedly reduced this spring run-off, and this may be enough to delay the phytoplankton bloom and thereby shorten an already brief growing season for larvae fishes and benthic invertebrates.”* (Morin et al. 1980)

THE GULF OF MAINE AND CHINA SEA ARE WARMING AT AN ALARMING RATE, AND NOW THERE IS ANOTHER AREA

The countries who are the biggest producers of hydroelectricity are warming their nearby oceans. The Gulf of Maine and South China Sea are two areas in the global ocean, which are warming the

fastest, and they are located next to the two largest producers of hydroelectricity in the world. Number one is China, and number two is Canada. Quebec Hydropower is Canada's largest producer, and it's warmer than natural discharge waters flow via the Labrador Current into the Gulf of Maine.

The third area is Barents Sea, and scientists say *"changes are so sudden and vast that in effect, it will soon be another limb of the Atlantic, rather than a characteristically icy Arctic Sea."* The Barents Sea is being impacted by Norway and Russia, which are the 5th and 6th largest producers of hydroelectricity in the world.

The water impounded by these large reservoirs is heated by the sun, and the discharged water from the impoundment is much warmer than the natural free flowing water upstream of the reservoirs. The temperature of the Gulf of Maine's waters is responding to the cumulative impact of more and more reservoir hydropower generation sites being built in the past fifty years. Since 1969, Quebec Hydro has built 22 reservoir hydropower dams, which is almost one every other year.

Since 1986, the area of the under ice plume from the LaGrande River has trebled and can extend 100 KM (62 miles) under the land fast ice of James Bay in the Hudson Bay (Roche 2017). Plumes of this magnitude, with warmer than natural flowing waters, could be contributing to thinner and weaker ice in the impacted area.

MORE CARBON IN THE AIR

The reduction in both the size and abundance of diatom phytoplankton blooms have contributed to the increased carbon in the air by significantly reducing the natural transference of carbon dioxide from the atmosphere to the ocean.

Mighty Diatom



(silica shelled phytoplankton)

The mighty diatoms are the microscopic plants that dominate all other ocean species in converting carbon dioxide to carbon and releasing oxygen.

“Diatoms are at the bottom of the food chain and suck up nearly a quarter of the atmosphere’s carbon dioxide . . . Size matters for the creatures that eat them and also for carbon sequestration, as large diatoms are more likely to sink when they die . . . If smaller sized diatoms dominate, then carbon sequestration becomes less efficient and there may be more carbon dioxide in the atmosphere, which would exacerbate global warming” (Litchman et. al.2000).

Here in Maine, we criticize those that irresponsibly bring destruction to the world’s oxygen producing forests, and yet we are fully complicit in policies that diminish the freshwater delivery of the critical necessary nutrients like silica to our own “ocean rain forests.”

The proliferation of reservoir hydroelectric facilities on Quebec’s major rivers has greatly altered the seasonal timing of silica-laden freshwater quantities delivered to Hudson Bay, Labrador Sea and eventually the Gulf of Maine. The diatom plankton ecosystems have not evolved to be starved of nutrients in the spring and summer and then fed nutrients under lower light and temperature conditions in late fall and winter. As a result, diatom population is adversely affected, and the rest of the food chain is starving and the percent of carbon dioxide in the atmosphere is increasing.

Quebec Hydropower’s management is contrary to the good science found in the conclusion of a 2004 scientific report Lost to the Tide: the Importance of Freshwater Flow to Estuaries, by University of Rhode Island oceanographer Scott Nixon, et. al;

1. ***“ Realization that fresh water serves an important ecological function in estuaries means that all engineering interventions in the flow of water to the coast should be looked at very carefully to see if diversions are really necessary and to see if releases from storage can be programmed to parallel the natural pattern as closely as possible.”***
2. ***“It is important to understand that the freshwater that reaches the coast plays an important role in sustaining the productivity of estuarine ecosystems, which are also very important to people. Maintaining the flow of fresh water to the coast should be a consideration in fresh water management decisions.”***

Mr. Jonathan Gilson wrote the following in a 2011 Report, in which, he referenced 217 Reports to support his conclusions:

“Episodic flood and drought events have pronounced impacts on fisheries production due to rapid change in physicochemical conditions modifying species richness and diversity. Many documented reductions in fisheries production have been attributed to river regulation modifying natural variation in freshwater flow. Protecting natural flow regimes is likely to be an effective management strategy to maintain the production of estuarine and coastal fisheries.”

CONCLUSION

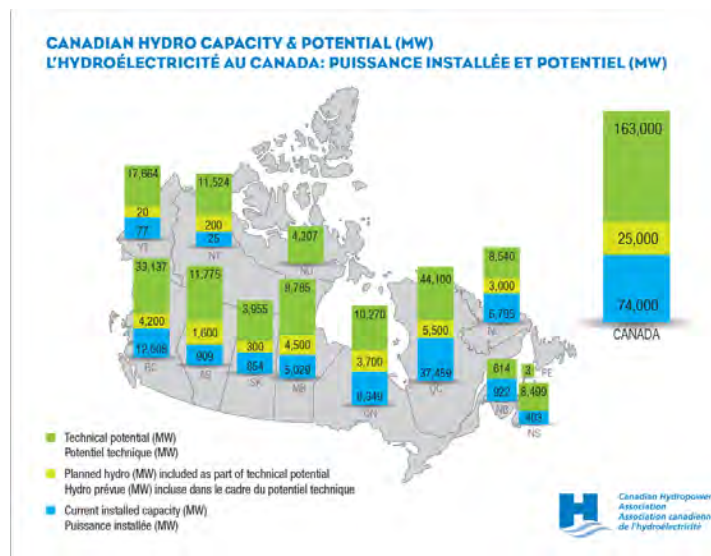
Let's put some of the above observations in layman's terms. It would be declared an extreme drought by meteorologists if total spring and summer precipitation was forty percent below normal. If it happened for fifty continuous years on land in the northern latitudes, the people would have starved to death. In the ocean waters of Newfoundland, Labrador and Maine, the fisheries are being starved to death.

For the past fifty years, a three-fold increase in river discharge of these warmer than normal reservoir waters (mid-thirty degree Fahrenheit) during the three months of winter represents a deluge of biblical proportion to the frozen seas. There are thousands of reservoir hydroelectric facilities throughout the northern latitudes operating in a similar manner.

The cumulative impact is predictable! Since the start of regular satellite observations in 1979, there has been an overall decline in Arctic sea ice in the past forty years. However, total sea ice in the Antarctic has increased by one percent per decade. Is this deluge of warmer than natural discharged waters a key factor in the decline of Arctic sea ice?

This Report has documented how the building and management by Quebec Hydropower of its reservoir hydroelectric facilities has captured the spring freshet and reduced the historic transport of dissolved silica. These actions are the driving force in the starvation of the fisheries and may be contributing to increase carbon levels in the atmosphere. Canada has ambitious plans to build many more reservoir facilities, which will only exacerbate the problem and may prove to be the tipping point.

MAP OF EXISTING AND FUTURE FACILITIES



Reject CMP Power Line Because Hydro-Quebec Facilities Damage Ecosystem

I am publicly writing to ask Maine's Department of Environmental Protection (MeDEP) to deny a permit for the 145-mile transmission corridor proposed by Avangrid-CMP to carry hydroelectricity generated by Quebec Hydropower from Canada to Massachusetts because Quebec Hydropower reservoir hydroelectric facilities are starving the fisheries in the Gulf of Maine and warming its waters.

In a recent 2016 Canadian study of trends in river discharge from 1964-2013, the authors found: that there has been a three-fold increase in river discharge during winter, when electric demand peaks, into the estuaries of Labrador Sea and Eastern Hudson Bay for the 2006-2013 period compared to 1964-1971 and a forty percent reduction in discharge during the summer. (*Recent Trends and Variability in River Discharges Across Northern Canada* Dery et. Al. 2016).

Let's put these findings in layman's terms. It would be declared an extreme drought by meteorologists if total spring and summer precipitation was forty percent below normal. If it happened for fifty continuous years on land in the northern latitudes, the people would have starved to death. In the ocean waters of Newfoundland, Labrador and Maine, the fisheries are being starved to death.

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The proliferation of large reservoir hydroelectric dams by Quebec Hydropower over the last 50 years never would have been allowed in Maine for the following reasons:

1. The construction and management of these dams would have violated Section 401 of the Clean Waters Act and Maine's Natural Resources Protection Act.
2. These dams are starving the fisheries of Hudson Bay, Labrador Sea and the Gulf of Maine, by reducing the transport of the annual budget of dissolved silicate during spring freshet to silicon diatom phytoplankton, which is the essential basis of the marine food web.

Attachment 1
Page 1

3. The reduction in diatom phytoplankton blooms have increased carbon in the air by significantly reducing the natural transference of carbon dioxide from the atmosphere to the ocean.
4. These reservoir dams are warming the waters of the Hudson Bay, Labrador Sea and the Gulf of Maine by capturing the spring freshet behind these dams and holding these waters to maximize hydropower generation during peak demand in the winter months.

If a permit is issued, it should be conditioned on Quebec Hydropower changing the management of their reservoir facilities to a Run of River mode, which uses the natural flow of the river. This would help restore large silicon diatom phytoplankton blooms to feed the fisheries and increase carbon dioxide transference from the atmosphere to the ocean. It should also help reduce the warming of the waters of Hudson Bay, Labrador Sea and the Gulf of Maine.

“Half of the Gulf of Maine’s ecosystem lies in Canada, where much of the water feeding the Gulf and affecting its temperature comes from,” was written by Colin Woodward in 10/15/15 Maine Sunday Telegram article.

Quebec Hydropower’s reservoir facilities have eliminated the spring freshet on these rivers by capturing and storing run-off.

The proliferation of reservoir hydroelectric facilities on Quebec’s major rivers has greatly altered the seasonal timing of silica-laden freshwater quantities delivered to Hudson Bay, Labrador Sea and eventually the Gulf of Maine. This would be an act of pollution on Maine’s rivers under the Clean Waters Act.

The diatom plankton ecosystems have not evolved to be starved of nutrients in the spring and summer and then fed nutrients under lower light and temperature conditions in late fall and winter. As a result, diatom population is adversely affected, and the rest of the food chain is starving and the percent of carbon dioxide in the atmosphere is increasing.

It is time to recognize that there may be a key regional factor starving the fisheries and warming Hudson Bay, Labrador Sea and the Gulf of Maine. If the fisheries are starving in all these waters, then the obvious place to look is the food chain.

Stephen M. Kasprzak

Attachment 1
Page 2

**HYDRO-QUEBEC'S DAMS
HAVE A CHOKEHOLD
ON THE
GULF OF MAINE'S
MARINE ECOSYSTEM**

By Stephen M. Kasprzak

January 15, 2019

PREFACE

I wrote an October 15, 2018 Report “The Problem is the Lack of Silica,” and a November 28, 2018 Report, “Reservoir Hydroelectric Dams - Silica Depletion - A Gulf of Maine Catastrophe.”

The observations, supplements and references in this Report support the following hypothesis, which was developed in these two earlier Reports:

Hydro-Quebec’s dams have greatly altered the seasonal timing of spring freshet waters enriched with dissolved silicate, oxygen and other nutrients. This has led to a change from a phytoplankton-based ecosystem dominated by diatoms to a non-diatom ecosystem dominated by flagellates, including dinoflagellates, which has led to the starvation of the fisheries and depletion of oxygen and warming of the waters in the estuaries and coastal waters of the Gulf of St. Lawrence, Gulf of Maine and northwest Atlantic.

Physicist Hans J. A. Neu offered a similar hypothesis in his 1982 Reports and predicted the depletion of the fisheries by the late 1980’s and a warming of the waters.

Anyone who wants to question this hypothesis has to also question more than 40 years of research, which the passage of time has documented the earlier research and predictions as correct.

If you stopped burning fossil fuels tomorrow, it will not stop the starving of the fisheries . This will only happen if you release the chokehold on the rivers and allow the natural flow of the spring freshet and the transport of dissolved silicate and other essential nutrients. The high outflows of the spring freshet will also strengthen the density current (haline circulation) and restore the natural balance in the mixing of Labrador Current and Gulf Stream waters and help cool the waters.

It should also help to reduce ocean acidity as larger and heavier silica-encased diatoms would sequester more carbon to the bottom of the ocean.

Climate change is not the only force destroying the Gulf of Maine, and it is time to recognize that hydroelectric reservoir dams may be part of the problem. Mr. Hue wrote the following in his 1982 Report:

“In conclusion, fresh water regulation may prove to be one of the most consequential modifications man can impose on nature. If we do not alter our course and give consideration to nature’s needs there will be irreparable injuries inflicted on the environment for which future generations will condemn us..”

My hypotheses can easily be tested by taking core samples in the bottom of the reservoirs and measuring dissolved silicate concentrations in the discharged waters from these reservoirs.

DEDICATION

This report is dedicated to Hans J.A. Neu.

He was a Senior Research Scientist with the Canadian Department of Fisheries and Oceans at the Bedford Institute of Oceanography , Dartmouth, Nova Scotia. A specialist for 27 years in estuarine and coastal hydrodynamics, he has studied the physical oceanography of the major waterways across Canada as well as on the continental shelf and north-west Atlantic. He died on January 28, 2009 at the age of 83.

His 1982 Reports "Man-Made Storage of Water Resources – A Liability to the Ocean Environment? Parts I and II" were published in Marine Pollution Bulletin Vol. 13, No. 1 and No. 2 and printed in Great Britain.

In 1982, Mr. H. Neu predicted the depletion of the fisheries and explained how reducing spring flows would negatively impact the transport of nutrients to the estuaries and coastal waters via the rivers and also from deep ocean waters via haline circulation and/or density currents.

The magnitude of this density current is fueled by fresh water entering the ocean via our rivers. *"In estuaries the density current varies with seasonal run-off, being at a minimum during low discharges in the winter and at its peak in spring and summer. In coastal waters which are some distance away from the fresh water sources (i.e. the Grand Banks the Scotian Shelf and Georges Bank) and Gulf of Maine (added by me) there can be delays of from several months to almost a year before the freshwater peak arrives"* (Hue Part 1 1982)

A February 9, 1977 article in the Sherbrooke Record in Quebec appears on page 4 and illustrates why I am dedicating this report to Hans J.A . Neu. It is very disquieting that the politicians, scientists and media failed to support his recommendations for more studying.

He was obviously right as proven by the collapse of so many fisheries by the late 1980's and the warming of the waters of the Gulf of Maine and St. Lawrence as well as the northwest Atlantic, which has been brought on by a much weaker density current due to the proliferation of reservoir hydroelectric dams by Hydro-Quebec over the past 70 years

He predicted in the 1970's and early 1980's the following negative impacts of reservoir hydroelectric dams:.

1. *“Far reaching consequences on the life and reproduction cycle in the marine environment of the region affected,”*(see Section II, on page 11.)
2. *“the next big decline (in fisheries stock) probably will be in the early or mid-eighties” and “will be worse, since regulation will have increased further in the meantime,”* (see Section II on page 11.)
3. *“There is a definite possibility that both winter and summer temperatures of the surface layer will increase; in winter due to an increase in upwelling of deeper warmer water, and in summer due to slower surface currents which will allow the surface layer to absorb more heat during its passage through the system. It can be assumed therefore that fresh water regulation modifies the climate of the coastal region to be more continental-like in the summer and more maritime-like in the winter.”*(See Sections X-XIII on pages 22-24.)
4. *“Even if we cannot yet measure the effects with certainty in our own marine environment, similar changes must already have happened to the coastal waters of Atlantic Canada and the effect must increase as regulation of our rivers continues. Of particular concern is the increased development of hydro-power – under construction or in the design stage – in Labrador, Ungava Bay, James Bay and Hudson Bay, which are about to threaten the productivity of the Grand Banks of Newfoundland.”* (See Section II on page 11.)

Hydro dams blamed for decline in fish stocks

DARTMOUTH, N.S. (CP) — A physicist at the Bedford Institute of Oceanography says hydro-electric dams might be more to blame than overfishing for the decline of fish stocks off Atlantic Canada, and no new dams should be built until the effects are known.

Dr. Hans Neu told a seminar at the institute Tuesday that Canada, more than any other nation, has been building water control projects on its estuaries, and no one knows what effect they are having on the ocean into which the rivers flow.

Dr. Neu, whose studies have dealt with the physics of water circulation, urged biologists to carry out research to prove whether his belief is correct that dams are the chief cause of declining fish stocks.

He explained that dams disrupt the natural cycle by which nutrient-loaded fresh water flows from the rivers into the ocean.

In their natural state, rivers carry smaller flows during the winter, when precipitation is frozen as snow, and sharply increased flows after the spring thaw. This coincides with the life cycle of marine organisms, increasing food supplies as they come out of their winter hibernation and decreasing supplies when winter

returns.

LEVEL CYCLES

But hydro-electric dams tend to level out the cycles, storing much of the spring and summer runoff in their reservoirs until winter, when consumer demand for power is greater.

This means that fresh-water nutrients reach the ocean in the winter, when the fish don't need them, and are lost into the barren depths beyond the continental shelf. In the spring and summer the nutrient supply fails to increase as rapidly as is needed.

Interruptions of the fresh-water supply could have further effects, he said, by interrupting "haline currents"—currents set up by the meeting of fresh and salt water. If these currents were stopped altogether, he said, it is theoretically possible that the coastal waters could freeze over.

Dr. Neu cited a scientific study showing that Egypt's Aswan High Dam on the Nile, a hydro-electric and irrigation project, caused a decline in nutrients to the Mediterranean off Egypt, with the result that fishing dropped off sharply. The catch of sardinella had been 15,000 tons in 1964 but declined to 4,600 tons in 1965 and only 554 tons in 1966. The dam also blocked passage of

other marine life such as shrimp and eel.

MANY MAJOR DAMS HERE

Canada has more than 20 projects controlling flows at least as great as the Aswan High Dam, Dr. Neu said. There has been much concern over the effects these dams have on the inland environment, yet nobody has studied what harm they are doing to the ocean environment.

Neither the provinces who plan the projects nor the bankers who finance them could be blamed for wanting the dams to run profitably, he said.

"But shouldn't there be someone who will stand up and say: 'No, you can't do that!'"

He suggested construction of water-control projects be regulated internationally and that no new projects be permitted until their effects on the ocean are known.

**The fit
never quit.**



Fitness. In your heart you know it's right.

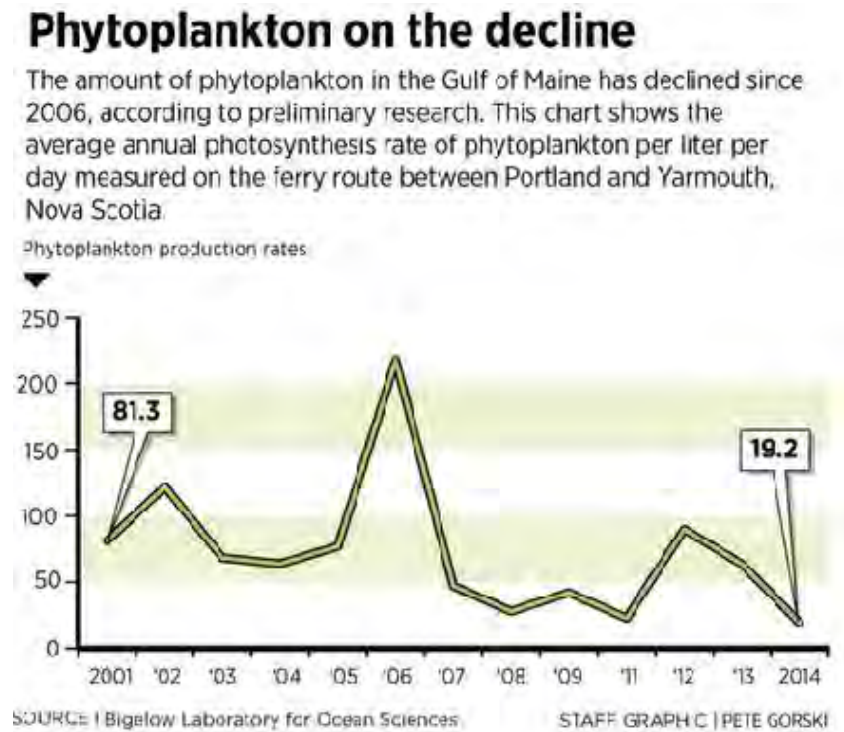
SUPPLEMENTS

- I. *“Hydro dams blamed for decline in fish stocks,”* in the Sherbrooke Record, Wed. Feb. 9, 1977 , pg. 4.
- II. *“Maine study finds potentially disastrous threat to single-celled plants that support all life,”* Christopher Cousins, BDN Staff, June 10, 2012, pgs 7 & 8.
- III. *“Hydroelectric dams are destroying the Gulf of Maine fishery,”* Roger Wheeler, Special to the Bangor Daily News, January 8, 2019, pgs 9 & 10.
- IV. *“The St. Lawrence is Low on Air,”* Quebec Ocean Fact Sheet @, January, 2011, pgs 28 & 29.
- V. *“Less and Less Oxygen in the St. Lawrence,”* Par Beatrice Riche, Editor of the Group for Research and Education of Marine Mammals, July 24, 2017, pgs 31 & 32.
- VI. *“Hydroelectric dams produce green energy? Think again,”* Stephen M. Kasprzak, Editorial to Maine Sunday Telegram, December 23, 2018, pgs. 34-36.
- VII. *“Hydro-Quebec offers misleading claims about climate impact,”* Bradford H. Hager, Editorial to Portland Press Herald, January 5, 2019, pgs. 37-39.
- VIII. *“Man -Made Storage of Water Resources – A Liability to the Ocean Environment? Part II,* “by Hans J. A. Neu in Matine Pollution Bulletin, Volume 13, Number 2, pages 44-47, 1982, pgs. 40-43.

SECTION I PHYTOPLANKTON IS ON THE DECLINE IN THE GULF OF MAINE

This Report and my two previous ones are focused on Hydro-Québec's reservoir hydroelectric dams and how they have negatively impacted phytoplankton, fisheries and water quality in the Gulf of Maine and its watershed, which includes the Gulf of St. Lawrence, James and Hudson Bays, and Labrador Sea.

The following graph, illustrates that phytoplankton biomass in the Gulf of Maine has fallen by 75%.



In the newspaper article, reprinted on the next two pages, Mr. Balch reasoned that above normal rainfall could be impacting phytoplankton regeneration rates.

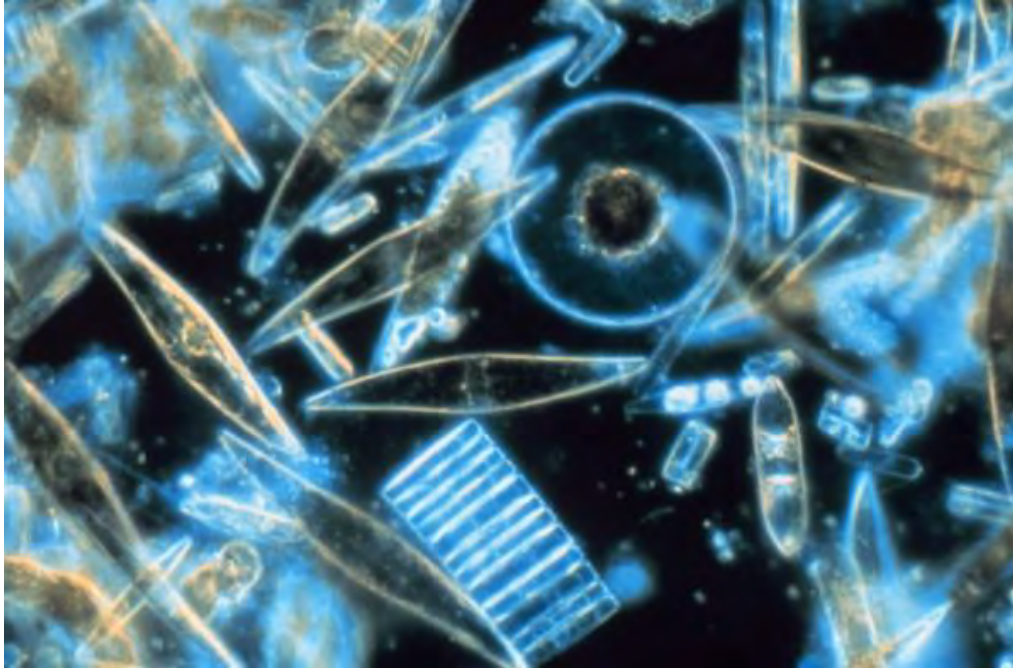
Above normal rainfall would be beneficial to phytoplankton regeneration rates by transporting more beneficial dissolved silica and nutrients to the coastal waters.

I believe the driving force of lower regeneration rates is the elimination of the "spring freshet" discharge into Gulf of St. Lawrence, James Bay and Hudson Bay and Labrador Sea.

The "natural" spring freshet of the Manicougan River as shown in Fig. 8 on page 16 has been eliminated. This freshet had a peak flow in 1976 of about 3500 cubic meters per second (124,000 cubic feet per second) and the freshet began around April 1st and lasted into June. These freshets have been eliminated on hundreds of rivers by the reservoir hydroelectric dams listed in Tables 1-3 on pages 14 and 15.

In a 1980's study by Therriault and Lavasseur on Lower St. Lawrence Estuary they observed "At high discharge rates (spring and fall) the whole Lower Estuary forms a single freshwater plume."

Maine study finds potentially disastrous threat to single-celled plants that support all life



Diatoms are one of the most common types of phytoplankton.

By Christopher Cousins, BDN Staff • June 10, 2012 5:02 pm

BOOTHBAY, Maine — Phytoplankton. If the mention of the tiny plant organisms that permeate the world's oceans isn't enough to pique your interest, consider this: They produce the oxygen in every other breath you take.

Still not interested? This is where it's hard not to take notice. In 2007, the reproduction rate of phytoplankton in the Gulf of Maine decreased suddenly by a factor of five — what used to take a day now takes five — and according to a recently released study by the Bigelow Laboratory for Ocean Sciences in Boothbay, it hasn't bounced back.

So what does it mean? According to Barney Balch, the lab's senior research scientist and lead author of the study, such a change in organisms at the bottom of the planetary food chain and at the top of planetary oxygen production could have disastrous consequences for virtually every species on Earth, from lobsters and fish that fuel Maine's marine industries to your grandchildren. But the 12-year Bigelow study focused only on the Gulf of Maine, which leads to the question, will it spread?

"I don't think it takes a rocket scientist to know that if you shut down the base of the marine food web, the results won't be positive," said Balch.

Balch said the study, which was published recently in the Marine Ecology Progress Series, provides one of the strongest links to date between increases in rainfall and temperature over the years and the Gulf of Maine's

ecosystem. Key factors in the study's conclusions were driven by 100 years of records on rainfall and river discharge, both of which have increased by between 13 and 20 percent over the past century.

In fact, of the eight heaviest rainfall years in the past century, four of them fell between 2005 and 2010. Balch said that increased precipitation, along with water melting from the polar ice caps, could be the reason for the problems discovered in the phytoplankton regeneration rate. The fact that Gulf of Maine's water temperature has risen about 1.1 degrees Celsius — which is on par with what is being seen around the world — could also be a factor.

“The major change that we're seeing is that we are now able to put [precipitation and temperature data] into better context,” said Balch. “It's so striking that the increase is so statistically significant.”

Though heavier water flows into the Gulf of Maine might be a major factor, Balch said it may actually be side-effects of that phenomenon — such as decreased salinity and increasing amounts of materials like rotting plant matter being swept up in the stronger currents — that are actually causing the problem. In other words, when the water is brown it's bad for phytoplankton because the added material in the water starves the single-celled plants of sunlight.

During the 12-year study, which focused on the area of sea between Portland and Yarmouth, Nova Scotia, researchers noticed that plumes of material coming from Maine rivers were reaching 70-100 kilometers into the ocean — farther than had ever been seen before. The outflows also prevent nutrient-rich deep-ocean water from circulating into the Gulf of Maine.

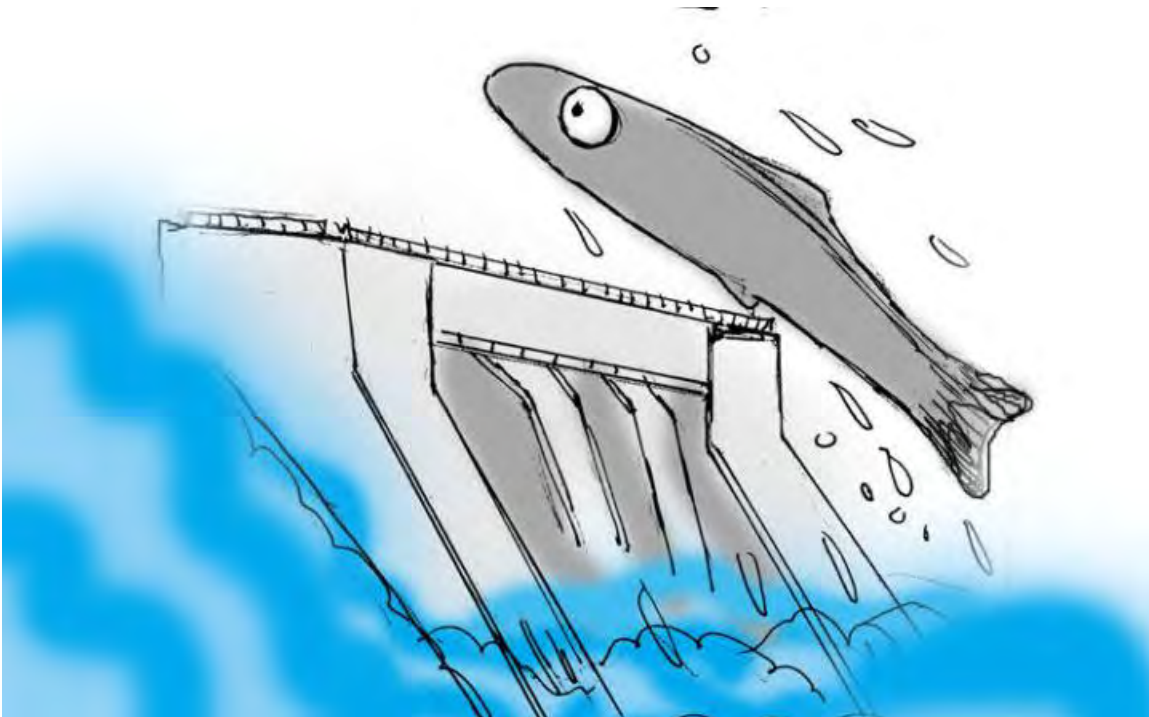
“When you collect the amount of data that we've collected, it's hard to discount the significance,” said Balch. “I know there are skeptics out there who still discount the issue of climate change, but the evidence now is just striking. We need to be thinking very carefully about trying to slow this down. It didn't happen overnight and it's not going to go away overnight.”

Balch said that the Gulf of Maine is small compared to the world's oceans, but not without the capacity to have a marked effect on the overall ecosystem of the Atlantic Ocean. If the problem with the phytoplankton persists, fishermen will notice its effects long before the world's oxygen supply suffers. Phytoplankton is a key food source for several species of larval fish and lobster populations.

“People shouldn't freak out about this but they should think very carefully about the long-term changes that we humans are making,” he said. “This study shows the incredibly tight connection that there is between land and the ocean, especially in the coastal ocean.”

THIS SPECIAL EDITORIAL TO THE BANGOR DAILY NEWS ON JANUARY 8, 2019 BY ROGER WHEELER EXPLAINS THE HOW AND WHY OF THIS DECLINE IN PHYTOPLANKTON IN THE GULF OF MAINE.

Hydroelectric dams are destroying the Gulf of Maine fishery



George Danby | BDN

By Roger Wheeler, Special to the BDN • January 8, 2019 9:08 am

In a June 10, 2012, BDN article, “Study finds potentially disastrous threat to single-celled plants that support all life on Earth,” the late BDN reporter Christopher Cousins asked if the reader is interested in the rapid disintegration of the marine ecosystem. Yes, Chris, and although over six years late you have my full attention.

Since he wrote this compelling article, we now are aware that the essential nutrient of the most important single-celled plants is dissolved silicate and reservoir hydroelectric dams work to extinguish the annual free transport of this nutrient via the rivers into the ocean currents feeding the Gulf of Maine.

If we could magically engineer a tree that produces 10 times the oxygen of any existing equally sized tree on Earth, we would worship it. If we could engineer a tree that removes 40 percent of the carbon dioxide from the air and water and permanently buried its absorbed carbon in the depths of the soil, we would welcome it. With this special tree, we might have a fighting chance against accelerating global warming.

Here on Earth, there is a plant that is only 2 percent of the Earth’s biomass but provides us with 20 percent of the oxygen we breathe. This plant removes a significant percentage of the carbon dioxide from the ocean and

miraculously permanently sequesters the carbon it contains in the deep ocean sediments. This plant is the diatom, a phytoplankton, and it is a miracle “tree.”

Tragically, we are destroying the diatom populations. Worldwide, diatom numbers, like other beneficial phytoplankton, are disappearing by about 1 percent per year. In the Gulf of Maine, phytoplankton, including diatoms, have decreased by a factor of five in just 17 years. Diatoms require adequate dissolved silicate to grow their heavy thick shells. Worldwide, the proliferation of tens of thousands of mega dams over the last 70 years is preventing silica and other important nutrients from reaching the oceans.

Ground zero for the impacts of dams is the Gulf of Maine. This area of the earth was the finest fishery because of its huge watershed delivering copious amounts of dissolved silicate annually to the Gulf of Maine. The rivers of New England, the Canadian Maritime Provinces and Quebec and Ontario all delivered nutrients like no other place on Earth. The St. Lawrence River, by discharge volume, is the **second largest** river in North America. Nothing is more important to estuaries and coastal water ecosystems than the seasonal timing and volumes of freshwater flow.

Now, the regulation of river flow in the US and Canada has moved to follow a highly unnatural policy of diminishing if not eliminating the nutrient delivering spring freshet, and maintaining low flows from spring through the fall while reservoir storage dams release high flows in the winter when flows were naturally at their lowest. In Canada, the size and numbers of dams and reservoirs are staggering.

Around the world and in Canada **more hydro dam projects are planned**. Not only do these dams change nutrient delivery in northern seas but they release vast quantities of warm reservoir water in the winter and eliminate the natural cold spring freshet waters. It is not surprising the Gulf of Maine is warming faster than any other ocean body. **The numbers and sizes of the diatoms have been reduced as more and more reservoir dams have been discharging silica depleted water into the ocean currents that feed the Gulf of Maine. Unnatural freshwater flow regulation is a climate and marine ecological train wreck for the microscopic diatom to the noble right whale. Dams have weakened the natural function of diatoms to feed bountiful fisheries and reduce carbon dioxide levels.**

We will not forget Chris Cousins’ 2012 article and we will continue to sound this alarm.

Roger Wheeler of Standish is the president of Friends of Sebago Lake.

SECTION II REDUCING THE FLOW OF FRESH WATER DURING SPRING AND SUMMER WHILE INCREASING IT DURING WINTER CHANGES THE SEASONAL COMPOSITION OF THE RECEIVING WATERS IN ITS SURFACE LAYER AND THE SEASONAL STRENGTH OF THE DENSITY CURRENT.

“What is less well known is that upwelling is also generated by density currents associated with the excursion of large amounts of fresh water over coastal regions and continental shelves such as found along the Atlantic coast of Canada. The latter represents a continuous transport of nutrient laden water on a scale far surpassing that of Gulf Stream eddies.”

This was written by Mr. Hans Neu in a 1982 Report Man-Made Storage of Water Resources-A Liability to the Ocean Environment? Part II. I have reprinted Part II (see Pgs. 40-43) and have quoted Mr. H. Neu extensively from Part I of his Report.

I have read and reviewed thousands of Reports, and I would describe Mr.H. Neu as an Einstein in regards to estuarine and coastal hydro dynamics.

In 1982, he predicted the decline and eventual collapse of the fish stock of the Gulf of St. Lawrence.

*“Life as we know it in our coastal waters and its level of productivity has evolved over thousands of years in response to these seasonal variations. **Changing this pattern by reducing the flow of fresh water during the biologically active season of the year, or even reversing the cyclic flow altogether, represents a fundamental modification of a natural system. Such a modification must have far reaching consequences on the life and reproduction cycle in the marine environment of the region affected.** Thus, it follows that storage schemes already implemented in Canada are having an impact on the biological resources of the Atlantic coastal region. Unfortunately, data to prove this quantitatively are masked by other possibilities. For example, a drastic decline in fish catches in the late sixties and early seventies is currently attributed to over-fishing in the internationally regulated area prior to the establishment of the Canadian 200 mile zone. In recent years, it appears that as a result of the reduced fishing pressure, some stocks are showing significant recovery. This fact, however, also happens to coincide with a period of increasing natural discharge in our river systems.*

*As demonstrated by Sutcliffe (1972, 1973) and Sutcliffe et. al. (1976,1977), fish catches, especially in the Gulf, varied correspondingly, being larger during the fifties but smaller during the sixties with an increase in the seventies after allowing a delay of a number of years for the fish to mature. This implies that the low flow period of the sixties imposed stresses on the productivity of the system. Unfortunately, at the same time as the flow was at its lowest level, regulation was “stepped up from an average of 4000 m³s⁻¹ to about 8000 m³ s⁻¹ with the implementation of the Manicouagan-Outardes-Bersimis hydro-power complex. **I contend that this further reduction in the spring flow was probably the final straw in the decline of the fish stocks.** The larger flows of the seventies decreased the proportional effect of the regulation and gave the fish stocks an opportunity to recover. **The next big decline probably will be in the early or mid-eighties when another low discharge period is predictable from the long term cycles (11 and 22 yr) of water levels in the Great Lakes. This decline however, will be worse, since regulation will have increased further in the meantime.”** Neu Part II 1982)*

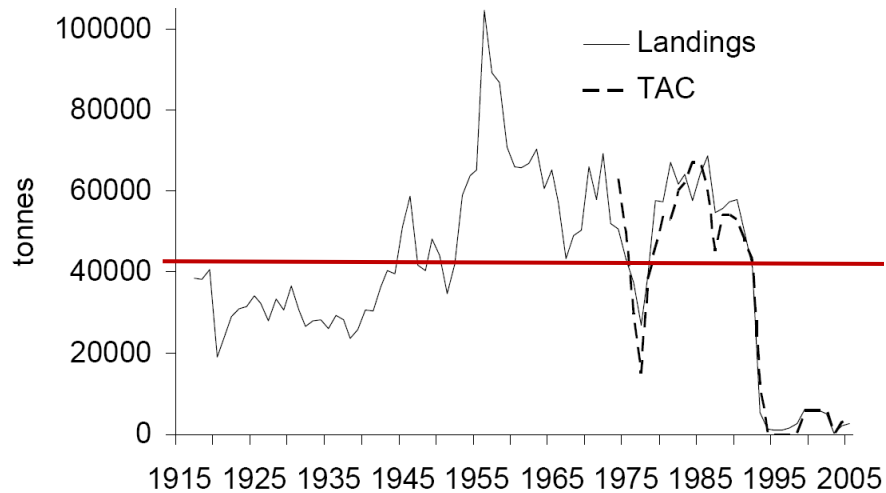


Figure 2: Landings and TAC (t) for the southern Gulf of St. Lawrence cod stock.

Source: Canadian Science Advisory Secretariat Science Advisory 2006/014
Assessment of Cod in the Southern Gulf of St. Lawrence, April 2006

He also predicted the decline of the fishing stock of the Grand Banks of Newfoundland:

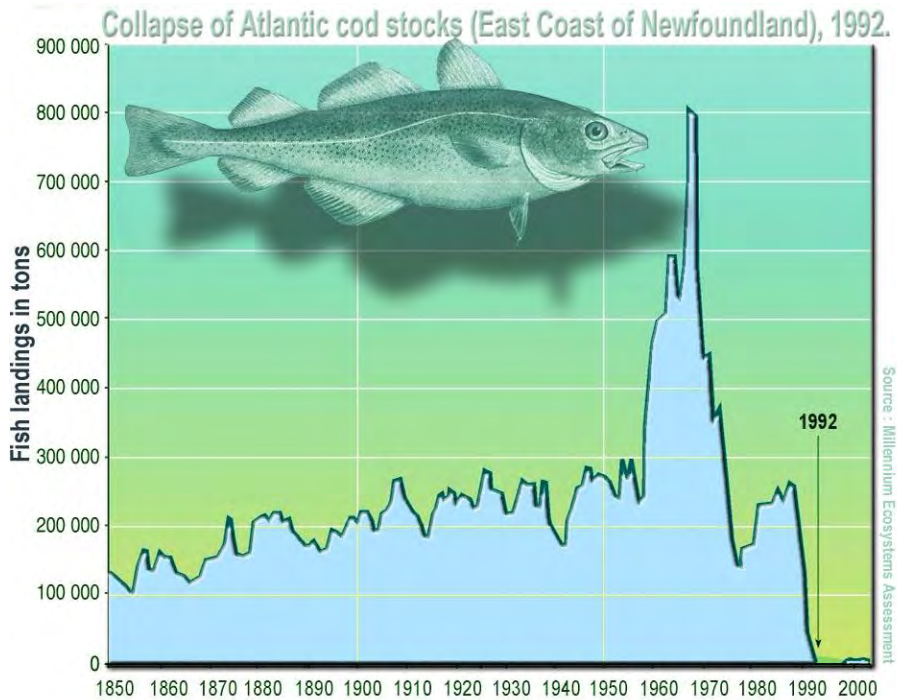
“Even if we cannot yet measure the effects with certainty in our own marine environment, similar changes must already have happened to the coastal waters of Atlantic Canada and the effect must increase as regulation of our rivers continues. Of particular concern is the increased development of hydro-power – under construction or in the design stage – in Labrador, Ungava Bay, James Bay and Hudson Bay, which are about to threaten the productivity of the Grand Banks of Newfoundland. (See Tables I - III.)

Until now it was assumed that hydro power is ‘clean’ with little or no impact on the environment, particularly that of the ocean. That this might not be the case is difficult to understand. Obviously, designing storage schemes and forecasting output of power is easier to grasp than to quantify the changes imposed on the population dynamics of the biota in the coastal region. There is the possibility that damages imposed by man-made lakes on the ecosystem may outweigh the benefits they provide. This is the crux of the problem. The prime task therefore is to establish a cost-benefit ratio in which all factors, also those which affect the ocean environment, as included. This should be a prerequisite for any further development.”
 (Neu Part II 1982).

The following appears in my October 15, 2018 Report: *“The Problem Is The Lack of Silica.”*

STARVATION OF ATLANTIC NORTHWEST COD FISHERY

There have been two collapses of the Atlantic northwest cod fishery in the past fifty years, and they are illustrated in the graph below. Both collapses have been analyzed as one and the cause blamed on overfishing and global warming.



There is no doubt that overfishing caused the spike in cod landings during the 1960's and the subsequent decline in the 1970's.

However, the second and more lasting decline occurred in the 1989-1991 period. The major factor of this decline has been the lack of silica caused by the capture of the spring freshet in the reservoirs of hydroelectric facilities owned by Quebec Hydropower. These facilities have significantly reduced the transport of dissolved silica and other nutrients needed for healthy spring and summer diatom phytoplankton blooms in the northwest Atlantic and Gulf of Maine. Mr. H. Neu's predictions were correct, and thanks to Mr. H. Neu's Reports, we all know much more as to the how and why there was a lack of silica.

Table I

Reservoir Hydroelectric Generating Stations
Discharging into Estuary and Gulf of St. Lawrence River

Owner	Name	Capacity in		Commissioned	Watershed
		Megawatts (MW)	Head (FT)		
Hydro-Quebec	Rapids Blanc	204	33	1934-35	St. Maurice
Hydro-Quebec	Bersimis-1	1,178	267	1956	Betsiamites
Hydro-Quebec	Bersimis-2	869	116	1959	Betsiamites
Hydro-Quebec	Jean-Lesage (Manic-2)	1,145	70	1965-67	Manicouagan
Hydro-Quebec	Outardes-4	785	121	1969	Outardes
Hydro-Quebec	Outardes-3	1,023	144	1969	Outardes
Hydro-Quebec	Outardes-2	523	82	1978	Outardes
Hydro-Quebec	Manic-5	1,596	142	1970	Manicouagan
Hydro-Quebec	Rene-Levesque (Manic-3)	1,244	94	1975-76	Manicouagan
Hydro-Quebec	Manic-5-PA	1,064	145	1989	Manicouagan
Hydro-Quebec	Sainte-Marguerite	882	330	2003	Saint-Marguerite
Hydro-Quebec	Touinstouc	526	152	2005	Touinstouc
Hydro-Quebec	Peribonka	405	68	2007-08	Peribonka
Hydro-Quebec	Romaine-2	640	156	2014	Romaine
Hydro-Quebec	Romaine-1	270	63	2015-16	Romaine
Hydro-Quebec	Romaine-3	<u>395</u>	119	2017	Romaine
		12,749			

Table II
Reservoir Hydroelectric Generating Stations Discharging
Into James Bay and Hudson Bay

Owner	Name	Capacity in	Commissioned	Watershed
		Megawatts MW		
Manitoba hydro	Kelsey	287	1957	Nelson
Manitoba Hydro	Kettle	1,220	1970	Nelson
Manitoba-Hydro	Lang-Spruce	980	1977	Nelson
Manitoba –Hydro	Jenpeg	122	1979	Nelson
Hydro Quebec	Robert-Bourassa	5,616	1979-81	LaGrande
Hydro Quebec	LaGrande-3	2,417	1982-84	LaGrande
Hydro Quebec	LaGrande-4	2,779	1984-86	LaGrande
Manitoba-Hydro	Limestone	1,350	1990	Nelson
Hydro-Quebec	Brisay	469	1993	Caniapiscau
Hydro Quebec	LaGrande-2-A	2,106	1991-92	LaGrande
Hydro Quebec	Laforge-1	878	1993-94	Laforge
Hydro Quebec	LaGrande-1	1,463	1994-95	LaGrande
Hydro Quebec	Laforge-2	319	1996	Laforge
Hydro Quebec	Eastmain-1	507	2006	Eastmain
Hydro Quebec	Eastmain-1-A	<u>829</u>	2011-12	Eastmain
		21,342		

Table III
Summary of Tables 1 & 2
Annual Capacity in Mega Watts (MW) of Reservoir Hydroelectric
Generating Stations Discharging Into

	James Bay and Hudson Bay	St. Lawrence River	Labrador Current	Total
1930-39				
1940-49		204		204
1950-59	2,334	2,047		2,334
1960-69		2,953		2,953
1970-79	2,200	3,363	5,428	10,991
1980-89	10,812	1,064		11,876
1990-99	6,116	469		6,585
2000-2009	507	1,813		2,320
2010-2018	<u>829</u>	<u>1,305</u>		<u>2,134</u>
	21,220	12,749	5,428	39,397

SECTION III HYDRO-QUEBEC MANAGES ITS DAMS TO TRANSFER THE RUN-OFF FROM THE BIOLOGICALLY ACTIVE SEASON TO THE BIOLOGICALLY INACTIVE PERIOD OF THE YEAR.

“In higher latitudes during the winter, river run-off is at a minimum while power demand is at its maximum. This is shown in Fig. 7, where an average hydrograph and the seasonal power demand of a city in northern regions are plotted. As can be seen, water supply and power demand are out of phase by nearly half a year.

Developers of electrical energy view this as an inconvenience of nature; thus they reverse the natural run-off cycle by storing the spring and summer flow in artificial lakes to be released during the winter. An example is shown in Fig. 8 for the Manicouagan River at Manic 5 power station (Neu Part I, 1982).”

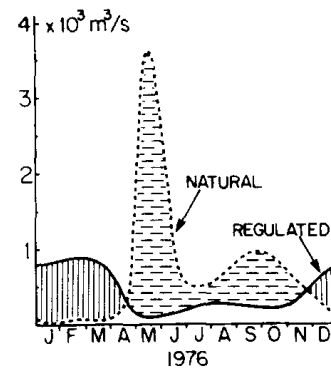
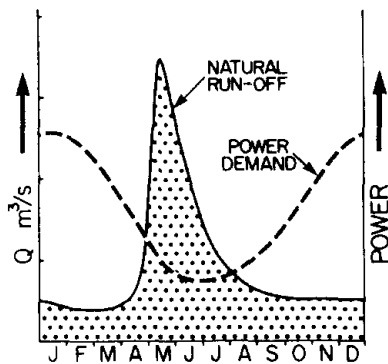


Fig. 7 Typical hydrograph and seasonal power demand. **Fig. 8** Natural and regulated discharge of the Manicouagan River at Manic 5 power station.

SECTION IV THIS IS ANALAGOUS TO STOPPING THE RAIN DURING THE GROWING SEASON AND IRRIGATING DURING THE WINTER, WHEN NO GROWTH OCCURS (Neu Part 1, 1982).

Such an alteration in seasonal precipitation rates would be catastrophic for the world's ecosystem. The trees in our forests would die off and carbon sequestration through photosynthesis would suffer a devastating blow.

The farmer's crops and fields would be barren leading to widespread hunger and starvation of livestock and world's population.

Man-made storage of our rivers has destroyed our oceans in the same way, but unfortunately the destruction goes unnoticed and depletion of the fisheries has been buried under sparkling blue water on a sunny day.

SECTION V THE HYDROGRAPH IN FIGURE 1 SHOWS THE MANICOUAGAN RIVER DISCHARGE WITH A MAXIMUM IN MAY WHICH IS 30 TO 40 TIMES LARGER THAN DURING WINTER MONTHS OF JANUARY-MARCH.

"In northern latitudes, winter precipitation in the form of snow remains stored until the following spring. During this period, biological activities slow down and become dormant with little or no need for nutrients. With the onset of spring, the snow melts, creating large river flows particularly during the early part of the season. At the same time the annual growth cycle begins and the nutrients required to support the renewed activities are provided on the land by the fresh water directly, and in the ocean indirectly by increasing the entrainment of nutrient-rich deep ocean water into the surface layer.

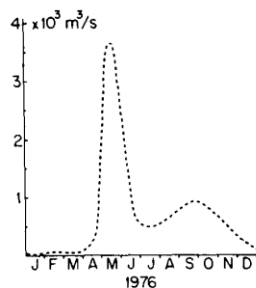
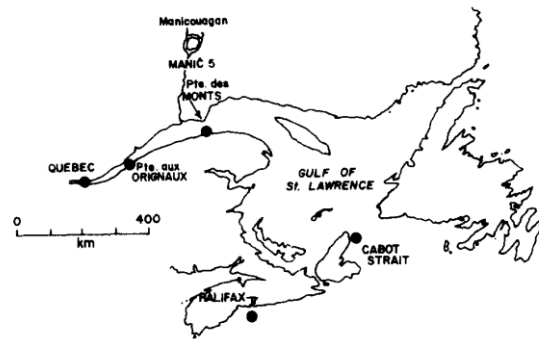


Fig. 1 Natural run-off to the Manicouagan River at Manic 5 power station.



Source: Neu Part I (1982)

A typical monthly run-off hydrograph of a snow-fed river is given in Fig. 1. It shows the Manicouagan River discharge with a maximum in May which is 30-40 times larger than during the winter months.

The seaward progress of the fresh water totals of the St. Lawrence and its tributaries, including the Manicouagan, is shown in Fig. 2a. These totals contain fresh water from melting surface ice which has formed in the system during the winter months. The estimated contribution at Cabot Strait is on the average about 4000 m³ s⁻¹ and at its peak probably 6000, m³ s⁻¹. The bulk of the spring freshet passes quickly through the estuary in May, then slows over the Magdalen Shoal in the southwestern Gulf in summer, and arrives at Cabot Strait by the beginning of August. From here it can be traced to Halifax and even to Georges Bank at the entrance to the Gulf of Maine in the autumn. (Man-Made Storage of Water Resources-A Liability to the Ocean Environment?"

(Part I, by Hans J. A. Neu 1982).

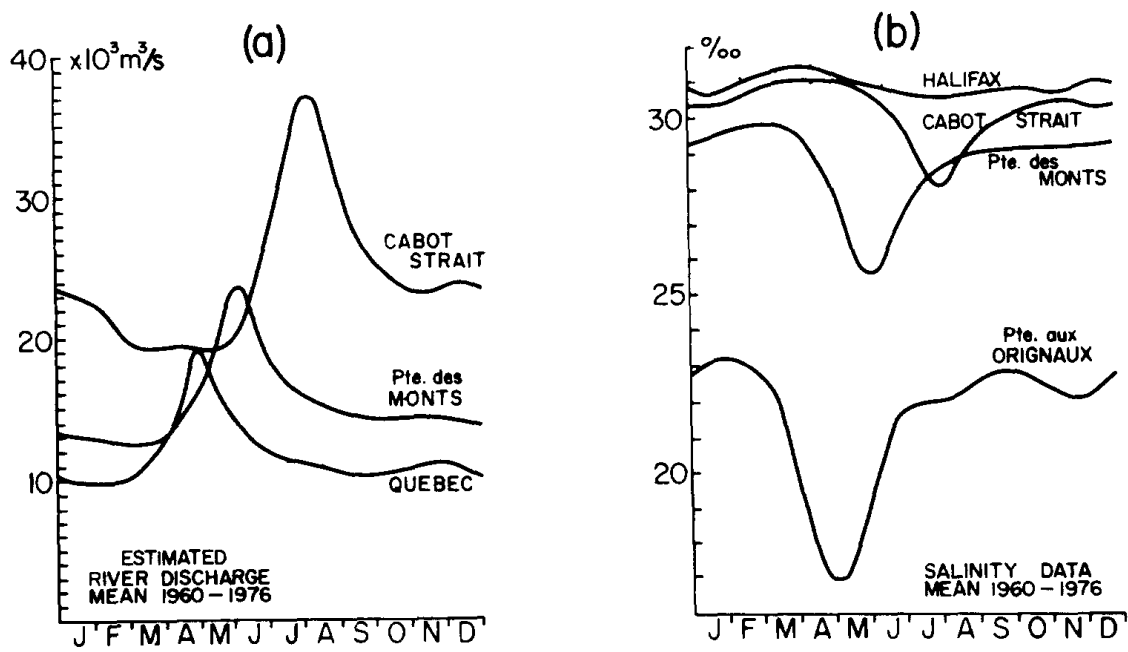


Fig. 2 Mean monthly (a) fresh water and (b) surface salinity variation for stations along the St. Lawrence system and Scotian Shelf.

Source: Neu Part I (1982)

SECTION VI MR. NEU PREDICTED IN HIS 1982 REPORT, “ARTIFICIALLY STORING THE SPRING AND SUMMER RUN-OFF TO GENERATE POWER THE FOLLOWING WINTER MUST HAVE A SIGNIFICANT IMPACT ON THE OCEAN ENVIRONMENT AND ON THE CLIMATE OF THE MARITIME REGION.”

“A primary reason for estuaries, embayments and continental shelves being among the most fertile and productive regions on earth is the supply of fresh water from land run-off which, on entering the ocean, induces mixing and the entrainment of nutrient-rich deep water into the surface layer. For temperate regions such as Canada, the natural fresh water supply varies sharply with season - being low during the winter when precipitation and run-off is stored as snow and ice, and very large during spring and early summer when the winter storage melts. Nearshore biological processes and adjacent ocean activities are attuned to this massive influx of fresh water - this is the time when reproduction and early growth occur. To modify this natural seasonal run-off for human convenience is to interfere with the hydrological cycle and with the physical and biological balance of the coastal region. Artificially storing the spring and summer run-off to generate power the following winter must have a significant impact on the ocean environment and on the climate of the maritime region.”

SECTION VII MR. NEU'S 1982 PREDICTION OF "MUST HAVE A SIGNIFICANT IMPACT," WAS BORNE OUT IN JUST A FEW YEARS, AS REVEALED BY THE FOLLOWING OBSERVATIONS:

1. ***"Serious levels of hypoxia (a lack of oxygen) first appeared in the St. Lawrence Estuary in the mid-1980's. In 2003, this area covered approximately 1,300 km² (500 sq. miles) of the sea floor, and has continued to grow over the last few years. In 70 years, the concentration of oxygen has decreased by half at depths greater than 250 meters."*** (Quebec Ocean Fact Sheet 2 – January 2011. See pages 28 & 29.)
2. **A tenfold increase in the accumulation rate of dinoflagellate cysts over the last four decades in the sediment of Lower St. Lawrence Estuary. Thibodeau, et.al. 2005.** This is equivalent to an average annual increase of 25% per year. Forty years from 2005 is 1965, and two large reservoir hydroelectric facilities were commissioned in 1956 and 1959. (See Table 1 on page 14.)
3. **Dissolved oxygen concentrations of 45 micromoles were recorded in June of 2017 in deep waters off Rimouski and Mantane, while concentrations are usually in 200-300 micromoles. (Whales online-Riche 7/24/17** Eutrophication is most likely the driving force in the oxygen depletion in the St. Lawrence Estuary.

SECTION VIII CLEARLY DIFFERENTIATES BETWEEN 2 TYPES OF MODIFICATION OF THE SILICA BIOGEOCHEMICAL CYCLE THAT OCCUR WITH EUTROPHICATION AND BOTH ARE CONTRIBUTING TO THIS OXYGEN DEPLETION IN THE ST. LAWRENCE ESTUARY

The first occurs behind the reservoir dams, where there is:

"a reduction in the water column silica reservoir through a modification of the biogeochemical cycling of silica. Increased diatom production results in increased deposition and preservation of diatom silica in sediments, which in turn leads to reductions in water column DSi concentrations." (Conley, et. al. 1993)

"When the moving water of the river hits a reservoir and slows down and all those particles that were in suspension sink out, the water becomes a lot more clear. This means light can penetrate into the water more than the couple of feet or inches it could before and that means photosynthetic plankton living in the water can suddenly make a good living. Phytoplankton can finally fix carbon into organic matter faster they respire it away. They can begin to grow.

But a dam means not only light, but also the time to put it to good use. Water that would have shot through that stretch of river in hours to days will now spend weeks to months to years in the extra reservoir volume. That's ample opportunity for phytoplankton like diatoms to build up biomass into thick blooms and to remove almost all the dissolved silica in the water. And because these stretches of quiet water with an enormously tall concrete wall at the downstream end are great places to build up sediments, the biogenic silica that has been produced stands a very good chance of sinking down and getting buried. The buck stops here, as they say, and as a result of downstream areas are starved of silica." (Silica Stories, Conley et. al. 2017).

“The second occurs as N and P are added to aquatic systems through anthropogenic activities. Because DSi is not added to any significant extent with nutrient enrichment (Office and Ryther 1980) additions of N and P will change the Si:N and Si:P ratios of receiving waters. These changes alone can have a substantial impact on ecosystem dynamics.

While nitrogen and phosphorus are the 2 most important nutrients governing overall algal growth (Ryther and Dunstan 1971, Schindler 1977, Hecky and Kilham 1988), the ratios of nutrients present (Tilman et al. 1982) and availability of dissolved silicate (Kilham 1971, Egge & Aksnes 1992) can regulate the species composition of phytoplankton assemblages (Fig. 1). Growth of diatoms depends on the presence of dissolved silicate (DSi). Whereas growth of non-diatom phytoplankton does not. When concentrations of DSi become low, other types of algae that do not require DSi can dominate algal community composition and decrease the relative importance of diatoms in phytoplankton communities.

Schelske & Stoermer (1971, 1972) also hypothesized that the limitation of diatom flora by reduced DSi supplies would lead to drastic and undesirable changes in the ecosystem where the phytoplankton community was dominated by green and blue-green algae during summer when DSi was limiting for diatoms,. The hypothesis that modification of the phytoplankton flora would occur with eutrophication was formalized and its implications were discussed for the coastal ocean and marine systems by Officer & Ryther (1980) and Ryther & Officer (1981). These 2 studies identified essentially 2 distinctly different phytoplankton-based ecosystems; one dominated by diatoms and the other a non-diatom ecosystem usually dominated by flagellates, including dinoflagellates, chrysophytes, chlorophytes and coccolithophores, which may also contain large proportions of non-mobile green and blue-green algae. They suggested that the diatom food web contributed directly to large fishable populations, that other algal-based food webs were undesirable either because species remain ungrazed or fuelled food webs that are economically undesirable, and that changes in species composition would lead to oxygen depletion in bottom waters. (Conley et. al. 1993).

SECTION IX REDUCED DISSOLVED SILICATE HAS LED TO EXCESS NITROGEN IN OCEAN WATERS, WHICH IS AS HARMFUL TO THE MARINE ENVIRONMENT AS EXCESS CARBON IS IN THE ATMOSPHERE.

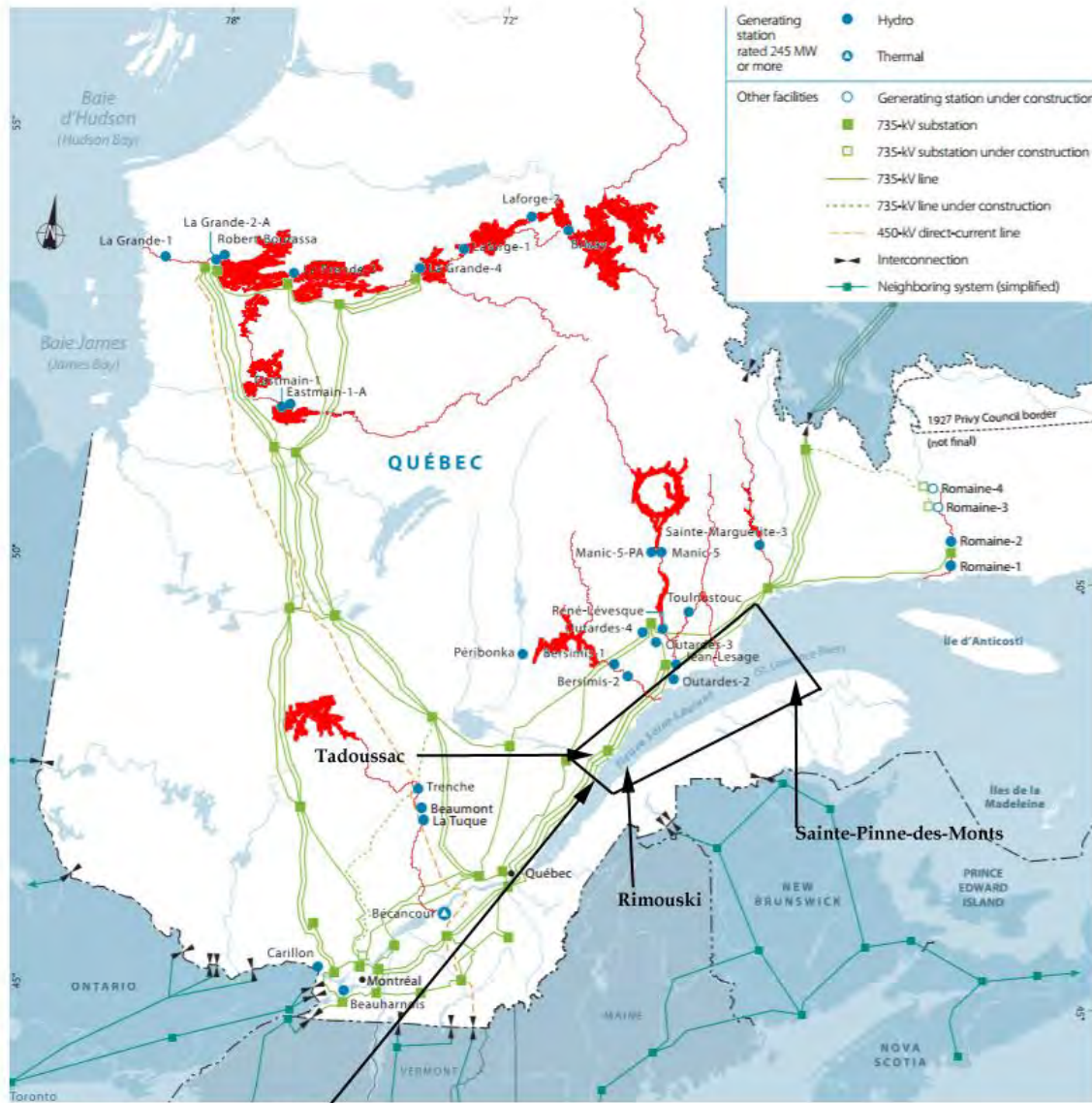
Less dissolved silicate in the upper waters of the Estuary and Gulf has allowed the increased nitrogen input from sewer treatment plants and storm water runoff to fuel an explosion in the growth of non-siliceous algal growth. This increase in algal growth (eutrophication) has led to oxygen depletion throughout the water column and a limitation in some of the bottom waters.

Many politicians and scientists have turned their backs on how and why silicate retention behind dams affects marine biochemistry and the ecosystem structure in coastal waters and estuaries. These are probably some of the same people who have accused the fossil fuel industry of covering up how burning fossil fuels is causing climate change!

THE ST. LAWRENCE IS LOW ON AIR

The zone most affected by the reduction of oxygen in the St. Lawrence Estuary extends from Tadoussac at the confluence of the Saguenay River and the St. Lawrence to the northwest of the Gulf of St. Lawrence.

(Quebec Ocean Fact Sheet 2 January 2011)



Lower St. Lawrence Estuary (LSLE)

Red Areas Highlighted Above Represent The Man-Made Storage of Water Resources Being Choked Off From Feeding The Marine Ecosystem

SECTION X HOW RIVER WATER INTERPLAYS WITH SALT WATER AND ITS SEASONAL VARIATION

“THE MOST OUTSTANDING FEATURE IN THE ENCOUNTER BETWEEN FRESH WATER AND SALT WATER IS THE FORMATION OF A CURRENT WHICH OCEANOGRAPHERS REFER TO AS HALINE CIRCULATION AND ENGINEERS AS DENSITY CURRENT. The energy system which generates this motion is in principle the same as that which generates the winds in the atmosphere. While the winds are the result of inequalities in barometric pressure caused by non-uniform heating of the atmosphere under solar radiation, the density current in coastal waters and estuaries is primarily the result of the difference in density between fresh water of the run-off and the salt water of the ocean.

There are basically two force components which generate this motion. First, fresh water entering the ocean raises the height of the water surface above the height of the ocean and establishes a horizontal pressure gradient. Water flows along this gradient resulting in a seaward flow of the surface water. The pressure gradient and thus the surface flows are maintained by the continuous input of river water. Second, sea water is more dense than river water and since pressure at depth depends on the water density times the water column height, there is a certain depth where the pressure from the low-density river water will be equal to the pressure from the denser sea water.

As shown schematically in Fig 3, below this depth the pressure difference is landward directed and above this point it is seaward directed. This arrangement imposes a two-layer flow system in which, as far as an estuary is concerned, the surface layer flows outward and the deeper layer flows inward. The major manifestation of this principle and the mixing involved is demonstrated by the large variation in salinity and temperature throughout an estuary.

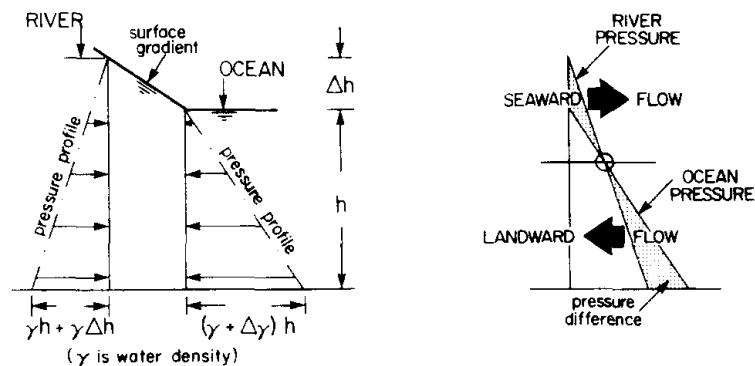


Fig. 3 Schematic diagram of pressure distributions for density currents.

SECTION XI OBVIOUSLY, THE TWO-LAYER CURRENT SYSTEM ACTS LIKE A LARGE NATURAL PUMP WHICH CONSTANTLY TRANSPORTS LARGE QUANTITIES OF DEEP OCEAN WATER ONTO THE CONTINENTAL SHELF AND THEN INTO THE EMBAYMENTS AND ESTUARIES.

Just as for the winds in the atmosphere, the, magnitude of the current is proportional to the pressure difference. Hence in times where more fresh water enters the ocean, the longitudinal gradient seaward increases and with it the strength of the current system. From this it follows that in estuaries the density current varies with the seasonal run-off, being at a minimum during the low discharges in winter and at its peak during the large discharges in spring and summer. In coastal waters which are some distance away from the fresh water source (i.e. the Grand Banks, the Scotian Shelf and Georges Bank) there can be delays of from several months to almost a year before the freshwater peak arrives.

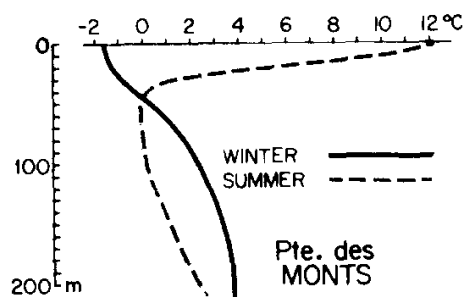


Fig. 6 Vertical temperature profile at Pointe des Monts in winter and summer.

SECTION XII CONCERNING THE TEMPERATURE OF THE WATER, SIMILAR VARIATIONS OCCUR BUT IN THIS CASE NOT EXCLUSIVELY DUE TO FRESH WATER BUT TO SEASONAL WARMING AND COOLING ALSO.

As shown in Fig. 6, the upper layer warms during the summer and cools during the winter. This trend is reversed in the deeper layer where during the summer an intermediate colder layer forms as a residue of preceding winter cooling, and is sandwiched between two warmer layers. This 'cold water' layer is characteristic of most of the coastal waters in the western North Atlantic. Although temperature, particularly during warming in spring, plays an important role in the biological activities of the upper layer, it has less influence on the density of the water, and hence on the motion and mixing, than the fresh water of the river.

SECTION XIII CONCERNING THE TEMPERATURE OF THE WATER, THERE WILL ALSO BE CHANGES BUT SINCE THIS PROPERTY IS NON-CONSERVATIVE, IT IS DIFFICULT TO PREDICT THE FULL EFFECT.

There is a definite possibility that both winter and summer temperatures of the surface layer will increase; in winter due to an increase in upwelling of deeper warmer water, and in summer due to slower surface currents which will allow the surface layer to absorb more heat during its passage through the system. It can be assumed therefore that fresh water regulation modifies the climate of the coastal region to be more continental-like in the summer and more maritime-like in the winter.

SECTION XIV THE GREATEST CONSEQUENCES WILL ARISE, PROBABLY, FROM CHANGES IMPOSED ON THE DENSITY CURRENT.

This current determines the transport of deeper water from the ocean onto the shelf and from there into the embayments and estuaries. Reducing the flow of fresh water during the spring and summer decreases the strength of the density current to the point where, if taken far enough, it could be stopped altogether, while increasing the fresh water during the winter increases the current. Except where nutrients are produced locally, their rate of supply is directly related to the volume of salt water which carries them. A reduction in the transport of this water therefore decreases the influx of nutrients – the natural food supply – during the biologically active season of the year. An increase of supply during the winter does not compensate for these losses since primary and secondary production does not occur during this period, and the nutrients will return to the ocean body without being utilized.

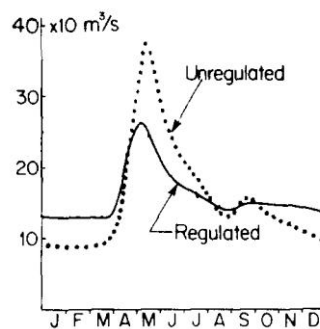


Fig. 11 Regulated and unregulated flow of the St. Lawrence at Pointe des Monts for 1976.

SECTION XV TAKING THE ST. LAWRENCE AS AN EXAMPLE, WHERE TODAY MORE THAN 8000 $m^3 s^{-1}$ (APPROXIMATELY ONE-QUARTER TO ONE-THIRD OF THE PEAK DISCHARGE) IS HELD BACK IN SPRING (FIG. 11), THE SEASONAL INFLOW OF OCEAN WATER INTO THE GULF MUST ALREADY BE SIGNIFICANTLY MODIFIED.

The reduction of the amount of water and with it the quantity of nutrients entering the system during the biologically active season must be in the order of 20-30% of its initial supply. According to El-Sabh (1975), the inflow into the Gulf through Cabot Strait is, at its peak in August, between 600 000 and 700 000 $m^3 s^{-1}$. Before regulation was implemented it probably was closer to a million cubic metres per second with all the extra nutrients that volume implies.

Beyond any doubt, similar reductions in the shoreward transport of sea water and nutrients have occurred at other places during the summer, such as in Hamilton Inlet below the Churchill Falls power development in Labrador, and will now occur in James Bay after the first power scheme there is in operation.” (H.J.A. Neu, 1982)

SECTION XVI THERE ARE MANY IN THE SCIENTIFIC COMMUNITY WHO HAVE WARNED FOR YEARS ABOUT THE NEGATIVE IMPACTS OF RESERVOIR HYDROLOGICAL DAMS.

Scientists Venugopalan Ittekkot, Christoph Humborg and Peter Schafer wrote a 2000 Report “Hydrological Alterations and Marine Biogeochemistry: A Silicate Issue? Silicate retention in reservoirs behind dams affects ecosystem structure in coastal seas.”

In this Report, they documented how reservoir dams will result in eutrophication and lower oxygen levels in downstream coastal waters:

“Freshwater and sediment inputs from rivers play a major role in sustaining estuarine and coastal ecosystems. Nutrients from rivers promote biological productivity in estuaries and coastal waters, and the sediments supplied by the rivers stabilize deltas and coastal zones and help to maintain ecosystems along the periphery of landmasses. In the last few decades human activities have caused enormous changes both in the nature and quantity of these inputs. Fluxes to the oceans of mineral nutrients, such as phosphate and nitrate, have increased worldwide by more than a factor of two (Maybeck 1998).”

Quebec’s population has doubled since 1951 from about 4,000,000 to over 8,000,000, which means much higher annual fluxes of phosphate and nitrate from sewerage treatment plants and storm water runoff into the Gulf.

“This increase has led to accelerated algal growth, known as eutrophication, and consequently to deterioration in water quality because of oxygen depletion. Toxic algal blooms occurring in coastal waters, which have devastating effects on fisheries and on biodiversity in general, are also attributable to eutrophication. Oxygen-deficient conditions, in turn, promote the production of greenhouse gases such as nitrous oxide and methane and their emission from coastal waters to the atmosphere.”

“The observed continuing increase in nutrients such as nitrate and phosphate and the reduction in silicate concentrations in rivers clearly indicate that nonsiliceous phytoplankton species will be more prolific in the receiving waters of many dammed rivers of the world. The occurrence of potential toxic flagellate blooms may become more frequent. Many important regulatory and socioeconomic functions of water bodies will be affected. The ability of these water bodies to sustain economically important fisheries resources will be reduced; severe perturbations can be expected in the biogeochemical cycling of elements, with adverse consequences for the role of coastal seas as sinks for anthropogenic gases such as CO₂.”

SECTION XVII IN A 2005 STUDY, RECENT EUTROPHICATION AND CONSEQUENT HYPOXIA IN THE BOTTOM WATERS OF THE LOWER ST. LAWRENCE ESTUARY: MICRO PALEONTOLOGICAL AND GEOCHEMICAL EVIDENCE, BY THIBODEAU, DEVERNAL, AND MUCCI, THE AUTHORS ANALYZED TWO SEDIMENT BOX CORES RECOVERED FROM THE LOWER ST. LAWRENCE ESTUARY AND OBSERVED THE FOLLOWING:

“A ten-fold increase in the accumulation rate of dinoflagellate cysts and benthic foraminifera in the sediment over the last four decades.” And “our results imply that a significant increase in marine productivity in the Lower St. Lawrence Estuary occurred since the 1960’s.”

THIS IS MUCH MORE THAN “A SIGNIFICANT INCREASE

A TEN FOLD INCREASE IS THE SAME AS A 1,000 PERCENT INCREASE. OVER A TIME FRAME OF 40 YEARS THIS WOULD BE AN AVERAGE INCREASE OF ABOUT 25 PERCENT PER YEAR OF DINOFLAGELLATE CYSTS IN THE SEDIMENT.

The driving force for this epic increase of dinoflagellates is the gigantic reservoirs behind these hydroelectric dams, which have changed the silica cycle and natural hydraulic cycle in the St. Lawrence and Gulf of Maine. Changes in the hydraulic cycle have also significantly reduced the annual input of dissolved oxygen and warmed the waters of these rivers.

“Most studies addressing the causes of eutrophication have concentrated on the elements nitrogen and phosphorus, mainly because both nutrients are discharged by human activities. Silicate, however, also plays a crucial role in algal growth and species composition. For example, the growth rates of diatoms (silica-shelled phytoplankton) are determined by the supply of silicate. Researchers have noted a decrease in the level of dissolved silicate in many coastal marine regions of the world in the last few years (Conley et al; 1993). The increased growth of silicate-utilizing diatoms-the result of nitrate-and phosphate-induced eutrophications-and the subsequent removal of fixed biogenic silica via sedimentation out of the water column (Billen et al. 1991.1996) are thought to explain the decrease in dissolved silicate. The resulting changes in the ratios of nutrient elements (e.g., silicon: nitrogen:phosphorus, or Si:N:P) have caused shifts in phytoplankton populations in water bodies (Admiral et. al. 1990, Turner and Rabalais 1994). Shifts from diatoms to nonsiliceous phytoplankton have been observed much earlier in the season in several estuarine and coastal regions (in the receiving marine waters of the Rhine River, for example).

“The source transport, and sink characteristics of silicate, as they relate to changes in the hydrology of rivers, are distinct from those of nitrogen and phosphorus. Large-scale hydrological alterations on land, such as river damming and river diversion, could cause reductions of silicate inputs to the sea (Humborg et al. 1997). By contrast, although all nutrients (nitrogen, phosphorus and silicon) get trapped in reservoirs behind dams, nitrate and phosphate discharged from human activities downstream of the dams more than make up for what is trapped in reservoirs; for silicate, there is no such compensation. The resulting alteration in the nutrient mix reaching the sea could also exacerbate the effect of eutrophications-that is, silicate limitation in perturbed water bodies can be set in much more rapidly than under pristine conditions, leading to changes in the composition of phytoplankton in coastal waters.”

And

“One of the issues to be resolved is whether the reduction in silicate in coastal waters is caused by its increased removal through enhanced diatom production or by a decrease in direct inputs from rivers. Although both processes are likely to affect silicate decrease, enough evidence is available to suggest that hydrological alterations such as river damming and river diversions could be the crucial factors (Milliman 1997). Given the large numbers of dams in operation today (Rosenberg et al. 2000) and the extent of river flow that is dammed or diverted (Voorosmarty and Sahagian 2000), reduction of silicate could be of global significance.” (Ittekkot, Humboarg and Schafer 2000).

SECTION XVIII I HAVE REPRINTED, ON PAGES 7 AND 8, A JANUARY 2011 FACT SHEET “THE ST. LAWRENCE IS LOW ON AIR,” BECAUSE THE READER HAS TO READ IT FOR THEMSELVES IN ORDER TO BELIEVE THAT THERE IS NO MENTION OF THE PROLIFERATION OF RESERVOIR HYDROELECTRIC DAMS DURING THE PAST SEVENTY YEARS AS A POSSIBLE CAUSE IN LOW OXYGEN IN THE ST. LAWRENCE.

In the section, “Caused by human activity-but only in part,” the author fails to mention that the discharged waters from the dams into the rivers have much less dissolved silicate to offset the increased input of nitrates and phosphates from municipal wastewater, as well as fertilizer and manure in nearby agriculture fields. As a result, the diatom populations have declined and dinoflagellate populations have exploded.

In the section “A link to climate change,” the author explains that the cause of less oxygen is because:

“The proportion of water coming from the Labrador Current Water has decreased, and thus more of the water entering the gulf comes from the less oxygenated Gulf Stream. This situation has contributed not only to a reduction in oxygen levels in the deep waters of the St. Lawrence Estuary, but also to an increase in water temperature of 1.65°C.

As discussed in Sections XII and XIII, the storage of water resources may be the driving force in this increase in water temperature.



THE ST. LAWRENCE IS LOW ON AIR

A serious danger is threatening the St. Lawrence River: a lack of oxygen. This phenomenon, called hypoxia, is a serious concern for the St. Lawrence Estuary, but also affects the gulf. Findings from a recent scientific cruise¹ confirm that a large portion of the estuary is slowly but surely suffocating.

In fact, the levels of oxygen in the deep waters of the estuary are so low that it could have serious repercussions on the marine ecosystems. Some scientists are even using the term “dead zones” to describe these areas of low oxygen that are expanding from year to year. When the concentration of oxygen in the bottom waters falls below 30% (hypoxia), many marine organisms, including fish, molluscs, and crustaceans, can no longer survive. Currently, certain parts of the estuary have oxygen levels below 15% saturation.

The critical zone

The zone most affected by the reduction of oxygen in the St. Lawrence Estuary extends from Tadoussac, at the confluence of the Saguenay River and the St. Lawrence, to northwest of the Gulf of St. Lawrence.

Serious levels of hypoxia first appeared in the St. Lawrence Estuary in the mid-1980s. In 2003, this area covered approximately 1,300 km² of the seafloor, and has continued to grow over the last few years. In 70 years, the concentration of oxygen has decreased by half at depths greater than 250 meters.

Caused by human activity—but only in part

Researchers have calculated that between one-third and one-half of the decrease in oxygen is the result of factors related to the river and the activities of those who live near it. Municipal wastewater, as well as fertilizer and manure used in nearby agricultural fields, results in the input of large quantities of nitrates and phosphates into the river. This creates an additional source of nutrients for the plankton, which multiply rapidly from spring through summer. When these abundant plankton die and fall to the bottom of the river, it gradually decomposes in the water, consuming the ever-decreasing supply of oxygen.



Entrance of the Bic Park, South shore of the St. Lawrence estuary.

A link to climate change

Scientists believe that changes in circulation in the Atlantic Ocean, possibly due to global warming, could contribute to the reduced oxygen in the St. Lawrence.

The water that enters the St. Lawrence is a mixture of two large water masses: the shallower Labrador Current Water is cold and oxygen-

rich, while the deeper North Atlantic Central Water, originating in the Gulf Stream, is warmer and less oxygenated. The deep water flowing into the estuary slowly loses its oxygen as it moves toward Tadoussac.

The problem is that the proportion of water coming from the Labrador Current Water has decreased, and thus more of the water entering the gulf comes from the less oxygenated Gulf Stream. This situation has contributed not only to a reduction in oxygen levels in the deep waters of the St. Lawrence Estuary, but also to an increase in water temperature of 1.65 °C.

If this trend continues, the deep waters of the estuary could, in the next fifty years, become anoxic (without oxygen). In a word, suffocation! According to that sad scenario, the deep waters of the estuary could no longer support any form of life, with the possible exception of some microorganisms.



Crédit: Bjorn Sundby

Oxygen concentration will be determined by scientists in the sediment sample and its living organisms.

A better understanding of the phenomenon and its consequences

To better understand the causes of hypoxia, Québec-Océan researchers are pursuing their studies on the impact of low concentrations of oxygen on organisms living in the deep waters. They are also developing simulation models to predict the concentrations of oxygen in the estuary and the Gulf of St. Lawrence. These advanced models take into account not only the circulation of the water masses, but also the ex-

change of oxygen between nutrients, sediments and plankton.

¹ *Hypoxia 2010 Cruise, lead by Prof. Alfonso Mucci on the Coriolis II.*

Find out more

- [Will "Dead Zones" Spread in the St. Lawrence River?](#)
- [Hypoxia 2010 Cruise](#)
- [The Deep Waters of the Estuary: A Dead Zone? \(French only\)](#)
- [Biodiversity - A quantifiable economic value \(French only\)](#)
- [Coastal water threatened with suffocation as a result of human activities \(French only\)](#)
- [The estuary is holding its breath](#)

SECTION XIX THIS CHANGE IN “PROPORTION“ WHICH IS MENTIONED AND HIGHLIGHTED IN THE PREVIOUS PAGES, IS TAKING PLACE 700 PLUS MILES DOWNSTREAM FROM THE ST. LAWRENCE ESTUARY IN THE NORTHWEST ATLANTIC AND IS BASED ON A HYPOTHESIS WHICH IS NOT PROVEN.

This hypothesis was studied in the following 2 reports:

1. Lefort S. “A Multidisciplinary Study Of Hypoxia In The Deep Water Of Estuary And Gulf Of St. Lawrence: Is This Ecosystem On Borrowed Time?” PhD thesis, McGill University; 2011.
2. Lefort S. Gratton Y, Mucci A., Dadou I, Gilvert D. ,“Hypoxia In The Lower St. Lawrence Estuary: How Physics Controls Spatial Patterns,”. J Geophys Res. 2012; CO7019.

And the authors of the second report concluded:

The result strongly suggests that the physics of the system and the source water properties are mostly responsible for oxygen depletion and its distribution pattern in the deep water column.

Three years later Daniel Bourgault and Frederic Cyr wrote a Report: “Hypoxia in the St. Lawrence Estuary: How a Coding Error Led to the Belief that “Physics Controls Spatial Patterns” and wrote the following Abstract and Conclusion:

“Abstract

Two fundamental sign errors were found in a computer code used for studying the oxygen minimum zone (OMZ) and hypoxia in the Estuary and Gulf of St. Lawrence. These errors invalidate the conclusions drawn from the model, and call into question a proposed mechanism for generating OMZ that challenges classical understanding. The study in question is being cited frequently, leading the discipline in the wrong direction.”

And

“Conclusion

The equation, boundary conditions, and parameters proposed by Lefort (2011) (1) and Lefort et al. (2012) (2) are inappropriate when solved correctly for explaining the observed oxygen field and hypoxia in the St. Lawrence Estuary. It is by unfortunate chance that their unrealistic Eq2 combined with their proposed boundary conditions, parameters and numerical scheme produced remarkable but puzzling agreement with observations. Hypoxia in the St. Lawrence Estuary and the OM in the Gulf of St. Lawrence Estuary and the OM in the Gulf of St. Lawrence are important feature to reproduce correctly with proper theory, and the community must not be left continuing to believe that their model succeeded in reproducing them.”

The authors also wrote the following in their Report: “THE AUTHORS HAVE BEEN INFORMED AND HAVE CONFIRMED THE UNFORTUNATE ERROR.”

SECTION XIV IT APPEARS THAT THIS HYPOTHESIS HAS CONTINUED SUPPORT AND THE WORD OF THIS UNFORTUNATE ERROR HAS BEEN SLOW IN GETTING OUT!

I have reprinted below a July 24, 2017 article "[Less and Less Oxygen in St. Lawrence.](#)"

Again, no mention of reservoir hydroelectric dams as a possible cause or reduction in dissolved silicate concentrations I remind the reader that these dams are owned by Hydro-Quebec, which is owned by the Province of Quebec.

LESS AND LESS OXYGEN IN THE ST. LAWRENCE

24 / 07 / 2017

Par Béatrice Riché

Editor of Group for Research
and Education on Marine
Mammals



During their recent mission aboard the *Coriolis II*, researchers observed the lowest concentrations of dissolved oxygen ever recorded in the deep waters of the St. Lawrence River. Why is there less oxygen in the deep waters and what are the consequences for the species of the St. Lawrence?

Coriolis II, the research vessel of the Institute of Ocean Sciences in Rimouski. © UQAR
From June 12 to 21, 13 researchers from McGill, Concordia and Moncton universities plied the St. Lawrence River between Québec City and Anticosti Island aboard the *Coriolis II*, the research vessel of the Institute of Ocean Sciences in Rimouski (ISMER/UQAR). The multidisciplinary team had several objectives: to learn more about surface water acidification, to monitor oxygen concentrations in deep waters and to map the sediments (including petroleum products) of the seafloor.

Researchers observed an area of hypoxia, i.e., a very low oxygen zone, in the deep waters between Tadoussac and Sainte-Anne-des-Monts. The lowest concentrations were recorded off Rimouski and Matane: 45 micromoles of dissolved oxygen per kilogram of water, while concentrations are usually in the order of 200-300 micromoles per kilogram. Oxygen levels in

the deep waters of the St. Lawrence have been declining for at least a decade. Researchers are concerned by this trend.

Multiple causes

There are a number of factors that might explain the magnitude of hypoxia in the St. Lawrence: the changing composition of water bodies entering the Gulf, climate change and pollution.

Two major currents of water penetrate the Gulf of St. Lawrence: the Labrador Current and the central North Atlantic Current. The water in the Labrador Current is cold and well oxygenated, while the central North Atlantic water is warmer and less oxygenated. Studies have shown that over the last few decades, the proportion of water from the Labrador Current entering the Gulf of St. Lawrence has declined, while that from the central North Atlantic has increased. This has two consequences on the deep waters of the St. Lawrence Estuary: a decrease in their oxygen concentration and an increase in their temperature.

Climate change may exacerbate hypoxia, as the higher the water temperature, the less soluble oxygen is. A [study](#) published last January by the Maurice Lamontagne Institute of Fisheries and Oceans Canada revealed that average deep water temperatures in the Gulf of St. Lawrence at depths of 250 and 300 metres have also reached levels never observed in the last hundred years.

Pollution may also play a significant role in the hypoxia phenomenon. The application of fertilizers and manure to farmland and municipal wastewater discharges contribute significant quantities of nitrates and phosphates to the river. These nutrients cause a proliferation of plankton. When the latter dies and sinks to the seabed, the decomposition process results in a depletion of the water's oxygen content.

Implications for species of the St. Lawrence

According to Yves G elinas, research professor at Concordia University's Department of Chemistry and Biochemistry and one of the 13 researchers involved in the mission, **some oxygen concentrations recorded at the mission "are too low to allow for the long-term survival of a number of living organisms [...] in these waters"**. Indeed, just like their terrestrial counterparts, marine organisms require oxygen. But although oxygen depletion has a detrimental effect on most species, others have a different tolerance level. Cod, for example, are unable to tolerate the low oxygen concentrations currently found in the deep waters of the Estuary and avoid these areas. However, other species, such as redfish, plaice and shrimp, congregate in low oxygen areas to avoid predators.

For those St. Lawrence whales that feed on benthic prey – including belugas, sperm whales, harbour porpoises and several others – “their feeding grounds are likely to change,” points out Robert Michaud, Scientific Director of the Group for Research and Education on Marine Mammals (GREMM). How will whales adapt to these changes? Will they change their feeding grounds or the species they consume? For Robert Michaud, these issues are at the heart of the challenges we face in understanding and protecting the whales of the St. Lawrence.

Sources

[Lack of oxygen may threaten St. Lawrence biodiversity](#) (in French, Radio-Canada, 2017-07-04)
[Thirteen scientists study St. Lawrence aboard *Coriolis II*](#) (in French, Radio-Canada, 2017-06-11)

Maine Voices: Hydroelectric dams produce green energy?

Think again

Building such dams in Maine would violate federal and state environmental laws, for good reason.

BY **STEPHEN M. KASPRZAK** SPECIAL TO THE TELEGRAM

CAPE PORPOISE — Before advocating for [the 145-mile line](#) to carry hydroelectricity generated by Hydro-Quebec (Our View, [Dec. 9](#)), the Maine Sunday Telegram Editorial Board should first explain why hydroelectricity produced by reservoir dams should be called “green energy.” The construction of these dams in Maine would be prohibited by [Section 401](#) of the Clean Water Act of 1972 and [Maine’s Natural Resources Protection Act](#).

Every reservoir hydroelectric facility [represents an environmental catastrophe](#), not only to the dammed river, but also to the ocean regions where the rivers’ currents convey nutrients.

ABOUT THE AUTHOR

Stephen M. Kasprzak is a resident of Cape Porpoise.

Commissioned in 1969, the Outardes-4 hydroelectric reservoir dam on the Outardes River discharges into the St. Lawrence River. Its surface area is 252 square miles – five times bigger than Sebago Lake.

Four other hydroelectric facilities, built from 1967 to 1989 on the nearby Manicouagan River, also discharge into the St. Lawrence. The Manicouagan Reservoir is a giant head pond created by the Daniel-Johnson Dam and has a surface area of 750 square miles – equivalent to 16 Sebago Lakes.

There are four other reservoirs on the Manicouagan River, and the Mavic-Outardes hydro project has an annual capacity of 5,579 megawatts. Maine’s total annual hydroelectric capacity is 753 MW.

The St. Lawrence, the largest-volume river in North America, is the major supplier of dissolved silicate to the Gulf of Maine, as daily flows are 40 to 50 times greater than any of Maine's major rivers.

The Churchill Falls Generating Station was built in the 1970s in Newfoundland-Labrador on the Churchill River, which discharges in the Labrador Current.

There are 11 generating units and a series of 88 dykes, which have a total length of 40 miles and created the Smallwood Reservoir with a surface area of 2,200 square miles – equal to 46 Sebago Lakes. The annual capacity is 5,428 MW.

The Robert-Bourassa hydroelectric project was completed in 1986 in Quebec on the LaGrande River, which discharges into James Bay. It has an annual capacity of 10,800 MW and five reservoirs with a surface area equal to 89 Sebago Lakes.

A second phase of hydroelectric dams was built on the LaGrande River in the 1990s with an annual capacity of 5,200 MW. The surface area of these three additional reservoirs equals 13 Sebago Lakes.

The surface areas of the above reservoirs, built on just four rivers, are equal to 169 Sebago Lakes or 982 transmission corridors 145 miles long by 300 feet wide.

Before these dams were built, the silica cycle was in a steady state with input balancing off the output. The major output loss is in the ocean waters, where it is estimated that the burial rate of biogenic silica is 2 to 3 percent per year. A cumulative loss of 3 percent per year would result in a 50 percent loss of silica in only 23 years.

This ocean loss was offset naturally each year by the input of dissolved silicate transported by the rivers. Rivers account for 80 to 85 percent of the annual

input of dissolved silicate to the oceans. In temperate rivers with reservoir dams, scientists have calculated an annual silica removal as high as 50 percent.

The cumulative impact of less silica being transported each year to the ocean has resulted in fewer and smaller diatoms. Depleted diatom populations fail to support a healthy food chain or ameliorate ocean acidity, and they'll release less oxygen into the atmosphere. This has led to the starvation of creatures and fishes that eat them and increased acidity. The silicate of the smaller diatoms dissolves before the carbon can be sequestered to the ocean floor.

These reservoir dams have had other catastrophic impacts. For example, the temperature of the high-volume winter discharged waters flowing into the ocean has increased. These reservoir waters are now thermally stratified lakes. In northern temperate lakes, the bottommost waters are typically close to 4 degrees Celsius year-round, which is much warmer than the super cold river waters flowing under ice in the winter. It is not surprising the Gulf of Maine is warming so fast.

How long will the media and officials remain silent about all the key causes of the demise of the Gulf of Maine because of Canadian hydropower dams and unnatural freshwater flow regulation?

Posted January 5, 2019

Commentary: Hydro-Quebec offers misleading claims about power's climate impact

We can't trust the utility's publicists to represent correctly their own carbon emissions.

BY **BRADFORD H. HAGER**SPECIAL TO THE PRESS HERALD

Hydro-Quebec's claim that – as paraphrased by Portland Press Herald Staff Writer Edward D. Murphy – the electricity they would send south is “[produced with none of the carbon emissions blamed for global warming](#)” is dead wrong, directly contradicted by scientific research sponsored by Hydro-Quebec itself. I care deeply about aggressively addressing climate change, and I agree with the Press Herald Editorial Board (Our View, [Dec. 9](#)) that the most important question in evaluating the proposed transmission line to Massachusetts is whether it will reduce total greenhouse-gas emissions.

But to answer this question correctly, we must use the best available science. The Press Herald should avoid passing along Hydro-Quebec's misinformation. Either the utility officials who claim their power is carbon-free are ignorant of [the science published](#) by their colleagues, or they are ignoring this established science in their attempt to sell power.

ABOUT THE AUTHOR

Bradford H. Hager is an MIT earth sciences professor and a part-time resident of Mercer.

[International Hydropower Association](#)

[data](#) show that Hydro-Quebec electricity is just about as dirty as hydropower gets. Why? When Hydro-Quebec dams rivers on northern Quebec's relatively flat terrain, it floods vast areas of forests and wetlands under shallow water. The amount of power

Hydro-Quebec produces per acre flooded is among the lowest of any

hydropower in the world. The trees, bogs and soils Hydro-Quebec floods have been storing carbon since the last Ice Age. When flooded, this stored carbon decomposes, releasing CO₂ and methane. To make things worse, drowned trees are gone forever and cannot grow back to remove CO₂ in the future.

Here's an example of their own [best available science](#) that Hydro-Quebec did not provide to the Press Herald: About a decade ago, Hydro-Quebec built dams to divert the Rupert River to the Eastmain hydro facility, flooding 175 square miles of virgin forest and wetlands. As a result, the first year after flooding, as much CO₂ was released as would have been released by a coal-fired power plant generating the same amount of electricity!

Fortunately, the release of CO₂ slows with time. Unfortunately, it never becomes insignificant. After five years, the total emissions from these Hydro-Quebec dams and natural gas power plants are about equal; after 10 years, the total release from hydro is "only" two-thirds that of natural gas. Extrapolating for a century, Quebec's hydro is about half as dirty as gas – something of an improvement, but in no way "carbon free."

How can we make the best of this situation? To reduce total regional emissions, Hydro-Quebec should export its somewhat-dirty hydropower to neighboring New Brunswick, displacing the much dirtier power produced there from [burning coal](#) while Maine and Massachusetts pursue truly carbon-free sources. That would result in a meaningful decrease in overall greenhouse-gas emissions.

Hydro-Quebec knows that their hydropower causes significant greenhouse-gas release. Yet, when marketing their project, they omit this information. This should make us skeptical about their other claims.

Hydro-Quebec's assertion that it has "wasted" enough water to provide 10 terawatt hours of electricity because it lacks transmission capacity is not

backed by documentation. In contrast, a 2017 study of Hydro-Quebec's export capacity found that the limiting factor for total energy output is generation, not transmission capacity. This makes sense – why would Hydro-Quebec pay the high cost of building dams and installing generators and not also provide adequate transmission capability?

Like any hydropower operation, Hydro-Quebec must deal with large variations in rainfall. It is expensive to build enough generation to handle peak flows, and then let the generators stand idle during years that are either dry or have normal rainfall. During unusually wet times, the water is “wasted” because it is more economical to spill water occasionally than to waste generation capacity most of the time. While it may be true that enough water to generate 10 terawatt hours of electricity has been spilled during times of unusually high water, that in no way shows that the rate and timing of this spillage could have been used to fulfill a contract for a more steady supply of power.

We can't trust Hydro-Quebec publicists to represent correctly the scientific research that their company supported about their own carbon emissions. The Press Herald and the Maine Public Utilities Commission should not accept what Hydro-Quebec says about “clean” energy and spillage without requiring and thoughtfully reviewing documentation.

VIEWPOINT

Viewpoint is a column which allows authors to express their own opinions about current events.

Man-Made Storage of Water Resources—A Liability to the Ocean Environment? Part II

HANS J. A. NEU

Mr. H. Neu is a Senior Research Scientist with the Canadian Department of Fisheries and Oceans at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia. A specialist for 27 years in estuarine and coastal hydrodynamics, he has studied the physical oceanography of the major waterways across Canada as well as on the continental shelf and in the north-west Atlantic.

The first part of this article (Mar. Pollut. Bull., 13, 7-12, 1982) described the impact of the seasonal freshwater runoff on bodies of water—such as the Gulf of St. Lawrence and the coastal region—through changes in the salinity and temperature distribution and through changes in the current generated by the density difference between the fresh river water and the ocean. The strength of the current and thus the transport of deep ocean water to the coastal region depends on the amount of fresh water released into the ocean. Therefore modifying the natural seasonal runoff by storing water for power production during the winter interferes with the timing of the physical and dynamic balance of the coastal region. The impact of this interference on the marine life and on the climate of the region is now discussed.

As on land, the basis of life in the ocean is the plant community which alone can synthesize energy and living tissue from raw materials in the presence of sunlight by photosynthesis. The circulation of the ocean determines the areas where nutrients can reach those upper levels where there is sufficient light for photosynthesis to proceed. Thus, upwelling areas are the fertile parts of the ocean which are highly significant to the marine environment.

Regions of upwelling can be related to large ocean currents like the Humboldt off South America, the boundary currents along the shelf break of the continental margin, and even the warm-core eddies of the Gulf Stream penetrating the shelf region. What is less well known is that upwelling is also generated by density currents associated with the excursion of large amounts of fresh water over coastal regions and continental shelves such as found along the Atlantic coast of Canada. The latter represents a continuous transport of nutrient laden water on a scale far surpassing that of Gulf Stream eddies.

This excursion, being subjected to large seasonal variations, is co-related with the biological activities and productivity in temperate regions. The area affected extends as far as the fresh water reaches. Within this area there is intense primary as well as secondary productivity

which is tuned to the seasonal variation in climate and run-off. This productivity is nourished by the seasonal nutrient supply which in turn is regulated by the seasonal fresh water run-off.

Life as we know it in our coastal waters and its level of productivity has evolved over thousands of years in response to these seasonal variations. Changing this pattern by reducing the flow of fresh water during the biologically active season of the year, or even reversing the cyclic flow altogether, represents a fundamental modification of a natural system. Such a modification must have far reaching consequences on the life and reproduction cycle in the marine environment of the region affected. Thus, it follows that storage schemes already implemented in Canada are having an impact on the biological resources of the Atlantic coastal region. Unfortunately, data to prove this quantitatively are masked by other possibilities. For example, a drastic decline in fish catches in the late sixties and early seventies is currently attributed to over-fishing in the internationally regulated area prior to the establishment of the Canadian 200 mile zone. In recent years, it appears that as a result of the reduced fishing pressure, some stocks are showing significant recovery. This fact, however, also happens to coincide with a period of increasing natural discharge in our river systems. As shown in Fig. 1, where the five-year running means of each year's monthly maximum (spring) and minimum (winter) discharges are plotted for the St. Lawrence at Pointe des Monts, larger spring flows existed in the fifties and middle seventies and lower flows in the middle of the sixties. As demonstrated by Sutcliffe (1972, 1973) and Sutcliffe *et al.* (1976, 1977), fish catches, especially in the Gulf, varied correspondingly, being larger during the fifties but smaller during the sixties with an increase in the seventies after allowing a delay of a number of years for the fish to mature. This implies that the low flow period of the sixties imposed stresses on the productivity of the system. Unfortunately, at the same time as the flow was at its lowest level, regulation was

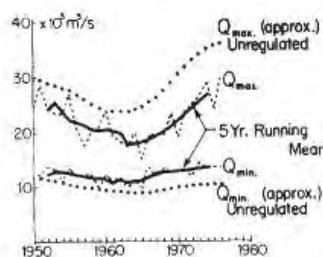


Fig. 1 Annual monthly Q_{max} and Q_{min} of the St. Lawrence river at Pointe des Monts.

stepped up from an average of $4000 \text{ m}^3 \text{ s}^{-1}$ to about $8000 \text{ m}^3 \text{ s}^{-1}$ with the implementation of the Manicouagan–Outardes–Bersimis hydro-power complex. I contend that this further reduction in the spring flow was probably the final straw in the decline of the fish stocks. The larger flows of the seventies decreased the proportional effect of the regulation and gave the fish stocks an opportunity to recover. The next big decline probably will be in the early or mid-eighties when another low discharge period is predictable from the long term cycles (11 and 22 yr) of water levels in the Great Lakes. The decline, however, will be worse, since regulation will have increased further in the meantime.

The Aswan Dam regulation in Egypt is similar in size to the regulation schemes in Canada, though located in the subtropical and tropical region and therefore not directly comparable with our coastal waters. It is, however, the only case known to the author where a large scale regulation scheme was assessed with respect to the ocean environment prior to its construction and reported upon after it was in operation. Western scientists predicted that retaining the run-off of the rainy season would significantly affect the biological balance in the southeastern Mediterranean. The prediction became fact. Aleem (1972) reported: "Construction of the Aswan High Dam in Egypt, and subsequent cessation (since 1965) of surplus Nile flood water (ca. $35 \cdot 10^9 \text{ m}^3$ of water annually) from discharging into the Mediterranean Sea, has had an impact on marine life in coastal waters adjoining the Nile Delta and on brackish-water life in the lakes. Nutrient concentrations have fallen considerably in these waters; phytoplankton bloom associated with the Nile flood have disappeared and, consequently, *Sardinella* catches have dropped from ca. 15 000 tons in 1964 to 4600 tons in 1965 and to 554 tons in 1966. Depletion of nutrients, reduction of organic matter and of mud and silt deposition affect also benthic life on the Continental Shelf and in brackish-water lakes adjoining the sea."

According to Tolmazin (1979), the fishing industry of the Black and Azov Seas has also suffered disastrous declines over the past 20 years. This coincided with the introduction of a number of regulation lakes in the major rivers flowing south into the Russian inland seas, the Caspian Sea included. The Dnieper, the Don and the Volga have been brought almost completely under man's control. Tolmazin (1979) concludes that creating these lakes caused this decline and quotes the following estimate: "The loss of fish food all over the country now

amounts to more than one thousand million rubles per year, including the finished products made from raw fish". He concedes that "The damage inflicted on other branches of the economy is very difficult to assess".

Even if we cannot yet measure the effects with certainty in our own marine environment, similar changes must already have happened to the coastal waters of Atlantic Canada and the effect must increase as regulation of our rivers continues. Of particular concern is the increased development of hydro-power—under construction or in the design stage—in Labrador, Ungava Bay, James Bay and Hudson Bay, which are bound to threaten the productivity of the Grand Banks of Newfoundland.

Until now it was assumed that hydro power is 'clean' with little or no impact on the environment, particularly that of the ocean. That this might not be the case is difficult to understand. Obviously, designing storage schemes and forecasting output of power is easier to grasp than to quantify the changes imposed on the population dynamics of the biota in the coastal region. There is the possibility that damages imposed by man-made lakes on the ecosystem may outweigh the benefits they provide. This is the crux of the problem. The prime task therefore is to establish a cost-benefit ratio in which all factors, also those which affect the ocean environment, are included. This should be a prerequisite for any further development.

Regulation Schemes

The two countries with the largest fresh water resources are Canada and the USSR. Soon after the second world war, Russia announced plans to develop its hydrologic potential. One of these was the creation of a central Siberian fresh water lake into which the rivers Ob, Lena and Jenisey would be diverted, each the size of the St. Lawrence. In spite of the announcements Russia has not yet started this project. It is assumed and hoped that this delay is more for ecological than for economical reasons. Another plan was for significant water diversion and storage in the Pechora–Vychegda–Kama scheme which diverts water, originally flowing north into the Barents Sea, south through the Volga into the Caspian Sea. The volume of water stored is about 200 km^3 . This scheme is somewhat similar to the water diversion proposals by the US under the so-called North American Water and Power Alliance for diverting Alaskan and Canadian rivers south to the US. From the viewpoint of their impact on nature, water regulations and water diversions are similar. Both remove the fresh water from the biologically active season of the year.

In the rivers flowing south, the Dnieper, Don and Volga, the total amount of water stored in 18 storage schemes is 142.3 km^3 , that is the same amount as stored in Manic 5, one of the many large Canadian storage lakes.

In Canada, during the last 25 years, a number of power developments with large storage schemes have been installed (Fig. 2). The most important of a total of more than 300 are: the Churchill Falls in Labrador; the Manicouagan system, the Outardes, Bersimis and Lac Saint Jean complex in the Laurentians north of the St. Lawrence; the LaGrande system into James Bay; to the west the St. Maurice and further west the Ottawa River system and the



Fig. 2 Major storage schemes in Canada.

Great Lakes Regulation; the Nelson-Churchill and Saskatchewan River schemes in the midwest; the Peace River and Columbia River storage schemes in British Columbia; to name just a few. A number of new schemes are under construction or in the design stage. They include several projects in the James Bay area; a new scheme in Labrador; the Gulf of St. Lawrence north shore development which includes the rivers from Sept Isles to the Strait of Belle Isle; a possible Ungava Bay scheme and the development of the rivers in Ontario on the James Bay and Hudson Bay, and others further west.

The dimensions of these schemes, particularly their storage capacity, are colossal. Manic 5, the largest lake of the Manicouagan system, stores 142 km³, one-quarter of which is live storage. This volume of water would cover half of Nova Scotia to a depth of 10 m. It is comparable with the storage capacity of Lake Nasser in Egypt, one of the largest man-made lakes in the world. While the construction of the Aswan Dam, which forms Lake Nasser, created great political upheaval and much scientific discussion as to its effect on the southeastern Mediterranean, Manic 5 was being constructed during the same period without any reaction at all.

To indicate the scale of the quantity of water stored in these lakes, all rivers on earth at any one time contain about 1300 km³ of water. The existing artificial storage in Canada already holds back this amount. Excluding the far north, Canada has an annual run-off of about 1500–2000 km³; this is not much more than the integrated artificial storage. Assuming that between one-third and one-quarter of this storage is live storage, then about 400 km³ of water is annually shifted from the summer to the winter season. The natural ratio of these two seasons is about 4:1, this means that prior to regulation, the two volumes were 1600 km³ and 400 km³ respectively. Under the existing conditions, the summer flow is therefore reduced to 1200 km³ and the winter flow increased to 800 km³, making the ratio 3:2.

Obviously, these changes which are already implemented are a fundamental modification to the fresh water regime of Canada and to the physics and dynamics of its coastal regions. There is no doubt in the mind of the author that if Canada continues this development and the USSR follows its lead, the hydrological balance of our

globe would be threatened and as a result the biological productivity of our oceans, primarily in their coastal waters, may be seriously jeopardized.

Possible Alternatives

Since it is obvious that the transfer of fresh water from the biologically active to the biologically inactive season of the year is the prime problem of water regulation, it leads to the question: can hydro power be fully developed economically without storage? There is no simple answer to this question because it depends on many factors.

One possibility would be to separate seasonal peak power production from general power production where power would be produced from 'run of the river' stations without significant storage. The peak power part would consist of a twin-lake system with a large head difference between the lakes as might be available in the Laurentians or Rocky Mountains. The water in the system would form a closed circuit and the system should be big enough to satisfy the seasonal demand of a region. In spring and summer, when large amounts of excess energy would be available from the 'run of the river' stations, water would be pumped from the lower lake into the upper lake, while during the winter when large quantities of energy are required but little is supplied by river stations, the water stored in the upper lake would be utilized. If the system were placed on the coast, the lower basin would not be necessary and the water recycled would be ocean water. The usefulness of salt water, however, must first be investigated because it may create other ecological problems. The operational efficiency of transferring power from 'run of the river' stations to peak power via pumping is about 65%.

The major benefit of such a scheme would be that the seasonal run-off of rivers, as designed by nature, would not be modified; thus the role that fresh water plays in coastal ecosystems would continue as in the past.

Alternatively, appropriate studies might be carried out into how much of a spring peak is necessary to maintain a reasonable level of primary production in the estuaries and coastal region. This knowledge could perhaps influence the present philosophy of power production to be more compatible with nature in the use of existing hydro-power systems.

Conclusions

Life in the ocean, as life on land, is intimately related to its environment. The ecosystem is a very closely interwoven fabric of all living things coupled with the natural processes that determine the character, quality and quantity of life that can be supported. Man, with his increasing ability to modify his environment, still has his place in it. But, until he understands its complexities to the extent that he can anticipate the disadvantageous consequences of his actions, man cannot hope to safely exploit the environment to his advantage.

The question then, is whether the interpretation given here is in accordance with the facts supported by

scientifically verified predictions and conclusions. Unfortunately, we are not yet able to give an answer. The problem is so large and so complex that it would take years, even decades, of intensive studies before some of the statements given in this analysis could be verified in detail. This time scale applies in particular to the biological field; climatological effects may show up sooner.

Decisions, however, have to be made which do not permit such a delay. Thus, in the interim, these decisions have to be based on theoretical and semi-empirical principles, observations and sound engineering.

In conclusion, fresh water regulation may prove to be one of the most consequential modifications *man* can impose on nature. If we do not alter our course and give consideration to nature's needs there will be irreparable injuries inflicted on the environment for which future generations will condemn us.

The author greatly appreciates the assistance given initially by E. S. Turner, formerly with the National Research Council, and F. Jordan who helped to analyse data, developed graphs, and assisted in the preparation of the paper.

- Aleem, A. A. (1972). Effect of river outflow management on marine life. *Mar. Biol.*, **15**, 200-208.
- Sutcliffe, W. H., Jr. (1972). Some relation of land drainage, nutrients, particulate material, and fish catch in two eastern Canadian bays. *J. Fish. Res. Bd Can.*, **29**, 357-362.
- Sutcliffe, W. H., Jr. (1973). Correlation between seasonal river discharge and local landings of American lobsters (*Homarus americanus*) and Atlantic halibut (*Hippoglossus*) in the Gulf of St. Lawrence. *J. Fish. Res. Bd Can.*, **30**, 856-859.
- Sutcliffe, W. H., Jr., Loucks, R. H. & Drinkwater, K. F. (1976). Coastal circulation and physical oceanography of the Scotian Shelf and the Gulf of Maine. *J. Fish. Res. Bd Can.*, **33**, 98-115.
- Sutcliffe, W. H., Jr., Drinkwater, K. & Muir, B. S. (1977). Correlations of fish catch and environmental factors in the Gulf of Maine. *J. Fish. Res. Bd Can.*, **34**, 19-30.
- Tolmazin, D. (1979). Black Sea - dead sea? *New Scientist*, **6**, 767-769.

THE STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR SITE LOCATION OF DEVELOPMENT ACT PERMIT
AND NATURAL RESOURCES PROTECTION ACT PERMIT
FOR THE NEW ENGLAND CLEAN ENERGY CONNECT
FROM QUÉBEC-MAINE BORDER TO LEWISTON
AND RELATED NETWORK UPGRADES

PRE-FILED DIRECT TESTIMONY OF

GREG CARUSO

FEBRUARY 28, 2019

TESTIMONY OF GREG CARUSO

1 **Please state your name and address.**

2 My name is Greg Caruso. My address is 81 West Shore Rd, Caratunk, Maine 04925.

3 **What is the name of your organization and business address?**

4 Maine Guide Service, LLC, PO Box 81, Caratunk, Maine 04925.

5 **What occupations have you had in the Caratunk area?**

6 For the past 26 years, I have worked as a Maine guide in the outdoor industry, and
7 twenty-four of those years as a whitewater guide, Master Maine Guide and year-
8 round manager in charge of hiring, training, staffing, and scheduling for one of the
9 largest outfitters in New England. Working as a hunting, ATV and snowmobile
10 guide, I have brought hundreds of guests up to Johnson and Coburn mountains. As a
11 whitewater and fishing guide, I have brought thousands of guests through the
12 Kennebec River gorge. In addition to that, I have logged thousands of hours as a
13 snowmobile groomer operator and have groomed every trail from the Forks to Grand
14 Falls, to Bald Mountain, to Parlin Pond, Greenville, Rockwood and Bingham. I also
15 work as a contractor for the ATC on the Appalachian Trail, ferrying over 6000 hikers
16 the last 3 years. I hope that you would consider me an expert in my field.

17 **Why did you choose to intervene in these proceedings?**

18 One thing that all of these years have revealed to me, is that people come to Maine to
19 get away from the modern industrial world, to escape if only for a few hours or days
20 from the super highways of traffic, the madness of work and schedules, tall steel and
21 concrete structures, and never-ending noise and bright lights. Where else can you

1 travel only a few hours to get complete solitude, and peace from those things? In all
2 of my interactions with the thousands upon thousands of guests, the comments
3 remain the same, “Wow! This is amazing!” or “Such a beautiful place!” or “It’s so
4 quiet here!” or “This is unspoiled wilderness!” or “Such an incredible getaway!”
5 There has never been anyone that said, “Looks like great place for a power line!” or
6 “These ridges should have some wind towers!” or “I’d like to see some blinking red
7 light at night over that mountain!” or “We need some red balls hanging over this
8 awesome gorge!”

9 Our most critical assets in this region for tourism are our mountains and waterways.
10 This is hallowed ground. It’s absolutely critical that we keep these places intact,
11 particularly in those remote towns or villages that rely on it for their livelihoods.
12 Is there a public need for this project? I am here to give a resounding NO to that
13 question. To answer anything other than that ignores all of the facts surrounding this
14 project. Maine does NOT need this and neither does Massachusetts. They have
15 plenty of their own natural resources they could exploit, but they chose not to. In
16 addition, Vermont has a ready and waiting, permitted corridor, underground and
17 under water, from Canada to Massachusetts.

18 There is no price that we can put on Maine’s most critical natural resources, which
19 give us our livelihoods and quality of place. How can we say to our guests “This is a
20 wild and scenic stretch of river...but ignore this part here.”? or “This is a national
19 scenic byway...umm, but not over here.” Or - “Let’s ride to top of Coburn Mountain
20 for a view of some amazing mountains and lakes... but don’t look when you get to
21 the top.” I guarantee the guests comments will be “Hey, what’s that about down

1 there?”, or “Too bad they had to put that there!” or “What’s up with that power
2 line?” Nobody can know for certain what the long term negative economic impacts
3 would be, but I can tell you that this would be at least many nails in the coffin to our
4 tourism industry. Our large working forest has been almost worked to death, and if
5 you add giant transmission line to fragment that forest even more, or add a bunch of
6 grid scale wind farms to that, our way of life as a tourist attraction will be buried in
7 the ground. Our brook trout habitat will be lost, our deer yards shrunk away to
8 nothing, and our view shed destroyed.

9 We simply cannot in good conscience sacrifice these things for a few short-term
10 jobs, or money for a bike trail (like we need more trails up here). Every waterbody in
11 this state, belongs to the people of this state, and the view shed in this state, belongs
12 to everyone.

13 Common sense needs to prevail here. We don’t need this! Remember that this is
14 vacationland! The way life should be.

15 CMP has not shown that there is no alternative. I would like to cite laws that are
16 relevant in these proceedings:

17 Site Location of Development Law – 30 M.R.S. § 484. Applicable Licensing Criteria

18 30 M.R.S. § 484(3). No adverse effect on the natural environment.

19 CMP has not “made adequate provision for fitting the development harmoniously
20 into the existing natural environment and that the development will not adversely
21 affect existing uses, scenic character, air quality, water quality or other natural
22 resources in the municipalities along the transmission line or in neighboring

1 municipalities.” CMP’s proposed project will likely have significant negative
2 impacts on existing whitewater rafting, hiking, hunting and fishing activities on
3 rivers remote ponds, lakes and on land, as well as on the scenic character of the Old
4 Canada Scenic Byway and the Appalachian Trail.

5 These significant negative impacts on our natural environment correlate to our
6 residents' way of life, livelihoods and the community's economic viability which is
7 dependent on the lure of tourists to visit the very attributes which will be taken away.
8 30 M.R.S. § 484(3)(A).

9 The Department should consider the effect of noise from the construction and
10 operation of the proposed transmission line. It is impossible for it to not disturb the
11 wildlife and recreational users.

12 30 M.R.S. § 484(3)(H).

13 CMP’s proposed project may adversely impact significant vernal pool habitat.
14 CMP’s application indicates that there are at least 42 significant vernal pools and 23
15 potentially significant vernal pools wholly or partially located within the proposed
16 action area. The herbicides CMP would use to keep the corridor clean would
17 inevitably enter and pollute the vernal pools.

18 30 M.R.S. § 484(5). Ground Water.

19 CMP’s proposed project may “pose an unreasonable risk that a discharge to a
20 significant ground water aquifer will occur.” CMP’s application indicates that
21 “potential sources of groundwater contamination will include fuel and hydraulic and
22 lubrication oils used in the operation and maintenance of vehicles, as well as the
23 application of herbicides to control vegetation.” NECEC Site Location of

1 Development Application at 15-1.

2 Chapter 375: No Adverse Environmental Effect Standards of the Site Location of
3 Development Act.

4 06-096 Ch. 375, § 3. No Unreasonable Alteration of Natural Drainage Ways.

5 CMP's proposed project "will cause an unreasonable alteration of natural drainage
6 ways" through improper drainage right-of way and drainage that may result in
5 adverse impact to adjacent parcels of land. CMP's application indicates that their
6 project will cross 115 streams, 263 wetlands, and impact 76.3 acres of mapped
7 wetlands. This corridor is crossing some very significant terrain with heavy
8 equipment. This terrain includes the areas I guide for fishing and hunting.

9 06-096 Ch. 375, § 6. No Unreasonable Adverse Effect on Surface Water Quality.

10 CMP's proposed project could cause the pollution of surface waters through both
11 point and non-point sources of pollution. CMP's application indicates that their
12 project will cross 115 streams, 263 wetlands, and impact 76.3 acres of mapped
13 wetlands.

14 06-096 Ch. 375, § 9. Buffer Strips.

15 CMP's proposed project will not adequately utilize natural buffer strips to protect
16 water quality, wildlife habitat, and visual impacts from the proposed transmission
17 line. At this time, it does not appear that CMP's proposed buffers are sufficient to
18 avoid these impacts.

19 06-096 Ch. 375, § 10. Control of Noise.

20 CMP's proposed project will not adequately control excessive environmental noise
21 from construction, operation, and maintenance of the proposed transmission line

1 which could degrade the health and welfare of nearby neighbors. This is especially
2 true for noise from the transmission lines themselves.

3 Specifically, during the long construction period, our fishing, hunting, rafting, hiking
3 trips will be invaded by the industrialized noise. Peace and quiet and the sounds of
4 nature are integral parts of the outdoor experience that people expect and are
5 attracted to.

4 06-096 Ch. 375, § 12. Preservation of Unusual Natural Areas.

5 CMP's proposed project will harm numerous land and water areas that contain
6 natural features of unusual geological, botanical, zoological, ecological,
7 hydrological, other scientific, educational, scenic, or recreational significance.

8 CMP's proposed project will impact at least 8 deer wintering areas (44.3 acres) and
9 12 inland waterfowl and wading bird habitats (22.7 acres). The project will cross and
10 degrade the scenically and recreationally significant Kennebec Gorge.

11 As for the proposed mitigation to IF&W for the deer, in my experience as a guide,
12 deer need large swaths of wood to survive the winter. Wintering areas cannot be
13 limited to a few small strips of wood along a powerline. In addition, these powerline
14 areas would be polluted with strong herbicides that these deer would be ingesting.

15 06-096 Ch. 375, § 14. No Unreasonable Effect on Scenic Character

16 And NRPA 38 M.R.S. § 480-D (1). Existing uses.

17 CMP's proposed project will definitely and unreasonably interfere with existing
18 scenic, aesthetic, and recreational uses as indicated above.

19 CMP's proposed project will have an unreasonable effect on the scenic character
20 along the proposed transmission line. For example, the line will cross the

1 Appalachian Trail, the Old Canada Scenic Byway, the Kennebec Gorge, and many
2 other important scenic sites - most importantly Coburn and Johnson mountains and
3 the critical snowmobiling and hunting areas. I have attached a visual rendering of
4 the Coburn and Johnson Mountain area via Google Earth with the snowmobile trail
5 system drawn (*See Exhibit 1*). As the successive pictures reveal, a large portion of the
6 snowmobile trail system between Jackman and The Forks will be directly and severely
7 impacted by this transmission corridor should permits be granted. The Coburn and
8 Johnson mountain trail system is at the very heart of our small town economy. A permit
9 in area would be the worst thing possible for our snowmobile tourism. It's the "mecca"
10 of snowmobiling in Maine.

11 Outdoor recreation hub - I have been grooming The Forks Area snowmobile trails
12 since 1998. I've groomed, guided and ridden and hunted in and around the area of
13 Johnson and Coburn Mountains for 20 years. I know the area and lay of the land
14 intimately. I understand the location of the power line and also understand the
15 importance of protecting the area of Coburn and Johnson mountains. That area in
16 particular is a hub for outdoor recreation for all of our tourism activities. From
17 snowmobiles to ATVs to hikers to animal watchers to sightseers, it is central to our
18 whole area and our livelihoods.

19 4 trails collide with the corridor - There are four different trail systems that merge in
20 the same location - at the Coburn Mountain parking lot. ITS 89 West comes from
21 Eustis; the Coburn Connector comes off of ITS 87 from The Forks/Bingham; ITS 89
22 North comes from Jackman; and the north shoulder bypass from Lake Parlin also
23 connects to ITS 87 bringing guests from Rockwood in the East. Anyone traveling

1 through this destination area will be inundated with powerline in every direction. It
2 will be impossible for this corridor/line not to be in-your-face and obtrusive to your
3 experience.

4 Impacting every trip - If you ask any snowmobiler that's ever been up here, if
5 they've been to Coburn Mountain, over 90% would say "yes". It is the first choice in
6 destination. A typical ride from The Forks would be ITS 86 along the Dead River to
7 ITS 89 to Grand Falls, then from Grand Falls back on ITS 89 to Coburn Mountain
8 over the north shoulder and to Parlin Pond. Then from Parlin Pond back to ITS 87
9 and down to The Forks. The Entire time, Johnson and Coburn Mountain are central
10 to that trip. Scenic views of these mountains from far to near are key guiding stops
11 along the way. If the powerline would be put into place, literally the poles and lines
12 will be observable from every scenic viewpoint.

13 Scenic destination area. Usage and Impact.

14 In the last ten years, traffic in that area has exploded. It is one of the most popular
15 destinations anywhere in the state. NECEC would be similar to running a powerline
16 up and around Cadillac Mountain in Acadia. The value and character and area has
17 been overlooked by the designers of this project and has purposely been ignored. No
18 studies have been done to know the amount of traffic that goes through these routes
19 during the winter. The Department and Commission should not even consider this
20 until studies are done to determine facts related to usage and economic impact of this
21 area.

22 Personal Financial Harm. No studies have been done to understand the economic
23 impact that Coburn Mountain and the snowmobile trails have in our communities.

1 To shut down Coburn during construction, would force many of the local residents,
2 like myself, to find work in another part of the state.

3 The very presence of this powerline invading our snowmobile trail system is enough
4 to ward off the visitors and regulars that I guide and know. It will change the
5 landscape to the point of no return. This area will forever be raped of its uniqueness
6 and allure and all that makes it a treasure.

7 Powerline trails. In terms of the quality of snowmobile trails under transmission
8 lines, I have had years of experience maintaining trails and grooming trails. They
9 don't hold the snow. They are hard on equipment because they are an unimproved
10 surface. They are windswept and sun exposed. They are the first trails to be melted,
11 and consequently closed. Nobody enjoys riding under a powerline but simply uses
12 them as a means of egress. No surveys have been done, aside from Sandra
13 Howard's, to see if snowmobilers enjoy riding on powerlines. But in my experience,
14 powerlines are simply used as a means of egress and are not the preferred trails to
15 ride or maintain.

16 Lights. Designers failed to take into consideration that any towers that are high
17 enough to require blinking red lights to aerial visibility are creating light pollution to
18 the very people who come up to our area to get away from it. These lights would be
19 a desecration of the view shed and outdoor experience.

20 06-096 Ch. 375, § 15. Protection of Wildlife and Fisheries.

21 CMP's proposed project does not adequately protect wildlife and fisheries. CMP's
22 proposed project does not contain buffer strips of sufficient area to provide wildlife
23 with travel corridors between areas of available habitat, will adversely affect wildlife

1 and fisheries lifecycles, and will result in unreasonable disturbance of deer wintering
2 areas, significant vernal pools, waterfowl and wading bird habitat, and species
3 declared threatened or endangered.

4 Natural Resources Protection Act – 38 M.R.S. § 480-D. Applicable Licensing
5 Criteria. 8 M.R.S. § 480-D (3). Harm to habitats; fisheries.

6 CMP's proposed project may unreasonably harm significant wildlife habitat,
7 freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or
8 adjacent upland habitat, travel corridor, and aquatic life. CMP's proposed mitigation
9 may diminish the overall value of significant wildlife habitat and species utilization
10 of the habitat in the vicinity of the proposed transmission line.

11 38 M.R.S. § 480-D (8). Outstanding river segments.

12 CMP has not demonstrated that no reasonable alternative to crossing outstanding
13 river segments, such as the Kennebec Gorge, exists which would have less adverse
14 effect upon the natural and recreational features of the river segment. Although CMP
15 doesn't consider this section of the crossing as "particularly unique or wild", citing
16 "... the Preferred Alternative location, which as described above is not particularly
17 unique or wild, would not adversely affect existing uses of the Kennebec River."

18 This section is where I stop with my fishing guests for lunch. It is just above Cold
19 Stream, a major tributary and significant spawning waterway. It is hard to believe
20 that this much disruption and heat will not interfere with the fisheries' viability.

21 Chapter 310: WETLANDS AND WATER BODIES PROTECTION

22 06-096 Ch. 310, § 5. General Standards.

23 CMP has not adequately minimized the amount of wetland to be altered. I believe
24 that CMP's proposal may result in an unreasonable impact because the project will

1 cause a loss in wetland area, functions, and values, and CMP has not demonstrated
2 that there is not a practicable alternative to the proposed project that would be less
3 damaging to the environment.

4 Chapter 315: Assessing and Mitigating Impacts to Existing Scenic and Aesthetic
5 Uses 06-096 Ch. 315.

6 CMP's proposed project is likely to unreasonably interfere with existing scenic and
7 aesthetic uses, and thereby diminish the public enjoyment and appreciation of the
8 qualities of a scenic resource, and that any potential impacts have not been
9 adequately minimized.

10 Chapter 335: Significant Wildlife Habitat
11 06-096 Ch. 335, § 3(A). Avoidance.

12 CMP's proposed project will have an unreasonable impact because it is will degrade
13 significant wildlife habitat, disturb wildlife, and affect the continued use of
14 significant wildlife habitat by wildlife. CMP has not demonstrated that there is not a
15 practicable alternative to the project that would be less damaging to the environment.

16 CMP has indicated that the placement of the corridor is based on land CMP owns.
17 This is not avoidance.

18 06-096 Ch. 335, § 3(B). Minimal alteration.

19 CMP has not minimized the alteration of habitat and disturbance of wildlife.

20 06-096 Ch. 335, § 3(C). No Unreasonable impact.

21 One or more of the standards of the NRPA at 38 M.R.S. § 480-D will not be met and
22 that therefore CMP's project will have an unreasonable impact on protected natural
23 resources and wildlife.

THE STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR SITE LOCATION OF DEVELOPMENT ACT PERMIT
AND NATURAL RESOURCES PROTECTION ACT PERMIT
FOR THE NEW ENGLAND CLEAN ENERGY CONNECT
FROM QUÉBEC-MAINE BORDER TO LEWISTON
AND RELATED NETWORK UPGRADES

PRE-FILED DIRECT TESTIMONY OF
ELIZABETH CARUSO
TOWN OF CARATUNK

FEBRUARY 28, 2019

1 **TESTIMONY OF ELIZABETH CARUSO**

2 **Q. Please state your name and address**

3
4 A. Elizabeth Caruso, 81 West Shore Rd, Caratunk, Maine 04925

5
6 **Q. What is the name of your organization and business address?**

7
8 A. Town of Caratunk, PO Box 180, Caratunk, Maine 04925

9 **Q. What is your current position?**

10 A. First Selectman, Overseer, Assessor

11 **Q. What other occupations have you had in the Caratunk area?**

12 I have worked as a Maine Registered Whitewater Guide since 1992. In 1994, I left a lucrative Industrial
13 Engineering career in Connecticut to live and recreate in this amazingly beautiful and peaceful area.
14 Utilizing my Masters in Business Administration, from 1995 to 2008, I co-owned and operated North
15 American Whitewater Expeditions, Inc. (dba North American Outdoor Adventure), a licensed
16 whitewater rafting outfitter operating on 7 rivers in Maine, Massachusetts, Vermont and Connecticut. I
17 also founded and operated The Outpost Bed and Breakfast and River House (bed and breakfast) in the
18 West Forks. In addition, I founded and operated the Dead River Outfitter Shop, selling outdoor gear,
19 equipment and clothing for year-round recreationists. In addition to the summer rafting season, we had
20 a fleet of snowmobile rentals and ATV rentals and offered guided tours during both seasons. My
21 company was instrumental in maintaining snowmobile trails, building snowmobile bridges and first
22 opening up Coburn Mountain as a groomed trail.

23 In addition, I helped start The Forks Area Chamber of Commerce and worked as its first Executive
24 Director, where one of my tasks was creating and marketing the Forks Area Snowmobile Trail map.

25 I also participated in the settlement negotiations over the FERC relicensing of Harris Station where
26 Florida Power and Light coordinated a large dialogue with the whitewater industry, communities,
27 organizations and agencies (circa 2000). A far cry from CMP's backroom, secretive dealings with a few
28 business stakeholders to create an MOU in lieu of open community mitigation talks.

29 In addition to working in the greater Forks Area as a guide and business owner, I am an avid outdoor
30 enthusiast. I have spent countless hours navigating the Kennebec, Dead and Penobscot rivers, boating
31 on the area's lakes and ponds, cross country skiing, snowshoeing, hiking the area's mountains and trails,
32 snowmobiling, ATV-ing and fishing. My husband and sons provide our family's organic, grass-fed
33 meat every year by hunting the area's deer and moose.

1 As a full-time homeschool mother, my husband is the primary source of income for our family. His
2 livelihood is comprised entirely of outdoor, tourism-based activities during Maine's four seasons. He is
3 a Maine Master Guide, and it is critical to our family that he have a secure flow of guests during the
4 hunting, fishing, snowmobiling and summer seasons.

5 **Q. Why did the Town of Caratunk intervene in these proceedings?**

6 The Town of Caratunk has grave concerns with regards to many facets of the NECEC proposal. As a
7 democratic government, our voters (residents) expect the town to defend and represent their welfare.
8 Most year-round residents derive their income in the tourism industry as independent guides or by
9 working for the recreational outfitters, lodges, cabins and restaurants, area gas stations, etc. A few of
10 these residents are intervenors in this proceeding, and many have submitted sworn testimonies and
11 public comments against the project.

12 Other residents work as carpenters, roofers, woodsmen, and handymen catering to the needs of the
13 area's landowners, both year-round and seasonal. However, most of Caratunk's landowners are from
14 out-of-state and own vacation homes and camps along Pleasant Pond and the Kennebec River. Caratunk
15 residents will not only be impacted financially through their livelihoods from which they derive income
16 to support families, but also in their ways-of-life. All residents chose homes and vacation homes or
17 camps in Caratunk for the area's peace and beauty in surroundings and also for the recreational
18 opportunities provided by the local mountains, ponds, lakes, rivers, streams, etc. NECEC will invade
19 the beautiful and valuable view shed which they enjoy but which also provides financial worth. NECEC
20 will assault the nature's silence and the nighttime darkness from their decks and during year-round
21 recreation activities.

22 There are obviously impacts to public health and safety, and scenic, historic and recreational values
23 related to any major energy project. Those impacts are the reasons behind the public outcry as seen in
24 the PUC public witness hearings, on the PUC website, in news stories, letters to the editor and guest
25 editorials, and at numerous grassroots events. Those impacts are exactly why the Town of Caratunk
26 intervened in this docket and why **every town, township, and plantation in the immediate vicinity**
27 that will be impacted by the new corridor **has formally voted against NECEC**.¹ Additionally, several
28 road associations, including Mile 10 Road Owners Association, Spencer Road, Grace Pond Subdivision

¹ The Town of Caratunk, West Forks Plantation, The Forks Plantation, Town of Jackman, Dennistown Plantation, and Town of Moose River and Alna have all voted to oppose the project and Caratunk has a moratorium in place pursuant to a special town meeting vote.

1 Road Owners Association, and Moxie Pond East Homeowners Association, representing landowners in
2 unorganized territories have submitted letters of opposition to this corridor². Obviously, these impacts
3 are critical enough to have two agencies analyze them from their respective views as an important part
4 of evaluating NECEC compared with any benefits to Maine and any potential alternatives.

5 It is self-evident that installing 100-foot-tall transmission towers along a new corridor as wide as the
6 New Jersey Turnpike through relatively undeveloped western Maine will have numerous, significant,
7 and permanent impacts. The Department doesn't have to quantify the impacts because CMP bears the
8 burden of proof to demonstrate that there won't be impacts. Those impacts are part of the total cost of
9 the project. Unfortunately, CMP hasn't done the studies³ or provided evidence to quantify the impacts or
10 prove there won't be any.

11 Due to the grave concerns of this corporate-profit-only project, an Elective Transmission Upgrade, the
12 Town of Caratunk recently enacted the Electrical Transmission Corridor Moratorium Ordinance in order
13 to protect the public health, safety and welfare of the residents of Caratunk. The Planning Board is
14 working on an appropriate ordinance and determining the most appropriate methods to regulate such
15 activities because there exists the potential for serious public harm including visual and financial impact,
16 fire, noise, taxpayer-incurred costs as well as environmental and health degradation.

17 **Buffering for Visual Impacts: Overview**

18 **CMP has NOT shown that THE USE CAN BE BUFFERED enough to not impact our wild and**
19 **scenic landscape that characterizes our 4-season outdoor recreation area.**

20 The transmission lines and corridor as designated through our area would not be buffered sufficiently to
21 maintain our community's economic vitality, our residents' ways of life and our residents' livelihoods.
22 Our year-round and seasonal residents chose purposefully to live in Caratunk for the remote, wilderness,
23 pristine and recreational attributes of the greater Forks area. This corridor represents a wide strip ripped
24 out of our landscape and significantly impacting, in fact negating, our scenic and wild setting. Tourists
25 and seasonal landowners come from all over the country and the world to partake of our wilderness
26 landscape and our guided wilderness trips, leaving their urban lifestyle to experience our unique pristine
27 wilderness.⁴

² CRTK-13, Homeowners' Association Letters

³ CRTK-1, January 9, 2019 Transcript of PUC hearings, cross-examination by Elizabeth Caruso

⁴ CRTK - 2, Kennebec Valley 2017 Regional Tourism Impacts

1 Our year-round residents who have a commercial guiding business or who are employed as guides,
2 waitstaff, housekeepers, office staff, cooks, cashiers, gas attendants, etc. in this area depend on the
3 characteristics of this wild and scenic landscape to remain wild and scenic and not be industrialized by a
4 150'-300' corridor of transmission lines and 100' poles. In addition, these wilderness guide businesses
5 and their families rely on the viability of the fishing, hunting, snowmobiling, hiking, ATV-ing, and
6 whitewater activities as well as the strength and health of the fishery and wildlife population and habitat.
7 Our community would be dramatically and negatively impacted by this transmission line/corridor
8 through the West Forks/Moxie areas, Johnson and Coburn Mountains and Parlin Pond, Bald Mountain
9 and Appalachian Trail. So much of our residents' revenue depends on the scenic and aesthetic uses of
10 our area.

11 We concur with the Department's statement that the photo-simulation of the corridor in leaf-stage was
12 Inadequate at best. During fall, winter and spring, the lines and poles would be visually, obtrusively
13 industrial against the natural wilderness. One of the many scenic areas impacted in the sub-districts is
14 the Coburn and Johnson mountain area. The corridor will tear a strip along the Coburn Connector Trail
15 and ITS 89, which are one the most popular destinations for snowmobilers. On a busy day, hundreds of
16 tourists snowmobiling to Coburn Mountain's 3800' observatory would be staring 360 degrees down at
17 the vastness of this destructive corridor.

18 **Winter Survey**

19 Because the applicant failed to conduct any survey of this critical season in the greater Forks area, a
20 Winter Recreation Impact Survey⁵ was conducted by Sandra Howard, PhD. This online survey was
21 distributed electronically, and participants responded during a 4-week period between January 18 and
22 February 18, 2019. Of the 163 participants, 70% thought "Riding along a powerline trail" was "Least
23 Important", 70% thought "Groomed trail riding in forested areas" were "Very Important", 71.2%
24 thought "Scenic beauty along snowmobile trails" was "Very Important", and 90% thought "Riding along
25 mountain view trails with overlooks" was "Very Important".

26 We are sure that, had the applicant conducted an analysis of the snowmobile recreation users of the area
27 of the new corridor, the data would show an overwhelming opposition to industrialized infrastructure in
28 this scenic area. As guides and guests have attested, 100' poles, red blinking lights and 150-300' scars

⁵ CRTK – 3, Winter Recreation Impact Survey

1 across the mountains, valleys, streams and ponds are simply horrific to recreationists and tourists
2 traveling to encounter a natural setting.

3 ALTERNATIVES ANALYSIS

4 **CMP has failed to show that there is NO ALTERNATIVE. In fact, there are alternatives.**

5 First of all, there already exists a corridor from the Quebec border on the other side of Route 201. CMP
6 could easily have used this corridor. It's quite simple and is even listed in the MOU with Western
7 Mountains and Rivers Corporation.

8 Secondly, CMP could have buried the line alongside Route 201 in a preexisting corridor and where the
9 land is already disturbed. Thirdly, CMP could have buried the line under pre-existing dirt roads. During
10 the Town's cross examination on January 9th of the PUC hearings, Mr. Dickinson explained that he had
11 proposed burying a transmission line in the Hudson Valley of New York due to aesthetic purposes.⁶

12
13 MR. TANNENBAUM: Can I just follow up quickly? Did -- I wasn't sure I heard this right.
14 Did CMP conduct an analysis of what it would cost to bury the line in the new corridor?

15 MR. DICKINSON: No.

16 MR. TANNENBAUM: Okay, thank you.

17 MS. CARUSO: So you mentioned earlier this morning that on a project in the Hudson
18 Valley you buried the line for aesthetic reasons. And it didn't occur to you to bury the line
19 here through this high tourism area and with all these camp owners having their property
20 abutting a huge DC transmission line?

21 MR. DICKINSON: So the project you're talking about, Connect New York, is a project that
22 is -- I would put in the dream category of project development portfolio that we have. It's --
23 so far has not got momentum within New York state. Maybe part of that is the cost related to
24 it, but, again, what the strategy there is we knew we were submitting into a request for
25 information in New York a number of years ago. We knew that there were existing AC
26 overhead projects that already were in place, and our idea was to find a corridor that already
27 was predisturbed. So a predisturbed corridor and putting a buried line along the thruway
28 means that you're not disrupting, you know, a new area, an area that currently wasn't dug up.
29 You're doing one that was just previously disturbed. So again, there was a specific rationale
30 and reason.
31

32 Route 201 would certainly be considered a "predisturbed" area, and yet, CMP chose not to use this
33 rationale or reason in this case. Additionally, CMP has given no evidence that it had realistically tried to
34 find an alternate route. They have stated that they chose this route because they already own the land,
35 thereby making the project less expensive. **CMP's shortsightedness and desire to cut costs should**

⁶ CRTK – 1, January 9 transcript, p. 90

1 **NEVER be the reason that our towns and landscapes are devastated and our residents' abilities to**
2 **enjoy life and sustain livelihoods should suffer.**

3 Furthermore, the applicant should have used the same foresight and precautions in our spectacular forest
4 and tourism area that they offered in New York. In response to a New York RFI, Thorn Dickinson,
5 Vice-President of Business Development for Iberdrola USA, proposed an underground line for a similar
6 1,000 MW DC line utilizing existing public and private right-of-way. As clearly stated in their own
7 "Connect New York" document⁷, the underground routing was utilized in order to 1) mitigate
8 environmental and right-of-way concerns, 2) avoid eminent domain, and 3) eliminate aesthetic and
9 health-based concerns.

10 **The "Connect New York" Option**

11 Simply stated, "Connect New York" is our vision of how to best advance the major supply-side energy
12 objectives delineated in "Power NY". It would include a 1,000 MW DC bulk transmission line running
13 from the Utica area to New York City. There is also the option to add a second 1,000 MW line. The
14 **routing would be underground utilizing existing public and private right-of-way. In doing so we**
15 **can mitigate environmental and right-of-way concerns that derail most bulk transmission projects**
16 **and avoid eminent domain and NIMBY issues. By burying an efficient, underground DC bulk**
17 **transmission line, line losses will be reduced and aesthetic and health-based concerns eliminated.**

18 In fact, the energy industry knows all too well that burying transmission lines is common practice to
19 alleviate aesthetic and environmental issues. NextEra has brought this very issue to the Department's
20 and Commission's attention. Where but in this spectacular area, would it have been more appropriate to
21 bury this corridor, eliminate 100' monstrosities, huge and humming DC transmission lines, and
22 drastically reduce the amount of herbicides polluting our streams, renowned fisheries and wildlife –
23 which many of us rely on to feed our families.

24 As a competitor in the 83D RFP process, TDI-VT has a fully permitted, ready-and-waiting,
25 **underground and underwater** corridor of 145 miles to deliver the same power from Hydro Quebec
26 into Massachusetts. There is no excuse for CMP to not have buried NECEC underground for the entire
27 length of the 53 new miles of corridor through our last contiguous forest and spectacular tourism area.
28 Additionally, the line should have been buried in all areas where residential homes would abut the line
29 or view shed.

⁷ CRTK – 4, Connect New York, p.7 (emphasis added)

1 Aside from already owning and arranging lease agreements for the land of the new corridor, CMP didn't
 2 research existing uses of the new area to minimize scenic, recreational, visual impacts (as their
 3 competitor TDI had done in Vermont). During the January 9 cross examination, CMP admitted the
 4 following.

5 MS. CARUSO: Okay. So **have you studied winter snowmobiling** in the affected area
 6 of the proposed new corridor?

7 MR. STINNEFORD: **We have not conducted a study**, although we have had
 8 numerous conversations with the Maine Snowmobile Association and they are very
 9 supportive of the Project.

10 MS. CARUSO: Okay. **Have you completed any studies as to why people come to**
 11 **the region of the new portion of the line to hunt, fish, raft, hike, or snowmobile?**

12 MR. DICKINSON: **No**, as I said, I think my understandings from the -- why I believe
 13 there's opportunities for new expanded tourism in the region come from conversations
 14 that I had had with people in the region.⁸

15 In other words, they had *some* conversations with *some* people and that's all they offer to support their
 16 contention that NECEC not only won't harm our tourist economy but will actually be good for it. In
 17 reality, the communities along the new corridor – who obviously know more about our local tourist
 18 economy than CMP does – have all come out strongly in opposition to NECEC. As mentioned above,
 19 the registered voters, landowners and/or boards of selectmen along the new corridor have
 20 overwhelmingly opposed NECEC. In contrast, CMP has very little support. The contractors who would
 21 build NECEC obviously like the idea, the relatively few business owners who would directly benefit
 22 from the WM&RC MOU are required to support it (discussed below).

23 CMP also tries to suggest that a “working forest” is somehow an already-spoiled landscape and that our
 24 local concerns should be dismissed. Western Maine is a wonderful, scenic, special area, and the
 25 landowners that manage the “working forest” are excellent stewards of the land. The overall value and
 26 beauty of our natural heritage is exactly why people come to our region to take advantage of a largely
 27 unspoiled wilderness experience. CMP's implication that this is more or less just a wasteland is untrue,
 28 disrespectful, and doesn't support any finding that NECEC will cause little, if any, impacts in our
 29 region. (Roger Merchant's GROUP 2 testimony will go into greater detail on this issue).

30 Aside from the last-minute resort to bury the 1000' of line under the Kennebec River, **CMP didn't**
 31 **conduct any kind of analysis to find out if it might be possible to install the line underground** – like

⁸ CRTK -1, January 9 Transcript p. 85 (emphasis added)

1 TDI and significant parts of Northern Pass – to see if some of the visual and environmental impact could
2 be avoided:

3 MR. TANNENBAUM: Can I just follow up quickly? Did-- I wasn't sure I heard this
4 right. **Did CMP conduct an analysis of what it would cost to bury the line in the**
5 **new corridor?**

6 MR. DICKINSON: **No.**⁹
7

8 The fact that they only did relatively superficial analyses related to project impacts is extremely
9 disturbing to the local communities and to those whose livelihoods and families are at stake. It should be
10 disturbing to the Department and Commission, as well.

11 What they did do was insufficient. James Palmer, the DEP's peer reviewer responsible for evaluating
12 CMP's Visual Impact Assessment, found it sorely lacking and sent them back to the drawing board to do
13 it better. The peer reviewer said, "The question remains—why is there not a full accounting of potential
14 scenic resources and a documented evaluation of all those with potential visibility? There does not even
15 appear to be a process to attempt a full accounting."

16 CMP has provided no evidence related to the potential impact on property values, no evidence
17 addressing whether the local communities have sufficient emergency response capabilities, and no
18 evidence that NECEC will not harm our tourism and recreation economy. Without supporting evidence,
19 it is difficult to see how CMP can claim there won't be any impacts. For reasons such as these, it is
20 difficult for intervenors and members of the public to see how the DEP/LUPC could possibly allow
21 NECEC to occur.

22 CMP has gone to great lengths to downplay the impacts and disparage the views of its critics. For
23 example, on September 4, 2018, DEP issued a formal letter response¹⁰ to CMP regarding information
24 that CMP provided on July 26, 2018. DEP's letter includes some enlightening quotes from the CMP July
25 26 filing. According to CMP:

26 "At the Preferred Alternative location, the river is generally flat water, and is **not**
27 **particularly valued by recreational users . . . This commercial [rafting] and**
28 **recreational use of this section of the river arguably has more impact on any bucolic**
29 **nature of the river than does the proposed overhead crossing . . . This existing**
30 **human-caused visual impact at the Harris Dam put-in is significantly greater than**
31 **the Preferred Alternative would be ... and affects rafters' and other boaters'**

⁹ CRTK – 1, January 9 Transcript p. 90 (emphasis added)

¹⁰ <https://www.maine.gov/dep/ftp/projects/necec/2018-09-04-Mirabile-follow-up-questions-7-27-to-8-14-submissions%20.pdf>,
emphasis added

aesthetic expectations on the river downstream . . . Due to the position, buffering, and limited duration of viewing, the overhead crossing in the proposed location will not diminish the recreational use or scenic character of the outstanding river segment located between the Forks and Indian Pond Dam. Accordingly, the two conductors and two shield wires that would cross the river at **the Preferred Alternative location**, which as described above **is not particularly unique or wild, would not adversely affect existing uses of the Kennebec River.”**

DEP asked, “...did CMP draw these conclusions based on user survey data? Can you provide the basis for these statements?” Of course, there was no survey data or analytical basis for CMP’s conclusions. Most of the “analysis” they did was after-the-fact – after the application was filed and only after DEP asked them to do it.

However, a Kennebec River Visitor Impact Study was conducted in 2018, and 98.6%¹¹ respondents stated that a pictured transmission line crossing with 12-18 FAA orange balls¹² would have “a negative impact on your wilderness river experience” (275 out of 279 participants). This information was presented as sworn testimony by Carol Howard at the Hallowell PUC Public Witness Hearing; the following day, CMP amended the application to bury the line under the gorge.

Instead of actually studying recreational impacts, CMP just dismisses them. Rafting guides and recreational boaters strongly disagree with the idea that where NECEC would cross the Kennebec River gorge “is not particularly valued by recreation users.” As a matter of fact – and as any study or survey of actual users would have shown – it’s one of the most peaceful and serene parts of the adventure where boaters have a chance to look around and catch their breath after the excitement of the whitewater. Instead of a constructive approach with stakeholders and any data-driven analysis, they offer unsupported, inaccurate, and frankly offensive opinions like, “recreational use of this section of the river arguably has more impact on any bucolic nature of the river than does the proposed overhead crossing.” Somebody at CMP just made that up. What’s even scarier is they apparently thought saying things like that would help them get a permit.

For additional intervening comments on this topic, please refer to:

06-096 Ch. 375, § 9. Buffer Strips.

06-096 Ch. 375, § 14. No Unreasonable Effect on Scenic Character.

06-096 Ch. 375, § 12. Preservation of Unusual Natural Areas.

38 M.R.S. § 480-D(8). Outstanding river segments.

6-96 . 315.

¹¹ CRTK – 5, KRV Impact Circle Chart

¹² CRTK – 5, KRV Impact Photograph

1 **Site Location of Development Law – 30 M.R.S. § 484. Applicable Licensing Criteria**

2 **30 M.R.S. § 484(3). No adverse effect on the natural environment.**

3

4 The Town of Caratunk believes that CMP has not “made adequate provision for fitting the development
5 harmoniously into the existing natural environment and that the development will not adversely affect
6 existing uses, scenic character, air quality, water quality or other natural resources in the municipalities
7 along the transmission line or in neighboring municipalities.” CMP’s proposed project will likely have
8 significant negative impacts on existing whitewater rafting, hiking, hunting and fishing activities on
9 rivers remote ponds, lakes and on land, as well as on the scenic character of the Old Canada Scenic
10 Byway and the Appalachian Trail. These significant negative impacts on our natural environment
11 correlate to our residents' way of life, livelihoods and the community's economic viability which is
12 dependent on the lure of tourists to visit the very attributes which will be taken away.

13

14 **30 M.R.S. § 484(3)(H).**

15

16 The Town of Caratunk believes that CMP’s proposed project may adversely impact significant vernal
17 pool habitat. CMP’s application indicates that there are at least 42 significant vernal pools and 23
18 potentially significant vernal pools wholly or partially located within the proposed action area.

19

20 **Chapter 375: NO ADVERSE ENVIRONMENTAL EFFECT STANDARDS OF THE SITE**
21 **LOCATION OF DEVELOPMENT ACT**

22 The Town of Caratunk – as well as all the towns north to the border – have grave concerns over the lack
23 of fire and emergency infrastructure that is necessary to support the construction and operation of such a
24 high-power transmission line. The absolutely horrific fires in California are reason enough to insist on
25 adequate fire protection around any such lines. None, however, exists.

26

27 In addition, these tourist dependent towns are just as concerned about where the construction workers
28 would even stay. The tourist lodges, hotels, cabins and motels do not want to fill their occupancy on
29 temporary construction workers leaving no room for returning tourism clients. In Caratunk’s cross-
30 examination of CMP executives on January 9th, when asked about this issue as well as the **absence of**

1 **fire and emergency medical care**, CMP had not even considered these requirements when choosing to
2 place this high-power line in our woods.

3 MS. CARUSO: -- did you ask the affected communities whether or not they
4 could accommodate such a large construction workforce or if they had the fire
5 and emergency response resources to handle it?

6 MR. DICKINSON: So the -- I don't think -- I think the simple answer is no.¹³
7

8 To answer the question, the Town of Caratunk has no local fire or emergency response. (*Both are
9 contracted out from Bingham). The Forks, West Forks, Parlin Pond, Jackman, Dennistown and Moose
10 River all rely on Bingham's ambulance, the Skowhegan Redington Fairview Hospital, and they have a
11 small fire department in Jackman and a few volunteers at the West Forks Volunteer Fire Department.
12

13 Furthermore, the Maine State Federation of Firefighters just released a letter of concern "for fire and
14 other emergency response capabilities within the areas located along and adjacent to the NECEC
15 corridor." The president warned:

16 "Please also note that these fire departments also lack sufficient off-road fire support
17 capacity. While several do have smaller 4WD apparatus, sufficient large-scale wildland
18 suppression and emergency mitigation equipment is not available in the rural areas of the
19 proposed NECEC Corridor area."¹⁴

20 "The most current available Somerset County Emergency Management Agency
21 Mitigation Plan states the following: C3 Goals Wildfires: Reduce damage, injury and
22 possible loss of life in Somerset County caused by wildfires. Somerset County is subject
23 to wild land fires. The most likely damages caused by a wildfire are the loss of life, loss
24 of prime timberland, and the destruction of personal and real property, especially homes.
25 The loss of electricity is also possible, since many high voltage transmission lines pass
26 through heavily wooded areas. Major wildfires may close commerce, resulting in major
27 losses of income to local businesses and individuals. *There were at least 261 wild land
28 fires in Somerset County in from 2005 to 2010. Information to date indicates that
29 consideration of the many emergency hazards associated with the construction and future
30 management of the NECEC Corridor have not been addressed. Due to this oversight, we
31 conclude that the preparedness and safety of our fire fighters, and other first responders

¹³ CRTK – 1, January 9, p. 124

¹⁴ CRTK – 6, Maine State Federation of Fire Fighters letter, 2/12/19

1 who will respond to NECEC Corridor incidents, has been severely overlooked and their
2 security and safety significantly compromised.”

3 *With the California fires still fresh in our eyes and memories, we see this concern alone as sufficient*
4 *reason for the Department and Commission to deny permits for NECEC.*

5 **06-096 375, § 14. No Unreasonable Effect on Scenic Character.**

6 The Town of Caratunk believes that CMP’s proposed project will have a devastating effect on the scenic
7 character along the proposed transmission line. For example, the line will cross the Appalachian Trail,
8 the Old Canada Scenic Byway, the Kennebec Gorge, the Spencer Road, Cold Stream, and many other
9 important scenic sites not the least of which is The Forks Area - Jackman Snowmobile Trail system.

10
11 CMP has been propagating that the area of the new 53 miles is nothing but a working forest. We all
12 know that clear cuts grow back, but CMP’s destructive herbicides and cutting will create a permanent
13 wasteland of the forest.

14 Notably, CMP’s visual rendering showed uninhabited, bland and undesirable roads, ponds and
15 mountains. In order to illuminate the outlandish misrepresentation of these impressive destinations, the
16 Town has attached a file¹⁵ of pictures of the tourist destinations, vacation lands, beautiful mountains,
17 pond and natural landscapes that NECEC will fragment and industrialize, forever destroying God’s
18 creation.

19
20 As the Department and Commission review these pictures, we ask you to keep in mind, not only the
21 beauty of the land, but also the joy and peace of the recreationists. If we could ask you to stretch your
22 imagination even further, think about how many Maine employees are involved in meeting the needs of
23 each one of these visitors (housekeeping, cook and wait staff, office administration, reservationists, gas
24 stations, grocery stores, guides, machine rentals, snowmobile groomers, cabins and lodge owners, etc.).
25 Next, think about the families they are supporting. A permit awarded to NECEC would not only
26 permanently affect these landscapes, wildlife and fisheries, but would permanently affect the livelihoods
27 of these Maine citizens and their families.

28
29 It is important to note that only after Coburn Mountain was opened as a trail destination, the
30 snowmobiling season became as strong and vibrant as it is now. Personally speaking as one local
31 example, my family would not be able to live in Caratunk year-round if we didn’t have the income of

¹⁵ CRTK – 8, Visual Rendering, Elizabeth Caruso

1 the snowmobiling season during the winter months.

2
3 Visitors from Maine and all over the globe are drawn to this last contiguous forest, remote ponds, and
4 incredible landscapes during the summer, fall hunting and hiking, spring fishing and winter
5 snowmobiling seasons. People leave their industrialized and urban settings to come to this area to catch
6 a glimpse of raw nature in its beauty and allow the inherent peace of their surroundings to settle their
7 souls. Once industrial powerlines flood these views, wrap around our mountains and ponds, these
8 visitors won't have a reason to return.

9
10 Attached is a rendering of The Forks Area snowmobile trail system around Coburn and Johnson
11 mountains with the proposed NECEC corridor superimposed.¹⁶ It is plainly evident that NECEC is
12 **maliciously invasive in its placement within this highly visible tourism destination area.** NECEC
13 will forever degrade this scenic area, significantly undermine the natural beauty of this area and
14 destabilize the tourism economy which Somerset County residents rely so heavily on.

15
16 **The John Muir Trust study of 2017 found that 55% of the tourists would not return to a**
17 **wilderness area if it has transmission infrastructure.**¹⁷

18
19 If CMP chose to bury the line for 1000 ft under the Kennebec River to avoid impact to tourism, CMP
20 should have avoided the snowmobiling recreational area as well. Snowmobiling, or winter, tourism is
21 equally as critical to the Forks area as rafting is during the summer. Coburn Mountain, with its 360-
22 degree spectacular view, is the major lure of snowmobile riders from Eustis, Jackman, Greenville and
23 Bingham. Wrapping industrial infrastructure all around Johnson and Coburn mountains will turn away
24 these riders. Without the volume of riders, restaurants, cabins, lodges, rentals, guides, gas stations, retail
25 shops – and all their support staff – will greatly suffer and some will likely have to move out of the area
26 for work.

27
28 **06-096. 375, § 15. Protection of Wildlife and Fisheries.**

29 The Town of Caratunk believes that CMP's proposed project does not adequately protect wildlife and
30 fisheries. The Town of Caratunk believes that CMP's proposed project does not contain buffer strips of
31 sufficient area to provide wildlife with travel corridors between areas of available habitat, will adversely

¹⁶ CRTK – 9, Coburn Mountain snowmobile trails

¹⁷ CRTK – 10, John Muir Study, 2017

1 affect wildlife and fisheries lifecycles, and will result in unreasonable disturbance of deer wintering
2 areas, significant vernal pools, waterfowl and wading bird habitat, and species declared threatened or
3 endangered.
4

5 As the above report explains, it is obvious that the consistent application of herbicides polluting the
6 Maine native brook trout fisheries and the natural deer and moose habitats would not be considered as
7 “management and conservation efforts aimed at maintaining populations of native species.” Similarly,
8 unnecessarily ruining deer wintering habitats by ripping an industrial corridor through these natural
9 areas would also not be considered proper management and conservation efforts.
10

11 **Natural Resources Protection Act – 38 M.R.S. § 480-D. Applicable Licensing Criteria.**

12

13 **38 M.R.S. § 480-D(1). Existing uses.**

14

15 The Town of Caratunk believes that CMP’s proposed project may unreasonably interfere with existing
16 scenic, aesthetic, and recreational uses as indicated above.
17

18 Rural vs. Industrial Maine Towns

19 When addressing the effects of the project location, it is critical that the Department and Commission
20 differentiate between the varied locations which NECEC would affect. There are two completely
21 dissimilar demographic and geographic cultures of Maine.
22

23 On the most northern section, NECEC consists of 53 miles of new corridor prior to the subsequent
24 sections along scenic ponds/lakes and continuing into forested or farm lands in rural towns. These
25 towns and plantations located in Somerset and Franklin counties are among the most heavily opposed to
26 the transmission project. In fact, the towns along the new corridor through the last unfragmented green
27 field are unanimously opposed. Being so remote geographically, these residents specifically chose to
28 acquire their lands for the scenic, peaceful and healthy attributes of a non-industrialized environment.
29 Their livelihoods and ways of life and healthy eating (hunting for organic, grass-fed game) require this
30 preserved, wild landscape. The very livelihoods of the residents in Somerset County, for example, are
31 dependent on their natural landscapes to lure tourists traveling from industrialized settings to recreate in
32 Somerset County.
33

1 In contrast, cities in and around the southern terminus of the line, in Lewiston, Maine, are accustomed to
2 industrial infrastructure. Just as the rural, northern areas depend on a preserved, wild landscape, these
3 cities and residents are dependent on mechanical industries for revenue and jobs. Likewise, these
4 southern areas seek to remedy economic depressions due to loss of industrial jobs with similarly natured
5 jobs.
6

7 The State of Maine is very diverse. Maine icons include lobster, lighthouses, coastlines, logging and
8 paper mills as well as big game, boating and fishing in pristine inland waters and rugged wilderness. LL
9 Bean, another Maine icon, would never publish fishing, kayaking or hunting pictures with industrialized
10 transmission lines in a pristine, wild setting. That is not Maine's iconic image. It is not "the way life
11 should be". Although certain proponents, such as the Maine Chamber, Lewiston/Auburn Chamber, City
12 of Lewiston and IBEW, may have louder voices, the rural citizens of Maine are equally as important
13 though fewer in number. The Department and Commission should consider Somerset and Franklin
14 counties equally with Androscoggin County.
15

16 It is also enlightening to find that the public outcry, as revealed through media polls, social media, and
17 especially through the PUC public comments, is not limited to Somerset and Franklin county residents.
18 Citizens from all regions of Maine are crying out to stop this project from devastating Maine's
19 wilderness, wild nature, Maine's tourism and brand. A reoccurring message is that we, this generation,
20 must preserve our wild landscape for the future generations – especially because urbanization and
21 industrialized infrastructure will only keep increasing in other areas of the state, region and country.
22 Americans will need Maine's wild and scenic areas even more in the future!
23

24 **38 M.R.S. § 480-D(3). Harm to habitats; fisheries.**

25

26 The Town of Caratunk believes that CMP's proposed project may unreasonably harm significant
27 wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or
28 adjacent upland habitat, travel corridor, and aquatic life. The Town of Caratunk also believes that
29 CMP's proposed mitigation may diminish the overall value of significant wildlife habitat and species
30 utilization of the habitat in the vicinity of the proposed transmission line.
31

32 **38 M.R.S. § 480-D(4). Interfere with natural water flow.**

33

34 The Town of Caratunk believes that CMP's proposed project may unreasonably interfere with the
35 natural flow of surface or subsurface waters as discussed above.
36
37

1 **38 M.R.S. § 480-D(5). Lower Water Quality.**

2
3 The Town of Caratunk believes that CMP's proposed project may cause violations of state water quality
4 laws, including those governing the classification of the State's waters as discussed above.

5
6 **38 M.R.S. § 480-D(8). Outstanding river segments.**

7
8 The Town of Caratunk believes that CMP has not demonstrated that no reasonable alternative to
9 crossing outstanding river segments, such as the Kennebec Gorge, exists which would have less adverse
10 effect upon the natural and recreational features of the river segment. Although CMP doesn't consider
11 this section of the crossing as "particularly unique or wild", citing "... the Preferred Alternative location,
12 which as described above is not particularly unique or wild, would not adversely affect existing uses of
13 the Kennebec River."

14
15 Practically speaking, this is a section of river where guests are sitting in the boats looking around
16 because it is too shallow to swim. Bald eagles are commonly seen, and the impact of pristine wilderness
17 is readily noticed and appreciated by guides and guests alike.

18
19 In actuality, the **Kennebec River is a Class A River** according to the 1982 Maine Rivers Study.¹⁸ CMP
20 failed to include that, according to the 1982 Maine River Study, the **Kennebec, Dead and Sheepscot**
21 **Rivers have been identified as "Class A" Rivers** and identified as:¹⁹

- 22
23 1. River or river segments possessing six resource values with regional, statewide or
24 greater than statewide significance in a specific resource category.
25
26 2. Rivers or river segments possessing two or more resource values which are recognized
27 to be some of the State's most significant in a given resource category. Included within
28 this category are rivers providing important habitat (defined as self-sustaining viable
29 runs or significant restoration efforts producing fishable populations) for the nationally
30 significant Atlantic sea run salmon".

31
32 **RESOURCE VALUES²⁰:**

- 33 • Geologic / Hydrologic Features
34 • River Related Critical / Ecologic Resources
35 • Undeveloped River Areas
36 • Scenic River Resources
37 • Historical River Resources

¹⁸ CRTK – 12,

https://www.maine.gov/dep/gis/datamaps/lawb_maine_river_survey/pdf/1982MaineRiversStudy_FinalReport2011.pdf?sfn=mo

¹⁹ CRTK – 12, Maine Rivers Study, p.9

²⁰ CRTK – 12, Maine River Study, p. 8

- Recreational River Resources

Furthermore, in Section I, Item 5 of the Findings, **the Study stated that impacts of development around these river resources should be avoided or minimized.** Obviously crossing the Kennebec River, whether under or over, and its tributaries should be avoided whenever possible.

There is a significant base of citizen and public agency support for the conservation and sound management of the river resources of Maine.

River conservation interests in the state vary widely. Such interests include recreational boating and fishing, commercial boating and fishing, education and scientific research, wildlife preservation, water quality maintenance, and miscellaneous recreational interests. While these interests vary and sometimes conflict, an underlying consensus exists that **rivers in their natural condition constitute a valuable resource to the State of Maine.** There also appears to be a consensus among river interests regarding which rivers are most important and warrant conservation action.

In addition, there appears to be a public recognition of the need to balance the goals of hydroelectric development and river conservation, and a desire for the use of hydropower where compatible with the resource values of a river and **where impacts of development are avoided or minimized.**

The department and Commission should carefully weigh the findings of this study as it was intended for state agencies' deliberations. As can be seen below, the Kennebec and Dead Rivers were ranked at the highest classification of river resource value, and the state must ensure that these qualities are protected.

INTRODUCTION²¹

On June 22, 1981, Governor Brennan released the Energy Policy for the State of Maine. The hydropower section of the policy directed that:

“The Department of Conservation, working with environmental, economic, energy and other appropriate interests, should identify river stretches in the State that provide unique recreational opportunities or natural values and develop a strategy for the protection of these areas for submission to the Governor.”

In response to this directive, and as a continuation of the State's ongoing efforts to conserve Maine's significant rivers, the Department of Conservation initiated the Maine Rivers Study. The U.S. Department of the Interior, National Park Service's Mid-Atlantic Office, as part of their ongoing river conservation technical assistance to the State, has provided staff to conduct this study.

The purpose of the study is two-fold. The first is to define a list of unique natural and recreation rivers, identifying and documenting important river related resource values as

²¹CRTK – 12, Maine River Study, p. 13 (emphasis added)

1 well as **ranking the State's rivers into categories of significance based on composite**
 2 **river resource value.** The second purpose of the study is to **identify a variety of actions**
 3 **that the State can initiate to manage, conserve, and where necessary, enhance the**
 4 **State's river resources in order to protect those qualities which have been identified**
 5 **as important.**

7 **Chapter 310: WETLANDS AND WATER BODIES PROTECTION**

8 **06-096. 310, § 5. General Standards**

9 The Town of Caratunk believes that CMP has not adequately minimized the amount of wetland to be
 10 altered. The Town of Caratunk believes that CMP's proposal may result in an unreasonable impact
 11 because the project will cause a loss in wetland area, functions, and values, and CMP has not
 12 demonstrated that there is not a practicable alternative to the proposed project that would be less
 13 damaging to the environment.

15 **Chapter 315: ASSESSING AND MITIGATING IMPACTS TO EXISTING SCENIC AND** 16 **AESTHETIC USES**

17 **06-096. 315.**

18 The Town of Caratunk believes that CMP's proposed project is likely to unreasonably interfere with
 19 existing scenic and aesthetic uses, and thereby diminish the public enjoyment and appreciation of the
 20 qualities of a scenic resource, and that any potential impacts have not been adequately minimized.

22 In Caratunk's cross-examination of CMP executives on January 9th, **CMP admitted that they did not**
 23 **even assess the area of the new 53 miles for existing uses.**

24 MS. CARUSO: "in the visual rendering presentation of August 17th you presented -- or
 25 your company presented to the PUC some pictures of Parlin Pond, Enchanted, Coburn
 26 Mountain, Rock Pond, Spencer Road, the Kennebec River, and they appear to be
 27 uninhabited without visible recreational usage or unusual scenery. And then it was stated
 28 at that meeting that you were trying to minimize the impact of a national scenic byway by
 29 putting the line to the east and to the west. Did you analyze the usages of areas you chose
 30 to place the line beyond it being a working forest?"

31 MR. DICKINSON: "You know, I'm not aware of that."²²

33 In Caratunk's cross-examination of CMP executives on January 9th, **CMP admitted that they did not**
 34 **conduct any studies on the impacts of tourism in the area of the new 53 miles.**

35
 22 CRTK -1, January 9 Transcript p. 81

1 MR. TANNENBAUM: Okay, so maybe the question should be, have you done a study
2 of the impacts on tourism?

3 MR. DICKINSON: Yeah, there's no specific study that we did.²³

4
5 In Caratunk's cross-examination of CMP executives on January 9th, **CMP admitted that they did not**
6 **conduct any studies on winter snowmobiling in the area of the new 53 miles.**

7
8 MS. CARUSO: Okay. So have you studied winter snowmobiling in the affected area of
9 the proposed new corridor?

10 MR. STINNEFORD: We have not conducted a study²⁴

11
12 In Caratunk's cross-examination of CMP executives on January 9th, **CMP admitted that they did not**
13 **consider the scenic and economic impacts from the corridor in the scenic and/or residential areas**
14 **of the new 53 miles.**

15 MS. CARUSO: So because of the scenic and economic impacts from this corridor, especially in
16 the new corridor area but also in the existing corridor area with all the camp owners and the
17 people who are impacted, did you ever consider burying the line for the entire length of the new
18 construction?

19 MR. DICKINSON: No, we didn't.

20 MS. CARUSO: Did you ever study the potential difference on the economy of the region
21 between burying the line and not burying the line?

22 MR. DICKINSON: No, we did not.

23 MS. CARUSO: Did you ever evaluate the scenic or visual impact of burying the line versus not
24 burying the line?

25 MR. DICKINSON: No, we did not.²⁵

26
27 Simply stated, CMP did not care where or how this corridor is placed. CMP did not consider the
28 citizens or residents of Maine. Their lack of foresight and attention to details reveals the rushed
29 planning of this project and the lack of stewardship in the great State of Maine.

30 **Chapter 335: SIGNIFICANT WILDLIFE HABITAT**

31 **06-096. 335, § 3(A). Avoidance.**

32 The Town of Caratunk believes that CMP's proposed project is likely to have an unreasonable impact
33 because it is likely to degrade significant wildlife habitat, disturb wildlife, and affect the continued use
34 of significant wildlife habitat by wildlife and CMP has not demonstrated that there is not a practicable

²³ CRTK -1, January 9 Transcript p. 83

²⁴ CRTK -1, January 9 Transcript p. 85

²⁵ CRTK -1, January 9 Transcript p. 89

1 alternative to the project that would be less damaging to the environment. CMP has indicated that the
2 placement of the corridor is based on land CMP owns. This is not avoidance.
3

4 **06-096. 335, § 3(B). Minimal alteration.**

5 The Town of Caratunk believes that CMP has not minimized the alteration of habitat and disturbance of
6 wildlife.
7

8 **06-096. 335, § 3(C). No Unreasonable impact.**

9 The Town of Caratunk believes that one or more of the standards of the NRPA at 38 M.R.S. § 480-D
10 will not be met and that therefore CMP's project will have an unreasonable impact on protected natural
11 resources and wildlife.
12

13 **06-096. 335, § 3(D). Compensation.**

14 **The Town of Caratunk believes that CMP's compensation is inadequate to off-set lost habitat**
15 **function.**

16 The Department and Commission must differentiate NECEC as opposed to a reliability transmission
17 project. As an Elective Transmission Upgrade, NECEC must be held to a higher standard than a
18 reliability transmission project, especially when the ETU is just a for-profit project that would be built to
19 serve an entirely different state. This ETU is no different than any other corporation, like Walmart or
20 McDonalds, that is applying for a permit to do business. That clearly shifts the balance when comparing
21 impacts versus benefits. CMP would need to prove there would be numerous, significant, permanent,
22 and quantifiable benefits in Maine that would be enough to justify the numerous, significant, permanent
23 and quantifiable impacts of the project. The evidence in the record doesn't even come close to
24 supporting a permit.

25 CMP argues that "no costs will accrue to Maine consumers." That is not the question. In fact, the Town
26 and its residents contend that there will be significant costs related to our livelihoods and ways of life,
27 property values, and risks to public safety and health – and we are all Maine consumers, too.

28 The real cost of the project is what it will do to our natural resources and local economy. Therefore, the
29 question for the Commission is whether there will be any benefits – such as enhancing reliability,
30 improving the tourist and recreation economy, improving trout fisheries, enhancing deer and moose
31 habitats– that sufficiently justify the unavoidable costs of building a brand-new transmission corridor
32 through an area that so strongly disagrees with CMP's contention it will be a good thing for us.

1 The Department and Commission can only approve NECEC if there is unequivocal and overwhelming
2 evidence that the NECEC ETU will provide significant and long-lasting benefits to Maine without
3 adverse impacts.–The applicant must demonstrate that the proposed activity will not unreasonably
4 interfere with the scenic character, existing scenic, aesthetic, recreational or navigational uses and that
5 the development fits harmoniously into the natural environment. CMP has not provided that evidence.
6 This Elective Transmission Upgrade does not fit harmoniously with the fisheries, wildlife, scenery, or
7 the landowners who abut the line or see the line from their homes. As is obvious from the public outcry,
8 town votes, the nearly 1000 PUC comments, ever-increasing grass roots uprising, countless editorials,
9 etc., this foreign corporate profit venture seeks to destroy the local economy, Maine’s brand and lure,
10 and the livelihoods and ways of life of the Maine people. That’s why CMP didn’t provide sufficient
11 evidence to support their case.

12 **30 M.R.S. § 484(5). Ground Water.**

13 The Town of Caratunk believes that CMP’s proposed project will “pose an unreasonable risk that a
14 discharge to a significant ground water aquifer will occur.” CMP’s application indicates that “potential
15 sources of groundwater contamination will include fuel and hydraulic and lubrication oils used in the
16 operation and maintenance of vehicles, but most importantly, the application of herbicides to control
17 vegetation.” NECEC Site Location of Development Application at 15-1. It should be unacceptable to
18 the DEP that the drinking water of Jackman and Moose River should be polluted with chemicals.
19

20 **06-096 Ch. 375, § 2. No Unreasonable Alteration of Climate.**

21 The Town of Caratunk believes that CMP’s proposed project may result in “unreasonable alteration of
22 climate.” CMP claims that the project is expected to reduce regional greenhouse gas emissions in
23 Massachusetts but has not produced evidence that this proposed transmission line will not result in an
24 overall increase in greenhouse gas emissions. Expert consultants from CMP, Generator Intervenors and
25 NextEra in the PUC proceedings could not confirm that Hydro-Quebec had the necessary capacity of
26 hydro power to provide for NECEC’s requirement to Massachusetts without shifting supply from their
27 other customers’ and buying fossil sourced power.
28

29 The Department can only consider whether this project will benefit the climate here in the state. If
30 NECEC is allowed to transpire, renewable energy projects (such as solar) in the state will be suppressed,
31 and therefore, harm Maine in reducing the state’s greenhouse gas emissions.
32
33

1 **06-096 Ch. 375, § 3. No Unreasonable Alteration of Natural Drainage Ways.**
2

3 The Town of Caratunk believes that CMP's proposed project "will cause an unreasonable alteration of
4 natural drainage ways" through improper drainage right-of way and drainage that may result in adverse
5 impact to adjacent parcels of land. CMP's application indicates that their project will cross 115 streams,
6 263 wetlands, and impact 76.3 acres of mapped wetlands.
7

8 **06-096 Ch. 375, §5. Erosion and Sedimentation Control.**

9 The Town of Caratunk believes that CMP's proposed project will not adequately control erosion and
10 sedimentation to protect water quality and wildlife and fisheries habitat. CMP's application indicates
11 that their project will cross 115 streams, 263 wetlands, and impact 76.3 acres of mapped wetlands.
12

13 **06-096 Ch. 375, § 6. No Unreasonable Adverse Effect on Surface Water Quality.**

14 The Town of Caratunk believes that CMP's proposed project could cause the pollution of surface waters
15 through both point and non-point sources of pollution. CMP's application indicates that their project
16 will cross 115 streams, 263 wetlands, and impact 76.3 acres of mapped wetlands.
17

18 **06-096 Ch. 375, § 9. Buffer Strips.**

19 The Town of Caratunk believes that CMP's proposed project will not adequately utilize natural buffer
20 strips to protect water quality, wildlife habitat, and visual impacts from the proposed transmission line.
21 At this time, it does not appear that CMP's proposed buffers are sufficient to avoid these impacts.
22

23 All indication is that these 90-100' structures would devastate the view shed of tourists in our area.
24 However, from the standpoint of landowners and taxpayers, this industrial invasion of their view shed
25 from their properties will significantly devalue their land. Not only is this robbing individuals of their
26 possessions, valuables and net worth, but this degradation will translate to a reduction in property tax
27 value for the towns and plantations.

28 CMP has bragged about lowering tower heights. For abutting landowners, the overwhelming concern is
29 not only view shed and property devaluation, but deep concern for sickness and disease from Corona
30 hum and electromagnetic frequencies. Testimonies from powerline victims (180' from AC MRPR line)
31 include that they were 1) unable to sleep in the house, 2) radios work laying on the grass, 3) dairy cows
32 stopped producing milk, 4) their animals became sterile, 5) animals died, 6) adults and children get

1 shocked²⁶. When an intervenor asked a CMP executive about particular cases, the executive smugly
 2 responded that they were litigating the situation. We ask the DEP to stand up for the citizens of Maine
 3 and to deny a permit for any structure that will cause cancers, sleep degradation and disruption of daily
 4 health or life to any citizen.

COMMENTS ON NON-HEARING TOPICS

06-096 Ch. 375, § 10. Control of Noise.

The Town of Caratunk believes that CMP's proposed project will not adequately control excessive environmental noise from construction, operation, and maintenance of the proposed transmission line which could degrade the health and welfare of nearby neighbors, line abutters, Appalachian Trail and other hikers, campers such as on Rock Pond, and camp owners on Moxie Pond. This is especially true for noise from the transmission lines themselves, especially during inclement weather. The Corona hum, inherent in the line's operation is a life altering, property devaluing concern.

The Town of Caratunk currently enacted the Electrical Transmission Line Moratorium Ordinance. One of the major concerns for the townspeople is the corridor's noise and electromagnetic frequencies as well as their associated health defects and/or disruption of normal lifestyles. Residents choose to live in Caratunk and the greater Forks areas is the environment's serenity, the silence that nature brings and the darkness from the absence of urban lights. NECEC would invade the silence with its inherent, constant noise. This very noise has prevented sleep from residents in the Farmington area whose homes abut an AC line - and NECEC is a much more powerful DC line.

06-096 Ch. 375, § 12. Preservation of Unusual Natural Areas.

The Town of Caratunk believes that CMP's proposed project will harm numerous land and water areas that contain natural features of unusual geological, botanical, zoological, ecological, hydrological, other scientific, educational, scenic, or recreational significance. CMP's proposed project will impact at least 8 deer wintering areas (44.3 acres) and 12 inland waterfowl and wading bird habitats (22.7 acres). The project will cross and degrade the scenically and recreationally significant Kennebec Gorge.

Application material indicates that the project area includes the following rare plants: wild leek, red-stemmed gentian, long-leaved bluet, and dry land sedge, and numerous natural and distinguished natural communities.

²⁶ CRTK – 7, Diane Zagwijn-Coston's official PUC testimony, 10/17/18

According to the Recreational Hunter and Angler Market Report: Maine, prepared for the Maine Office of Tourism and Department of Inland Fisheries & Wildlife (*See Attachment A, pages 116-117*

(emphasis added), *Insights from the Maine licensed and Traveling sportsmen surveys* revealed that:

- “The state of Maine is well positioned as one of the “Best” destinations among Maine licensed hunters and anglers across a majority of attributes that are important to them -ranging from climate, safety, pricing, and amenities. Maine’s particular strengths among Traveling sportsmen are its attractive natural setting and its sense of safety.”
- “The state’s natural amenities, beauty and sense of security or safety are also identified to be among the most important characteristics of a site that hunters and anglers say are important when making the decision to hunt or fish. “
- “The abundance of game species and the ability to target native populations are critical factors that influence destination choices. Maine Department of Inland Fisheries & Wildlife supports management and conservation efforts aimed at maintaining healthy populations of native species. “
- “Interestingly, one of the key destination factors for hunters and anglers is the remoteness of the location. However, travel distance also factors into their decision. The geographical size and travel distance to the more remote areas can be a challenge to bring sportsmen to the state. Among traveling sportsmen, it may be important to highlight other services in the area for nonsportsmen to influence the travel decision.”

38 M.R.S. § 480-D(2). Soil erosion.

The Town of Caratunk believes that CMP’s proposed project may cause unreasonable erosion of soil or sediment and may unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

Impacts to Maine Renewable Energy

Should CMP be granted the NECEC, Maine’s energy grid will be locked up, and future renewable energy projects such as Caratunk's solar farm would be prevented. With the approval of NECEC, new sources would be hindered and current viable energy contracts would be retired with Maine jobs lost. The only entities benefiting from NECEC is CMP, Massachusetts and Hydro-Quebec.

Title, Right or Interest

The Town of Caratunk believes that CMP does not have full right, title, and interest in the entire proposed corridor. The streams, rivers and the VIEWS belong to the people. CMP might own much of the land - arguably paid for by Maine ratepayers – but they do not have the right to steal the character of the lands or the scenic views.

Greenhouse Gas and Climate Benefit

The key point is that NECEC will not reduce greenhouse gas. The Department must find a valid environmental benefit before authorizing the destruction of a healthy fishery, wetland, wildlife and tourism area. However, NECEC provides no climate benefit as expert witnesses and intervenors have revealed.

The Massachusetts Attorney General submitted testimony from expert Dean M. Murphy to the Massachusetts Department of Public Utilities stating that NECEC does not meet the clean energy standards for their Section 83D RFP because it would not be “new”.

“The proposed contracts, as written, do not ensure that the Qualified Clean Energy acquired via the contracts will comprise fully incremental energy deliveries into New England, as the RFP specified. The RFP required that the Qualified Clean Energy under the contract should be incremental to (i.e., in addition to) the hydroelectric energy that HQ has delivered to New England historically, or that would otherwise be expected to be delivered. The proposed contracts implement much weaker requirements for incrementality and would allow most (and potentially all) of the contract energy delivered to substitute for historical deliveries (See Attachment B, page 5).

Mr. Murphy further testifies that just because there are new transmission lines available, there is no requirement for new clean energy.

However, merely adding transmission does not ensure that clean energy deliveries will be incremental relative to historical deliveries, unless the contracts explicitly require this. As the proposed contracts are written, that will not necessarily be the case; clean energy deliveries could be far less than fully incremental and still satisfy the requirements of the 10 proposed contracts (See Attachment B, page 16).

With regards to greenhouse gas benefit, Mr. Murphy clearly explains that HQ would implement “resource shuffling” or greenwashing, resulting in NO greenhouse gas reduction as a result of NECEC.

Q. Must the contracts require full incrementality for the 83D clean energy to create the desired offset to greenhouse gas emissions?

A. Even if the proposed contracts required energy deliveries to be fully incremental, this would not necessarily guarantee that GHG emissions would decrease by an amount corresponding to the Qualified Clean Energy of the contract. Incrementality is defined in the RFP only with respect to deliveries into New England, while GHG emissions must be measured at a global level. It would be possible, at least in principle, to satisfy the requirements of full incrementality

(i.e., the Qualified Clean Energy is incremental to the full historical average deliveries into New England), and still not offset a corresponding amount of global GHG emissions. This could happen through resource shuffling—reassignment of a fixed amount of clean energy so as to increase the clean energy delivered to a particular destination without increasing the total amount of clean energy overall.

For instance, with the new NECEC transmission link, if HQ increased deliveries into New England by the contracts' 9.55 TWh relative to historical New England deliveries, this would achieve full incrementality as defined in the RFP. But if HQ accomplished this by reducing its exports to other neighboring regions rather than by increasing clean energy generation overall, then global GHG emissions would not necessarily be reduced. Diverting clean energy from other regions to New England would enable a reduction in fossil generation and emissions within New England, but the reduced deliveries to other regions may need to be replaced by additional fossil generation in those regions. This would effectively substitute fossil generation in other regions for fossil generation in New England, shifting emissions from one region to another, without causing a material decrease (the actual impact would depend on the relative emissions intensities of each region.) (See Attachment B, , page 16-17)

Q. What would be required to ensure a reduction in GHG emissions?

A.Importantly, it must involve overall global emissions reductions, not reductions in one region or sector that might be offset by a corresponding increase that is triggered elsewhere, or reductions that would have occurred regardless of the proposed action (See Attachment B, page 17).

Hydro-Quebec has not confirmed or proven in any of Maine's proceedings that the company actually has the additional capacity to provide this hydropower. In fact, HQ has committed to utilizing existing facilities to supply NECEC contracted energy.

Q. Do the proposed contracts require the energy to be additional in this sense of offsetting GHGs globally?

A. No, not necessarily. HQ has committed to using existing HQPR facilities to supply the contracted energy. If these facilities were spilling significant amounts of water due to transmission constraints that would be relieved by the NECEC transmission, or if Hydro-Québec undertook investments to expand its system—to increase output from existing facilities or add

new generation or storage capability—then a portion of the generation may be considered additional. But the contracts do not require this, nor has HQ indicated that it is the case (See Attachment B, page 18).

In the Executive Summary of the Energyzt Advisors report: GREENWASHING AND CARBON EMISSIONS: UNDERSTANDING THE TRUE IMPACTS OF NEW ENGLAND CLEAN ENERGY CONNECT, experts further confirm that the contracts allow Hydro-Quebec to shift existing exports into New England to supply NECEC at a higher price.

Hydro-Québec has a financial incentive to sell as much excess energy that it can, subject to water and generation constraints, and divert exports from other markets into NECEC to achieve a higher price. Given its system characteristics and profit goals, Hydro-Québec could even purchase energy from other markets during low-priced hours in order to retain energy in the form of water waiting in its reservoirs for subsequent sale at higher prices to New England through NECEC. Furthermore, the significant inflow via a 1,200 MW transmission line into Maine could adversely affect the economic prospects for Maine renewables, which are likely to be deferred or delayed as a result of the project's impacts on the local transmission network. The net result would be a minimal impact on efforts to reduce total carbon emissions.

NECEC could divert energy sales from another market into New England; shifting flows between markets may not reduce total greenhouse gas emissions and could even increase total carbon injections into the atmosphere. (See Attachment C, pages 4-5)

Hydro-Québec's proposal in response to the Massachusetts Clean Energy RFP explicitly states that it would supply energy to NECEC from existing generation resources, and not from new sources of renewable energy developed to serve the line. Given that Hydro-Québec would maximize its exports without NECEC and sell whatever excess energy that it had into external markets, Hydro-Québec would supply NECEC by simply shifting those exports into New England via NECEC at a higher contracted price. This shift in energy flows could create an offsetting impact in the other markets which would have to produce replacement energy, potentially resulting in offsetting carbon emissions. While Maine power plants would be forced to shut-down to accommodate energy flowing into NECEC, fossil fuel plants in other markets (including oil, natural gas and coal units), would fire-up in response to Hydro-Québec's shifting its energy sales, negating any potential climate benefits.

Hydro-Quebec can and does buy energy from low-priced markets and then sells its “clean energy” at a higher price into other markets, potentially creating a similar impact on carbon emissions in the atmosphere as if Hydro-Québec were generating power from fossil fuels directly. (See Attachment C, page 14)

The Department should be most concerned with Maine’s greenhouse gas reduction, and in fact, NECEC will be preventing Maine own renewable energy entities from making the necessary strides in this area. According to the Energzt report, and as many of the intervenors have been stating, NECEC will flood and lock up the Maine energy grid. Not only does this inflict much harm on Maine’s ability to reduce greenhouse gas and provide climate change benefit, but it also sets back the State for years to come.

NECEC would suppress the development of new renewable energy generation in Maine which, in contrast to Hydro-Québec’s market-switching strategy, actually could lower greenhouse gas emissions and provide more local jobs and economic benefits than NECEC.

The Town of Caratunk offers a prime example of this suppression of new renewable energy generation. In July of 2017, Caratunk was approached by NextEra for a solar farm (located in Caratunk and the Town of Moscow) in response to the Massachusetts 83D RFP. The Town supported this project as it would make good use of existing land, formerly known as the US AF Radar Station; it would create fulltime jobs and tax revenue with no adverse impact. However, with the presence of NECEC’s DC line, this NEW renewable energy project would be prevented, barred from connecting to the Maine energy grid.

It is critical that the Department and state agencies permit an environment that supports Maine-based renewable energy projects as these are the endeavors which will result in greenhouse gas reductions for our state and region as well as employee Maine citizens and provide greater environmental benefit.

Respectfully submitted,

Date: 2/24/19

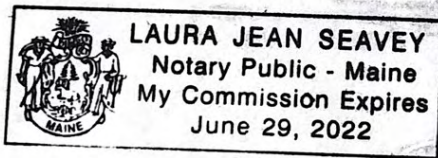
Elizabeth Caruso Gabriel M Caruso
(type or print witness name here
& sign on above line)

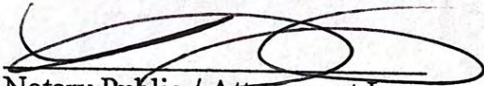
State of Maine
County of Somerset

Date: 2/10/2019

Personally appeared before me the above-named Elizabeth Caruso, who, being duly sworn, did testify that the foregoing testimony was true and correct to the best of his/her knowledge and belief.

Before me,




Notary Public / Attorney at Law
My Commission Expires: 6/29/22

MAINE PUBLIC UTILITIES COMMISSION
AUGUSTA, MAINE

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IN RE:)
) Docket No. 2017-232
CENTRAL MAINE POWER COMPANY) January 9, 2019
)

Request for Approval of CPCN for the New England Clean Energy
Connect Construction of 1,200 MW HVDC Transmission Line from
Québec-Maine Border to Lewiston (NECEC)

APPEARANCES:

- MITCHELL TANNENBAUM, Hearing Examiner
- CHRISTOPHER SIMPSON, Hearing Examiner
- MARK VANNOY, Maine Public Utilities Commission
- BRUCE WILLIAMSON, Maine Public Utilities Commission
- RANDALL DAVIS, Maine Public Utilities Commission
- FAITH HUNTINGTON, Maine Public Utilities Commission
- CHRISTINE COOK, Maine Public Utilities Commission
- BARRY HOBBS, Office of the Public Advocate
- ELIZABETH WYMAN, Office of the Public Advocate
- ERIC BRYANT, Office of the Public Advocate
- JARED DES ROSIERS, Pierce Atwood, Central Maine Power Company
- SARAH TRACY, Pierce Atwood, Central Maine Power Company
- ERIC STINNEFORD, Central Maine Power Company
- DAN PEACO, Daymark Energy Advisors, Central Maine Power
- JEFF BOWER, Daymark Energy Advisors, Central Maine Power
- DOUG SMITH, Daymark Energy Advisors, Central Maine Power
- THORN DICKINSON, Avangrid Networks, Central Maine Power Company
- BERNARDO ESCUDERO, Avangrid Networks, Central Maine Power
- JOHN SHOPE, Foley Hoag, Calpine Corp., Vistra Energy, Bucksport
- STEVE BARTLETT, Foley Hoag, Calpine, Vistra Energy, Bucksport
- JOHN FLUMERFELT, Calpine Corporation
- TANYA BODELL, Energyzt, Calpine Corp., Vistra Energy, Bucksport
- ANDREW LANDRY, Preti Flaherty, Industrial Energy Consumer Group
- SUE ELY, Natural Resources Council of Maine
- PHELPS TURNER, Conservation Law Foundation
- AMY OLFENE, Drummond Woodsum, NextEra Energy Resources
- BRIAN MURPHY, NextEra Energy Resources
- BEN SMITH, Soltan Bass Smith, Western Maine Mountains & Rivers
- ELIZABETH CARUSO, Town of Caratunk
- DOT KELLY

1 CONFERENCE COMMENCED (January 9, 2019, 9:05 a.m.)

2 MR. TANNENBAUM: Good morning. This is a hearing in
3 PUC docket 2017-00232 which is Central Maine Power Company's
4 request for approval of a CPCN for the New England Clean Energy
5 Connect. Let's start with appearances from the parties with
6 the Public Advocate, please.

7 MS. WYMAN: Liz Wyman, Office of the Public Advocate.

8 MR. BRYANT: Eric Bryant with the Office of the
9 Public Advocate.

10 MR. HOBBS: Barry Hobbs, Public Advocate.

11 MR. LANDRY: Andrew Landry from Preti Flaherty on
12 behalf of the Industrial Energy Consumer Group.

13 B. SMITH: Ben Smith on behalf of Western Mountains &
14 Rivers Corporation.

15 MR. TURNER: Phelps Turner, Conservation Law
16 Foundation.

17 MR. DICKINSON: Thorn Dickinson, Avangrid Networks.

18 MR. STINNEFORD: Eric Stinneford, Central Maine
19 Power.

20 MR. ESCUDERO: Bernardo Escudero, Avangrid Networks.

21 MR. PEACO: Dan Peaco, Daymark Energy Advisors on
22 behalf of Central Maine Power.

23 MR. BOWER: Jeff Bower with Daymark Energy Advisors
24 on behalf of Central Maine Power.

25 D. SMITH: Doug Smith with Daymark Energy Advisors on

1 behalf of Central Maine Power Company.

2 MS. TRACY: Sarah Tracy with Pierce Atwood on behalf
3 of Central Maine Power.

4 MR. DES ROSIERS: Jared des Rosiers from Pierce
5 Atwood on behalf of Central Maine Power.

6 MR. MURPHY: Brian Murphy on behalf of NextEra Energy
7 Resources.

8 MS. OLFENE: Amy Olfene of Drummond Woodsum on behalf
9 of NextEra Energy Resources.

10 MS. ELY: Sue Ely, Natural Resources Council of
11 Maine.

12 MS. KELLY: Dot Kelly, Phippsburg, Maine.

13 MS. BODELL: Tanya Bodell from Energyzt on behalf of
14 the generator interveners.

15 MR. SHOPE: John Shope, Foley Hoag on behalf of the
16 generator interveners which are Calpine Corporation, Vistra
17 Energy Corporation, and Bucksport Generation, LLC.

18 MR. BARTLETT: Steve Bartlett, Foley Hoag on behalf
19 of the generator interveners.

20 MR. FLUMERFELT: John Flumerfelt, Calpine
21 Corporation.

22 MR. TANNENBAUM: Okay, witnesses on the panel have
23 been sworn in. Oh, I'm sorry, appearances from the phone,
24 parties in the case?

25 MS. CARUSO: Elizabeth Caruso the town of Caratunk.

1 MR. TANNENBAUM: Okay. Any other party in the case
2 on the phone? Okay, let's proceed then. As I mentioned, this
3 panel has been sworn in in this proceeding so we'll proceed
4 with the questioning from NextEra.

5 MR. MURPHY: Thank you, and good morning, panel.
6 Similar to when we had the technical conference, I put together
7 a booklet with tabs on it that I'll go through. Hopefully
8 it'll make it easier for you all and for me. And in the first
9 tab is part of your application. I'm going to ask you some
10 foundational questions on that first tab. And NEC (sic) is a
11 high-voltage direct current or HVDC transmission line, correct?

12 MR. DICKINSON: That's correct.

13 MR. MURPHY: And NECEC is a high-voltage direct
14 current line designed to deliver 1,200 megawatts of energy. Is
15 that correct?

16 MR. DICKINSON: That's correct.

17 MR. MURPHY: And it's also using the voltage source
18 converter or VSC technology?

19 MR. DICKINSON: That's correct.

20 MR. MURPHY: And it's approximately, in the Maine
21 portion of the line, 145 miles?

22 MR. DICKINSON: That's correct.

23 MR. MURPHY: In your September 2017 petition filed
24 with the Commission, CMP explained that the transmission line
25 was to be constructed and operated as an overhead transmission

1 line.

2 MR. DICKINSON: That's correct.

3 MR. MURPHY: And since then, on October 22nd, 2018,
4 CMP filed documents indicating that it was amending its Maine
5 Department of Environmental Protection application to include
6 an underground crossing of the upper Kennebec River.

7 MR. DICKINSON: That's correct.

8 MR. MURPHY: The underground crossing of the Kennebec
9 River will bury the transmission line for approximately one
10 mile?

11 MR. DICKINSON: That's correct.

12 MR. MURPHY: At the November 28, 2018 technical
13 conference, I asked if CMP had considered routing the
14 underground -- excuse me, considered routing the transmission
15 underground for the 53 miles of green field corridor and
16 whether they had considered that in the same way they
17 considered routing under the Kennebec River. And the answer I
18 received from Mr. Dickinson was that you did not consider in
19 the same manner. Do you recall providing that answer?

20 MR. DICKINSON: Yes, I do.

21 MR. MURPHY: And therefore, just to make sure we're
22 all on the same page, it's currently the company's proposal
23 that the HVDC line will be approximately one mile underground
24 and 144 miles overhead.

25 MR. DICKINSON: That's correct.

1 MR. MURPHY: Now moving to tab four, this is NextEra
2 Hearing Exhibit 19 which is CMP's competitive intelligence
3 presentation on the TDD -- excuse me, the TDI HVDC line. On
4 page one of the presentation, you'll see that the TDI HVDC line
5 proposes to deliver a thousand megawatts of Hydro-Quebec energy
6 into Vermont. Do you see that?

7 MR. DICKINSON: Yes.

8 MR. MURPHY: And also on that first page of the CMP
9 presentation, the TDI Vermont line is approximately 154 miles
10 long. Is that correct?

11 MR. DICKINSON: Yes.

12 MR. MURPHY: And of the 154 miles, approximately a
13 hundred miles of that line is to be routed under water and 54
14 miles of that line is to be buried underground which is also in
15 this presentation.

16 MR. DICKINSON: Correct.

17 MR. MURPHY: And the TDI line is also using the same
18 technology that you all are using which is the VSC HVDC
19 technology. It's not on that page, but if you recall.

20 MR. DICKINSON: I do remember that, yes.

21 MR. MURPHY: Okay. And do you also recall that the
22 line that is the subject of this competitive intelligence is
23 fully permitted? Or they represent that they're fully
24 permitted.

25 MR. DICKINSON: They represent that they're fully

1 permitted.

2 MR. MURPHY: Thank you. And then on tab six, this is
3 information about Northern Pass, and it's fair to say that the
4 panel is aware of the Northern Pass transmission line.

5 MR. DICKINSON: Yes.

6 MR. MURPHY: And that is another HVDC line that is
7 proposed to deliver 190 megawatts of Hydro-Quebec energy into
8 New Hampshire. Correct?

9 MR. DICKINSON: Correct.

10 MR. DES ROSIERS: I believe you meant 1,090 not 190.
11 You said 190.

12 MR. MURPHY: Oh, thank you. 1,090 just to make the
13 record clear. I appreciate that. Is that correct, 1,090?

14 MR. DICKINSON: Yes, that's correct.

15 MR. MURPHY: Thank you. And of that -- I'm sorry.
16 And then next question is are you also aware that the Northern
17 Pass line on the U.S. side is approximately 192 miles in
18 length?

19 MR. DICKINSON: Yes.

20 MR. MURPHY: And of that 192 miles, Northern Pass
21 proposes to bury approximately 60 miles of that line.

22 MR. DICKINSON: Yes.

23 MR. MURPHY: And are you also aware that the New
24 Hampshire siting evaluation committee denied Northern Pass's
25 application for a siting and facility certificate last year?

1 MR. DICKINSON: Yes, I am.

2 MR. MURPHY: Now tab seven is the New York Connect
3 project, and, Mr. Dickinson, you worked on that project,
4 correct?

5 MR. DICKINSON: Yes.

6 MR. MURPHY: And am I correct to say that was a 244-
7 mile HVDC line that was proposed to be buried?

8 MR. DICKINSON: Yes.

9 MR. MURPHY: Now in your application, is it also
10 correct to say that you proposed to bury the HVDC line so that
11 line losses would be reduced and aesthetics and health-based
12 concerns eliminated?

13 MR. DICKINSON: I'm sorry, could you repeat the
14 second part of that?

15 MR. MURPHY: Sure. In your application, is it
16 correct to say that you stated one of the purposes to bury the
17 HVDC line was to reduce line losses and eliminate the concerns
18 regarding aesthetics and health?

19 MR. DES ROSIERS: I'll object to the question to the
20 extent it refers to an application. I don't believe there's
21 been a foundation laid that any application was filed with
22 respect to that project, Connect New York.

23 MR. MURPHY: Okay. We're talking about tab seven.
24 Do you recognize the application that you worked on?

25 MR. DICKINSON: Well, if I -- it would be helpful for

1 me to remember exactly what the date of this is, but I believe
2 this is from an RFI response from New York, you know, I think a
3 number of years ago, but it was a response for ideas from New
4 York about the different risks and challenges they saw
5 associated with the development of a more vibrant energy
6 infrastructure and --

7 MR. MURPHY: That's my understanding as well. So if
8 you go three pages in on tab seven, and under the title The
9 Connect New York Option, and if you go to the first paragraph,
10 the last sentence, and that's what I was paraphrasing. "By
11 burying an efficient underground DC volt transmission line,
12 line losses will be reduced, aesthetics and health-based
13 concerns eliminated."

14 MR. DICKINSON: Yeah, I think the line losses refer
15 specifically to a DC project. The burying portion relates to
16 concerns that we knew existed in the Hudson Valley region
17 associated with aesthetic and health-based concerns. And there
18 were already proposed above-ground AC transmission projects to
19 alleviate -- this is essentially a project that's fundamental
20 purpose was to alleviate the central east constraint in New
21 York where there's a significant amount of congestion. We were
22 -- we had this specific idea as a competitor to other ideas
23 that we saw as being out there. Those other ideas were
24 overhead projects. And by utilizing the thruway, we had a
25 corridor that was pre-disturbed. Obviously that corridor would

1 not have allowed for an overhead line to go right along the --
2 back and forth across the thruway, but a buried line through a
3 portion of land that had already been disturbed by the thruway
4 we believed was another alternative that the state would
5 consider. Of course, as you probably know from looking at
6 this, that in the end, the state decided not to consider this
7 project within that context.

8 MR. MURPHY: Go to tab eight, and throughout my
9 questioning --

10 MR. TANNENBAUM: Brian, I just want to follow up on
11 that. So is your testimony that burying the underground DC
12 line does not, in and of itself, reduce losses?

13 MR. DICKINSON: Yeah, I'd have to go to my -- the --
14 my engineering folks to tell me a little bit more about it, but
15 the prime benefit of the losses comes, I believe, from the
16 actual difference between DC and AC and the reduction in line
17 losses.

18 MR. TANNENBAUM: Okay, thank you. Sorry.

19 MR. MURPHY: No problem. Go to tab eight, and
20 throughout my questioning, again to make it easier on myself
21 and you all, I've taken parts of your testimony. And if you
22 need to refer to more than the parts that I've taken, you know,
23 feel free to, but the first part are pages 15 through 17 of the
24 panel's rebuttal testimony. And on page 15 at lines (sic) 18,
25 you state that CMP has executed a finding memorandum of

1 understanding, or MOU, with Western Mountains & Rivers
2 Corporation. Do you see that?

3 MR. DICKINSON: Yes, I do.

4 MR. MURPHY: Okay. Turning to the next page, which
5 is 16, on lines three through seven, you state the MOU commits
6 CMP to an initial donation of \$250,000. Is that correct?

7 MR. DICKINSON: Yes.

8 MR. MURPHY: And for your own purposes, on tab nine,
9 I have attached the MOU. So if you need to reference the MOU,
10 feel free to do that. You also state that there is an
11 additional 250,000 -- or 50,000 over five years should be paid
12 pursuant to the MOU. Isn't that correct?

13 MR. DICKINSON: That's correct.

14 MR. MURPHY: Now turning to page 17, lines one
15 through three, you state that if the high-voltage DC line
16 crosses the Kennebec Gorge underground, CMP agrees to
17 contribute five to \$10 million. Am I reading that correctly?

18 MR. DICKINSON: That's correct.

19 MR. MURPHY: And as we've already discussed, you've
20 agreed to route the high-voltage DC line under Kennebec Gorge,
21 right?

22 MR. DICKINSON: Correct.

23 MR. MURPHY: Now doing some math, given that you have
24 agreed to route the transmission line under the Kennebec Gorge,
25 in the event -- this is the words from the MOU if you need to

1 check it -- in the event you attain all your permits, license,
2 and approvals, then, under the MOU, you are committed to
3 provide Western Mountains a total of, my read is, 5.5 to \$10.5
4 million in payments. Does that sound correct?

5 MR. DICKINSON: That's correct. Obviously it doesn't
6 include the other commitments that are in the MOU, but that's
7 correct from a dollar perspective.

8 MR. MURPHY: Is it also correct that CMP has not
9 executed any other similar MOUs or agreements like the one it
10 executed with Western Mountains & Rivers?

11 MR. DICKINSON: That's correct.

12 MR. MURPHY: Now going back to tab four, which is the
13 TDI presentation, we'll go to page four. And here there are a
14 bunch of bullets, and part of my questions are about the
15 bullets and also clarifications about the bullets, and I want
16 to just make sure that the record's clear about what the
17 presentation says and doesn't say. Now if we go to the
18 presentation, the third bullet from the top indicates that the
19 TDI line agreed to pay a minimum of \$280 million over 40 years.
20 Do you see that bullet? It's under community funding, second
21 bullet, third bullet starts with "The agreement was filed."

22 MR. DICKINSON: I see that.

23 MR. MURPHY: Okay. And this is where I want to make
24 sure the record's clear. I think we'll be on the same page but
25 want to make sure. The next three bullets are not additive to

1 the 283 million. Actually they describe what's in the 283
2 million. And I have the CLF agreements and other information,
3 but is that your recollection as well? And take your time. I
4 do think those are not in addition to, but -- or subcategories
5 of the 283. And if you want to take it subject to check, I'm
6 happy with that.

7 MR. DICKINSON: That's probably the better way to do
8 it. I'll take that subject to check.

9 MR. MURPHY: So if, subject to check, you agree with
10 me those are subcategories, one example is the bullet that's
11 right underneath the third bullet, the fourth bullet. It
12 starts 109 million. And one of these subcategories is the 109
13 million that would be contributed to a fund to provide
14 renewable energy generation in Vermont. That's what your
15 presentation says, correct?

16 MR. DICKINSON: Correct.

17 MR. MURPHY: Okay. Also on this page, the very last
18 bullet, it explains that TDI agreed to \$136 million payment to
19 be used to reduce electric rates. That's what your
20 presentation says, correct?

21 MR. DICKINSON: Correct.

22 MR. MURPHY: Just simple math, adding the 283 to the
23 136 million, I come up with total commitments for TDI in these
24 agreements of \$419 million. Does that math sound correct?

25 MR. DICKINSON: That sounds correct.

1 MR. MURPHY: Now going to tab 14, this is the
2 Northern Pass bid, an excerpt from that. And you'll see under
3 number three, need for New Hampshire to receive unique benefits
4 for hosting the project, I'm just going to focus on two
5 bullets. And the first bullet that I'll focus on is the second
6 one entitled Forward New Hampshire Fund. Do you see that
7 bullet?

8 MR. DICKINSON: Yes.

9 MR. MURPHY: And according to this bid, Northern
10 Pass, through the Forward New Hampshire Fund, commits \$200
11 million to fund New Hampshire priorities in the areas of
12 community betterment, clean energy innovation, economic
13 development, tourism, etc. Is that correct?

14 MR. DICKINSON: That's correct.

15 MR. MURPHY: Okay. And if you go two more bullets,
16 Northern Pass also committed to a northern county job creation
17 fund for \$7.5 million.

18 MR. DICKINSON: Correct.

19 MR. MURPHY: That's what they're representing. So
20 taking those two numbers together, I come up with approximate
21 \$207 million that Northern Pass has stated it's committed to
22 New Hampshire.

23 MR. DICKINSON: Correct.

24 MR. MURPHY: Now I'd like to go to tab 15. And in
25 tab 15, I have excerpts from three bids into 83D, the NECEC

1 bid, the TDI bid, and the Northern Pass bid. And I'm just
2 going to walk through. If you go three pages in, this is a CMP
3 bid which commits \$50 million to be paid over 40 years to
4 Massachusetts low-income program if you're selected and awarded
5 and receive all your approvals?

6 MR. DICKINSON: Correct.

7 MR. MURPHY: And if we continue two more pages, see
8 that TDI, under what they're calling Section 13.3.2, commits to
9 \$20 million over 20 years.

10 MR. DICKINSON: Correct.

11 MR. MURPHY: And then if we go another two pages,
12 Northern Pass -- I read this to state that Northern Pass is
13 committing only to \$10 million over 20 years for the low --
14 Massachusetts low-income program.

15 MR. DICKINSON: That's correct.

16 MR. MURPHY: Go to tab 16. Again, this is an excerpt
17 from the panel's rebuttal testimony. On page nine at line 18
18 of the rebuttal testimony, you state that the Massachusetts EDC
19 transmission service rates are fixed. Is that correct? Do you
20 see that on line 18?

21 MR. DICKINSON: That's correct.

22 MR. MURPHY: Okay. And then later on page nine, you
23 state at lines 19 through 20, that because the transmission
24 service rates are fixed, that CMP bears the cost risk if ISO
25 New England determines that additional system upgrades are

1 required. Do you see that statement?

2 MR. STINNEFORD: Yes, that's correct.

3 MR. MURPHY: Thank you. Now turning to tab 17 which
4 is CMP's response to NextEra data or information request 002-
5 012. In this response, the second sentence, you repeat again
6 that the transmission service agreement rates are fixed. Do
7 you see that statement?

8 MR. STINNEFORD: Yes.

9 MR. MURPHY: Okay. Then in the next sentence, you
10 state that in developing the TSA fixed rates, CMP made certain
11 assumptions regarding required system upgrades and the CCIS
12 upgrades and their associated cost based on your studies. Do
13 you see that statement?

14 MR. STINNEFORD: Yes.

15 MR. MURPHY: The next sentence indicates that you
16 included a level of contingency in the TSA fixed rate to
17 account for the potential that the final cost associated with
18 the system and CCIS system upgrades are greater than that
19 estimate. Do you see that statement?

20 MR. STINNEFORD: Yes, I do.

21 MR. MURPHY: Okay. Now let's go back to tab 16 and
22 the last page on tab 16. This is, again, an excerpt from your
23 rebuttal testimony. Now this is page 14 and I would direct you
24 to lines 15 through 17 where it states that ISO New England is
25 expected to complete additional -- the additional system impact

1 study by August 2019 and the Section I.3.9 approval process by
2 October of 2019. Do you see those statements?

3 MR. STINNEFORD: Yes.

4 MR. MURPHY: Now does it follow then that CMP will
5 not know the certainty of whether the contingency we discussed
6 with the TSA fixed rate will be sufficient for the additional
7 ISO system upgrades until the October -- August -- I'm sorry,
8 the August or October timeframe? Let me restate that. It was
9 a little choppy. Does it follow that CMP will not know the
10 certainty of whether the contingency you set aside for the
11 additional ISO system upgrades, or the potential for those
12 upgrades, in your fixed transmission service agreement will be
13 met or exceeded until you have the results of the ISO's
14 studies in the August or October timeframe of this year?

15 MR. STINNEFORD: I would agree with that, yes.

16 MR. MURPHY: Okay. So given that, is it fair to
17 state that the current uncertainty associated with the
18 contingency and whether it will be met or exceeded is one of
19 the reasons, not all the reasons but one of the reasons, that
20 CMP has not committed to additional agreements over and above
21 that of the Maine Western Mountains MOU and similar to the
22 agreements that we previously discussed for TDI and Northern
23 Pass?

24 MR. DICKINSON: No, I wouldn't agree to that.

25 MR. MURPHY: Let's go to tab 19. This is page 18

1 from the panel's rebuttal testimony. At lines one through ten
2 -- or, I'm sorry, at lines 10 through 11, the panel states, "It
3 is not clear who will purchase any of the hydroelectric
4 generation that is transported under this TSA." Am I correct
5 that the TSA referred to here is the 110-megawatt TSA between
6 CMP and HQUS?

7 MR. STINNEFORD: Yes.

8 MR. MURPHY: Okay. Now turning to tab 20, this is an
9 excerpt from the HQUS bid into the Connecticut Zero Carbon RFP.
10 It's the title page. And then if you turn to the second page,
11 you see that in the bullets this is a bid between Hydro-Quebec
12 U.S. and Green -- Vermont Green Mountain and not NEC. Am I
13 reading this correctly?

14 MR. DICKINSON: That's correct.

15 MR. MURPHY: Now are you familiar that HQUS did not
16 put any bid into the Connecticut Zero Carbon RFP that included
17 the 110 megawatts TSA and NECEC?

18 MR. DICKINSON: That's my understanding.

19 MR. MURPHY: Is it also your understanding that
20 Hydro-Quebec didn't place any bid, whether it was the Vermont
21 Green Mountain line or the NECEC line, into the 2018 Rhode
22 Island RFP for long-term renewable energy contracts?

23 MR. DICKINSON: Yeah, to my understanding, I agree.

24 MR. MURPHY: Okay. Thank you. Those are all my
25 questions.

1 MR. TANNENBAUM: I'm a little shocked. Okay, let's
2 move to the generator interveners.

3 MR. SHOPE: Good morning. Mr. Dickinson, I
4 understand that you gave some rebuttal testimony in this case
5 relating to the subject of diversion. Do you recall that?

6 MR. DICKINSON: I just had a little hard time hearing
7 you.

8 MR. SHOPE: Oh, sure. Okay. Obviously you are one
9 of the CMP executives who gave rebuttal testimony, correct?

10 MR. DICKINSON: Yes.

11 MR. SHOPE: Okay. And part of the rebuttal that was
12 sort of under your domain of the three of you was the issue of
13 addressing Mr. Speyer's testimony about Hydro-Quebec's possibly
14 diverting exports from other adjoining control areas from New
15 England. Do you recall that?

16 MR. DICKINSON: I would describe my testimony as
17 demonstrating that, compared to an historical baseline, the
18 energy that would be delivered on this NECEC would be
19 incremental to the northeast.

20 MR. SHOPE: Okay, and -- but the -- was the reason it
21 was rebuttal testimony was that it was rebutting the arguments
22 that had been made with regard to diversion?

23 MR. DICKINSON: Yeah, I guess I don't -- the word
24 diversion, I mean, there was the subject about whether this was
25 incremental or not, and that was the focus of the testimony.

1 MR. SHOPE: Okay. Now, and with regard to the way
2 you came about the incremental analysis, just sort of round
3 numbers, you had -- you based -- your conclusion was that by
4 2023, Hydro-Quebec would have approximately 40 terawatt hours
5 available for export and you compared that to a historical
6 baseline that you had derived of 30.5 and you added the 9.54
7 (sic) terawatt hours for NECEC, and that essentially indicated
8 that, in your view, everything under -- that was going to be
9 supplied across NECEC to the Massachusetts utilities would be,
10 in your way of viewing things, incremental?

11 MR. DICKINSON: I would describe basically what I did
12 was to look at a historical five-year baseline which worked out
13 to be 30.5 terawatt hours and assume that they would continue
14 to commit to delivering that 30.5 and then looked at whether an
15 incremental 9.45 terawatt hours could then be delivered and
16 still, over the 20-year period, result in no impacts and have
17 that availability.

18 MR. SHOPE: Okay, and you concluded that Hydro-
19 Quebec, in fact, did have 40 terawatt hours available for
20 export. And so if you added the 30.5 to the roughly 9.5 for
21 NECEC, that equaled the 40?

22 MR. DICKINSON: So, yeah, I concluded that if you
23 take the storage that was demonstrated in capacity at the end
24 of 2017, the existing capability they had in 2017, added the
25 Romaine 4 unit that was in 2020 coming online, and 500

1 megawatts of additional capacity in 2025 and you assume all
2 those pieces, that you -- by delivering 40 terawatt hours, they
3 had that capability to still serve the energy that they had.

4 MR. SHOPE: Okay. And when you said you included the
5 storage, that was based, in part, on your measuring the storage
6 as of the end of the year, correct?

7 MR. DICKINSON: Correct, at the end of 2017.

8 MR. SHOPE: Yeah, okay. And have you made any
9 adjustment for the -- well, and is it your view that it's
10 proper to measure the available storage as of the end of the
11 year as opposed to when it's still winter in -- up in Quebec?

12 MR. DICKINSON: Well, it's the -- I had to rely on
13 just publicly-available data. That was the only piece of data
14 that I had associated with storage, and my view was, by
15 comparing year over year each year's storage at the same point
16 in time, it gave you a general sense of the increasing storage
17 of water that was building up in the HQ system.

18 MR. SHOPE: Okay. But so you're saying you looked
19 for data that would show what the available storage was --
20 well, let me put it this way. The storage that's available on
21 December 31 is not the maximum date of storage in the Hydro-
22 Quebec system, right?

23 MR. DICKINSON: Yeah. I didn't have any other
24 information to demonstrate whether it was high or low.

25 MR. SHOPE: Okay. Well, just based on your general

1 knowledge of being in the industry, it's the case that with
2 hydroelectric systems, or at least in the case of Quebec given
3 its climate, that it has peak load in the winter, it has to
4 supply a lot of electricity to heat people's houses, but at the
5 same time, the snow and the ice are not melting to fill the
6 reservoir, right?

7 MR. DICKINSON: No, that makes sense.

8 MR. SHOPE: Yeah. So during the winter months, in
9 fact, Hydro-Quebec is drawing down on its reservoirs in order
10 to supply electricity for heating.

11 MR. DICKINSON: I'm not a hydro expert, but that
12 makes sense.

13 MR. SHOPE: Okay. So - and the fresh water doesn't
14 come in to refill the reservoir until the late spring and
15 summer, right?

16 MR. DICKINSON: That would make sense.

17 MR. SHOPE: Okay. So that would suggest, therefore,
18 that the low point in the reservoir typically would be at the
19 end of the winter, beginning of the summer.

20 MR. DICKINSON: Yeah, I can see how that would be the
21 case.

22 MR. SHOPE: And so for purposes of reserves and
23 calculating reserves and how much was available, you would want
24 to look at that low point, right?

25 MR. STINNEFORD: I would just comment that, based on

1 my own experience with reservoir management at CMP, it's a
2 cyclical process. You would expect reservoirs to be relatively
3 full, as you say, going into the winter period, but then when
4 the spring melt hits those reservoirs, they do refill and you
5 get another high in storage following the spring melt.

6 MR. SHOPE: Sure. But for purposes of the utility
7 maintaining its reserves, it has to figure out how much it's
8 going to have at the low point, right?

9 MR. DICKINSON: Yeah, again, my understanding from
10 everything I've learned on Hydro-Quebec by researching the
11 publicly-available information, that 98 terawatt hours was
12 their guideline for that minimum level of storage.

13 MR. SHOPE: Okay. And you just weren't able to --
14 did you look for data at what the storage was at the -- you
15 know, in late spring, beginning of summer?

16 MR. DICKINSON: That's correct.

17 MR. SHOPE: You looked for it, but you weren't able
18 to find it?

19 MR. DICKINSON: Yeah, I looked for it and wasn't able
20 to find it.

21 MR. SHOPE: Okay. But if you had found it and it
22 showed lower numbers, that would then mean you would have to
23 adjust the amount that was in storage, right?

24 MR. DICKINSON: Yeah, I mean, I think if I had
25 perfect information and saw the shape overall here, that might

1 be something you'd look at for a specific purpose. Here, what
2 I'm trying to demonstrate is what is the general amount of
3 storage that's available in capacity. And by measuring it on
4 the same day every year, you -- you know, looking back over the
5 last five years, you can clearly see that the level of water in
6 storage is increasing.

7 MR. SHOPE: Okay. But in any event, if we were to
8 actually look at the storage on -- at the low point year to
9 year to year, that would mean there would be a reduction in the
10 amount that would be available.

11 MR. DICKINSON: Yeah, I mean, I don't know what that
12 information is so I don't have it.

13 MR. SHOPE: Now, as part of your calculations, you
14 also had to factor in the amount of electricity that Quebec was
15 going to consume for its own native load, right?

16 MR. DICKINSON: That's correct.

17 MR. SHOPE: Okay. And so maybe if we could
18 distribute what's already been previously marked as NRCM 002-
19 21. So I've marked -- and actually -- so -- and so the --
20 what's already -- what's just been distributed and is marked
21 already as NRCM 002-021, this is the backup for your modeling
22 of the domestic load growth up in Quebec, right?

23 MR. DICKINSON: That's correct.

24 MR. SHOPE: Okay. So if we look at the model here,
25 it looks like you -- your input is you're assuming Hydro-Quebec

1 domestic load of 182.8 terawatts in 2018, and if we just take -
2 - go to 2026, that grows to 189 in your modeling assumptions.

3 Is that correct?

4 MR. DICKINSON: Could you just repeat those numbers
5 and years again?

6 MR. SHOPE: Sure. So it's -- in 2018, which is the
7 first of the years in your backup, it's 182.8 terawatts, and
8 that's to the right of the column roughly in the middle there
9 called HQ Domestic Load.

10 MR. DICKINSON: Correct.

11 MR. SHOPE: Okay. And then that grows in 2026 up to
12 289.

13 MR. DICKINSON: Correct.

14 MR. SHOPE: Okay. And you drew these figures, as I
15 understand it, from the 2017/2026 Electric Supply Plan that was
16 issued by Hydro-Quebec on November 1st of 2016. Is that
17 correct?

18 MR. DICKINSON: That's correct.

19 MR. SHOPE: Okay, and that's -- so we've circulated
20 that. And then if you look on the second page, that -- we see
21 those very same numbers on the -- in the column Needs
22 Identified by the Plan.

23 MR. DICKINSON: Correct.

24 MR. SHOPE: Okay. Yeah, and the document, the 2017
25 to 2026 Electric Supply Plan we'd like to have marked as GINT

1 26. Okay, now -- and how did you find out about the 2017 to
2 2026 Electricity Supply Plan?

3 MR. DICKINSON: I think in my conversations with
4 Hydro-Quebec and me searching for documents that were publicly
5 available that related to load growth, they pointed this out to
6 me.

7 MR. SHOPE: Okay. Now did you make any inquiry as to
8 whether or not the plan that had been issued on November 1st of
9 2016 had been updated as of the time that you were preparing
10 your rebuttal testimony?

11 MR. DICKINSON: I don't remember.

12 MR. SHOPE: You don't remember whether you did that
13 or not?

14 MR. DICKINSON: I believe that my conclusion was this
15 was a good source of information for the basis of the model.

16 MR. SHOPE: Okay. But you don't know whether you
17 inquired as to whether it was the most current information?

18 MR. DICKINSON: It would make sense to me that that
19 conversation happened. I just don't remember it specifically.

20 MR. SHOPE: And presumably, if you had more current
21 information from Hydro-Quebec available, you would have wanted
22 to use it, right?

23 MR. DICKINSON: I think I would have considered -- I
24 considered every piece of information that I looked at in
25 putting together this model.

1 MR. SHOPE: Well, I mean, if Hydro-Quebec had issued
2 an update of the information and that was available, you would
3 presumably wanted to have used it for your analysis, right?

4 MR. DICKINSON: I think if I had a different report,
5 I would read the report, I'd understand what that report was
6 telling me and make sure it made sense within the context of
7 the analysis I was doing.

8 MR. SHOPE: All right. I'd like to distribute the
9 next document, please.

10 MR. TANNENBAUM: John, was the prior document
11 generator interveners six?

12 MR. SHOPE: Twenty-six.

13 MR. TANNENBAUM: Oh, 26.

14 MR. SHOPE: And I'll just note for the record, these
15 are certified translations of excerpts from documents that were
16 originally published in French. And actually, with respect to
17 GINT 16, which was the plan on November 1, 2016, did you read
18 it in the French, Mr. Dickinson?

19 MR. DICKINSON: I do not speak French.

20 MR. SHOPE: Did you have somebody translate it for
21 you?

22 MR. DICKINSON: I think for the relevant pieces where
23 I needed to understand what was being said, my memory is I did
24 make sure that I was understanding things correctly.

25 MR. SHOPE: Is that Google translate?

1 MR. DICKINSON: I think I was also was speaking to a
2 number of people that were bilingual.

3 MR. SHOPE: Okay. All right. So you now have before
4 you the 2017 progress report of the 2017 to 2026 Electricity
5 Supply Plan issued on October 31, 2017. Do you see that?

6 MR. DICKINSON: Yes.

7 MR. SHOPE: Okay. So this is a progress report on
8 the plan that you actually had used, right?

9 MR. DICKINSON: That's what it appears to be, yes.

10 MR. SHOPE: Yeah. And it was issued I guess about
11 nine months before your testimony -- before your rebuttal
12 testimony.

13 MR. DICKINSON: That looks correct.

14 MR. SHOPE: Yeah, okay. Now if we look at the page
15 which is a few pages in but it's marked on the bottom --
16 because it's an excerpt, it says in the lower right corner page
17 8 of 47. Do you see that?

18 MR. DICKINSON: Yes.

19 MR. SHOPE: Okay. And this also has load growth
20 being illustrated, and if you see about three-quarters of the
21 way down there's a -- that Needs Per Plan column that we talked
22 about.

23 MR. DICKINSON: Yes, I see that.

24 MR. SHOPE: Okay. And this one shows that the needs
25 per plan grow from -- in 2018 from 182.1 terawatt hours in 2018

1 to, in 2026, 191.6. Do you see that?

2 MR. DICKINSON: I see that, yes.

3 MR. SHOPE: Okay. So that's a load growth of 9.5
4 terawatt hours in that period, correct?

5 MR. DICKINSON: Between 2018 and 2026?

6 MR. SHOPE: Yes.

7 MR. DICKINSON: Yes.

8 MR. SHOPE: Okay. But the load growth that you had
9 assumed using the plan from the prior year, November 1 of 2016,
10 that was projecting a load growth for the same period of only
11 6.2 terawatt hours, correct?

12 MR. DICKINSON: That's correct, the difference
13 between the 0.4 percent load growth that I assumed and the 0.5
14 percent load growth that was in this analysis.

15 MR. SHOPE: So that's a -- so the difference between
16 those two as of 2026 would be 3.2 terawatt hours of additional
17 consumption being projected by Hydro-Quebec domestically.

18 MR. DICKINSON: Could you repeat that again?

19 MR. SHOPE: Sure. In other words, the difference in
20 the load growth projection as of 2026 is 3.3 terawatt hours,
21 right?

22 MR. DICKINSON: So in 2026, the delta between my
23 analysis and what would be here would be the difference between
24 191.6 and 189. So essentially 2.6 terawatt hours, but if you
25 accumulate that over that period of time, I think that number

1 sounds right.

2 MR. SHOPE: So -- well, just so I'm clear -- but the
3 updated plan had a slightly lower starting point, right?

4 MR. DICKINSON: That's right, yeah. The 2018 number
5 was 182.1 versus 182.8.

6 MR. SHOPE: So the -- but we're talking about at
7 least two or three -- depending on which way you slice it, it's
8 -- we're talking about two or three or more terawatt hours of
9 difference of load growth being projected as between the 2017
10 plan and the 2016 plan.

11 MR. DICKINSON: That's correct.

12 MR. SHOPE: Yeah, okay. And so in relation to NECEC,
13 that would wipe out about a third of the NECEC terawatt hours,
14 right?

15 MR. DICKINSON: Explain that to me?

16 MR. SHOPE: So in the NECEC terawatt hours are 9.5
17 terawatt hours per year over a number of years, right?

18 MR. DICKINSON: 9.4 terawatt hours per year, yeah.

19 MR. SHOPE: Yeah. And your analysis, based on, among
20 other things, the domestic load growth projections in Quebec
21 found that all 9.45 terawatt hours for NECEC would be, in your
22 words, incremental.

23 MR. DICKINSON: Correct.

24 MR. SHOPE: Yeah, okay. But if we say that Quebec
25 needs somewhere, you know, two and a half, three and a half

1 more terawatt hours domestically than you projected because you
2 used the older projection, that means that there's that much
3 less available for NECEC, right?

4 MR. DICKINSON: Well, so if we put into the model a
5 higher level of load forecast, what would happen -- if you go
6 to the HQ Energy Available in Storage, the graph that shows the
7 minimum level of storage and then the maximum level of storage,
8 what I show is that by 2020, you hit the maximum level of
9 storage where actually spilling of energy is going to be
10 required. We obviously know now that that spilling is
11 occurring earlier than I had projected. So by increasing the
12 load, you're going to reduce the amount of spilling, but I --
13 my guess would be that if you actually solved this for that
14 higher level, you would end up with a very similar case.

15 MR. SHOPE: I see. So basically, using the more
16 current load growth projection actually reduces what you
17 perceive as a spillage problem.

18 MR. DICKINSON: It would -- from the forecast I have
19 here, which was based at my understanding of the potential of
20 spilling at that point in time, then the amount of spilling
21 that I'm showing here would be reduced as a result of a higher
22 load forecast, yes.

23 MR. SHOPE: Now -- and you're assuming -- part of --
24 or one of the drivers of your assumption of spilling is that
25 you're using as the baseline the 30.5 terawatt hours which was

1 the average of the five prior years of exports. Is that
2 correct?

3 MR. DICKINSON: My assumption was that prior to NECEC
4 and the purpose for my calculation of the baseline, again,
5 going back to the dialogue that was happening at the time and
6 some of the questions that we'd received from environmental
7 NGOs, was that Hydro-Quebec was not going to be able to deliver
8 on their historical level of exports. They were going to have
9 to reduce those historical level of exports in order to meet
10 NECEC's demands. So we wanted to, in good faith, demonstrate
11 that -- whether that was true or not. And by holding those
12 historical level of exports, we were able to demonstrate that
13 Hydro-Quebec could keep their historical level of exports
14 without -- and add NECEC without having to withdraw energy from
15 other markets. They had enough incremental generation coming
16 online and they had enough water in storage.

17 MR. SHOPE: We went through, at the technical
18 conference, a lot of the storage issues, and so I don't want to
19 revisit all of that since that's, you know, in the record and
20 obviously the Commissioners will be able to consider the
21 correctness or not of your analysis at that time. But you have
22 raised spillage, and -- well, actually, let me back up. So as
23 I understand your previous testimony, the NECEC project is
24 going to be served entirely by existing facilities. Is that
25 correct?

1 MR. DICKINSON: I think that's the --

2 MR. STINNEFORD: Yeah, it's existing generation or
3 additions to that existing generation is, I believe, how it's
4 worded.

5 MR. SHOPE: Okay, but I'm looking at -- so my
6 understanding is that the power -- that no new facilities are
7 being built in order to serve the Massachusetts utilities
8 across NECEC. Is that your understanding?

9 MR. STINNEFORD: Yeah, the PPAs with the
10 Massachusetts EDCs include a list of eligible specific
11 resources which can provide energy under the PPAs, and
12 deliveries -- production and deliveries will have to be tracked
13 through a GIS-like mechanism to verify that. But that doesn't
14 mean that other capacity additions that are made on the HQ
15 system won't occur or won't increase their capability to
16 produce exports.

17 MR. SHOPE: So, well, let's just break that down.
18 The power purchase agreements that the Massachusetts utilities
19 have made with Hydro-Quebec specify that the power that will be
20 provided across NECEC to the Massachusetts utilities will come
21 from a specified group of plants, all of which are now
22 existing. Is that true or isn't it?

23 MR. STINNEFORD: I believe that's true, but, you
24 know, that would also include upgrades to the capacities of
25 those existing resources as well.

1 MR. SHOPE: Okay, so Hydro-Quebec may have to spend
2 additional funds to upgrade its facilities in order to serve
3 the Massachusetts contracts.

4 MR. STINNEFORD: That's not what I said.

5 MR. SHOPE: Okay, so explain to me what the
6 difference is between saying it's going to be served by an
7 upgrade facility or it isn't going to be served by an upgraded
8 facility.

9 MR. STINNEFORD: Hydro-Quebec has a portfolio of
10 generating resources. They have identified in the PPAs a set
11 of those resources that are eligible to provide deliveries
12 under the PPAs. That includes both the existing capacity of
13 those resources as well as any expansions to those resources'
14 capacity in the future. In addition to that, Hydro-Quebec may
15 add additional resources to its portfolio of generating
16 resources that would expand its ability to produce energy and
17 produce exports.

18 MR. SHOPE: Okay. Now, so as I understand your --
19 well, let me ask you this, Mr. Dickinson, since you raised the
20 point of spillage. Is it your position that Hydro-Quebec is
21 going to be building additional upgrades?

22 MR. DICKINSON: Yeah, there's Romaine 4 that'll be
23 added in 2020, 245 megawatts, and then a variety of efficiency
24 improvements that increase generation capacity without
25 increasing reservoir sizes that they've estimated at about 500

1 megawatts for 2025.

2 MR. SHOPE: So these efficiency upgrades, can you
3 just briefly, for the record, just explain what kind --

4 MR. DICKINSON: My understanding is it's --

5 MR. SHOPE: -- practical matter what kind of stuff is
6 that, you know, and --

7 MR. DICKINSON: My understanding is that the
8 reservoir sizes won't change, but they're improving the turbine
9 technologies to be able to extract more power from the water
10 that's flowing through the dam.

11 MR. SHOPE: Okay. And are those upgrades the kind --
12 do they have the lead times that the big dams have?

13 MR. DICKINSON: I would -- I don't have knowledge of
14 it, but it makes sense to me that that lead time would be less
15 because the -- one of the challenges in siting, I would assume,
16 would be the reservoir impact. And if you're not impacting the
17 reservoirs, I would assume the siting would be simpler.

18 MR. SHOPE: Okay. In other words, they have an
19 existing dam, they're just going to have to shut down one of
20 the turbines, either remove it and replace it or in some way
21 gussy it up, if you will, and then set it spinning again?

22 MR. DICKINSON: Yeah, I mean, I don't know all the
23 steps that go into planning, certifying, approvals,
24 construction, and engineering, but in a general sense, yes.

25 MR. STINNEFORD: I would say, you know, typically

1 those types of upgrades are trying to coordinate during
2 regularly-scheduled maintenance periods so there'd be no lost
3 generation.

4 MR. SHOPE: Okay, so now as I understand it, your
5 understanding is that right now, Hydro-Quebec is spilling water
6 because it has insufficient export transmission capability. Is
7 that correct?

8 MR. DICKINSON: Well, I would describe it a little
9 bit different. They clearly have stated that, with this
10 transmission line, they would be able to avoid, in 2018, an
11 amount of spilled energy equivalent to the NECEC line. But the
12 inability for them to deliver energy has -- is a combination in
13 certain markets to transmission capability, as it is in New
14 England, but then to the larger market, it's also their
15 inability to make sales at a margin above zero. Otherwise,
16 they would be -- putting water through the turbines that would
17 result in a sale that's a loss. And so instead of doing that,
18 they're spilling water.

19 MR. SHOPE: Okay. But in other words, at least, in
20 part in your view, Hydro-Quebec is spilling water even though
21 it has enough generation capacity, but it can't get the
22 electricity that it could generate to market in the United
23 States.

24 MR. DICKINSON: Well, it can't get it to market in a
25 profitable sale throughout the northeast.

1 MR. SHOPE: Yeah, okay. Now if Hydro-Quebec can't
2 get the power to market because it has insufficient export
3 transmission capability and, as a result, it's spilling water,
4 why would it build more generation?

5 MR. DICKINSON: Well, again, the -- your question --
6 I just want to make sure that the question is stated correct so
7 I'm not confusing the record. The -- my point is not that it
8 doesn't -- there isn't transmission capability to certain
9 markets. I think yesterday we talked about we do think there
10 is transmission capability to certain markets, not to New
11 England. But the challenge is that the cost for them to get
12 that power to other markets and make an energy sale would
13 result in a loss. So, again, just to make sure your question
14 is right, it's not there isn't transmission capability. It's
15 that they can't make those sales at a loss. So they're faced
16 with a decision: do we run this water through the turbine and
17 sell it at a loss or let the water spill over and have that.
18 So the --

19 MR. SHOPE: Okay, let me just back up and focus on my
20 question which is, okay, if right now their two choices are, in
21 your hypothesis, either sell the water at what you call a loss
22 -- sell the energy at what you call a loss through some export
23 transmission arrangement or spill the water, and those are the
24 choices that they have, why would they build more generation?
25 More generation doesn't solve the problem of getting the energy

1 to market in the United States, does it?

2 MR. STINNEFORD: I think the decisions to add
3 capacity, generating capacity, are long lead time decisions.
4 Hydro-Quebec obviously made some of these decisions years ago,
5 and they have been attempting for over a decade to build a new
6 interconnection to accommodate additional exports. So the
7 delays that have been -- have resulted in getting those
8 additional transmission facilities built have resulted, to some
9 extent, in the spillage.

10 MR. SHOPE: So as I understand it, your view is that
11 Hydro-Quebec began building Romaine 3 and planned for Romaine 4
12 in the expectation that at least some of the energy was going
13 to be used for export to the United States.

14 MR. DICKINSON: Yeah, I think -- that's correct.

15 MR. SHOPE: Okay. And -- but -- and when they did
16 that, they had to hope that the necessary transmission was
17 going to be built on the U.S. side of the border.

18 MR. STINNEFORD: Yeah, I wouldn't --

19 MR. SHOPE: Could you -- do you agree with that?

20 MR. STINNEFORD: I'm not sure I would agree with
21 Thorn's agreement earlier. It's not necessarily exports to the
22 U.S. but exports in aggregate to cost-effective markets.
23 Clearly they would like that to be the U.S. That is the
24 highest-priced market to which they can export, but --

25 MR. SHOPE: Okay, so your view is --

1 MR. TANNENBAUM: John, excuse me, Commissioner
2 Williamson has a follow up.

3 MR. SHOPE: Sure.

4 MR. WILLIAMSON: Excuse me, I'd like to ask a
5 question of the panel. To what extent could Hydro-Quebec be
6 adding reservoir capacity and upgrading turbines in
7 anticipation of expiration of the arrangement with Churchill
8 Falls? I think that's 4,600 megawatts or something at
9 Churchill Falls that expires in 2042.

10 MR. STINNEFORD: Yeah, I'm sure that's a
11 consideration in their long-term planning.

12 MR. WILLIAMSON: Okay, the second thing is on
13 spillage, to what extent might the addition of renewables,
14 particularly wind and solar in Quebec -- I noticed in one of
15 these reports it's mentioned that they're uncertain about the
16 contribution, but it could be -- I think I saw one terawatt
17 hour or a little bit more. To what extent could that spillage
18 -- because there is -- be occurring because there is policy
19 initiatives that are encouraging the development of wind and
20 solar instead? In other words, they have to buy it as a
21 prevential statement.

22 MR. DICKINSON: That's right.

23 MR. WILLIAMSON: -- they don't need the water.

24 MR. DICKINSON: That's right, that's right. The --
25 any generation added or any existing generation within the

1 control area of Quebec, whether it's some that's been added
2 over the last few years or new generation that would be added,
3 would only make the situation of additional spilling a larger
4 challenge.

5 MR. WILLIAMSON: Thank you.

6 MR. SHOPE: So -- oh.

7 MR. WILLIAMSON: Go ahead.

8 MR. SHOPE: Oh, sure.

9 MR. WILLIAMSON: Thank you.

10 MR. SHOPE: Thank you. So -- but just getting back
11 to my question -- and this is speaking to you, Mr. Dickinson,
12 because you are the one who prepared the rebuttal testimony on
13 this point. My recollection of your rebuttal testimony is that
14 you testified that Hydro-Quebec had been building in
15 anticipation of export to the northeastern United States, at
16 least in part. Are you withdrawing that testimony?

17 MR. DICKINSON: Yeah, I do. I think Eric's
18 refinement of my answer is a better one, which is obviously
19 they're looking at every market, and the northeast is obviously
20 one of the important ones that's there.

21 MR. SHOPE: Okay, so your view is that Hydro-Quebec
22 began planning for, permitting, and building Romaine 3 and 4 in
23 anticipation of export to northeastern United States, New
24 Brunswick, Ontario, potential PJM even, Midwest ISO, all of
25 these markets.

1 MR. DICKINSON: So, yeah, I mean, if you look at the
2 historical data around their construction and look at their
3 public statements that they've made as far back as 2003,
4 they've added 5,000 megawatts. One of the key aspects of that
5 they discussed in doing that was building a new clean energy
6 for a future that valued that clean energy.

7 MR. SHOPE: Okay, so --

8 MR. DICKINSON: And then if you move forward, even
9 since 2014 when Romaine 2, Romaine 1, Romaine 3 came -- or --
10 came online, they've, since 2014, added 1,304 megawatts of
11 capacity.

12 MR. SHOPE: Now in planning these dams, they have to
13 determine how big the dams will be, right?

14 MR. DICKINSON: Yes.

15 MR. SHOPE: Okay. And the size of the reservoir is
16 actually -- can be controversial. Is that -- up in Canada as
17 far as --

18 MR. DICKINSON: Yeah, my understanding that the
19 reservoir and the impacts of that are an important part of
20 their permitting.

21 MR. SHOPE: Yeah. And so in determining the sizing
22 of these dams to the extent Hydro-Quebec was considering export
23 markets, it would size the dam bigger to the extent that it was
24 hoping to export as opposed to simply sizing it for Quebec
25 native load.

1 MR. DICKINSON: Yeah, I think their decisions on the
2 size of the generation will be based on a forward-looking
3 strategic view of all the different reasons why they might
4 build hydro.

5 MR. SHOPE: Okay. Now -- and so just to be clear,
6 it's your understanding that they sized the dams bigger in
7 order to serve the export market as well as the native load
8 based on the hope or the expectation or the speculation that
9 sufficient transmission would be built to get that power to the
10 external markets.

11 MR. DICKINSON: I think the export sales has been a
12 consistent, important strategic initiative for them and would
13 have been considered in the size of the generation.

14 MR. SHOPE: Yeah. And for them to -- but in light of
15 the fact that export transmission would be needed, they had, to
16 some degree, speculate that that export transmission would be
17 built. Is that true?

18 MR. DICKINSON: That's right. So they -- as an
19 example, I think Northern Pass was originally being discussed
20 in 2008. And they had to make a decision, if we're going to
21 serve that, what kind of generation might we want to build in
22 order to make sure, going back even further before that. And
23 so when you consider the -- as Eric said, the expectation that
24 some of that transmission might get built and when it would be
25 built, they wanted to make sure there was generation available

1 to serve it.

2 MR. SHOPE: Now, with regard to spilling, I think you
3 said earlier that Hydro-Quebec right now is spilling the amount
4 of energy that would be -- it's spilling the amount of energy
5 at least that would be provided across NECEC due to the fact
6 that it doesn't have insufficient -- it doesn't have sufficient
7 export transmission. Did I hear that right?

8 MR. DICKINSON: Well, just to be clear, what -- I
9 never said what their total amount of energy they're spilling.
10 I understand that on a normal operation of a hydro portfolio,
11 you're always going to have spilling of water for operational,
12 local agreements, water levels. So what I'm talking -- so
13 imagine that as a base level that exists over the last 20 years
14 of normal spilling from an operations perspective. What I'm
15 talking about is the spilling that began in 2017 and
16 accelerated in 2018 related to -- not to operational issues,
17 but specifically to their inability to get the power out of
18 Quebec on an economic basis to make export sales.

19 MR. SHOPE: Okay, and is your information on that the
20 letter of December 14, 2018 from Simon Bergervin at Hydro-
21 Quebec to you?

22 MR. DICKINSON: Well, so there's that piece of
23 information. There's conversations that we had with the
24 Portland Press Herald, with members of Hydro-Quebec. Hydro-
25 Quebec also met with the Boston Globe. They also -- based on

1 the CEO's comments that he's made related to his public
2 announcements associated with the spilling of this economic --
3 the water that can't get out of Quebec as a result of economic
4 ability. But yes, the 10.4 terawatt hours of water that was
5 spilled year to date is about equivalent to water that could
6 have been run through the turbines and delivered on this
7 project if that project was in service now.

8 MR. SHOPE: Okay, so if we -- you mentioned the 10.4
9 terawatt hours. That's a reference to -- that's a figure
10 that's referred in Mr. -- letter -- if we look at what's been
11 marked as Kelly 004-001, Attachment 1, which was the letter of
12 December 14, 2018 which was discussed yesterday as an exhibit
13 -- do you have that?

14 MR. DICKINSON: Yes.

15 MR. SHOPE: Okay. And so if we go down under the --
16 towards the bottom of the page, it's the paragraph that's one
17 up from the last paragraph, and it says, "In this category to
18 date, in 2018 Hydro-Quebec has spilled approximately 10.4
19 terawatt hours' worth of energy," right?

20 MR. DICKINSON: That's correct.

21 MR. SHOPE: Okay. And that would include the -- as
22 far as we know from this letter, that would include the
23 ordinary spillage that you were describing earlier, right?

24 MR. DICKINSON: No, no, absolutely not.

25 MR. SHOPE: Well, it doesn't say that, does it?

1 MR. DICKINSON: Well, it says Hydro-Quebec spilled,
2 due to a lack of economic transmission, 10.4 terawatt hours.

3 MR. SHOPE: No, I'm reading a sentence there and it
4 says, "In this category to date," which is the previous
5 category is water spilled, it says Hydro-Quebec has spilled
6 approximately 10.4 hour -- terawatt hours' worth of energy.
7 And then it says "Without additional transmission export
8 capability, the quantity of spilled water in future years is
9 expected to be comparable to the quantity of spilled water in
10 2018 under comparable market and operational conditions,"
11 right?

12 MR. DICKINSON: So "in this category" is referring to
13 the category of water that was spilled due to economic
14 transmission.

15 MR. SHOPE: But it doesn't say that, sir, does it?
16 Where does it say that?

17 MR. STINNEFORD: That was the question that was posed
18 and to which they are responding was how much was spilled due
19 to a lack of economic transmission.

20 MR. SHOPE: So that's your -- but that's your
21 inference.

22 MR. STINNEFORD: No, that was the question.

23 MR. SHOPE: No, the question -- okay, so the question
24 is regarding the existing hydro facilities that will provide
25 electricity for NEC (sic), have those dams spilled water

1 instead of generating electricity due to a lack of economic
2 transmission. If so, please provide the volume and then please
3 provide the reasons for that spillage. So the question itself
4 presumes that there will be multiple reasons other than
5 economic transmission deficiency, right?

6 MR. DICKINSON: Well, the way Hydro-Quebec answered
7 the question was interpreting that the volumes that we're
8 looking for are for economic transmission. If they were to put
9 in what the total amount of spillage is, I would guess that was
10 probably closer to 15 terawatt hours of energy that actually
11 was spilled.

12 MR. STINNEFORD: In fact, they have confirmed that in
13 conversations that we've had with them.

14 MR. SHOPE: Okay, now these -- when you -- you said
15 you brought people from Hydro-Quebec down to meet with the
16 Portland Press Herald?

17 MR. DICKINSON: Well, I don't know if I brought them.
18 We went together, yes.

19 MR. SHOPE: Okay. And did you ask any of those
20 Hydro-Quebec representatives whether they would be willing to
21 come and testify in these proceedings so we could ask these
22 questions?

23 MR. DICKINSON: I did not ask that question.

24 MR. SHOPE: Nothing further.

25 MR. TANNENBAUM: John, the second document -- I'm

1 sorry, the progress report document, is that --

2 MR. SHOPE: G 7, yes.

3 MR. TANNENBAUM: Okay. Next up is CLF.

4 MR. TURNER: Thanks, Mitch. At this time we don't
5 have any questions.

6 MR. TANNENBAUM: Public Advocate?

7 MR. BRYANT: Good morning. So while -- I have some
8 questions about an exhibit that's being distributed, but first,
9 while Liz is doing that, can you tell us what the status is of
10 ISO New England's system impact study for this project?

11 MR. WILLIAMSON: Can you speak into the mic?

12 MR. BRYANT: My question was what's the status of the
13 ISO New England system impact study for this project?

14 MR. STINNEFORD: It is underway. It has begun.

15 MR. BRYANT: Is it still CMP's expectation that that
16 project -- that that study will be completed next summer or
17 early next fall?

18 MR. STINNEFORD: Yes, I would say this coming fall,
19 yeah.

20 MR. BRYANT: Okay, thank you. So I distributed what
21 has been marked as OPA Exhibit 4. It has been filed in CMS,
22 and it's a letter from Mr. des Rosiers to Mr. Lanphear, and
23 I've copied the first two pages. The remaining pages of this
24 letter are not subject to my question and aren't pertinent to
25 what I want to know. And the reason that I identified Mr.

1 Stinneford for questioning is that he's referenced in this
2 letter beginning at the bottom of the first page and it's to
3 the top of the second. So, Mr. Stinneford, are you familiar
4 with this letter?

5 MR. STINNEFORD: Yes, I am.

6 MR. BRYANT: Did you review it before it was filed in
7 CMS?

8 MR. STINNEFORD: I did.

9 MR. BRYANT: Did you help to draft it?

10 MR. STINNEFORD: I may have helped to edit it, yes.

11 MR. BRYANT: So in this letter, Mr. des Rosiers says

12 --

13 MR. DES ROSIERS: The typos are mine.

14 MR. BRYANT: The typos belong to counsel, thank you.

15 In the letter, counsel says that, quote, "CMP commits that the
16 NECEC will be owned by an affiliated special-purpose entity
17 rather than CMP should the Commission prefer this structure."
18 And I would just ask you, Mr. Stinneford, if CMP commits to
19 what its counsel has put forth in this letter.

20 MR. STINNEFORD: Yes, we do.

21 MR. BRYANT: On the second page of the letter in the
22 large paragraph towards the top, it references that this
23 change, this creation of the affiliate and the transfer of the
24 project to the affiliate, will occur, quote, "before
25 construction." Can you help me understand what CMP means by

1 "before construction"?

2 MR. STINNEFORD: Well, it was our understanding that
3 some of the concerns that had been expressed by the Public
4 Advocate's office and by Commission staff related to the risks
5 that this project would impose on CMP and its ratepayers were
6 risks related to construction. So -- whether that's cost
7 overruns, permitting, whatever. So we felt that to address
8 those concerns, it would make sense to actually make the
9 transfer occur prior to the commencement of construction.

10 MR. BRYANT: How would you identify the commencement
11 of construction? The taking down of trees, the putting up of
12 poles, or something in between?

13 MR. STINNEFORD: It would certainly be a point in
14 time after all permits had been received. There is some
15 procurement activity that's already underway so you can't tie
16 it to procurement, but certainly clearing of corridors would
17 constitute an early stage of construction, yes.

18 MR. BRYANT: The CPCN that's been filed here includes
19 the HVDC line that's generated most of the questioning but also
20 includes some upgrades to existing transmission -- CMP's
21 existing transmission system. Does CMP propose to put all of
22 the projects that are within this CPCN into an affiliate or
23 only the HVDC line?

24 MR. STINNEFORD: Our thought on that would be it
25 would be most efficient to put the HVDC line and converter

1 station into the SPE, but the AC upgrades on CMP's existing
2 system we would propose to keep within CMP. The SPE would
3 still be financially responsible for all the costs associated
4 with those upgrades, but ownership, I think if we started to
5 parse ownership on a reconducted line, for example, gets very
6 complex.

7 MR. BRYANT: Do you agree that in order to accomplish
8 the transfer of the project to an affiliate that CMP would need
9 to initiate a separate docket and to have the affiliate issues
10 examined in that docket under pertinent statute and rule?

11 MR. STINNEFORD: Well, they certainly would need to
12 be addressed in accordance with pertinent statute and rule.
13 Whether that's done within this docket or a separate docket I
14 think is to be determined.

15 MR. BRYANT: But either way, the affiliate would need
16 to receive an approval from this Commission as an affiliate and
17 potentially even as a T&D utility under Maine law. Is that
18 correct?

19 MR. STINNEFORD: That's correct. As we've
20 identified, there'd be a number of transfers and affiliate
21 transactions that would need to occur, and those would require
22 Commission approval.

23 MR. BRYANT: Thank you, that's all I have.

24 MR. TANNENBAUM: I think this might be a good time to
25 take a break. So we'll come back in 15 minutes.

1 CONFERENCE RECESSED (January 9, 2019, 10:27 a.m.)

2 CONFERENCE RESUMED (January 9, 2019, 10:45 a.m.)

3 MR. TANNENBAUM: Okay, let's go back on the record.

4 So the generator interveners have passed out a document, an ISO
5 New England document, titled Interim Compensation Treatment.

6 MR. SHOPE: Yes.

7 MR. TANNENBAUM: And you would like to put that into
8 the record as an exhibit?

9 MR. SHOPE: Yes, which I guess would be GINT 28 if so
10 accepted.

11 MR. TANNENBAUM: Okay, any objection? Or do you want
12 to think about it and -- I realize this is --

13 MR. DES ROSIERS: If I may respond after the lunch
14 break because we -- I haven't looked at it at all. I mean, I
15 assume it's -- because it's an ISO report, we'll have no
16 objection, but since I haven't looked at it, I don't want to
17 say that blindly.

18 MR. TANNENBAUM: Okay, fair enough.

19 MR. SHOPE: And in particular, just if it helps
20 anybody, we're going to be focusing -- or the reason that we'd
21 be introducing it would be slide 20 where ISO indicates that
22 imports would not be eligible for compensation under the -- a
23 fuel security program.

24 MR. TANNENBAUM: All right. We have -- we'll go back
25 to the questioning of the witnesses. I think we do have some

1 follow-up questions from the OPA so we'll do that now. So
2 CMP's initial proposal in this case was to house the NECEC
3 project within CMP?

4 MR. STINNEFORD: That's correct.

5 MR. TANNENBAUM: And in making that proposal or
6 making that decision, can you -- and maybe this is a question
7 for Thorn. Can you tell me who was involved at CMP in the
8 discussions regarding this issue?

9 MR. DICKINSON: In my memory, I was involved. There
10 was counsel, internal counsel, involved. Pierce Atwood was
11 involved and other executives, including at the head of
12 Avangrid Networks, I believe the president of CMP.

13 MR. TANNENBAUM: Okay, and their names? The names?

14 MR. DICKINSON: Sarah Burns, Bob Kump, Scott Mahoney,
15 myself --

16 MR. TANNENBAUM: Eric, were you involved?

17 MR. STINNEFORD: No, not directly in those
18 discussions. I was on temporary leave at that point in time.

19 MR. TANNENBAUM: Okay. Bernardo, were you involved
20 in those discussions?

21 MR. ESCUDERO: I do not recall. I mean -- no, I do
22 not recall.

23 MR. TANNENBAUM: Okay. You want to clarify
24 (indiscernible)?

25 MS. HUNTINGTON: Well, I'm going to ask some

1 questions about documents that were provided as an attachment
2 to an October 9th, 2018 filing by CMP. And it -- I'm not sure
3 that the witnesses need to have the documents in front of them,
4 but I'll look to Jared and Sarah to see whether you would like
5 them to. It's the -- just so you know what I'm referring to,
6 it's the redacted versions of the emails and the privileged
7 document.

8 MR. TANNENBAUM: I think it's just -- what you want
9 to do is confirm from those documents who were involved the
10 discussions. So just --

11 MS. HUNTINGTON: Okay, so I'm looking at the emails
12 and the persons that were included on the emails, and I see
13 consistently that Mr. Dickinson and Mr. Escudero were on the
14 emails. Does that refresh your recollection?

15 MR. ESCUDERO: Yeah, I'm sure I was -- well, I'm not
16 sure, but I believe it's possible that I was copied in emails
17 and probably copied on those meeting invites. What I don't
18 recall is attending those meeting invites -- I mean those
19 meetings, sorry.

20 MS. HUNTINGTON: Do you recall, Thorn, being involved
21 in the emails and attending meetings on this topic?

22 MR. DICKINSON: Yeah, definitely. I mean -- and this
23 is something we've talked about in prior testimony. We had, at
24 this period of time, a great deal of things going on at the
25 same time. So my memory is similar to Bernardo's. I do not

1 remember him being in those discussions so --

2 MS. HUNTINGTON: There's a Mr. Coon referenced on
3 some of the emails. Could you tell us who he is and what his
4 responsibility is at either CMP or Avangrid?

5 MR. STINNEFORD: He is treasurer for Avangrid
6 Networks.

7 MS. HUNTINGTON: Okay. And there's a Cathy McCarthy,
8 Urban Blake (sic), and Anne O'Hanlon included on several of the
9 emails. Could you tell us who those folks are?

10 MR. STINNEFORD: Ms. McCarthy and Mr. Blake are
11 attorneys at Bracewell, our Washington FERC counsel. Anne
12 O'Hanlon is the administrative assistant to Mr. des Rosiers.

13 MS. HUNTINGTON: And there's Paul Dumais referenced
14 on several of the emails and apparently involved in drafting or
15 providing comment on the document. Who was Mr. Dumais and what
16 was his position and his area of expertise?

17 MR. STINNEFORD: Mr. Dumais was director of
18 regulatory with an emphasis on transmission-related issues at
19 the time that this was drafted. He's since retired.

20 MS. HUNTINGTON: Was his -- was it transmission
21 ratemaking issues or transmission development issues or both?

22 MR. STINNEFORD: Primarily ratemaking issues.

23 MS. HUNTINGTON: Okay. And who was -- who is Jeffrey
24 Seabrick (phonetic)?

25 MR. STINNEFORD: Jeffrey Seabrick is an analyst who

1 works for Paul Dumais -- or did work for Paul Dumais at the
2 time.

3 MR. TANNENBAUM: So Thorn, we -- well, we'll take a
4 step back. Eric did answer questions during a tech conference
5 and in a data request regarding the reasons why CMP chose to
6 propose to put the project in CMP as opposed to an affiliate.
7 Can you tell me what your understanding of the reasons why that
8 decision was made?

9 MR. DICKINSON: Yeah, I think they were similar to
10 Eric's perspective. You know, I think that in our view the
11 project could be managed within CMP. We could manage it within
12 a place that didn't provide adverse risks. The costs of the
13 project would be separated out and made separate. So, you
14 know, we didn't see -- at least my own perspective, I didn't
15 see any benefits associated with creating a separate SPE.

16 MR. TANNENBAUM: Were there any other criteria or
17 issues discussed other than the ones raised by Mr. Stinneford?

18 MR. DICKINSON: I mean, I think --

19 MR. DES ROSIERS: If I may, just positing that the
20 content of the discussions that occurred in the presence of
21 counsel, both from Pierce Atwood and from Bracewell, you can
22 identify the topics, but at this point, don't disclose any of
23 the discussion because, as we have previously objected and as
24 has been found, the contents of the communication, there is a
25 privilege here, and I'm -- but I just want to walk the fine

1 line through the discussion.

2 MR. TANNENBAUM: I'm not asking about what --
3 questions about the document. I'm asking Thorn what CMP's
4 reasons were for proposing that it be put into a -- or stay
5 into CMP. And so far, the response from Eric is that you had
6 expertise within CMP --

7 MS. HUNTINGTON: And they own the land.

8 MR. TANNENBAUM: And that you own the land. Is there
9 anything else?

10 MR. DICKINSON: So the -- I think the other filter
11 that I was always looking at throughout this whole bid was
12 preventing -- presenting a project that was as competitive as
13 it could be, and that includes not only price and cost and our
14 ability to manage the project, to own the right-of-way, but
15 also our ability to execute and follow through. And I think
16 the -- another factor would be that having it at CMP was a
17 simpler approval process. We wouldn't have to have this other
18 step associated with creating an SPE. So I think that's the --
19 that topic would be an additional one that would have played --

20 MR. TANNENBAUM: In the approval process here or in
21 Massachusetts?

22 MR. DICKINSON: Well, I think just even structurally
23 within our own organization. You know, the approval process
24 here. I think we're always concerned, you know, that we knew
25 that there were projects that had been ongoing for eight, nine

1 years that were well staffed and ready to pick up anything that
2 we did in our bid. So we tried to minimize any uncertainty and
3 risk that was in our project that somebody could pick apart.

4 MR. TANNENBAUM: Was there a consideration that
5 Massachusetts may look at the bid more favorably if it was
6 housed in CMP as opposed to an affiliate?

7 MR. DICKINSON: I don't think from a -- you know, if
8 they were comparing two bids, one that had it as a separate SPE
9 and one at CMP and those existed, I don't think they would see
10 any difference associated with that. But I think that any
11 additional approval, requirement, regulatory process that might
12 have to exist, I could imagine might be looked at as another
13 risk.

14 MR. TANNENBAUM: Were there any ratemaking
15 considerations?

16 MR. DICKINSON: I don't believe that we saw any
17 differences between ratemaking between the two structures.
18 They would have -- my memory is they would have been identical.

19 MR. TANNENBAUM: Bernardo, are you aware of any of
20 the reasons why CMP chose to house this in CMP?

21 MR. ESCUDERO: No, I am not.

22 MR. STINNEFORD: If I could, Mitch, I mean, my
23 testimony will speak for itself, but I believe I did raise a
24 number of other issues, other than the two that you've noted,
25 in my testimony.

1 MR. TANNENBAUM: Okay. Now --

2 MS. HUNTINGTON: Can I follow up with a ratemaking
3 question? Were there -- was there consideration of the
4 treatment of the property that was acquired for this project
5 with respect to the period of time between when the property
6 was purchased and when it was transferred to what we're
7 referring to as the NECEC tariff within CMP or the ratemaking
8 treatment of the property if the project didn't succeed in the
9 Massachusetts RFP? Was that a consideration?

10 MR. DICKINSON: You know, I don't think that was a
11 consideration associated with the decision. You know, I think
12 that, you know, obviously we've had a lot of discussions around
13 this up until this point. My view, from the guidance I got
14 from external counsel, was that those right-of-ways did -- were
15 applicable to be recovered in rate base and -- or to return on.
16 So at that point when I made that decision, I wouldn't -- I
17 would have thought that if there was an SPE, that they would
18 have been transferred or some mechanism would have been in
19 place at that point to pull them out of rate base. So it
20 wouldn't have played into the decision in my mind.

21 MS. HUNTINGTON: But what -- I was focusing on the
22 period between when the property was purchased and the point in
23 time it was transferred to an SPE. Was that -- or in the event
24 the project didn't go forward. Was that not a consideration,
25 that in those periods of time and under those circumstances,

1 the land would remain in CMP rate base and be recovered by --
2 through CMP ratepayers or through the regional tariff?

3 MR. DICKINSON: My understanding based on the
4 guidance I had from legal counsel was that we would be able to
5 continue to earn a return on those right-of-ways up until the
6 time that it would be -- become part of a project later on.
7 And maybe just a little bit more on that. My understanding of
8 the FERC guidelines on that was if there was some opportunity
9 for a useful opportunity related to that right-of-way to the
10 future, then that's something that has that opportunity to
11 return, and that's what my understanding was based on.

12 MR. TANNENBAUM: So would it be correct that
13 ratepayers will continue to pay for that land until it's
14 transferred to a special-purpose entity?

15 MR. DICKINSON: Well, that was my understanding at
16 that time. That's what I'm referencing in the decision. So as
17 a -- because that was my understanding, in my mind it didn't
18 matter. The property wouldn't matter as it related to
19 transferring it to an SPE because you would transfer it from a
20 period of time when you're earning a return to a period of time
21 when it has a cash flow associated with a transmission service
22 agreement. Again, that was my understanding at that time.

23 MR. STINNEFORD: And I would just say, prospectively,
24 if the project does not go forward, that land will only stay in
25 Account 105 and be considered part of rate base as long as we

1 have a definitive plan for its use. If we no longer have a
2 plan for its use, it comes out.

3 MR. TANNENBAUM: So if you transfer it to an SPE and
4 then the project does not go forward, what happens then?

5 MR. STINNEFORD: Well, it would sit on the books of
6 the SPE as long as the SPE continues to exist, but it would not
7 be in rate base.

8 MR. TANNENBAUM: It would not be in rate base.

9 MR. STINNEFORD: That's right.

10 MR. TANNENBAUM: And it would not go back into rate
11 base unless the SPE has a specific project.

12 MR. STINNEFORD: Well, the SPE would have to have a
13 tariff in which to recover the costs. If it has no project, it
14 has no tariff.

15 MR. TANNENBAUM: Is there a reason to wait until
16 construction begins to transfer the property?

17 MR. STINNEFORD: Our -- as we've expressed perhaps in
18 confidential settlement discussions, but in terms of timing of
19 a transfer, we think it would make sense to wait until permits
20 are secured and then make the transfer because it's much easier
21 to transfer permits once issued than to disrupt the middle of a
22 permitting process by changing the entity. But we think it
23 could be done between that window of time once permits are
24 received but prior to the commencement of construction.

25 MR. TANNENBAUM: So there is a time period between --

1 obviously between the -- getting all the permits and starting
2 construction, and what you're saying is you would put it into
3 the SPE after all the permits are --

4 MR. STINNEFORD: That would be our suggestion. As
5 quickly as possible because we obviously don't want to delay
6 construction, but that would be the window in which we think it
7 makes sense to do it.

8 MR. TANNENBAUM: And meanwhile, this land for future
9 use has been in CMP's rate base and it has been paid for by
10 ratepayers?

11 MR. STINNEFORD: Yes, it is in rate base and we are
12 earning a return on it currently.

13 MR. TANNENBAUM: And that's throughout New England,
14 that's a socialized --

15 MR. STINNEFORD: Land is allocated in rate base based
16 on the so-called PTF/non-PTF allocator. So it's roughly 80/20.

17 MR. TANNENBAUM: Eighty PTF?

18 MR. STINNEFORD: Yes.

19 MR. TANNENBAUM: So if this project goes through,
20 then the ratepayers will have paid a certain amount of money on
21 this land that is now going into CMP's NECEC project.

22 MR. STINNEFORD: Yes.

23 MR. TANNENBAUM: Does CMP have any plans to reimburse
24 customers for that amount of money?

25 MR. STINNEFORD: I'll take my advice from counsel

1 when we're infringing on confidential settlement discussions.
2 That is certainly an issue that has been discussed in
3 settlement.

4 MR. TANNENBAUM: When CMP was -- and maybe this is
5 for Thorn. When CMP was deciding to propose that the project
6 remain with CMP, did the issue of a goodwill payment come up?

7 MR. DICKINSON: No, it didn't, my memory.

8 MR. TANNENBAUM: Eric?

9 MR. STINNEFORD: No, not that I'm aware of.

10 MR. TANNENBAUM: Bernardo?

11 MR. ESCUDERO: I am not aware.

12 MR. TANNENBAUM: I realize this is -- well, I'll ask
13 the question. In making your proposal today or when you filed
14 the letter to house this in an SPE, did CMP consider a goodwill
15 payment under Chapter 820 of the Commission rules or something
16 like a goodwill payment in effect?

17 MR. STINNEFORD: No. This is -- as we've discussed
18 in the context of Chapter 820, we don't view this as a non-core
19 activity which would invoke that requirement.

20 MR. TANNENBAUM: So assuming this doesn't settle and
21 it goes to the Commission, what we have before us is a proposal
22 that -- what I would assume is an amended proposal to house the
23 project in an SPE along with the conditions you indicated in
24 that letter regarding approval of affiliate transactions,
25 participating in money pool arrangements, credit facilities,

1 and that sort of thing. That's -- what's in this letter is
2 essentially an amended proposal?

3 MR. STINNEFORD: It's expressing our willingness to
4 adopt this type of structure with these types of conditions if
5 the Commission determines that that's in the best interest of
6 customers.

7 MR. TANNENBAUM: And if the Commission determines
8 it's in the best interest of customers, the Commission would
9 then rule on whether a goodwill payment is required under the
10 rule?

11 MR. STINNEFORD: I guess that's a question for
12 counsel, but, again, we would dispute that this is a non-core
13 activity that would invoke a Chapter 820 requirement and the
14 payment of a goodwill payment.

15 MS. HUNTINGTON: I think we may have addressed this
16 at one of the technical conferences, but I just wanted to get
17 clarity on the ratemaking treatment or the accounting treatment
18 of the ongoing expenses such as participating in this
19 proceeding or the Massachusetts RFP, as well as engineering and
20 permitting types of activities. How are those being accounted
21 for?

22 MR. STINNEFORD: All of those costs are accumulated,
23 have been accumulated for -- since we initiated the project in
24 accounts that are booked to a preliminary survey and
25 engineering account under FERC accounting rules which means

1 that they are effectively deferred. They're not recovered
2 under our tariff. And once a project is permitted and proceeds
3 to construction, then they are transferred out of that
4 preliminary survey account and actually into the specific FERC
5 plant accounts and expense accounts that would then become part
6 of the capitalized project. So that would include internal
7 labor costs, including our time here today, engineering
8 expenses, study expenses, consultant fees. All of that is
9 being booked into these preliminary survey accounts.

10 MS. COOK: Eric, those accounts, you said the
11 expenses are essentially deferred. Are they deferred with
12 carrying costs in any form?

13 MR. STINNEFORD: No. No.

14 MS. HUNTINGTON: I wanted to go back to the -- to
15 follow up on Mitch's questions again just to make sure we're
16 clear on the witnesses' testimony with respect to the issues
17 that were considered with respect to the decision to house the
18 project in CMP. And I'll articulate what I've heard from the
19 witnesses so far, and if you want to supplement it, please do.
20 So the way you've -- previously Eric has noted that for -- in
21 support of this, that the property is owned by CMP. CMP has a
22 proven track record in developing transmission projects. The
23 employees are within CMP and the arrangements related to
24 sharing employees in affiliate transactions would create an
25 administrative step. And I think Mr. Dickinson referred to the

1 advantage of -- in terms of the process of competing in the RFP
2 as well as with respect to permitting that keeping it in CMP
3 would simplify those processes or make you more competitive.
4 Is that --

5 MR. DICKINSON: Yeah, again, I just think it's a --
6 any time you add an additional requirement in an RFP, you take
7 a risk that that additional requirement is viewed by somebody
8 as a negative aspect to your bid.

9 MS. HUNTINGTON: Okay.

10 MR. STINNEFORD: If I could, Faith, the other issue,
11 and it's related to how you summarized my concerns, but the
12 other concern we expressed was by having to comply with
13 affiliate requirements between the SPE and CMP, we didn't want
14 to see barriers that would create inefficiencies in the
15 execution of the project or that would be detrimental to CMP's
16 core interests by restricting information, systems, employees'
17 time, and things like that.

18 MS. HUNTINGTON: Okay. And again, I understand that
19 I'm not allowed to ask about the content of the privileged
20 document, but I'm puzzled by the disconnect between your
21 testimony that you didn't -- that the fact that there'd be
22 perhaps more favorable ratemaking treatment with respect to
23 things like the property that could ride on CMP ratepayers was
24 not a factor, given the involvement of Mr. Dumais whose -- you
25 know, whose expertise was in FERC ratemaking issues. There

1 weren't any FERC ratemaking issues that were relevant to the
2 decision?

3 MR. DICKINSON: You know, I do remember conversations
4 around allocation of administrative and general costs, but in
5 the end, we determined that those allocations would be the same
6 if it was within CMP or at an SPE. So I think that was a
7 conversation I remember having with Paul. So that would be an
8 example of -- you know, and Paul was also involved in the
9 discussion with the external counsel previously, this was prior
10 to this, around the acquisition of the land and its ability to
11 be recovered under rates. So those are the two things I
12 remember talking to Paul about about this project and
13 specifically within that decision.

14 MS. HUNTINGTON: Thank you.

15 MR. TANNENBAUM: Okay, so we are now going to move on
16 to the IECG. Drew?

17 MR. LANDRY: Thank you. I'm passing out an excerpt
18 from the transmission services agreement which has previously
19 been marked Exhibit -- well, it's NECEC 17 which was included
20 in the prefiling (indiscernible) rebuttal testimony by CMP.
21 This version is marked confidential, but I conferred with Sarah
22 Tracy and others, and I'm confident that these portions are not
23 confidential, so I can refer to these publicly. My name is
24 Andrew Landry. I'm counsel for the Industrial Energy Consumer
25 Group. I don't have that much this morning, but first question

1 I had was I just wanted to confirm -- I know this is in the
2 record elsewhere, but you have stated on a few occasions that
3 are in the earlier part of the record that CMP agrees to hold
4 harmless Maine ratepayers from the cost of this project for the
5 first 40 years of that project. Is that correct?

6 MR. STINNEFORD: Yes.

7 MR. LANDRY: And you just answered a few questions
8 from the Public Advocate and the staff about moving the project
9 into a special-purpose entity, and my understanding is you've
10 expressed a willingness to do so if the Commission orders it
11 but you haven't committed to do that yet. Is that correct?

12 MR. STINNEFORD: That's correct.

13 MR. LANDRY: And in terms of holding customers
14 harmless, Maine ratepayers harmless, from any increases in
15 transmission costs, if the project were to suffer -- it was
16 within CMP and it were to suffer cost overruns or that sort of
17 thing, would having the project in a special purpose entity
18 serve to help insulate Maine customers from those cost
19 overruns?

20 MR. STINNEFORD: I think Maine customers could be
21 insulated in either structure, but --

22 MR. LANDRY: I think we previously talked in a prior
23 technical conference and in some data requests about whether or
24 not Hydro-Quebec failing to deliver any power would constitute
25 an event of default under the transmission service agreement,

1 and I think we concluded that it did not. In other words, the
2 Massachusetts EDCs are on the hook to pay CMP regardless of
3 whether Hydro-Quebec is actually able to deliver any power.

4 MR. STINNEFORD: There are circumstances under the
5 PPAs in which, if Hydro-Quebec fails to deliver for reasons
6 other than a TSA default or TSA non-delivery, that the EDCs can
7 terminate. And if that happens, then there's a termination of
8 not only the PPAs but potentially the TSAs, and Hydro-Quebec,
9 under those circumstances, is liable not only to the EDCs but
10 to CMP.

11 MR. LANDRY: Thank you. Now I circulated, before my
12 questioning, a -- what was attached I believe to your rebuttal
13 testimony, but it's marked NECEC 17. This is a portion of the
14 transmission services agreement between Central Maine Power and
15 NSTAR Electric d/b/a Eversource, and I assume the provisions of
16 this are essentially identical to those agreements that you
17 have with Western Mass. Electric and National Grid subsidiaries.
18 Is that --

19 MR. STINNEFORD: I believe with respect to these
20 particular provisions, that's correct.

21 MR. LANDRY: Now, the provisions that I've copied and
22 circulated relate to owner defaults and I believe is defined
23 under the agreement that Central Maine Power is the owner.

24 MR. STINNEFORD: That's correct.

25 MR. LANDRY: And if we look at 14.2(c), one of the

1 events of default is the failure of the transmission line to be
2 capable of operating at or above 1,040 megawatts as of the
3 commercial operation date unless it's excused. A little
4 paraphrasing, but --

5 MR. STINNEFORD: Yeah, there clearly are other
6 provisions in that section but yes.

7 MR. LANDRY: And looking at 14.2(e), and I'll let you
8 read it but I'll just paraphrase, essentially if there's a lack
9 of availability, failure to meet the minimum average
10 availability for some period of time, there being some
11 opportunity to cure, but if that's not resolved, then that will
12 be a default and -- is that a fair paraphrasing of 14.2(e)?

13 MR. STINNEFORD: Yeah, there are clearly many other
14 subprovisions within that, but that's a fair summary.

15 MR. LANDRY: And looking at the remedies upon
16 default, if you look at 14.4(a), I understand that upon a
17 default, which would include any under 14.2, that the
18 distribution companies may terminate the agreement?

19 MR. STINNEFORD: Yes.

20 MR. LANDRY: Would you agree that moving -- that if
21 the EDCs were to declare an event of default because of a
22 failure to -- of the project to be able to operate as it was
23 agreed to, that the loss of that revenue stream would be a
24 significant adverse impact on CMP or whoever owns the line?

25 MR. STINNEFORD: Well, there are several things that

1 could happen in that circumstance. I guess the first order is
2 that Hydro-Quebec would have rights to step into the agreement
3 and assume those obligations, in which case there potentially
4 could be no impact. But certainly if all revenue was lost,
5 and, you know, Hydro-Quebec is not interested in stepping in
6 and no other third party is, then, yes, the potential loss of
7 revenue would have a major impact.

8 MR. LANDRY: Would you agree that moving the
9 ownership of the line into a special purpose entity would
10 insulate Maine ratepayers from that risk more effectively than
11 having it within CMP?

12 MR. STINNEFORD: It potentially could be more
13 beneficial in that circumstance. As we've said, I mean, we're
14 -- if the project were to stay within CMP, from a ratemaking
15 perspective, we have committed to a full segregation of costs
16 at FERC, and FERC has accepted those provisions. So as I said,
17 I think there are means of insulating CMP even if it is -- the
18 project stays there rather than an SPE. But it, perhaps, could
19 be cleaner if it were separated.

20 MR. LANDRY: Thank you. That's all I have.

21 MR. TANNENBAUM: Okay. Dot?

22 MS. KELLY: No questions.

23 MR. TANNENBAUM: Elizabeth, you still on the line?

24 MS. ELY: I do have questions, NRCM.

25 MS. CARUSO: Yes, I am.

1 MS. ELY: If you want to go (indiscernible) or not
2 (indiscernible).

3 MR. TANNENBAUM: Okay, we'll go with Elizabeth and
4 then you can finish.

5 MS. CARUSO: Can you hear me -- oh. Can you hear me
6 --

7 MR. TANNENBAUM: Yes, I'm sorry, Elizabeth. Could
8 you speak into the phone?

9 MS. CARUSO: Sure. Is this better?

10 MR. TANNENBAUM: Much better.

11 MS. CARUSO: Okay. I have a handout which, due to
12 the weather, I was unable to attend today, but I have someone
13 who's helping me out by distributing a packet of information
14 for your review. And I believe Chris kindly printed off three
15 more pages that can be added to that. I can't tell when you
16 are ready. My feed got stuck. Oh, I see now. Thank you so
17 much for your help, ladies. (Indiscernible) didn't accommodate
18 my drive down there today. Are you all set?

19 MR. TANNENBAUM: I think we are.

20 MS. CARUSO: Okay.

21 MR. TANNENBAUM: Please proceed.

22 MS. CARUSO: So I'd like to start off with tab one in
23 the handout. Of course, you're familiar with it. It's the
24 memorandum of understanding between CMP and the Western
25 Mountains & Rivers Corporation. On page four, Roman numerals

1 three and four discuss the combined lump sum payment of 22
2 million which was initially the plan. My question is is this
3 the only mitigation payment that you have offered to do or do
4 you have any other agreements in place?

5 MR. DICKINSON: No, there are no other agreements.

6 MS. CARUSO: So you're not having any discussions
7 with anyone else related to additional mitigation or
8 compensation payments?

9 MR. DICKINSON: No, there are -- there have been
10 confidential negotiations that have happened here, and also
11 there are bilateral conversations that happened in discussions
12 that we're having.

13 MS. CARUSO: So do you expect to enter into any new
14 or additional mitigation or compensation agreements?

15 MR. DICKINSON: I would say that's uncertain at this
16 point.

17 MS. CARUSO: So you include that there -- it is
18 possible that you could have additional compensation --

19 MR. DICKINSON: Yes.

20 MS. CARUSO: -- your project budget. Okay. Now with
21 regards to the decision to go under the river, that has now
22 dropped the mitigation payment to somewhere between five and
23 ten million. Is that correct?

24 MR. DICKINSON: Yeah, for that portion of the MOU.

25 MS. CARUSO: Okay. Can you explain why you included

1 a provision to allow you to reduce the payment?

2 MR. DICKINSON: Well, it really was part of a two-
3 year dialogue that we had with the people that we had been
4 discussing with over that period of time. And you know, when
5 we started the dialogue, I think there was a general feeling of
6 just say no to the project. We spent a lot of time listening
7 to concerns, hearing what the concerns were of the people in
8 the community, and ultimately -- and part of it is in our --
9 the way we laid out this project of trying to minimize the
10 impacts by utilizing existing corridors and utilizing the new
11 corridor through an area that's already heavily logged, we
12 recognized that there were a few areas that we believed were of
13 the biggest importance, and one of them was the Kennebec River
14 crossing. So when we were approached to begin a dialogue, we
15 did. And in the process of that dialogue, there -- and part of
16 that was exploring what our belief was the cost of an
17 underground piece underneath the Kennebec River, which at that
18 time was in the 30 million range. We started having a dialogue
19 about, well, if there was an overhead, what might a mitigation
20 package look like there. If there is an underground, what
21 might the mitigation package look (sic). So it was a natural
22 dialogue over a couple-year period that eventually lead to that
23 point.

24 MS. CARUSO: So is it safe to assume that you thought
25 the aerial crossing of the Kennebec was the largest single

1 impact worthy of mitigation?

2 MR. DICKINSON: Yeah, I think that's fair to say.

3 MS. CARUSO: Okay. And do you -- so basically,
4 relative to the entire project which involves a significant
5 amount of newly-constructed corridor and numerous other
6 environmental and other types of impacts, you felt that that,
7 you know, thousand feet of visibility or so of the entire
8 project was worthy of mitigation.

9 MR. DICKINSON: We believe that that -- going back to
10 your prior question, we believe that that was the single
11 biggest piece of impact. Obviously within the DEP process that
12 is going on now, we've had a lot of discussions around
13 mitigation, and we've had a lot of discussions about
14 mitigations that will be within that process. But to answer
15 your question, we recognize that there are impacts from a
16 transmission line like this along the path, but we worked
17 extremely hard to try to minimize those impacts in the design.
18 We recognize that in the DEP process, those mitigations will
19 happen, but we recognize that the overhead river crossing was
20 the -- as you said, the single biggest area of concern.

21 MS. CARUSO: Right. Well, I'm not saying that. I'm
22 just asking you if you say that.

23 MR. DICKINSON: Yeah, yeah, no, I agree with that.

24 MS. CARUSO: Okay. And so when you took the 12 to
25 \$17 million off the table, what impacts do you think that five

1 to ten million dollar payment -- what impacts would they
2 address?

3 MR. DICKINSON: You know, I think our perspective was
4 there -- this area around the Kennebec River crossing. Still,
5 there are impacts around that general area, and I think it
6 still was meant to be a representation of that. But I think
7 more that it was an organic process that happened in the
8 negotiation which was I think there was some perspective
9 originally that the agreement would only have some -- you know,
10 only an underground approach could -- would ever be accepted.
11 And then as I said, eventually there was an approach for an
12 overhead. So I don't think there was any algorithm or rubric
13 around what that five to ten meant to represent, but it was,
14 again, the outcome of a dialogue over a two-year period.

15 MS. CARUSO: So, you know, we hear five and we hear
16 ten. Is it five? Is it ten? Is it something in between?
17 What is the amount?

18 MR. DICKINSON: Well, the firm obligation is five,
19 but, you know, the -- at the time, the range -- at that
20 specific time there were discussions around, in some of the
21 unorganized territories, ways in which the community could
22 benefit incrementally by doing tax incentive financing and
23 finding a way to make sure that those incremental taxes find a
24 way into the community. So I think some of that range was
25 around that area, but, you know, obviously I think we -- I know

1 me particularly who was at I think every individual meeting up
2 at The Forks and spent a lot of time up talking to people in
3 the community, I was very proud about this agreement, to the
4 opportunity to bring value to the community. And obviously we
5 continue to be open minded about how we can work with the
6 community going forward, including what that range might mean.

7 MS. CARUSO: So you mentioned that you were meeting
8 with the public and the community and talking to the public.
9 Wasn't that after you had already signed the MOU?

10 MR. DICKINSON: No, I mean, I made -- the -- part of
11 our negotiations with Western Mountains & Rivers was - from our
12 perspective, had a couple of concerns and things that were on
13 our mind when we communicated to them. One was we wanted to
14 have the goal of having this represent the community as a
15 whole, and as you can -- as you probably know from the makeup
16 of the board, we also wanted the board to be representative of
17 a large perspective of the community. And, you know, my
18 experience is that I was up there a lot talking with people
19 that had questions, people that wanted to learn more about what
20 was happening before or after, and we definitely encouraged all
21 the people we were talking about to continue to have
22 conversations, to let the community know that these discussions
23 were going on, although I'm sure that there were components of
24 the negotiation that -- as it relates to specific aspects that
25 were held back and confidential.

1 MS. CARUSO: I will follow up with this more a little
2 bit later, but would it be fair to say that the MOU and the
3 mitigation payment were designed to buy the local support of
4 the few companies and entities that were -- you were meeting
5 with initially for two years and then afterwards broke out and
6 discussed it with the public?

7 MR. DICKINSON: No, I think the way I would
8 characterize it is how I characterized it before. I thought
9 this line provided an opportunity to bring value to the
10 community through expanded nature-based tourism, economic
11 development, new trail systems, certain rights that people in
12 the community would have that they wouldn't have before, access
13 to certain recreational assets. I saw this personally as a
14 real opportunity to have a partnership between the project and
15 the community.

16 MS. CARUSO: So on page six, Section 7, subsection A,
17 it requires that WMRC, at CMP's request, would provide oral and
18 written testimony to any jurisdictional permitting agency and
19 require WMRC to testify that the MOU represents an appropriate
20 offset to various impacts of the project. Am I interpreting
21 that correctly?

22 MR. DICKINSON: Yes, I think you are.

23 MS. CARUSO: Okay. Is it typical practice for an
24 agreement like this to include a quid pro quo that requires the
25 entity that will receive compensation funds to proactively

1 support the project at the funder's request?

2 MR. DICKINSON: So this is a representation of the
3 common feeling that we arrived to at the signature of the MOU.
4 The dialogue, the numerous meetings that we had, the
5 conversations that we had all led to a point where the
6 signature -- signatories of Western Mountains & Rivers were
7 agreeing to this was consistent with their expectations. So I
8 wouldn't characterize it the way that you have.

9 MS. CARUSO: Do you consider the need to provide
10 mitigation for impacts related to things like our tourism
11 industry or potential negative impacts to local property
12 values?

13 MR. DICKINSON: Well, the -- you know, we're
14 obviously talking about within this proceeding the benefits and
15 the need for the project. In the DEP process, we'll be looking
16 at all the pieces within that, and I think those are all
17 considerations that happen within that context.

18 MS. CARUSO: Well, it appears that you did mitigate
19 for the crossing of the Kennebec, but I'm wondering if you
20 considered the need to provide mitigation for non-Kennebec
21 River related tourism impact.

22 MR. DICKINSON: Well, you know, I -- my own
23 expectation based on what I've learned is that there are going
24 to be significant opportunities for expanded tourism in this
25 region that -- you know, new access for ATVs, new access for

1 snowmobile accesses, new trail systems, along with funds that
2 we've designated to go towards encouragement of new tourism in
3 that area.

4 MS. CARUSO: Did you direct Daymark or the University
5 of Maine to account for economic impacts in all four seasons?

6 MR. DICKINSON: No.

7 MS. CARUSO: Okay. Have you completed any studies as
8 to why people come to the region of the new portion of the line
9 to hunt, fish, raft, hike, or snowmobile?

10 MR. DICKINSON: No, as I said, I think my
11 understandings from the -- why I believe there's opportunities
12 for new expanded tourism in the region come from conversations
13 that I had had with people in the region.

14 MS. CARUSO: Right, and I understand that. You -- I
15 understand the few companies that you spoke with that are on
16 the board at the time that you came up with this agreement.
17 I'm just asking if you did any studies, that's all.

18 MR. STINNEFORD: There are use surveys that are done
19 as part of the DEP permitting process but not associated with
20 this proceeding.

21 MS. CARUSO: That was done this fall but not prior to
22 coming up with the agreement. And that was for the Kennebec
23 River.

24 MR. DICKINSON: Yeah, I guess the only thing I'll
25 just say, I don't want it to be represented that the only

1 conversations I've had with people in the community are the
2 people that were -- we were working together on the agreement
3 over time. You know, I've talked to snowmobilers, ATVs,
4 hunters, other people that all see some of the opportunities
5 that come from a new corridor that exists.

6 MS. CARUSO: Right, but those conversations were had
7 after the MOU became public, correct?

8 MR. DICKINSON: No, I think the -- you know, we have
9 done, from the beginning of this project, an effort to reach
10 out to people along the corridor.

11 MS. CARUSO: Okay. We'll just move on and we'll come
12 back to that later. Did you -- in the visual rendering
13 presentation of August 17th you presented -- or your company
14 presented to the PUC some pictures of Parlin Pond, Enchanted,
15 Coburn Mountain, Rock Pond, Spencer Road, the Kennebec River,
16 and they appear to be uninhabited without visible recreational
17 usage or unusual scenery. And then it was stated at that
18 meeting that you were trying to minimize the impact of a
19 national scenic byway by putting the line to the east and to
20 the west. Did you analyze the usages of areas you chose to
21 place the line beyond it being a working forest?

22 MR. STINNEFORD: Well, I think as we have presented
23 in technical conferences here in this proceeding, you know, a
24 great deal of thought was put into the choice of the new
25 corridor location, siting it, to the maximum extent possible,

1 avoiding conserved and preserved lands. And, again, I think
2 we've provided maps that demonstrate that as well.

3 MR. DICKINSON: And I think I would just --

4 MS. CARUSO: -- but did you analyze the usages of the
5 areas?

6 MR. DICKINSON: You know, I'm not aware of that. You
7 know, I was just going to also point out that, I think as we've
8 also presented at that time, there -- these lands are owned by
9 two private companies. And, you know, they have made it very
10 clear publicly and particularly in a letter that was addressed
11 to the Commission in the middle of December that they have --
12 you know, their primary utilization (sic) of that land is as a
13 working forest and that --

14 MS. CARUSO: Right, I said beyond it being a working
15 forest was my question.

16 MR. DICKINSON: Well, no. So I was just making the
17 point that they have made it very clear that they, as a
18 secondary and on their own goodwill, have made those lands
19 available for other utilizations. But that utilization
20 shouldn't interfere with their ability as a private landowner
21 to utilize those lands how they see fit.

22 MS. CARUSO: Of course. So now there were three
23 pages that were distributed separately from my packet, and it's
24 a state of Maine report, recreational hunter and angler market
25 report. It's prepared by Southwick Associates, fish and

1 wildlife economics and (indiscernible) in April of 2015. And
2 this was prepared for the Maine Office of Tourism and the
3 Department of IF&W. On the second page, it's sort of a summary
4 of the report, and it says key insights. (Indiscernible) from
5 the Maine license and traveling sportsmen surveys. It says,
6 "The state of Maine is well positioned as one of the, quote,
7 best destinations among Maine licensed hunters and anglers
8 across a majority of attributes that are important to them,
9 ranging from climate, safety, pricing, and amenities. Maine's
10 particular strengths among traveling sportsmen are its
11 attractive natural setting and its sense of safety. The
12 state's natural amenities, beauty, and sense of security or
13 safety are also identified to be among the most important
14 characteristics of a site that hunters and anglers say are
15 important when making the decision to hunt or fish." On the
16 third bullet it says, "Interestingly, one of the key
17 destination factors for hunters and anglers is the remoteness
18 of the location." So are you aware in tourism surveys that
19 they show the primary reason people come to Maine to hunt and
20 fish is the remoteness and scenic quality of it?

21 MR. DICKINSON: That would -- I mean, that would make
22 sense to me.

23 MS. CARUSO: Okay. And have you studied how a
24 transmission line would affect these people's experiences?

25 MR. DICKINSON: I mean, we have, as we've already

1 talked about, done a significant amount of work demonstrating
2 the impacts both on the natural environment and on the visual
3 resources that are there. And, again, you know, my
4 conversations have led me to the belief that the -- that
5 there's a real opportunity for an increase in tourism, not a
6 decrease.

7 MS. CARUSO: But beyond discussing it with the people
8 in the agreement, you haven't done a study.

9 MR. DES ROSIERS: Objection to form, assumes facts
10 not in evidence. And compound question.

11 MS. CARUSO: I didn't hear that.

12 MR. TANNENBAUM: Okay, so maybe the question should
13 be have you done a study of the impacts on tourism?

14 MR. DICKINSON: Yeah, there's no specific study that
15 we did.

16 MR. TANNENBAUM: Okay.

17 MS. CARUSO: Okay. So there is no study on the
18 effects of the variety of the lodging, the restaurants, all the
19 associated -- the trickle-down effect of tourism --

20 MR. DICKINSON: Well, no, actually --

21 MS. CARUSO: -- this area?

22 MR. DICKINSON: Well, but that was a different
23 question I guess from my perspective. You know, the project
24 has substantial benefits associated with both a drop in energy
25 prices that have an overall effect on GDP that trickle down

1 throughout the Maine economy. Also, the property taxes that
2 the region will experience. And then specifically to what
3 you're talking about is a significant amount of both direct and
4 indirect jobs around the project, something we saw very clearly
5 with MPRP that had positive effects on, you know, restaurants
6 and hotels and other businesses indirectly related to the
7 project.

8 MS. CARUSO: Right. But there are studies that show,
9 and you're familiar with them in other proceedings, that people
10 -- tourists don't come to the remote areas -- or there was one
11 study, I'm not sure if you recall it, the John (Indiscernible)
12 Trust of 2017 where 55 percent of the tourists would not return
13 to an area of wilderness with a transmission line in it.

14 MR. DES ROSIERS: Objection to form, assumes facts
15 not in evidence.

16 MS. CARUSO: -- were just --

17 MR. TANNENBAUM: Thorn, are you familiar with that
18 study?

19 MR. DICKINSON: No, I'm not.

20 MR. TANNENBAUM: Okay.

21 MS. CARUSO: Okay. Oh, I thought it was. I thought
22 that was -- had been part of the proceedings. I apologize.
23 Moving on. So there were, in the visual rendering, some of the
24 additions that you submitted, pictures of snow on the ground,
25 but did you actually do a study in leaf-off conditions?

1 MR. STINNEFORD: I'm not sure what you mean by a
2 study. We did, in response to requests in the DEP permitting
3 process, provide additional renderings under winter snow cover
4 conditions.

5 MS. CARUSO: Okay. So have you studied winter
6 snowmobiling in the affected area of the proposed new corridor?

7 MR. STINNEFORD: We have not conducted a study,
8 although we have had numerous conversations with the Maine
9 Snowmobile Association and they are very supportive of the
10 project.

11 MR. DICKINSON: You know, I mentioned some of the
12 comments and conversations we had, and actually at the Somerset
13 County, the head of the MSA spoke. And I thought it was very
14 interesting and what he said he receives on a daily basis
15 complaints from all their members on a numerous amounts of
16 things. You know, he said you'd be amazed at how much people
17 complain about various things about their experience, but never
18 once in his whole period did he ever get a complaint that
19 somebody said they saw a transmission structure.

20 MS. CARUSO: Right. But have you studied how -- have
21 you done any studies in -- it seems like you -- there's a lot
22 about the Kennebec River that you're familiar with, but have
23 you studied how winter snowmobiling season affects the local
24 businesses, the year-round residents such as outfitters,
25 lodges, restaurants, the associated staff members, the

1 snowmobile guides, the grooming operations, and the -- as
2 travelers come up north, they -- they're spending in the gas
3 stations and the grocery stores, it all is affected by the
4 snowmobiling season. And have you studied what would happen to
5 the economy of the region during the construction period of the
6 new corridor --

7 MR. DICKINSON: We have not --

8 MS. CARUSO: -- there, you know -- okay.

9 MR. DICKINSON: We have not studied that, but again,
10 my belief in conversations with people in the snowmobile
11 communities, this actually will be a net positive effect. So I
12 would see that as a net benefit of addition, but we did not do
13 a study for that.

14 MS. CARUSO: Do you -- have you snowmobiled in the
15 area?

16 MR. DICKINSON: I snowmobiled when I was in -- up to
17 when I was in fourth grade but not since.

18 MS. CARUSO: Okay. So do you know the difference
19 between snowmobiling in trails and woods versus under power
20 lines?

21 MR. DICKINSON: I believe I've snowmobiled in both
22 conditions, but I wouldn't consider myself an expert.

23 MR. STINNEFORD: And I certainly have.

24 MS. CARUSO: Okay. So do you know what happens when
25 there's not enough snow on the trails? For example, when

1 spring starts to set in and the snow pack is melting, dirt
2 starts to be uncovered, the grooming operations cease. And you
3 know, when grooming operations cease, so does the flow of
4 riders, of course, both in state and out of state on the
5 trails.

6 MR. STINNEFORD: It's a sad time of --

7 MS. CARUSO: Does that make sense?

8 MR. STINNEFORD: Yeah, it's a sad time of year for
9 snowmobilers, I'll grant you that.

10 MS. CARUSO: Yeah. And when -- you know, if --
11 because when grooming operations stop, people don't want to
12 snowmobile on the trail. It's not as smooth. And when the
13 snowmobilers don't come, and the restaurants and lodges, of
14 course, they're losing their customer base. So did you know
15 that the snowmobile trails under transmission lines
16 historically are the first to be rutted and bare due to the
17 absence of the forest canopy and the resulting exposure of the
18 sun?

19 MR. STINNEFORD: That would not surprise me, no.

20 MS. CARUSO: Right. So you have -- so in terms of --
21 you know, you mentioned that you're adding new -- you're
22 excited about the possibility of new trails for snowmobiling
23 because of the transmission line. Did you account for that --
24 the differentiation between the snow cover in your economic
25 studies and economic impact?

1 MR. DICKINSON: No.

2 MS. CARUSO: What about -- if this -- if this -- if
3 you get the permits and this corridor is being constructed --
4 the area around Johnson and Coburn Mountains, which are so
5 heavily traveled by snowmobilers coming from Rangeley, Jackman,
6 Greenville, The Forks area, it's a destination spot. Are you
7 aware that the Coburn Mountain would be shut down during that
8 proposed construction?

9 MR. DICKINSON: I mean, our perspective would be when
10 we get to the period of staging our construction, to do it in a
11 way that has the least impact on whatever operations are going
12 on in the region.

13 MS. CARUSO: Okay. Well, regarding the line under
14 the Kennebec, have you started your test soils?

15 MR. STINNEFORD: Test --

16 MS. CARUSO: -- burying the line.

17 MR. STINNEFORD: The test boring, is that what you're
18 referring to?

19 MS. CARUSO: Yes.

20 MR. ESCUDERO: Yes, we have. We conducted that end
21 of last year.

22 MS. CARUSO: Okay. And did you need a permit to do
23 that?

24 MR. ESCUDERO: I believe we needed some sort of
25 permit and we got it, but I would need to confirm that.

1 MS. CARUSO: So because of the scenic and economic
2 impacts from this corridor, especially in the new corridor area
3 but also in the existing corridor area with all the camp owners
4 and the people who are impacted, did you ever consider burying
5 the line for the entire length of the new construction?

6 MR. DICKINSON: No, we didn't.

7 MS. CARUSO: Did you ever study the potential
8 difference on the economy of the region between burying the
9 line and not burying the line?

10 MR. DICKINSON: No, we did not.

11 MS. CARUSO: Did you ever evaluate the scenic or
12 visual impact of burying the line versus not burying the line?

13 MR. DICKINSON: No, we did not. And we also didn't
14 evaluate the various impacts of a buried DC line through a new
15 corridor.

16 MS. CARUSO: So you chose to bury the line under the
17 Kennebec but not for the entire 53 miles?

18 MR. DICKINSON: Well, our original --

19 MS. CARUSO: Was cost the primary --

20 MR. DICKINSON: I'm sorry.

21 MS. CARUSO: Sorry?

22 MR. DICKINSON: Sorry, go ahead.

23 MS. CARUSO: Was cost the primary reason for not
24 burying the line?

25 MR. DICKINSON: We believed it was the simplest, and

1 obviously cost was a component of that. But we also believed
2 it was the one that made the most sense.

3 MR. TANNENBAUM: Can I just follow up quickly? Did
4 -- I wasn't sure I heard this right. Did CMP conduct an
5 analysis of what it would cost to bury the line in the new
6 corridor?

7 MR. DICKINSON: No.

8 MR. TANNENBAUM: Okay, thank you.

9 MS. CARUSO: So you mentioned earlier this morning
10 that on a project in the Hudson Valley you buried the line for
11 aesthetic reasons. And it didn't occur to you to bury the line
12 here through this high tourism area and with all these camp
13 owners having their property abutting a huge DC transmission
14 line?

15 MR. DICKINSON: So the project you're talking about,
16 Connect New York, is a project that is -- I would put in the
17 dream category of project development portfolio that we have.
18 It's -- so far has not got momentum within New York state.
19 Maybe part of that is the cost related to it, but, again, what
20 the strategy there is we knew we were submitting into a request
21 for information in New York a number of years ago. We knew
22 that there were existing AC overhead projects that already were
23 in place, and our idea was to find a corridor that already was
24 predisturbed. So a predisturbed corridor and putting a buried
25 line along the thruway means that you're not disrupting, you

1 know, a new area, an area that currently wasn't dug up. You're
2 doing one that was just previously disturbed. So again, there
3 was a specific rationale and reason. But again, that -- the
4 RFI was not selected or moved forward with.

5 MR. TANNENBAUM: Thorn, a follow up. Excuse me.
6 What do you mean by predisturbed?

7 MR. DICKINSON: Yeah, so the -- there -- you know, I
8 actually don't know what was there before the New York State
9 Thruway, but you know, let's assume that that was a green field
10 area at least for some of the --

11 MR. TANNENBAUM: I thought -- excuse me, I thought
12 when you were talking about predisturbed, you were talking
13 about the corridor at issue here.

14 MR. STINNEFORD: No.

15 MR. DICKINSON: No, no. No, I was talking about the
16 corridor along the New York Thruway.

17 MR. TANNENBAUM: Okay, sorry.

18 MR. DICKINSON: Okay.

19 MS. CARUSO: So just to summarize, you didn't
20 evaluate the cost of burying the line, and likewise, you didn't
21 evaluate the cost to the region for the impact of property
22 values and viewshed and scenic issues and the health issues of
23 herbicides and other sorts of things by having an above line --
24 above-ground line.

25 MR. DICKINSON: Yeah, that's right. I also would say

1 that there were a lot of other things that we didn't evaluate.
2 Another example would be what happens if, for a 20 or maybe
3 even a 40-year period, we're not able to pull three million
4 metric tons of carbon out of the atmosphere and what happens to
5 the region, to the tourism, to the people that go and count on
6 that land to visit if, you know, these kind of steps aren't
7 made in order to abate climate change.

8 MS. CARUSO: Do you -- in comparing -- in addition to
9 -- if you had buried the line, in addition to fewer visual
10 impacts, would burying the line lessen the amount of herbicides
11 required to be sprayed along the route?

12 MR. STINNEFORD: Well, the corridor would still need
13 to be cleared of vegetation even if the line were buried. You
14 know, it may be a less cleared area, but it would still need to
15 be cleared and maintained.

16 MS. CARUSO: So how wide an area would you need to
17 clear?

18 MR. STINNEFORD: We haven't evaluated that.

19 MS. CARUSO: So if TDI in Vermont is willing to bury
20 their line and they're still delivering a significant
21 mitigation package, how can CMP refuse the cost to bury the
22 line?

23 MR. STINNEFORD: I guess first I would point out that
24 TDI has not found a customer that's willing to pay the cost to
25 do that. They have a proposed project, but no one's agreed to

1 pay for it.

2 MS. CARUSO: Is it a fair statement that burying the
3 line would have significantly fewer visual impacts and fewer
4 impacts on human health?

5 MR. STINNEFORD: It certainly would be less visible.
6 I can't speak to the health impacts. I don't think anyone on
7 this panel is an expert in this area.

8 MS. CARUSO: Okay. Moving on to tab two, please.
9 This is an article from the November 18th edition of the
10 Portland Press Herald. If you could turn to page five as noted
11 in the bottom right-hand corner. It starts with the headline
12 Merchant Versus Reliability, quote/unquote. Let me know --

13 MR. DICKINSON: Oh, I'm sorry, yeah, yeah, I'm there.

14 MS. CARUSO: Okay. Do you know Mr. Don Jessome who
15 is described here as a chief executive of the TDI project in
16 Vermont and who is a competitor under the 83D RFP?

17 MR. DICKINSON: No, I do not.

18 MS. CARUSO: In the first paragraph under that
19 headline, he was reported as saying that, quote, "all three
20 projects," end quote, which I assume related to the three
21 Hydro-Quebec proposals, including TDI, Northern Pass, and
22 NECEC, are so-called merchant lines. Would you agree with that
23 characterization that NECEC is a merchant project?

24 MR. DICKINSON: Yeah, I see that that is -- oh, would
25 I agree that NECEC is a merchant project?

1 MS. CARUSO: Uh-huh.

2 MR. DICKINSON: No, I'd never consider it a merchant
3 project.

4 MS. CARUSO: So would -- do you agree that the three
5 projects are not, quote, "reliability projects"?

6 MR. DICKINSON: So maybe just to clarify what I mean
7 by merchant. You know, we have a tariff. If this project is
8 built and constructed, it will have a tariff that's FERC
9 regulated and will result in revenues as long as we operate the
10 line that we're supposed to be in a tariff that dictates how
11 those revenues are provided from a counterparty of a utility.
12 So from a transmission perspective, I would say it was
13 consistent with other types of transmission except for the fact
14 that it's a fixed price and we take more risk associated with
15 that.

16 When I think of a merchant project, I think of a
17 project that might be built between two ISOs and takes an
18 arbitrage risk between those. Those revenues are uncertain.
19 They're taking the merchant power risk in order to generate
20 their profits. But I would put it in a different category than
21 reliability as you're saying. I just wouldn't put it in a
22 merchant category. I would put them into competitive
23 solicitations. Now I do think that there are reliability
24 benefits associated with the project, but clearly the prime
25 focus is on delivering clean energy to New England.

1 MS. CARUSO: Well, my understanding is that what are
2 generally referred to as, quote, "Reliability projects are
3 designated by ISO New England as pool transmission facilities
4 or PTFs. They're built to address a reliability need" --

5 MR. STINNEFORD: Yeah, I think you --

6 MS. CARUSO: -- "as identified by ISO New England."

7 MR. STINNEFORD: I think you've conflated several
8 things there. I mean, reliability projects are not necessarily
9 PTF projects, but they are built to address an identified
10 reliability need through a planning process, whether that's ISO
11 New England's process or our local transmission planning
12 process.

13 MR. TANNENBAUM: Let me follow up on this. Does the
14 term merchant transmission have a meaning within the industry?
15 Is there a --

16 MR. STINNEFORD: I'm not sure there's a standard
17 definition, but I think most people would agree with how Thorn
18 has represented this. If the project is fully secured through
19 long-term contracts with a secure counterpart, that would
20 generally not be considered merchant, just as it would with a
21 power plant. If a power plant is built on spec to sell into
22 spot markets without firm contracts, it would be considered a
23 merchant plant. But if it's secured with long-term power
24 purchase agreements, it generally wouldn't.

25 MS. CARUSO: Let me rephrase the question.

1 MR. VANNOY: Just a follow up. Sorry, one follow up
2 here. So how would you put Order 1000 and merchant in that,
3 just real briefly?

4 MR. DICKINSON: Yeah, at least from my perspective,
5 if there's a competitive solicitation around an opportunity,
6 for example, to take advantage of a congestion or a constraint
7 that exists across an interface like central east or one that
8 might exist between, you know, some PJM and MISO or something
9 like that, if the -- in my mind what determines a merchant from
10 a non-merchant is what is the buyer, where is the revenue
11 source that's from that. I think both of those could be in
12 competitive solicitations through an Order 1000, but if the
13 revenues are based on some market mechanism that involves
14 energy and/or capacity prices and the project developer is
15 taking that risk, that's what I would put into the merchant
16 category.

17 MR. TANNENBAUM: Thank you. Elizabeth, please
18 proceed.

19 MS. CARUSO: Okay, thank you. So I guess do you
20 agree that it's a for-profit project rather than a project
21 that's designated to meet a reliability need?

22 MR. STINNEFORD: I think those are two very different
23 things. Even reliability projects --

24 MS. CARUSO: Is it a for-profit project?

25 MR. STINNEFORD: Yes, as are most reliability

1 projects.

2 MS. CARUSO: So the article states that these three
3 projects -- again, we're referring to TDI, Northern Pass, and
4 NECEC -- are, quote, "being developed for clean energy goals
5 and to make money for Hydro-Quebec and the builders," end
6 quote. And by builders we assume he means investors. Do you
7 agree that these three projects, including NECEC, were proposed
8 to address public policy goals and make money for Hydro-Quebec
9 and the transmission line investors?

10 MR. DICKINSON: Yeah, I would say that I wouldn't
11 limit it to the three -- these three projects, though. There
12 were 53 proposals that were bid, some by solar developers, some
13 by wind developers, some by battery technology. All of those
14 individual developers all had a similar motivation to provide a
15 competitive project and earn a return.

16 MS. CARUSO: Right, but this article is about these
17 three right now. So is it true that these three 83D projects
18 that Mr. Jessome talks about are designed to meet a public
19 policy goal rather than an identified reliability need and
20 these are electric transmission upgrades?

21 MR. STINNEFORD: Yes, I mean, -- well, I can't speak
22 for the other two projects. I can only speak for CMP's NECEC
23 project. It was definitely proposed to -- in response to a
24 public policy initiative launched by the Massachusetts
25 utilities and the DOE. So, yes, I would agree with you that

1 it's a creature of public policy.

2 MS. CARUSO: Okay.

3 MR. DICKINSON: But I would just add one additional
4 piece is that there was a major focus in the RFP on firmness.
5 And what firmness implies is that when that energy is needed,
6 it will be able to be delivered. And we had some testimony
7 yesterday around the benefits of having a firm amount of energy
8 available when you're running out of oil on that day when --
9 within the ISO. So from that perspective, the fact that the
10 RFP didn't include firmness as a key component, I think there
11 is a component of the bid related to reliability.

12 MR. STINNEFORD: In fact, if you read, you know, both
13 Section 83D as well as the RFP itself, one of the stated
14 criteria is specifically that -- to ensure greater reliability
15 through, you know, reduced reliance on natural gas,
16 particularly during winter delivery periods.

17 MS. CARUSO: Okay. But as far as ISO is concerned,
18 is it an ETU?

19 MR. STINNEFORD: It will be an elective transmission
20 upgrade.

21 MS. CARUSO: Okay. And given that it's intended to,
22 you know, meet this public policy goal as you discussed, is it
23 fair to characterize NECEC as a for-profit project for Avangrid
24 and Hydro-Quebec?

25 MR. STINNEFORD: As I said, any transmission project

1 is going to earn a profit or return for the investors in that
2 project, including this project.

3 MS. CARUSO: Okay. Now, does it -- it looks to me
4 like in the statute it talks about, quote, "public need" but
5 doesn't specify whether or not it has to be a Maine need. Is
6 that correct?

7 MR. STINNEFORD: Could you specify what statute
8 you're referring to?

9 MS. CARUSO: The statute for the PUC that says
10 petition for approval of proposed transmission lines, Title 35-
11 A.

12 MR. STINNEFORD: I believe that's 3132 that you're
13 referring to, in which case I would agree it's -- the statute,
14 when it defines public need, is not specific in stating whether
15 that is a Maine need.

16 MS. CARUSO: So, you know, just help me out here
17 because I'm not a lawyer, but just hypothetically, could
18 someone in Maine apply for an ETU project in a different state
19 because of a public need in Maine?

20 MR. STINNEFORD: I'm not sure I followed that
21 question.

22 MS. CARUSO: Well, is it correct to assume that you
23 believe the Commission can grant a certificate for an out-of-
24 state need just because the statute doesn't specifically
25 prohibit that?

1 MR. STINNEFORD: I thought your question was to build
2 something out of state, in which case permitting under 3132
3 wouldn't be required.

4 MS. CARUSO: No, but could -- but it seems the
5 understanding of the company that they believe the Commission
6 can grant a certificate for an out-of-state need like
7 Massachusetts just because the statute doesn't specifically
8 prohibit -- that it doesn't specifically say it has to be a
9 Maine public need (sic).

10 MR. STINNEFORD: That's not --

11 MR. DES ROSIERS: Objection, assumes facts not in
12 evidence.

13 MR. STINNEFORD: Yeah, I was going to say --

14 MR. DES ROSIERS: Misstates the position of the
15 company.

16 MR. STINNEFORD: That is not the company's argument.

17 MR. TANNENBAUM: That's also a legal question too
18 that might not really be appropriate for the panel.

19 MS. CARUSO: Okay. Okay, thank you so much. Moving
20 on to tab three, I have a number of questions about CMP's
21 community outreach effort, mainly related to the pre-
22 application phase. There is a public outreach section in your
23 CPCN application which states that, quote, "CMP recognizes the
24 importance of public involvement and is committed to
25 transparent and responsive stakeholder agreements," end quote.

1 Will you accept that that's a direct quote from your
2 application, the statement represents CMP's corporate policy?

3 MR. STINNEFORD: I'm sorry, we're not finding the
4 language you're quoting.

5 MS. CARUSO: I don't -- hold on, I'm pulling up on my
6 screen. Let me find that, and I'll -- let me just move on
7 right here.

8 MR. TANNENBAUM: Elizabeth, we do need to take a
9 lunch break pretty soon. So I don't know if this is a good
10 time --

11 MS. CARUSO: Sure. You want to do it right now?
12 Because I'm --

13 MR. TANNENBAUM: We could. About how much more time
14 do you anticipate?

15 MS. CARUSO: I'm not sure. It's taking longer than I
16 expected so I think lunch right now would be fine. I have --

17 MR. TANNENBAUM: Okay, let me ask --

18 MS. CARUSO: -- four more tabs to get through.

19 MR. TANNENBAUM: Okay, let me ask NRCM. Do you have
20 an estimate?

21 MS. ELY: I have a very small number of questions. I
22 would expect no more than ten minutes.

23 MR. TANNENBAUM: Okay. All right, so we'll take a
24 lunch break for an hour now. What I'm wondering, if people
25 could think about and maybe we'll talk after, is if we do

1 finish early, which it looks like we will, should we proceed
2 with the Daymark panel today? Again, people might not be
3 prepared for that and maybe that doesn't make sense, but I'm
4 just asking a question and we could talk about it after.

5 MR. DES ROSIERS: Another suggestion I might have is
6 I think we were down to not that many questions left for a few
7 witnesses for Ms. Bodell that may fit better. You know, to --
8 instead of have the portion of her examination fall on Friday
9 because Friday will be a busier day I think than Thursday.

10 MR. TANNENBAUM: Okay, well, let's think about that
11 over lunch.

12 MR. FLUMERFELT: Excuse me, Mitch. John Flumerfelt
13 here. Could we wait until Mr. Shope's back in the room to have
14 that decision?

15 MR. TANNENBAUM: I assume he'll be back after lunch.

16 MR. FLUMERFELT: No, he -- I think he just took a
17 quick (indiscernible) break. In terms of your question.

18 MR. TANNENBAUM: Okay, but we'll break for lunch, and
19 then we'll talk about it after lunch. Okay? Thank you.

20 CONFERENCE RECESSED (January 9, 2019, 12:13 p.m.)

21 CONFERENCE RESUMED (January 9, 2019, 1:16 p.m.)

22 MR. TANNENBAUM: Okay, Elizabeth, please --

23 MS. CARUSO: I can't see the video, but --

24 MR. TANNENBAUM: You should in a second.

25 MR. DES ROSIERS: Mitch, before -- there was one

1 question of Mr. Escudero that he was going to check on. He can
2 give a confirmatory answer right at the beginning.

3 MR. TANNENBAUM: Okay. Bernardo?

4 MR. ESCUDERO: Yeah, thank you. You asked me if we
5 needed a permit for doing the borings at the Kennebec River,
6 and I confirmed with the (indiscernible) that we actually -- we
7 didn't need it. We checked with the land use planning
8 commission, and they confirmed that it wasn't needed. So I
9 wanted to make that (indiscernible).

10 MR. TANNENBAUM: Great, thank you. Okay. Elizabeth,
11 please proceed with your questions.

12 MS. CARUSO: Okay, thank you. So we are in tab
13 three, and the statement that I made was on page 88 of your
14 CPCN application. It states what it states in there, that CMP
15 recognizes the importance of public involvement and is
16 committed to transparent and responsive stakeholder engagement.
17 So my question is do you feel that statement represents CMP's
18 policy well enough?

19 MR. STINNEFORD: Yeah, we stand by the words in our
20 petition. We still feel that's true.

21 MS. CARUSO: Okay. Is it fair to assume you included
22 a discussion related to public outreach because you feel it is
23 important -- an important issue for the Commission?

24 MR. STINNEFORD: Yes.

25 MS. CARUSO: Okay. So the application describes the

1 first phase of NECEC communication plan as, quote, "prefiling
2 communications to ensure key stakeholders are well-informed and
3 not surprised by CMP's proposal," end quote, and it refers to a
4 more comprehensive discussion later on in the plan presented as
5 Exhibit NECEC-9. Going to this exhibit, on page one, the
6 language in the second paragraph reads, quote, "The NECEC team
7 began its outreach campaign to introduce and advance the
8 project on July 17th, 2017 with a series of conversations with
9 targeted stakeholders," end quote. Are you with me?

10 MR. DICKINSON: Yes.

11 MS. CARUSO: Okay. So who were the stakeholders that
12 were targeted during this phase?

13 MR. DICKINSON: I'm looking at our response to data
14 request NRCM-02-01 where we list a number of the meetings that
15 we've had throughout the process. And starting at July 17th,
16 we have city of Lewiston, Franklin County, Greater Franklin
17 Development Council, town of Farmington, Somerset County
18 Commissioners, Somerset Economic Development Corp., town of
19 Bingham, town of Moscow, town of Farmington, Jay, Androscoggin
20 County Commissioners. And then -- well, that's into August at
21 that point. I don't know if -- were you interested in further
22 meetings?

23 MS. CARUSO: No, I was just curious who the
24 stakeholders -- who you consider the stakeholders. Are these
25 the same stakeholders that were part of the board on the MOU?

1 MR. DICKINSON: No. No, these would be the city of
2 Lewiston -- obviously --

3 MS. CARUSO: Right, I heard -- yeah.

4 MR. DICKINSON: Yeah.

5 MS. CARUSO: Okay. Was there any public notice to
6 residents of the affected communities about any pre-application
7 meetings with community leaders or any other broader outreach
8 to invite public comment?

9 MR. DICKINSON: Yeah, was there any at any time
10 during the project, is that your question?

11 MS. CARUSO: Well, before the -- was there any public
12 notice about any pre-application meetings, like, before you
13 applied?

14 MR. DICKINSON: I mean, the challenge here is in a
15 competitive process letting your competition know what your
16 project looks like creates a challenge. You know, we had a
17 number of different bids, both wind, solar, battery technology
18 along with the two different Hydro-Quebec bids. We weren't
19 sure how much of our competition even knew that we were going
20 to be bidding or what we were going to be bidding, and
21 providing them any details around that is dangerous. And why
22 we end up having these meetings so close to our bid for these
23 kind of key meetings would be one way to mitigate that.

24 MS. CARUSO: Right. Well, you mentioned earlier that
25 you had met for two years with some stakeholders. So I'm

1 wondering why you chose not to meet with others, aside from
2 your competitive concerns. I mean, you didn't have to put it
3 in the newspaper.

4 MR. DICKINSON: Yeah, so the -- so, well, maybe one
5 comment is that the original conversations with the group that
6 then became Western Mountains & Rivers emanated out of our
7 earlier bids in the tristate RFP. So really the bids that we
8 had submitted into that solicitation also included wind and
9 solar opportunities. Again, they weren't selected in that RFP
10 process, but the dialogue really began well before that and
11 continued through on. As far as communications to the towns
12 along the corridor, you know, we've had multiple meetings with
13 every town along the corridor. We've -- all of those meetings
14 were publicly noticed and put onto the agenda for public
15 comment.

16 MS. CARUSO: Right, but I was referring to after the
17 bid but before the application. So on page two of the NECEC-9,
18 do you see under phase one of the plan where it says, quote,
19 "Prior to the filing and a broad public announcement, the
20 project team made contact with key stakeholders to provide an
21 overview of the project, including the route map, the economic
22 benefits, and plans to avoid sensitive areas," end quote?

23 MR. DICKINSON: I see that, yes.

24 MS. CARUSO: Okay. And do you also see on page three
25 under, quote, "phase one pre-filing communication," end quote,

1 the second sentence that says, quote, "Even before the project
2 was announced publicly or drew media attention, elected
3 officials, business and community leaders, and economic
4 development officials were provided with the project details,
5 answers to their questions, and an understanding of the project
6 benefits and impact," end quote?

7 MR. DICKINSON: Yes, I see that.

8 MS. CARUSO: Do you happen to recall when the project
9 first drew media attention?

10 MR. DICKINSON: There was Hydro-Quebec -- when we're
11 talking about this project specifically, not necessarily the
12 wind ones which obviously go back multiple years, but the --
13 Hydro-Quebec first announced that they were going to have a
14 project through wind -- through -- originally Hydro-Quebec only
15 had announced one bidding partner which was Northern Pass. And
16 I think it was in the spring of 2018 that they announced that
17 they were actually going to have multiple bids, one through New
18 Hampshire and one through Maine. At that point they didn't
19 specifically designate us as the provider of the transmission
20 services. And then as I noted in my earlier communication, we
21 began to brief people on the project really kind of closer to
22 the bid at the end of July.

23 MR. DES ROSIERS: Mr. Dickinson, in your answer you
24 said 2018. Did you mean 2017?

25 MR. DICKINSON: Oh, yeah, thank you. 2017, thank

1 you.

2 MS. CARUSO: So in that quote that we just read, I'm
3 assuming that when it says elected officials, you refer to
4 including people like mayors and selectmen and town managers.
5 Is that correct?

6 MR. DICKINSON: Yeah, so again, the city of Lewiston
7 would be an example. The Somerset County Commissioners, you
8 know, the other towns that I mentioned all would be examples.

9 MS. CARUSO: Okay. And did you meet with these
10 elected officials in each town along the route before you filed
11 your application?

12 MR. DICKINSON: The towns that are listed -- so this
13 is a complete list, I believe, of the formal meetings that we
14 had, and the -- you know, you can see the meetings that --
15 between the end of 2000 -- you know, summer of 2016 through
16 2017.

17 MS. CARUSO: I can't see it but --

18 MR. DICKINSON: Oh, okay, all right.

19 MS. CARUSO: -- that's okay.

20 MR. DICKINSON: Yeah, and I think one -- go ahead,
21 sorry.

22 MS. CARUSO: So those are the towns that you met with
23 before, but why didn't you meet with all the towns?

24 MR. DICKINSON: I think our -- again, I think there's
25 a balance of a number of factors. As I already mentioned, we

1 have to be very careful to not tip our hand associated to the
2 competitive nature of the bids that we're going into with --
3 you know, we had an idea there were going to be a lot of bids.
4 Fifty-three was a pretty big number, and that it -- the more
5 information you provide even an hour before a bid is due could
6 change somebody's strategy associated with how they bid,
7 balanced against a desire to get out there, as we laid out in
8 phase one, and then we identified those key areas to have those
9 contacts before the bid was submitted.

10 MS. CARUSO: So you chose to tell some towns
11 beforehand, but you -- it was kind of a secret to other towns
12 beforehand?

13 MR. DICKINSON: Yeah, there was no purposeful --

14 MR. DES ROSIERS: Objection. Can you define
15 beforehand? What time period are you referring to?

16 MS. CARUSO: Before the application.

17 MR. DES ROSIERS: And by the application, you mean
18 the application to the PUC?

19 MS. CARUSO: Right. So would you be surprised to
20 learn that the very first time any CMP representative discussed
21 NECEC with our selectboard in Caratunk was around on March 21st
22 of 2018, around five months after you filed the CPCN
23 application?

24 MR. DICKINSON: So I'm sorry, I thought there was a
25 follow up to your earlier question. Could you repeat that

1 again, please?

2 MS. CARUSO: Sure. Would you be surprised to learn
3 that the very first time that any CMP representative discussed
4 NECEC with the Caratunk selectboard was on March 21st of 2018
5 which was about five months after you filed the application?

6 MR. DICKINSON: I see that date on the data request.
7 That's correct, March 21st.

8 MS. CARUSO: And would you accept my representation
9 as the chair of the Caratunk selectboard that CMP's March 21st
10 meeting or presentation was not much more than a relatively
11 short pitch to request that Caratunk file a letter in support
12 of the project?

13 MR. DICKINSON: I mean, I would -- I'm pretty
14 familiar with the presentations that were used to provide
15 information to the communities along the border where we were
16 going. I wouldn't represent it the way you did, but I'm pretty
17 -- I think I'm somewhat familiar with what that presentation
18 looked like.

19 MR. STINNEFORD: But it's my understanding that each
20 of the towns, including Caratunk, was offered to have
21 additional presentations with additional information and we
22 would follow up if that was desired. And in fact, I think in
23 almost every town, we did follow up and had multiple meetings
24 with town officials.

25 MS. CARUSO: With regards to Caratunk, do you recall

1 that -- I believe that our first -- by the way, our first
2 meeting was pretty short. It wasn't a special meeting. It was
3 just part of our monthly selectmen meeting. So it wasn't like
4 we had a separate meeting open to the public to discuss this
5 project. I think you didn't expect to need much of our time if
6 I recall correctly so --

7 MR. DES ROSIERS: I'm going to state an objection.

8 MS. CARUSO: -- that's why I asked that question.

9 MR. DES ROSIERS: This appears to be testimony as
10 opposed to questioning of the witnesses.

11 MS. CARUSO: Well, I was just responding to what you
12 said.

13 MR. TANNENBAUM: Okay, just proceed.

14 MS. CARUSO: Do you recall that while Caratunk filed
15 a support letter after the March 21st meeting, we subsequently
16 retracted our support once we became more educated about the
17 project and that was submitted into the docket as a public
18 comment at that time?

19 MR. DICKINSON: You know, subject to check, I will
20 accept that.

21 MS. CARUSO: Okay. Would you also accept my
22 representation that Mr. Carroll told the selectmen at the March
23 21st meeting that Caratunk would be included as a party in
24 local mitigation discussions that were apparently underway?

25 MR. DICKINSON: I mean, my tendency is not to accept

1 that as a precept. I would want to talk to Mr. Carroll myself
2 and understand the nature of the dialogue that he had. I mean,
3 again, our approach was to make ourself (sic) available, and
4 every town along the corridor, as I understand it, every
5 organized town we met with multiple times so -- and we're open
6 to any request for any meeting anywhere. Something I think our
7 whole outreach team was incredibly about is our ability to make
8 ourselves available for people in the community to talk about
9 the project.

10 MS. CARUSO: So as you have earlier testified that
11 there was a lot of promise for community benefits with this
12 mitigation package and that it was supposed to go towards the
13 greater community and specifically it was stated from Caratunk
14 to Parlin Pond. Is that correct?

15 MR. DICKINSON: Yeah, that's correct.

16 MS. CARUSO: Okay. And so would you accept that, as
17 far as I'm saying it, the first time we heard about the MOU
18 with Western Mountains & Rivers Corporation was after it had
19 been executed, CMP did not request any input whatsoever from
20 Caratunk, and Caratunk was not, in fact, included in the
21 discussions leading up to the MOU?

22 MR. DICKINSON: Again, my perspective as I had
23 answered earlier was that there was a great deal of outreach
24 from the folks that were representing the community and Western
25 Mountains & Rivers to the community about what was -- that

1 there were discussions going on with CMP.

2 MS. CARUSO: So were there any elected officials from
3 Caratunk that were a part of those discussions?

4 MR. DICKINSON: There were none that were directly in
5 the meetings that I had, but my understanding were those
6 conversations were -- not specifically necessarily that one but
7 other ones were happening throughout the community.

8 MS. CARUSO: I'm not following.

9 MR. DICKINSON: So what I'm saying is that we
10 encouraged, and my understanding are the people that we were in
11 dialogue with, on numerous occasions, spent time outreaching
12 into the community to discuss the nature of the discussions and
13 the project that we were doing.

14 MS. CARUSO: So would it -- would you accept my
15 representation again that the first time any elected official
16 from the town of Caratunk, from selectmen to planning board
17 members to any officer, we had never heard about the MOU until
18 after Mr. Carroll told us that we would be a part of the
19 process and Caratunk would be represented in the mitigation?

20 MR. DES ROSIERS: Objection to form, assumes facts
21 not in evidence.

22 MS. CARUSO: I'm just asking if you would trust me
23 that that's my understanding of it.

24 MR. STINNEFORD: We have no way of knowing your
25 understanding. I'm sorry.

1 MR. TANNENBAUM: Eric or Thorn, are you --

2 MS. CARUSO: So if you --

3 MR. TANNENBAUM: Excuse me. So I think the question
4 is are you aware or can you -- do you know whether any officer
5 or elected official from Caratunk was informed of the MOU
6 before it was finalized?

7 MR. DICKINSON: Well, I think what -- to answer your
8 question is I don't have a way of knowing. I don't actually --

9 MS. CARUSO: Okay. Well, I'm not under oath, but I'm
10 not -- I'm telling the truth about it.

11 MR. TANNENBAUM: Okay.

12 MS. CARUSO: And it's my understanding that The Forks
13 -- the West Forks, the areas of this new part of the corridor,
14 were not knowledgeable or a part of the representation on that
15 board before it was signed.

16 MR. DES ROSIERS: I'll object to that --

17 MR. TANNENBAUM: And then --

18 MS. CARUSO: Is that your understanding as well?

19 MR. TANNENBAUM: Was that your understanding as well?

20 MR. DICKINSON: No, I -- you know, my belief was
21 there was a significant understanding around the community that
22 there was a dialogue going around about an MOU encouraged by
23 our discussions and our goals of representing a mitigation
24 package and an agreement that would provide benefits throughout
25 the community.

1 MS. CARUSO: So you're saying it was up to other
2 people? The other people on the MOU had to communicate that
3 with the members of the community?

4 MR. DICKINSON: Well, I think there's -- I can think
5 about all the trips I've made up to The Forks and sat around
6 picnic tables and showed maps of people (sic) and talked about
7 the project. Throughout this process, the outreach team has
8 proactively reached out to every town. Throughout this process
9 we've -- every time there's been a request for a meeting, we've
10 made ourselves available, and it's something I'm incredibly
11 proud of, the way we have managed the project. In addition to
12 all that, we encouraged the members of the Western Mountains to
13 reach out to the community to make sure that this represented a
14 broad sense of what was happening. So not alone, but in
15 addition to.

16 MS. CARUSO: I think it was maybe early to mid-March
17 when several entities like the generators and the Renewable
18 Energy Association intervened in opposition. Was it around
19 then? Do you know?

20 MR. STINNEFORD: I don't know exactly when
21 interventions were filed.

22 MS. CARUSO: At that time, were you more concerned
23 that the docket might become more complicated or controversial
24 because the interveners were participating in it?

25 MR. DICKINSON: I mean, we believe in this project.

1 We think this project provides significant benefits for Maine.
2 And we put together a team, a project, and a filing that we're
3 proud of, and I don't think we would have done it any different
4 if there had been just two or three interveners or 30 or 40.

5 MS. CARUSO: Okay. I just didn't know if it was a
6 coincidence that we were -- that the town of Caratunk was
7 approached by Mr. Carroll after that or -- I don't know when
8 CMP started to meet with officials in other towns to get
9 letters of support in the local area of the new corridor.

10 MR. DICKINSON: Well, again, we -- an NRCM data
11 request that I said, we listed all the formal meetings. So if
12 you refer to that, you can see the, you know, two long pages of
13 very small font set of meetings that we had over that period of
14 time.

15 MS. CARUSO: Okay. The last bullet on page three of
16 NECEC-9, it discusses that one of the objectives of pre-filing a
17 communications plan was to, quote, "build and maintain valuable
18 relationships along the route." Then continuing on on the top
19 of page four it says your additional objectives were to, quote,
20 "identify and address issues of importance to key stakeholders
21 and to use early input to develop the project worthy of
22 expedited permitting." Do you see that?

23 MR. DICKINSON: Yes, I do.

24 MS. CARUSO: Okay. Since we didn't -- we weren't met
25 with prior to the filing, and I suspect Caratunk wasn't the

1 only town, do you think it was an effective execution of phase
2 one of your communications plan?

3 MR. DICKINSON: Yes, I do.

4 MS. CARUSO: Okay. On the bottom of page four, it
5 says -- there's a second bullet regarding the project brochure
6 and some one pagers, and included in the pre-application
7 communications it says, quote, "outline the NECEC in a clear
8 and concise fashion and include a map as well highlights of the
9 project benefits," end quote. And then on page five, the first
10 bullet says, quote, "project maps." Is it fair to say that the
11 property taxes were one of the primary benefits you were
12 promoting in order to encourage support of local -- of elected
13 officials?

14 MR. DICKINSON: Yeah, I think it was one of a key of
15 -- a group of them, yes.

16 MS. CARUSO: Okay. And then on the first bullet on
17 page five, you refer to an overview map which delineates the
18 route and location of existing transmission-related
19 infrastructure, and you refer to the route maps that depict the
20 corridor on a town-by-town basis and include, quote,
21 "geographical features such as water bodies," end quote. And
22 the final sentence says that between the overview map and the
23 route map you provide a full understanding of the project
24 elements. Is that correct?

25 MR. DICKINSON: Yes, I see that.

1 MS. CARUSO: Okay. So does this imply that the map
2 showing the general route, the existing transmission
3 infrastructure, and water bodies provide a, quote, "full
4 understanding of the project elements of NECEC"?

5 MR. DICKINSON: Yeah, I mean, we've developed
6 numerous maps for numerous purposes throughout the process.

7 MS. CARUSO: Okay. So would you agree that things
8 like the height of the proposed towers, the width of the
9 corridor, the need to manage vegetation with herbicides, the
10 crossing of streams and wetlands, and the need to address local
11 fire control or emergency response requirements or the
12 temporary -- potential temporary interruption of the use of
13 snowmobile trails and other impacts to recreational resources,
14 would they be project elements? None of which were discussed
15 in our first meeting -- presentation at the town office.

16 MR. DICKINSON: I mean, the purpose of that --

17 MS. CARUSO: -- they were --

18 MR. DICKINSON: I'm sorry, go ahead. The purpose for
19 the town meetings were to provide a comprehensive understanding
20 of the project and then be available to questions. And, you
21 know, to the degree that people had a specific question, we
22 would do our best to get back and provide that information,
23 but, you know, I can't imagine the size of a presentation. It
24 would be at least a two-day long presentation if we went to
25 every element that you described in the project. So the idea

1 is we make ourself available, we listen to what people's
2 concerns are, and we do our best to respond to those.

3 MS. CARUSO: Right. So do you think that the -- so
4 you say that one of the goals of the pre-application
5 communications was to, quote, "identify and address issues of
6 importance to key stakeholders."

7 MR. DICKINSON: Yes.

8 MS. CARUSO: Since they weren't part of your initial
9 target audience, is it fair to say you felt that the
10 landowners, the guides who are using the area, and other
11 residents of the affected communities were not the, quote, "key
12 stakeholders"?

13 MR. DICKINSON: No, and I think, you know, again,
14 there is a balance here before submitting a project on how much
15 you can disclose about the project. What we did, and I think
16 what we're very proud about in the way that we built this
17 project, is to utilize most of it through an existing corridor
18 and then to -- largely through two private landowners that
19 currently log the land, utilize, site, the project at that
20 location. Now in our conversations and in our own analysis we
21 identified some areas that we knew would be a specific concern,
22 Moxie Lake, Appalachian Trail crossing, the Kennebec River.
23 And we actually modified some of our plans in order to mitigate
24 those impacts after speaking with people in the community about
25 those areas.

1 MS. CARUSO: So it was my understanding that one of
2 the groups opposing this is the landowners on Moxie Lake. Did
3 you meet with the -- those camp owners, the associations that
4 are along Moxie Lake?

5 MR. DICKINSON: Yes, I met with them.

6 MS. CARUSO: Before this and before the mitigation?

7 MR. DICKINSON: Well, we modified -- based on our own
8 analysis, we reduced the pole size along the -- there's a
9 transmission corridor that parallels Moxie Lake with an
10 existing 115 structure in it, and when we first designed the
11 line, we imagined having 95-foot poles, monopoles, in that
12 structure. And both of our own understanding, our own outreach
13 team, and conversations with the public, we believe that by
14 reducing the pole size to 75 feet, even though it costs more
15 money for us, it meant more structures, more pieces in there,
16 we actually brought the pole size down to the -- similar as the
17 topography in the area so those camp owners on the opposite
18 side of the lake would not see the structures. So that would
19 be, you know, an example where we -- you know, both our own
20 knowledge of our outreach team which involved people that know
21 Maine very well, our conversations with people in the public,
22 and then we made a modification to our project to incur
23 additional cost in order to mitigate the visual impacts of the
24 -- of that project.

25 MS. CARUSO: So -- but you didn't meet with the Moxie

1 landowners before you filed and, given the fact that they sent
2 a letter of opposition, apparently the lower tower height
3 didn't get them to support the project. Did you offer to bury
4 the line there?

5 MR. DICKINSON: No.

6 MS. CARUSO: Would you agree that a broader public
7 outreach -- you know, just given the fact of all the public
8 comments that have been posted on the PUC site, that perhaps a
9 broader public outreach at the beginning of the process might
10 have allowed CMP to develop a better understanding about the
11 issues of concern in the various communities before you
12 finalized the application or --

13 MR. DICKINSON: I -- you know, my own feeling is I'm
14 incredibly proud of the outreach team that we brought to bear
15 here. It's not one or two people. We have a, you know, large
16 group of people, both internal and external, some with years of
17 experience in siting projects and understanding the issues that
18 get raised. I can't point to a specific thing that we would do
19 differently. I mean, obviously we believe the project is a
20 good one. We believe that the benefits are real, and obviously
21 we've gone through that in extensive detail in this proceeding.
22 And unfortunately there are people that are -- for whatever
23 purpose and reason, don't see it the same way. Obviously
24 that's up to everyone to weigh the benefits here. But, no, I'm
25 incredibly proud of the outreach team and the efforts that

1 they've done on this project.

2 MS. CARUSO: Well, that's good. So do you think that
3 anything could have been done different to eliminate the huge
4 public backlash of the six or 700 comments of opposition, the
5 different organizations, and the towns that are rescinding
6 their support?

7 MR. STINNEFORD: I would say, you know, that just has
8 to be kept in perspective. I think it's still in excess of 90,
9 95 percent of the communities along the corridor are still
10 supporting the project. It's a small minority of communities
11 that are not. And, yes, there are several hundred individuals
12 who have filed comments and organizations that have filed
13 comments against the project, but I think a project of this
14 scale and this magnitude, you have to anticipate that there's
15 going to be some level of opposition.

16 MS. CARUSO: Okay. Did CMP at that time think it
17 might have been harder to show NECEC was worthy of expedited
18 permitting if they started having more broader public outreach?
19 You know, information sessions instead of talking to just a
20 targeted audience?

21 MR. DICKINSON: I'm sorry, I'm not sure I --

22 MS. CARUSO: What is expedited permitting in your
23 opinion?

24 MR. STINNEFORD: Well, I think it's been our
25 experience that the permitting process, for example, this

1 process that we're in today, although it has the possibility as
2 we've seen in the past, to run on for years on some projects, I
3 think to the extent that we hold this project to its current
4 schedule, we would consider that to be expedited relative to
5 history.

6 MS. CARUSO: But the PUC regulations say that there's
7 -- that is has to be decided within a certain amount of time.
8 So you're kind of limited on that, correct?

9 MR. STINNEFORD: That time is routinely extended.

10 MR. DES ROSIERS: Someday I'm going to get one done
11 in that time.

12 MR. TANNENBAUM: Don't count on it.

13 MS. CARUSO: Have you ever asked the affected
14 communities whether the very rural areas like in Somerset
15 County, like the area of the new corridor, if they logistically
16 can provide accommodations for such a large construction work
17 force or whether they have adequate fire and other emergency
18 response resources to deal with, you know, potential project-
19 related hazards during the construction and the operation?

20 MR. DICKINSON: I mean, the -- our -- I mean, we have
21 a great deal of experience in managing these types of projects
22 and understanding the communities that we host them within.
23 And those are conversations that, yeah, there were times where
24 that came up in our dialogue, and I would expect that if this
25 project continues to go forward, there will be continued

1 coordination and efforts along that front.

2 MS. CARUSO: But just I guess (indiscernible) answer,
3 did you ask the affected communities whether or not they could
4 accommodate such a large construction workforce or if they had
5 the fire and emergency response resources to handle it?

6 MR. DICKINSON: So the -- I don't think -- I think
7 the simple answer is no. Obviously we've done an analysis over
8 the employment that will be required in order to get the
9 project done through the work at the University of Southern
10 Maine.

11 MR. STINNEFORD: And I would just say that, you know,
12 setting aside the issues you raised around public safety which
13 I acknowledge, one community's challenge is another's
14 opportunity. I mean, to the extent that this construction
15 process is going to inject a great deal of economic value into
16 the community, I think many view that as a positive.

17 MS. CARUSO: So have you spoken with, for example,
18 you know, the towns of Jackman or West Forks, The Forks, or
19 Caratunk to see if they had accommodations to -- that were
20 available, aside from their tourist accommodations, like the
21 hotels that are hosting the tourists that come to the area, do
22 they have an excessive amount of rooms available? Do they have
23 fire departments? Do they have emergency resources to support
24 this kind of construction project?

25 MR. DICKINSON: Yeah, I mean, we continue to be in

1 dialogue in the specific example of Jackman. I was just up
2 there a few weeks ago, and we were talking about some of the
3 topics that you mentioned. So, yeah, I think it's -- in our
4 view it's an ongoing dialogue that will continue to happen in
5 the towns to make sure that we provide the most value we can
6 related to the project with having the least impact.

7 MS. CARUSO: Right. But have you ever built such a
8 large project in Somerset County? An area like this that is
9 not really inhabited? Do you really know if there's enough
10 resources or not to support this construction? Or the
11 operation of the line once it's up in terms of fire and
12 emergency? You don't really know right now, right?

13 MR. STINNEFORD: You asked about four questions
14 there, and I haven't had a chance to answer any of them yet.
15 Yes, we have built projects in Somerset County, not in this
16 specific area. We have built projects in areas that are
17 equally remote and have not encountered problems with the
18 housing and lodging, feeding of construction crews. We've
19 managed to work those issues out in areas that are equally
20 remote. But in terms of, you know, have we had conversations
21 with those municipalities around the public safety issues that
22 you've raised, I think Thorn has addressed that question.

23 MR. DICKINSON: And then from an operations
24 perspective, you know, we have thousands of miles of
25 distribution and transmission system throughout Maine. So, you

1 know, the --

2 MS. CARUSO: Well, I'm only asking this because I
3 hear the communities themselves are expressing real concerns
4 that they don't have the housing or the fire should there be
5 fires like what happened in California. So what the question
6 is is have you addressed these concerns beforehand? And do you
7 know that, should there be fires like that, that there is a
8 response crew in the location that's there? Do you know if
9 there's -- for example, do you know if they have five
10 departments? Are they volunteer fire departments? Is there an
11 ambulance service? Is there a hospital there?

12 MR. STINNEFORD: We have transmission lines that
13 traverse areas of Maine that have -- are equally remote, if not
14 more remote, than what we're talking about in this corridor
15 through many unorganized townships that have no fire
16 departments, no public safety resources. So it's not a new
17 issue. It's an issue that we're accustomed to.

18 MS. CARUSO: Okay, moving on to tab four, you'll see
19 that the first page from the printout -- is a printout from a
20 January 2nd post on Facebook that invites people to visit a
21 specific portion of the website, the NECEC website, if they
22 want to find out more information about how the project affects
23 their community. Do you see that?

24 MR. DICKINSON: Yeah.

25 MS. CARUSO: And then there's a link that takes

1 visitors to the map on the website where people can click on
2 individual towns, and here you'll see a relevant page for
3 Caratunk. At the bottom of the second page on tab four,
4 there's an estimate of the new tax revenue Caratunk will
5 receive in one year -- in year one. And there's an asterisk
6 that refers to a sort of disclaimer on the following page that
7 says it's an estimate based on the 2017 preliminary design and
8 it is subject to change. Do you see that?

9 MR. STINNEFORD: Yes.

10 MS. CARUSO: So your tax estimates were performed by
11 the Maine Center for Business & Economic Research. Is that
12 correct?

13 MR. STINNEFORD: That's correct.

14 MS. CARUSO: And as I understand it, the total
15 estimated property taxes are approximately 18 million per year.
16 Is that correct?

17 MR. STINNEFORD: Yes.

18 MS. CARUSO: And the process that they developed --
19 they used to develop the \$18 million estimate was the same that
20 Daymark used as an assumption in how they modeled the overall
21 economic impacts. Is that true?

22 MR. STINNEFORD: Well, I think both Daymark and Mr.
23 Wallace will be testifying later in this proceeding. I'd
24 probably ask them directly.

25 MS. CARUSO: So if the numbers -- but this was to say

1 if the numbers are lower -- if the actual number is lower than
2 their estimate, would that mean that Daymark had over estimated
3 the economic benefits?

4 MR. STINNEFORD: Or if the taxes end up being higher,
5 then they have under estimated the benefits. That's correct.

6 MS. CARUSO: Okay. Are you familiar with the sworn
7 testimony during the public witness hearings from the tax
8 assessor for the town of Caratunk and other towns, Mr. Garnett
9 Robinson?

10 MR. STINNEFORD: I'm generally aware of the
11 testimony, not the details.

12 MS. CARUSO: Okay. Are you aware that, you know, in
13 his professional experience, he works as an assessor for
14 various other towns throughout the state and towns also in
15 which CMP has recently built large transmission projects?

16 MR. STINNEFORD: Was there a question there?

17 MS. CARUSO: Are you aware of that?

18 MR. STINNEFORD: Yes.

19 MS. CARUSO: Okay. Do you recall that he provided
20 specific examples of how CMP had tax declarations and lower tax
21 payments -- under-reported tax declarations and lower tax
22 payments than the initial revenue projections which had been
23 provided to those towns during the development or permitting
24 stage of the projects?

25 MR. STINNEFORD: Yeah, I think one of the things that

1 happened, particularly -- and I think most of these issues have
2 arisen as -- around the Maine Power Reliability Program, the
3 MPRP project. And I think what happened in those instances was
4 the property tax projections were calculated based on the
5 specific investment to be made in each community and assumed
6 that that value would be assessed at its installed cost
7 effectively, at least in the initial year. What it didn't take
8 into account is the way that Maine Revenue Service handles the
9 assessment of transmission line. It's unique. It's somewhat
10 complex. But in general terms, transmission lines are assessed
11 on an average unitized basis by voltage class. So, for
12 example, all of CMP's 345,000 volt transmission facilities are
13 all assessed at the same average value per mile based on an
14 initial investment, less 30 percent depreciation, and then that
15 value is fixed. And then all transmission across our -- across
16 the state is assessed on that same average value basis. So the
17 result of that was that some communities that had significant
18 transmission line investment from MPRP did not see the full
19 benefit of that property tax assessment in their community, but
20 conversely, there were many other town who did not host any of
21 the project that saw an increase in the assessed value. Now,
22 in the case of the NECEC project, we'll see a significantly
23 diminished impact of that methodology because NECEC's costs
24 will have to be fully segregated from CMP's other transmission
25 costs. The DC corridor will be separately assessed, separately

1 costed and assessed. So the full assessed -- assessment impact
2 of those facilities will be realized in the host communities
3 where it's located. It still will be subject to this fixed 70
4 percent depreciated value calculation, but it will not be, in
5 effect, socialized across other communities.

6 MR. TANNENBAUM: Okay. We have a follow up.

7 MR. WILLIAMSON: Eric, I have a question. To what
8 extent does CMP face payments in lieu of taxes in towns as
9 opposed to assessed valuations and so forth? I mean, it is
10 used in some states and some other jurisdictions.

11 MR. STINNEFORD: Yeah, I'm not aware of any of the
12 host communities for this project where that will be the case.

13 MR. WILLIAMSON: Okay.

14 MR. TANNENBAUM: Hold on, Elizabeth.

15 MS. CARUSO: So --

16 MR. TANNENBAUM: Yeah, Elizabeth, hold on. We -- the
17 bench has another follow up. Go ahead, Chris.

18 MS. COOK: So just so I understand what you just
19 said, Eric, does that mean that the \$18 million of property tax
20 value is actually only going to be 70 percent of that?

21 MR. STINNEFORD: It's not as simple as that,
22 unfortunately. The initial property tax assessments that had
23 been done that I believe fed into both Ryan Wallace's work and
24 Daymark's I believe assumed that they -- that property would be
25 depreciated over time and its assessed value would depreciate

1 over time. So that analysis probably overstated the assessed
2 value on the front end but understated it on the back end
3 because the 70 percent is fixed through time. You know, the
4 decision under this Maine Revenue Service bulletin that we
5 subscribe to was done as a simplification. You know, rather
6 than tracking actual depreciation on every asset through time,
7 this was a simplified way to establish a fair assessed value,
8 but it is fixed.

9 MS. COOK: So do you have a view right now as to
10 whether what Daymark and Mr. Wallace have done is an over
11 estimate or an under estimate?

12 MR. STINNEFORD: I think there are many assumptions
13 in that analysis. You know, we assumed it was based on current
14 mil rates, for example. There was no escalation of mil rates
15 so -- there are other assumptions that would probably push that
16 in the other direction if we were to adjust for this
17 methodology.

18 MS. COOK: Okay, thank you.

19 MR. TANNENBAUM: Okay. Elizabeth, please continue.

20 MS. CARUSO: Okay. So, for example, what you're
21 saying is that 100,487 for Caratunk is really split to some
22 extent between the town and the state?

23 MR. STINNEFORD: No. The --

24 MS. CARUSO: So -- go ahead.

25 MR. STINNEFORD: No, I mean, the process I described

1 is the process by which CMP comes up with an assessed value for
2 transmission lines. So we will calculate the assessed value
3 using that methodology, report that to the town of Caratunk,
4 and that will be the basis for Caratunk's issuance of a
5 property tax bill to CMP.

6 MS. CARUSO: So do you see the concern, though, that
7 towns have when CMP comes in order to get a permit and they
8 have a wonderful revenue projection for the town who issues the
9 permit, and then when it comes down to it, the permit actually
10 is about, you know, 17 or 30 percent or something far less than
11 what they expected? Do you see that concern for town assessors
12 and selectmen?

13 MR. STINNEFORD: Well, I can understand the concern,
14 yes.

15 MS. CARUSO: And do you think that there's a
16 difference between the tax treatment for an ETU versus a rate-
17 based utility asset?

18 MR. STINNEFORD: They're all rate-based assets. I
19 mean, the purpose of this assessment methodology is to
20 recognize that fact that, unlike many other classes of
21 property, transmission line assets, their ability to earn is
22 based on their depreciated book value. And that's no different
23 whether it is a rate-based reliability transmission line or an
24 ETU that is recovering its revenue through some other tariff.

25 MS. CARUSO: So if this -- you know, as a for-profit

1 project, if the actual revenue performance is less than
2 projected once it's in operation, wouldn't we expect the
3 property value of the line to drop?

4 MR. STINNEFORD: We might argue for that, but that's
5 not the methodology that Maine Revenue Service prescribes.

6 MS. CARUSO: Well, are you familiar with the wind
7 farm in Bingham and the unorganized territory where, just
8 within two years ago, they put it up, they -- and then within
9 two years, their performance dropped significantly, they were
10 filing for abatements, and want to sue the town for their tax
11 bill?

12 MR. STINNEFORD: You're talking about the assessment
13 of a generation project, not a transmission line who recovers
14 its revenues through a completely different mechanism.

15 MS. CARUSO: But it's still a for-profit project, and
16 if it doesn't -- part of the assessing -- part of the
17 components for assessing is based on the performance of that
18 business component of that line. And at some point, CMP could
19 say, well, we're not really producing what we expected to be
20 producing, we're not entering the market, it's really not --
21 it's not as valuable as we thought it would be and we don't
22 want to pay these taxes.

23 MR. STINNEFORD: Yeah, again, transmission lines are
24 not assessed based on their market value. Unlike generation
25 projects, paper mills, other types of property, transmission

1 lines are uniquely assessed based on the methodology that I've
2 described. It's not based on value. Market value I should
3 say.

4 MS. CARUSO: But your earnings are locked in by the
5 PPA, is that right, and -- per the 20-year contract?

6 MR. STINNEFORD: Forty-year contracts, yes.

7 MS. CARUSO: Okay. And you recover your revenue as
8 well?

9 MR. STINNEFORD: Yes, independent --

10 MS. CARUSO: -- that?

11 MR. STINNEFORD: Yes, we do.

12 MS. CARUSO: Okay. So are you aware that when
13 selectboards and town assessors review the tax impact of any
14 new development, we also consider the potential offsetting
15 impacts to existing property values?

16 MR. STINNEFORD: I'm not aware of that, no.

17 MS. CARUSO: Okay, so we need to look at -- so you
18 don't know if the value from MCBER included any offsetting
19 impacts that the towns have to assess?

20 MR. DES ROSIERS: I'm going to object and indicate
21 that Mr. Wallace of the Maine Center will be testifying on
22 Friday and can be a much better witness to answer that
23 question.

24 MR. TANNENBAUM: Eric, do you an opinion one way --

25 MR. STINNEFORD: I do not. I mean, I don't believe

1 he factored that into his analysis, but that's something he
2 should confirm.

3 MR. TANNENBAUM: Okay. Sustained.

4 MS. CARUSO: At the bottom of the first page of the
5 website printout provides information that Caratunk is in
6 Somerset County, provides the distance that the corridor will
7 travel through Caratunk, and provides the estimated new tax
8 revenue. Do you see that?

9 MR. STINNEFORD: Yes.

10 MS. CARUSO: And then the next page has four bullets
11 of additional benefits. Is that right?

12 MR. STINNEFORD: Yes.

13 MS. CARUSO: So -- and then are there any other
14 information on the Caratunk page?

15 MR. STINNEFORD: Again, I don't know. This -- we did
16 not produce this so I'm not sure whether there was other
17 information that was not included or not.

18 MS. CARUSO: No, that's it. So when someone follows
19 the link for more information about NECEC in their community,
20 this is what they get, assuming we didn't leave any pages out,
21 correct?

22 MR. STINNEFORD: Yeah, I'm not sure whether there is
23 additional information for other communities or if they're all
24 the same. I don't know.

25 MS. CARUSO: Well, at least for Caratunk. So will --

1 on this issue, will CMP -- so CMP can't make a firm commitment
2 that they'll actually pay the estimated amount that is being
3 published as part of the company's efforts to solicit local
4 support. You're saying you can't make a firm commitment that
5 you will definitely be paying this?

6 MR. STINNEFORD: No.

7 MR. DES ROSIERS: In paying the "this," is "this"
8 referring to the tax amount?

9 MS. CARUSO: Yes.

10 MR. STINNEFORD: As the footnote says, we will not
11 know the actual assessed value until we know the actual cost of
12 the project. This is all based on estimated project cost.

13 MS. CARUSO: Uh-huh. Okay, the next document, tab
14 four, is a filing that was made at FERC on August 20th, 2018.
15 I assume you're familiar with this.

16 MR. STINNEFORD: Yes.

17 MS. CARUSO: The pages are from Exhibit 3-1, Schedule
18 1. I understand it -- the way I understand it, this is
19 analysis CMP provided to FERC as part of a proceeding where
20 FERC would approve the rate of return under your transmission
21 contracts for NECEC.

22 MR. STINNEFORD: No.

23 MS. CARUSO: Is that right?

24 MR. STINNEFORD: No, that's not correct.

25 MS. CARUSO: It's not?

1 MR. STINNEFORD: We were filing approval of the
2 transmission service agreements, not specifically a rate of
3 return but the terms and conditions of the entire agreements.

4 MS. CARUSO: Okay. On line 18 of each page you
5 provide a number for property tax expense under the category
6 Revenue Requirements. And in year one of the project it says
7 you expect to incur 20.533 million in property tax expense.
8 And it looks like that stays relatively consistent over the
9 first 20 years of the project. Is that true?

10 MR. STINNEFORD: That is what this indicates, yes.

11 MS. CARUSO: Okay.

12 MR. STINNEFORD: I believe it is --

13 MS. CARUSO: Was this estimate also provided by
14 MCBER?

15 MR. STINNEFORD: No, it was not. This is based on
16 assumptions that were in a different financial model, and,
17 again, it's -- it was based on an estimate of the initial cost
18 and assessed value. I don't even know if the assumed mil rates
19 in that analysis were -- equivalent to the analysis that was
20 used by Mr. Wallace.

21 MS. CARUSO: Okay, so I guess you can understand my
22 confusion because on one hand we -- there's 18 million that has
23 been touted as one of the major economic benefits of the
24 project, and then we have our professional tax assessor who
25 testified under oath that CMP often pays much less than the

1 initial estimate and then we have this estimate to FERC which
2 is more than 20 million. So it's hard to know which it is, you
3 understand?

4 MR. STINNEFORD: I think that just points to the
5 challenges of estimating future property taxes.

6 MS. CARUSO: Okay.

7 MR. STINNEFORD: I'm assuming that the communities
8 would not be upset if we -- turned out our estimate of 20
9 million was correct.

10 MS. CARUSO: Just a minute, please. Okay. Well,
11 thank you for your interpretation. This is something that, you
12 know, the public needs to know because it's the outreach that
13 we are receiving that we want to be able to understand it and
14 be confident in it. Okay, moving on to tab five, this is an
15 article published on December 12th in the Times Record which
16 reports on a public information meeting that was held in the
17 town of Durham. Do you see that?

18 MR. DICKINSON: Yes.

19 MR. STINNEFORD: Yes.

20 MS. CARUSO: Okay. So I just want to point out that
21 this was a meeting organized and hosted by NRCM, and I was in
22 attendance and also spokesperson for Avangrid, John Carroll,
23 attended. On the seventh paragraph on the second page of the
24 article toward the bottom, I'll read a quote. It says, that
25 CMP representative John Carroll called the opposition, quote,

1 "bizarre and shameful, lamenting that instead of seeing Hydro-
2 Quebec as a leader in the clean energy movement," he said we --
3 quote, "we are immediately suspicious," end quote. And I
4 assume by "we" he means project opponents. Do you see that
5 statement?

6 MR. STINNEFORD: I see the statement, yes.

7 MS. CARUSO: Okay. So do you think it's helpful for
8 the project spokesman to accuse or insult stakeholders like
9 that?

10 MR. DES ROSIERS: I'm going to object to the use of a
11 newspaper article for this purpose. I believe we've excluded a
12 whole bunch of other press articles, and to ascribe -- to use
13 it in this purpose is inappropriate and calls for hearsay and
14 assumes facts not in evidence.

15 MR. TANNENBAUM: Well, I think the -- go ahead and
16 allow the question on the assumption or hypothetical that Mr.
17 Carroll did say those things, but I will restrict lengthy
18 questions regarding a newspaper article. So you can respond.

19 MS. CARUSO: Okay.

20 MR. STINNEFORD: Yeah, I don't think any of us here
21 were present at that meeting so I have no understanding of the
22 context in which these partial quotes were made. So I can't
23 offer an opinion on whether Mr. Carroll's intent here was to be
24 insulting or whether he was expressing his view on an issue
25 that's critical to the project. I think it's very difficult to

1 make any kind of assessment with this very limited context.

2 MS. CARUSO: Okay. Do you know if CMP has any kind
3 of code of conduct with -- or other employee communications
4 policies governing whether or not -- you know, how CMP
5 representatives comment?

6 MR. STINNEFORD: We have general codes of conduct. I
7 don't know whether the -- our corporate communications group
8 has a specific code of conduct as you've described it. I don't
9 know.

10 MS. CARUSO: Okay. There was also a radio interview
11 on December 12th on WVOM with Mr. Carroll, and there -- did you
12 know that -- did you listen to it?

13 MR. STINNEFORD: I have not, no.

14 MS. CARUSO: He referred to people who disagree with
15 CMP's projected benefits as being --

16 MR. DES ROSIERS: I really object to this one because
17 we don't even have a document with a transcript for this radio.
18 So there's no basis for the question in the record.

19 MR. TANNENBAUM: Okay, that objection's sustained.

20 MS. CARUSO: Okay. So my concern is and the concern
21 of other residents --

22 MR. DES ROSIERS: I'm going to that too, assumes
23 facts not in evidence.

24 MR. TANNENBAUM: Go ahead and proceed.

25 MS. CARUSO: We're wondering if, because towns have

1 come out in opposition to the project, if CMP will be kind of
2 -- with regards to delivering our electricity, with regards to
3 outages, if they would be retaliating against the towns who are
4 in opposition.

5 MR. STINNEFORD: I'm sorry, was that a question?

6 MS. CARUSO: Yes.

7 MR. STINNEFORD: No, CMP does -- will not retaliate
8 against any community for any reason.

9 MS. CARUSO: So we shouldn't have a problem with the
10 electricity being delivered, the outages, the workings of the
11 distribution of electricity in our towns because towns have
12 come out against the project?

13 MR. STINNEFORD: No, we have statutory and regulatory
14 obligations to provide service to all communities, and, you
15 know, a community's position with respect to this project is
16 not going to affect that.

17 MS. CARUSO: So assuming Mr. Carroll's comments are
18 correct, this does not represent CMP's corporate view towards
19 its stakeholders?

20 MR. STINNEFORD: Again, I'm not sure what comments
21 you're referring to.

22 MS. CARUSO: Well, the ones that were already
23 objected to.

24 MR. DES ROSIERS: I'll repeat my objection.

25 MR. TANNENBAUM: Yes, as far as the radio goes, we

1 don't know what Mr. Carroll said. And as far as the newspaper
2 goes, there is a lot of question regarding exactly what
3 somebody might have meant in a quote in a newspaper which is
4 why we don't allow newspapers into the record.

5 MS. CARUSO: Okay, very good. Thank you. Moving on
6 to tab six, this includes pages 26 and 27 from the CPCN
7 application where we discuss municipal permitting requirements.
8 Do you see that?

9 MR. STINNEFORD: Yes.

10 MS. CARUSO: On line five of page 26, you cite the
11 requirements of the statute which require the project developer
12 to provide municipal offices with maps of the project. Is that
13 correct?

14 MR. STINNEFORD: Yes.

15 MS. CARUSO: And I believe the application says that
16 you distributed maps via certified mail prior to submitting the
17 application. Is that correct?

18 MR. STINNEFORD: Yes.

19 MS. CARUSO: Are there any other statutory or
20 regulatory compliance requirements or Commission policies
21 related to public outreach that is applicable to NECEC or is it
22 pretty much entirely your discretion?

23 MR. STINNEFORD: No, there are other requirements, to
24 notify abutting landowners, for example,

25 MS. CARUSO: Okay. On page 26, line nine, there's a

1 discussion that continues to page 27, and it talks about the
2 need for NECEC to address municipal jurisdictional issues and
3 local land use ordinances. And on line three of page 27,
4 there's a statement that says, quote, "CMP anticipates all
5 required local approvals will be obtained by mid-2019," end
6 quote. Is that still what you anticipate given project delays
7 and such?

8 MR. ESCUDERO: The current expectation is that we
9 will initiate the local approvals early this year and that the
10 (indiscernible) will go through early '22, 2022 is the current
11 plan.

12 MS. CARUSO: Okay. Do you plan to initiate local
13 permitting before or after the Commission issues its decision?

14 MR. ESCUDERO: Well, I haven't seen the detailed
15 plans yet. We just got it developed at the end of 2018 so I
16 cannot provide an answer to that.

17 MR. STINNEFORD: I think, you know, each municipal
18 permitting requirements are different in terms -- you know,
19 some may have more substantial permitting requirements that
20 have longer lead times. Others are fairly perfunctory. And
21 there are other considerations, such as the time that is
22 allowed between the issuance of a permit and the time that
23 construction must begin. So all of that feeds into the
24 scheduling of local permitting, and it will be different for
25 different communities and will be driven, in large part, by the

1 construction schedule for the project.

2 MS. CARUSO: Okay. On page 27, line nine, it says
3 that, quote, "In the unlikely event a municipal ordinance
4 severely restricts or prohibits construction of the project,
5 CMP will pursue an amendment of the applicable ordinance," end
6 quote. Then it goes on to say that if that doesn't work -- and
7 this is a quote from the CPCN application -- quote, "CMP will
8 petition the Commission under applicable Maine law for
9 appropriate redress to permit approval and construction of the
10 project." And then there's a footnote that states the relevant
11 statutory language. Do you agree?

12 MR. STINNEFORD: I agree that's what it says, yes.

13 MS. CARUSO: Okay. At this point, do you expect
14 you'll have to submit any petitions for a municipal permit
15 exemption?

16 MR. STINNEFORD: It's -- at this stage, we don't know
17 yet.

18 MS. CARUSO: Okay. Is it a fair summary to say that
19 the way the process works is that CMP has to make best efforts
20 to obtain any and all local permits, but if it fails to obtain
21 one or more, they can and will ask the Commission to give them
22 an exemption?

23 MR. STINNEFORD: I -- that's a very broad
24 summarization, but I think it's a fair one.

25 MS. CARUSO: Okay. Is it fair to use the word pre-

1 exemption to describe a situation where a state agency exempts a
2 project developer from an otherwise applicable local land use
3 requirement?

4 MR. DES ROSIERS: Objection, calls for a legal
5 conclusion.

6 MR. TANNENBAUM: Sustained.

7 MS. CARUSO: So for an elective transmission upgrade
8 or a for-profit project as this is that's not being developed
9 but was -- is for a for-profit investment for a company, would
10 an exemption be a -- something that would be pursued if there
11 were -- if it was missing a permit to continue?

12 MR. STINNEFORD: I guess I still struggle with your
13 characterization of -- distinguishing this as a for-profit
14 investment. Any investment that the utility makes will earn a
15 profit hopefully. There really is nothing that distinguishes
16 this project with respect to profitability from any other
17 investment the company would make. I think what you're asking
18 is an ETU. That is distinguishable. And as far as we're
19 concerned, its status as an ETU as opposed to some other form
20 of transmission upgrade under the ISO New England tariff would
21 not make a difference in terms of whether or not it would
22 require or result in us seeking an exemption from the
23 Commission over a local permitting issue.

24 MS. CARUSO: Okay. Has the Commission ever been
25 asked to approve an elective transmission upgrade over is NECEC

1 the first one?

2 MR. STINNEFORD: To my knowledge, there has not been
3 one in Maine.

4 MS. CARUSO: So are non-utility energy developers who
5 may want to invest in things like solar or wind farms, are they
6 eligible for any exemptions from municipal land use
7 requirements?

8 MR. STINNEFORD: You're asking for my legal opinion?

9 MR. DES ROSIERS: I'm going to object on legal --

10 MS. CARUSO: What is your understanding, yes.

11 MR. DES ROSIERS: I'm going to object on legal
12 grounds. But I will state that to the extent such a developer
13 were building a transmission line, they would be entitled to
14 seek an exemption.

15 MS. CARUSO: Okay. If you are unable to obtain any
16 of the local permits, when would the Commission -- or when
17 should the Commission expect you to file a pre-emption petition
18 that seeks appropriate redress?

19 MR. DES ROSIERS: Objection --

20 MR. TANNENBAUM: Objection sustained on the question
21 using the term pre-emption. Otherwise, Eric, you can answer if
22 you heard the question.

23 MR. STINNEFORD: Well, I think I did. I think, you
24 know, as you summarized before, we have to make good-faith
25 efforts to achieve local permitting through the normal means.

1 If we are unsuccessful either in achieving a required amendment
2 to a local ordinance or achieving a local permit, it would be
3 at that time that we would petition the Commission for an
4 exemption.

5 MS. CARUSO: So, you know, you're aware that Caratunk
6 has rescinded initial support, and are you also aware that
7 other communities have held town-wide votes and some formally
8 oppose the approval of NECEC?

9 MR. STINNEFORD: I'm generally aware of that, yes.

10 MS. CARUSO: Okay. Is it your view that the
11 Commission has the authority to grant an exemption from local
12 permitting requirements in communities that have voted against,
13 formally, the project?

14 MR. DES ROSIERS: Calls for a legal conclusion.
15 Objection.

16 MR. TANNENBAUM: Sustained.

17 MS. CARUSO: Are you aware that the town of Caratunk
18 currently has an electric transmission line moratorium in
19 place?

20 MR. STINNEFORD: I am.

21 MS. CARUSO: Do you believe that the Commission could
22 give an exemption for a town that has a moratorium in place?

23 MR. DES ROSIERS: Objection, calls for a legal
24 conclusion.

25 MR. TANNENBAUM: Sustained.

1 MS. CARUSO: Would CMP ask for an exemption from the
2 Commission for towns that are not -- for towns that, for
3 example, have a moratorium or an ordinance that would not issue
4 CMP the permit for this?

5 MR. STINNEFORD: I think those circumstances will
6 have to be addressed on a case-by-case basis. I can't answer
7 that in the abstract. We have to assess, you know, what our
8 alternatives are in each one of those municipalities where we
9 encounter those circumstances.

10 MS. CARUSO: But you wouldn't agree not to.

11 MR. STINNEFORD: I'm sorting out the double negatives
12 there. I think that's correct, we would not agree not to.

13 MR. TANNENBAUM: Elizabeth, can I ask how much more
14 time you have? You're going to significantly --

15 MS. CARUSO: Yes. Just a couple more and then I'm
16 done.

17 MR. TANNENBAUM: Okay, proceed.

18 MS. CARUSO: I understand that CMP has all the land
19 rights it needs to build the project as currently proposed. Am
20 I correct that the issuance of the CPCN would let CMP use the
21 power of eminent domain for NECEC?

22 MR. DES ROSIERS: Calls for a legal conclusion.

23 MR. TANNENBAUM: Sustained.

24 MS. CARUSO: Well, would CMP need to come to the
25 Commission if it wanted to use eminent domain?

1 MR. DES ROSIERS: Objection, calls for a legal
2 conclusion as a matter of --

3 MS. CARUSO: Would you agree not to use eminent
4 domain?

5 MR. STINNEFORD: We can't do that sitting here today
6 not knowing what circumstances we might encounter in the
7 future, but as we said, for this project as it stands now, we
8 have all of the land rights that we require to build the
9 project. So it would not be necessary under the current
10 circumstances.

11 MS. CARUSO: So you wouldn't seek the PUC -- you
12 wouldn't -- so you wouldn't use eminent domain if you had to or
13 you wouldn't seek the PUC exemption if you had to, as of right
14 now?

15 MR. TANNENBAUM: I don't think that's -- that was the
16 answer. The answer was they have land rights so they don't
17 anticipate needing to use eminent domain, but if eminent domain
18 was required, I think Eric's answer was he can't commit to not
19 doing it.

20 MR. STINNEFORD: That's correct.

21 MS. CARUSO: Okay. I think we're all set. Thank you
22 very much for your time. I have no further questions.

23 MR. TANNENBAUM: Okay. Sue?

24 MS. ELY: Thank you. Sue Ely, Natural Resources
25 Council of Maine. I have just a couple of questions, and

1 apologies to Eric and Mr. Escudero, I think they're mostly for
2 Thorn. But if anyone else on the panel has an answer, by all
3 means, feel free to answer. But, Mr. Dickinson, earlier when
4 you were answering questions from Attorney Shope, you -- I
5 think it was Mr. Shope's questions -- you were talking about
6 speaking to a bunch of people who are bilingual to help
7 translate Hydro-Quebec documents. Do you recall that
8 conversation? It was --

9 MR. DICKINSON: Yes.

10 MS. ELY: Okay. Do you recall who those people
11 where?

12 MR. DICKINSON: Yeah, I -- essentially Hydro-Quebec
13 employees that could speak English.

14 MS. ELY: Okay. You also -- during --

15 MR. DES ROSIERS: Most of them do that very well.

16 MS. ELY: I know, if only it were a different
17 province that didn't have quite a strong leaning towards
18 French, this wouldn't be such a complicated proceeding maybe.
19 There -- you also mentioned that you had to rely on publicly-
20 available data when compiling your rebuttal testimony about the
21 greenhouse gas implications and reservoir levels. Is that
22 correct?

23 MR. DICKINSON: Correct.

24 MS. ELY: And I was wondering if you could elaborate
25 on why you had to rely on publicly-available data.

1 MR. DICKINSON: Well, probably a better way to say it
2 is that was the methodology that I did for putting together the
3 rebuttal testimony. So the plan was for me to address the
4 issues that were prior -- in prior testimony, and I pursued
5 publicly-available information to put that information
6 together.

7 MS. ELY: You relied on publicly-available data, yet
8 you had access to Hydro-Quebec employees. Is that correct?

9 MR. DICKINSON: Yeah, I would -- so Hydro-Quebec
10 employees both, you know, made sure I wasn't making fatal flaws
11 associated with how I were to look at it and, if I was
12 struggling to find a specific reference to publicly-available
13 information, they would point me in the right direction.

14 MS. ELY: What was the purpose in -- if you had
15 access to Hydro-Quebec employees, what was the purpose of only
16 relying on information that was publicly available?

17 MR. DICKINSON: I mean, I guess in my perspective,
18 that made it much easier in providing the information in the
19 testimony. So by that means, I could put the information out
20 there and show -- I mean, the -- and stepping back just maybe a
21 little on the purpose for the analysis, the --

22 MS. ELY: I'm sorry, I just want to know if you had
23 access to an employee who could give you information, why, if
24 they could give you sort of the potential to have real-time
25 information about Hydro-Quebec's system, would you rely only on

1 public information?

2 MR. DICKINSON: For purposes of this specific
3 representation, the goal was to provide a representation of the
4 perspective of their ability to me and define this as
5 incremental energy as an issue that was brought up by a number
6 of environmental NGOs in my discussions with them and to do it
7 in a way that allowed us to share that with everybody. So I
8 never pursued confidential information. I mean, I never asked
9 a question for confidential information. The goal was always
10 to develop a model based on publicly-available data.

11 MS. ELY: Okay. So then I want to ask you, the
12 document that you provided, well, CMP provided in response to a
13 data request by Ms. Kelly was an email from Hydro-Quebec, and I
14 guess it's a different approach is to get Hydro-Quebec to write
15 an email responding to a data request. Was there no publicly-
16 available information that would make that point --

17 MR. DES ROSIERS: Objection to --

18 MS. ELY: -- in the data request?

19 MR. DES ROSIERS: Objection to form. I'm not sure
20 what you're referring to by an email.

21 MS. ELY: Sorry, thank you. The email that was the
22 response to Dot Kelly's data request 004-001 that we have been
23 discussing earlier today.

24 MR. STINNEFORD: So I believe that was a letter, not
25 an email.

1 MR. SHOPE: I think it's the letter of December 14
2 from Bergervin to which I was referring earlier.

3 MS. ELY: I'm sorry. Yes, it is a letter, sorry.

4 MR. DICKINSON: So again, I'm sorry, I lost the
5 question in there.

6 MS. ELY: That's fine. I'm sure that my muddled
7 delivery did not help. The -- I'll try it one more time. So
8 why, for responding to Dot Kelly's data request marked 004-001,
9 did you -- did CMP include a letter drafted by Hydro-Quebec as
10 opposed to publicly-available information?

11 MR. DICKINSON: So the method that we -- when we
12 received the data request, we forwarded it on to Hydro-Quebec
13 and Hydro-Quebec responded with the letter that they provided.
14 So that was the method by which we responded to Dot Kelly's
15 data request.

16 MS. ELY: Okay.

17 MR. STINNEFORD: I would just say specifically there
18 is no public source for this specific information that was
19 requested which is why we addressed it directly to them.

20 MS. ELY: Okay. When you responded, did Hydro-Quebec
21 -- when you asked this question of Hydro-Quebec, did they
22 respond with any additional information besides the letter?

23 MR. DICKINSON: I mean, as I had said earlier in my
24 testimony, not only did this data response get responded to,
25 but we also had meetings with the Portland Press, we had

1 meetings with the Boston Globe. The outreach team also met
2 with a number of other papers and had discussions, and I think
3 in those context of discussions that, you know, other
4 conversations happened, other information, videos on -- showing
5 the water actually spilling, other things like that were
6 exchanged.

7 MS. ELY: Were those conversations in an attempt to
8 answer Ms. Kelly's data request?

9 MR. DICKINSON: Oh, no, I'm sorry, no.

10 MS. ELY: Okay.

11 MR. STINNEFORD: We did have other telephonic
12 conversations with the author of this letter and other HQ
13 employees to get further clarity round this.

14 MS. ELY: But they didn't provide you any underlying
15 data to support the letter? I'll phrase it as a question. Did
16 they provide you underlying data to support the letter?

17 MR. STINNEFORD: I wouldn't say they provided us
18 data. They did provide us with clarifying explanation and
19 information. For example, earlier today we talked about the
20 ordinary spillage that would occur in the Hydro-Quebec system
21 to address environmental permitting restrictions, hydrologic
22 conditions, the normal seasonal spillage that occurs on their
23 system. In those conversations, they clarified that that is in
24 the range of four to five terawatt hours a year pretty
25 consistently through history and that the numbers that are

1 reflected in this letter are incremental above that four to
2 five terawatt hours that would ordinarily be spilled. So, you
3 know, we did have those types of clarifying conversations with
4 them, but they did not provide us, you know, supporting reports
5 or documents for that data.

6 MS. ELY: Okay. Switching gears. Earlier, Mr.
7 Dickinson, you were asked a -- and I don't -- I think you'll
8 remember this generally. I don't have the data request off the
9 top of my head. You had been asked to identify which employees
10 -- well, actually, it's in response to an NRCM request that we
11 were just talking about. It's the meetings that you attended
12 to talk to individuals about the project. And I'm curious have
13 these stakeholder meetings continued after the data request
14 that you responded to? Have you continued to go to those
15 meetings with community members?

16 MR. DICKINSON: Maybe you could -- if you could just
17 restate that? I want to make sure I understand what date
18 you're referring to. Dot Kelly's --

19 MS. ELY: No, the NRCM request for the list of
20 stakeholder meetings.

21 MR. DICKINSON: Oh, yeah. Yeah, I mean, we have
22 continued to offer every town along the corridor and adjacent
23 towns for meetings. They've told us -- I think every town now
24 has told us, no, we're good. We've had multiple meetings in
25 all those towns. We're willing to go anywhere and have a

1 meeting anytime with people that are interested in the project,
2 and, you know, we -- you know, between myself, Eric, Doug
3 Herling, members of the outreach team, we've been all over the
4 state. And, you know, my mantra to the team was always there's
5 only 1.4 million people in Maine, let's talk to them all.

6 MS. ELY: So your testimony is that you have
7 continued to have these meetings throughout this -- throughout
8 the process, they didn't stop when you submitted the data
9 request to the Natural Resources Council of Maine.

10 MR. DICKINSON: No, that's right.

11 MS. ELY: Okay. And you mentioned that Doug Herling
12 has participated in these meetings, that you have participated.
13 Who else is continuing to participate in these stakeholder
14 meetings?

15 MR. DICKINSON: I mean, the short and long of it --
16 and you could -- I mean, depending on how you call these
17 stakeholder meetings, you know, we're trying to come up with --
18 we have meetings right now where we're trying to figure out how
19 to utilize our commitment to bring fiber optic to Somerset,
20 Franklin County and to -- like, for example, we were just in
21 Whitefield the other day. So Whitefield is an area where the
22 345 line goes, and we've now made a commitment to put fiber
23 optic up on that AC transmission line. And we met with the
24 people in Whitefield about the idea of connecting in their
25 existing fiber optic along that place, and in that meeting, it

1 included -- actually Heather Johnson at the point was Connect
2 Maine who is, you know, kind of the fiber optic leader for the
3 state at that point in time. It was Bill Sawyer, an engineer
4 for CMP, and Justin Tribbet who also is an engineer. We were
5 meeting with them to figure out how we can bring value to that
6 community by bringing fiber optic, and those kind of
7 discussions are going on in Somerset and Franklin County. But
8 that's just a specific example. Eric would be in some
9 meetings. Bernardo would be in some meetings. Other
10 management people that are involved. Really the way I see it
11 is everybody that's on the project, not just the core group of
12 outreach teams, should be available to interact with the
13 community on a regular basis.

14 MS. ELY: Does that include going to selectboard
15 meetings?

16 MR. DICKINSON: Yeah.

17 MS. ELY: Does that include going to county
18 commissioner meetings?

19 MR. DICKINSON: Yes.

20 MS. ELY: Okay. You mentioned that you'd made a
21 recent commitment to put fiber optic in the 345 line. Is that
22 writing -- is that agreement in writing?

23 MR. DICKINSON: No, I'd describe it as a handshake
24 agreement, but the engineers and the people that are managing
25 the dollars related to the project understand that it's a

1 commitment.

2 MS. ELY: Okay. Who is the commitment with?

3 MR. DICKINSON: We sat around a table at the
4 Skowhegan Cafe or -- I can't remember the name of the place,
5 and a number of folks from Whitefield and us talked about it.
6 And, you know, I made the commitment there at that point.

7 MS. ELY: Are these members of the community that you
8 made the agreement with?

9 MR. DICKINSON: Yeah, I think they're some of the
10 people that are community members that care, that want to see
11 about value being brought to their community. Some of the
12 people that I believe were on the selectboard of --

13 MS. ELY: Can you be more -- like, so I understand
14 that people who want to see value in their community is a
15 subset of people, but can you be more specific about who you
16 made your agreement with and -- or who they represent?

17 MR. DICKINSON: Again, the -- what -- I think the
18 better understanding of how we have approached this project is
19 every time we get a phone call for an opportunity in a
20 community to have a dialogue about the project, we take it. In
21 that conversation with Whitefield, in that meeting that we had,
22 they asked about fiber optic because they had heard about it
23 related to the DC line. We had -- I think I had one
24 conversation early on with one selectman, who is also on the
25 economic development selectmen for Whitefield. And then that

1 led to a larger group where we sat around and had blueberry pie
2 and coffee around a little plastic picnic table, and at that
3 meeting, we heard what their interests were. I contacted our
4 engineering group, understood the incremental cost that we'd
5 incur, and, for me, I believe that extra cost was worth the
6 value of delivering it. We asked for nothing in return. We
7 asked for nothing from any of the people in Whitefield. I
8 believe this is the kind of thing that we've demonstrated
9 throughout this project.

10 MS. ELY: Will you be signing a memorandum of
11 agreement or any more-formalized documentation?

12 MR. DICKINSON: If the town of Whitefield would like
13 to have a formal commitment from us committing to that, we're
14 happy to do it.

15 MS. ELY: Are there other communities that you've
16 made these types of handshake agreements with?

17 MR. DICKINSON: So the representation of a handshake
18 as a negative thing is interesting to me. To me --

19 MS. ELY: It was not a -- it was --

20 MR. DICKINSON: Okay.

21 MS. ELY: My deadpan delivery might give me away, but
22 I am really just asking are there other communities that you
23 made a handshake agreement with?

24 MR. DICKINSON: Yeah, I think where there's
25 conversations we're having throughout the project to find ways

1 to help deliver value in ways that, to my, are synergistic with
2 the project, and fiber optic is a perfect example. And there's
3 a lot of things going on in the project, a lot of irons in the
4 fire, but, you know, those kind of conversations are happening
5 all along the -- on the project, and we are open to any
6 additional calls from any towns that want to have these
7 conversations.

8 MS. ELY: I'm trying to understand if there are other
9 side agreements that are being made through the -- through this
10 process.

11 MR. DICKINSON: So the -- there's no -- the agreement
12 with Whitefield is -- there's no agreement. There's no
13 negotiation. There's not a document that is looked at to be an
14 MOU. It was me listening to people in the community about what
15 they cared about and me making a commitment to them. And as I
16 said, if they want me to firm that up in a letter or an MOU,
17 we're happy to do that. So there's no side agreements that are
18 currently engaged, but we have conversations with both Somerset
19 and Franklin County around fiber optic, as an example, to try
20 to figure out how to -- we've already committed as part of the
21 project to provide significant amount of splice points along a
22 high-bandwidth fiber optic cable at the edge of our right-of-
23 way, and we're going to provide that at no cost, no -- to
24 people that would be able to connect into that as a way to
25 encourage fiber optic. What we're also interested in are there

1 other opportunities that we could do beyond that, and those are
2 the kind of discussions would be an example in the specific
3 area of fiber optic that we're doing.

4 MS. ELY: I understand you testified earlier that
5 there are no new MOUs that you have signed besides the one with
6 the Western Mountains & Rivers Corporation. Is that a correct
7 understanding?

8 MR. DICKINSON: That's correct.

9 MS. ELY: Are there -- aside from the MOU structure,
10 are there any other agreements that Central Maine Power or
11 Avangrid has made with any other interested parties?

12 MR. DICKINSON: There's no other MOUs that we've
13 signed or executed related to any other interested parties.

14 MS. ELY: It doesn't have to be an MOU. Any type of
15 agreement.

16 MR. DICKINSON: No, I don't believe so.

17 MS. ELY: Okay. That's all I've got for questions.

18 MR. TANNENBAUM: I know Barry's got just an issue.
19 Jared, how much redirect?

20 MR. DES ROSIERS: Not much, five or ten minutes at
21 the most.

22 MR. TANNENBAUM: We've been going for a while. I
23 think we should -- why don't we just take a break now, come
24 back in 15.

25 CONFERENCE RECESSED (January 9, 2019, 2:56 p.m.)

1 CONFERENCE RESUMED (January 9, 2019, 3:16 p.m.)

2 MR. TANNENBAUM: Okay, let's go back on the record.
3 Barry, I know you had some -- a line of questions. Let's --

4 MR. HOBBS: Yes, I do, if you don't mind. Well,
5 good afternoon. It's good to see you. Been a long day so far.
6 I just had a couple questions, and I don't know whether to
7 address them to you, Thorn, or to all of you but collectively
8 why don't we talk about them. We've heard so far from
9 Elizabeth Caruso from Caratunk and also Ms. Eli who was -- Ms.
10 Ely, rather, who represents the Natural Resources Council of
11 Maine, and they talked a little about community benefits and
12 the like. And when you were putting your project together for
13 Massachusetts, you had certain criteria you had to follow under
14 their statute, is that correct, as far as community benefits or
15 that part of your submission to --

16 MR. DICKINSON: The response to the RFP included an
17 RFP document that required specific criteria that needed to be
18 filed.

19 MR. HOBBS: Right. So did -- in your process of
20 having, you know, been selected, did you look to the New
21 Hampshire documents or the Vermont documents or the two
22 proposals that were a competing proposal to look at those
23 documents at all and, in particular, the community benefit
24 elements of those two projects with respect to their
25 submission?

1 MR. DICKINSON: So just so -- just to make sure I
2 understand, the Massachusetts RFP had specific requirements in
3 it for their own state.

4 MR. HOBBS: Yes.

5 MR. DICKINSON: So when you're referencing the
6 community benefits, are you talking about the community
7 benefits --

8 MR. HOBBS: For the state -- for example, looking
9 at the state of Vermont and looking at the benefits that would
10 have gone to the state of Vermont if they would have been
11 successful in their project. The same is true of New
12 Hampshire. I'm more interested in New Hampshire if that could
13 be the case. So did you have an opportunity to look at their
14 applications, their full applications, both -- more so in New
15 Hampshire than Vermont?

16 MR. DICKINSON: Sure. So we did a great deal of
17 market intelligence before we submitted our bid, and because
18 that's a project that's been going on for nine or ten years,
19 there was information out there and available. And part of
20 that was the various agreements that they had made along the
21 route.

22 MR. HOBBS: And did you happen to look at the
23 proposal that was rejected by the site evaluation committee of
24 the state of New Hampshire?

25 MR. DICKINSON: I'm aware that the Northern Pass

1 project was denied by the site evaluation committee.

2 MR. HOBBS: Did any of you -- anyone else, Bernardo
3 or Eric, look at those particular submissions and then look at
4 their -- and look what -- the final rejection or why they were
5 not approved by their respective commissions?

6 MR. STINNEFORD: Yeah, I'm generally familiar with
7 the filings and the decisions. I probably can't quote the
8 details.

9 MR. ESCUDERO: I am aware of the decision, but I
10 didn't review the application.

11 MR. HOBBS: You didn't review the application?

12 MR. ESCUDERO: I did not.

13 MR. HOBBS: You did not. So as far as the state of
14 New Hampshire's proposal, are you familiar with the community
15 benefit package that was submitted fairly --

16 MR. DICKINSON: Yeah, in a broad, yes.

17 MR. HOBBS: Yes. Did you also know that there was
18 an attempt by Public Service Company of New Hampshire d/b/a
19 Eversource -- and who filed a motion for rehearing on the
20 decision an order denying the application? Did you know that
21 there was an extensive submission made? I believe submitted in
22 March of 2018?

23 MR. DICKINSON: Yes, I'm aware of that.

24 MR. HOBBS: And are you of the document itself?

25 MR. DICKINSON: I think I may have read a summary

1 related to it, but I didn't pick it up and read the whole --

2 MR. HOBBS: So you are familiar with the document
3 and --

4 MR. DICKINSON: Yes.

5 MR. HOBBS: I'd like to, if I may, if you -- it
6 sounds like you would -- that I could refresh your
7 recollection, possibly. And how about you, Eric or Bernardo?
8 Did you have an opportunity to look at the final -- because
9 that was the final nail in the coffin. And so obviously I'm
10 sure -- I know that your attorney did and I know that the
11 battery of attorneys and I'm sure your president did. But
12 Eric, I'm sure you must have looked at that particular
13 document.

14 MR. STINNEFORD: I did look at it. I skimmed it
15 briefly. I -- again, I didn't spend a lot of time reading it.

16 MR. HOBBS: And, Bernardo, you probably didn't.

17 MR. ESCUDERO: I remember reading about it in the
18 media, but I don't remember looking at that specific document.

19 MR. TANNENBAUM: Are you familiar with the community
20 benefit aspect of that motion?

21 MR. DICKINSON: Yeah, I believe in a very general
22 sense, yes, yeah.

23 MR. HOBBS: The reason I'm asking you that is that
24 during the process of your successful submission and obviously
25 your petition to this -- to the Public Utilities Commission

1 allowing for permission to go forward with the project here in
2 Maine and before the Department of Environmental Protection and
3 the Land Use Planning Board, you obviously must have thought
4 about what was offered in the state -- Commonwealth of
5 Massachusetts, what they required obviously or what was offered
6 by Eversource and what by -- in New Hampshire -- in Mass. -- in
7 Vermont. Were you --

8 MS. BODELL: So again, I'm confused when -- only when
9 you reference Massachusetts. So --

10 MR. HOBBS: Well, no, the reason I say that is
11 because obviously you were successful with Massachusetts, but
12 then you had to come to Maine. And I'm talking about the idea
13 of permission, just like when they were looking at the project,
14 they couldn't get approval. Eversource couldn't get approval
15 in the state of New Hampshire because they didn't meet the
16 requisite requirements apparently of their site evaluation
17 committee which is different than how we operate here. So the
18 reason I'm asking you that question --

19 MR. TANNENBAUM: I'm sorry, Barry, what exactly is
20 the question that you're asking?

21 MR. HOBBS: Well, what I'm asking for a question is
22 what considerations did you give in putting together some type
23 of community benefit package in Maine? Maybe give us some idea
24 of what you went through, what process.

25 MR. DICKINSON: Yeah, sure. It was very similar to

1 some of the testimony that I've already discussed earlier today
2 where we started off by trying to design a project that had the
3 smallest amount of impact that we could. And I think always
4 the first goal there is to build a transmission line across the
5 existing corridor, and I think just about 70 percent of that is
6 along the existing corridor. Then the second goal would be,
7 can you build a transmission line in an area where the impact
8 is minimized because that area has similar utilization than it
9 does now. And so by having two private landowners where
10 there's a heavily-wooded section, a working forest, putting
11 that line there and avoiding many of the other sensitive areas
12 was the beginning of the project. I also talked about some of
13 the things we did in areas where we thought there would be some
14 concerns and some larger impacts: the Appalachian Trail, Moxie
15 Lake, the Kennebec River. And then ultimately when we put
16 together a price, we have to balance the overall price to
17 Massachusetts, what we think is fair for Massachusetts for what
18 they pay and the benefits they get, versus the benefits that
19 Maine and the impacts in Maine. And that is the balance that
20 we took. And we took in tons of information. We did market
21 intelligence on where our other projects were, our own
22 experience in developing projects, and as I said, our
23 confidence in the way our project was designed.

24 MR. HOBBS: It sounded like, from your testimony of
25 Ms. Caruso, that the only commitment that's present is the

1 commitment that is binding upon your project.

2 MR. DICKINSON: That's right. I mean, specifically
3 to that narrow question, obviously as part of the DEP process,
4 we are currently in discussions about a ton of different types
5 of mitigation associated with the project, and those are things
6 that are still ongoing.

7 MR. HOBBS: And obviously there are some
8 confidential discussions that have occurred in the past and
9 obviously I don't want you to testify to any of those, of
10 course. But I wanted you to take a look, if you could, if all
11 three of you could take a look at community benefits. And I
12 know that earlier I think Mr. Murphy led you through some
13 exhibits of the community benefits for the state of New
14 Hampshire. And it was interesting because I was kind of
15 puzzled with the figure that was used in the state of New
16 Hampshire for the proposal because I think that that was the
17 original amount that was proposed by the developer at the time
18 and that was the amount of money on the table when the site
19 evaluation committee turned down the proposal. But the reason
20 I'm giving you this other document to look at is because the
21 Public Service Company of New Hampshire d/b/a Eversource, in
22 their motion to rehear the case, not only made arguments based
23 upon the original discussion but they also discussed why they
24 wanted to reopen the case and what other possible potential
25 benefits could be put on the table for reconsideration in order

1 to have the proposal decided. So if you could do me a favor
2 and take a look at Attachment C which is in the back of this
3 very big document. And if you could look at -- if you haven't
4 -- I'm just going to give you a couple minutes to look at it
5 because it's really interesting, section Additional Conditions,
6 which they proposed now in this. So essentially what they're
7 attempting to do, to give you a backdrop of why I'm interested
8 in this, they --

9 MR. WILLIAMSON: Barry, is this on page four of
10 Attachment C?

11 MR. HOBBS: No, it's Attachment C.

12 MR. WILLIAMSON: C. And then I find --

13 MR. HOBBS: And then on page four would be the --
14 no, it's page 15. It's number 74, page 15, Additional
15 Benefits.

16 MR. TANNENBAUM: Okay. And Barry, what's the
17 question that you're asking?

18 MR. HOBBS: What I'm asking -- first of all, I want
19 them to take a look and if they could just review that.

20 MR. TANNENBAUM: Okay, so you're reviewing Additional
21 Conditions on page 15.

22 MR. HOBBS: Were you aware, after knowing the
23 backdrop of this, that there was an additional relief benefit
24 that was requested -- that was offered as an offer to the
25 evaluation committee?

1 MR. DICKINSON: At a very high level, yes, but, you
2 know, my focus here would have been more on -- you know, my
3 curiosity would have been on the likelihood that they're going
4 to --

5 MR. HOBBS: What was your understanding of -- at a
6 high level of --

7 MR. DICKINSON: My simple memory of it was that there
8 was an extra amount of benefits that were provided as part of
9 that.

10 MR. HOBBS: And what do you -- what did you know
11 about, for example, the energy cost relief benefits? That's
12 number 74. What do -- does that look familiar to you? That's
13 number 74, page 15. Does that figure of a value up to \$300
14 million over a 20-year period -- are you --

15 MR. TANNENBAUM: Maybe we can cut this a little
16 short. Were you aware, before you saw this document, of what
17 the additional benefits that were proposed?

18 MR. DICKINSON: Not to this detail. I mean, I knew
19 that they -- my understanding was Eversource was making a last-
20 pitch effort to try to throw everything they could in order to
21 overturn the appeal and that they threw a bunch of stuff to see
22 what would stick. But I didn't go through these in detail to
23 review them and understand them.

24 MR. HOBBS: So you -- the \$300 million figure
25 doesn't stand out to you over a 20-year period?

1 MR. STINNEFORD: Well, I --

2 MR. HOBBS: How about you, Eric?

3 MR. STINNEFORD: I guess I would correct the
4 characterization. They're not paying 300 million in cash.

5 MR. HOBBS: No, no.

6 MR. STINNEFORD: They're providing 400,000 megawatt
7 hours in --

8 MR. HOBBS: That's right. I'm asking --

9 MR. TANNENBAUM: Barry, allow him to answer.

10 MR. HOBBS: I apologize.

11 MR. STINNEFORD: They're offering to provide 400,000
12 megawatt hours of environmental attributes whose value may be
13 as much as 300 million based on their representation of the
14 market value.

15 MR. HOBBS: But you would define that as a benefit,
16 wouldn't you?

17 MR. STINNEFORD: Yes, I think that's the intent.

18 MR. HOBBS: Okay. And as far as what the
19 applicants -- what it says here, if I may just read it to you,
20 "The applicants shall monetize such environmental attributes
21 for the purpose of providing a reduction in energy cost to low-
22 income and business customers in addition to the projected
23 wholesale market price benefits of the project." So in your
24 review of your project, was there ever any consideration to
25 utilizing the same type of benefit structure as a community

1 benefit for the state of Maine?

2 MR. DICKINSON: Again, I think our existing proposal
3 provides a significant amount of benefits to Maine that we've
4 already described. And then as I described, in developing our
5 price, we obviously had to consider contingencies around the
6 project, and we tried to balance, in that process, our
7 understanding of the impacts of our project, the real impacts
8 of our project, not some other project that's different than
9 ours, and then balance the price that we were then asking for
10 Massachusetts to pay versus the benefits and the impacts that
11 Maine would have. In the end, that's how we made the decision.
12 So we did consider those types of things went in the
13 development of the price.

14 MR. HOBBS: So in your opinion then what London
15 Economics found or what your company found through your
16 consultants will say -- which we're going to hear about later
17 on is what you feel to be enough community benefits to satisfy
18 the state of Maine as far as having a benefit consistent with
19 our law.

20 MR. DICKINSON: And so we -- just to be clear, we
21 have the incremental jobs for the period of time of the
22 construction. We have the reduction in energy prices, the
23 potential reduction in capacity prices, property taxes, fiber
24 optic, and what we believe is an added benefit for tourism.

25 MR. STINNEFORD: And to your question, you know, that

1 -- those benefits, we've estimated, you know, they're roughly
2 \$100 million over the first ten years of the project. And that
3 is, in our view, more than sufficient to meet the statutory
4 requirement of a public benefit, particularly since the cost to
5 Maine customers for this project is zero.

6 MR. HOBBS: What was the cost of the project in New
7 Hampshire to New Hampshire ratepayers? Was it zero?

8 MR. STINNEFORD: Again, it depends on which -- how
9 you're defining this project. The Northern Pass has been
10 through multiple iterations.

11 MR. HOBBS: No, this last proposal.

12 MR. STINNEFORD: In this last instance in which it
13 was bid into 83D, it would have been supported fully by the
14 Massachusetts customers just as our --

15 MR. HOBBS: Thank you very much, that's the answer,
16 right? Thank you. I have no further questions. Thank you.

17 MR. TANNENBAUM: Jared, redirect?

18 MR. DES ROSIERS: Mr. Dickinson and Mr. Stinneford,
19 you were just asked questions about the benefits packages in
20 Vermont and the benefits packages in New Hampshire. And why
21 didn't CMP promise hundreds of millions of dollars on top of
22 the benefits you described, Mr. Dickinson?

23 MR. DICKINSON: Yeah, I think first of all, I would
24 reference these two specific projects had been developed for
25 multiple years prior to any awareness of any kind of

1 competitive solicitations for transmission, and they made an
2 election how they approached that project, the way they built
3 that out, how they did that, and made their decisions along
4 with that. For us, we started from the point of designing this
5 project in a way to mitigate the impacts as much as we could as
6 we described and then defined that right balance between
7 Massachusetts, what they're going to pay and the benefits
8 they're going to get, versus the benefits that Maine would get
9 and the impacts to Maine.

10 MR. DES ROSIERS: And, Mr. Stinneford, in striking
11 the balance that Mr. Dickinson described, what is the
12 significance with respect to competitive transmission under
13 current FERC policy and the applicable tariffs in New England?

14 MR. STINNEFORD: Yeah, I --

15 MR. SHOPE: Objection, calls for a legal conclusion.

16 MR. STINNEFORD: I'll address it at a policy level
17 rather than with respect to law.

18 MR. TANNENBAUM: Proceed.

19 MR. STINNEFORD: We have significant concerns that if
20 the world proceeds as it appears to be where more and more of
21 our transmission network is going to be built through
22 competitive bidding solicitations, whether that's through Order
23 1000 or through state-specific procurement programs such as
24 we've seen here with 83D, that if projects are continually
25 required to inflate their bids with community benefit packages

1 on the order of hundreds of millions of dollars, the end result
2 of that is going to be pricing for transmission projects that
3 is not going to fulfill the expectations of policymakers, our
4 state regulators, here in New England in particular where we
5 have seen, you know, a strongly expressed desire for lower
6 transmission costs through competitive processes. If those
7 competitive processes continue to be distorted by these types
8 of benefit packages, those benefits will never be realized.

9 MR. DES ROSIERS: In the approach that CMP used in
10 formulating its bid for the NECEC, did the company apply a
11 similar approach with respect to its other bid in 83D or in any
12 other prior solicitation?

13 MR. DICKINSON: Yeah, that would be a consistent
14 approach for the other projects that we bid into this
15 solicitation, including the wind, the solar, and the battery
16 projects in addition to the tristate RFP that we had issued
17 before and similarly to other projects that we've tried to move
18 forward within a development portfolio.

19 MR. DES ROSIERS: What would be the significance --
20 what would be the impact, in your view, of requiring
21 transmission projects built as elective transmission upgrades
22 to deliver renewable resources from Maine, what would the
23 impact be if, in order to build transmission, it were necessary
24 to include significant community benefits along the lines of
25 the TDI or Northern Pass projects?

1 MR. DICKINSON: Yeah, I mean, I think there are two
2 impacts. Obviously one of them is going to be that the
3 resources in Maine, the wind resources, the solar resources,
4 other sources that are also going to require transmission are
5 going to become more pricey, and that has impacts on whoever
6 the end customer is, whether it's Maine customers or other New
7 England customers. And it's also going to disadvantage those
8 projects against other alternative sources that may not be
9 providing that same tax to the price.

10 MR. DES ROSIERS: Shifting gears. Now shifting back
11 to some of the questioning that Mr. Shope did with respect to
12 -- and that's to you, Mr. Dickinson, with respect to your
13 modeling that you did as part of your rebuttal testimony.
14 Since you submitted the rebuttal testimony in July, are -- have
15 you become aware of other information that supports, in your
16 view, the conclusions and opinions you provided in that
17 testimony?

18 MR. SHOPE: Objection, scope.

19 MR. TANNENBAUM: Overruled.

20 MR. DICKINSON: So as I mentioned earlier today, I
21 had a conversation with Hydro-Quebec around the issue where
22 they disclosed to me the spilling of water in '17 and '18.
23 That was coincident with the CEO from Hydro-Quebec publicly
24 committing to that in Quebec, as we mentioned, on an interview
25 publicly. I also already mentioned the conversations we've had

1 with a number of newspaper resources to discuss that same
2 information. I think the other thing that was interesting is
3 that during the discovery process, I became aware of an email
4 that I hadn't read before that, although it's confidential, the
5 -- what -- the subject of it had to do with Hydro-Quebec
6 showing that there was a firm amount of energy that they could
7 get out of Quebec without a new transmission line. And, you
8 know, I can't get into the specifics of the number in the
9 public session, but that number that was in there and that
10 discussion about the fact that, without NECEC, they're going to
11 reach a cap where they're not going to be able to export
12 additional energy because of economics that we talked about
13 earlier is reinforced in that email from May of 2017.

14 MR. DES ROSIERS: Now, Mr. Stinneford, there was
15 questions from the Office of the Public Advocate and the IECG
16 with respect to the potential impacts of having CMP be the
17 owner of the project as opposed to a special-purpose entity.
18 Do you see benefits to CMP and its existing customers if the
19 project were to be owned by CMP?

20 MR. STINNEFORD: There are potential benefits, and
21 I've addressed some of this in earlier testimony that, in
22 financing the project, there will have to be new debt issued.
23 And currently, at rates that are available in the market, that
24 debt could be achieved at a lower cost than CMP's current
25 embedded cost of debt. The result of that would be that our

1 average cost of debt for CMP would go down. If this is
2 separately financed outside of CMP, CMP ratepayers would lose
3 the benefit of that.

4 MR. DES ROSIERS: There was also questions with
5 respect to whether the company believed it was appropriate or
6 -- to -- that the special-purpose entity would pay a -- some
7 kind of a goodwill payment to -- or, excuse me, that the SPE
8 would pay some sort of a goodwill payment as part of a
9 transfer, and I believe your testimony was you did not believe
10 that to be appropriate. And just explain why you don't believe
11 it would be necessary or appropriate in this instance.

12 MR. STINNEFORD: Sure. The basis that we have heard
13 argued for a goodwill payment is that the project would
14 constitute a non-core service under Chapter 820 and that -- and
15 I've heard various reasons or explanations for why it should be
16 considered non-core. Our concerns or my concerns are that
17 those reasons that I have heard expressed would mean that much
18 of CMP's future transmission activity, if not all of it, could
19 potentially be considered non-core. You know, whether that's
20 due to the fact that this was competitively bid or that it was
21 for the benefit of a third party and not CMP's native
22 customers, those kind of criteria are behind much of the
23 transmission that we build today and are likely going to be an
24 increasing amount that we build in the future. And if that's
25 the criteria for determining whether something is core or non-

1 core, you know, much of CMP's activities would be then
2 considered non-core and have to be spun off into an affiliate.
3 And I -- it leads to what I think is an untenable result, and
4 we would have great concerns with that.

5 MR. DES ROSIERS: Now there was also questions,
6 though, with respect to the treatment of the plant held for
7 future use that is currently owned by CMP and that has been put
8 into rates under the -- both the regional tariff and the local
9 tariff and that transmission customers have paid and that what
10 will happen with that plant when the NECEC moves forward. And
11 I guess what is the company's position today with respect to
12 how that plant should be treated both on a prospective basis
13 and then retrospectively with respect to -- retrospectively?

14 MR. STINNEFORD: Prospectively, I don't think there's
15 any disagreement that when the project goes forward, that land
16 would be transferred out of CMP rate base in Account 105 and
17 would be booked to the project. We have promised in
18 confidential settlement discussions that in the context of a
19 CPCN being issued by the Commission here and the project going
20 forward to construction that we would refund to Maine customers
21 the amount that has been previously been collected in rates
22 associated with that land held for future use. That's an
23 amount that is, in rough terms, a hundred million --

24 MR. TANNENBAUM: Hundred million?

25 MR. STINNEFORD: -- a million dollars plus carrying

1 costs.

2 MR. DES ROSIERS: Hold on.

3 MR. STINNEFORD: And I -- you know, I can say today
4 that that is a commitment that we would make even outside of
5 settlement. If that were the desire of the Commission, that
6 that money be returned to customers through a revenue
7 requirement credit upon the issuance of a CPCN and transfer of
8 that property into operating property, we would pledge to make
9 that commitment.

10 MR. DES ROSIERS: There was some questioning with
11 respect to the public outreach and the notice that was provided
12 prior to the submission of the petition in this CPCN
13 proceeding, and at that time, there was some mention of giving
14 notice to abutting landowners. Could you describe that and
15 when that happened?

16 MR. DICKINSON: Sure. So that we were required to
17 make a public information meeting as a result of our DEP
18 application. We -- the requirement was really only one of
19 those information meetings for -- to happen. We actually held
20 three. In prep for those meetings, you need to provide written
21 notice to all abutters, and we made that notice to those
22 parties. We had held those three public hearings in a way to
23 try to provide coverage for the overall project. Again, even
24 though we were only required to do one. One was in Bingham,
25 one was in Lewiston, and one was in Windsor.

1 MR. DES ROSIERS: Were they well attended?

2 MR. DICKINSON: Yeah, they were extremely well
3 attended. There was a lot of dialogue. We had a well --
4 staff, number of outreach people and experts, at a number of
5 stations showing visuals of the project, the route of the
6 project. We had computers manned so that people could see
7 specifically where the line was located. We had follow up with
8 people that had questions and addressed misconceptions that
9 were out there related to the project.

10 MR. DES ROSIERS: There was also some questioning
11 with respect to the outreach to the town of Caratunk. And did
12 CMP -- what was CMP's outreach to Caratunk and the town
13 officials?

14 MR. DICKINSON: Well, we -- you know, we discussed
15 the meeting that was held. My expectation is there was an
16 outreach ahead of that, but since the -- since that meeting,
17 we've continued to, a number of occasions, ask for additional
18 meetings and we've been -- to the town officials, and the town
19 officials have communicated back that they're not interested in
20 us for coming back.

21 MR. DES ROSIERS: That's all I have, thank you.

22 MR. VANNOY: Can I ask a follow up?

23 MR. TANNENBAUM: Yes, you may.

24 MR. VANNOY: Could you flesh out a little bit more
25 for me, Eric, the -- you commented a future where TOs can't own

1 as core business those transmission projects. You called that
2 untenable. Could you flesh out what you mean by that in a
3 little bit more detail?

4 MR. STINNEFORD: Yeah, if you believe that we're on a
5 trend, as I do, that, whether it's reliability projects or
6 public policy projects or state-initiated RFP processes, a
7 significant piece of our future transmission is going to be
8 procured through competitive processes -- and that's going to
9 be reliability upgrades, it's going to be ETUs, it's going to
10 be all sorts of transmission. If, you know, CMP is required to
11 separate its activities around those types of construction
12 projects from its other transmission and distribution
13 activities, it's going to create additional costs,
14 inefficiencies, operational constraints that, in our mind, just
15 don't make sense.

16 MR. TANNENBAUM: The way I see your core business is
17 to provide reliable transmission and distribution service. It
18 doesn't really, in my view, matter whether that -- if it's a
19 reliability project, whether it's procured through a
20 competitive process or through the judicial process. So I
21 don't think that the issue is whether it's a competitive
22 process or not. I think it may go more towards whether it's a
23 core function of CMP to provide reliable transmission service.
24 So, for example, if CMP were to own a generator lead to bring a
25 wind project into the grid, would that generate a lead, be a

1 core business of CMP?

2 MR. STINNEFORD: I'd have to think about the legal
3 definitions behind that, Mitch.

4 MR. TANNENBAUM: I know, it -- well --

5 MR. STINNEFORD: It's -- I mean, to some extent, we
6 infringe on that today when we build generator interconnections
7 under an interconnection request. Although staff may not have
8 raised the competitive bidding issue, other parties have as a
9 criteria for consideration in core versus non-core. But
10 they've also raised the issue of building transmission for
11 somebody other than our native load requirements as being
12 outside of core activities. You know, under that definition,
13 then us building a generator interconnection, whether we own it
14 or it's being built and turned over for the benefit of the
15 generator or system upgrades that we're building on our system
16 to accommodate an independent generator, that would fall under
17 the category of non-core. And I think, you know, that doesn't
18 make sense to us either.

19 MR. WILLIAMSON: This is going back to Eric, to your
20 comments about the benefits, community benefit packages,
21 becoming a part or perhaps a usual part or a commonplace part
22 of transmission projects, that tends to increase transmission
23 costs, project costs overall. How do you regard CMP's -- or as
24 you stated, a policy view, a high-level policy view, how do you
25 regard that view as compared with your peers in the region? Do

1 you find, for example, that Eversource is perhaps excessively
2 generous in what they offer? I mean, do others share that kind
3 of perspective on, while it may need to be done, there is a
4 cost on projects? Because, back to your original point, we are
5 all concerned about transmission costs in New England. That's
6 well known. So let me know your thoughts regards -- CMP as
7 related to the peers --

8 MR. STINNEFORD: Yeah, I mean, I hesitate to speak on
9 behalf of other transmission developers, but, I mean, clearly
10 some are willing to make those commitments and include those
11 costs in the cost of their project. You know, they're not
12 doing it out of their own goodwill and out of their own
13 financial backers. They're asking customers to pay for those
14 mitigation packages. Not all projects, I suspect, are doing
15 that, and I'll admit each state is going to view the
16 requirement for those kind of mitigation packages differently.
17 Our concern is that if we reinforce that requirement by
18 demanding similar mitigation packages here in Maine, we're just
19 contributing to that snowball effect that is going to make this
20 very difficult to reverse in the future.

21 MR. WILLIAMSON: And just do you get the impression
22 that nationally this is a problem? This may be beyond what
23 you're familiar with, but on the other hand, you may have come
24 across --

25 MR. DICKINSON: I mean, we just competed in a project

1 in the MISO region, and it is very clear that the winning
2 bidder, NextEra, did not include a benefits package in that
3 transmission line. So that would be a very recent example of
4 that. But the one difference I think to point out here with
5 Northern Pass as being kind of the prime example -- obviously
6 the Vermont project was not selected -- that was a project that
7 moved for ten years and continued to try to find a way to make
8 that project move forward and had a different strategy on how
9 they approached it.

10 MR. WILLIAMSON: Thank you.

11 MR. TANNENBAUM: I'm kind of caught up in this
12 core/non-core. If CMP participated or constructed a
13 transmission project in another state, would that be core
14 because it's transmission?

15 MR. STINNEFORD: I think if you -- based on my
16 reading of the definitions, you know, right now the definition
17 of core versus non-core does have a hook to franchise service
18 territory. So activities that are outside of that could be
19 considered non-core. So we don't dispute the fact that if we
20 were bidding on a competitive solicitation to build
21 transmission elsewhere in New England or outside of New England
22 that that could be considered non-core.

23 MR. TANNENBAUM: Okay. Anything else for this panel?
24 Okay. You're excused. Thank you very much for your testimony.
25 We have a couple of exhibit issues I want to discuss. So the

1 generator interveners, I believe, asked questions regarding
2 Exhibits 26 and 27.

3 MR. DES ROSIERS: No objection to those and no
4 objection as well to Exhibit 28.

5 MR. TANNENBAUM: No objection --

6 MR. DES ROSIERS: To 26 or 27 or the additional
7 presentation that they passed around today. We have no
8 objection to that as well.

9 MR. TANNENBAUM: And was that marked?

10 MR. DES ROSIERS: I believe it was marked as 28.
11 Yeah, so they --

12 MR. TANNENBAUM: Twenty-eight? Okay. Now, let's
13 see.

14 MR. TURNER: Mitch, sorry, I just -- over here. I
15 just want to -- on number 28, it's clearly a typo, but just for
16 the record it says January 8, 2018. I believe they meant
17 January 8, 2019.

18 MR. SHOPE: Yes, that's the markets committee error,
19 but it's a common error at the beginning of the year.

20 MR. TURNER: Understood.

21 MR. SHOPE: We'll talk to Mr. Fowler about it when he
22 comes on Friday. And by the way, just as a housekeeping
23 matter, should we -- with regard to the exhibits that we've
24 passed around today, should we file them on the website?

25 MR. TANNENBAUM: You mean in the docket?

1 MR. SHOPE: Yeah, in the docket. Because I know some
2 -- CMP has circulated some additional exhibits, and I don't
3 know whether they've yet been filed on the docket.

4 MR. TANNENBAUM: They should be. If they're not data
5 requests, they should be on CMS -- or data responses.

6 MR. DES ROSIERS: And in that regard, because we
7 haven't finished with Ms. Bodell's testimony, I haven't made --
8 checked to make sure all of ours are addressed, but we
9 certainly intend to do that when Ms. Bodell's testimony is
10 complete.

11 MR. TANNENBAUM: Okay. Brian, regarding NextEra's
12 exhibits, we deferred ruling on many of your proposals. I
13 believe what you referred to today were marked in your pre-
14 hearing memo as Exhibits -- well, sorry, I'll get back to that.
15 I'm assuming now at this hour we're not going to move to Ms.
16 Bodell or do parties think we should?

17 MR. SHOPE: Oh, so we're ready to go, and as far as
18 I'm concerned, anything that makes Friday shorter is a good
19 thing, but --

20 MR. TANNENBAUM: Want to go for an hour --

21 MR. SHOPE: But it's -- okay.

22 MR. TANNENBAUM: Why don't we --

23 MR. SHOPE: I'm assuming that we would finish it up.
24 Is that --

25 MR. TANNENBAUM: Okay, so quickly, Brian, I believe

1 you referred to as -- you referred to Exhibit 17, 25, 22, and
2 24. Can I assume -- and then -- so we deferred on those. I
3 assume there's no objection for those exhibits going in the
4 record.

5 MR. DES ROSIERS: It's my understanding, subject to
6 discussion with Mr. Murphy, that for some of them, he intends
7 to only offer the portions that are included in his handout.
8 We have no objection to the inclusion of those portions of the
9 documents, not the complete files that he originally filed. So
10 with that, we have no objection.

11 MR. TANNENBAUM: So maybe that would be worth filing
12 in CMS, just the excerpts. And then the other ones that we
13 deferred ruling on during a case conference, would those be
14 considered withdrawn?

15 MR. MURPHY: I don't think I'm going to use them
16 tomorrow, but if we could wait till tomorrow.

17 MR. TANNENBAUM: All right, let's wait until
18 tomorrow. Okay, Ms. Bodell. Drew, would you like to lead us
19 off?

20 MR. LANDRY: Sure, why not. Good afternoon, Ms.
21 Bodell. I'm Andrew Landry. I'm counsel for Industrial Energy
22 Consumer Group in this proceeding. And I wanted to start with
23 a couple of follow ups from yesterday's hearing. I think you
24 mentioned at some point you discussed the fact that Hydro-
25 Quebec has some flexibility with respect to either delivering

1 power or making a financial make-whole payment in lieu of
2 delivering power. Do you recall making those comments?

3 MS. BODELL: I do.

4 MR. LANDRY: Would you agree that that's not an
5 unlimited right, that there is a certain minimum physical
6 deliverability that has to be done under the contract?

7 MR. SHOPE: I'm going to object to the form because I
8 think you're talking about deliverability versus delivered. I
9 mean, I think since you --

10 MR. LANDRY: Delivery --

11 MR. SHOPE: Delivery. Yeah, you said deliverability,
12 yeah.

13 MR. LANDRY: Thank you. Would you agree that there
14 is a minimum requirement for physical delivery under the
15 contract?

16 MS. BODELL: I would agree that there is a minimum
17 requirement for physical delivery. I think a lot of our
18 discussion yesterday was about the definition of what's
19 incremental to New England, and that definition allows for a
20 significant amount of reduction in what they're currently
21 sending into New England without any penalty whatsoever. And,
22 for example, in 2017 they delivered 18.2 terawatt hours into
23 New England. Under the Eversource and Unitil contracts,
24 they're only required to deliver three terawatt hours. And
25 under the other contract, it has a maximum of 9.45 with

1 adjustments that would take it down. So I think the
2 conversation yesterday did not speak to -- what's in the
3 contract with respect to total deliverable energy was focused
4 on the incremental aspects of delivering into New England which
5 all of the -- well, I'll speak for ourselves -- which the
6 economic benefits analyses was focused on.

7 MR. LANDRY: Okay. I don't want to dive too deep
8 into the PPA because I'm sure we'll bore everybody at this late
9 hour, but would you agree that the contract calls for a hundred
10 percent capacity factor but allows some flexibility to
11 substitute either financial payments or delivery in other
12 hours?

13 MS. BODELL: I would agree that the contract allows
14 for that flexibility. In both of those cases, either a
15 financial payment, which is why I referred to this more as a
16 put, and the second is with respect to the ability to do makeup
17 deliveries at other points during the period designated,
18 whether it's within the year, whether it's in the specific type
19 of hour, or whether it's a longer period.

20 MR. LANDRY: And again, I don't want to get into the
21 details, but is it your understanding that there's a limit to
22 the amount of substitution they can do?

23 MS. BODELL: I would agree with you that there is
24 language that attempts to limit that substitution at which
25 point the make-whole payments -- I think they're called cover

1 damages -- come into play. But I also indicated in my
2 surrebuttal report that the Hydro-Quebec guarantee, parental
3 guarantee, backing the support for these contracts is limited.
4 And therefore, if there is a benefit that Hydro-Quebec could
5 obtain by simply walking away from the contract because there's
6 a higher benefit than that parental guarantee, they would have
7 an economic incentive to do so. So at the end of the day, it's
8 going to be an economic decision, but the contract speaks for
9 itself.

10 MR. LANDRY: Thank you, I agree with that. And one
11 further question about the PPA and then we'll move along.
12 Which is would you agree that the contract requires the power
13 to -- or the contract to satisfy ISO New England's capacity
14 capability interconnection standard?

15 MS. BODELL: I agree that there is language in there
16 and a process by which that's to be obtained. And obviously if
17 there is a deliverability issue with respect to the contract,
18 there are repercussions with respect to whether or not the
19 contract and the project can proceed.

20 MR. LANDRY: Okay, thank you. And would you -- and
21 moving past the PPA, would you agree that the capacity
22 capability interconnection standard of ISO New England is
23 intended to ensure that energy is -- from particular units
24 seeking to interconnect is capable of qualifying for the
25 capacity market, at least physically capable of delivering the

1 power that -- for which capacity is proposed, it doesn't say
2 anything as to the MOPR or anything we'll talk about on Friday?

3 MR. SHOPE: I'm going to object to the form of the
4 question because --

5 MR. LANDRY: Sorry.

6 MR. SHOPE: -- it -- there -- it's a very complicated
7 clause that you're asking about and there were, like, three
8 different --

9 MR. LANDRY: Okay --

10 MR. SHOPE: -- concepts getting mashed up there.

11 MR. LANDRY: I'll maybe ask an open-ended question
12 which is could you describe your understanding of the capacity
13 capability interconnection standard of ISO?

14 MS. BODELL: I'd actually want to review that before
15 I gave you a description of that, but on a high level I can
16 say, in general, any ISO is going to want to ensure that a
17 connection is not going to adversely impact the reliability of
18 their system.

19 MR. LANDRY: Okay, thank you. Now, there's a lot of
20 discussion -- I'm sure we're going to have a lot of discussion
21 on Friday about the minimum offer price rule, and I really
22 don't want to talk about that today at all except to note that
23 in terms of whether Hydro-Quebec is able to qualify this energy
24 in the capacity market, one possibility is that it could have
25 -- or could qualify by having a low enough price under the

1 minimum offer price rule to be able to participate in an
2 auction. Is that fair?

3 MS. BODELL: So you're talking about a minimum offer
4 price which would be calculated as part of the minimum offer
5 price rule?

6 MR. LANDRY: Right, I'm saying if Hydro-Quebec seeks
7 to qualify this power in the capacity market, one possibility
8 is it would actually -- would satisfy the minimum offer price
9 rule and would be able to bid in the market?

10 MS. BODELL: I think that we'll talk more about this
11 on Friday. I would call it a theoretical possibility because I
12 think there's very strong evidence, including the spirit of the
13 minimum offer price rule as well as specific information that
14 we've provided about what we know publicly about Quebec's
15 system, that makes that theoretical.

16 MR. LANDRY: And another possibility is that it
17 doesn't qualify, but it does participate in a substitution
18 auction and replaces some existing units.

19 MS. BODELL: That most certainly is a possibility.

20 MR. LANDRY: And you discuss in your testimony, I
21 believe -- your initial testimony, I believe, at page 27 the
22 fact that Wyman might be one of the units that might seek to
23 retire. Is that -- or -- is that your recollection or is that
24 fair?

25 MS. BODELL: That is fair. In my original testimony,

1 I identified Wyman as a plant potentially at risk of being an
2 obvious choice for the substitution given its size but also the
3 fact that it is -- has been identified already as a plant at
4 risk of retirement by ISO New England. And so given that, plus
5 given the general characteristics of Wyman which I described, I
6 would see Wyman as being a candidate for potential
7 substitution. But then again, Wyman provides fuel diversity
8 and that has allowed for an RMR contract in other cases in this
9 market.

10 MR. LANDRY: And you also identified, I think on page
11 28, a number of gas units that you thought might be candidates
12 for substitution?

13 MS. BODELL: That's right. Again, my analysis did
14 not look at the details of their financials because I don't
15 have access to a critical component of that which is their
16 fixed costs. But just basically assuming that if they're not
17 operating to provide energy, they're not generating as much
18 revenue, and if they're large, they have larger fixed costs.
19 That would imply that the larger plants that are not operating
20 are potential candidates for substitution.

21 MR. LANDRY: Now, let's assume in your hypothetical
22 that ISO New England stepped in to support Wyman and, in fact,
23 some gas units retired in the substitution auction. In that
24 case, would a Hydro-Quebec contract with a capacity supply
25 obligation enhance the fuel security of Maine and New England?

1 MS. BODELL: Not necessarily, and let me tell you
2 why. And this goes to your first question about the contract
3 and the flexibility in the contract. Because there is this
4 minimum level that theoretically could be required to be
5 delivered under this contract and there is this contract in
6 place, it would make sense for Hydro-Quebec to deliver the
7 energy that it has available through NECEC and also potentially
8 bid capacity through NECEC but take that capacity away from
9 what they're currently bidding into New England through New
10 Brunswick and through New York. And the reason is because they
11 have to pay wheeling costs for selling that capacity and the
12 energy associated with it through New Brunswick and through New
13 York. And so, therefore, it would be less costly if -- under
14 our conclusion that they have very limited capacity to be able
15 to sell anyway, it would make economic sense for them to simply
16 shift their capacity supply obligations from the other
17 interties into NECEC, which would cause no net benefit
18 whatsoever, no net impact on capacity prices. As far as the
19 fuel diversification is concerned, the reality is Maine is the
20 most diversified fuel part of ISO New England, and some of the
21 gas that's supplied to those plants comes through a separate
22 line that is unrelated to the Algonquin city gate TETCO 3
23 congestion that has occurred during peak periods. So I'm not -
24 - I haven't done a thorough analysis, but there are just
25 general aspects of the way the gas plants in Maine are

1 connected that would make me believe it's not going to have a
2 benefit for the rest of New England from a fuel diversification
3 point of view even if those gas plants did retire.

4 MR. LANDRY: With respect to imports or delivery of
5 capacity through New York or Hydro-Quebec, does Hydro-Quebec
6 have a capacity supply obligation through those points?

7 MS. BODELL: Yes. So Hydro-Quebec has -- I mean,
8 this is in one of my workpapers. Hydro-Quebec has a capacity
9 supply obligation -- or qualified -- I'd have to look, but I
10 think they also did win their capacity supply obligation. They
11 both qualified and won the capacity supply obligation for I
12 think it's 300 megawatts through New York and -- I would have
13 to look up the number, again, it's in my workpapers -- but for
14 a certain amount through New Brunswick as well.

15 MR. LANDRY: Would they have to surrender those
16 capacity supply obligations?

17 MS. BODELL: If they, as we conclude, have a limited
18 amount of capacity and, therefore, they're trying to optimize
19 the capacity that they have, they would not have to surrender
20 that. It would just make an economic -- it would make economic
21 sense that if they have no more capacity to bid, that they
22 redirect the capacity they're currently bidding through New
23 York and New Brunswick into NECEC. Again, because they have
24 the lower cost of delivery since they're not paying the
25 wheeling charges.

1 MR. LANDRY: I understand that, but they have an
2 existing capacity supply obligation, yet they transfer to a
3 different delivery point?

4 MS. BODELL: They only do one year-to-year capacity
5 supply bid, and I think that's in part because it -- well, I
6 suspect it's because of the volatility of the water supply and
7 the capacity that they could have available on any year.

8 MR. LANDRY: So theoretically, it might not be
9 available at any particular time.

10 MS. BODELL: That's right. And in fact, as I showed
11 in the supplemental report, there were two years, FCA 9 and FCA
12 10 I believe, where Hydro-Quebec only qualified for 200
13 megawatts into the market. And they've recently been able to
14 qualify for more, but that just shows it was following a dry
15 year in 2013, and come 2014/'15 I think they bid conservatively
16 into the FCA. But I think it's important to see the variation
17 in what their historical qualification and clearing has been.

18 MR. LANDRY: Now if they didn't qualify, or didn't
19 seek to qualify, in the capacity -- forward capacity market,
20 would they still be eligible to receive payments from
21 generators who are penalized under the pay for performance
22 rules?

23 MS. BODELL: The pay for performance is tied to the
24 capacity supply obligation, and so if Hydro-Quebec does not
25 have a capacity supply obligation, they would not be subject to

1 those penalties or rewards.

2 MR. LANDRY: But if another unit, let's say a gas
3 unit in Maine, was unable to satisfy its obligation during a
4 peak period and had to pay a penalty, if Hydro-Quebec were
5 delivering during those hours, would they be eligible to
6 receive a portion of the payments?

7 MS. BODELL: The pay for performance which is part of
8 a capacity supply agreement, the answer -- I believe it's part
9 of the capacity supply agreement obligation, and so the answer
10 would be no. And that's part of the reason why some of these
11 plants are putting delist bids out, because there's a pay for
12 performance penalty that goes into their calculation.

13 MR. LANDRY: Let's say when they pay the penalty, the
14 money goes into a pool that's used to fund -- to pay folks who
15 do show up and provide capacity or are available during those
16 hours, is that right?

17 MS. BODELL: That's right. But I think, again,
18 subject to check, and we can look at this on Friday, but I
19 believe the pay for performance is a capacity supply obligation
20 payment. I know the penalties are only tied to whether or not
21 they had a capacity obligation and did not pay. I'd want to
22 check to make sure that the payment only goes to those that
23 did. But if it does go to all of the plants, then your theory
24 would be correct.

25 MR. LANDRY: All right, thank you.

1 MR. VANNOY: Just a follow up. If you take the
2 hypothetical that it goes to anybody who's supplying energy
3 during that scarcity period --

4 MS. BODELL: Correct.

5 MR. VANNOY: -- that they receive a payment in that
6 pay for performance incentive piece, how would you view that
7 with respect to some of the other economic incentives they have
8 to move their capacity around. I mean, does that change in any
9 way what you're saying with respect to their incentives?

10 MS. BODELL: It still would change what I'm saying
11 with respect -- it would not -- I don't think it would change
12 what I'm saying with respect to the incentives because there's
13 energy that would be flowing through NECEC. They'd be getting
14 a high price under the contract for that. And so under most
15 conditions, they're going to want to flow the energy under that
16 contract, especially because of some of these contractual
17 provisions, even though they have flexibility not to. So if
18 they're going to get paid no matter what, does it matter where
19 they're shifting their energy? No, but they still want to be
20 able to get the capacity supply payment. And, again, I'd want
21 to go back to the pay for performance to refresh myself on the
22 details of how the payout goes before I make a conclusion, but
23 I think generally, they still save on the New Brunswick
24 wheeling charge which is why they would put it through NECEC
25 irregardless -- if the pay for performance -- so let me step

1 back. If the pay for performance payment occurs just because
2 they're delivering energy, that in and of itself would not
3 impact whether they sell it through New Brunswick or through
4 NECEC. It's the fact that there's a wheeling charge through
5 New Brunswick that they have to pay that would have to be
6 compared to a fixed payment that they already have to make
7 under the TSA. So they can avoid the New Brunswick
8 transmission fee if they sell it through NECEC. I hope that
9 makes sense.

10 MR. VANNOY: No, I followed. Thanks.

11 MR. LANDRY: We talked a little bit about delisting
12 here and the possibility of some units in Maine seeking to
13 delist. Am I correct there's two types of delist bids that
14 plants can pursue? One is a dynamic delist bid and another is
15 a static, is that the right term?

16 MS. BODELL: That is correct.

17 MR. LANDRY: And one of those is -- contemplates the
18 full retirement of the unit and the other one contemplates that
19 the unit would remain operational and simply participate in the
20 energy market or whatever else it wants to do?

21 MS. BODELL: Yes.

22 MR. LANDRY: If the unit selected the option of
23 remaining open, would those -- are those units eligible to
24 receive payments from the pay for performance penalties? Maybe
25 it's the same question I asked before.

1 MR. SHOPE: I'm sorry, you said remaining open, and
2 I'm not sure what -- I guess formally it's an objection to the
3 form of the question, but I -- maybe you could rephrase it.

4 MR. LANDRY: Yeah. Would those units be eligible to
5 receive any payments in the event that there was units paying a
6 pay for performance penalty?

7 MR. SHOPE: Drew, again, objection because I'm not
8 sure what unit -- you said units that are open which I don't
9 think is a term.

10 MR. LANDRY: Right. I'm referring to the units that
11 have delisted but have remained operational. If they remain
12 operational and they are able to operate during peak hours when
13 pay for performance penalties are incurred by some units, would
14 they be eligible to receive payments as a portion of the
15 penalties?

16 MS. BODELL: Again, I'd really like -- you know,
17 sometimes these rules are very complex and they have clauses
18 and subtle aspects. I'd like to refresh myself on the pay for
19 performance rules and get back to you on that.

20 MR. LANDRY: Sure.

21 MS. BODELL: My original thought is that the pay for
22 performance penalties and rewards are only paid to companies
23 and plants that have a CSO, that have qualified and cleared the
24 capacity market. But there may be some exceptions or clauses
25 or under -- you know, they're just -- or state of emergency.

1 So I just -- I really would like to review those rules before I
2 make a definitive statement to say that somebody who no longer
3 has a CSO and is operating as an energy-only resource, whether
4 or not they would be eligible for the upside of a penalty -- of
5 a performance pays program but not the downside. They most
6 certainly would not be part of the downside. I just need to
7 review the rules to see if they'd be part of the upside.

8 MR. LANDRY: All right, thank you.

9 MR. SHOPE: And it's not within the scope of his
10 testimony, but if you'd like to ask that question of Mr. Fowler
11 on Friday, then certainly by all means.

12 MR. LANDRY: Thank you. Now those units -- a unit
13 that does choose to remain open if it's a -- after they delist,
14 presumably it might be -- a lot of these units in Maine have
15 been running as peaking units. Is that fair?

16 MS. BODELL: That is true.

17 MR. LANDRY: And if they did have available fuel
18 supply and were able to run during peak hours, whether that's a
19 winter unit that has oil available or a unit in the summer, a
20 gas unit, any -- during the summer, they would be -- have the
21 opportunity to receive some of those high prices during those
22 extreme peak hours.

23 MS. BODELL: That is true. However, a lot of those
24 plants are receiving revenues under the capacity market, and
25 the question is, from an economic decision point, they now have

1 less flexibility with respect to the source of their revenues.
2 They're permanently out of -- if they substitute out through
3 CASPR, they're permanently out of the capacity market, and,
4 therefore, changes in energy prices -- they'd be more sensitive
5 to changes in energy prices.

6 MR. LANDRY: Sure, okay, thank you. Now, with
7 respect to these -- the low-capacity factor units that you had
8 identified, again, I think at pages 27 and 28 of your
9 testimony, I believe a number of them were operating in the,
10 you know, 15 percent capacity factor plus or minus. Is that
11 your recollection?

12 MS. BODELL: I'll say that the chart speaks for
13 itself because we did calculate what the capacity factors are,
14 but most certainly they are not operating very often. They are
15 not even peak operators, they're super-peak operators that
16 operate during the most extreme pricing situations.

17 MR. LANDRY: And when do those most extreme pricing
18 situations occur?

19 MS. BODELL: Those extreme pricing situations
20 generally occur during the summer peak hours when load is
21 highest. They also can occur in the winter because of the
22 higher gas prices that happen not just in New England, but most
23 of the markets, just because of the winter cold, results in a
24 higher demand for gas from residential and industrial and
25 commercial consumers, mainly for the heating. So generally the

1 peak prices in New England occur in the summer and the winter.
2 However, as we discussed yesterday, there are some anomalies
3 that can occur during the shoulder months tied to the fact that
4 that's when a lot of the generators are scheduled for
5 maintenance. And so, therefore, often that tight supply can
6 create some anomalous price spikes. Generally, the higher
7 prices are going to occur -- the super peaks are going to occur
8 in the winter and the summer.

9 MR. LANDRY: Now, with respect to the gas units that
10 you'd identified in your chart on page 28, if the price spike
11 is being caused by a shortage of gas, those units probably were
12 not running during the gas period -- the peak winter period?

13 MS. BODELL: I would say no. I think if the gas
14 plants are not operating during the winter peak period, it's
15 generally because they're not economic and the oil is a lower-
16 priced option. And so the oil plants will be coming online,
17 the dual-fuel units will be coming online, and oil will start
18 to set the price instead of natural gas. So I don't think that
19 you can't look at a gas plant as being unable to get the supply
20 and that's why they're not operating. I think the market
21 prices send a very good price signal which say, look, you can
22 operate, you can get the gas, but it's going to be very
23 expensive, but there's a cheaper alternative, which is this oil
24 plant over here, so we're going to operate the oil plant
25 instead. And that's the nature of the New England system with

1 the dual-fuel capability and the oil units. New York has a
2 similar type of situation.

3 MR. LANDRY: Do you think that a fair number of the
4 hours that the gas units are running are summer afternoons?

5 MS. BODELL: I would expect that to be the case, yes.
6 Again, summer and winter, but summer afternoon I would expect,
7 if it's a very hot summer, that there'd be a summer day they'd
8 be operating.

9 MR. LANDRY: You agree that the development of
10 additional solar facilities in Maine and New England may tend
11 to cause the capacity factor of these units to reduce as well?

12 MS. BODELL: So the answer -- the question is simple.
13 The answer is more complicated because I think what you're
14 talking about now is what's called the duck curve and that's
15 where there's actually a dip in the load in the middle of the
16 day in the summer because the solar is providing energy and
17 offsetting the need for energy to be delivered to residential
18 consumers who would otherwise have air conditioning load
19 because the solar panels on the roof are offsetting that. And
20 in that case, what you would expect is that an inefficient gas
21 unit might not operate but, in fact, those inefficient gas
22 units happen to have the fastest ramp up speeds. And so they
23 happen to be needed often to be able to make up the difference
24 when the solar gets covered by a cloud. If a cloud comes over
25 all of a sudden, the load gets up. And so there's a lot more

1 volatility that requires ramping capability, and that can be
2 paid for through ancillary services and that can be a valuable
3 revenue source for these inefficient but fast ramp up/ramp down
4 plants.

5 MR. LANDRY: The capacity factor only reflects the
6 hours generation, it doesn't reflect ancillary services.

7 MS. BODELL: Well, the ancillary services are a non-
8 spinning reserve or spinning reserve. But to the extent
9 they're required to inject into the system to cover when the
10 cloud comes over, then there's energy being injected into the
11 system to do that. And so you would see that would go into the
12 capacity factor calculation. But again, I said it's a
13 complicated answer to what seems like a simple question. You
14 really have to run the analysis to see what the solar load is,
15 how these plants are needed, and how increased solar is going
16 to impact their capacity factor. But, in general, I would
17 expect with lower super peaks, there could be a lower capacity
18 factor for those units.

19 MR. LANDRY: Thank you. One more area. Would you
20 agree in general that the cost of energy has a direct impact on
21 whether businesses are -- can be profitable if energy's an
22 important part of their cost structure?

23 MS. BODELL: Yes, to the extent that energy is an
24 important input to a manufacturing process or any business,
25 then the price of that energy impacts their profitability.

1 MR. LANDRY: So to the extent that you see a
2 reduction in the price of energy, businesses would have --
3 potentially have available funds to hire new workers or to
4 expand their property, their -- expand their business
5 locations.

6 MS. BODELL: I think it depends on how big that price
7 reduction is and how much of the cost that energy component is
8 of the total cost structure as well as what the investment
9 requirements are and even if there is an opportunity to expand
10 to produce more. So it's not a simple relationship. There's a
11 lot of threshold numbers that would need to be analyzed.

12 MR. LANDRY: But the tendency would be, if you have
13 more available money, you -- I mean, you may just decide to
14 keep it as a business owner, but you also may decide that,
15 given the lower cost structure, it's an opportunity to expand.

16 MS. BODELL: Again, I will agree with you that lower
17 costs are beneficial to businesses. What they do with that is
18 very unique to those businesses.

19 MR. LANDRY: Do you have a sense of how significant
20 energy costs are to the operation of paper mills and similar
21 manufacturers?

22 MS. BODELL: My understanding is that it's a large
23 portion of their costs, but I don't know the relative portion
24 or how that compares to the fixed costs.

25 MR. LANDRY: Are you aware that a number of paper

1 mills have permanently closed in Maine over the last four or
2 five years?

3 MS. BODELL: I am aware of that, but I don't know
4 what the cause is, whether it's tied to energy prices, whether
5 it's tied to a change in the market, or if there are other
6 costs that have increased like gas or any of the other costs
7 that go into producing and delivering.

8 MR. LANDRY: Fair enough. Thank you very much.

9 MS. BODELL: Sure. You're welcome.

10 MR. TANNENBAUM: Dot?

11 MS. KELLY: Thank you. Thank you, Ms. Bodell. My
12 questions are all going to be about the same kind of topic to
13 better understand how if, let's say, the TDI transmission line
14 was built or the Northern Pass line was built or if the CMP
15 line was built, how it impacts things like the indirect savings
16 to energy costs, CASPR, LMP in Maine, and zonal separation in
17 Maine. So I'm going to start from the beginning, but I was
18 just giving you a flavor.

19 MS. BODELL: Thank you.

20 MS. KELLY: So referring back to Mr. des Rosiers'
21 questions on the TDI proposal, are you familiar with that 83D
22 project to kind of use that or would it be better to use the
23 Northern Pass or can you do both?

24 MS. BODELL: Why don't we use a generic project?
25 Because I think whatever your questions are, I don't have

1 enough detail about any of the projects, and if I did, I
2 wouldn't be able to share it. So let's talk about a general
3 transmission project.

4 MS. KELLY: Okay, located in different areas.

5 MS. BODELL: And coming from Quebec into New England
6 is, I assume, your condition.

7 MS. KELLY: Correct.

8 MS. BODELL: Okay.

9 MS. KELLY: Is it fair to say that you're going to do
10 that response in a way that's an evaluation as done as a but-
11 for analysis? So it's -- you're going to try to just have that
12 be the one thing that's changing in the answers that you're
13 going to give to me?

14 MS. BODELL: That's exactly right. And when you do a
15 benefits analysis for transmission, you look at what are the --
16 what would happen without the project, what would happen with
17 the project. And the only thing you change is the addition of
18 the project when you run the models. There may be some
19 ancillary things that have to be adjusted because of the
20 project, but generally you would just change that one thing. I
21 haven't seen a benefits analysis that does a comparison where
22 you take an historical number even though you know the future
23 is going to be different and put it in. Generally, you do your
24 projection forward, what is it going to be, and then put in the
25 new project.

1 MS. KELLY: And so I recognize it's difficult
2 because, from your testimony of yesterday, there's that
3 additional question of is this incremental power that's coming
4 in or how much from Hydro-Quebec will impact it. So I'm hoping
5 in your answers you'll address what your basis is. So I'd like
6 to start from where Mr. Landry was questioning you. Assuming
7 the transmission line through Maine and then a transmission
8 line leading into Massachusetts from New Hampshire or Vermont,
9 would that have any significant impact on the price of energy
10 in Maine due to the indirect savings?

11 MS. BODELL: So in general, as our analysis showed,
12 an injection of energy into market is going to have an impact
13 on prices. I think what is critical in this case is if there's
14 a contract that's going to determine how much energy is going
15 to be injected into the system, you would -- and you have
16 access to that contract, you would want to take those details
17 into account. So given that the supplier is the same in the
18 three examples that you provided, I think it would be important
19 to get the details of that contract and analyze what the
20 economic incentives are and how that impacts the benefits in
21 New England. We assumed, as I've already said, that this is an
22 injection that comes in. There's not a redirection from New
23 England even though we did look at the economics and assume a
24 diversion from New York. Again, you'd want to look at the
25 details of ow much is going to be delivered and under what

1 conditions given the contract. If you don't have the contract,
2 you try to make an educated guess about what the injections of
3 energy are going to be.

4 MS. KELLY: So yesterday some of the questions were
5 just assuming what you assumed in your original modeling which
6 showed a pretty significant indirect benefit. Can you speak to
7 how that would be the same or different with a line that was
8 not going through Maine but an adjacent location into
9 Massachusetts?

10 MR. SHOPE: I guess I'm going to object to the form
11 of the question. I'm not sure what is meant by significant or
12 what is meant by indirect. I think the modeling related to the
13 effect on the wholesale energy market prices. And I think
14 indirect has been a discussion at least in the expert reports
15 with regard to jobs or perhaps a multiplier effect, that sort
16 of thing.

17 MS. KELLY: Okay, please ignore the indirect part.

18 MS. BODELL: So, Dot, could you please repeat the
19 question?

20 MS. KELLY: Sure. Using your model that you did for
21 the original testimony, could you describe whether there would
22 be a difference between a line in Maine, like CMP, and a
23 similar line in an adjacent state?

24 MS. BODELL: Okay.

25 MR. TANNENBAUM: So I think the question is if you

1 had a similar line in New Hampshire or Vermont, would there be
2 similar benefits in terms of energy and capacity reductions.

3 MS. BODELL: Right, and I think also she's asking us
4 to use our original assumption that doesn't get into the
5 details of the economics of the contract and when energy would
6 be injected but simply looks at -- assume it all comes into New
7 England and anything else that would have been sold into New
8 England continues to be sold into New England. So under that
9 -- under those conditions, there would be differences between
10 the impacts of a line that's coming directly into Maine and a
11 line that's coming into, say, Vermont or New Hampshire. You'd
12 have to run the model to know how that impacts the locational
13 marginal prices because it is about transmission constraints,
14 and I don't think anybody can do that in their head. It's very
15 complicated. But I think the key difference that we did
16 emphasize is the impact on the capacity market, the fact that
17 Maine, with NEC (sic) coming into Maine, it would bind. We
18 talked about this yesterday, that that would not be the case if
19 it was going into another marketplace. And so our conclusion
20 is that there is a higher likelihood you would have the
21 retirements in Maine with NECEC and, although there's still a
22 risk, it's a lower risk with respect to a transmission line
23 that would go into another part of the region.

24 MS. KELLY: And could you address the zonal
25 separation that has been described? Would that still be the

1 same? Would Maine be considered a separate zone at this point?

2 MS. BODELL: So again, it depends where that other
3 transmission line would be coming in. If that other
4 transmission line is coming into New Hampshire or Vermont, it
5 would still be part of the northern zone which is already a
6 separate capacity zone. If it were going into Massachusetts,
7 for example, then it wouldn't -- it'd have a different impact.
8 But, again, we're getting into some of the details of the way
9 that the capacity markets work, and Mr. Fowler is, frankly, an
10 incredible expert on that because he has sat in those meetings
11 multiple days and hours across the year.

12 MS. KELLY: As always, thank you very much for your
13 responses.

14 MS. BODELL: Thank you, Ms. Kelly.

15 MR. TANNENBAUM: Sue?

16 MS. ELY: Actually, my question was the zonal
17 question, and that was just covered. So no questions.

18 MR. TANNENBAUM: Okay. John, redirect?

19 MR. SHOPE: Yes, Ms. Bodell, when you were being
20 questioned by Mr. des Rosiers, you -- he asked you about, you
21 know, your observation that in light of what you now know about
22 Hydro-Quebec's exports to New England last year -- and I think
23 you had mentioned the 18 terawatt hours -- in relation to the
24 thresholds for incremental under the Massachusetts contracts
25 and you had mentioned three terawatt hours for Eversource and

1 Unitil and around nine and a half terawatt hours for National
2 Grid, at the end of that -- and you had mentioned in connection
3 with all of that that you believe that potentially all of the
4 power that was currently being -- or that would be sold on
5 NECEC could be redirected from power that was already being
6 sold to New England. You remember that generally?

7 MS. BODELL: I do remember that, yes.

8 MR. SHOPE: And you had mentioned that this would
9 very significantly affect the determination of whether there
10 was any price benefit in Maine.

11 MS. BODELL: That's correct.

12 MR. SHOPE: Okay. And I believe Mr. des Rosiers
13 asked you a question just in general, well, if there's not
14 going to be price suppression or at least to the same extent,
15 why do the generators care about that. So I guess the question
16 would be why would generators in Maine care about the proposed
17 NECEC project or be concerned about it in light of the
18 information that you now have about the historical Hydro-Quebec
19 sales in relation to the thresholds under the contracts?

20 MS. BODELL: Yes, so if what Hydro-Quebec ends up
21 doing is, without NECEC, it would have sold into Maine through
22 New Brunswick but instead decides to sell that energy through
23 NECEC, there would be no difference in the energy price for the
24 most part. There might be some minor changes, but generally
25 it's going to be about the same. So that would mean no energy

1 market benefits or impacts in Maine. On the other hand, if it
2 came out of, say, western Massachusetts and was injected into
3 Maine, all else equal, you would have the higher congestion,
4 the higher losses. And, therefore, since the LMP that the
5 generators receive is composed of the energy price plus the
6 losses, plus the congestion, there would still be an impact on
7 the energy market price in Maine, that LMP price in Maine, but
8 it would be less than what I calculated. That said, there
9 could still be an adverse impact on the energy market price for
10 the generators. So I would think they would be impacted --
11 adversely impacted by that.

12 MR. SHOPE: Now, Mr. des Rosiers asked you about a
13 cold snap that had occurred just about a year ago in late
14 December of 2017, the very beginning of January of 2018.

15 MS. BODELL: Yes.

16 MR. SHOPE: You recall that? Okay. And I believe
17 you had testified that you had some familiarity with that
18 situation.

19 MS. BODELL: I did. For a client that I can't
20 disclose, they asked us to do a detailed analysis of what
21 happened during that cold snap, what caused it, why did it
22 happen, what happened with prices in New England, is this a
23 capacity constraint on the gas pipelines coming into New
24 England, is it something else. So we did that analysis. And
25 part of what we looked at as part of that analysis was where

1 was the energy coming from in New England, who was supplying
2 the energy during that cold snap, that period of time.

3 MR. SHOPE: And did you -- well, actually maybe we
4 can just circulate the next document and you can tell us what
5 that is.

6 MS. BODELL: Yeah, so one of the things we looked at
7 was the imports, how were the imports impacted during the cold
8 snap, did they stay the same, did they go up, did they go down.
9 And this, what's being passed around, is one of the slides from
10 the presentation that we made to our client. It was slide six
11 -- I don't know off the top of my head, maybe it was around 25
12 pages, 30 pages, the entire deck -- analyzing what had
13 occurred. We also did some memos and we did some commentary on
14 some of the public statements that were issued by ISO New
15 England as part of our analysis. But this particular page, and
16 this was -- could I get a copy, Steve? Thank you. So this
17 particular page, I was trying to pull it up yesterday -- and
18 when you're on the stand, you can't do things as quickly as you
19 think -- because I vaguely remembered that we had found that
20 the imports have gone down. And, in fact, what this shows --
21 it comes from the ISO New England morning reports, and the gray
22 box in this chart is during the cold snap, December 26th, 2017
23 to January 8th, 2018. It looks at, on these colored bars,
24 whether something's coming in from New York ISO across each of
25 the three interties, whether it's coming into New England

1 through New Brunswick, or whether it's coming in through Phase
2 II which, as you know, is directly connected to Quebec, or
3 whether it's coming in from High Gate which is also directly
4 connected to Quebec but tends to be a pretty standard contract.
5 And what you see is during that cold snap -- and again, this
6 was just a statement that we made in April at the bottom in the
7 brown box -- Canadian imports from Quebec fell by around one-
8 third and that's specifically the Phase II line. It was
9 predominantly the Phase II line, although, as you can see from
10 some of the blue bars, High Gate also went down. And
11 interestingly, if you look at the orange bars, those are
12 imports coming in from New Brunswick, and you see that those
13 also had some variation as well. And the conclusion is, from
14 this, that during that very cold peak period in the winter of
15 2017 and '18 the Quebec imports into New England fell by around
16 one-third.

17 MR. SHOPE: But what was happening to prices in New
18 England at the time of the cold snap?

19 MS. BODELL: Prices -- as we discussed yesterday,
20 prices were very, very high. They weren't necessarily being
21 set by the gas price, although some of the hours were. There
22 was also prices being set by the oil price, but it was still a
23 very high-priced period in New England. It would be a time
24 when you would have the most incentive to sell every single
25 megawatt of energy that you could into New England. And yet,

1 during that time, it was also cold in New York, it was also
2 cold in Quebec, and there were other competing needs. We don't
3 know exactly what was going on with those systems. All we know
4 is that the total imports coming into New England from Quebec
5 during that period was one-third lower than the surrounding
6 days.

7 MR. SHOPE: Okay, and I think Mr. des Rosiers had
8 asked you about what potential benefit the NECEC line would
9 have if there -- a similar cold snap were to occur if the
10 project goes forward. And so could the same thing happen?

11 MS. BODELL: So assuming they haven't shifted their
12 capacity supply obligation into NECEC, there's enough
13 flexibility in the contract that during the super peak cold
14 days Quebec does not have to deliver. As long as they were to
15 make it up during other hours, they would be fine and wouldn't
16 suffer any penalty. And then, of course, the incremental
17 calculation is on a year-by-year basis. But with respect to
18 fuel security or deliverability during the time when New
19 England needs it most, there's so much flexibility in that
20 contract that I wouldn't count on it.

21 MR. SHOPE: That's it for the generator interveners.

22 MR. TANNENBAUM: Okay. Anything else for this
23 witness?

24 MR. SHOPE: Oh, yes. I'm sorry, yes. Just to
25 clarify, we would like to have what's just been passed around

1 as Generator Intervener 29.

2 MR. WILLIAMSON: Do you have an extra copies of that?

3 MR. BARTLETT: Yes, we do actually. Sorry.

4 MS. BODELL: Steve, there are three important people
5 in addition to all the other important people in this room.

6 MR. TANNENBAUM: So --

7 MR. SHOPE: I'm sorry, did you folks not have copies
8 of that when we were going over it?

9 MR. WILLIAMSON: I have it.

10 MR. TANNENBAUM: Okay, so any objections?

11 MR. DES ROSIERS: Since we've just been provided this
12 and this is an Energyzt report as opposed to an ISO New England
13 report, I would want to do -- have a better understanding. The
14 source is listed as analysis of ISO New England morning
15 reports. It's not necessarily identifying the source of the
16 data, and this is ISO data. So we have some foundational
17 issues as to --

18 MR. SHOPE: Well, it is ISO data, and so we -- I'm
19 happy to -- then we can have that emailed to Mr. Simpson and
20 then we can circulate that as well if you'd like or we can have
21 -- or if you'd like to cross examine Ms. Bodell as to what the
22 source of the data is, that's fine too. But I --

23 MR. DES ROSIERS: If I may suggest, if counsel for
24 the generator interveners can share the source data, we can
25 look at it and then -- and reserve on an objection or reserve

1 on asking any questions of Ms. Bodell with respect to her
2 analysis that's just been provided to us.

3 MR. TANNENBAUM: Okay, so we'll defer ruling.
4 Anything else for today? Thank you, Tammy.

5 MS. BODELL: Thank you.

6 MR. TANNENBAUM: See you Friday. We'll probably see

7 --

8 MS. BODELL: All right, we'll see you Friday.

9 MR. SHOPE: And tomorrow is nine o'clock if my memory

10 --

11 MR. TANNENBAUM: Yes, it is.

12 CONFERENCE ADJOURNED (January 9, 2019, 4:51 p.m.)

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C E R T I F I C A T E

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I hereby certify that this is a true and accurate transcript of the proceedings which have been electronically recorded in this matter on the aforementioned hearing date.

D. Noelle Forrest
D. Noelle Forrest, Transcriber

Kennebec Valley

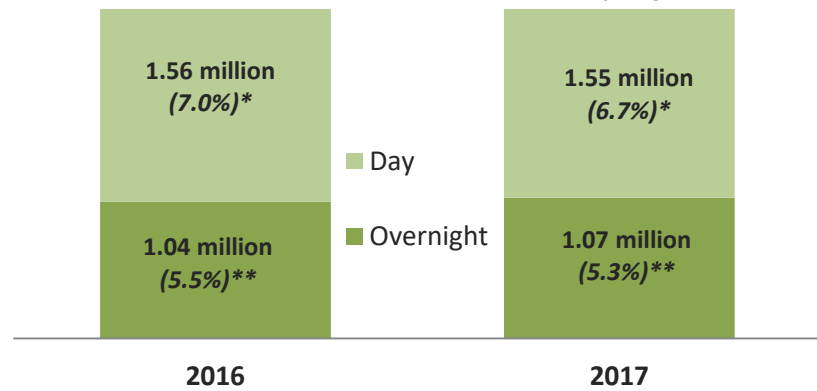
2017 Regional Tourism Impact Estimates



An estimated **2.6 million visitors** came to the Kennebec Valley region in 2017, a 0.7% increase over 2016.

2016 Total 2.60 million <i>(6.3% of All Maine Visitors)</i>	2017 Total 2.62 million <i>(6.0% of All Maine Visitors)</i>
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Number of Visitors to the Kennebec Valley Region



* Percent of estimated total Maine day visitors
 ** Percent of estimated total Maine overnight visitors

Year-over-year changes in visitation estimates fall within standard statistical margins of error and, therefore, should not be interpreted as absolute, significant fluctuations in visitation. Valid indicators of change include ongoing trends over multiple years, as well as noted statistically significant changes.

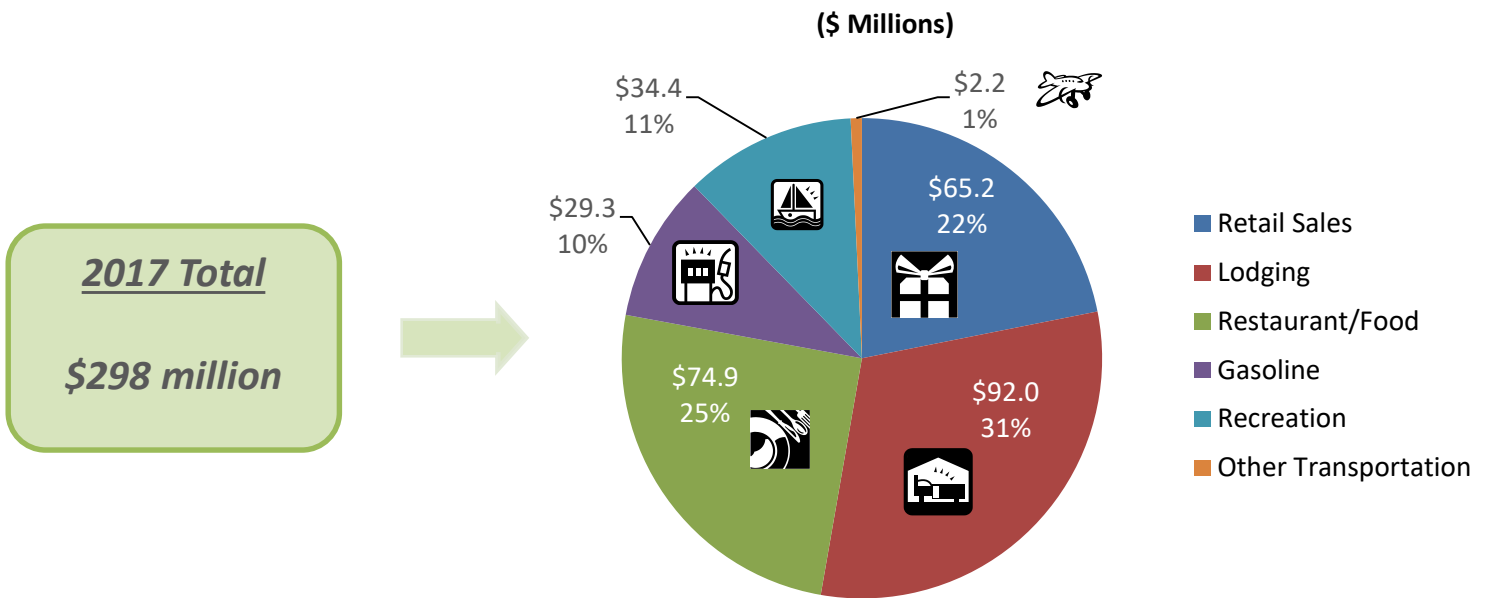
• For the purposes of visitation and visitor expenditure estimates, only visitors on tourism-related trips are included. Tourism-related trips include: All leisure trips, trips that are a general visit to see friends or relatives, a wedding, a holiday visit, and business trips that are for a convention/conference/trade show or training/professional development.



Kennebec Valley

2017 Regional Tourism Impact Estimates

In 2017, Kennebec Valley visitors spent nearly **\$298 million**, down 1.9% from 2016.



The \$298 million spent by visitors in the region supported...

Economic Impact begins when a visitor spends money in an area. The benefits to the local economy go beyond the basic impact of these dollars spent – these dollars create a chain effect. The effects of these expenditures are evident as the direct recipients of these expenditures in turn pay wages, earn income, and pay taxes. Further these secondary recipients spend *their* income and thereby create more impact.

4,901 jobs

\$95.7 million in total earnings

\$27.6 million in total taxes

- For the purposes of visitation and visitor expenditure estimates, only visitors on tourism-related trips are included. Tourism-related trips include: All leisure trips, trips that are a general visit to see friends or relatives, a wedding, a holiday visit, and business trips that are for a convention/conference/trade show or training/professional development.
- For the purposes of expenditure estimates, visitors are defined as all overnight visitors and all out-of-state day visitors on tourism-related trips.
- Economic Impact is estimated using DPA visitor expenditure estimates, and the RIMS II Economic Impact model.

**Winter Recreation Impact Survey
February 2019
Conducted by Sandra Howard, PhD**

Summary:

This online survey was distributed electronically and participants responded during a 4-week period between January 18-February 18, 2019. The prompt to participants read as follows: “We are collecting data about the winter recreation experience in western Maine. These data will be used in response to a proposed 145-mile transmission line through Maine, which would include crossing many mountains, wetlands, and waterways in an undeveloped region of western Maine.”

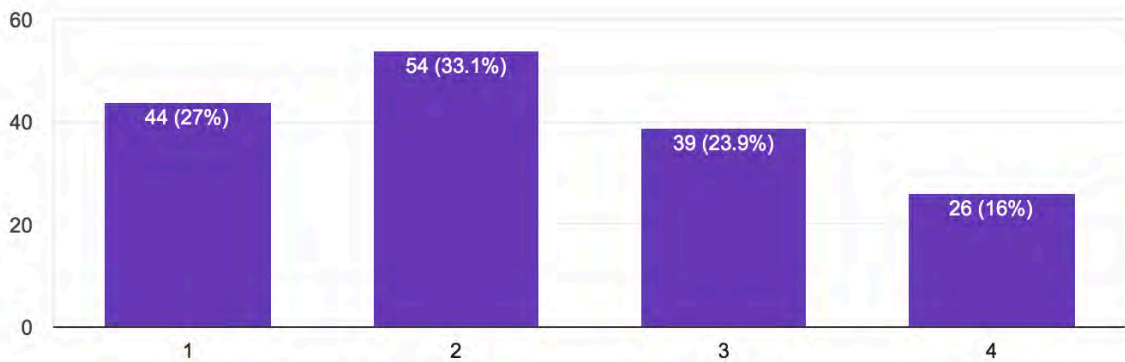
- 163 Participants
- State of Residence
 - Connecticut (8.0%)
 - Maine (65.6%)
 - Massachusetts (17.8%)
 - New Hampshire (4.3%)
 - Other – Maryland, New York, Virginia, Pennsylvania (4.3%)
- Year of most recent trip to Maine
 - 2019 (84.6%)
 - 2018 (13.5%)
 - 2017 (1.9%)
- Duration of most recent trip to western Maine
 - 1-2 days (14.1%)
 - 3-4 days (40.4%)
 - 5 or more days (30%)
 - Seasonal Resident (3.9%)
 - Year-Round Resident (11.6%)
- Number of times traveled to area to participate in winter rec. activities
 - 1-5 times (8.6%)
 - 6-10 times (11.6%)
 - 11-15 times (7.4%)
 - 16-20 times (7.4%)
 - 20+ times (65%)
- Activities engaged in on most recent trip to area (*select one or more)
 - Purchased Fuel (91.4%)
 - Purchased Meals/Drinks at Local Restaurant (90.8%)
 - Snowmobiling (86.5%)
 - Purchased Grocery Items (81.6%)
 - Viewed scenery (75.5%)
 - Purchased Retail Items (68.1%)
 - Stayed at Area-Owned Home (55.2%)

- Stayed at Area-Lodging Accommodations (50.3%)
- Snowshoeing/Winter hiking (39.9%)
- Ice Fishing (39.3%)
- Cross-country skiing (19%)
- Rented Snowmobile (6.7%)
- Other (6.6%)
- Hired Snowmobile Guide (1.8%)

• RATE EACH FACTOR FOR SELECTING A SNOWMOBILE DESTINATION:

Driving distance from home

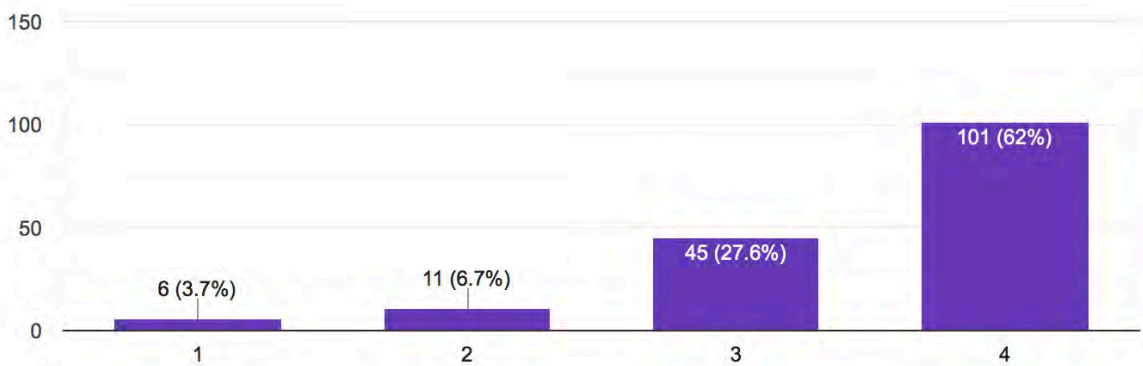
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Trail conditions

163 responses

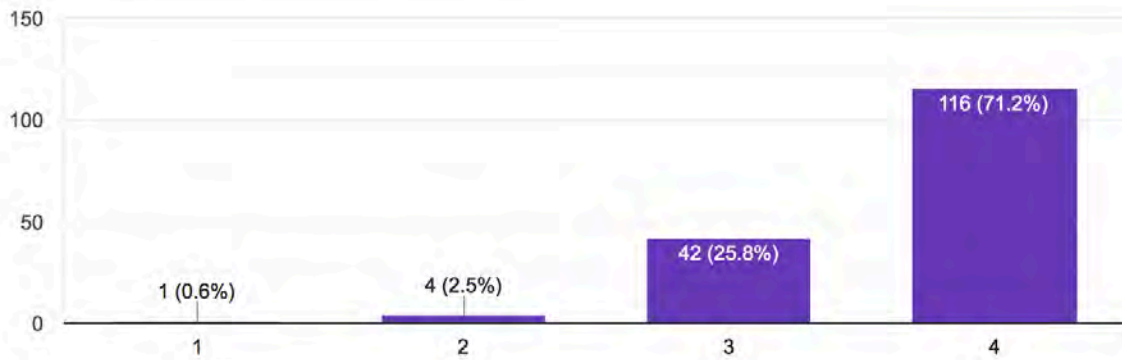


SCALE (1 = Less Important; 4 = Very Important)

Scenic beauty along snowmobile trails



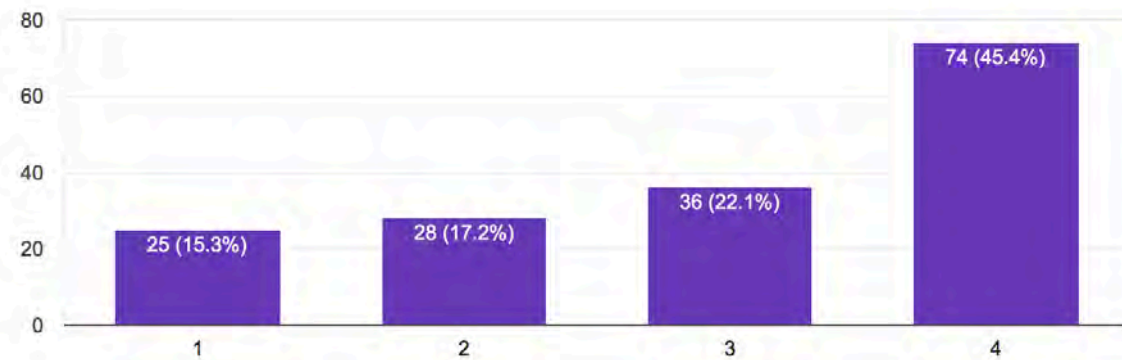
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Ability to participate in other recreation activities (i.e. ice fishing, snowshoeing, x-country skiing, etc.)

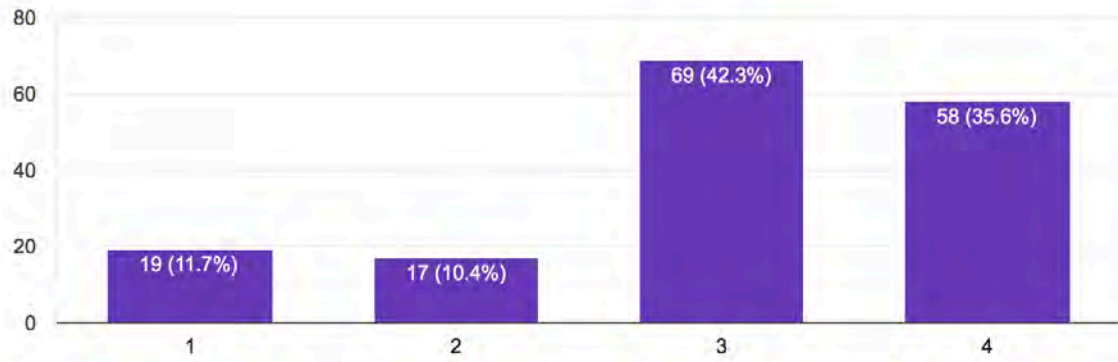
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Accommodations

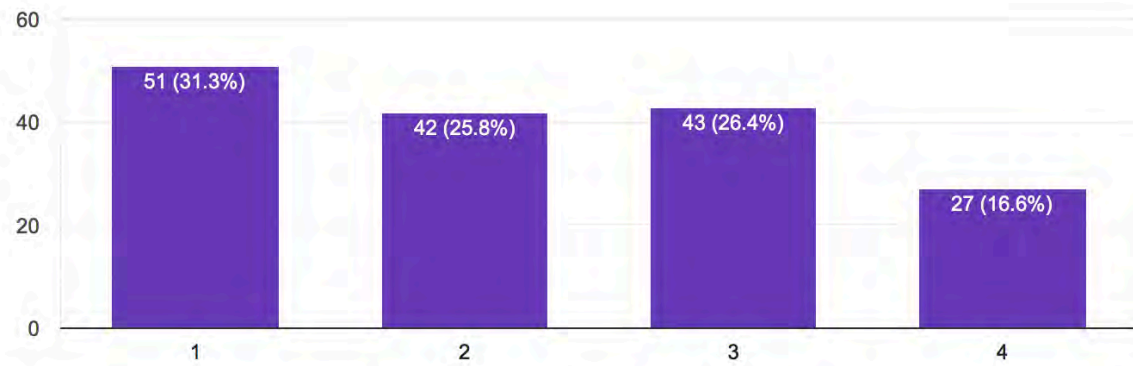
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Internet Access

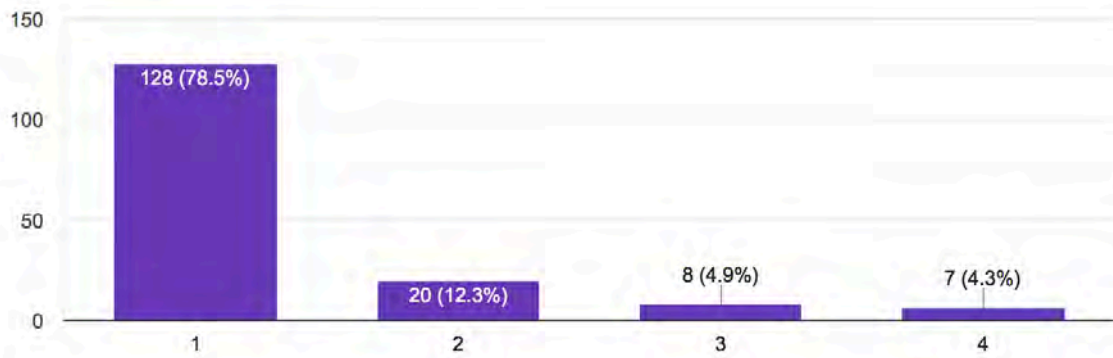
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Opportunity to view large-scale utility infrastructure in the area

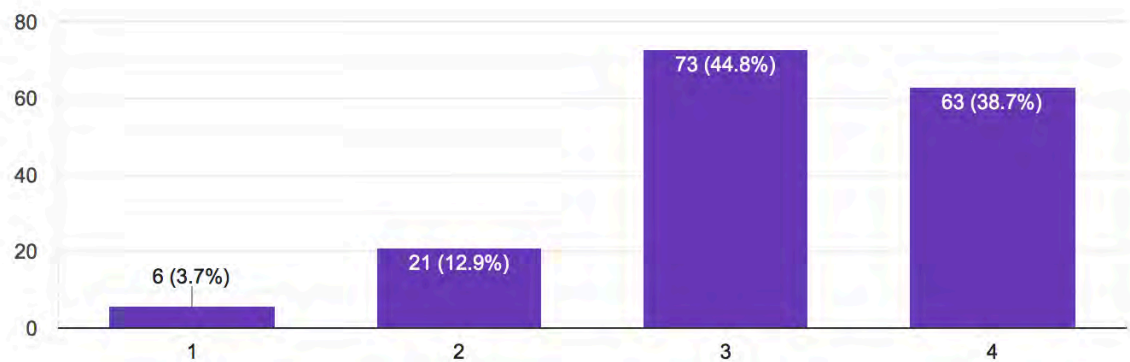
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Restaurants

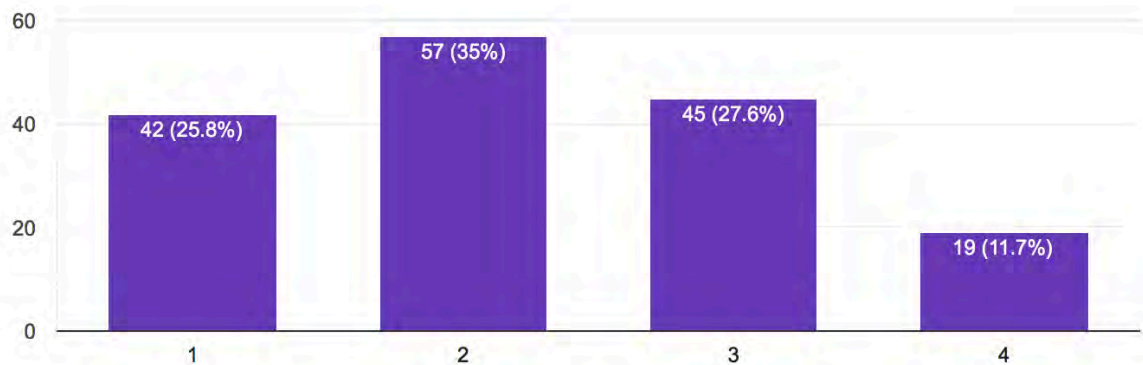
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Shopping

163 responses

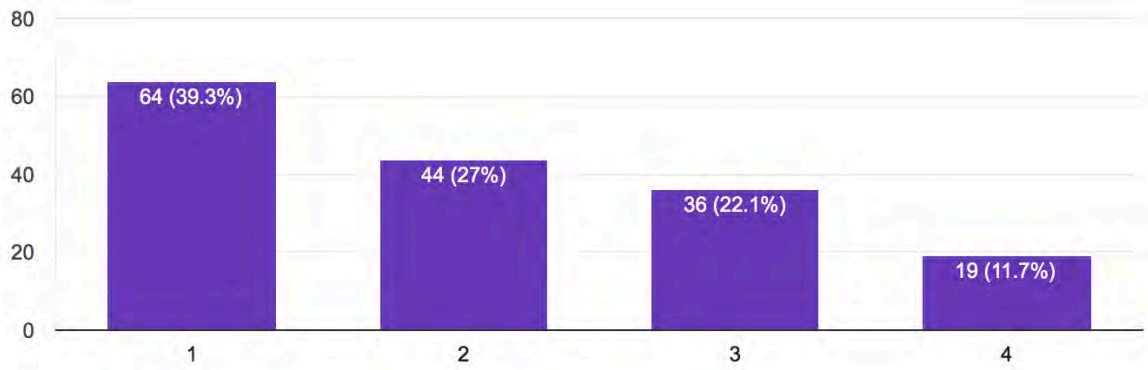


SCALE (1 = Less Important; 4 = Very Important)

Area Rentals



163 responses

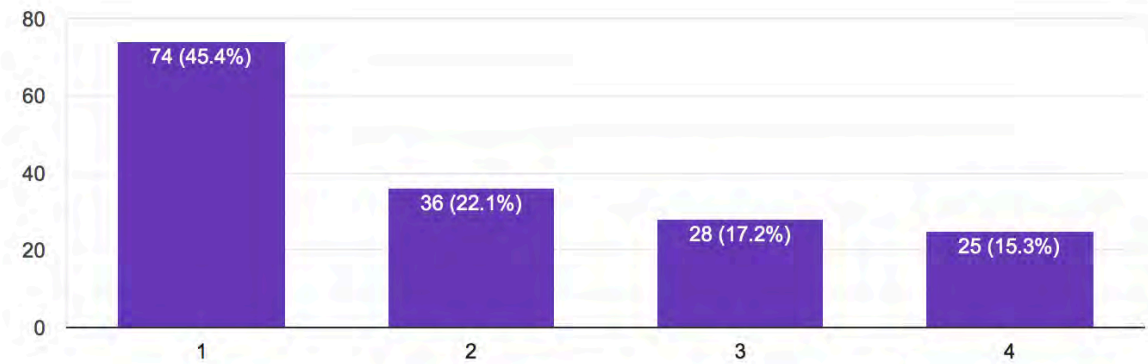


SCALE (1 = Less Important; 4 = Very Important)

Area Guides



163 responses

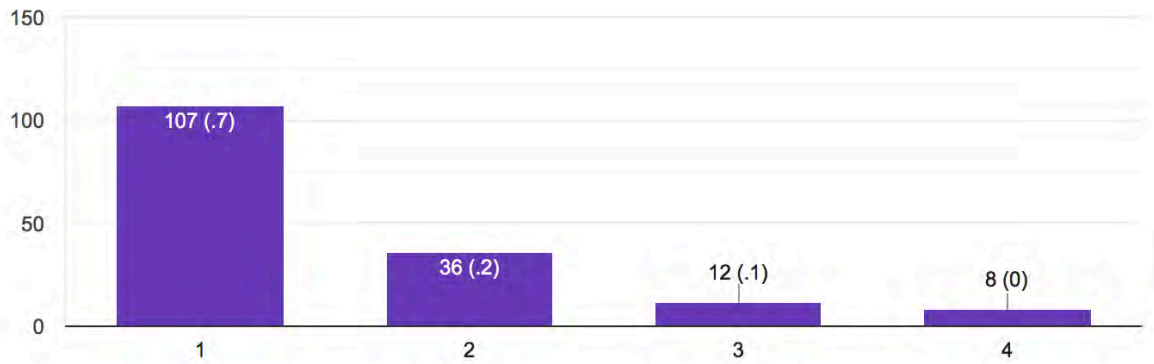


SCALE (1 = Less Important; 4 = Very Important)

- RATE YOUR PREFERENCE FOR EACH TYPE OF SNOWMOBILING EXPERIENCE BELOW:

Riding along a power line trail

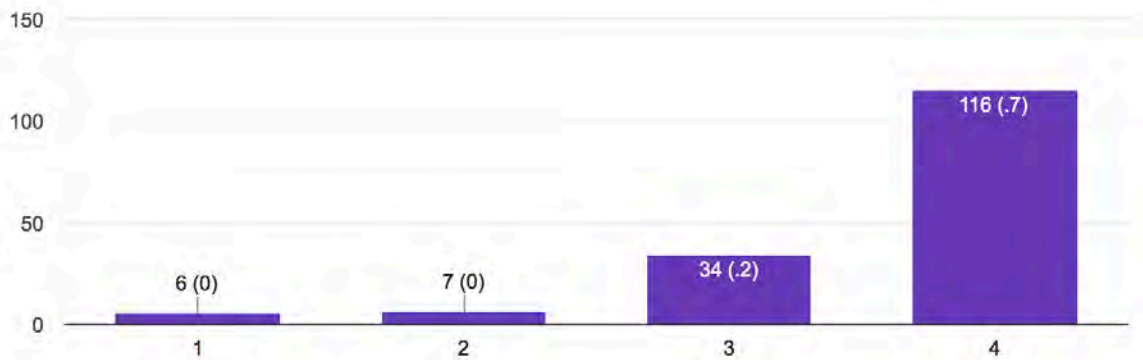
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Groomed trail riding in forested areas

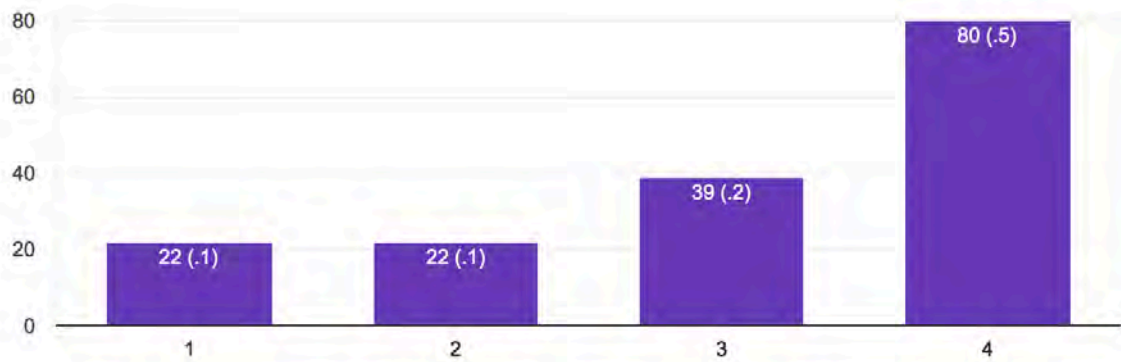
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Riding with few road or power line crossings

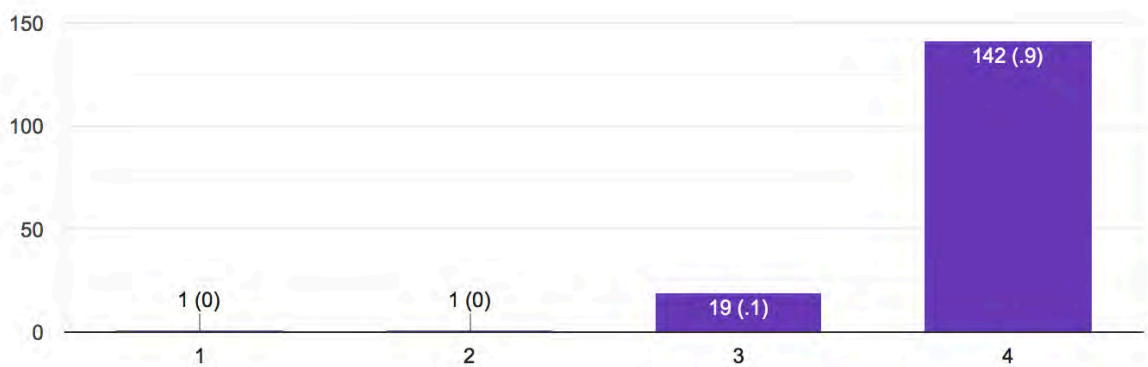
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Riding along mountain view trails with overlooks

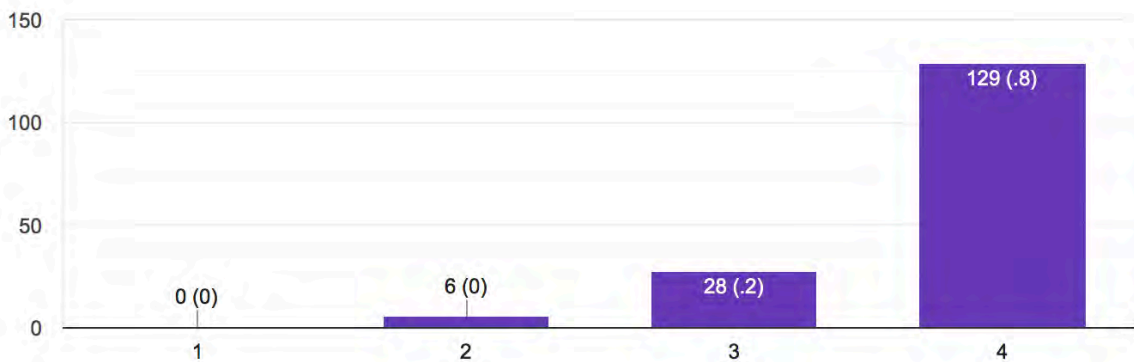
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Seeing wildlife in their natural setting

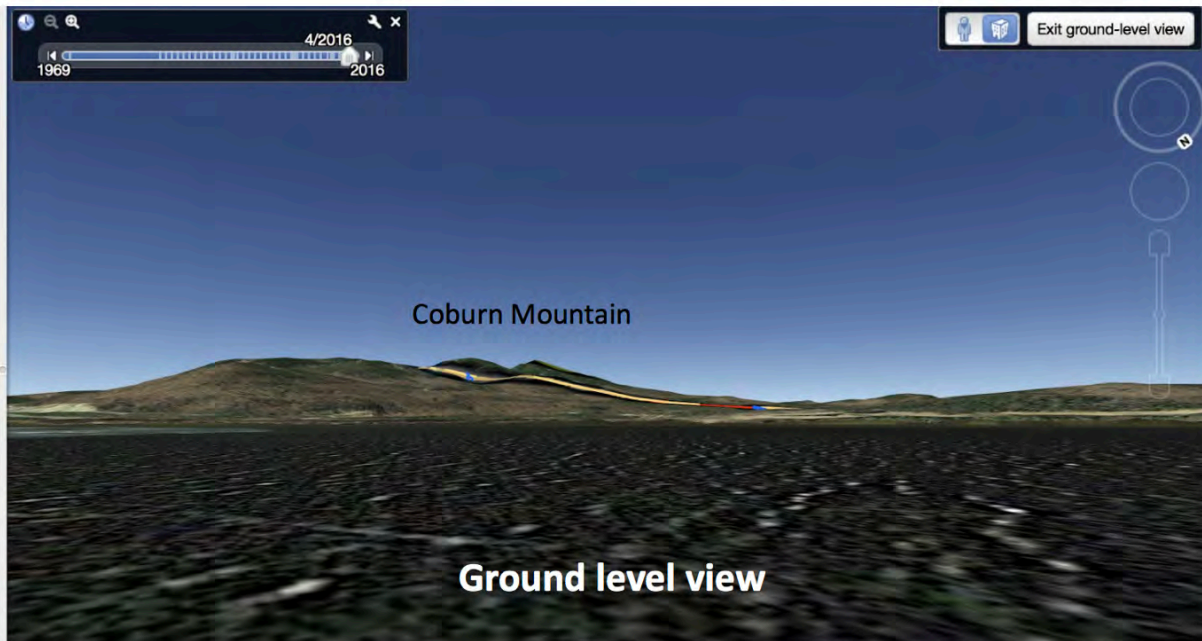
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

- Participants were asked to “look at the scenic photos and GIS simulation photos that show a 150-foot wide cleared corridor with 100-foot transmission towers.”

GIS simulation of proposed transmission corridor at Coburn Mountain



Snowmobilers at the top of Coburn Mountain



View of Grace Pond from the top of Coburn Mountain - GIS simulation of transmission corridor



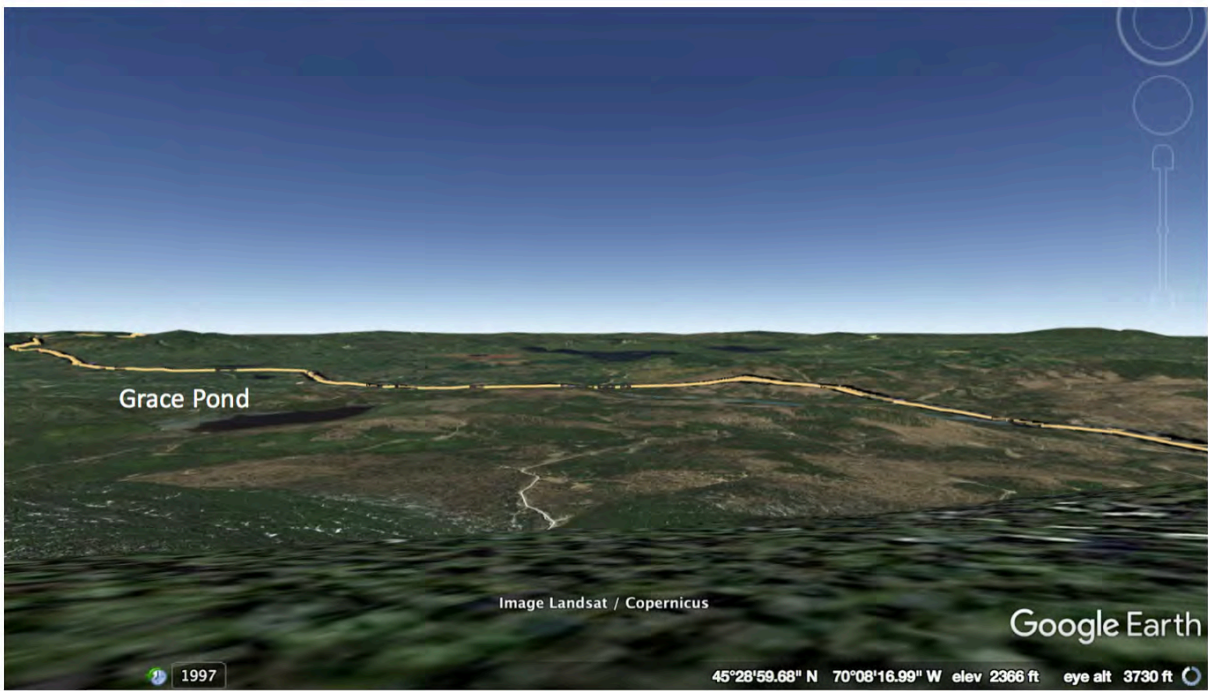
View of Grace Pond from the top of Coburn Mountain



View of Johnson Mountain from the top of Coburn Mountain - GIS simulation of transmission corridor

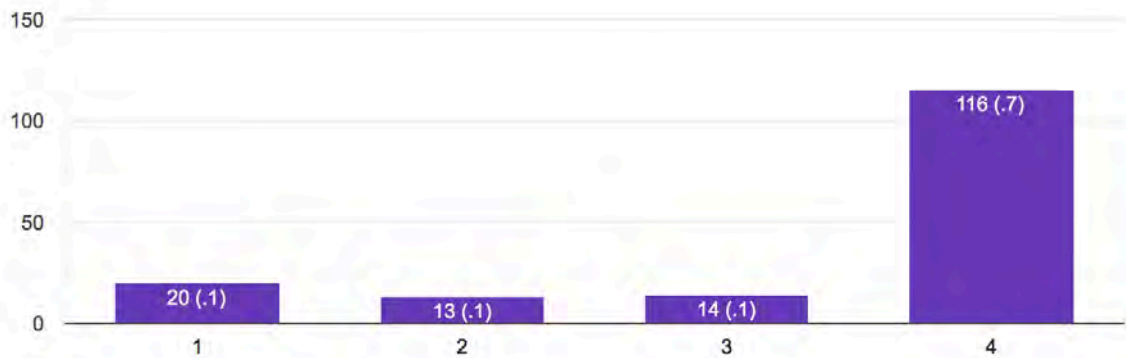


View of Grace Pond from the top of Coburn Mountain - GIS simulation of transmission corridor



What visual impact would a 150-foot wide cleared corridor with 90-foot transmission towers have on your wilderness snowmobiling experience?

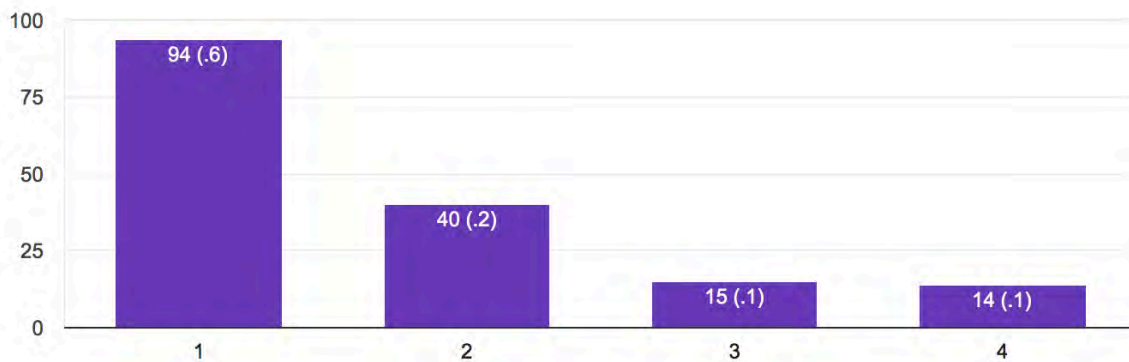
163 responses



SCALE (1 = Little Negative Impact; 4 = Strong Negative Impact)

Would you be more or less likely to visit a scenic area which contains large-scale developments for a snowmobiling destination?

163 responses

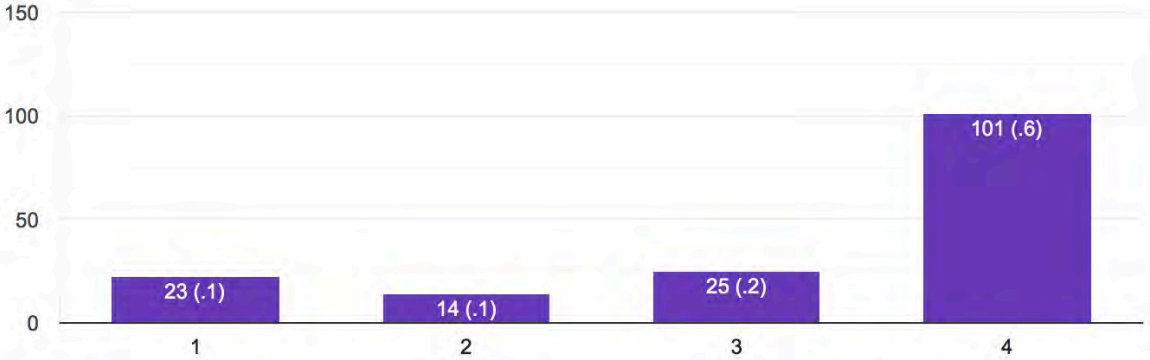


SCALE (1 = Little Negative Impact; 4 = Strong Negative Impact)

What impact would the presence of a 150-foot wide cleared corridor with 90-foot transmission towers have on your decision for a return visit the area in the future?



163 responses



SCALE (1 = Little Negative Impact; 4 = Strong Negative Impact)

“Connect New York”

Introduction

The respondent group detailed below is proud to provide the following submission to the New York Energy Highway Request for Information (RFI). The information contained within this response addresses the requirements of the RFI and includes additional information regarding property, interconnection, operational, socio-economic, and environmental issues among others. An Index is also included to map the projects benefits to the Energy Highway’s objectives.

Simply stated, the Connect New York proposal:

- Provides for the construction of a 1,000 MW DC underground transmission line, with the option of an additional 1,000 MW’s, utilizing existing public and private rights-of-way which become a main route on the “New York Energy Highway” and will satisfy many of the Cuomo Administration’s energy goals;
- Satisfies “New York’s energy policy goals of providing affordable and reliable energy, while improving the environment, creating and retaining jobs, and promoting economic growth, as New York transitions to a more efficient, lower carbon and cleaner, greener energy economy; and
- Reduces transmission system congestion that prevents the delivery of power from northern and western generating stations to southern load centers, reducing a significant financial burden on ratepayers.

Section I – Respondent Information

Iberdrola USA, 52 Farm View Drive, New Gloucester, ME 04260
Thorn Dickinson, Vice President – Business Development
(207) 688-6362
thorn.dickinson@iberdrolausa.com

Iberdrola USA, a subsidiary of global energy leader Iberdrola S.A., is an energy services and delivery company serving about 2.7 million customers in upstate New York and New England. Its primary subsidiaries are New York State Electric & Gas, Rochester Gas and Electric and Central Maine Power.

Iberdrola USA, and its parent, bring tremendous experience and investment capabilities to New York. Iberdrola USA is in the midst of a \$1.4 billion upgrade of its transmission system in the state of Maine. The project, called MPRP, includes over 400 miles of new transmission lines, five new substations, and upgrades to numerous existing lines and substations. The company is about 1/3 of the way into the 5 year project and the project is on time and on budget. This project has created over 3,300 direct and indirect jobs for the state of Maine. Importantly, the project’s DART rate (a measure of safety incidents) is .09 through March 2012 vs. a national

average of 2.1. The completion of this project in early 2015 fits well with the likely construction schedule for this proposal.

Iberdrola is also a leader in the utilization of technology. For example, the MPRP project will be fully compliant with IEC 61850, an international best practice standard for substation automation and communications. Iberdrola USA subsidiary, Central Maine Power, recently completed the full installation of automated or “smart” meters that will provide tremendous environmental and customer benefits. Consumers are able to better manage their energy usage. CMP eliminated over 2 million vehicle miles per year.

Our parent, Iberdrola S.A., is a global investor-owned company with experience forged over more than 150 years of history that provides service to 31 million customers in 38 countries and four continents.

After a significant process of growth and internationalization, which involved an investment of over \$100 billion in the last eleven years, Iberdrola is today one of the five largest global utilities, the world leader in the wind sector, and the leading Spanish energy group.

Our 33,000 employees manage assets worth \$130 billion that in 2011 produced revenues worth \$42 billion and a net profit over \$3.5 billion.

Iberdrola will continue to grow its core businesses: power generation through clean technologies and the build up and management of transmission and distribution networks. In addition, the continuous improvement of operational efficiency will remain one of the basic foundations of the Group’s activities.

The path to sustainable growth in size, efficiency and profitability has brought Iberdrola a number of international awards, such as the nomination as leading electric utility on the “Global 100 Most Sustainable Corporations in the World”. In addition, Iberdrola has been member of the “Dow Jones Sustainability Index” for the last eleven years.

The Cianbro Companies, 101 Cianbro Square, Pittsfield, ME 04967

Peter G. Vigue, Chairman & CEO

207-679-2192

pvigue@cianbro.com

Throughout its 63-year history, Cianbro has safely and efficiently planned, managed, and constructed many technically complex, historic, and environmentally sensitive projects for a wide variety of public and private clients. A total commitment to safety combined with the enthusiasm of an innovative team of construction professionals, has enabled Cianbro to build a durable reputation for completing projects safely, on schedule, and within budget. Founded in 1949 by the Cianchette brothers, Cianbro is now one of the largest, most diverse, successful, 100% employee-owned, construction and construction services companies based on the East Coast. Presently operating in more than forty (40) states, in twelve markets, and employing over 4,000 team members, Cianbro self-performs civil, structural, mechanical, electrical, transmission, fabrication, and coating work.

Cianbro is also the managing member of Atlantic Energy Partners, LLC; the developer of the Neptune Regional Electrical Transmission System (Neptune). The Neptune Transmission System provides up to 660 MW of electric power from the PJM system to the LIPA grid on Long Island via a 500-kilovolt (kV), high voltage direct current (HVDC) cable. The HVDC cable extends between two converter stations, one in Sayreville, New Jersey, and one on Duffy Avenue in the community of New Cassel in the Town of North Hempstead. The Sayreville converter station takes alternating current (AC) power from the PJM system and converts it to DC power, while the Duffy Avenue station converts DC power back to AC for use on the LIPA system. The DC cable runs approximately 50 miles under the Raritan River in New Jersey and the Atlantic Ocean, and an additional 15 miles buried alongside the Wantagh Parkway. The Neptune Transmission System interconnects to PJM in Sayreville at a nearby First Energy substation, and interconnects to the LIPA system at the Newbridge Road substation in Levittown.

Since starting operation in mid-2007, Neptune has provided, on average, nearly 25 percent of the electric power used on Long Island, and runs at its full capacity of 660 MW most of the time. In addition, Neptune has performed as well or better than expectations, averaging nearly 98 percent availability. The Neptune HVDC cable allows LIPA to tap into a diverse range of power generation from PJM, including renewables such as wind and hydro, as well as oil, coal, nuclear, and natural gas. This diversity of generation sources is not available on Long Island. Because wholesale energy prices in PJM are generally much lower than on Long Island, power brought over the Neptune cable is less expensive than most of what can be generated on the island.

For LIPA, the Neptune HVDC cable was seen as an environmentally friendly, cost-effective solution to future power needs. According to LIPA, an economic assessment conducted prior to construction projected that the Neptune cable would provide about \$1.4 billion in net benefits to LIPA, which was significantly more than any other project proposed to meet Long Island's long-term energy needs. As former LIPA Chairman Kevin Law has said, *"The Neptune cable provides LIPA with the opportunity to acquire lower-cost energy to meet customer needs while providing more flexibility in selecting the markets from which we acquire that energy. It is a significant win-win for Long Island."*

Gilberti Stinziano Heintz & Smith, P.C., 555 East Genesee St., Syracuse, NY 13202
William Gilberti, CEO and Managing Partner
315-442-0171
wgilberti@gilbertilaw.com

For more than twenty-five years, Gilberti Stinziano Heintz & Smith, PC (GSH&S) has served the needs of clients in the energy field, including large, multi-plant power producers, natural gas pipeline operators, and electric transmission line developers, as well as the developers, installers and operators of various renewable energy systems and other smaller generating facilities. We have been counsel on power generation projects that total more than 5,000 megawatts of generating capacity and have counseled both gas pipeline and electric transmission companies on projects involving more than 450 miles of transmission line.

Together with the firm's CEO and Managing Partner, William J. Gilberti, Jr., the lawyers in the GSH&S energy group combine decades of in-depth industry knowledge and experience and include leading practitioners in the industry, such as a former executive vice president and

general counsel of the New York Power Authority, the largest state-owned power organization in the nation, and a former counsel to the U.S. Nuclear Regulatory Commission.

The firm's understanding of, and experience with, the applicable financing structures, regulatory requirements and governmental approvals needed for large infrastructure and commercial development projects in New York, including large scale energy generation and transmission projects, is unparalleled. From the initial planning and feasibility phases of a project through environmental review and permitting to completion of construction and beyond, GSH&S provides counsel and strategic advice to clients on every aspect of energy development.

GSH&S has successfully completed the permitting and environmental review for various power plants firing a wide variety of fuels and for hundreds of miles of transmission line in the State. The firm has served as lead counsel in several landmark cases under the State's Environmental Quality Review Act (SEQRA), including litigation establishing that certain previously approved industrial operations were "grandfathered" and not subject to review. GSH&S has also provided strategic legal counsel on the approvals needed for various major generation and transmission projects in New York, including, among others, a 130-mile underground electric transmission line, an aboveground 190-mile electric transmission line and a 50-mile overhead electric transmission line.

GSH&S often engages in complex litigation involving State and federal agencies regarding permitting and environmental issues. The firm served as lead counsel in such a case for the second largest independently owned cogeneration plant in North America. As a result of the firm's strategy and effort, the U.S. Court of Appeals for the 4th Circuit vacated and remanded the Federal Energy Regulatory Commission (FERC) interpretation of the Energy Policy Act of 2005 in a case of national first impression, knocking out federal licensing regulations that would displace state regulation of electric transmission lines; and the U.S. Court of Appeals for the 9th Circuit vacated and remanded to the federal Department of Energy, its determination to create the Mid-Atlantic National Interest Electric Transmission Corridor, the designation of which is a prerequisite for any shift of transmission line licensing from the states to FERC.

GSH&S regularly assists in the drafting and negotiation of various energy contracts, most recently having negotiated power purchase and interconnection agreements for the developer of a utility-scale solar photovoltaic project.

Spectra Environmental Group, Inc., 19 British American Blvd., Latham, NY 12110
Robert C. LaFleur, President
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rlafleur@spectraenv.com

Spectra was formed in 1993 and is a self-certified, federal Small Business Enterprise (SBE). Spectra maintains its corporate office in Latham, New York, just minutes away from the New York State capital office buildings in Albany, and has branch offices in Syracuse and Poughkeepsie, NY. Spectra has 47 employees that specialize in areas of infrastructure engineering, environmental analysis, planning, permitting, and compliance.

Spectra's engineers and scientists are leaders in integrated engineering solutions for a sustainable energy future. In the energy service market, Spectra provides environmental management,

permitting, conceptual design, site/civil engineering, project management, surveying, and construction management.

Spectra is owned and operated by Robert C. LaFleur and John H. Shafer, PE. Mr. Shafer has over 40 years in the field of transportation and infrastructure systems. Prior to joining Spectra, Mr. Shafer served as Executive Director of the New York State Thruway Authority (NYSTA) and Chief Engineer for the New York State Department of Transportation (NYSDOT). Mr. Shafer currently serves on several State advisory committees, including the committee overseeing the replacement of the Tappan Zee Bridge. Mr. LaFleur has 39 years of experience as an expert in environmental planning and permitting projects. He has been called upon to provide expert testimony in a number of legal proceedings concerning environmental and planning matters. Mr. LaFleur has acted as Project Manager on an extensive power transmission project under Article VII of the Public Service Law.

Spectra has experience working with a variety of federal and state regulatory agencies. Among these include the New York State Power Authority (NYPA), the New York State Office for Technology, the New York State Department of Environmental Conservation, the United States Environmental Protection Agency, as well as the NYSTA and NYSDOT. These are all agencies with an interest in this energy highway project being proposed by the Power Authority.

Section II – Project Description

“Connect New York” is a 1,000 MW DC bulk transmission line running from the Utica area to New York City (Zone E - Mohawk Valley to Zone J - New York City). This underground transmission initiative would utilize existing public and private right-of-way to build a new bulk transmission line that would enable the fulfillment of the “New York Energy Highway” and many of the Cuomo Administration’s energy imperatives. It would include 244 miles of high voltage DC cable, two AC/DC converter stations and a small amount of high voltage AC cable. There is also the option to add a second 1,000 MW line. This is a technology that is in use in the United States and overseas. The permitting process is expected to be completed within two years, and the project is expected to be completed within four years, unless those timeframes are shortened as discussed in Section V below.

Section III – Project Justification

“Connect New York” is a bulk transmission initiative that would utilize existing right-of-way to build a new bulk transmission line that would enable the fulfillment of many of the Cuomo Administration’s supply side energy imperatives. “Connect New York” is a practical, feasible and necessary prerequisite to the successful realization of many of the important energy precepts outlined in “Power NY” and the “New York Energy Highway”.

“Power NY”

“Power NY states that... “New York’s energy policy must meet the interrelated goals of providing affordable and reliable energy, improving our environment and creating jobs and economic growth through energy policy as we transition to a more efficient, lower carbon and

cleaner, greener energy economy. (“Power NY” Page 1) “Power NY” delineates its guiding principles as follows:

- **Affordability**... take steps to reduce energy costs
- **Energy Efficiency**
- **Smart Transmission and Distribution**
- **Economic Development** – job creation
- **Environmental Quality** – cleaner fuels and renewables
- **Reliability** – dependable and emergency prepared
- **Equity** – demands that one region or neighborhood not bear most of the costs of a certain policy while another receives the benefits
- **Good Execution and Government’s Role** – facilitate and encourage private sector investments that supports our energy goals and these guiding principles
- **Transparency and Accountability**

“Power NY” delineates several supply side energy imperatives that form the foundation of the Cuomo Administration’s energy policy. These ambitious energy goals include:

1. Upgrade and Expand the Transmission Grid

“Improve Reliability and Reduce Costs by Upgrading our Transmission Infrastructure and Bringing Reliable, Low Cost Clean Energy to Areas Where it is Needed Most While Maintaining Regional Equity”

2. Improve the Environment Through Renewables and Clean Energy

“Expand Wind and Solar Power and Repower Old Plants to Make them Cleaner and More Efficient”

“Make New York the Nation’s Leader in Wind Power”

“Enact a New Power Plant Generation Siting Law”

“Close Indian Point... We must find and implement alternative sources of energy generation and transmission to replace the electricity now supplied by the Indian Point Power facility.

3. Improve Energy Independence

“By... supporting in-state energy resource development, New York will reduce outflow of dollars to pay for energy imports” (2009 State Energy Plan).

4. Renewable Portfolio Standard

Renewable increased to 30% by 2015

5. Greenhouse Gas Emissions Reductions

Executive Order #24: Decreased by 80% by 2050

While these energy precepts are logical, sensible and progressive there are many significant challenges confronting their realization. Some of these challenges are administrative, including permitting and siting. Some involve the limitations of older fundamental infrastructure, including in particular, the bulk transmission grid that constricts the flow of energy from existing and prospective generation sites to the marketplaces.

Transmission: The Foundation of a Progressive Energy Policy

Irrespective of what generation options are utilized, adequate bulk transmission is a necessary prerequisite to bring new age power to market and to realize the supply side energy imperative outlined in “Power NY” and in the “New York Energy Highway”. This view is supported from almost every authoritative vantage point.

- NYISO Wind Generation Study (2010)
“Although the addition of wind to the resource mix resulted in significant reduction in production costs, the reduction would have been even greater if transmission constraints between upstate and downstate were eliminated.”
- 2009 State Energy Plan
“(Transmission) investments are also necessary to support the state’s transition to a clean energy economy, and will be driven by longer-term strategic needs, including the need to reduce GHG emissions.”
- NYISO 2010 Comprehensive Reliability Plan
“The Indian Point Plant retirement scenarios... show that loss of ISOs expectations would exceed criteria... thermal violations... and voltage performance on the system would be degraded.”

The “Connect New York” Option

Simply stated, “Connect New York” is our vision of how to best advance the major supply-side energy objectives delineated in “Power NY”. It would include a 1,000 MW DC bulk transmission line running from the Utica area to New York City. There is also the option to add a second 1,000 MW line. The routing would be underground utilizing existing public and private right-of-way. In doing so we can mitigate environmental and right-of-way concerns that derail most bulk transmission projects and avoid eminent domain and NIMBY issues. By burying an efficient, underground DC bulk transmission line, line losses will be reduced and aesthetic and health based concerns eliminated.

This bulk transmission path will significantly mitigate two of the three major transmission bottlenecks at the Central East interface costing Southeast New York over a billion dollars per year. In addition, the project will bring much needed new capacity to some of New York’s most active wind development sites and existing cleaner gas fired plants in Upstate NY. Because the project will use public right of ways, it will provide a new source of revenue to the state. Additionally, this project will be a life-line to older upstate generating facilities that may currently be less environmental friendly by allowing them to repower with new technologies and to continue to support their local economies.

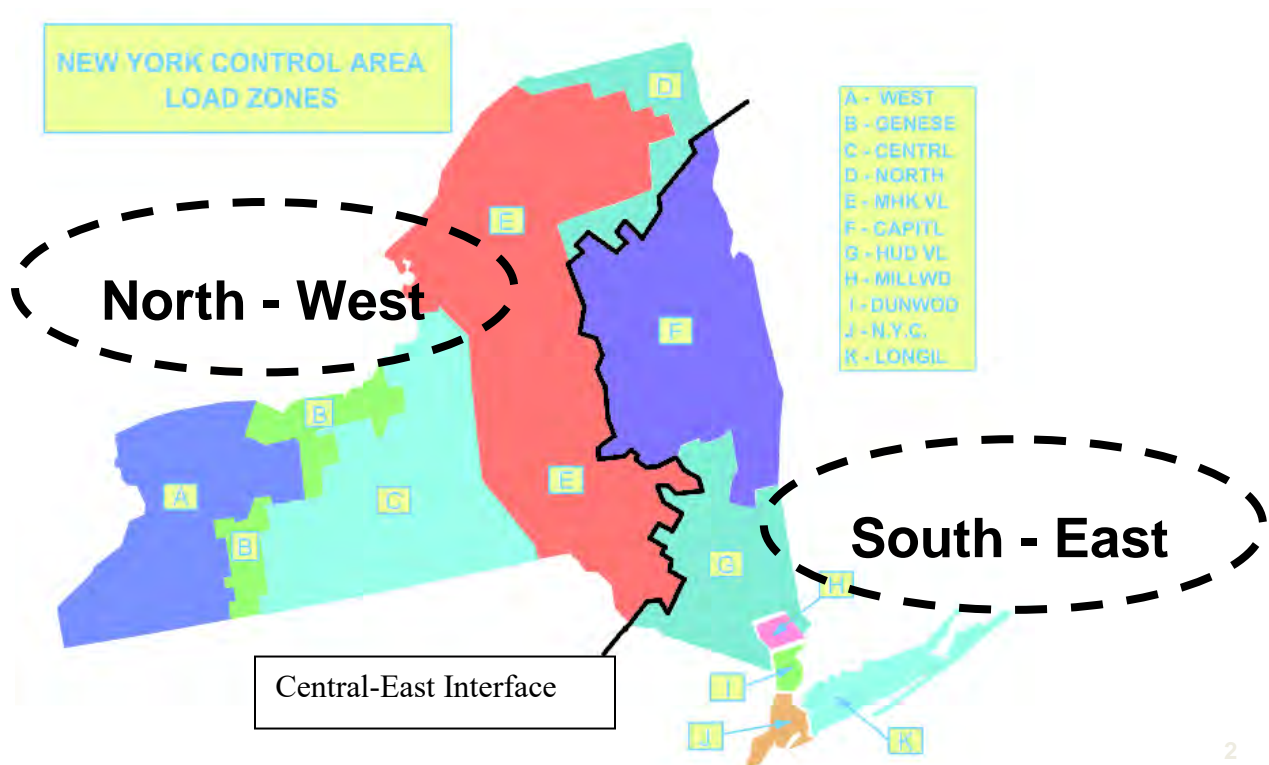
The Central-East Interface – Transmission Congestion

The Central-East Interface is the name given to a conceptual transmission boundary that separates the bulk transmission capabilities located in the North and West regions of New York from the load (demand) centers located in the South and East. Essentially it is the choke point where the ample generating capacity located in the North and Western regions are constricted from supplying the markets in the South and East regions. Figure 1, below, illustrates the Central-East Interface.

Figure 1

Central – East Interface

Divides New York into 2 distinct zones: North-West and South-East.



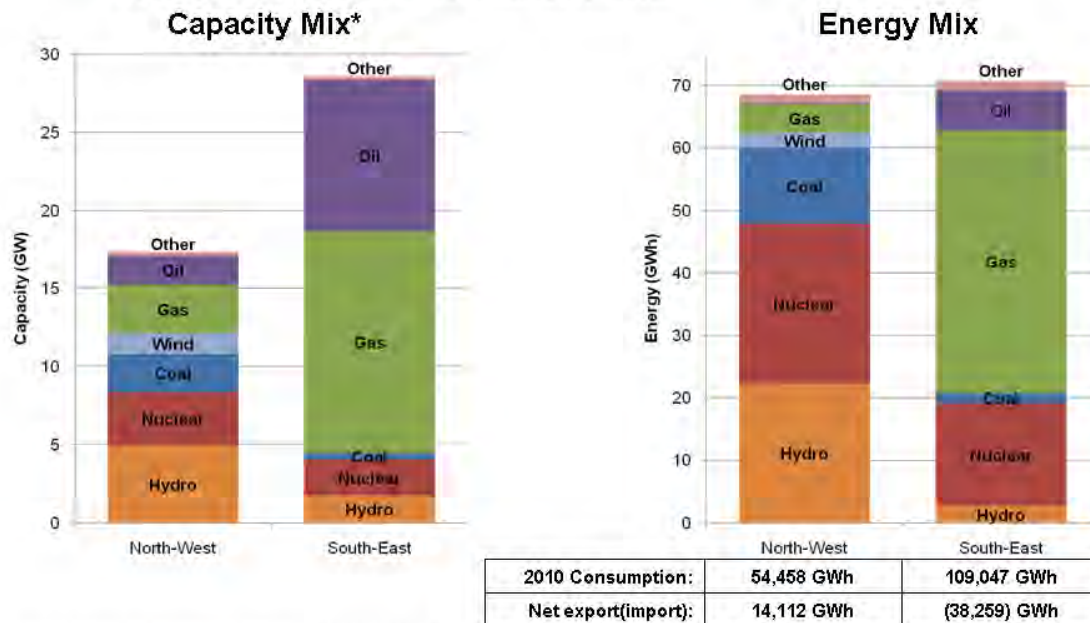
This interface creates two very distinct energy markets. These markets have different energy generation portfolios and demand profiles and accordingly different prices and different greenhouse emissions.

The bar graph below, Figure 2, illustrates the capacity mix of the generators in the North-West and the South-East. It also discloses the energy generated from these facilities.

Figure 2

Regional Capacity and Energy Portfolios

Note: Includes resources physically located in region only.
Does not include imports from other states/provinces.



* Values based on nameplate capacity (2011 NYISO Gold Book)

Several observations can be made from this chart.

- The South-East is much more dependent on gas/oil base load capacity.
- As shown below, much of this gas/oil fixed capacity is older, less efficient steam units that rely on fuel with higher green house gas emissions
- Without Indian Point, the South-East generating facilities would be almost entirely gas/oil.
- The North-West regions produce more energy than they consume (net exporters).
- The North-West region's production is less than it would be if the bulk transmission transfer capability across the Central-East Interface were greater than it is.
- The South-East region is a net importer (38,259 GWh) with 14,112 GWh or 36% of these imports coming from the North-West. The remainder comes from out of state, i.e., representing a missed opportunity for in-state generators.

Figure 3

Pre-1970 downstate peaking generators

Owner/Operator	Generator & Unit	Town	Year in Service	Primary Fuel	Nameplate (MW)	2010 net GWh	Capacity Factor
Consolidated Edison Co. of NY, Inc.	East River 6	Manhattan	1951	Oil	156.2	480.6	35%
Long Island Power Authority	Glenwood ST 04	Glenwood	1952	Gas	114.0	95.3	10%
Long Island Power Authority	Far Rockaway ST 04	Far Rockaway	1953	Gas	100.0	189.9	22%
Consolidated Edison Co. of NY, Inc.	East River 7	Manhattan	1955	Oil	200.0	471.0	27%
Long Island Power Authority	Barrett ST 01	Island Park	1956	Gas	188.0	518.4	31%
Astoria Generating Company L.P.	Astoria 3	Queens	1958	Oil	376.0	728.3	22%
Long Island Power Authority	Port Jefferson 3	Port Jefferson	1958	Oil	188.0	238.2	14%
NRG Power Marketing LLC	Arthur Kill ST 2	Staten Island	1959	Gas	376.2	530.3	16%
Long Island Power Authority	Port Jefferson 4	Port Jefferson	1960	Oil	188.0	192.0	12%
Astoria Generating Company L.P.	Astoria 4	Queens	1961	Oil	387.0	636.9	19%
Astoria Generating Company L.P.	Astoria 5	Queens	1962	Oil	387.0	411.7	12%
TC Ravenswood, LLC	Ravenswood ST 01	Queens	1963	Oil	400.0	633.2	18%
TC Ravenswood, LLC	Ravenswood ST 02	Queens	1963	Oil	400.0	502.9	14%
Long Island Power Authority	Barrett ST 02	Island Park	1963	Gas	188.0	562.9	34%
TC Ravenswood, LLC	Ravenswood ST 03	Queens	1965	Oil	1,027.0	1,143.3	13%
Long Island Power Authority	Northport 1	Northport	1967	Gas	387.0	1,153.4	34%
Long Island Power Authority	Northport 2	Northport	1968	Gas	387.0	854.9	25%

Source: 2011 NYISO Gold Book

Price Impacts in North-West after Relieving Congestion

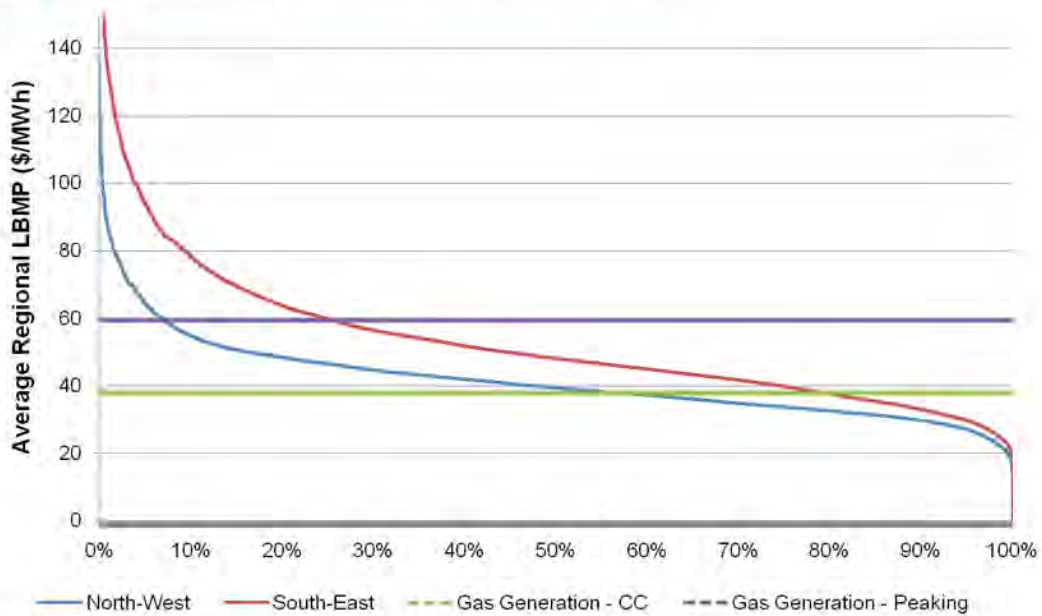
Some have suggested that new bulk transmission designed to relieve the bottlenecks at the Central-East Interface would materially increase the price of energy in the North-West. Comprehensive modeling would need to be completed to accurately forecast the various effects on prices throughout the state if new bulk transmission were built. This would be done as part of our proposal. Nevertheless, one can deduce that there is ample excess generating capacity in the North-West, capable of creating power that would flow into the South-East and not significantly increase the marginal cost of power in the North-West.

Specifically, the North-West had a nameplate capacity for gas of 3,100 MW and in 2010 had net generation of 4,630 GWhs representing a low 17% capacity factor. Of the 3,100 MWs of gas generating capacity, 2,292 MWs or 74% was combined cycle gas and ran at a low capacity factor of 19.8%. Again while comprehensive modeling would spell out the specifics, one can infer that given the low capacity for the combined cycle fleet, these units were setting the market price in the North-West market. More interestingly, the North-West combined cycle fleet has the capacity to export an additional 8,100 GWhs, assuming that they operated at a 60% capacity factor and that the bulk transmission's transfer capability at the Central-East Interface could accommodate it. Currently, the bulk transmission system cannot accommodate any additional exports from the North-West into the South-East. That is why the combined cycle gas fleet in the

North-West region operated at a 19.8% capacity factor and why the less efficient, more expensive, less reliable and dirtier gas/oil steam units listed in Figure 3 filled the void. The regional energy price duration below, Figure 4, graphically makes these points demonstrating the regional price difference.

Figure 4

Regional Energy Price Duration (2010)



- Graph is illustrative of regional price differences in 2010.
- Data is comprised of hourly averages of day-ahead LBMPs for each NYCA zone within region.
- Gas generation marginal prices calculated using 2010 average gas price of \$5.41/mmmbtu and average heat rate of 7,000 btu/kWh (CC) and 11,000 btu/kWh (peaking)

The Cost of Transmission Congestion

The practical consequences of the Central-East Interface transmission congestion increased the state-wide annual cost of power by an average of 12% over the period from 2004 through 2010. This represented an average annual cost of \$1.4 billion included in the average state-wide cost of energy of \$11.7 billion. Although 2011 numbers are still being finalized, it is estimated that total congestion for last year will be \$1 billion. See Figure 5.

Figure 5

Historical New York Congestion Costs by Zone

Zone Name	Load Zone	Congestion Costs to NY Electric Consumers*							Average (\$ M)
		2004	2005	2006	2007	2008	2009	2010	
West	A	-1	-5	1	-14	-25	-14	-1	-8
Genesee	B	1	-1	2	-14	-9	4	6	-2
Central	C	1	-1	4	9	18	8	11	7
North	D	0	-1	0	0	-2	-3	-1	-1
Mohk. Valley	E	0	0	2	5	10	4	5	4
Capital	F	8	19	27	74	143	53	62	55
Hud. Valley	G	5	20	54	87	176	57	73	67
Milwood	H	3	12	27	31	78	16	23	27
Dunwoodie	I	4	24	44	56	124	41	49	49
NY City	J	582	809	673	700	1,403	503	560	747
Long Island	K	230	508	708	518	624	274	350	459
Total		833	1,384	1,542	1,452	2,540	943	1,136	1,404
Total Energy Cost to Load		10,059	15,314	11,969	12,831	15,485	7,397	9,005	11,723
Congestion % - original		8%	9%	13%	11%	16%	13%	13%	12%

Cost to New York consumers averaging \$1.4B per year

86% of that cost borne by New York City and Long Island

Congestion has averaged 12% of consumer energy costs

*Source: Congestion costs results from NYISO's PROBE analysis, a model designed to reproduce market prices as closely as possible.

2008 results are high due, in large part, to very high natural gas prices which can occur periodically in a commodity's life cycle.

Highlighted areas represent load zones that will benefit from the transmission project.

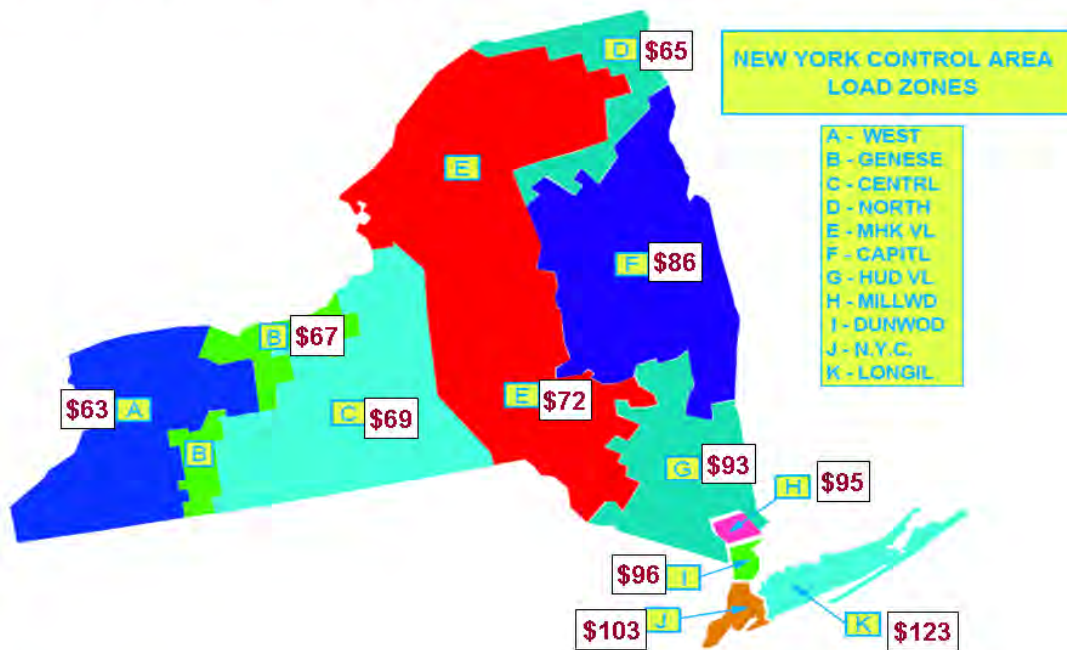
Several observations can be made including:

- New York City and Long Island have paid nearly 86% of this annual congestion cost averaging \$1.4 billion.
- The congestion peaked in 2008 at 16% due to very high natural gas prices which can and will occur periodically in a commodity's life cycle.
- Even during the historical economic downturn in 2009 and 2010 the congestion cost was \$1.0 billion each year.
- This additional cost of energy for New York and Long Island consumers could have been avoided if new bulk transmission across the Central-East interface had been in place.

The map below, Figure 6, illustrates the 2010 average market prices by Load Zone during the highest 1,000 hours of congestion.

Figure 6

**2010 Market Prices by Load Zone
Average Prices During Top 1,000 Hours of Congestion (\$/MWh)**



It is the reduction of these congestion costs that represents the primary commercial justification for building “Connect New York”. Nevertheless, other important strategic benefits are associated with this proposal and will, in time, bring commercial returns.

Reinvigorating Renewable Development

If New York State is committed to meeting its RPS goal, several initiatives could be introduced that would reverse the downward momentum for wind development. Principal among these is relieving the congestion that prevents export of low cost North-West wind power to high cost South-East load centers. This commitment could also be backstopped by requiring utilities and state agencies to enter long-term fixed-price bundled contracts with credible wind developers with proven track records. Utilities have traditionally been hesitant to sign long-term contracts due to rating agency implications, but there are regulatory means to address these concerns.

To realize the potential of the State’s renewable resources, bulk transmission must be expanded to reach north and west into the most promising wind development zones. This bulk transmission must be supplemented with a plan to develop new secondary transmission lines to gather the newly developed wind energy and deliver it to the newly developed bulk transmission system.

Second, the reauthorized Public Service Law Article X process, with its 25 megawatt threshold and application to renewable generation projects, needs to be implemented in a way that maximizes the potential benefits of single entity (Public Service Commission) approval within one year from complete application (or 6 months for certain modifications of existing facilities). Further consolidating and/or streamlining the State Environmental Quality Review Act process for smaller renewable generation sources is necessary and might be accomplished by establishing time limits for completion of hearings, decisions and appeals for renewable projects of certain dimensions/features, regardless of whether they are reviewed under SEQRA or under the Public Service Law.

Finally it is conventional wisdom that off-shore wind is significantly more expensive than on-shore wind. The state's agencies should focus on the most realistic renewable options to meet the RPS mandate that is only four years away. Now is not the time to experiment with the exotic alternatives.

Environmental Compatibility

“Connect New York” will utilize a combination of existing public and private right-of-ways, which have been previously disturbed and will significantly minimize, if not entirely eliminate, impacts to visual, historic, archaeological and other important environmental resources. By proposing efficient, buried transmission lines, the proposal will also address many of the concerns associated with aerial transmission lines and towers, such as their visual impacts and aesthetics, electromagnetic radiation effects and impacts on property value. Connect New York will also allow for the transmission of energy from wind farms and other clean upstate generating facilities that produce less greenhouse gas emissions than the older generating facilities downstate.

The Indian Point Question

The Fukushima nuclear accident refocused attention on the Indian Point nuclear plant and the effort to renew the plant's two operating licenses when they expire in 2013 and 2015. The practical reality is that the plant's 2,000 MW capacity is currently a vital piece of the energy portfolio for southern and eastern New York. Its power is “clean” and low priced. Nevertheless it represents a recognized potential safety risk to the greater New York City metropolitan area.

There cannot be a serious discussion about closing Indian Point without simultaneously proposing an alternative energy supply that meets the reliability requirements of the region. New bulk transmission is a necessary prerequisite to filling this potential energy void.

“Connect New York” is not the exclusive answer to replacing the potential loss of Indian Point energy but it could be an important piece of the puzzle that could, with the right support delivered in an urgent manner, come to the market in a reasonably timely fashion.

Summary of Benefits

How Connect New York Could Advance

Governor Cuomo’s Supply-side Energy Imperatives and Satisfy the Goals of the New York Energy Highway

There are many compelling benefits associated with the “Connect New York” initiative but perhaps the most important one is that it is achievable. Many of the mine fields threatening the approval of customary transmission proposals are avoided with the “Connect New York’s” approach. Environmental and NIMBY challenges are largely circumvented by utilizing the existing right-of-way. Eminent domain is similarly not an issue.

Equally important “Connect New York” is all about New York. It will foster New York’s desire for energy independence by building an energy highway that will change the financial dynamics of repowering upstate plants while encouraging new investment in on-shore wind development east of Lake Ontario. It will reduce the state’s annual energy bill by reducing congestion and allowing lower cost, cleaner energy upstate to flow into New York City and Long Island. This will finally reduce downstate energy bills at a time when consumers need some relief.

The energy most likely to be transmitted on “Connect New York” (gas and renewables) will displace more expensive and higher green house gas energy produced by the older vintage fossil fuel plants in the metropolitan New York/Long Island regions thereby reducing greenhouse emissions as well as energy costs.

Finally, “Connect New York” will create thousands of New York jobs not only during the construction period but subsequently by enhancing prospects for older upstate coal plants to invest in repowering as a new downstate energy market is opened up. The same holds true for renewable development east of Lake Ontario, assuming that long-term power purchase contracts can be put in place to support the 2015 RPS mandate.

In summary, the time has come for this transmission infrastructure proposal to be implemented as the foundation for Governor Cuomo’s “Power NY” vision and the “New York Energy Highway”.

Section IV – Financial

As a privately funded capital project, the business case for developing “Connect New York” is predicated on securing long-term capacity purchase contracts with New York State’s load serving entities. The high level business case for “Connect New York” is commercially attractive:

1. Build a 1,000 MW DC line with two converter stations, with the option to add a second 1,000 MW line;
2. Underwrite the investment with a fixed price transmission contract; and
3. New York electric consumers realize a significant annual reduction in energy costs attributable to reduction in congestion costs.

Alternative approaches could be used to determine how the project costs would be allocated among the load serving entities. Some regions in the country utilize an allocation methodology based on which customers benefit from the project. Although this may be the most fair approach, the process of determining beneficiaries is complicated and can become contentious. Other regions in the country use a postage stamp allocation. Under this approach, the project is determined to have benefits for the state or region as a whole and the costs are allocated on a prorated usage basis. This is by far the simplest approach, but it could be argued that those customers that are not receiving the large majority of the projects benefits should not pay an equal share. It may be determined that some combination of the two approaches, one that recognizes the allocation of project benefits but that does not get bogged down into detailed and potentially contentious modeling discussions is the correct middle path.

Section V – Permit/Approval Process

The current administrative and regulatory construct would require the following approvals, each of which will be sought concurrently, with the associated time frames running in parallel. The list below includes an approximation of the time required to secure those approvals based on historical precedents and assuming conventional approach to gaining these approvals. Vigorous support and follow through by the Administration could reduce these timeframes.

A. Public Service Commission Article VII Application – 2 years

An Article VII proceeding before the Public Service Commission (PSC) typically requires approximately two years to complete. The Respondents control the rights to certain application materials and intellectual property that have been maintained on the active docket before the PSC. If utilized as part of the current conceptualized proposal, this position on the active docket could potentially shorten the time frame for permitting, as well as the overall construction date, by approximately six months or more.

B. NYISO System Reliability Impact Study

- Preparation of system impact study – 6 months
- NYISO review and approval – 6 months
(A similar project was previously evaluated and a system reliability impact study was performed and approved)

C. FERC authorizations to sell transmission rights at negotiated rates – 6 months

D. Acquisition of right-of-ways

- Various public entities

Index

As a final reference, the table below indicates that all four of the Energy Highway objectives, detailed on Page 11 of the New York Energy Highway RFI, are satisfied by “Connect New York”. The following table provides the appropriate Energy Highway RFI page references.

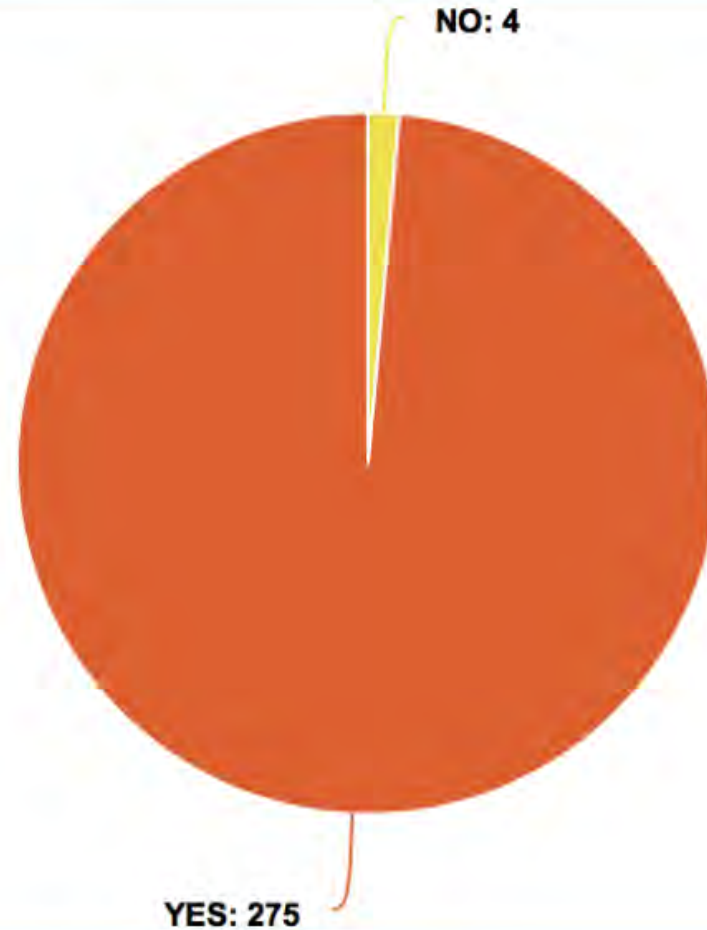
Energy Highway Objectives		Page Reference
Reduce constraints on the flow of electricity	√	4, 7-13
Assure long-term reliability	√	7-10, 13-14
Encourage development of renewable generation	√	13-14
Increase efficiency of power generation	√	4, 7-14

Page 13 of the New York Energy Highway RFI listed additional benefits that should be addressed in the submission. The table below demonstrates that these have been met by this submission and provides the appropriate page references.

Additional Project Benefits		Page Reference
Create Jobs	√	15
Environmentally Sustainable	√	4, 9-14
System Performance and Operation	√	4, 7-14
Rate Payer Value	√	7-13
Demonstrate ability to go through NYISO SRIS/SIS Process	√	16

Kennebec River Visitor Impact Study

Response to Visual Impact of Kennebec River Crossing on Wilderness Experience
279 Recreational and Commercial River Users



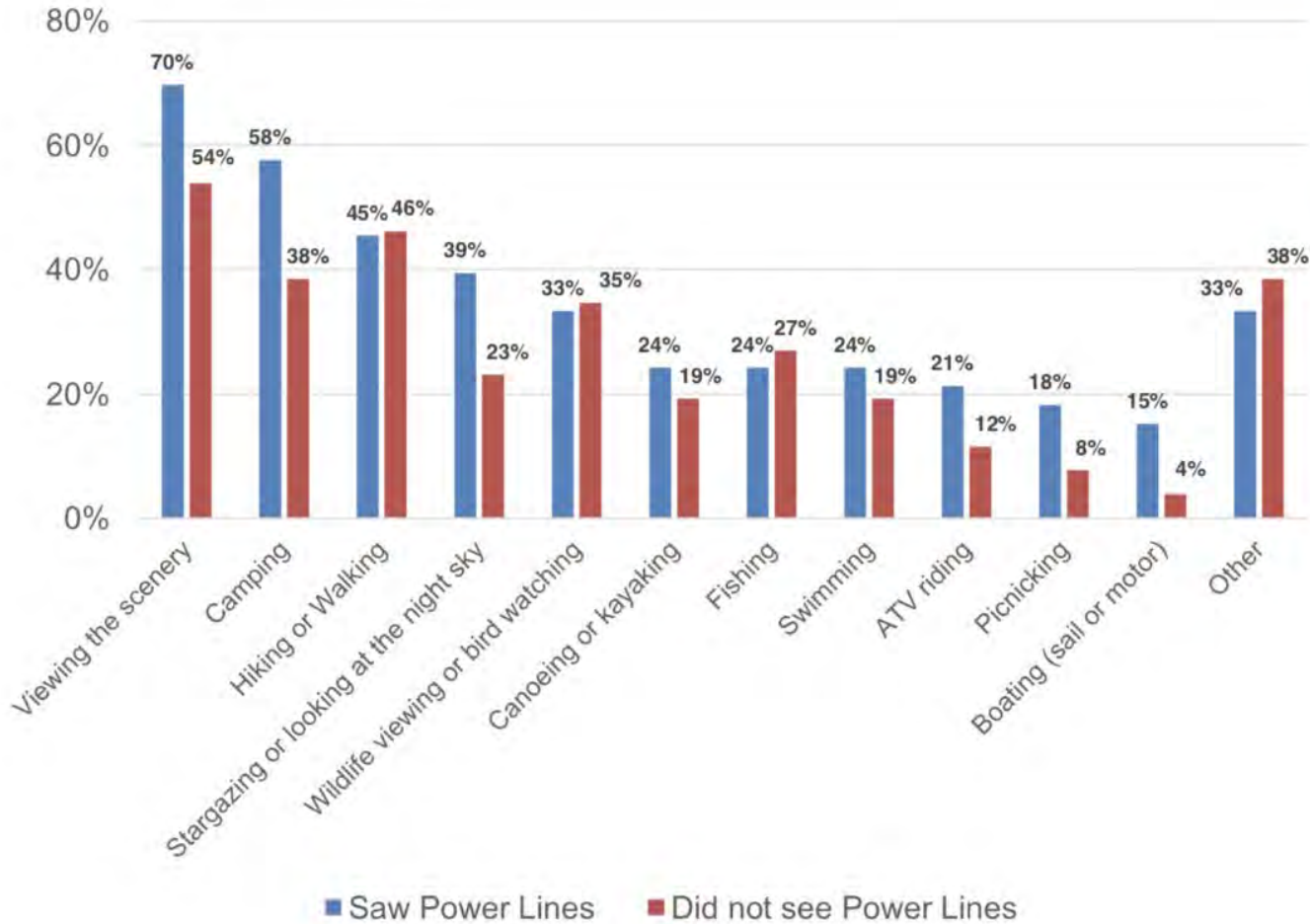
■ NO ■ YES

Updates on River Crossing

- While CMP has decided to drill under the river, that minimizes scenic impact in only that ONE area. There will *still* be sign of infrastructure on shoreline and huge visual impacts throughout the remainder of the corridor.
- Will those access roads to the river provide additional access to river enthusiasts? Will it result in overcrowding like on the Deerfield River?
- What are the impacts on river ecology, water quality & fish habitat?
- If it takes months to complete, how would that impact the rafting season and river flows during construction?
- What about the larger environmental issues of the entire construction and concerns about the source of hydropower?
- The Kennebec River is important, but it's not the only area to be concerned about in Somerset County and remaining corridor.

Visits to Area and Activities

Q4. Thinking about your visit to the upper Kennebec River area, what are your plans other than rafting?



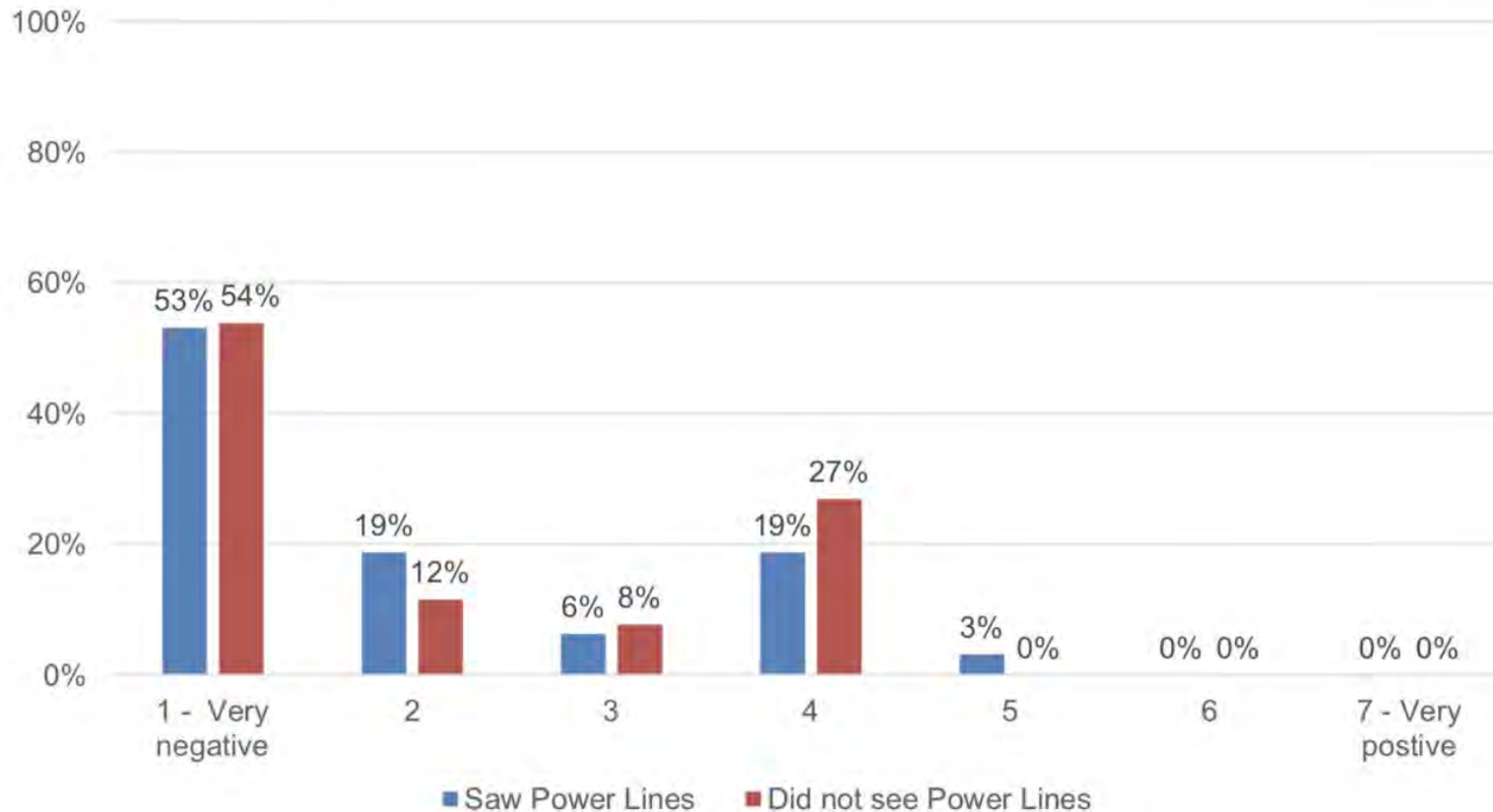
Summary

Beside rafting, viewing the scenery, camping, hiking or walking were the most common activities for rafters visiting the upper Kennebec River area.

Even CMP's river user survey submitted to PUC-DEP-LUPC revealed that tourists prioritized viewing the scenery in Somerset County.

Impact of Human Activity

Q10. Please rate the impact this sign of activity may have on the quality of your experience today. - Views of powerlines on hillsides.



Rate on a scale 1 to 7 scale where 7 means a very positive impact on your experience and 1 means the factor would have a very negative impact on your experience.

The majority of respondents said that power lines on hillsides would be negative. How will this impact their decision to return to this area for a wilderness experience in the future?



Maine State Federation of Firefighters



Feb 12th, 2019

Governor Janet T. Mills, Augusta ME
 Maine PUC: chris.simpson@maine.gov
 DEP attn Jim Beyer: NECEC.DEP@maine.gov
 LUPC attn Bill Hinkel: Bill.Hinkel@Maine.gov
 Mass DPU: alan.topalian@state.ma.us & dpu.efiling@mass.gov

Dear Recipients:

This letter is to express concerns for fire and other emergency response capacities within the areas located along and adjacent to the proposed NECEC Corridor. (RE: DPU 18-64; DPU 18-65; DPU 18-66)

The Maine State Federation of Firefighters (MSFFF) has a membership of over 6000 firefighters. Many of our members are volunteers within small departments in rural communities. Several of our volunteer members, who serve areas within the proposed NECEC Corridor, contacted us to express their concerns for fire and safety response. These concerns focus not only on the major construction phases of the project, but also on significant risks that will be established and which will continue to exist long after construction crews have left the area and wide areas of high voltage power lines cross their jurisdictions. Further conversations and investigation indicate that to date, no evaluation, assessment, or documentation of the fire, emergency medical, terrorism and other risks, or the services and equipment needed to mitigate those risks, have been formally identified, discussed, studied, and/or reported on.

While Maine is not a "fire regime" it does not mean that catastrophic fires cannot occur here. Rural fire response has improved in the seventy years since "The Year Maine Burned" in 1947, but we must remember October 1947 followed one of Maine's rainiest seasons on record. *"From October 13 to October 27, firefighters tried to fight 200 Maine fires, consuming a quarter of a million acres of forest, taking the lives of 16 people, and wiping out nine entire towns. The Maine fires destroyed 851 homes and 397 seasonal cottages, leaving 2,500 people homeless".*

As we've seen over the last few years in other parts of our country and around the world, fires of magnitude that quickly overwhelm state and local resources are becoming annual events. Additionally, as was demonstrated in 2018 with the Paradise (CA) Campfire; PG&E, the power company whose transmission power lines were responsible for the fire, quickly declared bankruptcy. The convenience of PG&E and its ability to declare bankruptcy leaves Paradise, its victims, and the American taxpayer, to clean up the 150,000 acres of toxic wasteland before any attempt is made to rebuild from the destruction.

Regarding fire suppression and emergency support within the proposed NECEC Corridor, please see the enclosed map and note the following:

Approximately 70 miles, from the Quebec border to Bingham, has no organized fire or emergency response capacity. These areas are covered by the Maine Forest Service (MFS). During a typical fire season, approximately March-October, the MFS has Rangers living the area who provide initial size-up once they arrived on scene. Weather permitting, air support from Augusta is dispatched; if air support is not already assigned to another fire in another part of the state. Ground crew members from around Maine may also be called to fight fires. Organizing and staging MFS wildland firefighters for a significant fire takes an hour or more. Fires on a windy day gain a significant headway before crews can arrive to remote areas. Volunteers from rural Maine towns are also trained in wildland firefighting and may respond to assist with MFS and Rangers when available.

The first 100 miles of the proposed Corridor, including the 70 miles covered by the MFS and Rangers, has only three (3) volunteer departments within a one-mile (1-mile) buffer of the proposed Corridor. These are the Bingham, Anson, and Solon Volunteer Fire Departments. This area has no staffed fire services and daytime coverage is extremely limited.

South of Bingham, and still within Somerset County, there are three (3) additional fire departments with a two-mile (2-mile) buffer of the proposed NECEC transmission line. These are the volunteer departments of Starks, Madison, and Industry. Once again, these three additional departments have no staffed fire and daytime coverage is extremely limited.

Please also note that these fire departments also lack sufficient off-road fire support capacity. While several do have smaller 4WD apparatus, sufficient large scale wildland suppression and emergency mitigation equipment is not available in the rural areas of the proposed NECEC Corridor area.

Non-fire emergency medical services (EMS) paramedic response is provided by Upper Kennebec Valley Ambulance out of Bingham. Emergency transports are taken to Redington-Fariview Hospital, 35-miles away. Redington-Fariview hospital has a Lifeflight landing pad, with helicopter transport dispatched from Bangor, Lewiston, or Sanford, if available.

Initial response for terrorist or other types of emergency incidents would come from either the Franklin or Somerset County Emergency Agencies depending on the location of the incident. We have been unable to locate any reference or notice from NECEC on how risk and incidents of this nature would be mitigated.

An example of a known risk that supports the need to evaluate, assess, document and sufficiently mitigate comprehensive fire and emergency risks associated with the proposed NECEC Corridor is shown by the 2017 (draft) Somerset County ME Hazard Mitigation Plan.

The most current available Somerset County Emergency Management Agency Mitigation Plan states the following:

C3 Goals

Wildfires: Reduce damage, injury and possible loss of life in Somerset County caused by wildfires.

*Somerset County is subject to wild land fires. The most likely damages caused by a wildfire are the loss of life, loss of prime timberland, and the destruction of personal and real property, especially homes. The loss of electricity is also possible, since many high voltage transmission lines pass through heavily wooded areas. Major wildfires may close commerce, resulting in major losses of income to local businesses and individuals. *There were at least 261 wild land fires in Somerset Country in from 2005 to 2010.*

Information to date indicates that consideration of the many emergency hazards associated with the construction and future management of the NECEC Corridor have not been addressed. Due to this oversight, we conclude that the preparedness and safety of our fire fighters, and other first responders who will respond to NECEC Corridor incidents, has been severely overlooked and their security and safety significantly compromised.

The Officers and members of the MSFFF appreciate the opportunity to present these comments and look forward to having the fire, EMS, and other emergency response issues regarding the proposed NECEC Corridor fully evaluated, assessed, and documented. We also encourage the development of and look forward to reviewing mitigation and implementation plans to address associated Corridor risks, and fully support these risks being formally discussed, studied, disclosed, and reported.

Respectfully submitted,



Kenneth Desmond
President, MSFFF
PO Box 911
Sabattus, ME 04280

enc: map of Somerset Cnty Region

Somerset County & Region Fire Response Capacity relative to proposed NECEC Corridor

Six Fire Departments in Somerset County are within a two mile buffer (4 miles across) of the proposed NECEC transmission line.

Approximately 70 miles, from the Quebec border to Bigham, has no organized fire response department within two miles.

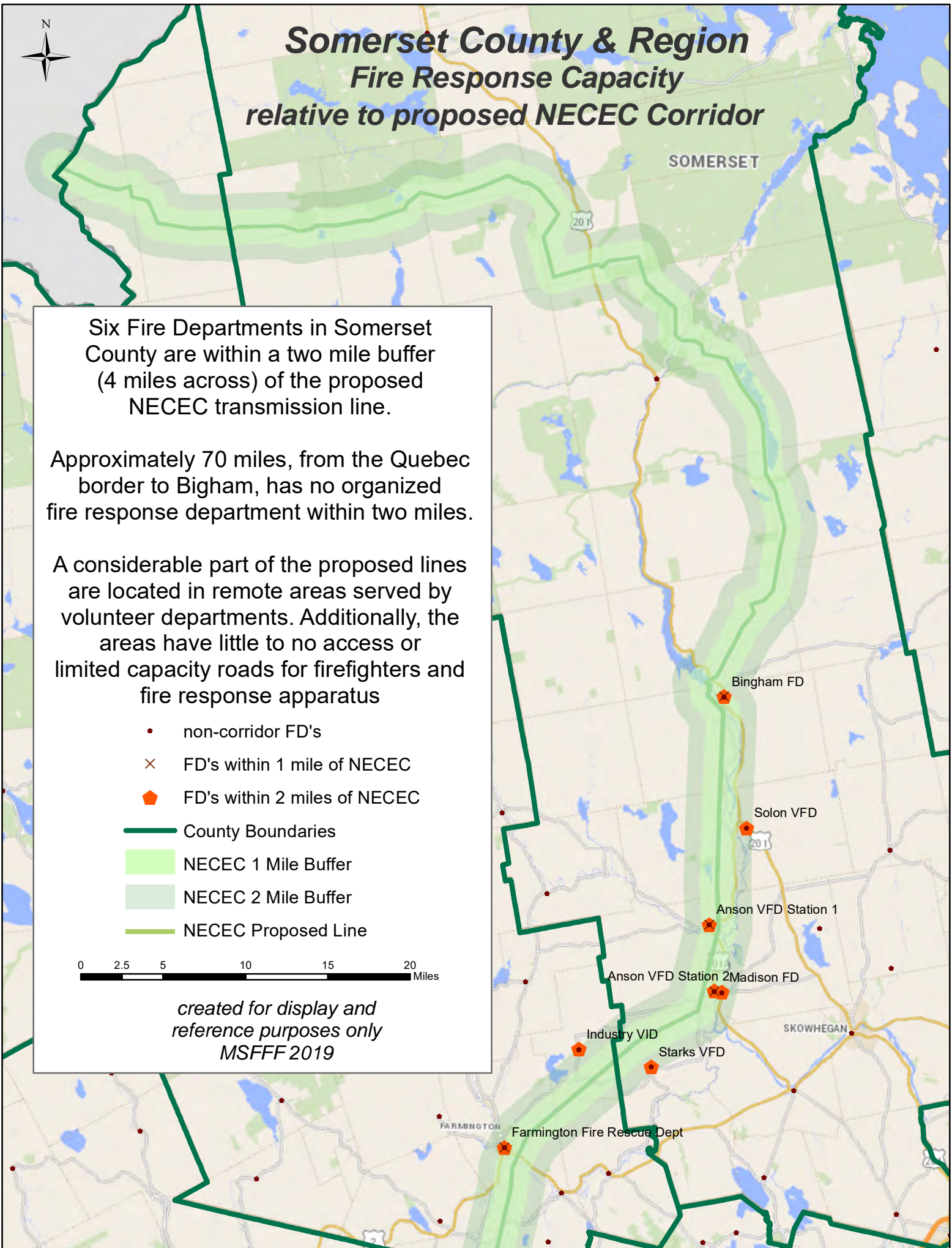
A considerable part of the proposed lines are located in remote areas served by volunteer departments. Additionally, the areas have little to no access or limited capacity roads for firefighters and fire response apparatus

- non-corridor FD's
- × FD's within 1 mile of NECEC
- ◆ FD's within 2 miles of NECEC

- County Boundaries
- NECEC 1 Mile Buffer
- NECEC 2 Mile Buffer
- NECEC Proposed Line

0 2.5 5 10 15 20 Miles

*created for display and
reference purposes only
MSFFF 2019*



Maine public utility commission public testimony hearing on October 17, 2018(2018-00232)

My name is Diane Zagwijn-Coston. Jim and I reside at 482 togus Road in Chelsea along with our grand-daughters Lilli age 4 and Autumn age 9.

Our property directly abuts CMP's transmission corridor in witch section 3025 of the high voltage MPRP has now been constructed. This was one of the last sections of the MPRP high voltage transmission line sine 2014 when blasting began. New pole 82 of the 345 Kilovolt AC line is 182.5 from my bedroom and that is to close. I know the CMP considers this project to have been a true success, on time and on budget. But as an abutter, I feel that we where not given accurate and full information and are now suffering with stray and induced voltage that impacts our animals, ourselves and has resulted in very significant shocks to my nephew, my husband, my 9 year old granddaughter, and two of our animals. The shocks are sever enough to knock my husband to the ground and cause our adult horse to rear up and scream out in pain.

In April 2017 when Jim received his first shock I contacted CMP to report the shock and that our radio would play by just stretching the cord out on the ground in our backyard. CMP gave this phone report work order #10300381598. no one form CMP responded.

In May of 2017, after contacting several people, two CMP representatives finally came to our home. They tested a lot of places using a hand held voltage meter one probe on the ground and the other in different locations. I witnessed the testing. My own notes show that the voltmeter read 89 volts by just placing the lead in the gr4ound and the other in the air. This testing was done with the circuit breaker to my property off.

Things happened on our property since the moment they began preparing to build the line. Among other things many trees on my property, not in the right of way, where cut down; Blasting occurred and 23 animals large and small died within weeks of the blasting., fencing was destroyed and herbicide spraying was done with out notice and our horse was sprayed in the face with it. However, what I really want you to hear is what has happened to us since the line was energized in April, 2015.

Right off and still continuing we have stray current(voltage) on fencing that was not turned on. Everyone in our house hold has had health issues we have never had before the line was energized, including sever headaches, body aches with burning pain, and large epidermal cysts. All our animals are now sterile where before, every year for four consecutive years many animals where born yearly on our property.

I am testifying here today, to urge the commission to be sure there is an LDRT (LAND DISPUTE RESOLUTION TEAM) and an Ombudsman be appointed for the NECEC. I suggest that the Ombudsman have more authority to address problems and cause relief to be provided than it had in the MPRP. I don't know if the voltage and magnetic field that is leaking from the transmission line located next to my home is going to be repeated with the new high voltage lines that are to be installed with the NECEC project, but problems like ours should be prevented- and if not prevented, addressed, right away, when they do occur.

I have five documents that I would like entered into evidence. They are all on the PUC online computer system under the invention that the PUC Commissioners, thank you, Commissioners,

Coston Testimony, October, 2018

required PUC staff to undertake after our PUC appeal of the LDRT recommendation was referred to the Commissioner, 2018-00034. The investigation Docket is 2018-00170.

The five documents I wish to include as part of this Testimony are all available in Docket 2018-00170. I have a hard copy here, or they could be digitally included. Four are from item 7, 1. Pre-filed testimony of Diane Zagwijn-Coston; 2. Exceptions to Recommended Decision on Coston's Appeal of LDRT decision (2018-00034); 3. Attachments to exceptions to Recommended Decision; 4. factual issues #4 on stray voltage; in the fifth is item 14 Dot Kelly inclusion of filling in 2018-00034 -Dkelly comment to Revise the Recommend Decision on the Coston Farm. LDRT Appeal final version.

I hope no one else has to go through what my family has endured.

Sincerely,



Diane Zagwijn-Coston

Testimony for 2017-00232 Attachment 1
2018-00170 Attachments to Exceptions to Recommended
Decision from Filing # 7.

STATE OF MAINE
PUBLIC UTILITIES COMMISSION

May 24, 2018

EXCEPTIONS & COMMENTS
OF DIANE ZAGWIJN-COSTON
AND JAMES COSTON TO
RECOMMENDED DECISION

PETITION FOR FINDING OF PUBLIC
CONVENIENCE & NECESSITY FOR THE
MAINE POWER RELIABILITY PROGRAM
CONSISTING OF THE CONSTRUCTION
OF APPROXIMATELY 350 MILES OF 345
KV AND 115 KV TRANSMISSION LINES
(MPRP) PERTAINING TO CENTRAL
MAINE POWER CO.

DOCKET NO. 2008-00255

CENTRAL MAINE POWER COMPANY
APPEAL OF LDRT DECISION
REGARDING DIANE AND JAMES COSTON

DOCKET NO. 2018-00034

TO THE PUBLIC UTILITIES COMMISSION: This submission is made on behalf of Diane Zagwijn-Coston and James Coston [hereinafter, "Costons"] to provide the Commission with their exceptions and comments on the "Recommended Decision" dated May 18, 2018.

RE I. SUMMARY. The Costons respectfully take exception in part and agree in part with the recommended finding that the Ombudsman's referral to the Landowner Dispute Resolution Team (LDRT) from the Maine Power Reliability Program (MPRP) is outside the jurisdiction of the Landowner Dispute Resolution Process (LDRP). They expressly take exception to the part that finds the Ombudsman's referral regards alleged impacts "caused by Central Maine Power Company's operation" of the MPRP.

The Coston's complaint involves *design errors* and *construction issues* in the MPRP—not operation. They seek a Commission order that CMP mitigate the MPRP design flaw by moving the tower that is positioned too close for safety to their home,

ATTACHMENT 1
to Costons' exceptions

EMF Site Measurements

Customer Name: Diana Coston Witnessed: YIN
 Service Address: 482 Togs Road
 Account Number: 211-0009538-019
 Date of Measurement: May 19, 2017
 Field Star S/N: FW Bell s/n 1642006 1:30 PM
 Energy Service Specialist: DM Begin
 Additional Personnel Present: Chris Marshall-BMMed

The measurements recorded herein are instantaneous measurements.

Transmission structure; section #: 3025, pole #: 82
 (If applicable)
 Center Line of existing transmission corridor: 50.2 mGauss
 Edge of transmission right of way: 37.2 mGauss
 Nearest adjacent point of residence/business: 7.4 mGauss
 Service Entrance: 7.2 mGauss
 Nearest CMP Distribution Structure: Pole 39 5.6 mGauss
 (pole/padmout transformer #: 39)

Internal measurements for residence/business:

Location	Comment	Measurement mGauss
Porch	adjacent driveway	5.8
Trough-right barn		8.8
Leach field		16.6
Plow Truck		5.6
Microwave		577 mg on contact
In House Kitchen	breaker off	6.2
Kitchen Table	breaker off	6.7

ATTACHMENT 2
to Coston's Exceptions

From: Thompson, Gregory J. [mailto:gregory.thompson@avangrid.com]
Sent: Friday, August 25, 2017 1:46 PM
To:
Subject: FW: Coston Farm, Chelsea

Chris and Bill,

Below is a summary of the meeting between the Coston's, Ray Boucher and Greg Snow. It should be noted that there is no official report regarding the visit. This site visit was meant to rule out the possibility of the distribution circuit causing a safety concern for the Coston's. Ray and Greg do not have the expertise nor the equipment to test for EMF. Further, they would not be the appropriate representatives to discuss safety as it relates to the transmission line and the proximity to the Coston's property. Ben Shepard's group or a contractor through Ben's group should be able to address those issues.

Greg Thompson

Manager of Regional Operations

Augusta Service Building

From: Boucher, Raymond A.
Sent: Friday, August 25, 2017 11:03 AM
To: Thompson, Gregory J.
Cc: Snow, Gregory
Subject: Coston Farm, Chelsea

Greg, below are my recollections related to our preliminary investigation of the voltage potential concern raised by Mr. and Mrs. Coston at their farm in Chelsea. Greg Snow may have additional information or comments. Please review this and let me know if you have any questions.

On May 3, 2017, Greg Snow, who was filling in for Tim Robbins, called me to discuss Mrs. Coston's concerns about potential shocks at their farm in Chelsea. Greg indicated that Mr.

Coston had recently been doing some maintenance work on an electric fence at their farm when he became aware of the voltage potential on the metal fencing. The Costons believe the presence of voltage on their fence may be related to the 345 KV transmission line (MPRP) which runs adjacent their property.

Before assuming it was related to EMF from the transmission lines, I suggested to Greg that we should do some preliminary checks to ensure that the unwanted voltage was not related to faulty wiring or equipment connected to the electric service we were providing from the local distribution circuit.

Subsequently, Greg Snow and I met with Mrs. Coston at her farm that morning. Using his standard multi-meter, Greg took voltage measurements by placing one probe in the earth and the other on the fence conductor (with the fence off) in the area Mrs. Coston said her husband had noticed the voltage potential. Greg confirmed that he was measuring voltage that fluctuated around 84 volts.

At our request, Mrs. Coston then opened her electric service main breaker. With the electric service to the farm now completely off, Greg rechecked the earth to fence potential at the same location and indicated that the readings had not noticeably changed. Additionally, he noted that he was getting similar fluctuating voltage to earth readings simply by holding the probe to his body or even in mid-air.

Greg related this to his experiences with EMF induced voltage that he often experienced while doing line-work in transmission corridors. He indicated that it was common practice for linemen to ground metal objects such as vehicles etc. to mitigate the induction while they worked in transmission corridors. He suggested to Mrs. Coston that this might be a good practice for them as well since much of the fencing appeared to be located well within the transmission corridor.

I indicated to Mrs. Coston that we would refer this to Company personnel that had information regarding the 345 KV transmission corridor boundaries and expertise in transmission EMF induced voltage for further investigation and follow-up.

Later that day I sent an email (attached) to you with our findings so this could be directed to the appropriate people for further investigation.

=====

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=====

Greg Snow and I met with a customer this morning who is getting shocks at her home. They thought the voltage was being induced by the 345 KV transmission line (MPRP) adjacent to their property. We did some voltage checks and did confirm that there was voltage present (varied to over 84 + volts to earth) on their fence line which runs parallel to the transmission line. It is not faulty electrical equipment as we also confirmed the voltage readings even with the service main breaker open. It does appear to be related to the transmission line and Greg Snow can fill you in with the customer name, phone number and explain the voltage readings in more detail.

This is beyond anything I can address. Could you follow-up with someone more familiar with the MPRP project and right-of-way and resulting voltage induction issue. Please let me know if you have any questions for me.

From: Pierce, Tamra L.
Sent: Tuesday, May 02, 2017 3:48 PM
To: Boucher, Raymond A.
Subject: Voltage Induction

Ray,

Steve said that this should be given to Greg Thompson to decide how it should be handled. He also suggested the safety person for Augusta but I am not sure they handle these types of issues. I would talk with Greg.

**Attachment 3 to Exceptions and Comments
of Diane Zagwijn and James Coston**

AFFIDAVIT OF DIANE ZAGWIJN-COSTON

I am Diane Zagwijn-Coston of 482 Togus Road in Chelsea, Maine. Under oath, I make the following statement in support of the Exceptions and comments being filed on behalf of myself and my husband James Coston ["Jim"] with the Public Utilities Commission today.

1. The factual statements made in our referenced "Exceptions" being filed today are true to the best of my knowledge, information and belief, including, but not limited to:
 - a. Jim and I are raising two grandchildren, ages 3 and 9, in the house we own at 482 Togus Road, which is located nearest to Pole 82 of Section 3025 of the CMP transmission line.
 - b. we were not notified that Pole 82 was going to be on our side of the corridor until after it was built. We had understood from Al Godfrey that that pole was going to be on the further side of the corridor, but somehow, it got moved closer to us.
 - c. I have become very concerned about my own and my family's health since the line became operational. This is because I have had chronic headaches which I had never had before, growths have appeared on my face, my legs frequently have pains like I've never had before, my blood pressure has gone way up and I suffer a lot of insomnia that I never used to consider a problem. I have seen a growth appear on my husband's hip and hear complaints of headaches and other pains from the girls.
 - d. We have had 24 animals die since the blasting and after the line became active. That is a lot for a small farm. It's hard on everyone.
 - e. We have had several different animals that we always used to be able to breed in the spring, become completely infertile. We have had some newborn animals die shortly after birth. That was not at all our experience as a farm prior to the blasting, construction and operation of this line.
 - f. After seeing what has been happening with so many of our animals, I am increasingly concerned about the long-term impact on our granddaughters healthy development, including but not limited to their ability to someday have children.
 - g. We have moved the girls' bedrooms to the point in the house furthest from Tower 82, but that hasn't helped their symptoms.
 - h. In 2014 our well water was tested and found to be contaminated after several of our farm animals suddenly died (soon after the blasting took place in the transmission line

corridor). From that time until August, 2017, we hauled 28 one-gallon jugs of water every three days from a spring 6 miles away until that spring was no longer available to us. Now we buy almost that much water every three days.

i. We have a house with 2 baths and 3 bedrooms, with a 2 car garage, a storage shed and a barn and we have 10 acres for agricultural use. We do have a small balance on our mortgage on it still.

j. We have been looking for a place to move to that is similar. So we have looked for places with between 5 and 15 acres and 3 bedrooms within a 10-30 mile radius of where we live and where I and my husband work (Chelsea and Vassalboro). But the places we have found are all over \$200,000 some over \$300,000. We found four that we could see moving to, but all have now been sold.

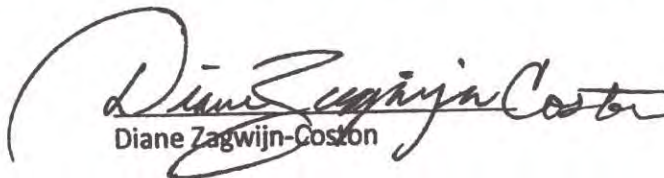
k. We will not be able to purchase such a place and relocate without help.

l. This process has been already very time consuming and extremely discouraging for us. It is especially depressing to think we have to start over or bringing in a different process.

2. I am not a lawyer and I know I have been focusing mostly on incidents and factual matters, not the legal questions like jurisdiction as they said in the proposed decision. This is the reality of my life; I can't help it. That's why we looked for a lawyer to help with the legal issues.

But I still want the Commission to know the details of what we've been through and the specific ways we disagree with what CMP is saying. So attached with this is what I have prepared for a new submission to Harry Lanphear (the same as I did earlier this year) to be ready for hearing in the LDRP process either by the LDRT or by the PUC. I ask that you please consider this affidavit and my attachment in reaching a decision on the PUC's jurisdiction to hear the referral made by the Ombudsman.

May 25, 2018

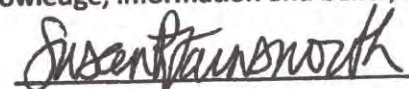

Diane Zagwijn-Coston

NOTICE

STATE OF MAINE
KENNEBEC, ss.

Personally appeared Diane Zagwijn-Coston and, under oath, stated to me that the foregoing statements by her are true to the best of her knowledge, information and belief, this 25th day of May, 2015, before me,

My commission expires 12/3/2019.


Notary Public: Susan R. Farnsworth

ATTACHMENT TO AFFIDAVIT OF DIANE ZAGWIJN-COSTON

NOTE: CMP submitted a lengthy comment to this docket on February 21, 2018. This attachment to my affidavit addresses certain points and attachments in the CMP February 21, 2018 to show how we disagree with CMP's version of events and why. Diane Zagwijn-Coston

1. ANIMAL DEATHS STARTED AFTER BLASTING.

On page 5, the CMP comment states:

On 05.15.14 – Jim Coston contacted MPRP Real Estate agent Al Godfrey concerning farm animals that had died. Mr. Coston reported that animals started dying in fall 2013. Mr. Coston believed blasting may have tainted the ground water. Chris Marshall (Burns & McDonnell) asked Stephanie Cote (Ciambro) to contact Coston on behalf of Irby, the general contractor responsible for constructing the MPRP in the area.

My husband and I specifically remember that the animals died in the spring of 2014 and it was after April, not February.

I remember contacting Mr. Godfrey and then CMP, within a few days of the deaths, which occurred over a few weeks. The deaths were the newborn calves and the newborn goats, and a couple adult goats, as well as some smaller animals. After this incident, the cows could not be bred back because they were sterile. Calves on the farm are born in May to June. The last calf born, and the only calf to live more than a short period, was born in June and named June. She is still on the farm.

CMP's Exhibit 5 page 1 of 2, is an internal email from Stephanie Cote dated Tuesday, May 20, 2014 sent to Chris McKenney and four other men. It was not sent to the Costons. The email purports to document the conversation she had with Diane Coston the day before. It states (directly conflicting with the information quoted above from page 5 of CMP's exhibit).

I'm following up my voicemail with this email regarding abutter James Coston and his dead farm animals in Chelsea (Togus West). I spoke with Diane Coston over the phone yesterday afternoon. As communicated by the Diane their farm animals (cows, chickens & rabbits) began dying in mid February 2014. Our internal review yesterday confirmed that blasting at structures 83-87 on S. 3025 did not take place until mid April 2014. We confirmed this morning that our matting crews were not in the area until staging began February 27, 2014.

Not only is this information about the calves dying in February wrong, as we are sure about when calving happens, but it conflicts with the statement reported by CMP on page 5 (quoted above) which states Mr. Coston reported the animals started dying in fall 2013. They did not and he would not have said that.

The email in Exhibit 5 ends with the information that Al Godfrey was at the Coston farm because I called him about the dying animals. That is true and that is why we want Al Godfrey to testify about his recollections. We were always impressed with Mr. Godfrey with his quick responsiveness and thoroughness. Al Godfrey initially came to see us

ABC

when he was representing CMP in the negotiations we had with CMP about its purchase of our land in the corridor. I request that Al Godfrey be asked about his recollections on this because we are confident that he will confirm our version of the facts.

It is still not clear why our animals died after the blasting occurred.

2. STRAY VOLTAGE.

A. With power off Costons report shocks from fence.

On page 6, CMP accurately notes that Jim was shocked by the electric fence while the fence was turned off for the first time (04.09.17). The CMP report insinuates that this delay from the energizing of the lines in 2015 means something. In fact, according to Jim it was just the unusual occurrence that the power was off because Jim was setting up the fence for the season. Jim's nephew was by, and because the fence was not energized, being a young man, he grabbed onto it and the handle, and was shocked. Jim couldn't believe it; he confirmed that the fence was unplugged, and tested the fence for himself. He was shocked to the ground. They then walked the whole fence to see if some unknown electrical connection existed, which it didn't. Thus the fact that it wasn't noticed until 2017 that the un-energized fence was conducting significant stray electricity, is not surprising. If, as I understand they do in Wisconsin, the utility did stray voltage testing before and after the installation of high voltage lines on close abutters, the fact would have been known sooner. It was a risk that was unknown to us during the design and construction phase, as a result.

Stray voltage is an issue of significant safety and health for our family. There appears to be a downplaying of the importance of stray voltage by CMP on the Coston property, with important emails missing and erroneous facts included.

The CMP timeline describes the actions that they took after we reported being shocked by the electric fence while the fence was turned off. On Sunday, April 9, 2017, Jim was severely shocked by the un-energized electric fence (See description above). On April 12, 2017 I called to report that Jim had been severely shocked on April 9th. (The timeline however, inaccurately states he was shocked on April 12.) That shock was significant and very upsetting to him and me. We were then and are still very afraid of the stray voltage hazards that are on our property. We all avoid the fence.

Stray Voltage Shock and Testing. I have a note that I spoke to Rhonda in the Department of High Tension Line Service Center and Rhonda gave me a work order

#10300381598. The fact that a work order of that number was issued could be checked, but I never got anything in writing and no one ever came.

After I had reported to CMP on April 12, 2017, I waited until the end of the month and when there was no follow up, I contacted Al Godfrey who made a few phone calls. Al Godfrey called back and requested Diane call Tim Robinson. His answering machine said to contact Sam W. Diane spoke to Sam, who was just filling in, and Sam suggested Diane talk to Greg Snow. Diane talked to Greg Snow who agreed to come over and investigate. Greg and Ray came the next day, on May 3, 2017. That's when Greg got his reading of 84 volts as described in Attachment 2.

It was only through extreme perseverance that I got someone to acknowledge the significant shock that Jim had suffered.

On September 13, 2017, the timeline explains that both Jim and our grand-daughter were shocked while operating a gate on a de-energized fence, but that CMP got a message from the PUC that didn't say that both Autumn and Jim got shocked. I conclude from that, that the message did say that Autumn got shocked. The timeline note makes it seem that CMP was unaware that anyone was shocked. But reading it closely, I believe they did learn at least that Autumn was shocked.

I recall that my first call to Merica (since Leah was still out with her medical condition) I only knew and only reported to her that Autumn was shocked. I was not aware at that point that Jim had grabbed the fence from Autumn since she was not letting go, and that is when he got badly shocked. I did tell Merica soon after that however that both of them were shocked. I also told her where that fence was.

The fence that has since had the filters put on it is the one closest to the transmission lines by the leachfield. The gate handle that shocked Autumn is on a different fence, further away from the corridor and south of our home on the south side of the Coston driveway.

This is CMP's timeline entry, which seems to downplay the seriousness of the incident and shows their lack of follow through.

09.13.17 – Coston's granddaughter, as well as Jim Coston, allegedly shocked while opening gate on de-energized fence. Coston called PUC. PUC forwarded to CMP, in that correspondence, no mention of Jim Coston also being shocked.

Over a month later, the timeline states that Jim Wright and Tom Ward checked fence and filters, finding the filters worked perfectly. They didn't want to talk to me, they just



wanted to check the filters. They didn't comment on the fact that the fence that shocked Autumn was on the other side of the property from the corridor edge.

In section C., of the CMP comment (page 15) CMP describes their efforts on stray voltage at the Coston property. I feel the stray voltage issue that exists throughout the property has not been fully investigated and is clearly related to the design and location of the Transmission Line.

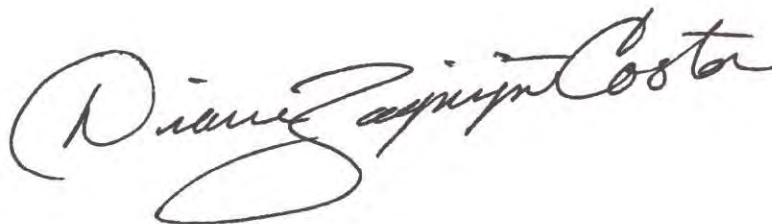
The report continues:

Second, CMP has in any case already addressed the Costons' stray voltage concern by adding filters to the Costons' electric fence. As CMP has reported to the Costons and Ombudsman Sprague, the installation of electric fences below transmission lines, particularly when the fences run parallel to the lines, often causes stray voltage issues in the fence when the fence is turned off. To mitigate this issue, CMP has installed voltage filters on the Costons' fence. CMP repeatedly tested these filters during Summer and Fall 2017, and each time found them to be working properly.

As described in this Exhibit, CMP ignores the stray voltage that has been evident on the property even after the installation of the two filters.

Summary. Jim and I ask the PUC, no matter what is decided about jurisdiction, to require CMP to do a full investigation and report on alternatives or to provide a different location for us similar to their relocation of the Morrisseys.

Although CMP maintains they have addressed our stray voltage concern, we ask that the PUC specifically find that CMP has not sufficiently addressed our stray voltage concerns.

A handwritten signature in black ink, reading "Diane Elizabeth Coston". The signature is written in a cursive style with a large, looping initial "D".

Testimony for 2017-00232 Attachment 2
 2018-00170 Coston stray voltage filing 7 factual issue #4.
 (Stray-Induced Voltage)

ISSUES & EVIDENCE RE COSTON'S PROPERTY SAFETY CLAIMS				
FACTUAL ISSUE # (4) STRAY VOLTAGE ENERGIZING ELECTRIC FENCING				
#	EXHIBITS	DATE	PGS	NOTES/COMMENTS
1	Definition of "Agrivolt"	7/19/2018	1	
2	Email from regarding S3025 flows	12/21/2017	2	
3	S3025 Flow charts - 12/18/15-11/14/17		16	
4	Letter to Harry Lanphear rebuttal comments	5/25/2018	6	
5	Readings done by Dot Kelly	5/25/2018	4	
6	Email from Susan Cottle to Leah Sprague	5/18/2017	1	
7	Email from Leah Sprague to Costons	2/1/2018	1	
8	Email from Chris Marshall to Leah Sprague and forwarded to Diane	8/25/2017	4	
9	Email between Greg Thompson and Roy Boucher	5/25/2017	3	
10	Email between Costons and Leah Sprague forwarding emails	8/8/2017	2	
11	Copy of notice of Precautionary Recommendation from Performed Line Products Co.	?	2	
12	Wisconsin Public Service information regarding farm voltage/measuring	?	3	

Agri volt.

" The presence of electric current in the animal environment, regardless of the source, generates stress. Over time, this stress can affect the immune system. A weakened immune system makes the animal more prone to diseases and consequently affects its well being and performance.

Subject: Fwd: Chelsea: S3025 Flows

From: lwsprague@aol.com

To: costonsfarm@yahoo.com

Date: Saturday, July 14, 2018 11:34:22 AM

Their response.

Sent from my I phone

Begin forwarded message:

From: "Marshall, Christopher" <cmarshall@burnsmcd.com>
Date: December 21, 2017 at 10:08:19 AM EST
To: Leah Sprague <lwsprague@aol.com>
Cc: "Kayser, John" <jkayser@burnsmcd.com>
Subject: Chelsea: S3025 Flows

Leah,

The attached graphs reflect the flow on Section 3025 on the days requested. There does not appear to be any correlation between the flow on the line and the known dates where there was induced voltage on the fence.

On several days the graphing appears to show zero flow. This is inaccurate and is due to the device used to collect the data. CMP has indicated that they can provide more accurate data for those dates using a different device, however the technician who can do so is not available until early January.

As we discussed the other day, we can arrange a time for CMP to test the fence so that it can be moved, however in the future the Costons should use their own voltage meter to confirm there is no voltage on the line if they would like to continue using it in the current configuration running parallel to the transmission line.

I'll be spotty over the next week, but call me if you have any questions.

Chris Marshall, PMP \ Burns & McDonnell

Senior Public Involvement Specialist \ Stakeholder Management Solutions

o 207-517-8494 \ m 207-272-5975 \ f 207-517-8463

000197

cmarshall@burnsmcd.com \ burnsmcd.com

27 Pearl Street \ Portland ME 04101

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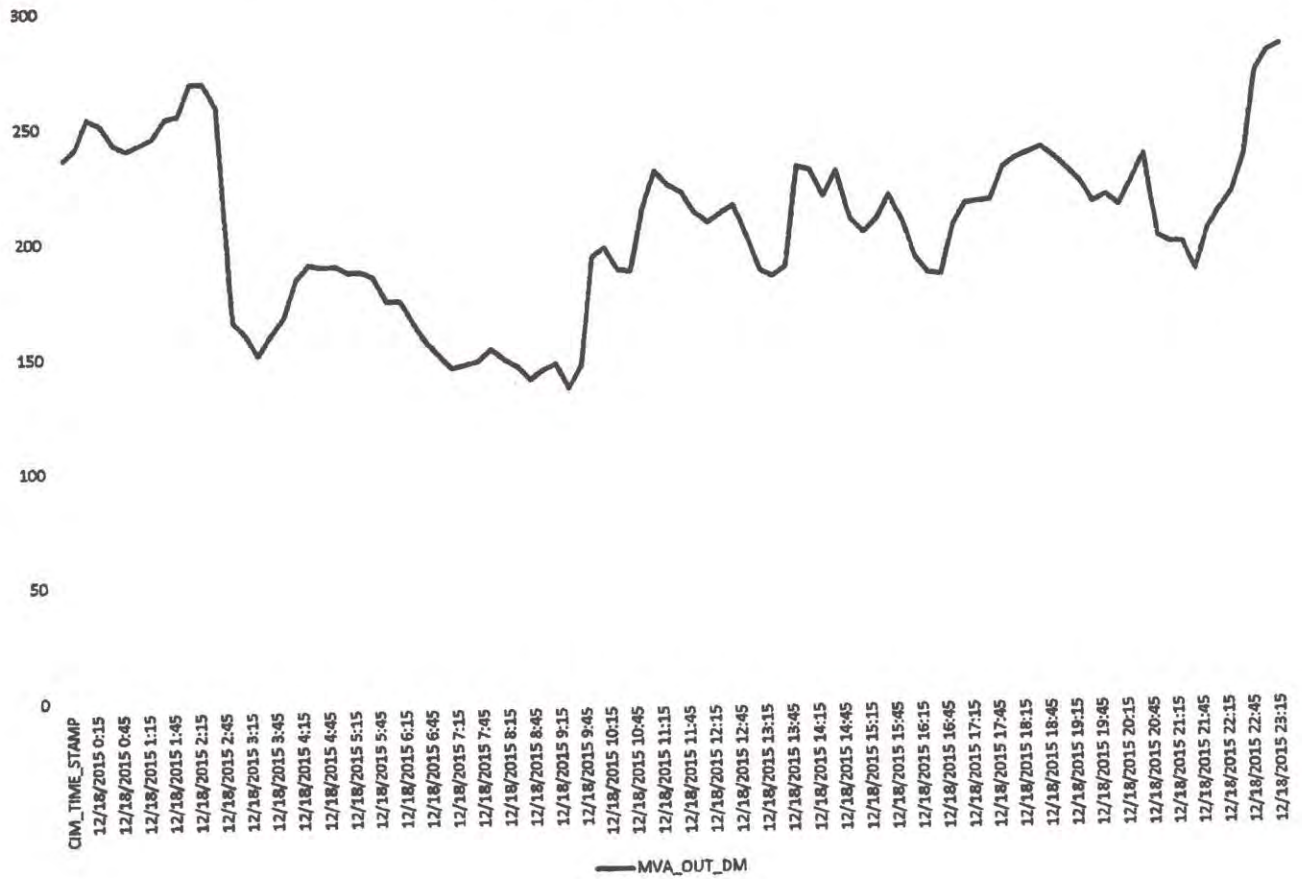
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 image006.png
1.1kB

 S3025 Flows.pdf
136.9kB

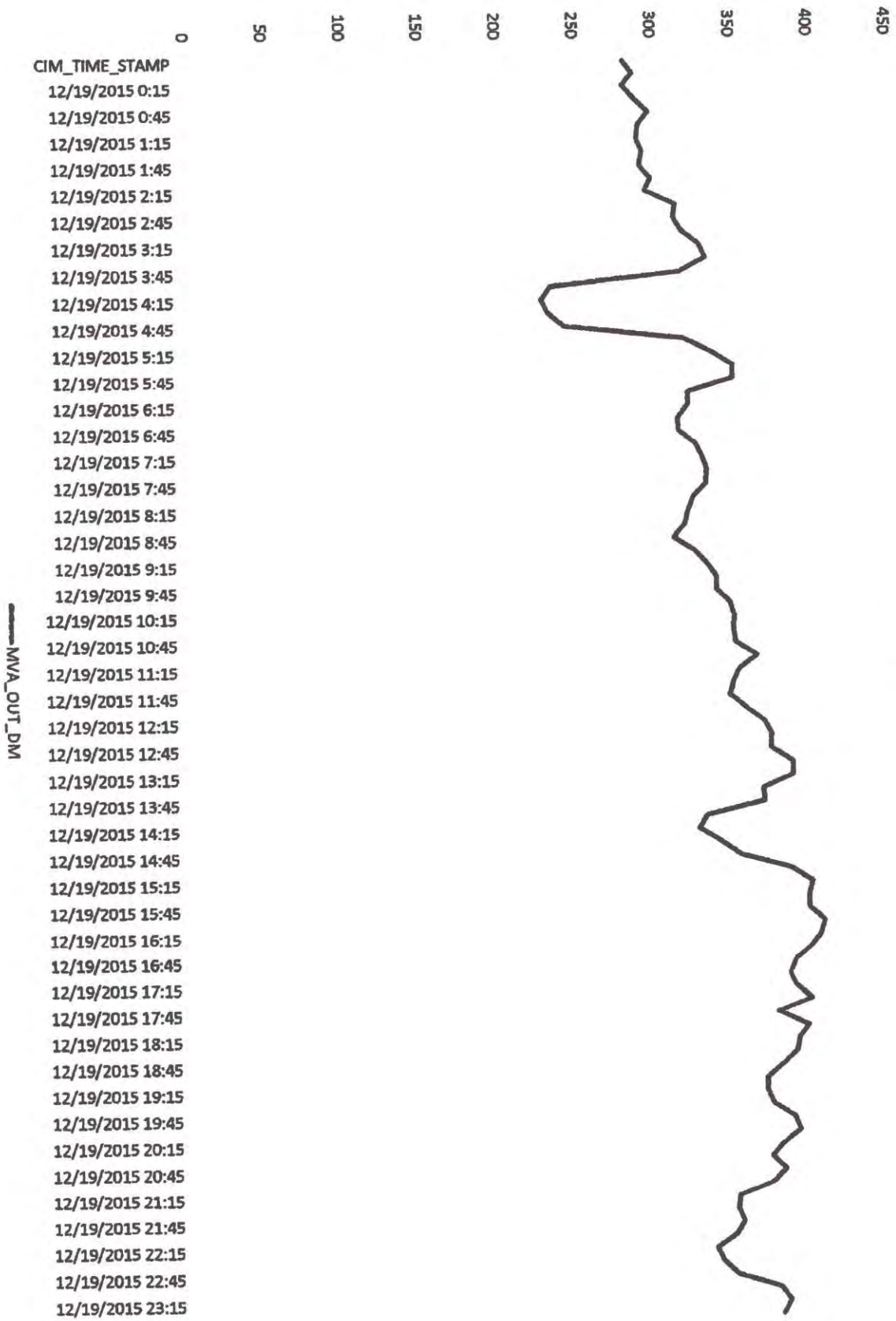
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S3025 Flow, 12/18/2015

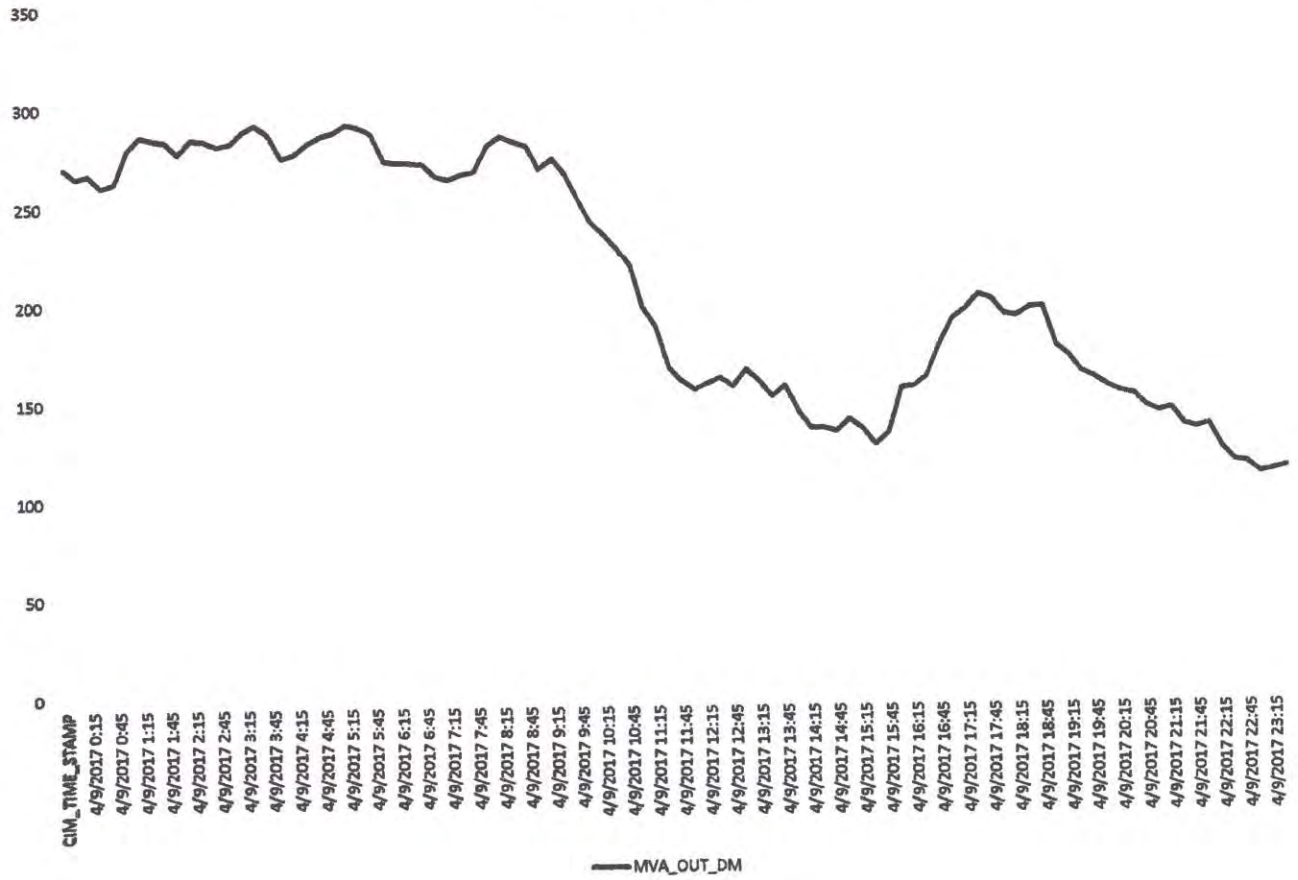


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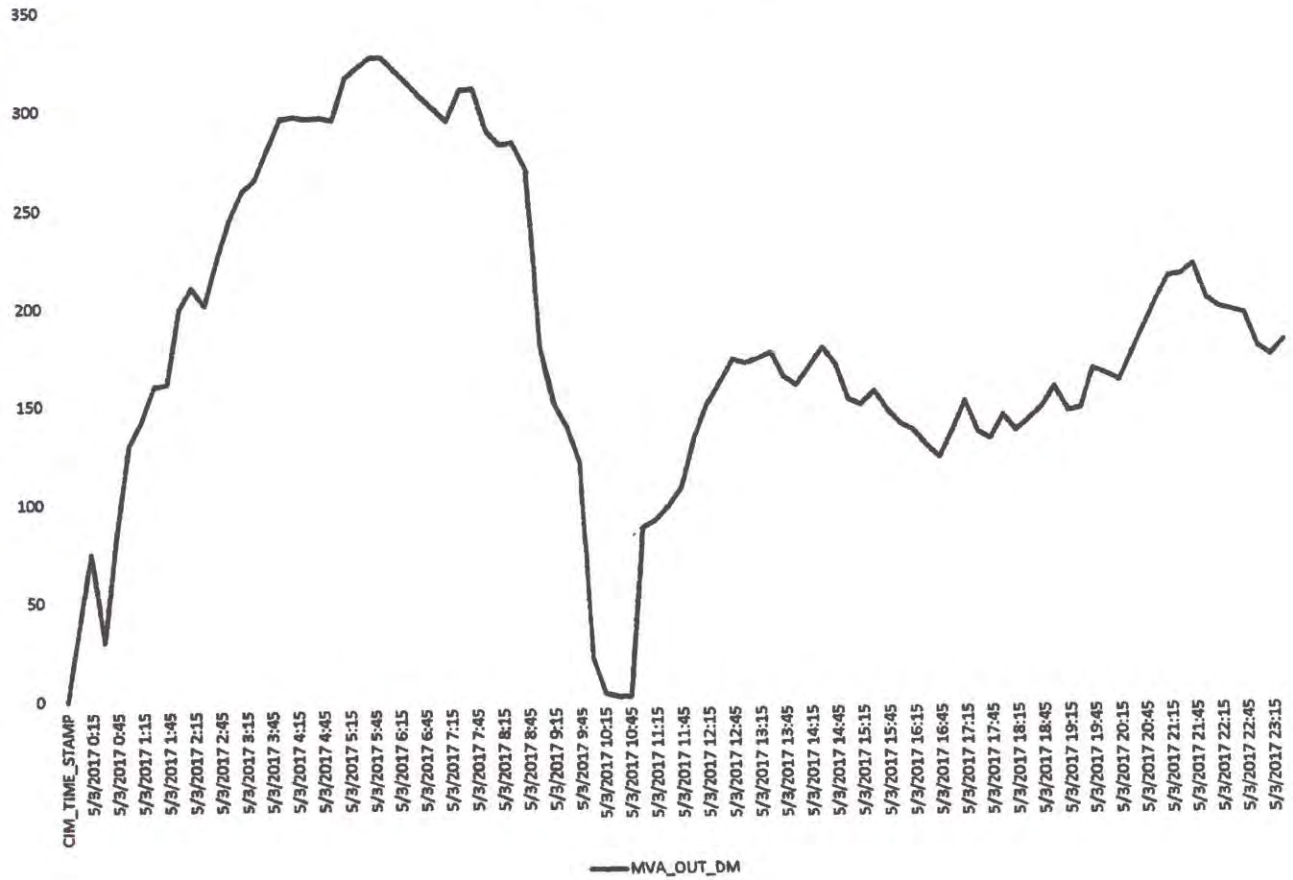
S3025 Flow, 12/19/2015



S3025 Flow, 4/9/2017

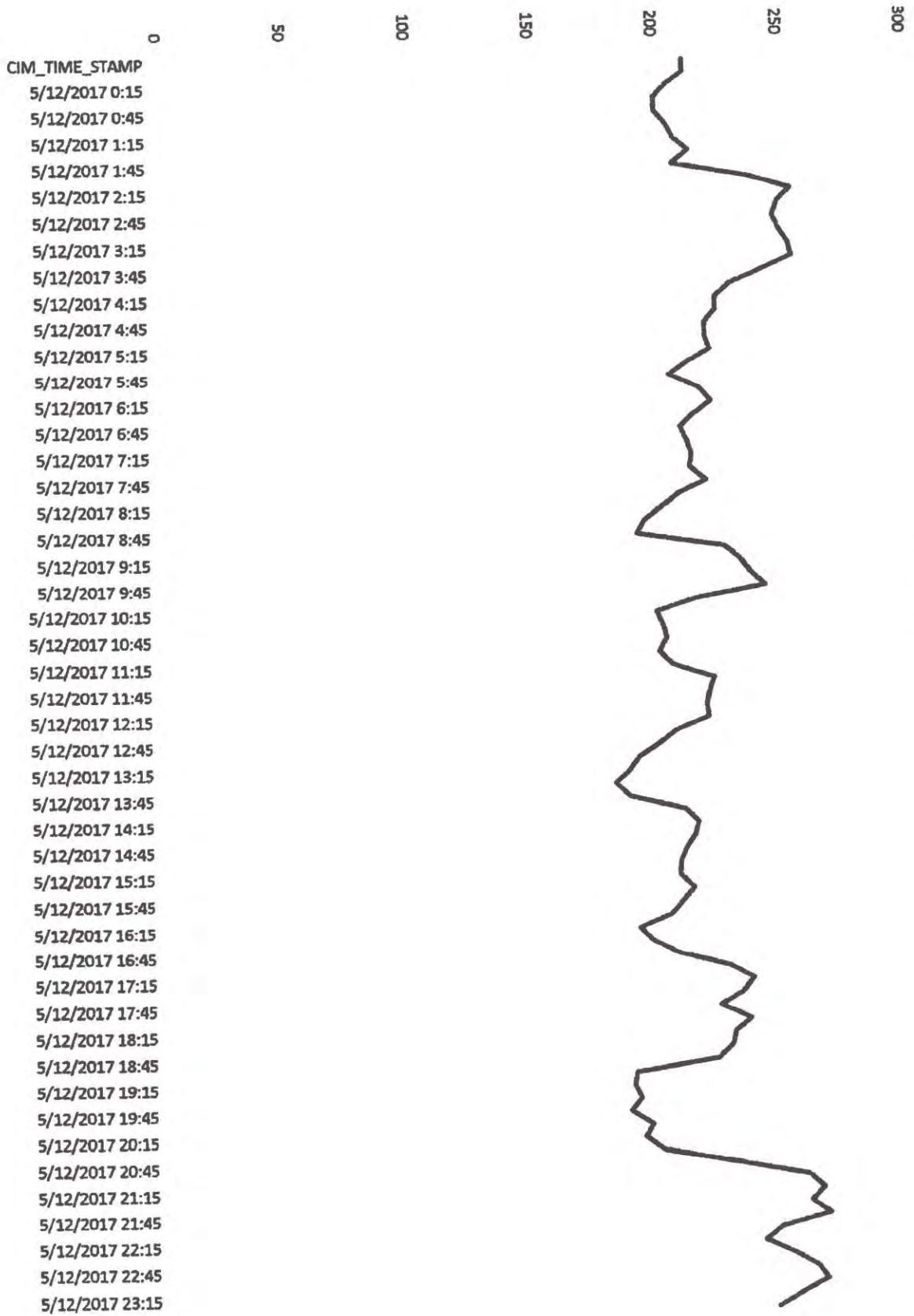


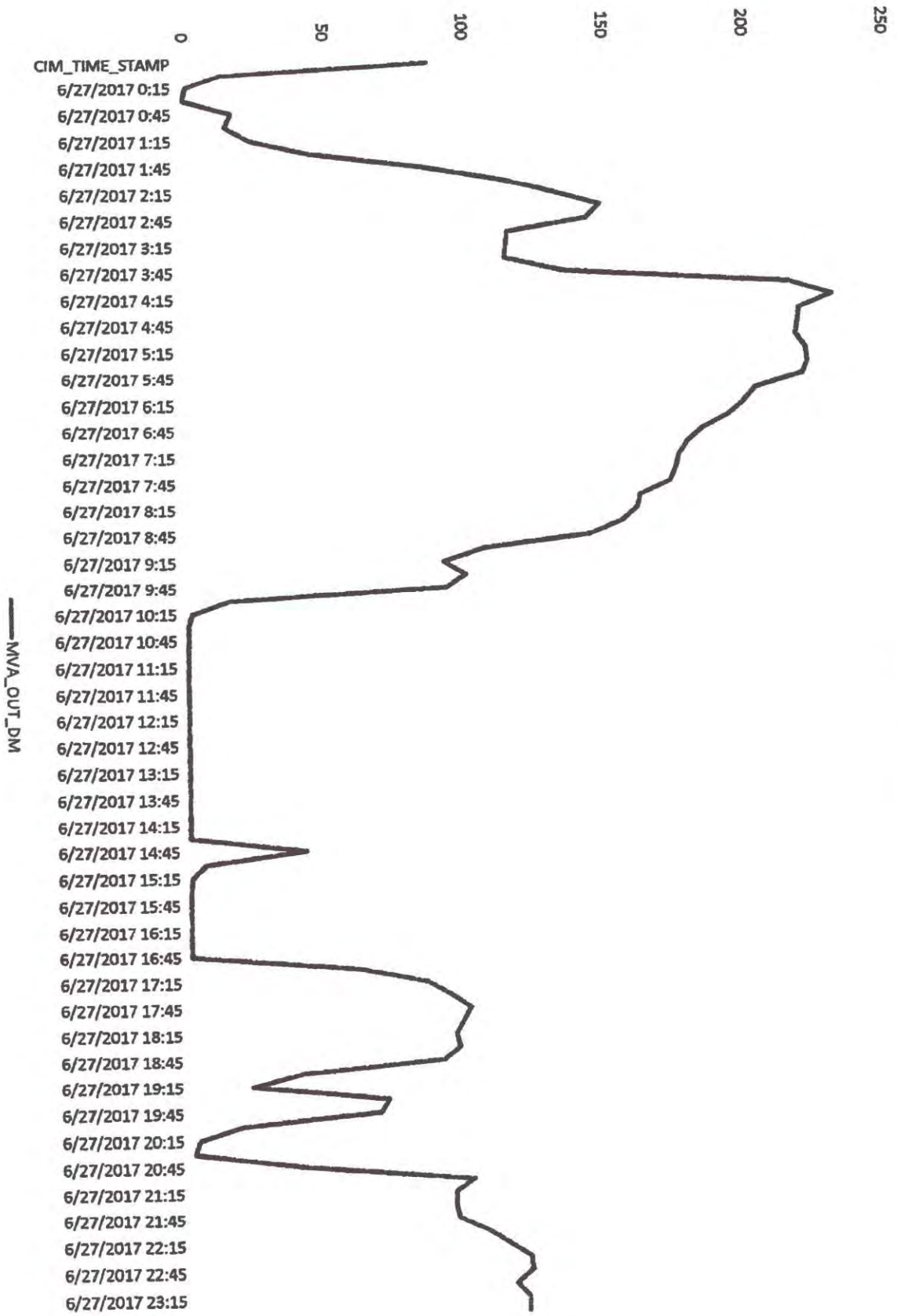
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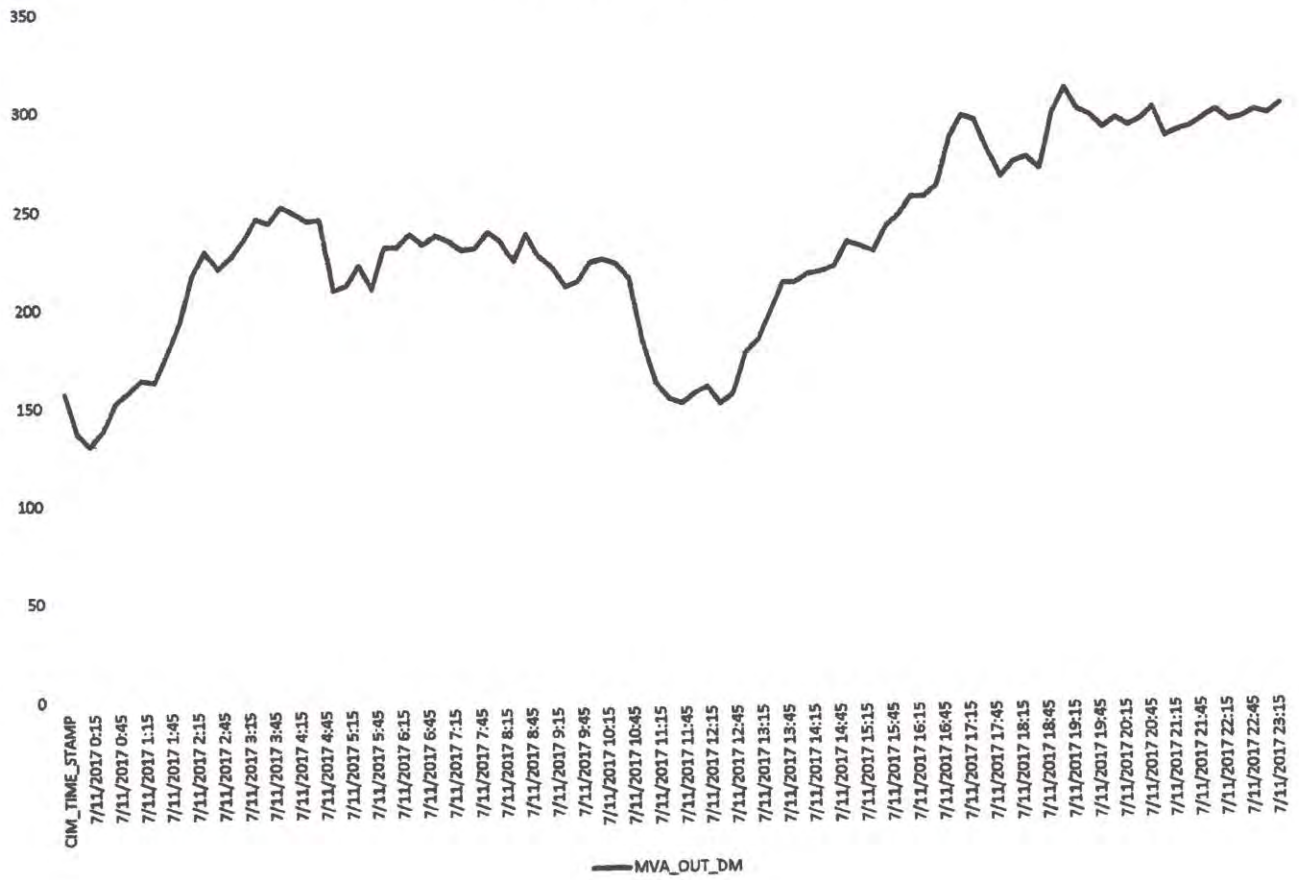
S3025 Flow, 5/12/2017





S3025 flow, 6/27/2017

S3025 Flow, 7/11/2017



000205

S3025 Flow, 7/19/2017

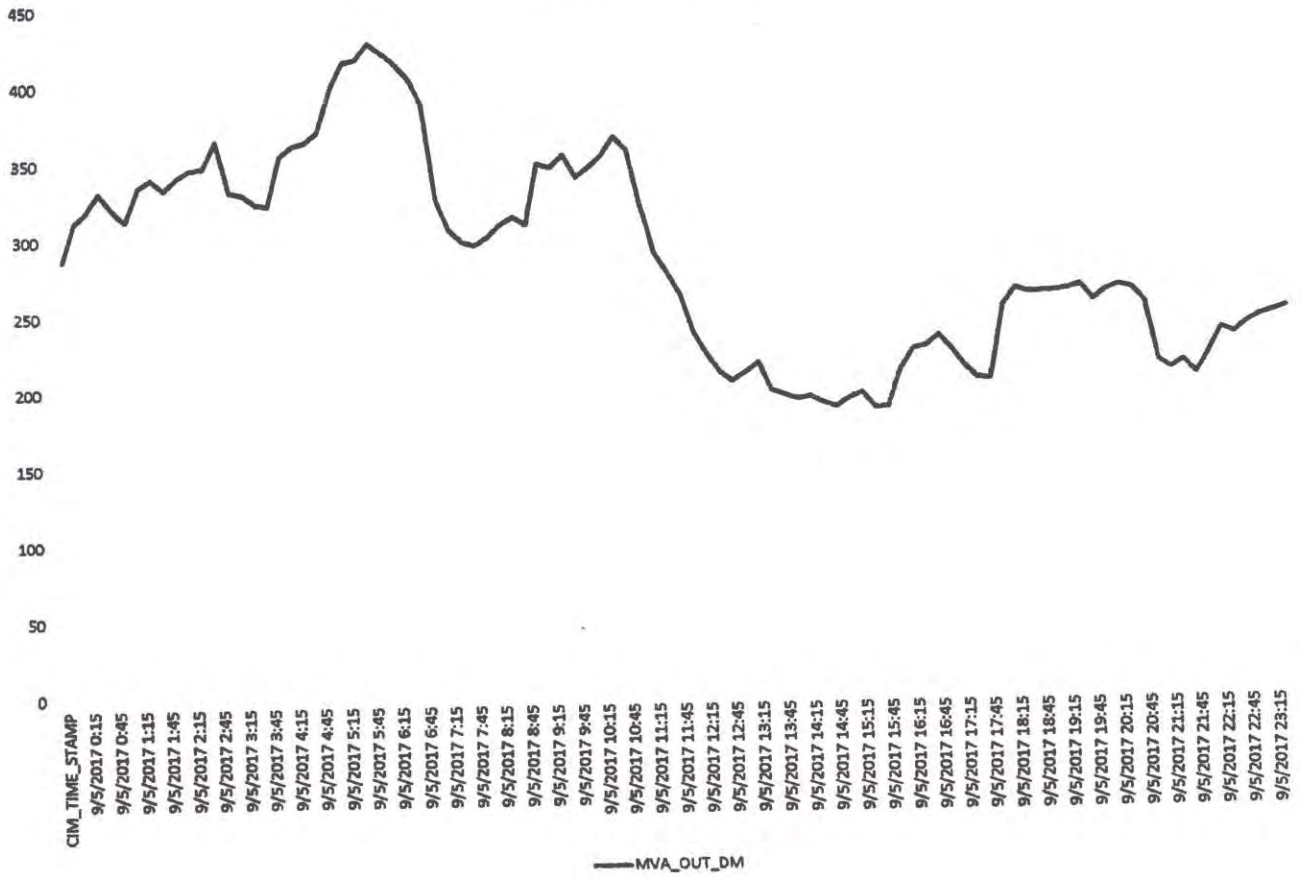


S3025 Flow, 8/10/2017

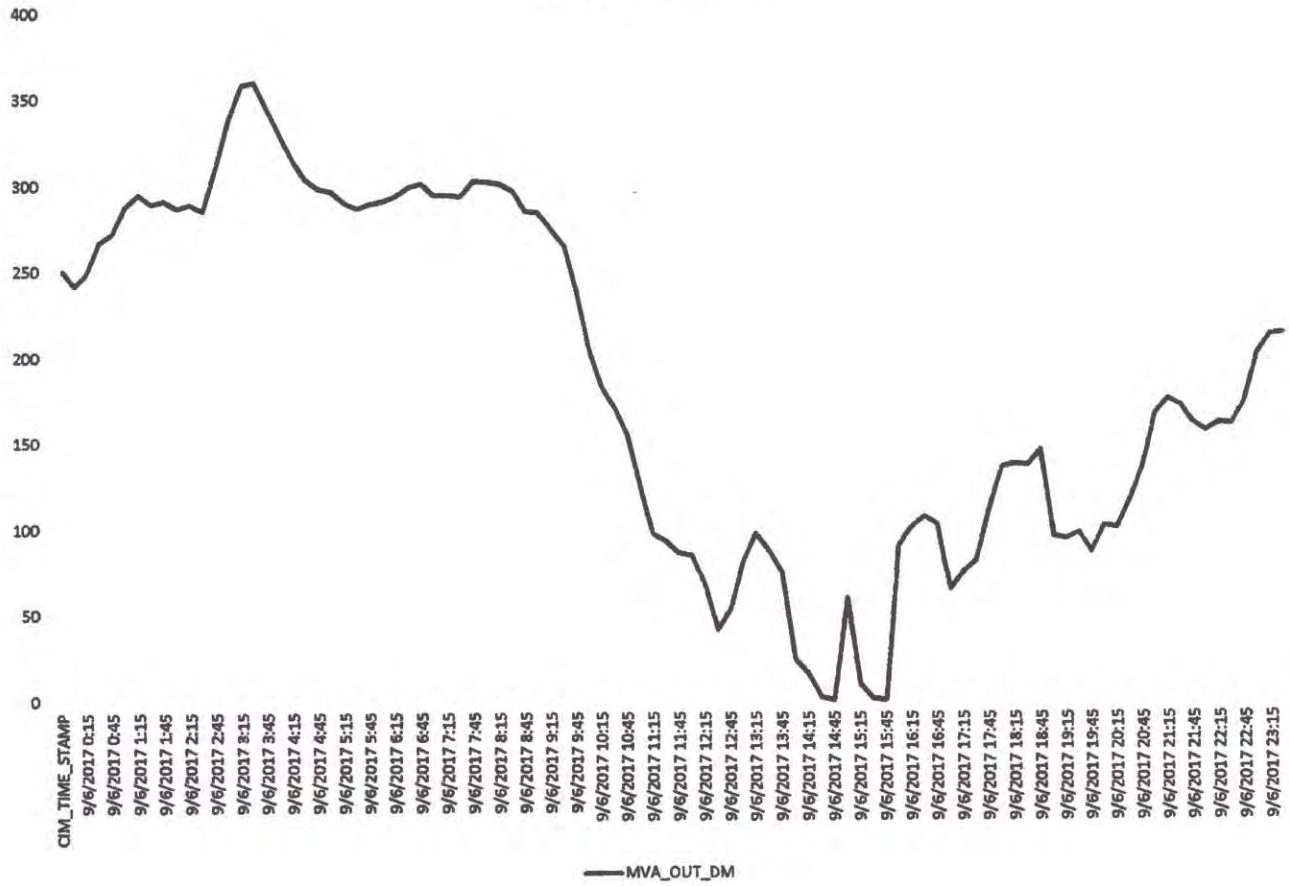


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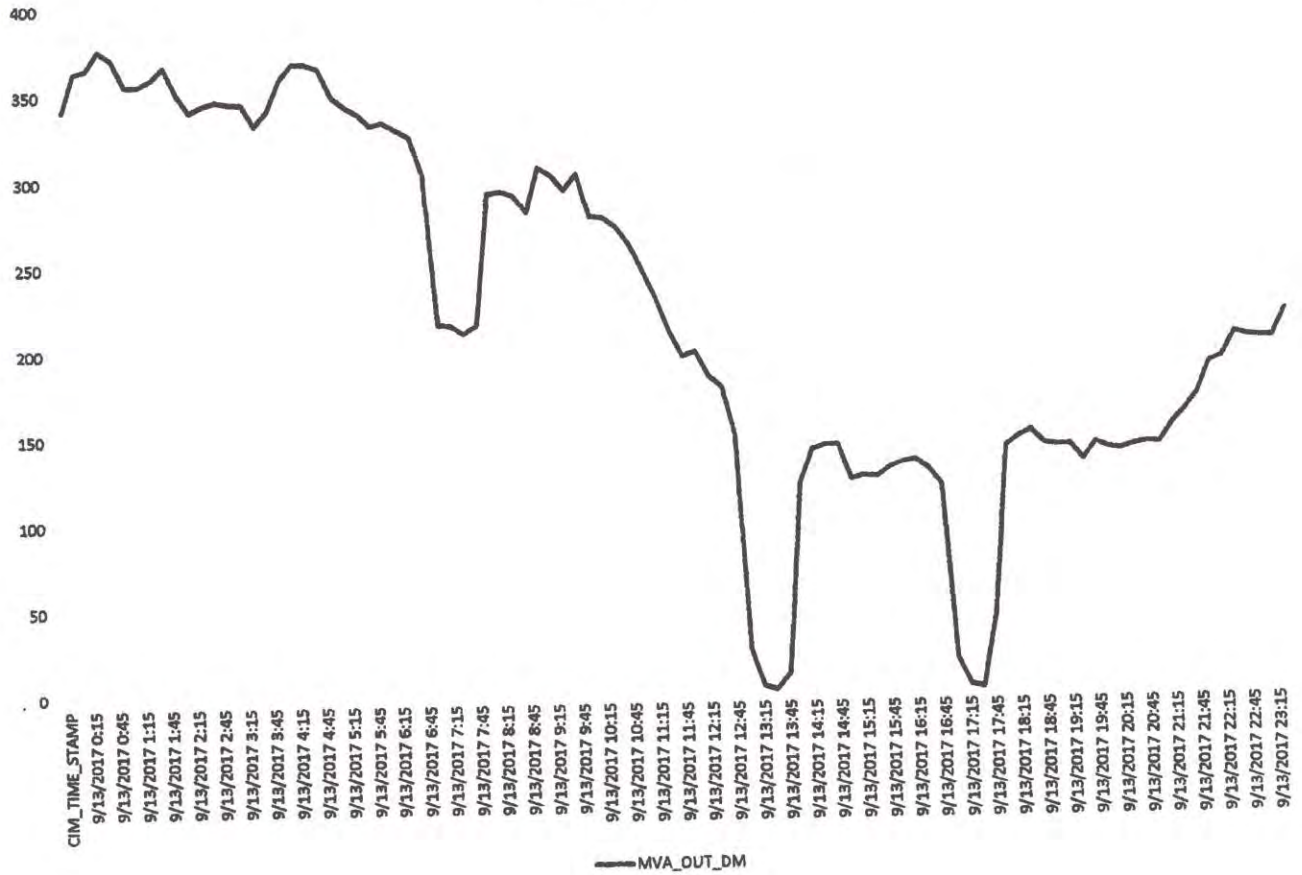
S3025 Flow, 9/5/2017



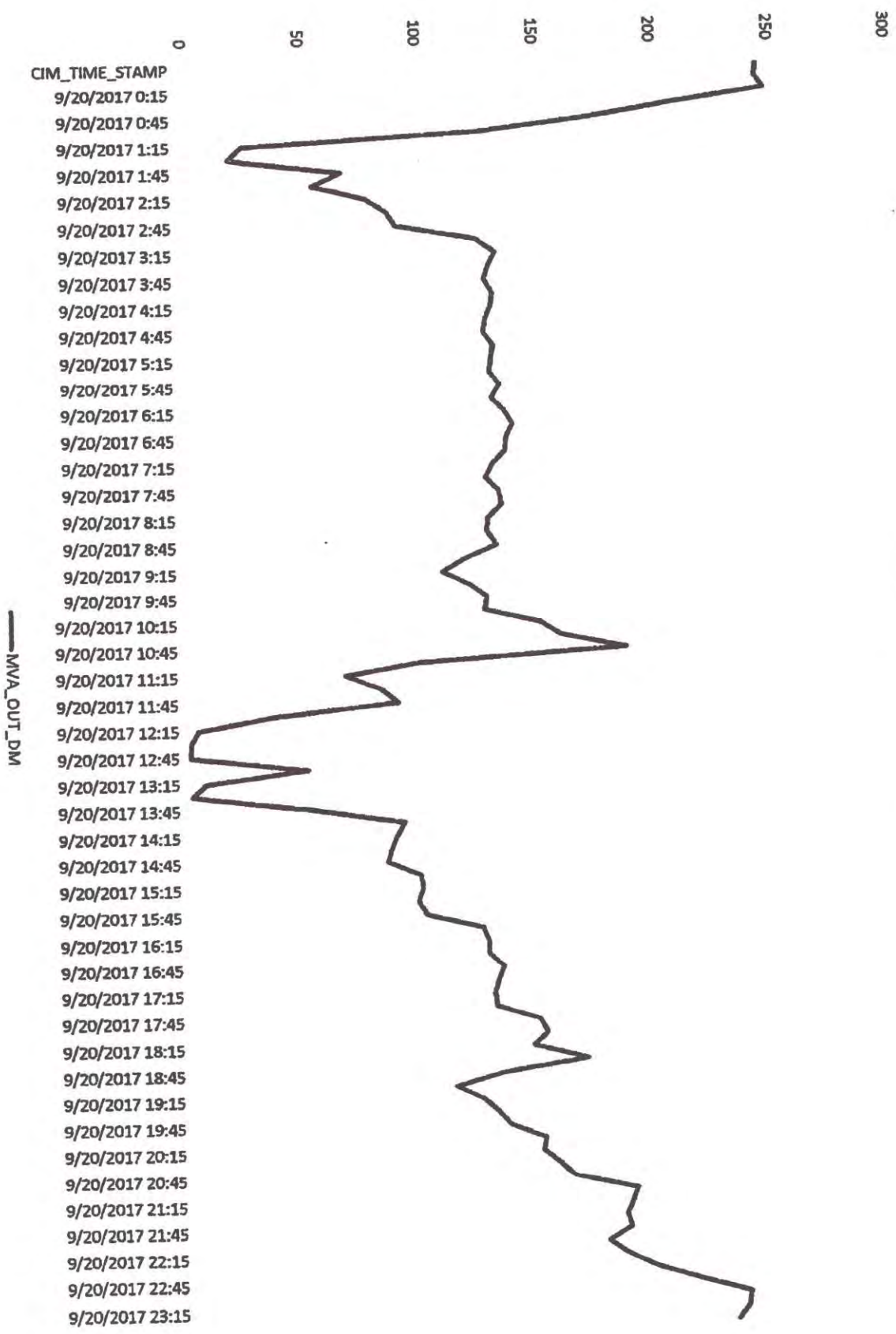
S3025 Flow, 9/6/2017



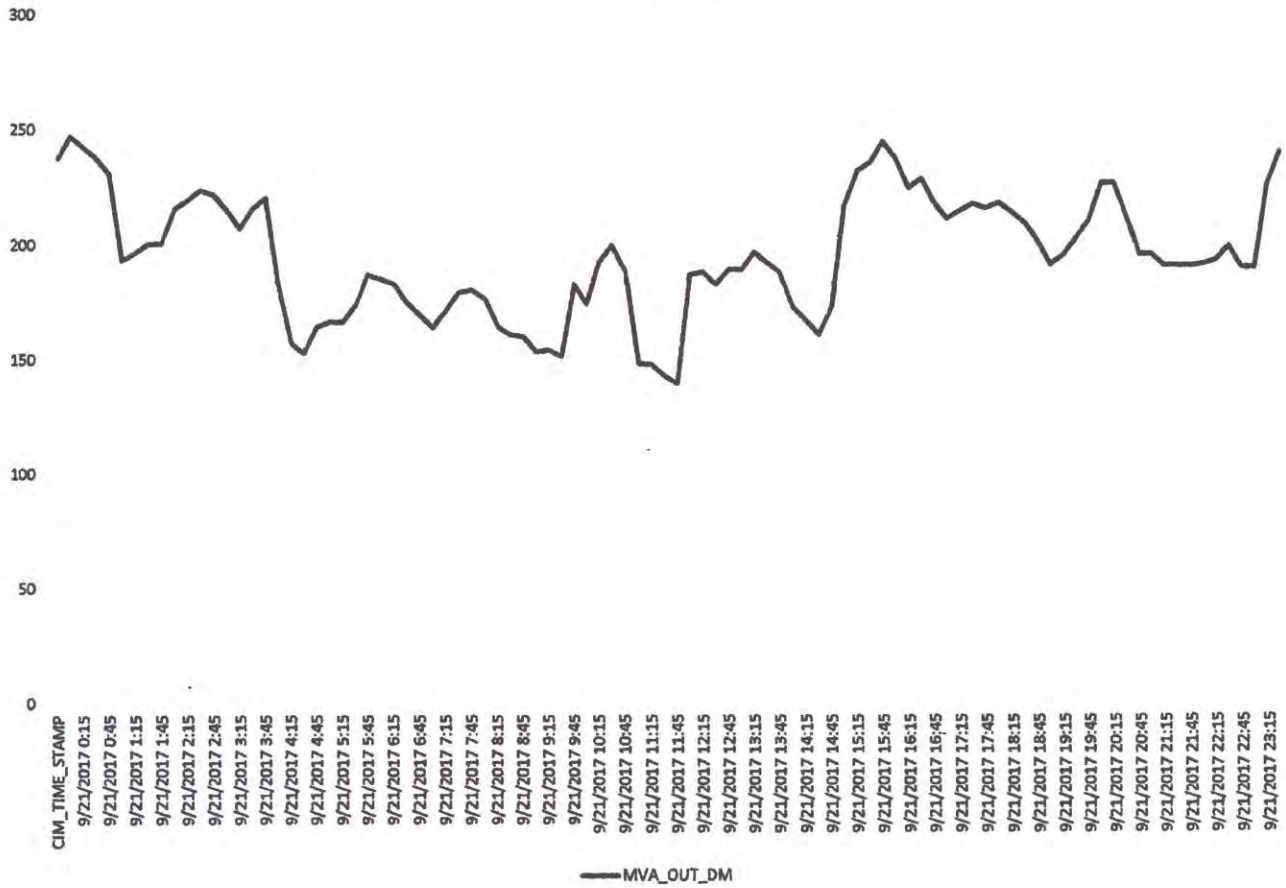
S3025 Flow, 9/13/2017



S3025 Flow, 9/20/2017

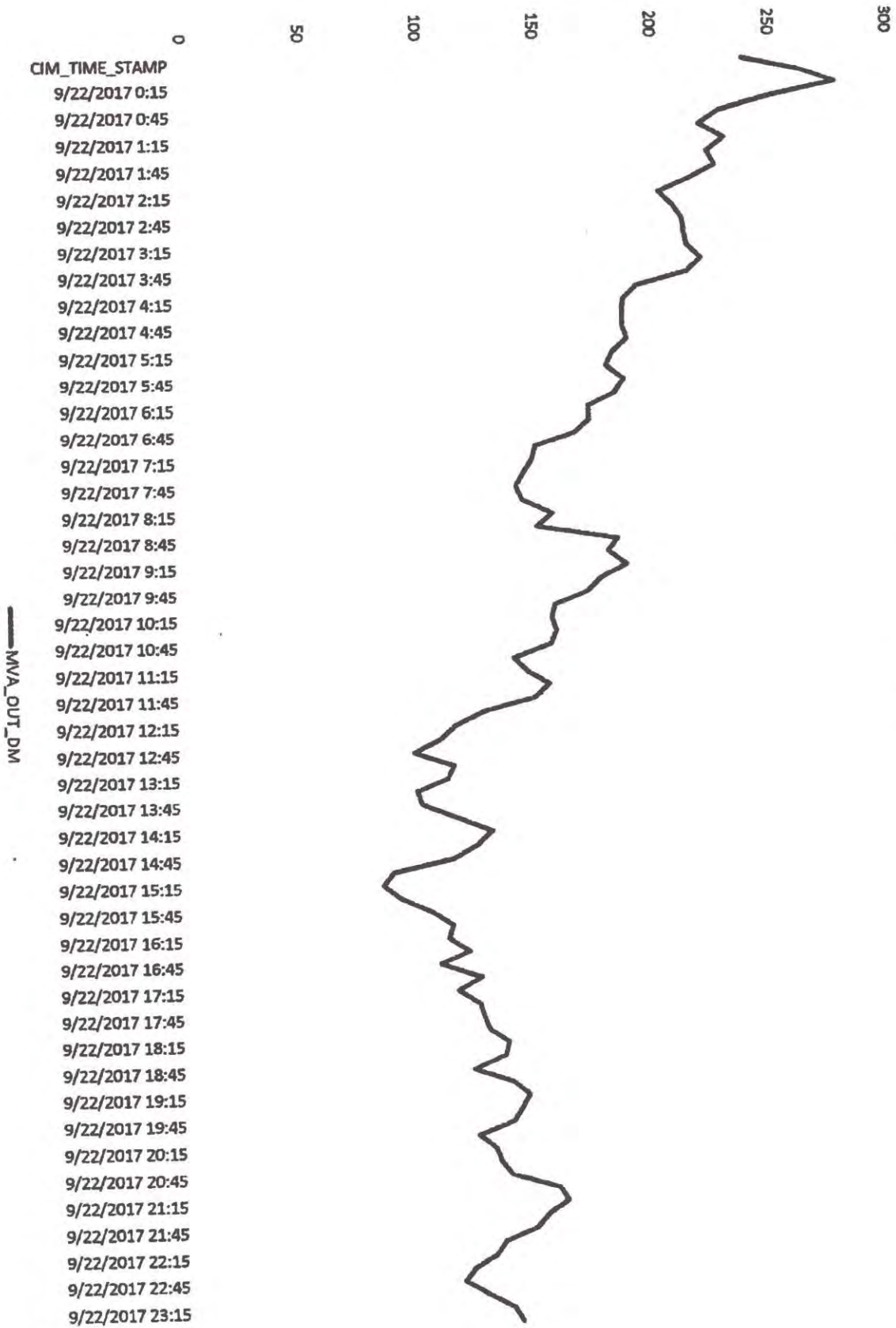


S3025 Flow, 9/21/2017

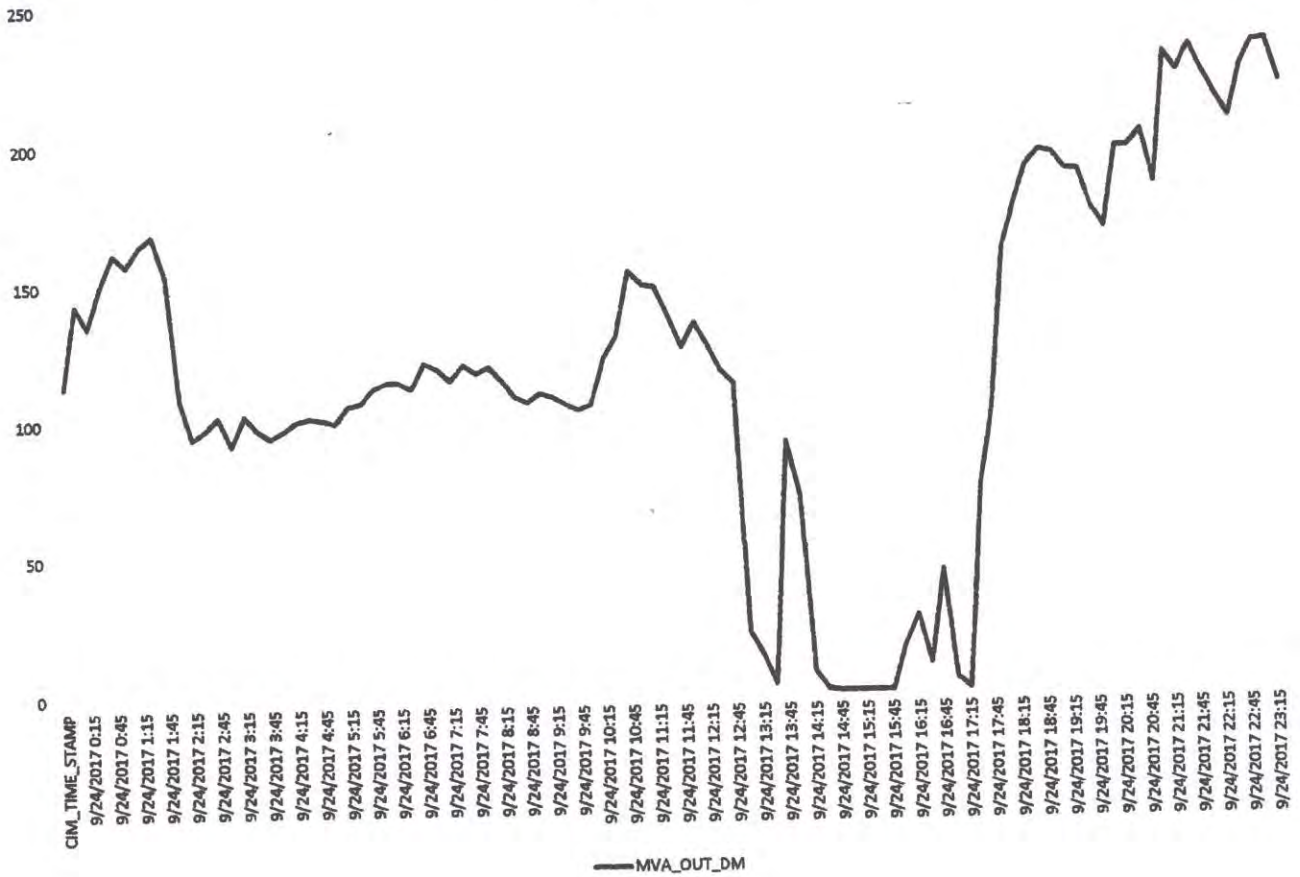


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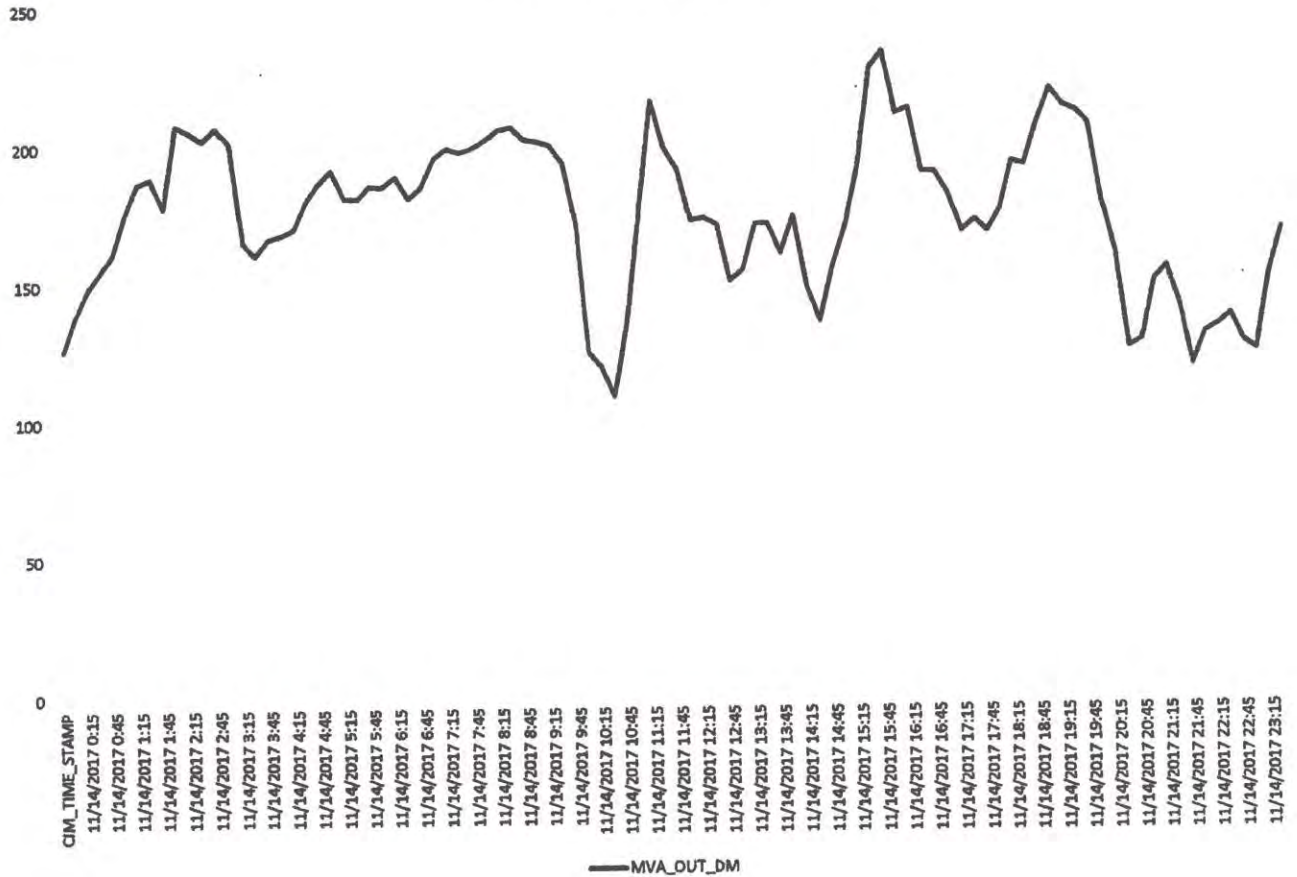
S3025 Flow, 9/22/2017



S3025 Flow, 9/24/2017



S3025 Flow, 11/14/2017



Email 5/25/18
@ 6:29 pm

#3
Email
Dot Kelly

Diane & DOT'S Work
for 5/25/18

May 25, 2018

Harry Lanphear, Administrative Director
Maine Public Utilities Commission
18 State House Station
Augusta, ME 04333-0018

Re: 2018-00034: Rebuttal Comments on Staff Recommended Decision Regarding Proposed LDRT Referral, Diane and James Coston, 482 Togus Road, Chelsea

Mr. Lanphear,

As I stated in my February 21, 2018 comment to this docket, Jim and I are here before the PUC with two serious and dangerous situations which we ask for your help with CMP to document and develop recommendation.

(1) Unpredictable stray voltage. (2) Excessive levels of EMF.

We request the Draft decision be modified to specify that CMP perform a stray voltage test similar to the free tests offered in Wisconsin utility areas and produce a report with recommendations. We would appreciate the PUC opening an investigation so that the stray voltage report comes under the PUC process, as the LDRT process is not being allowed as a vehicle for our legitimate issue to be addressed.

CMP submitted a lengthy comment to this docket on February 21, 2018. This rebuttal addresses the points and attachments in the CMP February 21, 2018 comment.

DESIGN AND CONSTRUCTION: On page 1 of CMP's comments CMP maintains that the LDRT process is no longer available because construction is over. The recommended draft decision codifies CMP's contention. We maintain that without a different vehicle to address concerns of design and construction from the MPRP, the LDRT process should be utilized to see that abutters are not facing health impacts to themselves and their livestock from the new transmission line. The EMF readings done at our property by CMP showed levels 37% higher than the maximum CMP predicted and higher than the level in the Curtis decision and lawsuit (Docket 2011-00504 and upheld by the Maine Law Court on February 26, 2013).

With respect to the very important issue of stray voltage, CMP has declined to do the testing that they originally said they would do, on the grounds that they do not typically test along transmission corridors. Meanwhile Jim and I still have a problem that was not resolved by the installation of filters on our electric fencing. CMP had maintained that the filters would solve the problem.

000216

We agree with CMP that our construction concerns were resolved by a settlement agreement entered into in February 2012. That issue is not what is being requested regarding stray voltage and EMF levels.

EMF and Stray Voltage Impacts. On page 2, CMP states "The Costons' remaining claims concerning stray voltage and electromagnetic fields were asserted after the completion of construction and involve the operation of CNMP's transmission system in the vicinity of the Coston property." We think this is a false conclusion. It is specifically the design of the transmission lines and their close proximity to our home and farm combined with the lack of warning that we would have any impact from the transmission line on our activities, that makes this issue one directly related to the issuance of the Certificate of Public Convenience and Necessity and the Design and Construction of the line.

We had lived with the 115 kV transmission line in the location where the 345 kV line is now. We did not have stray voltage or the animal behavior that we now experience with the 345 kV line. We do not think CMP wanted to have our life impacted, but it is.

Again, we request the Commission open an investigation into Stray Voltage and EMF levels on our property as an alternative to the LDRT process.

Rebuttal of CMP's Statement of Facts that it was known that the HVAC line was going to be located to the south.

On page 3 CMP uses a draft document to infer that we should have been aware that the high voltage line was going to be located on the southern side. In fact, we were informed by Al Godfrey that the high voltage line would be on the north side and that our north neighbors were going to be affected by line and need to move, not us. As documentation we have the October 21, 2008 option to purchase which does not show where the transmission lines will be and which shows we have more land around our home toward the corridor than the similar graphic in CMP's attachment in this filing. The option to purchase and land swap graphic is attached.

We would like the investigation to get testimony from Al Godfrey as he was the CMP consultant directly involved in the land swap and our dead animals discussed below. We disagree with CMP's version of the facts.

Dying animals. Disagree with internal document revealed in this comment.

On page 5, the CMP comment states, "On 05.15.14 – Jim Coston contacted MPRP Real Estate agent Al Godfrey concerning farm animals that had died. Mr. Coston reported that animals started dying in fall 2013. Mr. Coston believed blasting may have tainted the ground water. Chris Marshall (Burns & McDonnell) asked Stephanie Cote (Ciambro) to contact Coston on behalf of Irby, the general contractor responsible for constructing the MPRP in the area.

Jim Coston specifically remembers that the animals died in the spring of 2014, and Diane Coston remembers contacting Mr. Godfrey and then CMP within a few days of

the deaths, which occurred over a few weeks. The deaths were the newborn calves, and the newborn goats, and a couple adult goats, and then the cows could be bred back because they were sterile. Calves on the farm are born in May to June. The last calf born, was born in June and named June. She was the only calf that survived. She is still on the farm.

CMP's Exhibit 5 page 1 of 2, is an internal email from Stephanie Cote dated Tuesday, May 20, 2014 sent to Chris McKenney and four other men. It was not sent to the Costons. The email purports to document the conversation she had with Diane Coston the day before. It states (directly conflicting with the information quoted above from page 5).

I'm following up my voicemail with this email regarding abutter James Coston and his dead farm animals in Chelsea (Togus West). I spoke with Diane Coston over the phone yesterday afternoon. As communicated by the Diane [the extra the before Diane is in the email, which otherwise seems well crafted, emphasis added] their farm animals (cows, chickens & rabbits) began dying in mid February 2014. Our internal review yesterday confirmed that blasting at structures 83-87 on S. 3025 did not take place until mid April 2014. We confirmed this morning that our matting crews were not in the area until staging began February 27, 2014.

Not only is this information about the calves dying in February wrong, as Jim is sure about when calving happens, but it conflicts with the statement on page 5 (quoted above) which states the animals started dying in fall 2013.

The email in Exhibit 5 ends with the information that Al Godfrey was at the Coston farm because of the dying animals. That is why we want Al Godfrey to testify about his recollections. We were always impressed with Mr. Godfrey with his quick responsiveness and thoroughness. According to LinkedIn, <https://www.linkedin.com/in/al-godfrey-bb5a6b2b>, Al Godfrey is President at TMSI Engineers in Gardiner, Maine specializing in Civil Engineering.

Diane made mention that Al Godfrey and a Chris (?) stopped by in response to their concern. We want to understand what information you gathered from this meeting as Diane was looking for a comprehensive well water test.

Diane would like to confirm that Al Godfrey did come the day after she called him reporting the multiple deaths. When Al Godfrey arrived, the water testing person, Steven McCoy with AERUS, that Diane had hired was just leaving and Mr. Godfrey and Steven talked for a bit. Again, we request that Al Godfrey be asked about his recollections because we are confident that he will confirm our version of the facts.

It is still not clear why our animals died after the blasting occurred.

With power off Costons report shocks from fence. On page 6, CMP accurately notes that Jim Coston was shocked by the electric fence while the fence was turned off for the first time (04.09.17). The CMP report insinuates that this delay from the energizing of the lines in 2015 means something. In fact, according to Jim Coston it was just the unusual occurrence that the power was off because Jim was setting up the fence for the season. Jim's nephew was by and because the fence was not energized, being a young man, he grabbed onto it and the handle, and was shocked. Jim couldn't believe it, confirmed that the fence was unplugged, and tested the fence for himself. He was shocked to the ground. They then walked the whole fence to see if some unknown electrical connection existed, which it didn't. Thus the fact that it wasn't noticed until 2017 that the un-energized fence was conducting significant stray electricity, is not surprising. If, as in Wisconsin, the utility did stray voltage testing before and after the installation of high voltage lines on close abutters, the fact would have been known sooner. It was a risk that was unknown.

Stray Voltage.

This is an issue of significant safety and health for the Coston family. There appears to be a downplaying of the importance of stray voltage on the Coston property, with important emails missing and erroneous facts included.

The CMP timeline describes the actions that they took after the Costons reported being shocked by the electric fence while the fence was turned off. On Sunday April 9, 2017, Jim was severely shocked by the un-energized electric fence (See description above).

Erroneous fact. The timeline then states that Mr. Coston was shocked again on April 12, 2017. This is not true. The shock was significant. The Costons were then and are still very afraid of the stray voltage hazards that are on their property. They avoid the fence.

The entry in the timeline for April 12, 2017 doesn't reveal who thought Jim Coston was shocked again, but certainly no one has directly asked the Costons. Diane has a hand written record that shows she called CMP on April 12, 2017 to report the April 9, 2017 event.

Stray Voltage Shock and Testing. Diane has a note that she spoke to Rhonda in the Department of High Tension Line Service Center and Rhonda gave her a work order #10300381598. This work order could be checked but was never given to Mrs. Coston.

On May 3, 2017, after Diane had reported to CMP on April 12 she waited until the end of the month and then contacted Al Godfrey who made a few phone calls. Al Godfrey called back and requested Diane call Tim Robinson. His answering machine said to contact Sam W. "I verbally talked to Sam, who was just filling in, and he suggested I

talk to Greg Snow". I talked to Greg Snow who agreed to come over and investigate. They came on May 3, 2017. As you can read in this description, it is only through Diane's extreme perseverance that she got someone to acknowledge her.

The May 3 testing with Ray Boucher and Greg Snow, which Diane witnessed, showed very high levels of stray voltage – 84 V. Ray Boucher sent an email to Gregory Thompson of Avangrid that day which summarized his findings. This email was not described or disclosed by CMP, but was provided to Diane in October 2017. See three page e-mail thread dated August 25, 2017 from Gregory Thompson regarding the testing by Greg Snow.

On May 3, 2017, Ray Boucher wrote:

Greg Snow and I met with a customer this morning who is getting shocks at her home. They thought the voltage was being induced by the 345 KV transmission line (MPRP) adjacent to their property. We did some voltage checks and did confirm that there was voltage present (varied to over 84+ volts to earth) on their fence line which runs parallel to the transmission line. It is not faulty electrical equipment as we also confirmed the voltage readings even with the service main breaker off. It does appear to be related to the transmission line and Greg Snow can fill you in with the customer name, phone number and explain the voltage readings in more detail.

This is beyond anything I can address. Could you follow-up with someone more familiar with the MPRP project and right-of-way and resulting voltage induction issue. Please let me know if you have any questions for me.

Clearly Ray and Greg thought this was a big issue. The email on August 25, 2017 from Mr. Thompson to "Chris and Bill" takes a different view of the hazard without describing why.

Mr. Thompson writes:

Below is a summary of the meeting between the Coston's, Ray Boucher and Greg Snow. It should be noted that there is no official report regarding the visit. This site visit was meant to rule out the possibility of the distribution circuit causing a safety concern for the Coston's. Ray and Greg do not have the expertise nor the equipment to test for EMF. Further, they would not be the appropriate representatives to discuss safety as it relates to the transmission line and the proximity to the Coston's property. Ben Shepard's group or a contractor through Ben's group should be able to address those issues.

000220

Downplaying the ongoing issue of stray voltage and pressuring Mrs. Coston to say she is satisfied is mis-represented.

On June 27, 2017 CMP sent two men to the site. They had a box of filters, didn't do any measurements, used only two filters and then pressured Diane to say that she was satisfied, by repeatedly asking her, "Are you satisfied?" Diane responded, Yes, I am happy you came to put the filters on, but only time will tell if they are going to work." Diane did not state that Leah ever said she had to move out of her home due to EMF. Diane believes Leah said "that the levels are unsafe."

The timeline states:

06.27.17 – Ben Shepard and Jim Wright (CMP) installed filters on the electric fence to address induced voltage. Diane Coston informed Shepard that Ombudsman Sprague advised her to move out of her home due to EMF.

The CASD letter sent on July 6, 2017, (see Exhibit 8) corroborates that Diane was uncomfortable with the conclusion that the installation of the filters was sufficient. The last paragraph shows that her satisfaction was conditional, by including the word "currently", when Merica Tripp related the phone call just two days after the filters were installed.

I spoke with Ms. Coston on June 29, 2017. She indicated that she is **currently** satisfied with the installation of the filters... (emphasis added, note how it differs from the timeline quotation).

Thus the timeline entry overstates the case when it doesn't include the word "currently".

07.06.17 – CASD sent letter to James Coston confirming that Diane Coston was "satisfied with the installation of the filters in order to mitigate the safety concern regarding the electric fence" and closing the Costons' complaint.

It is clear that Mrs. Coston would have preferred to have the case remain open to monitor that the filters were successfully addressing the stray voltage issue and that they were no longer going to be shocked.

On September 13, 2017, the timeline explains that both Mr. Coston and his grand-daughter were shocked while operating a gate on a de-energized fence, but that CMP got a message from the PUC that didn't say that both Autumn and Jim got shocked. We can only conclude that the message did say that Autumn got shocked. The timeline note, makes one think that CMP was unaware that anyone was shocked, but reading it closely makes one realized they did learn that Autumn was shocked. Diane recalls that her first call to Merica (since Leah was still out with her medical condition) only reported that Autumn was shocked. She was not aware that Jim grabbed the fence from Autumn

Readings
on
May 25th
2018.

Done by Dot Kelly
at 482 Toquo Rd Chelsea
ME

Finch 10" from Filter - 1-7-14
N Side

7 5" out Air 39.0 40.5
Finch cor 2 3.9

10" off Air 30.7
Finch 7.25 2.6 1.1 2.8

10" 15" Air 39.33 38.09
Finch By Filter 8.25 8.47

S. W. Corner 10" off Air 36 0.296
Finch 10" off 0.18 0.57

S. Side 25" off Barn
10" 5" off Air 4.0 4.55
Finch 3.3 2.1 3.0 2.7
3.7 3.5

All Testing has leads on
At 12:54
Top stairs

Deck 1.003 bottom of stairs .003
with one ^{black} lead in .241

Between ~~two~~ Garage doors in corner of barn
black lead in ground .578 V. AC.

South side
25 ft from corner of Barn 1.57 1.63 V. AC

25 ft from south of west corner of barn

2.457 to 2.57 V. AC

25 ft west of barn 2 feet east of electric fence
3.9 V. AC to 4.86 V ac, 5 inches from fence
line 3.7 V. AC touching fence ~~39.03~~ 39.05 V. AC

South East corner of barn fence line 2 ft
away 1.064 V. AC to 1.086. 5 inches from fence
1.105 V. AC to 1.111 V. AC touching the fence
is 39.03 V. AC to 39.07 V. AC

directly under distribution line edge of driveway 1.553 V. AC
to 1.533

pole # 39. Standing open air .015 black lead in
ground under distribution wire .250 to .263

2.7 feet north of 45 mile side under the
345 K. V. line. Adjacent to road bed (1 foot)
16.9 to 16.85 V. AC.

Triaxial Magnetic Field Meter T-192

Homeowner

Swiss meter @ 10:12 am 5/25/18

on Kitchen table: 2.33 mG
2.45

On Diane's work desk in room
closest to power lines 2.44 - 2.59

VM Southwire 21030T True RMS AC
Clamp meter CAT III 600V 400A

Kitchen table w/ no leads
0.003 - 0.004 V

With leads in it shows 0.167 -
0.170 V

Diane's desk

Leads in separated by 2'
0.131 Volts

When black lead is touched to metal file
cabinet the reading went to 0.392 V.

1-800-452-4699

Subject: **Fwd: MPRP--James and Diane Coston**

From: lwsprague@aol.com

To: costonsfarm@yahoo.com

Date: Sunday, February 18, 2018 01:56:26 PM

Ann Brooks is with CMP.

Sent from my iPhone

Begin forwarded message:

From: "Cottle, Susan" <susan.cottle@maine.gov>
Date: May 18, 2017 at 9:26:52 AM EDT
To: "lwsprague@aol.com" <lwsprague@aol.com>, "Brooks, Ann M. (Ann.Brooks@cmpco.com)" <Ann.Brooks@cmpco.com>
Cc: "Tripp, Merica A" <Merica.A.Tripp@maine.gov>
Subject: MPRP--James and Diane Coston

Leah—I am writing to you as the ombudsman for the MPRP to let you know that we are advising James and Diane Coston to contact you with their concerns resulting from the project; they are being provided with your contact information today. We have a complaint open here for them having to do with stray voltage, which may arise near any transmission line. And we will be continuing to address that complaint accordingly. However, the Costons have additional concerns beyond the voltage issue that they believe are specifically related to the project that have affected their water and, from what we understand from the Costons, have not yet been addressed as needed. The ombudsman process is, of course, the most appropriate venue for the resolution of any MPRP concerns.

Ann—I am including you on this email as our CASD contact so that you/CMP is aware of this. As we discussed yesterday, I had indicated that if the consumer indicated to us that there were matters related to the MPRP that had not previously been satisfactorily addressed, we would need to refer them to the ombudsman. As noted above, the stray voltage issue is something that we in CSAD will continue to look into (Merica will be handling it) and be expecting CMP to address promptly so as to ensure safety in both the immediate- and long-term.

If either of you have any questions, please do not hesitate to contact me directly.

-S

Susan E. Cottle, Deputy Director

Consumer Assistance and Safety Division

Maine Public Utilities Commission

18 State House Station

Augusta, ME 04333-0018

000226

Subject: Notes

From: lwsprague@aol.com

To: costonsfarm@yahoo.com

Date: Thursday, February 1, 2018, 10:35:25 AM EST

1. CMP did not notify the Costons that the line would be constricted adjacent to their property. The Costons learned of this only as construction progressed and as finally confirmed by Al Godfrey in 2014. They never received any notice of the change in the location of the transmission structures from the north to the south side of the corridor.
2. Blasting occurred before the Costons' animals began to die. (NOTE: Diane will confirm his again through her notes.) *July 2011.*
3. Obviously the two voltage filters installed by CMP on the Costons' electric fence have not addressed the stray voltage problem because shocks have been received from the non-energized fence after the filters were installed.
4. The Costons never told PUC staff that they were satisfied with this attempt to resolve the stray voltage problem. In fact, it was PUC staff who recommended that the Costons contact the Ombudsman and gave them the Ombudsman's contact information.
5. The issues of excessive EMF and stray voltage are designated and constriction issues that have never been resolved and could only have been known after the transmission line was energized.

It appears from page four of Amy Mills' letter that while the LDRT is not making factual findings at this time, the LDRT has already decided these factual issues and would "deny the referral" but for the question of jurisdiction. Thus, as laymen, the Costons should probably appeal this decision to the full Public Utilities Commission in order to be sure their rights are preserved.

Leah W. Sprague
P.O. Box 1228
Damariscotta, ME 04543-1228
207.586.6080

000227

•
•

Fwd: Coston Farm, Chelsea (3)

People

Leah Sprague <lwsprague@aol.com>

To

Diane Zagwijn-coston

Oct 14 at 1:40 PM

This message contains blocked images.

Duane,

I'm not sure whether I forwarded this to you before.

Leah

Sent from my I phone

Begin forwarded message:

From: "Marshall, Christopher" <cmarshall@burnsmcd.com>

Date: August 25, 2017 at 2:47:17 PM EDT

To: Leah Sprague <lwsprague@aol.com>

Subject: FW: Coston Farm, Chelsea

Please see below and attached. This is confirmation that there was no official report of the service center visit.

Since this is an internal email from CMP including contact information, I ask that you treat it as information for review only.

As we have previously discussed, the Service Center asked the transmission group to respond following this visit, which we did.

000238

Chris

Chris Marshall, PMP \ Burns & McDonnell

Senior Public Involvement Specialist \ Stakeholder Management Solutions

O 207-517-8494 \ M 207-272-5975 \ F 207-517-8463

cmarshall@burnsmcd.com \ burnsmcd.com

27 Pearl Street \ Portland ME 04101

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000229

Tammy

Tammy Pierce

Key Account Manager

Kennebec Valley Region

Central Maine Power Company

57 Old Winthrop Road, Augusta, ME 04330

Office # - 207-621-6658

Fax # - 207-629-4887

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[Diane Zagwijn-coston](#) Wow!! new email from leah

Oct 15 at 10:04 AM

[Diane Zagwijn-coston](#) Duane, I'm not sure whether I forwarded this to you before. Leah Sent from my I phone Begin forwarded message: From: "Marshall, Christopher" <cmarshall@burnsmcd.com> Date: August 25, 2017 at 2:47:17 PM EDT To: Leah Sprague <lwsprague@aol.com> Subject: FW: Coston Farm, Chelsea Please see below and attached. This is confirmation that there was no official report of the service center visit. Since this is an internal email from CMP including contact information, I ask that you treat it as information for review

000030

Today at 12:09 PM

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000331

From: Thompson, Gregory J. [<mailto:gregory.thompson@avangrid.com>]
Sent: Friday, August 25, 2017 1:46 PM
To:
Subject: FW: Coston Farm, Chelsea

Chris and Bill,

Below is a summary of the meeting between the Coston's, Ray Boucher and Greg Snow. It should be noted that there is no official report regarding the visit. This site visit was meant to rule out the possibility of the distribution circuit causing a safety concern for the Coston's. Ray and Greg do not have the expertise nor the equipment to test for EMF. Further, they would not be the appropriate representatives to discuss safety as it relates to the transmission line and the proximity to the Coston's property. Ben Shepard's group or a contractor through Ben's group should be able to address those issues.

Greg Thompson

Manager of Regional Operations

Augusta Service Building

From: Boucher, Raymond A.
Sent: Friday, August 25, 2017 11:03 AM
To: Thompson, Gregory J.
Cc: Snow, Gregory
Subject: Coston Farm, Chelsea

Greg, below are my recollections related to our preliminary investigation of the voltage potential concern raised by Mr. and Mrs. Coston at their farm in Chelsea. Greg Snow may have additional information or comments. Please review this and let me know if you have any questions.

On May 3, 2017, Greg Snow, who was filling in for Tim Robbins, called me to discuss Mrs. Coston's concerns about potential shocks at their farm in Chelsea. Greg indicated that Mr.

000232

Coston had recently been doing some maintenance work on an electric fence at their farm when he became aware of the voltage potential on the metal fencing. The Costons believe the presence of voltage on their fence may be related to the 345 KV transmission line (MPRP) which runs adjacent their property.

Before assuming it was related to EMF from the transmission lines, I suggested to Greg that we should do some preliminary checks to ensure that the unwanted voltage was not related to faulty wiring or equipment connected to the electric service we were providing from the local distribution circuit.

Subsequently, Greg Snow and I met with Mrs. Coston at her farm that morning. Using his standard multi-meter, Greg took voltage measurements by placing one probe in the earth and the other on the fence conductor (with the fence off) in the area Mrs. Coston said her husband had noticed the voltage potential. Greg confirmed that he was measuring voltage that fluctuated around 84 volts.

At our request, Mrs. Coston then opened her electric service main breaker. With the electric service to the farm now completely off, Greg rechecked the earth to fence potential at the same location and indicated that the readings had not noticeably changed. Additionally, he noted that he was getting similar fluctuating voltage to earth readings simply by holding the probe to his body or even in mid-air.

Greg related this to his experiences with EMF induced voltage that he often experienced while doing line-work in transmission corridors. He indicated that it was common practice for linemen to ground metal objects such as vehicles etc. to mitigate the induction while they worked in transmission corridors. He suggested to Mrs. Coston that this might be a good practice for them as well since much of the fencing appeared to be located well within the transmission corridor.

I indicated to Mrs. Coston that we would refer this to Company personnel that had information regarding the 345 KV transmission corridor boundaries and expertise in transmission EMF induced voltage for further investigation and follow-up.

Later that day I sent an email (attached) to you with our findings so this could be directed to the appropriate people for further investigation.

=====

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Greg Snow and I met with a customer this morning who is getting shocks at her home. They thought the voltage was being induced by the 345 KV transmission line (MPRP) adjacent to their property. We did some voltage checks and did confirm that there was voltage present (varied to over 84 + volts to earth) on their fence line which runs parallel to the transmission line. It is not faulty electrical equipment as we also confirmed the voltage readings even with the service main breaker open. It does appear to be related to the transmission line and Greg Snow can fill you in with the customer name, phone number and explain the voltage readings in more detail.

This is beyond anything I can address. Could you follow-up with someone more familiar with the MPRP project and right-of-way and resulting voltage induction issue. Please let me know if you have any questions for me.

From: Pierce, Tamra L.
Sent: Tuesday, May 02, 2017 3:48 PM
To: Boucher, Raymond A.
Subject: Voltage Induction

Ray,

Steve said that this should be given to Greg Thompson to decide how it should be handled. He also suggested the safety person for Augusta but I am not sure they handle these types of issues. I would talk with Greg.

000234

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- kmart
- Leah Sprague
- Notes
- Susan Farnworth

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Fw: Fwd: 10300381598 CHELSEA 2 Yahoo/Susan Fa

Leah Sprague Diane, They communicate Leah Sent f Aug 8, 2017 at 10:04 AM

Diane Zagwijn-coston <costonfarm@yahoo.com> To: farns@gwi.net Aug 8 2017 at 2:55 PM

This message contains blocked images. Show images or Always show images

Hide original message

On Tuesday, August 8, 2017 10:04 AM, Leah Sprague <wsprague@aol.com> wrote:

Diane,
They communicate.
Leah
Sent from my iPhone

Begin forwarded message:

From: "Marshall, Christopher" <cmarshall@burnsmcd.com>
Date: August 8, 2017 at 9:57:22 AM EDT
To: Leah Sprague <wsprague@aol.com>
Subject: Fwd: 10300381598 CHELSEA

Fyi.

Chris Marshall
Burns & McDonnell
207 272.5975

Original message
From: "Kohler, Susan B." <Susan.Kohler@cmpco.com>
Date: 8/8/17 8:11 AM (GMT-06:00)
To: "Shepard, Benjamin N" <Benjamin.Shepard@cmpco.com>, "Marshall, Christopher" <cmarshall@burnsmcd.com>
Subject: FW: 10300381598 CHELSEA

Good Morning,
More requests from Costons.

From: Couturier, Daniel
Sent: Tuesday, August 08, 2017 9:07 AM
To: Kohler, Susan B.
Subject: FW: 10300381598 CHELSEA

From: Yorls, Rhonda
Sent: Tuesday, August 08, 2017 8:39 AM
To: LineClericalNewService
Cc: Wright, James (CMP); Couturier, Daniel
Subject: 10300381598 CHELSEA

CONTACT DIANE COSTON
CONTACT PHONE # 588-6113

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Leah Sprague Fwd: 10300381598 C

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Fw: Fwd: 10300381598 CHELSEA 2

Yahoo/Susan Fa...



Leah Sprague <lwsprague@aol.com>
To: Diane Zagwijn-coston



Aug 8, 2017 at 10:04 AM

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Diane,

They communicate

Leah

Sent from my iPhone

Begin forwarded message:

From: "Marshall, Christopher" <cmarshall@burnsmcd.com>
Date: August 8, 2017 at 9:57:22 AM EDT
To: Leah Sprague <lwsprague@aol.com>
Subject: Fwd: 10300381598 CHELSEA

Fyi.

Chris Marshall
Burns & McDonnell
207.272.5975

----- Original message -----

From: "Kohler, Susan B." <Susan.Kohler@cmcco.com>
Date: 8/8/17 8:11 AM (GMT-06:00)
To: "Shepard, Benjamin N" <Benjamin.Shepard@cmcco.com>, "Marshall, Christopher" <cmarshall@burnsmcd.com>
Subject: FW: 10300381598 CHELSEA

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More requests from Costons.

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Sent: Tuesday, August 08, 2017 9:07 AM
To: Kohler, Susan B.
Subject: FW: 10300381598 CHELSEA

From: Yorks, Rhonda
Sent: Tuesday, August 08, 2017 8:39 AM
To: LineClericalNewService
Cc: Wright, James (CMP), Couturier, Daniel
Subject: 10300381598 CHELSEA

CONTACT DIANE COSTON
CONTACT PHONE # 588-6113

- 1 SHE WANTS RADIATION TESTING ON GROUND FROM HIGH TENSION LINES
- 2 SHE WANTS A STEP VOLTAGE TEST DONE
- 3 SHE WANTS TO KNOW IF HER HUSBAND IS WORKING ON THEIR ELECTRIC FENCING AND THERE IS A SURGE THRU THE HIGH TENSION LINES WILL HER HUSBAND GET FRIED?

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2 In applying ARMOR-GRIP® Suspension or Armor Rods, the alignment of the ends of the rods should be maintained within 3/4 inch.

PRECAUTIONARY RECOMMENDATIONS FOR EXTRA HIGH VOLTAGE PRODUCTS

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https://accel.wisconsinpublicservice.com/business/farm_voltage/measuring.aspx

Measuring stray voltage on the farm

Stray voltage, a common phenomenon, most likely will be found if you look for it. In other words, all farms with electrical service have some level of stray voltage. WPS can help you determine if the levels on your farm are affecting your livestock.

A stray voltage test using protocol developed by the Public Service Commission of Wisconsin is the only way to give you the answers that you need. WPS knows where and what to measure, knows what types of sources to look for, and has the equipment and expertise to conduct the most comprehensive stray voltage test available to you.

- [How WPS measures stray voltage](#)
- [Cow contact measurements](#)
- [Determining the source](#)
- [Testing timeframe](#)
- [Schedule a free stray voltage test](#)

How WPS measures stray voltage

WPS tests for stray voltage for a period of 24 to 48 hours to measure all levels of electric load during a typical day.

Voltmeters are positioned where livestock touch two contact points simultaneously. By doing this, WPS measures the actual voltage levels that livestock encounter, in addition to voltage at other points on the electrical system.

- The handheld Fluke 87 meter allows us to locate cow contact points with the highest voltage. WPS then uses these spots - certain stalls, for example - to conduct the tests. By testing in areas with the highest readings, we know that the "worst-case scenario" is being recorded.
- WPS places its main digital voltmeter (Metrosonics MSRV4) near an area where readings can be observed. This meter reads both steady-state and impulse (motor start) voltages. The Metrosonics records measurements on four channels:
 1. Primary neutral to a remote ground rod
 2. Main service panel neutral to a remote ground rod
 3. Voltage drop in the neutral wire between the primary transformer and the main service panel. (The higher the voltage drop, the stronger the chance for stray voltage problems.)
 4. Cow contact voltage
- A handheld, clamp-on ammeter is used to measure currents on neutral conductors.

000239

-
- A handheld oscilloscope displays instant readings of voltage impulses that may be caused by fences, trainers or motors.

[Back to top](#)

Cow contact measurements

WPS takes measurements where livestock may encounter stray voltage as they simultaneously touch two points, such as:

- Water bowl to floor
- Water bowl to stall
- Stall or parlor steel to floor
- Heated waterer to floor
- Feed bunk to floor

When the floor is a contact point, a wire from the meter is connected to a copper plate pressed down onto a clean spot on the concrete floor. Salt and water may be used to increase conductivity of the floor.

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Determining the source

WPS diagnoses the source of stray voltage by measuring the voltage at the primary and secondary neutral, and also by measuring the voltage drop between these two points. A remote ground rod is used as a reference. The reference rod is driven into the ground at least 100 feet from a primary or secondary panel or an electrical ground. By taking these readings, we can determine the source of any excessive voltage and work with you on corrective actions that may need to be taken.

[Back to top](#)

Testing timeframe

By testing for 24 to 48 hours straight, WPS is sure to record the highest levels of stray voltage, such as when the milk pump motor is started during milking. The Public Service Commission of Wisconsin requires electric utilities to test for a minimum period of 24 hours.

[Back to top](#)

Schedule a free stray voltage test

Our comprehensive stray voltage test is free. Schedule an appointment to have your WPS agricultural consultant and a WPS electrical engineer visit your farm and conduct the test. Once testing is complete, WPS will provide you with a printout of the actual voltmeter readings and discuss the findings with

000040

you. If the utility is found to be the source of any excessive stray voltage, WPS will fix the problem. If the on-farm electrical system is found to be the cause, we will work with you to reduce the level of stray voltage.

To make an appointment, [contact us](#).

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00024

1 **Q. Please state your name and address, and list others currently**
2
3 **living with you at that address.**

4
5 **A.** My name is Diane Zagwijn-Coston. I live at 482 Togus Road, Chelsea, Maine.
6 with my husband, James Coston ("Jim") and my two granddaughters, ages 3 and 9.

7 **Q. What is your connection to and interest in the investigation recently**
8 **ordered by the Maine Public Utilities Commission in this case?**

9 **A.** My family's lives have changed horrendously since Central Maine Power's ("CMP")
10 representative first contacted us on October 21, 2008—nearly ten years ago—asking to
11 discuss buying some of our land for the high voltage (345kV) powerline to be built in the
12 Central Maine Power right of way that ran across and beside our property.

13 We first contacted the PUC's Ombudsman in June, 2011—over 7 years ago—about
14 some of the issues included in this investigation. Some of the initial problems we
15 complained about were resolved back then. But some things we raised--like having the
16 new boundary line surveyed—were not.

17 I am grateful for the Commission's willingness to investigate the issues referred
18 to it by Ombudsman Leah Sprague. I hope this investigation will provide us a resolution
19 that will leave us able to live, raise our grandchildren and farm in a *safe* environment.
20 As a result of CMP's high voltage power line being operated too close to our home, and
21 from other things that happened during the construction phase, our home is no longer a
22 safe place for us to live in, much less raise little children in, and it is no longer a safe
23 place for breeding livestock as we had been doing before the line was built. I also hope
24 this investigation will expose and address issues in certain parts of their land purchase
25 process, expose and address certain kinds of conduct that occurred during construction,
26 and expose and address the way complaints were handled in our case, so that other
27 people won't have to suffer the way we have.

28 **Q. What can you tell the Commission about the factual basis for each of the**
29 **five issues related to your property that Commission identified from the**
30 **Ombudsman's referral?**

31 I will explain the factual basis with reference to each of the five issues, issue by issue,
32 laid out by the PUC Commissioners for this "investigation", but first I want to give the
33 factual background common to all of the issues. I feel I can best do this by first saying
34 how things were before CMP bought property from us on November 29, 2010 and then
35 explaining how it's been after that date.

36 **Q. How did CMP come to acquire land from you in 2010?**

37 **A.** On October 21, 2008, we were contacted by a representative from CMP, named Al
38 Godfrey I believe, about CMP's purchasing a triangular piece (1.46 acres) of our land
39 located next to where our home is, that it wanted to own before proceeding with
40 construction of a new high voltage transmission line to be placed in CMP's existing right
41 of way. On November 29, 2010, closing was held on that sale as we had agreed that
42 CMP could acquire that property from us by swapping for another triangular piece of
43 land adjacent to both our land and CMP's Right of Way, plus some cash payment.

44 At the time of the closing in 2010, we were using the property CMP wanted to buy
45 for grazing area for a variety of animals on our farm. The land we got in exchange was
46 further from our house and barn, and less convenient, but still suitable for our grazing
47 purposes.

48 **BEFORE CMP BOUGHT LAND FROM US ON 11/29/10.**

49 **Q. What is your history of ownership of the property where you live on**
50 **Togus Road?**

51 **A.** Jim (my husband) and I first acquired acreage and began living at 482 Togus Road
52 in June of 2004. At the time of our purchase in 2004, the property was crossed in part by

53 and otherwise adjacent to a CMP Right of Way, with a 115v transmission line on the far
54 side away from us. . In 2010, the land we owned there was reshaped as a result of CMP's
55 purchase of land from us and a purchase by us of land from CMP. After those two
56 purchases, all of our land was only adjacent to the right of way, but it longer went across
57 or under CMP right of way at any point.

58 **Q. Who has occupied the property besides you since 2004?**

59 When we first moved in there in 2004, our household was Jim, me, my ten year old
60 daughter and our two dogs. By 2010, I had one granddaughter living with us, and we
61 had acquired a substantial number of farm animals.

62 **Q. How do you and your husband support your household and animals?**

63 For the past several years, I have worked as a teaching assistant in the Chelsea
64 Elementary School (3/4 mile down the road), the same school my daughter went to and
65 now my grandchildren attend. My husband is employed in construction by an employer
66 based in Vassalboro. Because of our jobs, this property was and is a very convenient
67 location for us.

68 Over the six years (2004-2010), we acquired several kinds of animals and
69 operated a small farm which helped feed our family and sometimes provided some
70 additional income.

71 **Q. What animals did you acquire between 2004 and 2010?**

72 **A. HORSES:** On February 14, 2005, we acquired our first horse, a thoroughbred
73 named "Cheyenne." In April of 2006 we got a second horse, a quarterhorse named
74 "Ginger". In 2007, our third horse "Frankie", a paint stallion, was born. He was born
75 there on the property to Ginger.

76 **CATTLE:** In August of 2006, we got ten (10) head of cattle, including one Holstein, one
77 Black Angus and eight Herefords. That herd consisted of one bull and nine females.

78 From that herd, two calves were born were born in each of the next four years, through
79 and including 2010. We would usually sell two calves a year, keep half the meat for our
80 family and sell the other half of the meat.

81 CHICKENS: In August of 2006 we acquired 20 chickens and a couple of roosters. From
82 those chickens, we were able to collect about two dozen eggs a day, year-round. We kept
83 what we needed for our family and sold eggs to people who knew we had them at \$2.50
84 a dozen.

85 PIGS: In 2006, we began seasonal raising of two pigs a year, (from April or May
86 through October or November) after which we sold them for slaughter. Again, we
87 usually kept some of the meat, sold the rest.

88 GEESE: In 2008, we got two geese. Four geese were born from them and sold by us
89 that year and at least two geese were born and two sold in each of the next two years
90 through and including 2010.

91 GOATS: In 2006, we also acquired six goats because I am lactose intolerant and so is
92 my granddaughter, Autumn, who has lived with us from her birth in 2008.

93 RABBITS: Between 2006 and 2010, we also acquired six rabbits.

94 GUINEA PIGS: Between 2006 and 2010, we also acquired two guinea pigs.

95 **Q. How would you summarize what it was like, living at 482 Togus Road, in**
96 **the six years between 2004 and 2010?**

97 A/ Taking care of my young daughter, then beginning in 2008, also my newborn
98 granddaughter, plus all the animals we had, kept us very, very busy. But we really
99 enjoyed living on this property through 2010.

100 Periodically, we would have friends and family come over for day-time get togethers,
101 during which a lot of the time we would be outside on our property: riding horses,

102 walking, talking, barbequeing meals, etc. We felt it was a beautiful surrounding and a
103 great place for children to be able to play and be active outside.

104 We had no health issues in those days. Overall, we were happy there.

105 **Q. Prior to November 29, 2010, what concerns, if any, had you expressed**
106 **about the new high power line to be built in the right of way next to you?**

107 **A.** We had understood from Al Godfrey in our discussions with him between October
108 21, 2008 and the closing on November 29, 2010, that CMP wanted to buy the piece of
109 land from us so they could construct a new high power (345kV) transmission line in the
110 right of way, in addition to the 115 kV already there on the far side of the ROW, away
111 from our property. During our discussions and negotiations with CMP, primarily
112 through Al Godfrey, we were told by him, and understood, that the new line would be
113 built near the existing 115kV line and also located on the far side of the right of way –
114 away from our house. We asked questions about that location and also asked about the
115 scope of the electromagnetic field (EMF) of the new line.

116 In response to our questions, Al Godfrey provided us with a drawing of the
117 proposed right of way and line location, as well as printed information for a resource
118 material about EMF. Given the proposed location of the new line on the far side (away
119 from us) of the CMP right of way, we felt comfortable that we wouldn't be significantly
120 impacted by EMF or otherwise by the new power line. See attached pages 1-87 of our
121 Exhibits related to Issue # 1.

122 Other than our questions about impact from the EMF, we were not aware of any
123 cause for concern to our health or well-being. We saw no reason to expect significant
124 disruption or change in our lives, or any negative impact on our health or our farm
125 animals, from construction of the new 345kV power line on the farther side of the right
126 of way.

127 Sadly, we were wrong not to worry more—in many respects. See attached pages 88 –
128 401 of our Exhibits related to Issues # 2- 5.

129 **AFTER CMP BOUGHT LAND FROM US ON NOVEMBER 29, 2010**

130 **Q. What was it like after CMP bought the land in the right of way from you**
131 **on November 29, 2010?**

132 **A.** Soon after CMP's purchase of the piece of our property on November 29, 2010,
133 things changed—and got quite difficult within the first six months during the time CMP
134 sub-contractors were preparing the right of way for construction. They destroyed a
135 considerable stretch of our fencing, cut a whole stand of trees on *our* property (as well as
136 one tree in back field that was of great sentimental value to myself and my mother and
137 that was nowhere near CMP's right of way), plus they destroyed and/or cut off access to
138 a major grazing area for our animals. CMP sub-contractors also sprayed weed control
139 liquid, without prior notice to us, and hit one of our horses directly in the face at very
140 close range, completely spooking her so she bolted and ran off the property over to the
141 neighbors. The neighbor saw them spray her. When I got to her, her face was dripping
142 wet with a brown substance that I washed off. I also had to irrigate her eyes—not an
143 easy task.

144 I called Lucas Tree and was told the spray was not harmful to animals and was
145 environmentally friendly. I was surprised by that as the sprayers were decked out head
146 to toe in plastic. I was upset that we got no notice and that they ended up going so close
147 to our animals. In August of this year, I saw the spraying equipment out front again. I
148 asked them if they were going to spray by our property. I was told that we are in a “no-
149 spray” zone.

150 In June of 2011, we filed a complaint with Ombudsman MacGowan. He met with
151 us on July 22, 2011. His notes are attached at page 95 of our Exhibits re Issue #2. As a

152 result of his investigation, we got a gift card to a tractor supply store for us to purchase
153 fencing and payment was to a farmer for us to get hay to get through that season. See
154 page 99 of our Exhibits in re Issue #2. We did not get the other things the Ombudsman
155 had mentioned in his July 22, 2011 notes.

156 In 2011, the CMP sub-contractors were cutting a large stand of trees on our
157 property, many of which were not within the ROW. In the process of doing that cutting,
158 they dropped a tree into the geese's fenced-in area (on our property and not within the
159 ROW), completely scaring the geese. Then they went into the geese's fenced in nesting
160 area to remove the two geese and the nest. To accomplish that, they had to hold the
161 gander by the neck so he wouldn't bite them. After that, none of the 7 goose eggs that
162 had been laid hatched, because the geese would not return to sit on the nests.

163 The stand of trees they cut down in 2011 on our side of the ROW line had offered
164 important shade protection to our animals. The pigs blistered and suffered very bad
165 sunburn from the resulting lack of shade. We had to build a temporary shelter for the
166 animals until we could relocate and refence their grazing area. Jim was constantly
167 moving fences at the request of the sub-contractors.

168 Things got much, much worse in April of 2014 after CMP sub-contractors had
169 blasted within the ROW in preparation for erecting the towers for the new line. Not
170 long after the blasting, our horses stopped using the watering hole nearest to the ROW
171 (which they had been using) and would only drink from a watering hole on the far side
172 of our property, beyond the barn and well away from the ROW.

173 Also, in April and May of 2014, twenty-one (21) of our animals died or were
174 stillborn. Nine calves (all 6 months old and younger) died, and one calf was born dead.
175 [The mother of the newborn born dead had given birth in prior years to 6 other calves
176 without any issues.] Six rabbits (four, 3 to 4 years old, and two, only 6 months old) also

177 died. Three goats died or were born dead in April (one 3-year old nanny gave birth to a
178 stillborn female goat; and the nanny died 3 hours later. Also a 1-year old goat died.) A
179 couple of smaller animals (rabbits) also died.

180 We believe our water was contaminated as a result of the blasting and we think
181 that affected these animals and caused them to die. This was a year before the line was
182 activated.

183 With all these things, the year 2014 was a nightmarish time for us due to the
184 deaths but also what it did to our workload to continue living there with our animals.
185 After the horses refused to drink the water and a number of our other animals had died,
186 we called Steven McCoy of Aerus to test our water. We had had him test it in 2008, and
187 he found some arsenic at that time. He had told us we shouldn't drink it nor should any
188 of our animals under 200 pounds. So, from that time on, in 2008, we hauled water for
189 ourselves and the small animals from a well spring on the Vigue Road in Whitefield.

190 After we got the 2014 water test results from Steve McCoy, we had to hauling
191 more than twice as much water from the well because Steve told us this time, that from
192 what he found in the water, which now included MbTE, he would advise that we not
193 even use the water to shower, let alone let us or any of our animals drink it, including
194 the larger animals. Then, beginning in August, 2017, the well supply was no longer
195 available as a source for the water we were hauling every week and since then, we have
196 had to buy our water (bottled) from a store. Attached, for example, are some copies of
197 receipts for our water purchases from part of June, July and August, 2018. See page 182
198 of our Exhibits re Issue #3. I do not have a copy of either the 2008 or the 2014 Aerus
199 test results done for us by Steve McCoy, but we would like to ask that he be able to
200 testify as an expert on our behalf and that his test results and related documents would

201 be included as part of his report and opinions. See exhibits related to Aerus at pages 123
202 and 124 of our Exhibits re Issue #3.

203 In April 2014, I also called Al Godfrey. I called him because we had been so
204 impressed before with how responsive and thorough he had been for us during the land
205 negotiations. He was very quick to respond this time again.

206 When Al Godfrey arrived, it was 6 p.m. He spoke briefly to Steve McCoy, as Steve
207 was just leaving after doing our water test. Then, Al talked with us briefly on the porch,
208 and after that, Al walked with us out beyond the garage. On looking around outside, as
209 soon as he saw the new poles, Al looked shocked and immediately said “Jim and Diane, I
210 am so sorry. Wow, they did move the corridor and I don’t know how.” He bowed his
211 head, and again said “I am so sorry”.

212 And then, after the line was *activated* in March of 2015, things went from bad to
213 worse.

214 **Q. What happened after the March, 2015 activation of the new 345kV high**
215 **power line?**

216 **A.** I described a lot of what happened in my affidavit and other attachments we included
217 with our “Exceptions and Comments of Diane Zagwijn-Coston and James Coston to the
218 Recommended Decision” that we filed with the Commission in Docket No. 2008-00255
219 on or about May 24, 2018. See attached that entire response we filed along with all its
220 attachments.

221 (1) SHOCKS FROM STRAY VOLTAGE AND/OR INDUCED VOLTAGE. See our
222 attached Exhibits re Issue #4 starting at page 195 – 241. Our May filing described severe
223 shocks that Jim’s nephew and Jim received from our electric fence when it was not
224 connected in April, 2017, after the 345kV line was activated. Also, since then, both Jim
225 and my granddaughter received similar shocks from a de-energized fence in 2017. In

226 June of 2018, our bull got a thick scar across his nose from touching a line with way
227 more than normal 'juice' in it. Also, later this summer, one of our two horses reared and
228 screamed also after getting a severe shock from a fence line that was totally deenergized.
229 We have called those shocks instances of "stray voltage". We realize at least one or two
230 of those may have been instances of induced voltage in places where our electric fence
231 runs parallel to the power line. CMP has assumed that our fence is the problem, but
232 have not helpful in explaining exactly we are to deal it and we still have the problem.
233 They installed two filters on our fence in 2017 but did not ground them but only to a
234 painted fence post. I have since understood that a painted fence post is not a proper
235 ground. Jim has been advised not to touch the fence without first testing and testing
236 periodically while working with it.

237 (2) HEALTH ISSUES. I also want to elaborate on the physical symptoms that I, my
238 family and some of our animals have had.

239 (a) HIGH BLOOD BLOOD PRESSURE. In December, of 2015, I was sent to the
240 hospital by our school nurse, when she got a reading of 240 over 180 for my blood
241 pressure. I got higher readings in the hospital. I had never before had a problem with
242 my blood pressure. I now have to take medication every day for to keep my blood
243 pressure in check.

244 (b) CYSTS. I have had two instances of large really ugly swelling and bumps
245 appearing on my face, that I was told were epidermal cysts. They disfigured my face so
246 much that I did not go to work at the school for four weeks in April and May of 2014 and
247 also two weeks in 2017. In 2017, my cyst absessed and had to be dug out. See my
248 attached exhibit labeled "8-29-18 medical records of Diane Coston." My horse, Ginger,
249 had very similar bumps on her body, which also got infected and had to be dug out. See

250 page 398-401 of our “Exhibits re Factual Issue #5. Jim also had a similar sizeable
251 bump appear on his hip.

252 (c) HEADACHES. Since the line was activated in 2015 all of us have had frequent
253 long-lasting headaches, when none of us had them before. We get them more often and
254 more intensely the more time we spend there.

255 (d) ENDLESS INSOMNIA; INTERRUPTED SLEEP. We rarely have been able to
256 sleep through the night since the lines were activated. We sit bolt upright from a sound
257 sleep several times a night, for no apparent reason. On occasion, humming of the lines
258 will wake us up. We moved the children to the far end of the house, and they sleep
259 better and seem to have fewer complaints. We, however, are exhausted. Jim never
260 used to have a problem sleeping right through the night; I used to only wake up maybe
261 once a night. Now we each wake up 4 to 5 times a night.

262 (e) ACHES; PAINS; SENSATIONS. We all experience periodic unexplained
263 physical aches, pains and odd sensations that we never had before. When the children
264 complain of such things and are otherwise home for the day, I try to send them to a
265 friend or relative’s for the day. That seems to help.

266 (f) SPARKING; TINGLING. I have had to stop wearing metal rimmed glasses as I
267 was seeing sparks in front of my eyes when I wore them and got bad headaches with
268 them on. I have to wear glasses when I drive, but don’t put them on until I am out of the
269 driveway. Visiting friends even comment on odd physical sensations and sparks or
270 tingling when at our house. This is only since the line was activated.

271 (g) LIVER ISSUES. I don’t know the cause, but I recently was found to have fatty
272 deposits on my liver and more testing is going to be done. I have never had anything like
273 that before. I do not drink alcohol. Neither of us do.

274 (h) Financial stress has increased for us due to all added costs of mitigating the
275 contaminated water, time lost by me for work, my added medication expenses, etc.

276 (i) Other more generalized stress has steadily increased for all of us, perhaps
277 from the unceasing EMF. For Jim and I, it's also from worrying about how we can get
278 ourselves into a safe living situation, especially for the children. Since so many of our
279 animals, both large and small, have died or become sterile, we can't help but worry
280 about health consequences of prolonged exposure for our grandchildren, as well as
281 ourselves.

282 **Q. What result, what relief, would you like to get as a result of this PUC**
283 **investigation?**

284 **A.** We do not know what other steps we could take to make our home safe, and we can
285 not afford to move to anything reasonably comparable. See our attached Exhibit named
286 "8-29-18 real estate search related documents." Except for Al Godfrey's
287 responsiveness, we have not felt CMP as a company, or as the employer of various sub-
288 contractors, has taken our complaints seriously or responded to them effectively. That
289 makes it all the worse.

290 What I would like is for CMP to agree to, or if not, to be ordered to, relocate us to a
291 reasonably comparable property in size, geographic location and suitability for
292 residence and farming, but which is safely removed from high power lines.

293 I ask that the Commission review our pre-filed testimony, allow us opportunity to
294 make data requests of CMP before they ask more of us; and also allow us time to
295 designate expert witnesses related to the 5 issues, especially but not only for the
296 contaminated water, EMF and on stray or induced voltage, and to amend our exhibit list
297 at the time we do so.

298 If we can not get all our exhibits uploaded tonight by midnight, I ask that we be given an
299 extension of time to complete the process. I also am very concerned about my own, and
300 my family's health. We do not have health insurance and so I would ask for some
301 reimbursement for medical expenses we have and will continue to incur since the line
302 was activated. I also

303 **Q. Is that all your testimony?**

304 **A.** Yes, it is the essence of what I have to say at least until we can get some more
305 information, through data requests we want to make from CMP as we mentioned at the
306 Case Conference held in this Investigation on July 26, 2018.

Testimony for 2017-00232 Attachment 4
2018-00178 Exceptions to Recommended Decision
filing 7.

STATE OF MAINE
PUBLIC UTILITIES COMMISSION

May 24, 2018

EXCEPTIONS & COMMENTS
OF DIANE ZAGWIJN-COSTON
AND JAMES COSTON TO
RECOMMENDED DECISION

PETITION FOR FINDING OF PUBLIC
CONVENIENCE & NECESSITY FOR THE
MAINE POWER RELIABILITY PROGRAM
CONSISTING OF THE CONSTRUCTION
OF APPROXIMATELY 350 MILES OF 345
KV AND 115 KV TRANSMISSION LINES
(MPRP) PERTAINING TO CENTRAL
MAINE POWER CO.

DOCKET NO. 2008-00255

CENTRAL MAINE POWER COMPANY
APPEAL OF LDRT DECISION
REGARDING DIANE AND JAMES COSTON

DOCKET NO. 2018-00034

TO THE PUBLIC UTILITIES COMMISSION: This submission is made on behalf of Diane Zagwijn-Coston and James Coston [hereinafter, "Costons"] to provide the Commission with their exceptions and comments on the "Recommended Decision" dated May 18, 2018.

RE I. SUMMARY. The Costons respectfully take exception in part and agree in part with the recommended finding that the Ombudsman's referral to the Landowner Dispute Resolution Team (LDRT) from the Maine Power Reliability Program (MPRP) is outside the jurisdiction of the Landowner Dispute Resolution Process (LDRP). They expressly take exception to the part that finds the Ombudsman's referral regards alleged impacts "caused by Central Maine Power Company's operation" of the MPRP.

The Coston's complaint involves *design errors* and *construction issues* in the MPRP—not operation. They seek a Commission order that CMP mitigate the MPRP design flaw by moving the tower that is positioned too close for safety to their home,

unless CMP is willing to purchase their home and help them relocate to a safe and reasonably comparable replacement home and compensate them for damage to their land and property caused by CMP and its subcontractors in the course of construction.

Only because the cost of moving a tower (or, alternatively, the cost of their being relocated into a comparable home) will likely exceed \$200,000 do the Costons agree with the conclusion that the LDRT does not have jurisdiction to address their complaint.

Finally, the Costons respectfully take the position that the LDRP could and should remain functional for the purpose of dealing with design and construction problems, even after the MPRP became operation, where, as here, the primary way to mitigate continuing safety concerns would be to relocate or redesign structures and the alternate ways for landowners to seek redress are cost prohibitive and beyond the capacity of the Costons, as they would be for the average landowner.

RE II. BACKGROUND.

Section A of the background part of the recommended decision addresses the creation and purpose of the LDRP. Determining that there is jurisdiction in the LDRP now to review the Costons' claims is consistent with the overall purposes cited in this section. Even though it is too late to provide the "expedited" kind of review during design and construction that was hoped for when the process was set up, it is actually not too late to avoid a situation where part of the transmission line would need to be relocated and "reconstructed at considerable expense" should the reviewers find for the Costons on their complaint about the fundamental lack of adequate safety in section 3025 of the MPRP transmission line as designed and constructed so close to their home. Cf. reference at page 12 of the Recommended Decision to the LDRT's explanation in its

Mendola¹ decision of the purpose of the LDRP.

The fact the Coston's complaints include significant safety concerns, rather than, for example, mere aesthetics and related diminution of value, warrants taking advantage of the opportunity to mitigate this situation through the LDRP because allowing this situation to continue without mitigation would directly contravene the Commission's statutory mission "to ensure *safe, reasonable and adequate service*"² [Emphasis added.]

With no notice to the Costons, CMP changed the design of the transmission line from the north side to the south side of the corridor (thereby relocating a pole in section 3025 to within 182.5 feet of their home). If they had had proper notice of the change, it would be a lot fairer to say that it's too late for them to complain now because the issue could have been addressed during the design and construction phase. In their response to the LDRT Referral, by letter dated January 23, 2018 to Harry Lanphear, the Costons requested opportunity to provide evidence that this change was made and made without notice to them. They have requested opportunity to call Al Godfrey as a witness because what he said then in 2014 (on seeing the actual location of the tower near them) and what he had told them prior to that would support their version of these facts.

CMP should not be able to change the design with no notice to the affected landowner and then later say in effect, 'Sorry, because the construction (according to the changed design) is now complete, you can't use the LDRT to try to resolve your issues with the design.' The problem that this flawed design creates for the Costons is amplified and illustrated by the fact that the electromagnetic field ("EMF") readings at the corridor's edge (nearest pole to them in section 3025) turned out to be 62% higher³

¹ See Landowner Dispute Resolution Team, Consideration of Referral by Ombudsman Regarding Michael and Rachel Mendola, LDRT Docket No. 2013-00002, Dec. 26, 2013 referenced on page 12 of Proposed Decision dated 5/18, 2018.

² 35-A M.R.S.A. §101.

³ The proposed decision acknowledges this change is part of the Coston's concern, but rely on CMP's claim that

than had been projected by CMP's experts, and this is a level they believe is demonstrably unsafe.

The fact that the design and construction phase is over is a relevant factor in deciding if the LDRT should still have a functional role to resolve controversies like the Costons, but it should not be the only one. Factors to be considered should include what sort of relief is requested and whether relocation or reconstruction of the line is what would best resolve the issues raised as is the case here. If the answer to that inquiry is yes, then the fact that construction is over, should not preclude LDRT review. Otherwise, making design changes without notice and then finishing construction before there is opportunity for landowner input or complaint is encouraged, not avoided and mitigation is made avoidable.

B. The Coston Property Dispute

In addition to concerns about the high EMF readings, the Costons have stray voltage issues that also appear to directly result from the design change that relocated the pole so close to their home. As noted in the proposed decision, the Costons are raising two grandchildren, now aged 3 and 9, in their home. They regard the EMF levels as a threat to the children's physical safety and healthy development from just continuing to live in that home. Al Godfrey provided the Costons (when they asked about EMF) an NIH booklet dated June 2002 of questions and answers called "EMF electric and magnetic fields associated with the use of Electric Power." In a section on the World Health Organization International Agency for Research on Cancer, it states the following about a report by an international scientific panel of 21 experts from 10 countries who met in June 2001 to review the scientific evidence regarding the potential carcinogenicity of static and ELF (extremely low frequency or power-frequency) EMF:

The panel classified power-frequency EMF as “possibly carcinogenic to humans” based on a fairly consistent statistical association between a doubling of risk of childhood leukemia and magnetic field exposure above 0.4 microtesla (0.4 μ T, 4 milligauss or 4 mG).” Referenced NIH report at page 54.

By comparison, the May 19, 2017 reading in the Coston’s kitchen (with the breaker off) was **6.7 mGauss**. See report of EMF Site Measurements by D M Begin on May 19, 2017, incorporated herein by reference and included herewith as **ATTACHMENT 1** to these Exceptions.

Stray voltage is also an important safety concern for this family, especially but not only for the children, one of whom has already been significantly shocked by touching the fence in the Costons’ yard. A reading for stray voltage done by Greg Snow in May, 2017 at the Costons’ showed 84 volts. See **ATTACHMENT 2** correspondence from Greg Thompson including correspondence from Raymond Boucher, incorporated herein by reference.

CMP has declined to do more stray voltage testing, as they had originally said they would do, on the grounds that they do not typically test along transmission corridors. But the Costons still have a problem that was not resolved by the installation of filters on their fencing. The Costons understand the proposed decision to suggest they could file a new complaint about that with the CASD or bring ten-person civil complaint. Neither option is very satisfying at this point, and filing a ten-person civil complaint with the Commission may not be feasible for a number of reasons nor would it likely provide timely relief, even if successful.

Diane Coston’s letter dated January 23, 2015 (commenting on the LDRT referral) to Harry Lanphear, lists the numerous health issues they have experienced since 2015 (that they did not have before) including chronic head aches, leg pain, insomnia, masses forming on face and hip, as well as high blood pressure and chronic fatigue. It is their

experience and belief that these things come from the stray voltage and the high EMF levels since the line was activated. ⁴ That may seem operational, but it would not have been the issue it is but for the design change that located a pole too close to their home. ⁵ There is no coal mine with a canary in it here, but the dying and infertile animals they have complained about, support their concerns for their own health and should raise real concern in any observer that they are simply now living too close to a 345 kV line as result of that design change. See **ATTACHMENT 3**, Affidavit of Diane Zagwijn-Coston, incorporated herein by reference. That this impact of a change in project design was not fully knowable until after line operation began, should not bar resolution by the LDRT.

The Costons also allege that their well water was contaminated as a result of the blasting. Whether the blasting had such a damaging impact due to the design change, and whether or not the blasting was done in a negligent manner, the fact is that a number of the Coston's farm animals died mysteriously in 2014 within a short period of time after the blasting that year. Contrary to CMP claims, this was before the lines were activated, so that is not an operational issue either. The damage to the value and usefulness of their property from contamination of their well water source and the loss of several farm animals, is all damage and loss that the Costons incurred during the construction of the line. This damage has not been resolved or compensated either. ⁶

⁵ It is consistent that such health impacts could come from high levels of exposure to EMF based on guidelines and related materials published by the International Commission on Non-Ionizing Radiation Protection.

⁶ The Costons do agree that a prior complaint they had made about temporary interference with grazing rights was resolved through the Ombudsman and LDRP. They do not agree that the cutting of trees on their land without notice or permission has been compensated or resolved, but they do understand that that is something they would need to deal with through the courts.

As the proposed decision notes, the total impact and effect of the design that placed the pole so close to the Coston's home has been to make that home unsafe and thus unlivable for them and their grandchildren. If they are not able to get the line relocated, or alternatively themselves relocated, the value and usefulness of their property will have been taken from them without compensation. That would be, in our view, tragic. It would also be a taking in violation of the fifth amendment to the US constitution.

RE: V. DECISION AND ORDER

As noted above in Section II A of these exceptions, there is still need for LDRP-style rapid response now to the safety concerns raised and, with all due respect, the Costons argue that process should not be foreclosed to them simply because the line is now built and operational, when their primary concerns relate to unsafe conditions from design changes made without notice to them and to other construction issues.

The proposed decision suggests that the Costons' case does not involve significant enough EMF levels to warrant the relief requested and cites the Curtis case⁷ in support of this conclusion. However, that case is factually distinguishable from the Coston case because CMO projected EMF levels at the Curtis residence would be 3.4 mG on average and 5.0 mG at peak. In the Coston's case, EMF testing (actual not, projected) found EMF levels to be 6.7 mG⁸ at their kitchen table with the breaker off. See attached Exhibit A, the results of the 5-19-2017 EMF Site Measurements. The Costons' actual EMF levels are considerably higher than those projected for the Curtis' residence.

Also, the PUC stated in Curtis:

We do not direct CMP to purchase the Curtis residence. In general, we

⁷ Central Maine Power Company Appeal of LDRT Decision Regarding Wanda and Mark Curtis, Docket No. 2011-00504, Order (April 18, 2012).

⁸ See ATTACHMENT 1.

do not favor the purchase of abutting landowner property as a reasonable EMF mitigation technique. We do not rule out the possibility that such a home purchase may be reasonable in a particular circumstance. However, we cannot conclude that house purchase is warranted here where CMP does not need the property to build the line, the modeled EMF exposure is relatively low and there is a significant expense associated with the purchase.⁹ Id.

CONCLUSION

In conclusion, the Costons respectfully request that the Commission modify the Recommended Decision to:

- a) find that in this situation the LDRP should be allowed to function because the Costons safety concerns are from design and construction issues, even though construction is complete;
- b) agree that the Costons' case is a case of significant safety concerns, distinguishable in that regard from the Curtis case, and thus is a case warranting house purchase (unless the line is relocated); and
- c) because of the expense involved, is a case jurisdictionally appropriate for resolution by the Commission itself, rather than the LDRT.

Dated: May 25, 2018

Respectfully submitted,



Susan Farnsworth. Bar #348
Counsel for Diane and James Coston
P.O. Box 29, Hallowell, ME 04347
(207) 626-3312

⁹ In the Curtis case, the Commission was asked by the Office of Public Advocate, through its counsel, to adopt a standard of 3mG exposure and the Commission declined to do so.

Testimony for 2017-00232 Attachment 5
2018-00170 OKelly Comment to Revise the Recommended Decision on the
Coston Farm LDRT Appeal w/ affidavit, dated 10/17/2018

May 25, 2018

Harry Lanphear, Administrative Director
Maine Public Utilities Commission
18 State House Station
Augusta, ME 04333-0018

Re: 2018-00034: Comments on the Recommended Decision Denying the Referral of the Coston Stray Voltage Health and Safety Issues to the LDRT.

Mr. Lanphear,

I have been following the Coston attempt to get someone to keep their property, their grandchildren, their animals and themselves safe from the impacts of stray voltage on their property. I met Diane Coston soon after I read her request for an appeal submitted to the PUC.

I have spoken with Mrs. Coston on numerous occasions since February and have been at their home for many hours both yesterday and today.

I am concerned that a hazardous situation is being ignored which is caused by the design of the MPRP 345 KV high voltage power line in close proximity to the Coston farm and house.

At the Coston farm and home, they have had ongoing instances of serious shocks from un-energized electric fences on their property.

The important test information that CMP has not explained is the high levels of stray voltage on the Coston property. CMP engineers tested the property on May 3, 2017 (more than a year ago) and found readings of up to 84 volts by having the ground of the voltmeter touching the earth and the other lead held in the air.

I have talked with a few electrical engineers, with the Wisconsin Public Service Utility and have read the information in this docket. All the engineers, including the two CMP employees that conducted the stray voltage test and the Wisconsin Public Utility manager for their stray voltage program feel that a reading of 84 volts is a serious situation. I have attached a document on stray voltage from the Wisconsin Public Service Utility.

In Wisconsin, I spoke with Cory Kauchta, 920-433-2913, and he described their free stray voltage testing program, which is available from all the Wisconsin Public Utilities. He told me that for cattle farms, 0.5 volts AC is the screening level in Wisconsin, with 1 volt AC an action level. At 2-3 volts, cattle are affected. Today I brought a volt meter to the Costons and tested many areas around their yard and fence. Although I just had a

unit from Lowe's, I was able to replicate high voltage readings in the 30 – 40 Volt AC range by placing the black lead in the ground and red lead in the air. By the fence with the filters, closest to the transmission line, the readings on the electrified fence were vacillating but generally low, so the filters there are working. However, the unenergized fence, further away from the transmission line, at the back of barn showed readings of 39 Volts AC.

We can see that the Costons have had serious incidents where they have been badly shocked by unenergized gates and fences. They are taking many precautions to not be hurt by this dangerous situation.

I firmly believe that the Commission should not make a decision in this case that allows this level of stray voltage to be swept under the rug. Please reconsider the recommended decision and modify it to require that CMP to fully investigate the stray voltage at the Coston residence, submit documentation of the findings and take appropriate action.

Thank you for considering these comments. If you have any questions or wish further information please contact me.

Sincerely,

Dot Kelly

Dot Kelly

Date: 10/17/2018

I attest that the foregoing testimony is correct to the best of my knowledge and belief.

Dot Kelly

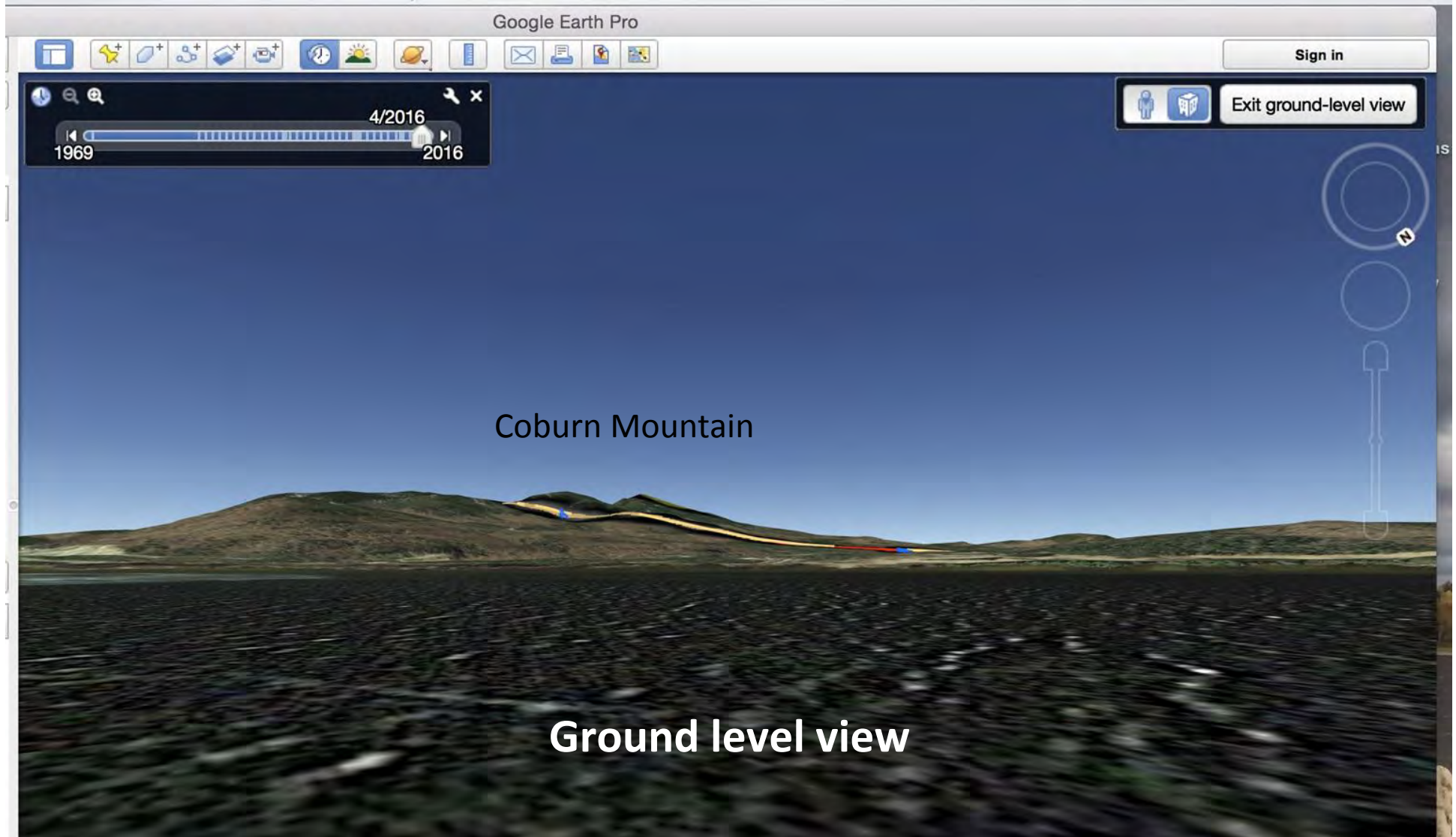
NECEC's Negative Impacts to Scenic View Shed and Year-Round Recreational Tourism



CMP's rendering of Parlin Pond Claims: uninhabited & no Corridor view



Google Earth's Parlin Pond: Corridor is indeed VISIBLE



From northern end
of PP looking
southwest.

**60-80 ft Average
Tree Height
vs.
100' Towers**

*see Forest Trees of Maine: https://www.maine.gov/dacf/mfs/publications/handbooks_guides/forest_trees/individual_spp_index.html

Parlin Pond: Corridor to Impact Business

Who would want an industrial transmission line as a backdrop of their wedding venue?



Joe Kruze

Lake Parlin Lodge: Winter Recreational Usage



Joe Kruze

- ❖ Hundreds of meals served daily during the snowmobile season.
- ❖ Tourists ride in from Eustis, Jackman, Forks, Greenville, Bingham

Parlin Pond: Heavy Winter Recreational Usage




Joe Kruze

Parlin Pond Tourism Economy

Where are the
**winter user
studies?**



Joe Kruze

A photograph showing a long line of snowmobiles descending a snowy slope. The snowmobiles are arranged in a single file, with their headlights on, creating a trail of light on the snow. The background is a dark, overcast sky.

Lodging
Restaurants
Guides
Rentals
Sales
Groceries
Retail

Joe Kruze

**The Forks Area to
Jackman
is a
Maine Tourism
Winter Destination.**

**Where's the user data for
scenic and economic
impact?**

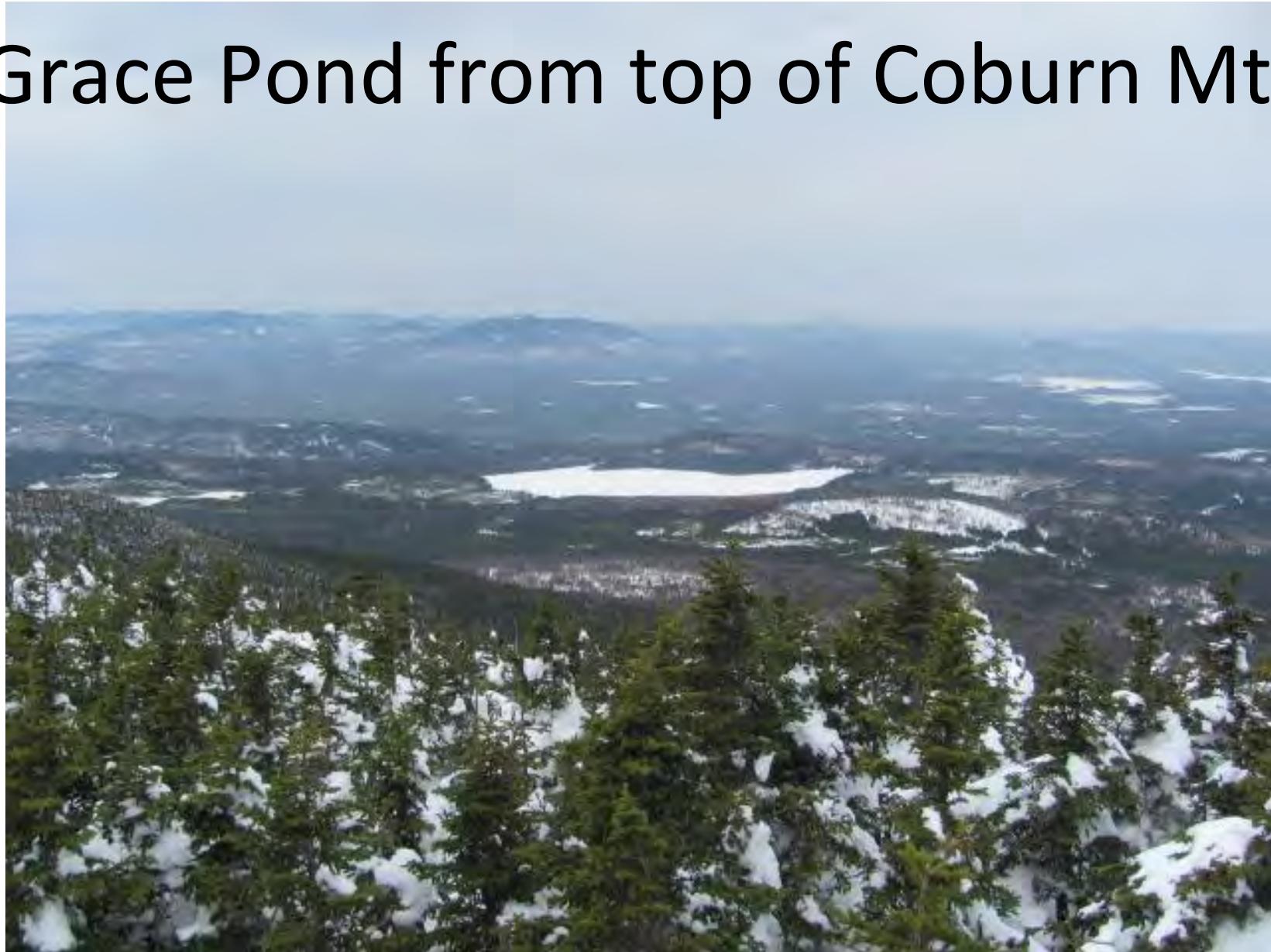
**How deeply are the
employees and families
going to be impacted?**

Coburn Mountain, 360 view of NECEC



Tallest ITS peak in New England
Host to hundreds of snowmobilers a day

Grace Pond from top of Coburn Mtn



Ed Buzzell

Coburn Mountain View of Corridor Facing NW

Grace Pond

Image Landsat / Copernicus

Google Earth

1997

45°28'59.68" N 70°08'16.99" W elev 2366 ft eye alt 3730 ft

1969

2016

From the Top of Coburn: Corridor Visible around Johnson Mountain

Johnson

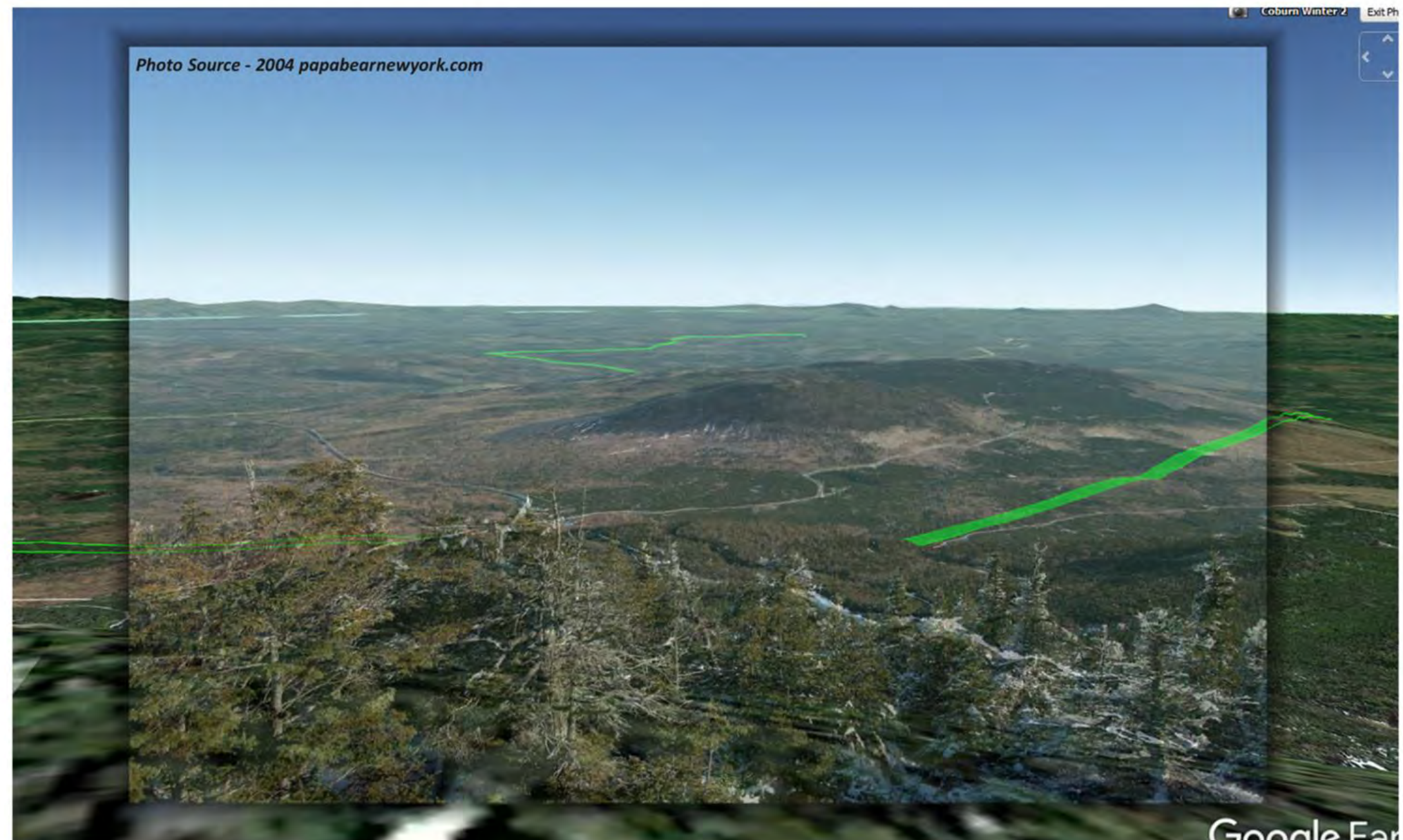
Image Landsat / Copernicus

Google Earth

1997

45°27'03.04" N 70°06'43.90" W elev 2239 ft eye alt 3729 ft

Coburn Mountain Google Earth Overlay 2





Enchanted Pond

Mike/Shirley
Johnson

Shutdown Mountain from Enchanted Pond



Mike/Shirley
Johnson

1969 4/2016 2016

Exit ground-level view

Corridor from Shutdown Mtn Trail



Enchanted Pond

Image Landsat / Copernicus

Google Earth

Preview

1997 Imagery Date: 4/23/2016 43°25'44.70" N 70°10'03.56" W elev 1788 ft eye alt 2083 ft

Spencer Access Road

Not just a “logging road”



Spencer Road is a highly used, beautiful and scenic access road to Enchanted, Grace, Rock ponds, #5 Mtn., access to 16,000+ acres of conservation land...



Spencer Access Road



Spencer Road Recreational Usage



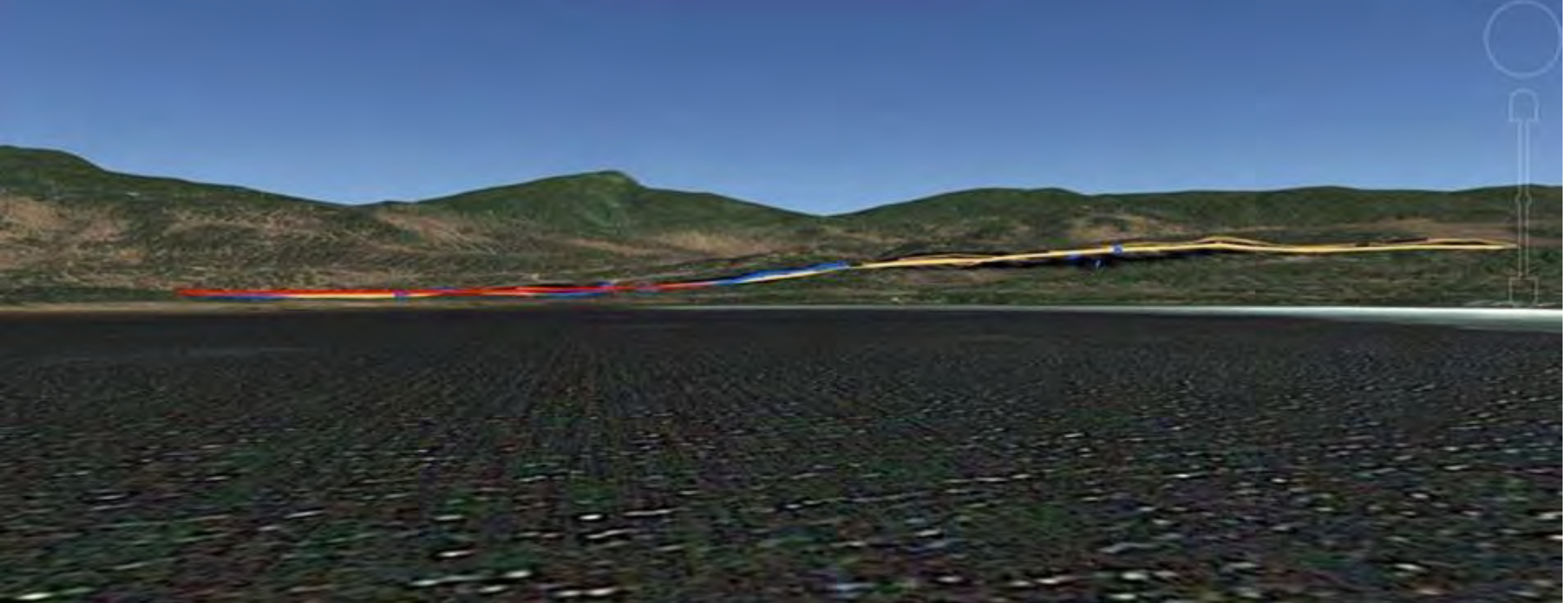
Kimberly Nadeau– Spencer Road



Rock Pond now



Rock Pond after



Three Slide Mountain from Rock Pond



Three Slide Mtn

Rock Pond



Corridor View From Three Slide Mtn

Rock Pond

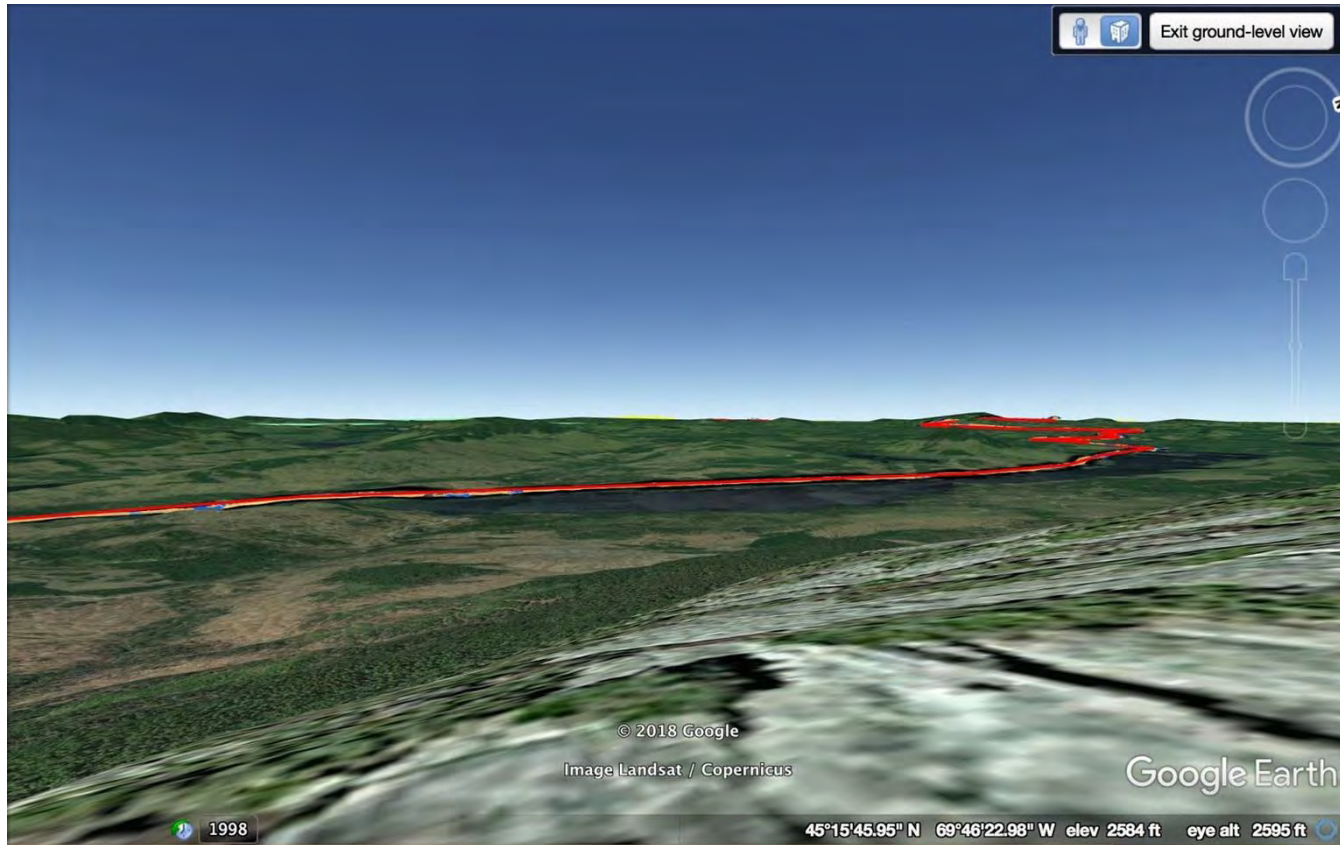
Image Landsat / Copernicus

Google Earth

1997

45°29'28.17" N 70°23'27.05" W elev 2559 ft eye alt 3009 ft

Summit of Moxie Bald Mountain Appalachian Trail



Moxie Pond as seen from summit of Mosquito Mtn.

Moxie Bald Mtn

From Top of
Mosquito

Moxie Bald Mtn

© 2018 Google
Top of Mosquito
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google Earth

2019
The Forks Area
SNOWMOBILE MAP
Ride ITS 86, 87 & 89

Bingham • Caratunk • The Forks • West Forks
TWP Parlin • Jackman • Eustis • Rangeley
Rockwood • Greenville • Kokadjo • Abbot

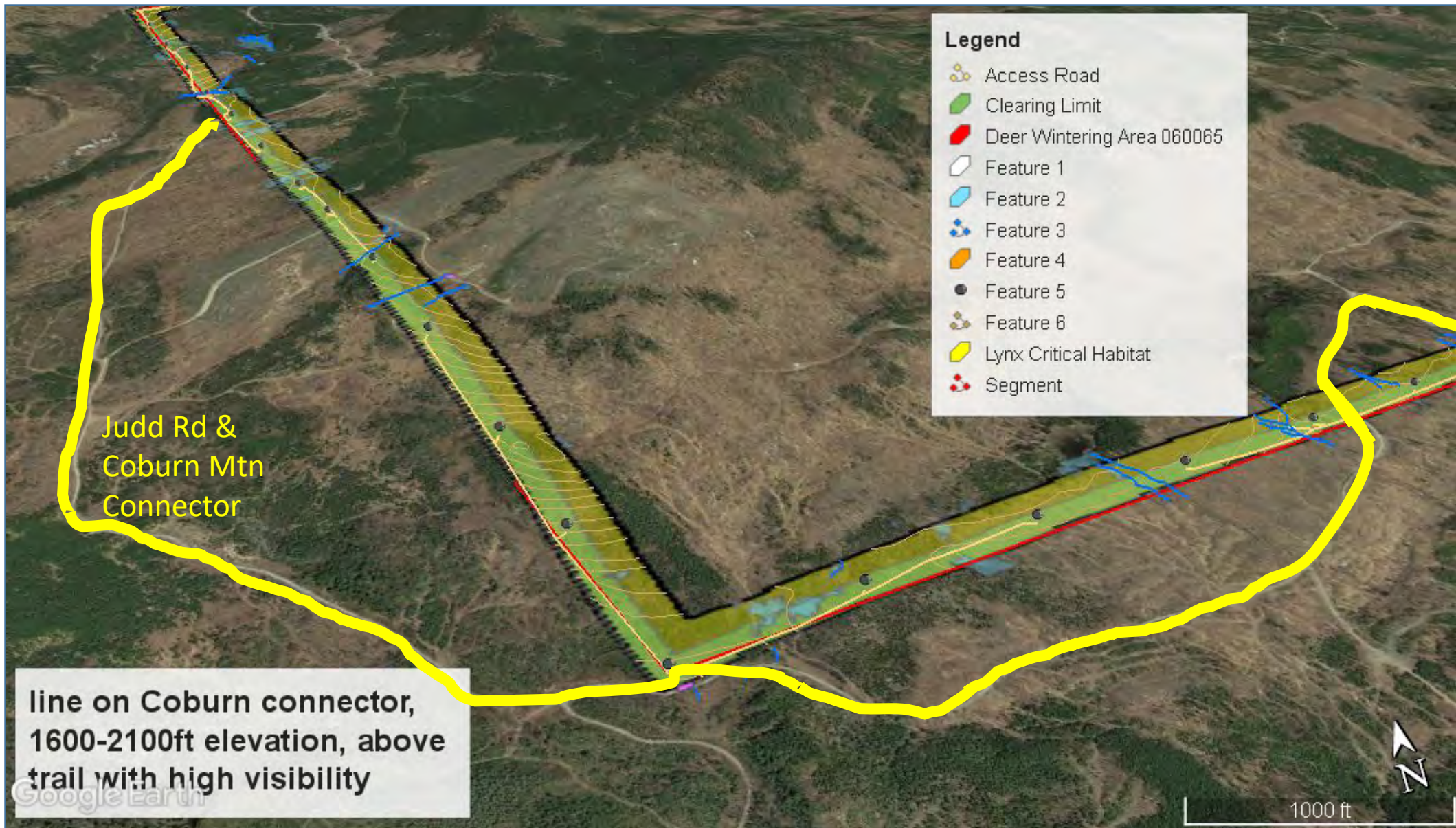
like us 

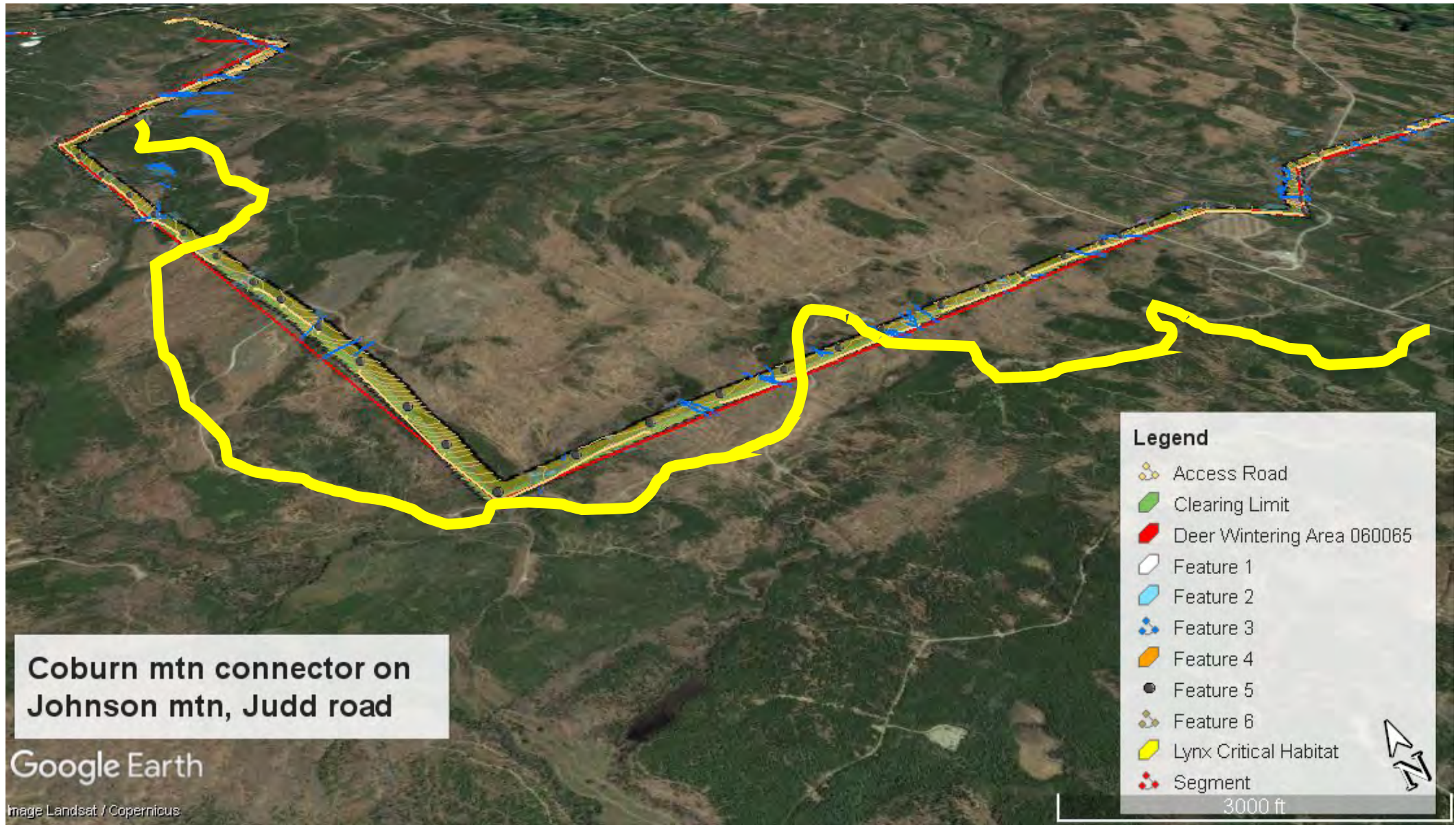
Coburn Mt. Maine's Highest Groomed
Snowmobile Trail at 3750ft

The Forks Area Chamber of Commerce
Route 201, PO Box 1 | West Forks, Maine 04985
www.forksarea.com









Legend

- Access Road
- Clearing Limit
- Deer Wintering Area 060065
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Feature 6
- Lynx Critical Habitat
- Segment

3000 ft

**Coburn mtn connector on
Johnson mtn, Judd road**

Google Earth

Image Landsat / Copernicus

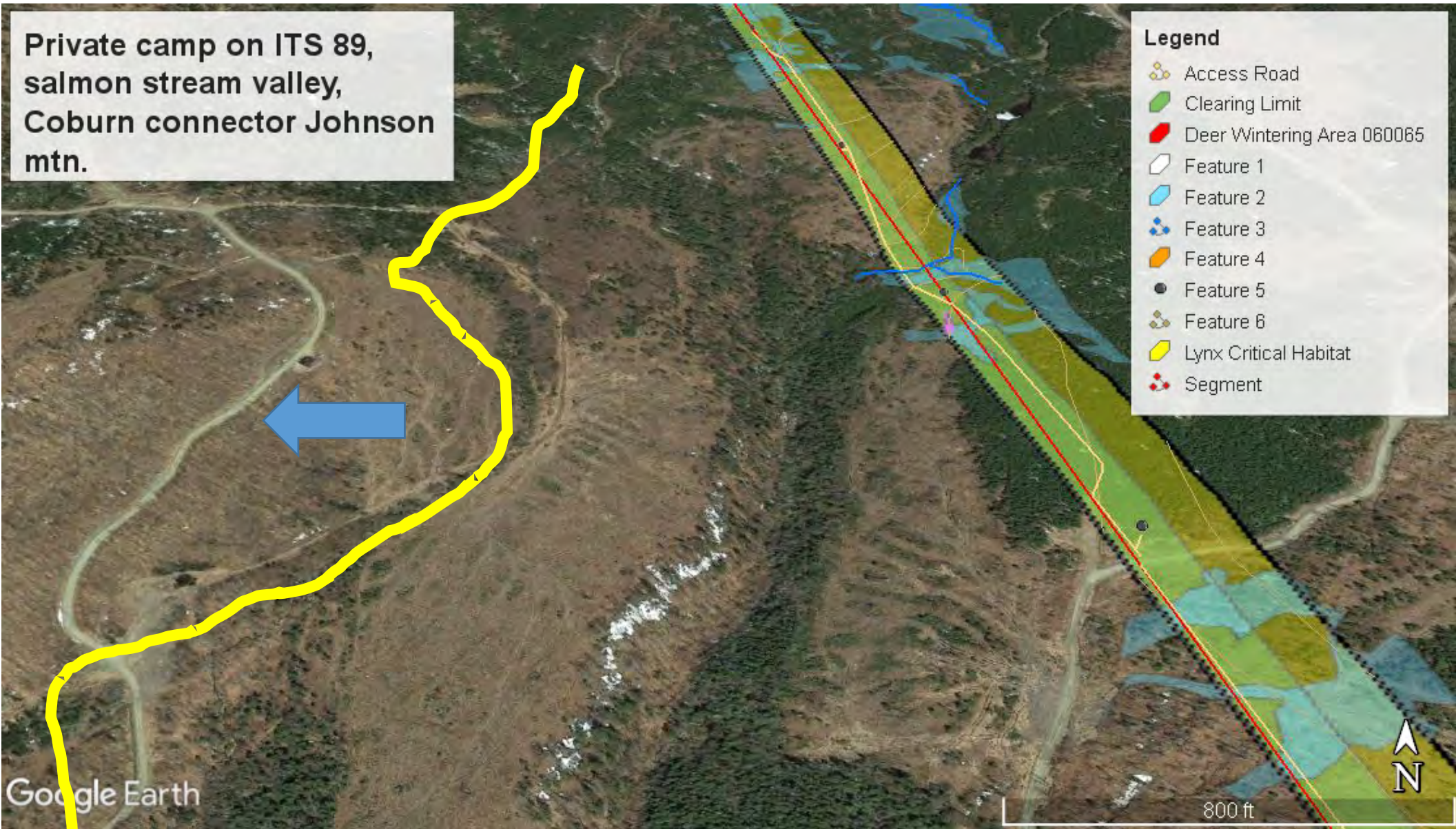
Private camp on ITS 89,
salmon stream valley,
Coburn connector Johnson
mtn.

- Legend**
- Access Road
 - Clearing Limit
 - Deer Wintering Area 060065
 - Feature 1
 - Feature 2
 - Feature 3
 - Feature 4
 - Feature 5
 - Feature 6
 - Lynx Critical Habitat
 - Segment



Google Earth

800 ft




ITS 89, Coburn mtn parking lot, Coburn mtn connector Johnson mtn.

Legend

- Access Road
- Clearing Limit
- Deer Wintering Area 060065
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Feature 6
- Lynx Critical Habitat
- Segment

Google Earth

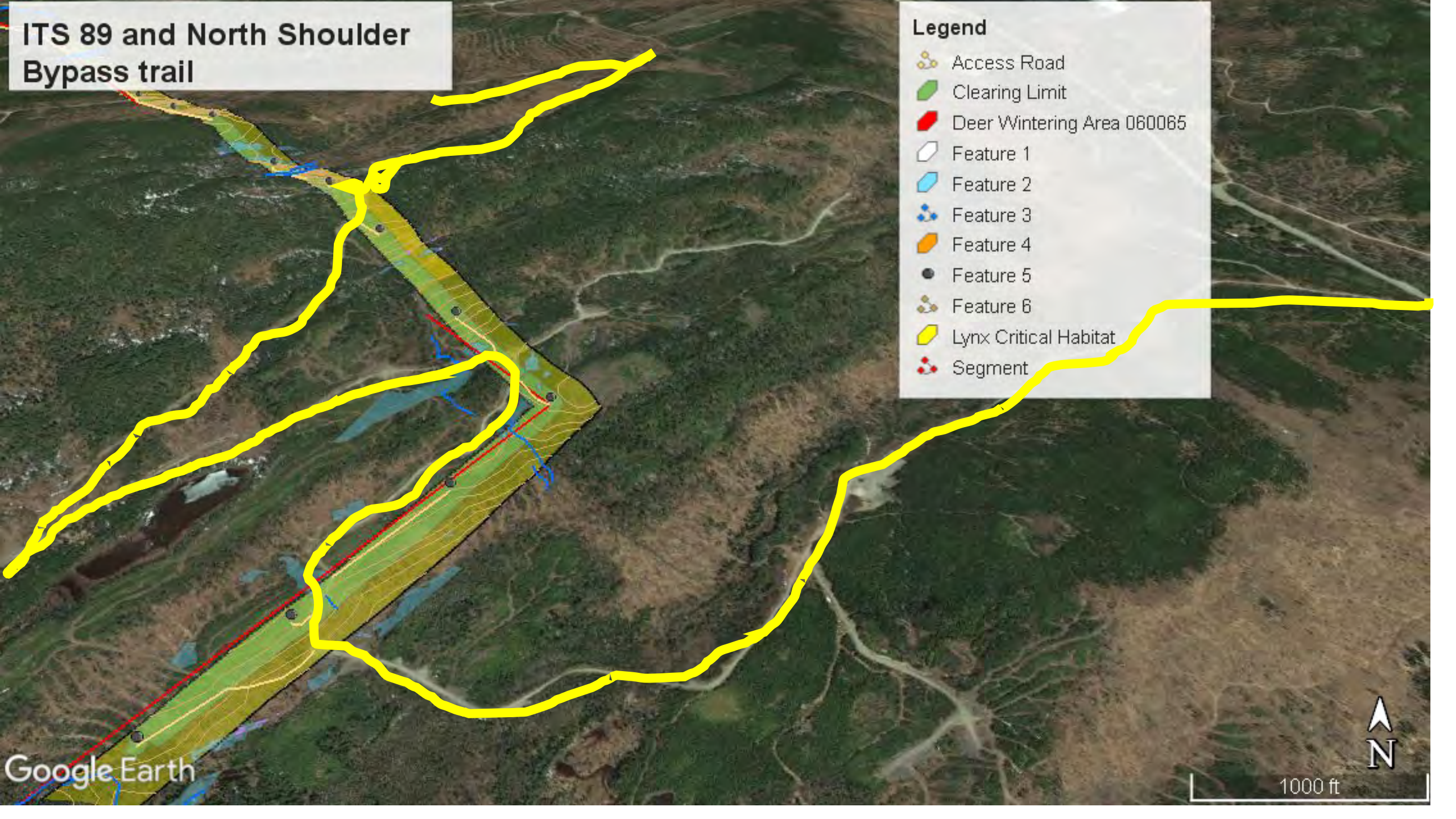
1000 ft



ITS 89 and North Shoulder Bypass trail

Legend

- Access Road
- Clearing Limit
- Deer Wintering Area 060065
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Feature 6
- Lynx Critical Habitat
- Segment

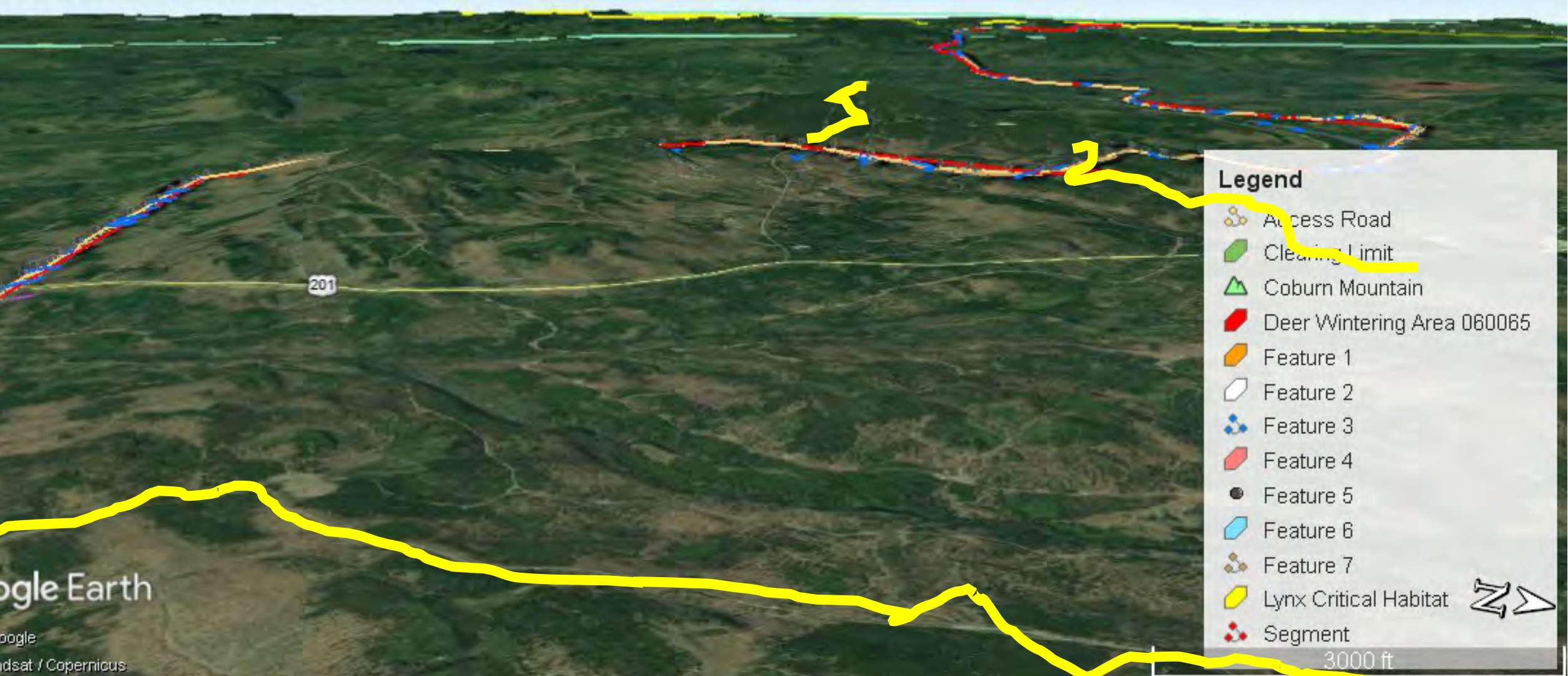


Google Earth



1000 ft

S 87 from Cold Stream mountain
road looking toward Johnson and
Coburn mtn(ITS 89 and Coburn
connector and bypass trail



Legend

- Access Road
- Clearing Limit
- Coburn Mountain
- Deer Wintering Area 060065
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Feature 6
- Feature 7
- Lynx Critical Habitat
- Segment

3000 ft

S 89 line crossing North Shoulder Coburn Mtn 2700ft

Legend

- Access Road
- Clearing Limit
- Deer Wintering Area 060065
- Feature 1
- Feature 2
- Feature 3
- Feature 4
- Feature 5
- Feature 6
- Lynx Critical Habitat
- Segment





Wild Land

Conducted by YouGov on behalf of John Muir Trust

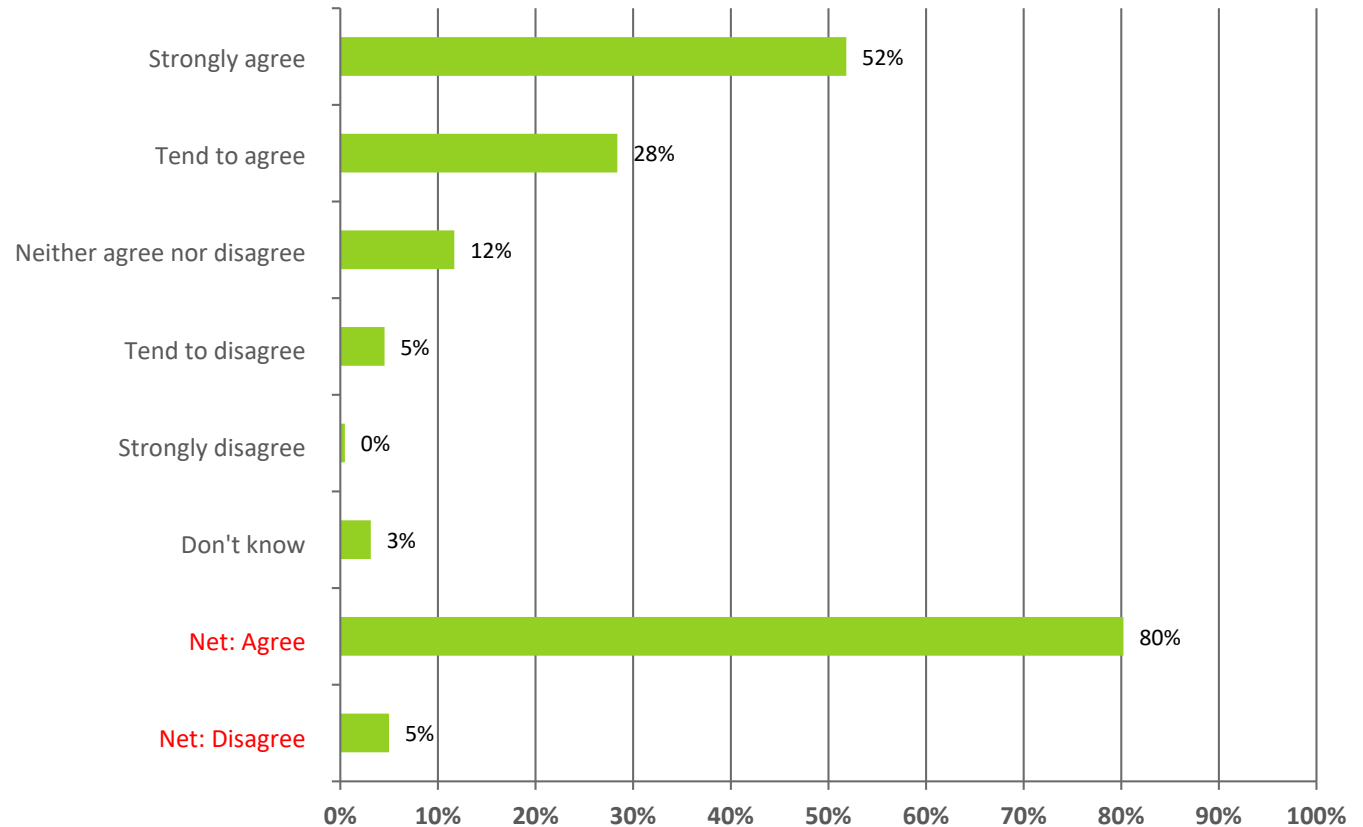
Fieldwork Dates: 18th - 22nd May 2017



Wild Land

SJW_q1. For the following question, by "Wild Land Areas", we mean places that are rugged, remote and free from major human structures. To what extent, if at all, do you agree or disagree with the following statement?

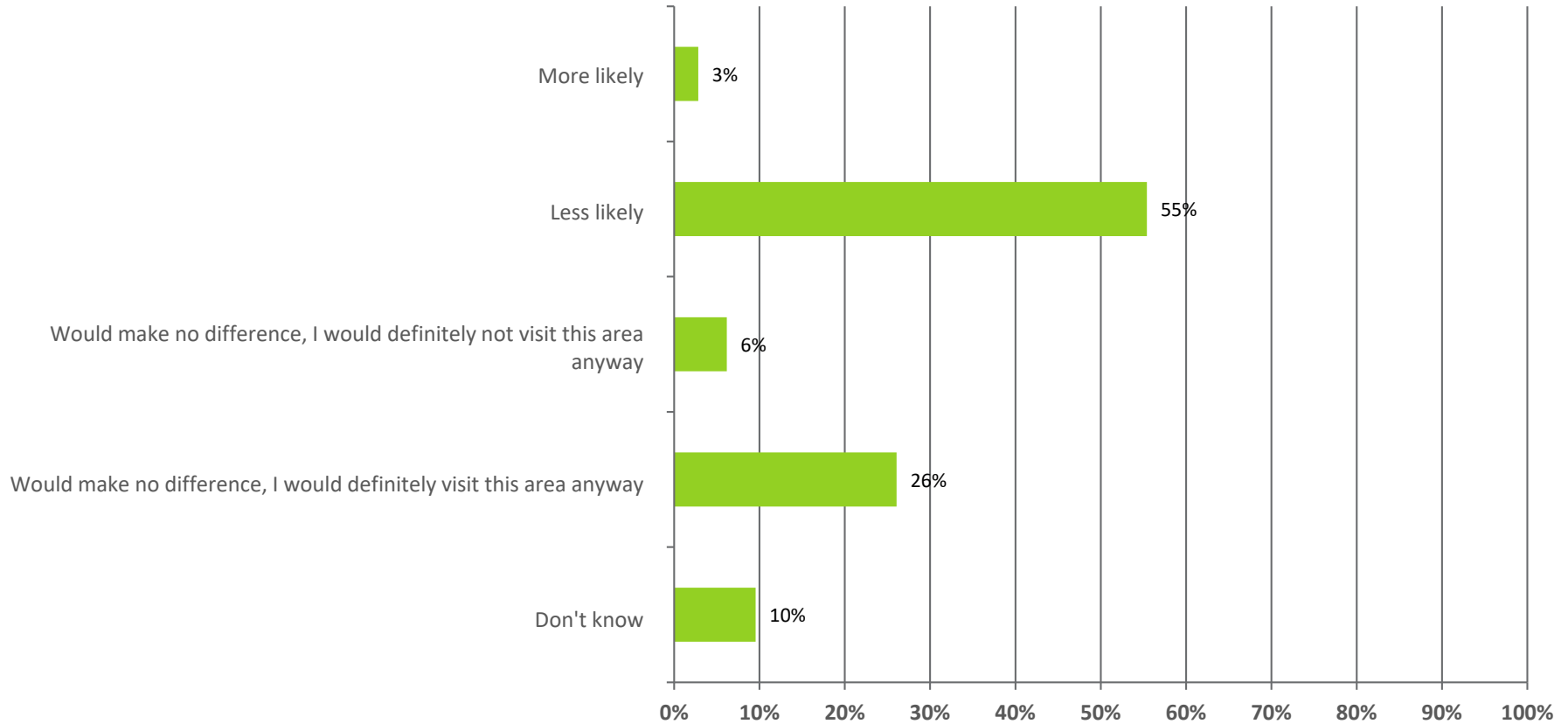
"Wild Land Areas should continue to be protected in the future from large scale infrastructure, such as industrial-scale wind farms, major electricity transmission and super-quarries"



Unweighted base: All Scottish adults (1028)

Wild Land

SJW_q2. Would you be more or less likely to visit a scenic area which contains large scale developments (e.g. commercial wind farms, quarries, pylons etc.), or would it make no difference?



Unweighted base: All Scottish adults (1028)

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MAINE RIVERS STUDY

Final Report

State of Maine
Department of Conservation

U.S. Department of the Interior

National Park Service
Mid-Atlantic Regional Office

May 1982
Electronic Edition August 2011
DEPLW-1214

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James Ernst
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John Willard

Acknowledgements

Many thanks go to all the state resource management agency personnel and concerned recreational organizations and users of the rivers of Maine who provided invaluable information, comment, and review for this study. Special thanks go to Tom Cieslinski for his role in coordination the project.

Financial Assistance

“Financial assistance for preparation of this document was provided by grants from Maine’s Coastal Energy Impact Program and Maine’s Coastal Program through funding provided by the US Department of Commerce, Office of Coastal Zone Management, under the Coastal Zone Management Act of 1972, as amended.”

Financial assistance was also provided by the Maine Department of Conservation and the US Department of the Interior, National Park Service.

Section I. Major Findings

1. The State of Maine is unique in the Northeastern United States in the number and diversity of significant natural and recreational river resources that it possesses.

The Maine Department of Inland Fisheries and Wildlife estimates that there are 31,806 miles of permanently flowing rivers and streams in the state, a figure equivalent to one linear mile of stream for every square mile of land surface. Rivers vary in size from the long and wide Penobscot River which drains 8570 square miles to the short and narrow Rapid River and Grand Lake Stream. Over sixty rivers enter the ocean along the Maine coast and three rivers form the U.S. / Canadian International Boundary. Among these water resources are select quantity of rivers which are widely recognized for their outstanding values.

Important river resources include:

- a. 17 river gorges, 61 waterfalls, and 38 white water rapids identified as being outstanding geological or hydrological features with state-wide significance.
- b. More miles of undeveloped free-flowing rivers than any other state in the Northeast United States
- c. River corridor segments which provide habitat for diverse populations of rare and endangered plant species of state and national importance.
- d. Coastal rivers which provide significant habitat for northern bald eagle and shortnosed sturgeon, on the Federal Threatened and Endangered Species List.
- e. 192 miles of high quality river habitat for an internationally known landlocked salmon fishery and 22,000 miles of primary brook trout habitat known for its excellence throughout New England
- f. The only rivers in the eastern United States containing significant self-sustaining Atlantic Salmon runs, and, due to federal and state restoration efforts, the East coast's most heavily fished Atlantic sea run salmon river.
- g. Three rivers which together account for over 60% of the state's commercial alewife catch and a number of other coastal rivers which have the potential to become profitable commercial fisheries
- h. The only two stretches of Class V white water and the longest single stretch of Class II-IV rapids in the entire New England region.
- i. The longest and most popular extended back country canoe trips in the Northeast and over 4000 miles of other rivers suitable to boaters of all ability levels.

2. The Maine River Study has identified 4264 miles of rivers and river segments which possess significant natural and recreational resource values.

Maine rivers have been inventoried and analyzed to identify important river areas and to rank these areas according to their overall significance as unique and/or multiple value natural and recreational resources. The final ranking represents a synthesis of objective resource analysis and a consensus of opinion among resource experts and state river conservation interests.

Rivers, river segments and related tributaries identified as possessing significant natural and recreation resource values were placed in one of four significance categories, identified as rating A, B, C, and D. These categories represent a hierarchy of cumulative resource values, and are defined in the following manner.

River Rating Hierarchy:

- A** Rivers and related corridors on the "A" list possess a composite natural and recreational resource value with greater than state significance.
- B** Rivers and related corridors on the "B" list possess a composite natural and recreational resource value with outstanding statewide significance.
- C** Rivers and river-related corridors or specific areas on the "C" list possess a composite natural and recreational resource value with state-wide significance.
- D** Rivers and river-related corridors or specific areas on the "D" list possess natural and recreational values with regional significance.

The total mileage of rivers and streams in each of the categories is summarized in the following table:

Significance Category Rating	Number of Rivers	Total Miles of Main Segments	% of the State's Total River/Stream Resource	Total Miles including Significant Tributaries	% of State's Total River/Stream Resource
A	20	867.0	2.7	1663.5	5.2
B	18	698.0	2.2	1176.0	3.7
C	41	843.5	2.6	1152.5	3.6
D	23	262.0	0.8	272.0	0.9
Total	102	2670.5	8.4	4264.0	13.4

A number of rivers included on the study's B list have been identified as possessing specific resource values of highest importance to Maine river constituents. These rivers are therefore deserving of special efforts to maintain the identified outstanding resource values. These rivers and their corresponding values are as follows;

Inland Fisheries Values:

- Crooked River
- Grand Lake Stream
- Kennebago River

Commercial Anadromous Fisheries Values:

- Damariscotta River
- St. George River

Whitewater Boating Values:

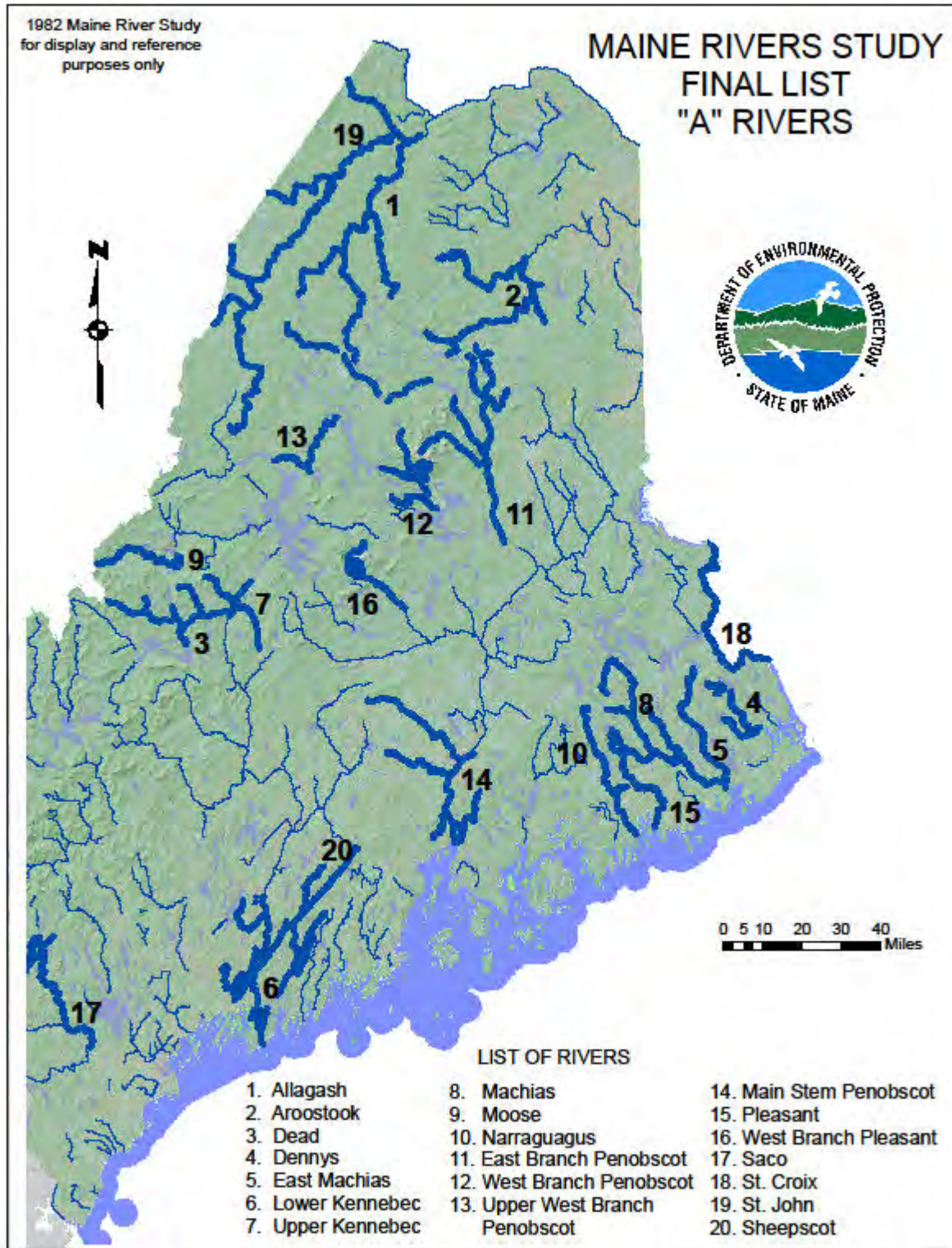
- Carrabassett River
- Rapid River

Critical Botanic Values

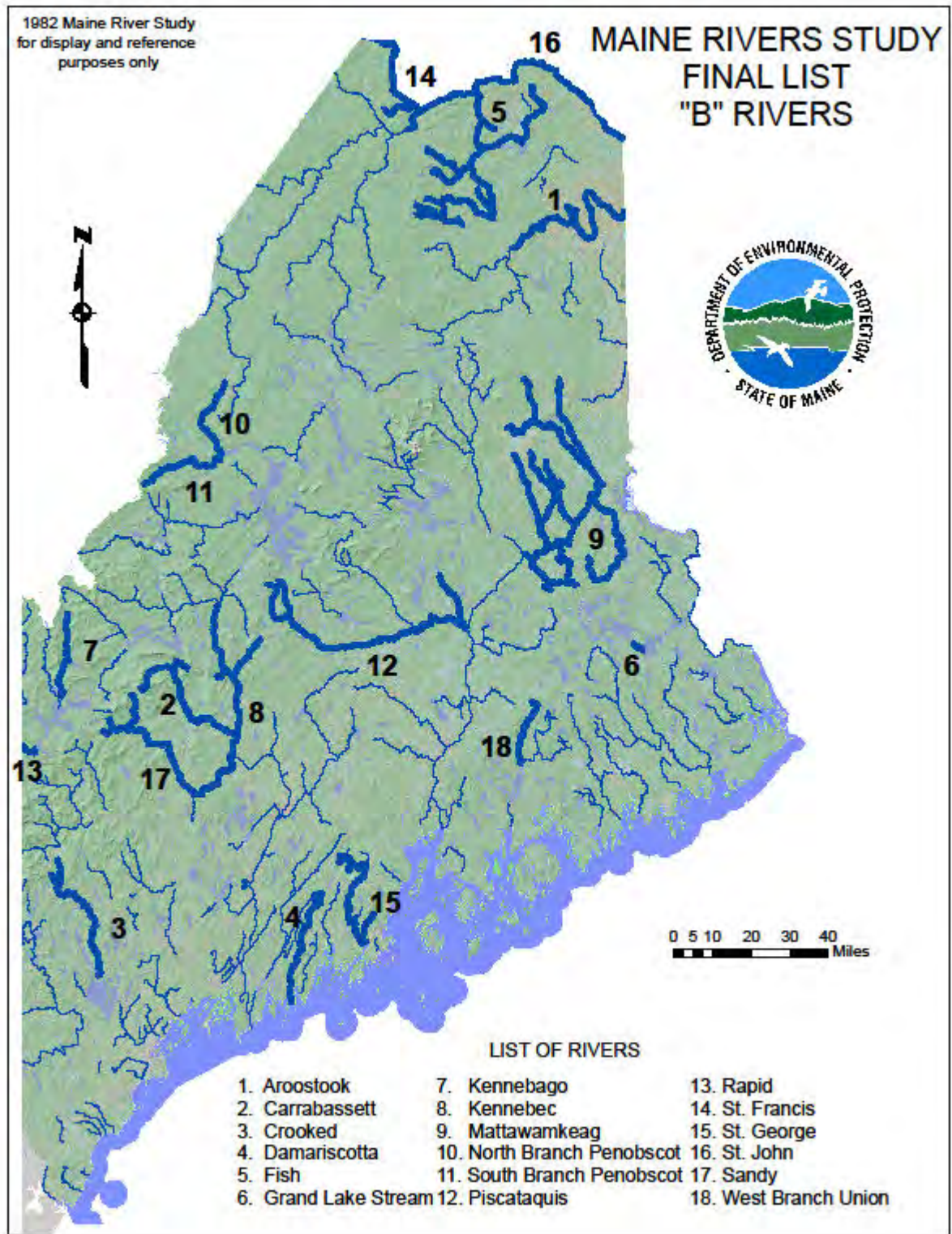
- St. John river
- Aroostook River

Maps identifying rivers and river segments included in the study's "A" and "B" significance categories follow.

“A” Rivers Map and River segments



“B” Rivers Map and River segments



3. The potential exists in Maine for the conservation of complete watersheds or river ecosystems, an opportunity unparalleled by few, if any, states in the Northeast.

A specific river segment does not function independently but instead, both affects and is affected by adjacent land areas, connecting segments, lakes and tributaries. This physical and biological interdependence of rivers and tributaries within a watershed provides the basis for the principle that a systems approach to water resources planning and management is both prudent and necessary. This is particularly so in riverine systems which are in a natural state.

The Maine River Study has identified a number of relatively large watersheds within the state which are of high significance as undeveloped and interdependent hydrologic units. These sub-basins are characterized by a general lack of major artificial river impoundments, minimal river corridor development, a high degree of hydrologic and ecologic interdependence, and a consistency of resource quality among all segments. These include:

- a. The upper St. John watershed including the Northwest, Southwest, and Baker Branches, and the Little and Big Black Rivers.
- b. The East Branch of the Penobscot watershed, including the Seboeis River and Wassataquoik Stream.
- c. The Aroostook and Big Machias watershed above Sheridan.
- d. The Allagash watershed.
- e. The Mattawamkeag watershed.
- f. The Fish River watershed, including the Fish Lakes Chain.
- g. The Machias River watershed in Washington County

4. Potential conflicts between hydroelectric development projects and significant natural and recreation rivers exist in the State of Maine.

Estimates of the total hydropower potential in the state (including both undeveloped sites and existing dam sites capable of being retrofitted) vary between 600,000 kilowatts and 1,200,000 kilowatts. Preliminary assessments of feasible hydroelectric sites on the study's A, B, and C rivers by Maine's Office of Energy Resources have identified 72 sites capable of producing 400,000 kilowatts of power.

Of the river segments identified on the Maine River Study's A list, Federal Energy Regulatory Commission preliminary permits are pending for 5 sites with a total generation potential of over 125 megawatts. These projects are located on the West Branch of the Penobscot, the Kennebec, the Aroostook, and the East Machias. A 500 kilowatt project is currently being constructed on the Pleasant River in Washington County. Twenty additional potential sites are located on "A" list rivers. "B" list preliminary permit applications include projects on the St. George, Rapid, Kennebec, Mattawamkeag, Piscataquis, and Aroostook rivers with a total generation potential of over 60,000 kilowatts.

The extent of the conflict between significant river resource areas and hydropower development vary according to the specific resource characteristics associated with a particular site. In many instances, resource impact will be minimal or can be mitigated or avoided through proper facility sizing and placement, fishway design, and/or water release scheduling. However, while the impact on river related resources will be minor for many potential projects, a select number of developments could significantly alter a river's character and destroy irreplaceable resources, some with multi-state or national significance.

Corridor land development and resources use may also impact river resource values with adverse effects occurring on water quality, wildlife habitat, user access, and scenic values. Again, conflict can often be minimized through proper planning which recognizes the resource values associated with the particular river area.

5. There is a significant base of citizen and public agency support for the conservation and sound management of the river resources of Maine.

River conservation interests in the state vary widely. Such interests include recreational boating and fishing, commercial boating and fishing, education and scientific research, wildlife preservation, water quality maintenance, and miscellaneous recreational interests. While these interests vary and sometimes conflict, an underlying consensus exists that rivers in their natural condition constitute a valuable resource to the State of Maine. There also appears to be a consensus among river interests regarding which rivers are most important and warrant conservation action.

In addition, there appears to be a public recognition of the need to balance the goals of hydroelectric development and river conservation, and a desire for the use of hydropower where compatible with the resource values of a river and where impacts of development are avoided or minimized.

6. A variety of alternatives are available within the local, State and federal government and the private sector to conserve and manage Maine's significant natural and recreational rivers.

The natural and recreational resources of Maine's rivers are extremely significant, diverse and complex. These river areas contain a mix of public and private land ownership in the form of existing parks, recreation areas, agricultural lands, historic sites, natural areas, forests and villages. Natural resources in some areas are interwoven with the fabric of existing communities. These "living or working river areas" contribute to the uniqueness, quality, and resource value of the areas from a State and National perspective.

In addition to the importance of the river corridor resources, there appears to be a base of public agency and citizen support for improved management and enhancement of these resources. The State and local jurisdictions as well as private groups and citizens have committed themselves to conserve and enhance river areas throughout Maine. As strong as the support is for improved management of Maine's rivers, so are the feelings of a need for local control and private stewardship. Indications are that proposals for the conservation of Maine's rivers should be initiated and developed at the State and local level.

In this regard, no single level of government or existing system of parks, regulations, recreation areas, programs or preserves can be expected to conserve and manage Maine's rivers. Only through the shared responsibility of the several levels of governments and the private sector, can the significant natural and recreational values of the State's rivers be conserved or enhanced.

A coordinated application of existing government programs, consistent with varying river area goals, could result in significant economic benefits and will support federal, State and local conservation and enhancement efforts.

II. INTRODUCTION

On June 22, 1981, Governor Brennan released the Energy Policy for the State of Maine. The hydropower section of the policy directed that:

“The Department of Conservation, working with environmental, economic, energy and other appropriate interests, should identify river stretches in the State that provide unique recreational opportunities or natural values and develop a strategy for the protection of these areas for submission to the Governor.”

In response to this directive, and as a continuation of the State’s ongoing efforts to conserve Maine’s significant rivers, the Department of Conservation initiated the Maine Rivers Study. The U.S. Department of the Interior, National Park Service’s Mid-Atlantic Office, as part of their ongoing river conservation technical assistance to the State, has provided staff to conduct this study.

The purpose of the study is two-fold. The first is to define a list of unique natural and recreation rivers, identifying and documenting important river related resource values as well as ranking the State’s rivers into categories of significance based on composite river resource value. The second purpose of the study is to identify a variety of actions that the State can initiate to manage, conserve, and where necessary, enhance the State’s river resources in order to protect those qualities which have been identified as important.

III STUDY METHOD AND PROCESS

Introduction – Each of Maine’s rivers and major streams were assessed during the course of this study to identify the State’s unique natural and recreation rivers. The method used to identify and rank Maine’s rivers, prepared in cooperation with the River Basin Subcommittee of the State’s Land and Water Resource Council, was designed to:

- a. Rely on existing quantitative and qualitative research information.
- b. Rely on information from recognized river resource experts
- c. Use a “systems” or river-ecosystem approach of analysis which recognized the relationships and interrelationships of rivers, their tributaries and watersheds.
- d. Incorporate public and expert input into the evaluation process

The study process was intended to not only develop an objective and factual base of information on Maine’s rivers, but also a consensus among river experts regarding the most important rivers in the State.

The method used is based on the following five step process.

Step 1 – Identification and Definition of Unique River Values

The first step in the study identified unique recreation and natural river categories. These categories, selected by the study team and the River Basin Subcommittee, were used to serve as a framework for the collection and analysis of river information. The unique natural river categories selected for analysis included:

- 1) geologic and hydrologic features (gorges, waterfalls, etc)
- 2) critical and rare species of plants and wildlife (bald eagle wintering areas, etc)
- 3) undeveloped river corridors
- 4) scenic river corridors (river areas with outstanding views, visual diversity, etc)

The categories selected for unique recreational river areas included:

- 1) anadromous fisheries (salmon runs, etc)
- 2) inland fisheries (trout streams, etc)
- 3) whitewater boating (areas with rapids)
- 4) canoe touring (areas for canoe boat trips)
- 5) backcountry excursion boating (areas for extended wilderness trips)
- 6) river related historic sites with national significance

Once these categories or “types” of unique rivers and river segments were identified each category was described and defined in detail.

To help determine which rivers or river segments possessed resource values of regional or greater significance, a set of standards were established for each category. These standards serve as minimum “threshold” criteria to determine which rivers should be considered for further evaluation.

The specific criteria for each natural and recreational river category and the evaluation method used to identify qualifying river areas is described in Section IV of this report.

Step 2 – Identification of Significant River Resource Values

The second step of the study process involved the identification of those rivers and river segments which met the natural and recreation river category criteria. River areas were identified through a review of existing sources of information (canoe guidebooks, natural area studies, previous river inventories, etc) and through discussions with various government and private sector river experts. Rivers which met or exceeded the category criteria were identified on the Preliminary Draft List of Rivers Under Evaluation released in November 1981. This list of more than 120 rivers and river segments was distributed to public and private interests for review and comment.

Each of the rivers and river segments on the Preliminary Draft List was researched by natural and recreation river category, and river values were systematically identified. The Preliminary List and documentation of river values served as a basis for subsequent analysis.

Step 3 – River Category Evaluation

The next step of the study process focused on the evaluation and detailed documentation of river values by specific category. With assistance from resource experts all rivers and river segments identified as unique or significant in a given category were further inventoried and analyzed in detail to substantiate river values. The results of this analysis were recorded on lists by river category. These lists of rivers represent a culmination of the river evaluation, documentation and expert review process and are judged to possess resource values of regional, statewide, and greater than statewide significance.

Step 4 – River Category Synthesis

River information collected, evaluated and documented in earlier steps was combined in an effort to summarize all of the natural and recreation values associated with particular river segments and to connect adjoining river segments which possess similar values.

To help simplify the recording and display of river values a matrix was used. The matrix identified the total number of resource values associated with each river segment and highlighted those areas of statewide or greater than statewide significance. New river segment descriptions were defined using the following general guidelines.

1. Where a river possesses a combination of overlapping natural and recreation values, a composite river segment is identified with the outer boundaries of the overlapping segments determining the boundary of the entire river area.
2. A tributary stream which flows into, and is connected to a larger river area is included in the larger river segment description if the tributary stream: a) possesses natural or recreation values consistent with those of the main river area, and/or b) significantly enhances the overall value of the larger river segment's resources.
3. A tributary stream with natural or recreation values greater than those of a connecting main river area is listed separately from that area.
4. Larger connecting rivers have been listed as tributaries to a river system in certain unique situations (i.e. Big Machias River in the Aroostook River watershed), where: a) the rivers are free-flowing and within an undeveloped watershed; b) the rivers in the watershed exhibit a high degree of hydrological and ecological interdependence.

Following the combination of rivers and associated tributaries, river segment descriptions and resource values were revised and displayed on a matrix.

Rivers or river segments with related resource values which have been determined to be the state's most significant in a specific resource category were identified on a matrix with an asterisk. These resources possess greater than state or national significance, related to the distribution and rarity of the resource value.

Step 5 – Comparative River Evaluation

The combined unique and significant natural and recreational resource values of all river segments were evaluated on a comparative basis to determine their relative importance within the State of Maine. Each of the rivers from the Preliminary Draft List were ranked and placed into one of four categories of river resource significance ranking. These categories, identified as A, B, C, and D, represent a range of river values, from areas which are greater than that of State significance to those of regional importance.

Rivers and river segments were placed within particular categories based on the number and significance of various river values. The final river ranking scheme recognizes rivers which have a variety of significant values as well as importance due to specific unique resource qualities.

River Ranking Criteria – The criteria used to place rivers within the four categories are as follows:

“A” Rivers

1. River or river segments possessing six resource values with regional, statewide or greater than statewide significance in a specific resource category.
2. Rivers or river segments possessing two or more resource values which are recognized to be some of the State’s most significant in a given resource category. Included within this category are rivers providing important habitat (defined as self-sustaining viable runs or significant restoration efforts producing fishable populations) for the nationally significant Atlantic sea run salmon.

“B” Rivers

1. Rivers or river segments possessing four or five resource values with regional, statewide or greater than statewide significance in a specific resource category.
2. Rivers or river segments possessing one resource value which is recognized to be one of the State’s most significant in a given resource category.

“C” Rivers

1. Rivers or river segments possessing one to three resource values with regional, statewide or greater than statewide significance in a specific resource category.

“D” Rivers

1. Rivers or river segments possessing one or more resource values of regional significance

Using the aforementioned criteria, rivers and river segments were identified in the Draft Final List of Rivers Under Evaluation released in February 1982. This list of rivers was distributed to public and private interests for review and comment, and copies of the list were made available through a statewide news release.

In addition, a series of public meetings in Bangor, Presque Isle, Machias, and Lewiston were held to solicit input. Public comments, and additional information where appropriate, were incorporated in final revision of the Draft Final List.

Thus, the Final List of Rivers released in April 1982 reflects the results of a comparative and cooperative river evaluation process which incorporates factual, objective information and the consensus opinion of numerous diverse river interests.

IV. RIVER RESOURCE CATEGORIES

Unique Natural Rivers – Overview

This section of the final report will outline the process of identification, documentation, and evaluation of Maine's "unique and natural rivers". The focus here is on these natural resources that make a river important:

- an absence of development within the land corridor adjacent to the river
- the presence of a variety of habitats for the fauna and flora
- uncommon and unique features like bedrock formations
- rare and threatened plant and animal species
- critical ecologic areas
- scenic waterfalls and vistas
- National Historic Sites and National Natural Landmarks

The combination of the wide scope of this study and the limited time allocated did not allow for the collection of new information or field work on a river by river basis. Rather, the emphasis was on the gathering and organizing of existing information from a variety of sources and experts. State and Federal resource management agencies were of help in this section of the study, and will be cited in discussion on the appropriate resources.

Much of the river-related resource information was taken from statewide assessments of natural resources by the Maine Critical Areas Program, a part of the State Planning Office. The groundwork for this program was laid in 1972 with the Maine Natural Areas Inventory, a report which attempted to identify the most significant natural areas around the state. After this study was issued, it became clear that additional work was needed for the systematic evaluation of the relative values of natural resources of the state, in order to identify which areas were the most unique or significant.

In 1974, the State Legislature passed an act establishing a state Register of Critical Areas, and charged the State Planning Office with initiating a Critical Areas Program designed to identify, document, and conserve statewide critical natural areas through management agreements and donation or acquisition of property. Primary emphasis in the program at this time is on identification and registration of critical areas.

The kinds of critical areas evaluated by the program primarily correspond to the definition of "historic and fragile lands," from U.S. Senate Act 268, 93rd Congress.

“ . . . lands where uncontrolled or incompatible development could result in irreversible damage to important historic, cultural, scientific, or esthetic values, or natural systems which are of more than local significance, such lands to include shorelands of rivers, lakes and streams, rare or valuable ecosystems and geological formations, significant wildlife habitats, and unique scenic or historic areas. . . .”

Other natural resource experts with important contributions to the study included wildlife resource experts from the University of Maine at Orono, Maine Department of Inland Fisheries and Wildlife, and U.S. Fish and Wildlife Service, who were helpful in the identification and documentation of significant river related wildlife resources. The prior assessment of the state's rivers by the National Park Service for the Nationwide Rivers Inventory was the primary source of information for the evaluation of corridor development and scenic resources of the rivers in Maine.

A. GEOLOGIC/HYDROLOGIC FEATURES

Introduction

The majority of bedrock formations of the State were originally deposited as sediments on the bottom of the ocean during the Lower Paleozoic era (hundreds of millions of years before the present), as well as being formed from molten rock material from deep within the earth. Later in the Paleozoic period during the building of the Appalachian Mountains, these sediments were subjected to intense pressures and temperatures causing them to become folded, faulted, and uplifted, accompanied by intense volcanic activity. Today these durable igneous and metamorphic rocks are exposed in the Mountains of New England upland section of the state, as well as along parts of Maine's rocky coast. The finest examples of bedrock features – such as waterfalls, gorges, and fossils – are distributed in these areas of Maine.

Many of the bedrock materials outcropping along the banks of streams and rivers in northern Maine contain traces of organisms and plants called fossils, which once lived in the early marine environments hundreds of millions of years ago. The majority of these river related fossil localities lie within a band of non-to-partially metamorphosed rocks which sweeps across the central part of the state, ending in the northeastern corner of Aroostook County. Most of these fossils are marine vascular plants and invertebrates from the Lower to Middle Paleozoic era.

During the Quaternary glaciation, the state was covered with a mile thick accumulation of snow and ice, a much larger version of the glaciers which survive today in the European Alps and Canadian Rockies.

As the glaciers from Laurentide Ice Sheet moved southward from eastern Canada they scoured the bedrock formed millions of years earlier, shearing off the tops of many hills, ridges, and mountains. Approximately 10,000 years ago this ice began to melt, leaving behind a watery landscape of lakes, ponds, streams, rivers, and wetlands.

A veneer of boulders, sand, gravel, and clay also remained to blanket the landscape, testimony to the tremendous erosive power of the slowly moving glaciers. These deposits of glacial sediments formed many of the state's lakes by damming valleys widened and deepened by the glaciers. The hydraulic action of glacial meltwater initiated the process of erosion on underlying bedrock material, occasionally encountering cliffs or abrupt jumps in the landscape, and forming waterfalls. Normally, these hydraulic features degenerated into whitewater rapids as the bedrock eroded. For a waterfall to remain in a landscape, one of two conditions must have been present. Either the flow of the stream was insufficient to significantly erode the bedrock, or the rock contained a particular feature (such as cracks or joints) which allowed the waterfall to maintain itself as erosion proceeded. In this situation, the falls would migrate upstream with time, excavating a downstream gorge. Waterfalls also resulted from streams selectively eroding areas of weakness in the bedrock.

Many interesting surficial geologic formations were formed at the margins of the melting glaciers in the central and southern areas of the State; many of these glacial deposits are the finest examples in the northeast region. Surficial formations related to rivers include linear ridges called eskers or horsebacks, intricately braided streams with complexes of river islands, rivers with sinuous meander complexes, glacial outwash plains, glaciofluvial marine deltas, and washboard moraines.

1. Definition

There are river-related physical features in the state whose location and distribution are controlled by the structure and composition of the bedrock, by the surficial geology and by natural geologic processes including weathering and erosion.

Towering waterfalls, steep-walled granite gorges, systems of lakes, ponds, and wetlands, and surficial glacial formations are among these unique physical features. The distribution of these resources is a function of the geologic events occurring hundreds of millions of years ago, as well as resulting from events occurring after the melting of more than one mile of ice which covered Maine until approximately 10,000 years ago.

2. Significance

a. Scientific – Many of the geologic features associated with rivers have unique importance for scientific research. These features (such as glacial eskers, fossils, or gorges) are useful in the research of past geologic processes which affected the distribution and composition of rocks and minerals on the earth, as well as understanding present-day geologic processes changing the world.

Gorges and waterfalls contain large areas of steam washed and exposed bedrock, important in a state where most bedrock areas are obscured by glacial drift making scientific study difficult if not impossible. Waterfalls are also important geologic sites for study because they are not accidental features in a landscape; their location is a function of the bedrock geology and / or glacial history of an area.

The scientific study of the fossils found in the rocks of the state has greatly affected the understanding of the State's paleogeographic history and the knowledge of the types of ancient forms of life which once lived in what is now Maine. Some of the state's fossil sites are widely known and well-documented localities and have yielded specimens of museum quality; many are the finest found in the world. Still other sites have been discovered only recently and deserve more detailed study.

One river-related geologic locality which is reportedly crucial to the understanding of central Maine geology is Ripogenus Gorge. The Gorge, which contains a wide variety of sedimentary, igneous, and metamorphic rock types; displays significant geologic structures in addition to being an important Silurian fossil locality; was recently recognized by the National Park Service as a potential National Natural Landmark.

b. Scenic / Recreational – Because of their scenic and esthetic qualities, waterfalls and gorges are often linked to local and regional tourist economies serving as camping or fishing sites or scenic roadside vistas. Some gorges have large rapids run by commercial whitewater rafting interests which bring dollars into local areas.

c. Historic – The rivers of Maine are intimately tied to the State's history because of their importance as traditional transportation routes. Many gorges and waterfalls presented obstructions to former log running and have legendary significance. Others have since been modified by channel improvements for log running, or obliterated by downstream dams for hydroelectric generation. Occasionally, waterfalls and gorges were the sites for mills or small towns and have associated historic buildings with state and national significance.

d. Ecologic – Gorges and waterfalls often contain a great diversity of hydrologic and ecologic environments, and a variety of habitat for flora and fauna. These environments may include flatwater above the hydrologic feature, ledges, rapids, and shooting flow through the gorge or waterfall, with gravel floodplains and rapid water downstream. Ravines, gorges, and streamside cliffs are often more shaded, with higher humidity than most environments, and many species of rare plants are known to grow in such areas. Sandy glacial outwash plains are another river-related geologic feature which have a unique association of plants. The droughty infertile soils are often maintained as blueberry barrens, supporting the cultivation of wild blueberries.

3. Standards for Inclusion

Unique and significant geologic and hydrologic features in Maine are studied on a continuing basis by the Critical Areas Program. The physical resources studied to date include bedrock fossil localities, eskers, waterfalls, and gorges. Significant white water rapids in the state have also been identified by this program, and their findings were incorporated into the assessment of recreational boating by the Maine Rivers Study.

Geologic and hydrologic features meeting the significance criteria defined by the Critical Areas Program are recommended for inclusion on the Register for Critical Areas; at this time, 61 waterfalls and 19 gorges have been recommended. Significant eskers and fossil locations have also been added to the Register.

River-related geologic features recognized by the National Park Service in the Nationwide Rivers Inventory as important because of their uniqueness, rarity, or scarcity (one-or-two-of-a-kind nature, or having significance for a particular region of the state) were also included in this study. These features included reversible falls, glacial outwash plains, river-linked lake systems, and river meander complexes.

4. Evaluation Method and Criteria

During the assessment of the State's geologic and hydrologic features, general criteria were used to identify significant river-related physical features. These criteria were developed in order to identify areas of geologic and hydrologic importance associated with rivers which deserved recognition by this study, but had not been comprehensively studied on a statewide basis. These criteria included the following:

a. Scarcity: a resource with extremely limited distribution in the State, New England region, or United States; distinctly unusual, rare, one-or two of a kind features.

b. Diversity of values: significant physical features occurring in association with other values (i.e., a gorge which is a classic geologic type locality with habitat for endangered bald eagles and high recreational value).

c. Susceptibility to human activities; features which could be degraded or destroyed by human presence or activities.

d. Ecologic significance: resource sites which contain a variety of habitats and ecological values.

e. Historic value: features that were involved in the settlement, transportation, or early industrial activities of the State. A site was considered significant historically if: a) it had interesting military history; b) it was an important industrial or economic site; c) it was important in 19th century log driving activities.

f. Scenic / Esthetic value: resource features which were important to the local and regional recreation and tourist economies. A feature was considered to have outstanding scenic attributes if: a) it was of large magnitude in some way (length, depth, overall size); b) had good potential or existing vistas, and c) it had a diversity of hydrologic elements including rapids, chutes, flumes or falls.

g. Scientific attributes: a site was considered geologically outstanding if any one of the following criteria existed: a) it was a type locality or best exposure of a geologic formation; b) it had an exceptional display of bedrock structures; c) it displayed exceptional hydrologic features.

The fossil sites were considered scientifically significant if meeting on or more of the following criteria:

1) Areas which are the type of locality of a particular fossil (i.e. The area where there first specimens known to science were collected).

2) Areas containing a unique fossil assemblage, index fossils, and/or fossils useful for scientific age determination and correlation work.

3) Areas with educational value and frequently visited by school groups.

The following rivers were recognized by experts as having outstanding river related geologic resources and highlighted on the Final List of Rivers with an asterisk:

Upper Kennebec River
West Branch Penobscot River
West Branch Pleasant River

5. Information Sources and Expert Review

The following references were used by the study team to identify and document resource values.

Waterfalls in Maine and Their relevance to the Critical Areas Program of the State Planning Office;
Brewer, Thomas, 1978

Gorges in Maine and Their relevance to the Critical Areas Program of the State Planning Office; Brewer,
Thomas, 1978

A Preliminary Listing of Noteworthy Natural Features in Maine; Center for Natural Areas, June 1976.

Significant Bedrock Fossil Localities in Maine and Their Relevance to the Critical Areas Program;
Forbes, William H., 1977

Nationwide Rivers Inventory; U.S. Department of the Interior, National Park Service, Mid-Atlantic Regional Office, Philadelphia, PA, 1981

Dr. Thomas Brewer of Boston College, Boston Massachusetts, and Janet McMahon and Harry Tyler of the Critical Areas Program within the State Planning Office provided information and expert opinion to the study team.

B. RIVER RELATED CRITICAL/ECOLOGICAL RESOURCES

Introduction

The State of Maine possesses an unusual abundance of water and related land resources, having more miles of river and more lakes per square mile than any other state in New England, as well as the highest percentage of land covered by forest of any state in the United States. Of the 19.8 million acres of land in Maine, 17.4 million acres (approx 88% of the state) is in forest, and 1.5 million acres (7% of the state) is covered by inland fresh water. This figure does not reflect areas of bogs and wetlands which are perennially wet or flooded for certain seasons of the year.

The topographic relief in Maine has produced a complexity of terrestrial ecosystems, which for the purpose of this discussion can be grouped into basic vegetative types: Alpine tundra, Northern hardwood spruce-fir, Northeast spruce-fir, transition hardwood-conifer, and transition hardwood. With the exception of Alpine tundra, any of these major vegetative associations may be found along a river corridor, depending on the altitude of the area, as well as other influencing factors such as soil type, steepness and aspect of slopes, and amount of moisture present.

Just below the alpine areas and on the tops of many of the lesser peaks in the White Mountains is the Northeast spruce-fir association, usually consisting of pure fir forest just below timberline, with red spruce increasing at lower elevations. These conifer forests grade into Northern hardwood spruce-fir forests downward, the transition occurring at about 2500 feet in the White Mountains. These forests contain a variety of hardwood and conifer species. Some of the conifers such as red spruce and fir drop out at lower elevations and in the more southern portions of Maine. Transition hardwood-conifer forests, found in extreme southwest Maine and along lower valleys in other parts of the state, have a greater number of southern species like white ash, black birch, black cherry, and increasing concentrations of red oak, white oak and hickory.

Soils throughout the state are largely developed from glacial tills and stratified drift, tending to be podsoles (soils with upper horizons depleted of plant essential nutrients) at higher elevations under spruce-fir forests, and brown podsolics at lower elevations. Most of the soils are acidic, although limestone areas throughout the state often have unique calciphile (or calcium loving) vegetation, occasionally with associations of rare and endangered plant species.

These are other special types of river-related vegetation in Maine found with certain types and conditions of soils. Areas of coarse sandy glacial outwash along many rivers support pitch pine barrens. In some cases these areas are maintained in a lower successional stage as blueberry barrens by controlled burning and other management practices.

White pine is another species that grows well in glacial outwash areas, where it can reproduce without competition from other species of trees. This tree also grows well on steep-sided riparian areas (along rivers, streams, lakes, and ponds) in a variety of soil conditions. The vast majority of the immense pines which once grew along the rivers of Maine have been cut, although a few stands of old growth white pine exist in the state. The most notable example of these is The Hermitage stand along the West Branch of the Pleasant River.

Low, cool, poorly drained sites in Maine often support classic bog ecosystems, with typical acid peats resulting from the accumulation of sphagnum moss. These bogs are important natural areas, supporting many endemic, unique, or peripheral species of plants (especially orchids) which are found only in these unusual biotic systems. A special type of bog forest characterized by Eastern Atlantic or coastal white cedar is found in some parts of mid-coastal and southeastern Maine. Another unique type of bog sometimes within river corridor areas is the raised bog, formed in depressions on drier ridges surrounding bogs. A mound several feet high is formed by the accumulation of sphagnum moss, while water is retained by the sponge-like consistency of the moss.

Of all the various ecosystems associated with rivers, perhaps the most significant are the wetlands, the transition zones between the terrestrial and the aquatic environments. Wetlands have outstanding natural value (for the production of photosynthetic oxygen, as catchments for flood waters, pollution filters, and aquifer recharge areas and for species habitat) as well as significant economic value, supporting the important statewide hunting, fishing, and trapping recreational community. Inland wetlands have primary importance as feeding, nesting, and rearing areas for waterfowl.

Although generally associated with waterfowl, wetlands provide habitat for many furbearing animals as well. Otter, beaver, muskrat, mink, and others are directly dependent on these areas for their food and shelter. Other species such as deer, woodcock, and hare often inhabit areas bordering these wetlands. In addition to the previously mentioned furbearers and game animals, numerous non-game species depend on wetlands to supply some or all of their life requirements. Tidal rivers and salt marshes have plants which are adapted to changes in water level, salinity, temperatures, and nutrients. These coastal rivers and wetlands serve as resting areas for spring and fall migrations of waterfowl, as well as wintering areas for waterfowl and raptors, including the endangered bald eagle.

There are other areas associated with rivers that support unusual assemblages of plants, including certain relict and endemic species. These are highly specialized species, influenced by subtle changes in sunlight, humidity, temperature, and soil moisture, texture and composition. These areas include cliffs, where plants are subjected to fluctuations and extremes of light, temperature, climate, and erosion, as well as ravines and gorges which have shaded, humid conditions preferred by certain species.

BOTANIC CRITICAL / ECOLOGIC RESOURCES

1. Definition

There are over 2,100 species of vascular plants known to occur in the State of Maine. Of these, 318 species are considered scarce or rare. The Critical Areas Program has identified 97 species known to inhabit riverine areas. Significant habitats for vascular plants include cliffs, gorges, river and stream banks, pond and lake margins, bogs, and wetlands.

The causes of the rarity of these plants can be difficult to define at times, although the majority of the rare plants can be identified in one or more of the following categories, according to the Critical Areas Program:

- a. Species with scarce habitat within the State (although more common elsewhere)
- b. Species at the northern or southern limit of their range.
- c. Species with a very restricted natural range (endemics).
- d. Species with seriously declining populations.
- e. Species which, for a variety of reasons, are rare throughout their entire range.

The definition of rarity can be complex, since it is a function of the actual limited distribution of the plant in its habitat, as well as its perceived value to our society. The Critical Areas Program has defined rarity primarily by its biological distribution. A plant species is considered to be rare if it has been found in ten (or fewer) towns in the state; a species may be found in more than 10 towns and still be considered rare if it is at the limit of its range, is declining or vulnerable, or is restricted in distribution throughout its range.

2. Significance

The values of plants to our society and to other animals of the land and waters of this world are infinite. Plants regulate temperature near the earth, maintain the atmospheric balance of carbon dioxide to oxygen, convert solar energy into stored chemical energy needed by animals, have educational and aesthetic value, and supply an endless variety of medical and chemical products for humans. Communities of plants are important for soil development, prevention of erosion, storage of water, and providing food and shelter to many species of animals.

The many varieties of rare and unusual plant species are found in habitats which are unstable and changing, and subject to climatic extremes. The gene pool of these plants is a storehouse for traits necessary for breeding new species, as well as representing unknown potential as a source of new chemicals and drugs to serve mankind.

3. Standards for Inclusion

Using data on the distribution of rare plant species, as well as the previously mentioned rarity criteria, a group of botanists has assigned levels of importance to rare plants in the New England region. The Critical Areas Program has adopted this system for its own work in the state, assigning each listed plant species to one of three levels of importance; National, New England, or State.

National level rare species are of two types;

- 1) Presently listed as a Federal Endangered or Threatened Species, or proposed for review or under review for listing by the Office of Endangered Species of the U.S. Fish and Wildlife Service, or
- 2) found in few areas outside of New England, although not having official recognition as nationally threatened.

Species considered rare within New England are vascular plants listed through a joint effort by the U.S. Fish and Wildlife Service and New England Botanical Club. Some of these species may be rare throughout New England, but are common in Maine, and are obviously not included on this list.

Species rare at the state level are those species not considered rare through most of their range, but are rare within this state. The majority of species in this level are species reaching their northern limit in Maine.

In addition to identifying rare vascular plants, the Critical Areas Program has also assessed unusual stands of old growth white pine around the state. Significant river-related stands on the Presumpscot River, West Branch Pleasant River, and Vaughan Brook have been included in this study.

4. Evaluation Method and Criteria

The known or suspected locations of critical botanic species along the rivers in Maine were mapped, and segments containing the range of distribution of the plant species were defined using the following criteria;

- a. Plant species were considered to be river-related if found within the one-quarter mile land corridor adjacent to either bank of the river.
- b. A one-mile buffer zone in both directions of a species locality was included within the segment description, in order to account for possible disjunct populations of rare vascular plant species.

Once all localities of plant species were mapped, the river segments were analyzed to determine their overall significance for critical and rare plants, based on the diversity of species at the various levels of importance (National, New England, State).

A system of points was assigned to each of the particular levels of significance, as follows.

	Points
a. Species on the Federal Endangered and Threatened List. <i>Pedicularis furbishiae</i> (Furbish lousewort) is the only riverine plant species on the list at the present time.	5
b. Species under review for inclusion on the Federal Endangered and Threatened List. These species are: <i>Listeria auriculata</i> <i>Oxytropis campestris</i> var. <i>johannensis</i> <i>Viola novae-angliae</i> <i>Cardamine longii</i>	4
c. Other species with National level significance	3
d. Species with New England level significance	2
e. Species with state level significance	1

One half (0.5) points were deleted from the score for each species if a particular plant location of a species was based on historical records of botanists, and the location is only suspected and has not been verified in recent years by Critical Areas Program or other approved botanists. Thus, based on this scoring system, a river segment with a known location of *Oxytropis campestris* var. *johannensis* (National level significance), and suspected location of *Gentiana amarella* (New England level of significance) would be awarded a score of 5.5 points (4+ 1.5 points).

Based on this system of scoring, the following rivers were judged to be clearly outstanding on the basis of critical/rare vascular plant species, and identified with an asterisk on the Final List of Rivers;

St John River, between Hamlin and Hafford Brook

Arroostook River, between the Canadian Border and Pudding Rock

Information was also gathered on ecologic plant areas which have been recognized as having national significance by the Department of the Interior under the National Natural Landmarks Program. The following rivers with related National Natural Landmarks have been highlighted on the Final List of Rivers with an asterisk:

Dennys River – Meddybemps Heath, in the headwaters of Meddybemps Lake

Mattawamkeag River - Thousand Acre (Crystal) Bog, along Fish Stream & East Branch Molunkus Stream

Passadumkeag River – Passadumkeag Marsh, along Cold Stream

West Branch Pleasant River – The Hermitage Old Growth White Pine Stand

5. Information Sources and Expert Review

The following references were used by the study team to identify and document resource values.

Rare Vascular Plants in Maine, Critical Areas Program Report, June, 1981

A Preliminary Listing of Noteworthy Natural Features in Maine, Maine Critical Areas Program, June 1976

Mr. Harry Tyler and Ms. Susan Gawler of the Critical Areas Program within the State Planning Office provided information and review to the study team.

ZOOLOGIC CRITICAL / ECOLOGICAL RESOURCES

1. Definition

The reduction and deterioration in habitat of many species of river related wildlife is of major concern to the scientific community in the perpetuation and continued viability of these resources. When a type of habitat or significant ecologic area having certain necessary and indispensable qualities is destroyed or degraded, certain zoologic species suffer a reduction in abundance and may ultimately be threatened with extinction. For the purposes of this report, the following definition of critical or endangered zoologic species is offered.

a. Endangered – A species whose prospects of survival and reproduction are in immediate jeopardy. Its peril may be the result of a single cause or variety of causes, including the following:

1. Habitat: loss or change of habitat, high specialization of habitat, and restricted distribution.
2. Reproduction: small size of litters, long period of gestation, slow maturation of young
3. Behavior Patterns: poor adaptability to changing conditions.
4. Competition and predation
5. Over exploitation
6. Disease

b. Rare or Critical – A species, not presently threatened with extinction, but having such a small population or area of habitat throughout its range that it could face endangered conditions in the future if its environment worsens.

2. Significance

Critical zoological resources are of importance to the environment in the State of Maine by insuring the preservation of natural diversity in an ecosystem. The maintenance of a heterogeneous species pool allows a particular species to more readily adapt to changing environmental conditions. The preservation of critical and endangered species has a cultural significance as well, which comes from a deep-seated psychological and philosophic evaluation of the environment, including a refined reverence for life. This view holds that all plants and animals have value as intrinsic components of the living part of our planet and should not be destroyed through man's intentional or inadvertent activities upon the environment. In this view, species extinction brought about by man's activities is considered a cultural disaster.

3. Evaluation Method and Criteria

Due to the absence of a well developed data base a comprehensive assessment of river related wildlife and ecologic areas was not possible in the time allocated for this study. Where information was available on the statewide distribution and significance of certain species (such as bald eagles), then this data was incorporated into the study. Some wildlife resource experts did contribute information on regionally significant river related ecologic areas, which was noted in the documentation section of this report for the study's "A" and "B" rivers.

a. Federal Endangered Wildlife Species

The State of Maine has the only significant population of bald eagles in the northeast United States. The northern subspecies of bald eagles was officially listed as endangered in the state in February 1978. Coastal areas and river estuaries provide important habitat for the majority of Maine's wintering and breeding populations of eagles; Inland rivers, ponds, and lakes also have seasonal importance to nesting and summering eagles, although the use of these areas undergoes a marked decline during the winter months when ice cover limits their opportunities for foraging.

Wildlife biologists from the University of Maine at Orono have assessed river-related areas in the state for the presence of important habitat for bald eagles.

Important rivers are those with a significant concentration of birds for a particular region of the state, including:

- a. Areas with active nesting sites
- b. Areas with historic nesting sites
- c. Areas which are used by significant concentrations of wintering eagles

Based on these criteria, the following rivers have been rated as outstanding for the presence of very significant concentrations of nesting and/or wintering populations of bald eagles and have been identified with an asterisk on the matrix with the Final List of Rivers:

Lower Kennebec River: including Merrymeeting Bay

Main Stem Penobscot River: Bucksport to Old Town

Dennys River: Hinkley Point to headwaters of Meddybemps Lake

b. Critical Zoologic Species with Statewide Significance

The Critical Areas Program is involved in an ongoing process of assessment of critical zoological species in the state. At the present time heron rookeries, horseshoe crabs, and American oysters are the only river-related critical species that it has evaluated on a statewide basis. Significant habitat areas for these species (such as nesting areas and breeding grounds), have been listed on the Maine Register of Critical Areas.

When assessing the significance of a particular zoologic species, the Critical Areas Program uses the following criteria:

- 1) **Peripherality:** the degree to which a species is at the edge of its typical geographic breeding range.
- 2) **Endemicity:** the range of distribution to which species is restricted (i.e. Found only in Maine out of the entire Northeast, out of the entire U.S., out of North America, out of the entire world).
- 3) **Relative Scarcity:** the number of sites where a particular species is known to be found
- 4) **Probable Status Change:** a measure of a species trend in population and sites of location over a specified period of time.
- 5) **Relative Specialization of Habitat:** the environmental requirements of a particular species and its degree of specialization to certain habitats; including its vulnerability to loss of habitat.
- 6) **Scarcity of Habitat:** the relative scarcity of potential or actual suitable habitat of a species.
- 7) **Susceptibility to Disturbances:** the relative degree of tolerance of a species to immoderate human presence.
- 8) **Relative Knowledge:** the amount of information available on the distribution and scarcity of a particular species.
- 9) **Relative Use:** the general level of public interest in a species.
- 10) **Spatial Distribution:** a measure of the pattern of distribution of a species over its geographic range.
- 11) **Probable Site Persistence:** the relative probability of species presence at a certain location for a majority of years over a given span of time (usually 20-25 years).
- 12) **Seasonal Mobility:** the conditions of seasonal movements of a species
- 13) **Area Size Needs:** the area required by a species for all life needs (breeding sites, feeding grounds, territory) during its breeding season.

c. Critical Ecological Areas

The Maine Department of Inland Fisheries and Wildlife has identified and inventoried eight inland and six coastal types of wetlands located around the state. The Land Use Regulation Commission has also zoned fish and wildlife protection sub-districts for deer wintering yards and wetlands in the unorganized territories. Regional biologists associated with the Department of Inland Fisheries and Wildlife were able to document the more important ecologic areas for many of Maine's rivers. These areas included critical coastal salt marshes important for shorebirds and migratory and wintering waterfowl, significant acreages of inland wetlands and their associated fauna, and large deer wintering areas.

4. Information and Expert Review

The following references were used as sources of information for this study:

A Preliminary Listing of Noteworthy Natural Areas in Maine:

Center for Natural Areas; South Gardiner, Maine 1976

Register of Critical Areas,

Maine Critical Areas Program, Maine State Planning Office

An Ecological Characterization of Coastal Maine,

U.S. Department of the Interior, Fish & Wildlife Service; Newton Corner, Mass., 1980

Bald Eagle Management Plan, Ray Owen and Charlie Todd,

University of Maine at Orono, School of Forest Resources

Expert opinion and review was provided by Ray Owen and Charlie Todd from the University of Maine at Orono, resource biologists from the Maine Department of Inland Fisheries and Wildlife, and the U.S. Fish and Wildlife Service.

C. UNDEVELOPED RIVER AREAS

1. Definition

Any physical alteration of the land surface will influence the natural processes along the river corridor. Construction activities can cause increased soil erosion and runoff to enter a stream; septic tank effluent from seasonal homes along river banks can cause changes in water quality. Development in the river corridor may have a negative or positive impact on the resources of a river depending upon how it alters the essential elements which compromise it.

2. Significance

Undeveloped lands contiguous to the rivers of Maine represent some of the more significant natural resource areas in the State. The interface between the adjacent land and the flowing water of a river is an important area, providing food, cover, and habitat for a variety of fauna and flora. Wetlands associated with rivers have special importance in the hydrologic and biological systems, serving as areas for aquifer recharge, acting as catch basins for flood waters, filtering out pollution, producing oxygen by photosynthesis, and providing species habitat. Forests and ground cover lining the river banks cool the waters by providing shade, and prevent soil erosion. River corridors in the natural state often have high quality scenery for recreational users of the river. It is clear for all these reasons that undeveloped corridor lands warrant the conservation and protection of their special qualities.

3. Standards for Inclusion

Rivers and river segments in Maine which were evaluated for the amount of existing corridor development must have met the following qualifying criteria.

- a. The main stem of a segment must be greater than 10 miles in length (tributaries to the main segment could be less than 10 miles in length) .
- b. The river or river segment must be free from significant hydrologic impoundments, modifications, and diversions.

Once the river evaluations were conducted, a cutoff value of 30 development points per mile was used to define the more significant undeveloped rivers in Maine. An explanation of the development point system of evaluation follows in the next section.

4. Evaluation Method and Criteria

The National Park Service of the Department of the Interior developed a process for evaluating the undeveloped character of a river corridor in its work on the Nationwide Rivers Inventory. The method used for the Inventory was adapted for use in this study. The assessment of land use development in river corridor areas was made using the most recent USGS 7.5' or 15' quadrangle maps available. This information was supplemented in some cases with aerial photos and local road maps and atlases.

Each river and river segment was measured on the map and divided into one mile intervals beginning with the downstream segment boundary. The study river corridor (defined as contiguous lands within one quarter mile of each river bank) was also defined on the map.

Using data sheets, all land use development was recorded for each mile interval, and numerical values were assigned to the various land uses. Development having a greater impact on natural values, (i.e. bridge crossings, parallel railroads and power lines, and small towns) were given more points than lower impact development (i.e. footpaths and unpaved roads).

The following is a list of land use features typically found within river corridors and their corresponding development points.

<u>Land Use Development Features</u>	<u>Points</u>	<u>Land Use Development Features</u>	<u>Points</u>
Primitive road ending	1	Railroad parallel	20
Footbridge	2	Paved road parallel (red)	
Gaging station		Pipeline parallel	25
Primitive road parallel (trail)	3	Powerline parallel	
Small dock	4	Water storage tank	
Unpaved road ending (plain)		Bulkhead	
Orchards, farms, dwellings, cemetery	5	Rip rap	
Abandoned rail line ROW	6	Small Tributary reservoir	
Outfalls		Gravel pits	
Railroad ending	8	Developed recreation area	30
Powerline ending		Marina (site check)	
Fire tower		Country club	
Outbuildings, schools		Swimming pool	
Unpaved road		Radio tower	35
Light duty bridge (plain)		Power substation	
Paved road ending (red)	10	Pumping station	
Paved boat ramp		Paved road bridge (4 lanes)	40
Campground		Sewage plant	
Picnic area		Apartment building	
Unpaved road parallel (plain)		Hospital (site check)	
Pipeline and powerline crossing	15	Village (up to 499 pop / site check)	
Railroad bridge	18	Dam (small)	
Paved road bridge (red)			

After the land use development features for the river segment were identified, the numerical scores for each one mile interval were tabulated. By totaling all interval scores, and dividing through by the number of intervals (river miles), an average mile by mile index of the river's corridor development was calculated.

Outstanding River Segments

Examination of previous National Park Service work for the Nationwide Rivers Inventory has shown that rivers with an average of less than 15 point per mile are equivalent to the least developed rivers in the northeast United States. Outstanding undeveloped rivers in the State with a corridor development index of 15 points or less and a length greater than 25 miles were identified with an asterisk on the matrix accompanying the Final List of Rivers; and are as follows:

- Allagash River Aroostook - Machias System
- East Machias River
- Machias River (Washington County)
- East Branch Penobscot – Seboeis River System
- Upper West Branch Penobscot River
- Pleasant River (Washington County)
- St Croix River
- St Francis River
- St John River (including the Big Black, Little Black, and Baker Branch)

5. Information Sources and Expert Review

The following references were used as sources of information for this study:

Wild and Scenic Rivers System Study – Northeast Region, US Department of the Interior, Heritage Conservation and Recreation Service, Northeast Region, Philadelphia, Pennsylvania.

Wild and Scenic Rivers System Study – Northeast Region, Guidelines for Evaluating Wild, Scenic and Recreational Rivers.

Nationwide Rivers Inventory, Criteria for River Evaluation; US Department of the Interior, Heritage Conservation and Recreation Service, Northeast Regional Office, J. Glenn Eugster, October, 1979

Nationwide Rivers Inventory – Final List of Rivers, State of Maine, US Department of the Interior, Heritage Conservation and Recreation Service, Northeast Regional Office, January 1981

Nationwide Rivers Inventory, Criteria for Establishing River Priorities; US Department of the Interior, Heritage Conservation and Recreation Service, Northeast Regional Office, J. Glenn Eugster, April, 1980

J. Glenn Eugster from the National Park Service in Philadelphia provided information and expert review for this portion of the study.

D. SCENIC RIVER RESOURCES

1. Definition

Different river areas in Maine possess different types of scenery. Traditionally, scenic river resources have been identified by user preference studies and professional evaluations. To determine user preferences, groups of people are usually shown a series of river area photos, and asked to rate them according to preference or quality. Results are then analyzed to determine which river and landscape corridor elements or mix of elements correlate highly with preferred areas.

In professional evaluations, river areas are analyzed by trained planners according to a set of fixed criteria using either design principles, ecological and cultural criteria, or a quantitative scale.

In both instances the objective is to focus on specific variable river and river corridor characteristics which have been determined to be major influences on perceived scenic or landscape quality.

2. Significance

For many years there has been a growing recognition of the concept that certain landscape elements such as scenery are unique resources worth identifying and protecting. In fact, there are many federal and state laws and regulations which address the growing need for management of visual resources. Until the 1960's the area of public environmental management and policy related to scenic resources developed mostly in the context of outdoor recreation. The focus was predominantly on the management and preservation of specific areas with unique or outstanding scenic attributes. Concern with scenic values in the context of a larger landscape area or the relationship of scenic values to a wider range of resource issues are a side effect of environmental legislation within the last 15 years. For example, at the federal level, scenic and aesthetic considerations were addressed in the National Environmental Policy Act of 1969, the Coastal Zone Management Act of 1972, and the Wild and Scenic Rivers Act of 1968. The State of Maine followed the approach of these laws when it formulated the Mandatory Shoreland Zoning Act and Site Location of Development Act.

Scenic values and qualities have been recognized for years in the real estate field, which has assigned higher market values based on public demand to certain scenic features, such as properties with mountain views, or locations on river or lake waterfront areas. The Maine tourism industry also recognizes the scenic qualities of the State's river environment in many of its programs.

3. Minimum Standards for Inclusion

Initially rivers, river segments and other landscape areas were identified using recognized sources of scenic or visual information such as the Nationwide Rivers Inventory, various Critical Areas Program reports, canoe guides, travel information and other documents. To be placed on the Preliminary Draft List of Rivers Under Evaluation, rivers had to be recognized or documented as being scenic or possessing a high degree of visual quality due to a specific feature, characteristic or element. All sources of information, whether subjective or objective, were treated equally.

4. Evaluation Method and Criteria

The two basic components of the scenic river resource assessment are land form and pattern. The quality of any scenic river experience is dependent on the synthesis of land pattern into the overall land topography.

Land forms are the natural forms of the surface of the earth, the mountains, rolling hills and valleys which form the overall context of a natural landscape. The study of land forms constitutes an important part of a scenic river resource assessment, through the visual impact of dominant landscape forms, as well as affecting the patterns and distribution of other components of scenic river areas.

Land use pattern is the interlocking texture of fabric of the landscape including man and the by-products of his technology and culture. Patterns of land uses are a function of combinations of the parts of the natural and built environment and their overall composition. The composition of these parts is an important determinant of the visual quality of a landscape. For example, a small New England river hamlet against a steeply forested mountain range, or a sandy floodplain area next to a large rock outcrop are examples of contrasting combinations of texture which create patterns that are visually interesting. The nature of our perceptions depends upon the combination of natural and built pattern within the existing landform. The scenic quality of the river environment will depend on the quality of both the natural pattern and built pattern, and on the extent to which the two patterns are meshed or harmonized with one another.

The perceived scenic quality of a river and its corridor will also be a function of the frequency and diversity of the various natural and man-made components which combine to form a landscape (such as geomorphic and hydrologic features, vegetation, and cultural values), as well as the interrelationships among these components. Scenic resource values can be defined based on general relationships among components of a landscape. These relationships, which become the basic principles upon which assessment of river-related scenic resources is based, include the following:

- As the relief increases, the scenic quality of the river corridor increases
- As the landscape becomes more rugged, the scenic quality of the river corridor increases
- As the amount of enclosure by vegetation increases, the scenic quality of the river corridor increases
- As the diversity of land uses increases, the scenic quality of the river corridor increases
- As the naturalness of a landscape increases, the scenic quality of the river corridor increases.

- As the amount of tree cover increases, the scenic quality of the river corridor increases.
- As the density of land use edges increases, the scenic quality of the river corridor increases.
- As the diversity of land use edges increases, the scenic quality of the river corridor increases.
- As the compatibility of land use increases, the scenic quality of the river corridor increases.
- As the water surface and water edge increases, the scenic quality of the river corridor increases.
- As the size and length of the view increases, the scenic quality of the river corridor increases.

In general, spatial variety and three-dimensional contrast are positive values within a given river corridor's landscape composition. The greater the contrast and variety in spatial landforms and patterns, the higher the perceived scenic value. Spatial variety is judged on the shape of spaces, the degree of enclosure by landform or vegetation, and the diversity of shape, pattern, and enclosure which exist in a landscape.

Once relationships among compatible parts of a landscape have been defined, it is possible to proceed with the analysis by identifying the presence of specific landscape components or combinations of components which have scenic value. The following are river and landscape features and components which were identified in this analysis:

1) Landscape Physiography

This qualitative evaluation of physiographic relief will give an index of three dimensional contrast in a river-related landscape. The topography surrounding a river corridor is classified into one of the seven categories of form, representing a continuum of physiography from flatland to mountains. The underlying assumption is the greater the amount of relief in a river corridor, the greater the scenic quality.

2) Landscape Diversity

The amount of spatial variety is another measure of scenic value in a landscape. The scenic value of a river corridor will be enhanced when there is a diversity of hydrologic, geomorphic, and vegetative elements present. A general rule is the greater the diversity of landscape elements (land, water, vegetation) the higher the scenic quality.

a) Hydrologic features inventoried included channel shape, the presence of waterfalls, cascades, and whitewater rapids, tributary confluences, ponds and lakes, river islands, and complexity of water edges. The presence of hydrologic features (such as waterfalls and rapids) that have universal public appeal will enhance the scenic qualities of a river corridor. Scenic quality will also increase as the complexity of hydrologic elements increases. The greater the sinuosity of a river channel, the greater the visual carrying capacity of recreational users at the river's surface. In a similar manner, the more irregular or complex a river's shoreline or corridor (from the presence of river island complexes or tributary confluences for example), the higher its visual quality.

b) Vegetative features inventoried on the rivers included the percentage of tree cover, diversity of vegetative types, presence of forest edges, and forest wetland contacts. The underlying assumption was that scenic quality increases with the increased amount of tree cover, density of forest edges, and diversity of vegetation.

c) Outstanding geomorphic landforms and landscape features were identified for each of the three physiographic sections in Maine (Seaboard Lowland, New England Upland, and White Mountains) and then inventoried for each of the evaluated rivers. These representative and unique scenic features, by physiographic section, included:

- Seaboard Lowland

Landforms: undulating topography, worm clam flats, tidal marshes, beaches, and dunes

- New England Upland

Landforms: rolling topography, bold dome-like hills, soft round hilltops, steep side slopes and V-shaped gullies.

Drainage: curved dendritic, right-angle tributaries, glacial ponds and swamps, oxbow lakes

Landscape Features: eskers, kames, moraines, monadnocks, glacial erratics fields

- White Mountains

Landforms: V-shaped valleys, conical peaks in rows, eroded cliff and bench topography.

Drainage: radial, dendritic, deranged,

Landscape Features: ravines, escarpments, monadnocks, eskers, drumlins, kames, lake deltas, other glacial features.

In addition to inventorying these specific features which are thought to increase a river corridor's scenic quality, other geomorphic elements were identified which by their complexity of form or shape, add to river scenery. These elements of form are defined as relief enclosure.

- **Relative Relief:** the scenic quality of the river corridor will increase with greater relative relief. To calculate, elevation points were selected at quarter-mile intervals on a topographic map for a river area, and the lowest elevation point was subtracted from the average high elevation.

- **Enclosure:** as the amount of enclosure increases, scenic quality increases. Enclosures were measured by calculating the percentage of area enclosed by (lying below) the median of relative relief.

3) Land Use Diversity and Compatibility

Land use diversity relates to the number of different land use types, their areas, and the length of their edges. Compatibility of land use is a measure of the visual congruence (the visual fit) of adjacent land uses. Land use includes visually distinctive types of surface cover such as agricultural fields or forest, which may support more than one use.

b. Evaluation Methodology

The National Park Service of the Department of the Interior developed this process of scenic assessment outlined in the previous section for its work on the Nationwide Rivers Inventory. Evaluation of scenic river landscapes was conducted for the Inventory using the most recent USGS 7.5' of 15' quadrangle maps available, supplemented by field work, videotapes and slides from low-altitude helicopter flights over many of these rivers. Substantial use was made of this existing data base which was modified and expanded where appropriate for the Maine Rivers Study.

For this study's scenic river assessment, each river or river segment was measured on a topographic map and divided into one mile intervals beginning with the downstream segment boundary.

Using data sheets, all significant scenic landscape components were recorded for each mile interval. Greater value was assigned to segments with an outstanding diversity of components, or those riverscapes with a highly compatible combination of vegetative, hydrologic, geomorphic, and cultural values.

5. Information Sources and Experts

The following references were used as sources of information for this study;

Nationwide Rivers Inventory – Criteria for River Evaluations: US Department of the Interior, Heritage Conservation and Recreation Service, Northeast Regional Office, Philadelphia, Pa. 1979

Study of Visual and Cultural Environment for North Atlantic Region: Research Planning and Design Associates, Amherst, MA, published as Appendix N, North Atlantic Water Resources Study, November 1970

Guidelines for Identifying and Evaluating Scenic Resources; Hudson River Basin; Water and Related Land Resources Study, Technical Paper 4, October 1978

A Preliminary Listing of Noteworthy Natural Features in Maine: Center for Natural Areas, South Gardiner, Maine, June 1976

J. Glenn Eugster from the Mid-Atlantic Regional Office of the National Park Service provided information and review for this section of the study.

E. HISTORICAL RIVER RESOURCES

1. Definition

The rivers of Maine have long served a vital role in the colonization, development, and industrial growth of the state. This part of the Maine Rivers Study focused on the identification of river related historic places and sites which have achieved recognition as national Historic Landmarks or are listed on the National Register of Historic Places. It is realized that many of the rivers of Maine have historical and cultural value other than these recognized on the national level, such as the historic use for logging runs, the presence of archaeological sites, building with state or local importance, or settlements which represent unique cultural values. However, a lack of expertise and state agency assistance did not permit a more comprehensive survey by the study team. Thus, this discussion will focus on National Historic Landmark and National Register sites associated with rivers in the state.

2. Significance

River-related national historic landmarks and places in Maine are visible reminders of the events, places, and objects which have affected broad patterns of American history and reflect the evolution of industry and culture in this state and the US. They contain prehistoric and historic villages of the American Indian and early colonists, fortifications for the protection of access to waterways, sites of industry and resource extraction activities, and bridges with unique architectural styles. All historic areas designated as National Historic Landmarks are of national significance; other properties which are nominated by the State of Maine and placed on the National Register of Historic Landmarks after approval by the Secretary of the Interior are of national, state, or local significance. In recent years, building districts which possess a composite quality and evoke a special feeling and association have been added to the National Register. Such districts may contain individual buildings which of themselves may not be outstandingly significant but which, as an assemblage representing a special character of an urban or rural waterfront or port, possess national, state, or local significance.

3. Standards for Inclusion

There are many National Historic Sites which are found along rivers in Maine. However, only those sites which have a direct connection to the river, in terms of industrial, economic, or cultural importance (such as former significant winter ports or fortifications at the mouths of rivers for the defense of upstream settlements) were noted as significant by this study.

4. Evaluation Methods and Criteria

To attain the designation of National Historic Landmark, a property must be studied by National Park Service historians, architects, or archaeologists, usually as a part of a major theme in American history such as Social and Humanitarian Movements or Agriculture. The property should meet three general criteria:

- 1) significance in a given field
- 2) association with individuals and events
- 3) integrity, the latter meaning that original and intangible elements which contribute to national significance must remain intact

Potential landmarks are brought semi-annually before two advisory boards of scholars and national leaders – the Consulting Committee for the National Survey of Historic Sites and Buildings, and the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments. These boards review the presentations of National Park Service professionals. Those properties which meet the approval of the Secretary's Advisory Board are recommended for landmark status. The actual designation is effected when the Secretary of the Interior, acting upon the counsel of his Advisory Board, approves landmark designation. The National Historic Landmarks Program is the only honorary historic preservation program of its kind in the Nation.

Because of their recognized national significance, National Historic Landmarks associated with particular rivers in Maine have been noted on the matrix accompanying the Final List of Rivers with an asterisk, to highlight their outstanding historic value.

A variety of criteria have been defined to guide the State, Federal agencies, and the Secretary of the Interior in evaluating potential entries in Maine for addition to the National Register of Historic Places, and include the following:

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- a. That are associated with events that have made a significant contribution to the broad patterns of the state's history; or
- b. That are associated with the lives of persons significant in the state's past; or
- c. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. That have yielded, or may be likely to yield, information important in prehistory or history.

Before submission to the National Register, all nominations must be approved by a State review board whose membership includes professionals in the fields of architecture (or architectural history), history, and archeology. If the property meets the National Register criteria, the board recommends it for nomination. The nomination form is then signed by the State Historic Preservation Officer and forwarded to the National Register, which reviews the potential entry and decides whether to accept or reject it.

5. Information Sources and Expert Review

The following references were used by the study team to identify and document resource values:

National Register of Historic Places, US Department of the Interior, Heritage Conservation and Recreation Service, Washington, DC, 1976

Annual Listing of Historic Properties, National Register of Historic Places; US Department of the Interior, Heritage Conservation and Recreation Service, Federal Register; Tuesday, February 6, 1979

_____ ; Federal Register, Tuesday, March 18, 1980

_____ ; Federal Register, Tuesday, February 3, 1981

The State Historic Preservation Office was requested to participate in the identification, documentation, and review of significant historic and cultural rivers but declined.

Unique Recreational Rivers – Overview

Both the economically important tourist industry and the life style of Maine residents rely heavily on the recreation use of the state's natural resources. Rivers are important components of this recreational use, providing diverse recreational experiences to a variety of interests. Recreational activities associated with rivers include camping, picnicking, fishing, boating, hiking, sightseeing, swimming, hunting, skating, and sailing.

While each of these activities is important to varying degrees, the Maine River Study has restricted its recreational analysis to activities which are:

- 1) directly dependent on free-flowing river resources
- 2) highly popular throughout the state, and
- 3) engaged in by large and readily identifiable user groups.

The recreational categories chosen for analysis include recreational boating (canoe touring, white water boating, and extended back country boating), inland fishing, and anadromous fishing.

For each recreational category, rivers were evaluated according to resource significance, economic importance, and user priority. This evaluation process recognized that user preference ultimately plays a dominate role in the determination of a river's value as a recreational resource. Input from concerned user groups was therefore sought throughout the process, with a strong attempt made to arrive at a consensus of opinion among users regarding the recreational significance of specific rivers.

This user input, coupled with objective analysis by resource experts, resulted in the category findings detailed in this report. The specific method used for each recreational category follows.

A. ANADROMOUS FISHERIES

a. Definition

Fresh water and tidal rivers which empty into the ocean or salt water estuaries provide vital habitat for anadromous fish. An anadromous fish species is characterized by its migratory nature, spending much of the life cycle in salt water but returning to fresh water to spawn. Catadromous fish species (e.g. the American eel) reverse this pattern by migrating to the ocean to spawn. For the purpose of this study, catadromous fish are considered to be included in the anadromous category.

The Maine River Study has identified important anadromous fishery rivers and isolated those that are of highest value to the state and its residents.

b. Significance

Historically, anadromous fish were of high importance to Maine's commercial fishing industry and were a dependable food source for coastal river inhabitants. While extensive commercial fishing depleted this resource, it was the increase in industrial pollution and the construction of impassable dams which most seriously depleted anadromous fish populations. The creation of the Atlantic Sea Run Salmon Commission in 1947, as well as the state Department of Marine Resources' strong commitment to anadromous fish restoration beginning in the mid-1960's, provide evidence that Maine recognizes the tremendous ecological and recreational significance as well as the commercial value of the state's anadromous fish.

a. Ecological Importance – Many of Maine's coastal rivers are characterized by their exceptional potential to support anadromous fish, both in numbers and species diversity. Of special note are the rivers which provide habitat for the more sensitive species. The shortnosed sturgeon found in a limited number of rivers is listed as an endangered species by the federal government. The American shad and Atlantic sea run salmon have also had their numbers severely reduced and depend on Maine rivers for their survival.

Maine's six rivers with fishable self-sustaining Atlantic salmon runs are unique, as no other state can claim even one. At least three additional rivers in the state are recognized as having high potential for restoration of historic Atlantic salmon fisheries.

b. Recreational Importance – The Atlantic sea run salmon fishery is recognized as a statewide high priority resource of value to Maine's recreational fishing interests as well as to the state's tourist industry. The Penobscot River is the most heavily fished Atlantic salmon river in the country; the value of this one river to the tourist industry is estimated to be a half million dollars per year. The American shad and rainbow smelt also are potentially of high recreational importance. Smelt are currently popular as a winter fishing resource. Overall, more user-days are expended fishing smelt than any other of the state's anadromous fish species.

c. Commercial Importance – Salmon, smelt, shad, and alewife were historically of high value to the commercial fishing industry. While the depletion of salmon, shad, and smelt have lessened their commercial importance, the alewife, which is an essential lobster and trawling bait, continues to be an important commercial fishery. According to the Maine Department of Marine Resources, landing of alewife doubled between 1970 and 1977, with total catch tripling during this time. With successful restoration, shad and smelt could also contribute significantly to Maine's commercial fishery industry.

Restoration efforts by the State Department of Marine Resources and the Salmon commission, assisted by federal funding, are beginning to produce results. Restoration, coupled with improvements in water quality and proper planning for future impoundments, will ensure that the ecological, recreation, and commercial potential of Maine's rivers as anadromous fish resources will be realized.

3. Standards for Inclusion

Rivers were included in the Preliminary Draft List of Rivers Under Evaluation if they met the following standards:

- a. The river must be a viable anadromous fishery resource. It therefore must either currently support a substantial anadromous fish population or have realistic potential for restoration as evidenced by:
 - a) current restoration efforts, or
 - b) management plans which call for timely restoration.

b. The river must drain a minimum of 25 square miles before discharging into tidal waters. (Thirty of Maine's sixty coastal rivers meet both of these standards).

4. Evaluation Method and Criteria

The criteria used to evaluate anadromous fishery river significance include:

- a. Habitat quality and quantity
- b. Presence of threatened, endangered, or sensitive species
- c. Species diversity
- d. Recreational importance
- e. Commercial importance
- f. Evidenced restoration efforts
- g. Unique characteristics (i.e. self-sustaining Atlantic sea run salmon runs)

Note: The migratory nature of the resource makes specific anadromous fish segment identification difficult. Both the major thoroughfares and the spawning areas are essential to species survival. Therefore, when labeling segments for rivers in the anadromous category, the entire length of the river migration cycle was identified.

Rivers meeting the minimum standards were evaluated with the assistance of the Maine Department of Marine Resources' anadromous fish experts. The Preliminary Draft List was reviewed by private fishing interests and Atlantic Sea Run Salmon Commission staff. Because of the unique value of the Atlantic salmon, all rivers which support self-sustaining salmon runs were given high priority. All of these salmon rivers are, however, of importance to other species and to the state's overall anadromous fish program.

The rivers in Maine which were judged to be of highest significance include the following. Each river is identified by an asterisk in the Final List of Rivers section of this report.

Damariscotta River: high commercial alewife importance

Dennys River: self-sustaining Atlantic salmon run

East Machias River: self-sustaining Atlantic salmon run

Kennebec River: high habitat quality and quantity, species diversity and abundance, presence of endangered species, high recreational importance.

Machias River: (Washington County): the state's largest self-sustaining Atlantic salmon run, recreational importance

Narraguagus River: self-sustaining Atlantic salmon run

Penobscot River: high recreational importance, high restoration expenditure, habitat quality and quantity

Pleasant River (Washington County): self-sustaining Atlantic salmon run

Sheepscoot River: self-sustaining Atlantic salmon run, endangered species

St George River: high commercial alewife importance

5. Information Sources and Expert Review

Information and expert opinion was provided to the study team by the following agencies and organizations.

Maine Department of Marine Resources

(fisheries biologists' input and review, species management plans)

Maine Department of Inland Fisheries and Wildlife

(Atlantic Sea Run Salmon Commission staff biologist review, miscellaneous publications)

Trout Unlimited

Maine Sportsman Magazine

B. RIVER-RELATED INLAND FISHERIES

1. Definition

Inland fish include all fish species which inhabit a fresh waters environment throughout their life cycle, in contrast to the migratory anadromous fish which require both fresh and salt water habitats. Included in the general category of inland fisheries are both cold water and warm water species. This analysis is restricted to river fisheries and does not consider lake fisheries. However, rivers which derive their major importance from their support of lake fisheries are given recognition.

While factors such as ecological importance (i.e., critical habitat) are given strong consideration, the focus of the study is the identification of inland fishery rivers and streams which are judged to be of high recreational importance.

2. Significance

The State of Maine has approximately 32,000 miles of flowing water, all of which support sport fisheries. Major cold water species include the native brook trout (the most abundant and certainly one of the most important cold water species), and native landlocked salmon (a highly prized fish found in a limited number of rivers), and the introduced brown trout (an adaptable species capable of providing a sport fishing resource where other cold water species will not thrive). Rivers which provide principal habitat for cold water species total 23,000 linear miles with an average of 153 legal sized fish per mile. Landlocked salmon are found in 64 rivers covering 635 miles. Nearly 200 miles of Maine's rivers provide exceptionally high quality habitat for this species.

Major stream-related warm water species include the native white perch and the introduced smallmouth and largemouth bass. All have self-sustaining populations. Warm water species predominate in 6400 miles of Maine's rivers and streams.

Sport fishing for inland species has witnessed a large increase in popularity over the past few years among Maine's residents, and approximately 190,000 resident fishing licenses are sold annually. When non-resident licenses and youth (who are not required to obtain a license) are taken into account, the Department of Inland Fisheries and Wildlife projects that 385,000 people fish Maine waters. Studies using creel census expansion techniques estimate 460,000 angler-days are spent annually on Maine's rivers and streams, accounting for one-third of the total inland fishing use. Cold water fish harvest in rivers and streams totals 532,000 fish annually, and the Department of Inland Fisheries and Wildlife estimates that there is potential for doubling both the use and take figures. The Department currently stocks 316,000 cold water fish annually in 105 streams totaling 826 linear miles.

Inland fisheries have economic as well as recreational value. Seventy to eighty thousand out-of-staters annually purchase fishing licenses and a number of in-state fishing guides and outfitter businesses depend on Maine inland fisheries. The overall dollar value of inland river and stream fishing has not been established, but it is definitely an important component of Maine's natural resource-related tourist industry.

3. Standards for Inclusion

Preliminary inland fish resource data was obtained with the assistance of the Maine Department of Inland Fisheries and Wildlife. Using a questionnaire accompanied by guidelines for evaluation, fisheries biologists in each of Maine's seven wildlife management regions were asked to identify approximately ten river and/or stream segments which they determined to be of high importance to that region's recreational fisheries program. A total of 81 river segments totaling 1487 miles was identified through this process. These results were reviewed by state level fisheries biologists from the Department of Inland Fisheries and Wildlife, and four additional segments were added due to their statewide significance. These 85 rivers and river segments comprise the Preliminary Draft List of Rivers Under Evaluation.

The list of rivers developed should not be construed to represent all rivers of significance for inland fisheries in each region. A limitation was placed on the number to be listed per region, and the emphasis was on importance for recreational fisheries. It should be clearly stated that all other rivers, brooks, and streams not on the list have at least some significance to the overall inland fisheries resources of Maine. Also, recreational demands upon these resources can be expected to change over time, with consequent shifts in significance for recreational fisheries uses and relative importance.

4. Evaluation Method and Criteria

The Department of Inland Fisheries and Wildlife's regional biologists evaluated the rivers which they selected according to the following criteria:

- a. **Species Composition** – The existence of fish species of major importance by virtue of being:
 - 1) rare in the region
 - 2) highly preferred by anglers
 - 3) of major ecological importance
- b. **Water Quality** – The extent to which overall water quality is capable of sustaining preferred fish resources.
- c. **Aquatic Habitat Quality** – The existence of natural features favorable to fish production and sustenance of preferred fish species (adequate flow, cover, etc)
- d. **Fishing Quality** – An evaluation of recreational fishing results (success rate, size of take, desirability of species taken, etc.)
- e. **Quality of Recreational Use** – The ability of a river segment to provide a satisfying recreational fishing experience (scenery, solitude, challenge, variety, etc)
- f. **Existing Recreation Use** – The popularity of a river segment as a recreational fishery resource.
- g. **Economic Importance** – The importance of recreational fishing on the river segment to the regional economy (use of local guides, retail sales, etc)

Using comparative analysis, rivers which were preliminary judged to be of highest statewide significance were identified. The regional lists were then distributed to Maine fishing interests for review and comment. Each of Maine's local Trout Unlimited chapters evaluated rivers on the Preliminary Draft List according to the criteria of fishing quality, recreational quality, and current use. Again using comparative analysis, rivers were ranked by region and the highest priority rivers were noted. Trout Unlimited's Maine Council combined local chapter findings and produced a comprehensive list of that organization's statewide fishery priorities.

The study's final determination of the state's outstanding inland fishing rivers incorporated the Department of Inland Fisheries and Wildlife's preliminary findings, Trout Unlimited's review and evaluation, and comments from other recognized resource experts and interested individuals who reviewed the study's Preliminary Draft List.

Rivers which were identified as being the States' most significant recreational inland fishery rivers follow. Each is identified with an asterisk in the Final List of Rivers section of this report.

Crooked River
Fish River Lake Thoroughfares
Grand Lake Stream
Kennebago River
Penobscot River, Upper West Branch
Penobscot River, West Branch (Ripogenus Gorge Section)
Penobscot River, East Branch

Other highly significant recreational fisheries include the:

Moose River
Narraguagus River
Rapid River
Roach River
Saco River
St John River
Sheepscot River
Nahmakanta Stream
Presque Isle Stream
Wassataquoik Stream

Trout Unlimited efforts and expenditures on the Little Ossipee River and the Pleasant River (Cumberland County), and the Maine Department of Inland Fisheries and Wildlife's stocking and management efforts on a number of additional rivers throughout the state attest to these rivers' significance. Those rivers identified by this study as being of high importance are, however, the result of a consensus of expert and public opinion and are representative of high quality resources of a type not found in this abundance in other states in the eastern United States.

5. Information Sources and Expert Review

Information and expert opinion were provided to the study team by the following agencies and organizations:

Maine Department of Inland Fisheries and Wildlife (state fisheries biologists, regional fisheries biologists, species management plans)

Trout Unlimited (local chapters and Maine Council)

Maine Sportsmen Magazine

Sportsman's Alliance of Maine

Regional and state biologists from the Maine Department of Inland Fisheries and Wildlife performed the preliminary identification and assessment of inland fisheries, and provided comment and review throughout the study. Species management plans were the source of information on habitat and significance of particular species. The Maine Council and local chapters of Trout Unlimited, as well as Maine Sportsmen Magazine and Sportsman's Alliance of Maine provided review and comment on the study.

C. RIVER-RELATED RECREATIONAL BOATING

1. Definition

The present study focuses on river-related recreational boating which is dependant on flowing waters and the use of a "waterway trail". Consequently, river resources were identified which were of importance mainly to recreational activities using open and closed canoes, kayaks, and inflatable rafts. In order to represent a broad range of recreational boating interests, the general recreational boating category has been subdivided into three more specific categories, which identify distinct recreational boating activities and river users. These three categories are as follows:

- a. **Canoe Touring** – Rivers and river segments which are navigable in an open canoe by novice to intermediate paddlers and which contain predominantly flat water, quickwater, and Class I rapids.
- b. **Whitewater Boating** – Rivers and river segments which are navigable in canoes, kayaks, or rafts by intermediate to expert boaters and which contain a significant number of Class II to Class V rapids.
- c. **Backcountry Excursion Rivers** – Rivers located in natural environments which are of adequate length to provide an extended river camping experience. These rivers may contain any combination of white water and/or canoe tour boating.

2. Significance

Maine's natural amenities have long been the source of recreational opportunities for the people of the state as well as the principal generator of tourist industry revenue. While historically the coast has been the focus of tourist recreation attention, the 1970's saw a strong diversification in recreation use patterns, with river use in particular increasing at an unparalleled rate. Though comprehensive user statistics do not exist for most state rivers, those that do exist verify this marked increase in river recreation popularity. The Allagash Wilderness Waterway witnessed a 60% increase in use between 1966 and 1980, while use on the St John has more than doubled since 1975. Use on the Saco River increased 300% between 1971 and 1976, and recent analysis suggests that recreational boater use on the Saco has since increased by 25% annually. The most significant change in boating use has occurred in commercial rafting. In 1976 approximately 600 commercial passengers rafted the Kennebec Gorge and the West Branch's Ripogenus Gorge. In 1981 this figure approached 14,000, a 200-fold increase.

Even without future growth, commercial rafting will annually add approximately \$2,000,000 to Maine's tourist industry revenues. River recreation popularity has also made canoe outfitting a viable component of the tourist industry with significant use on the Allagash, St John, Penobscot, and coastal rivers in eastern Maine.

Maine's recreational river resources are extensive. For example, the Appalachian Mountain Club's canoe guide identifies 4,474 miles of boatable rivers and streams within the state. The Maine Rivers Study has determined that 1,750 of these miles represent significant boating areas of high resource quality and high use priority. 650 of these miles are predominantly associated with white water boating, 500 with flat water canoe touring, and 600 with back country excursion boating.

Included in these 1,750 miles of river are a number of river segments which possess unique features. Maine can boast New England's only two stretches of Class V white water as well as the region's longest stretch of continuous canoeable white water. It can also boast the Northeast's premier back country canoe trips and one of three federally designated wild and scenic rivers.

These river resources, combined with a number of lesser known rivers with significant recreation potential, provide the State of Maine with a recreational resource of extremely high value. Though 98% of the state's river corridors are privately owned, the prevalent multiple use concept at work in the state ensures that these resources will remain accessible to boating enthusiasts.

3. Standards for Inclusion

To be included in the Preliminary Draft List of Rivers Under Evaluation, a river had to:

- a. Be listed as a prominent river trip in one or more of the recognized river guide books
- b. Be recommended by one of the state's recognized statewide recreational boating interests or organizations, or
- c. Show evidence of use by commercial outfitters

4. Evaluation Method and Criteria

A list of rivers meeting the minimum standards for inclusion in the recreational boating category was distributed to representatives of recreational boating interest groups, commercial outfitters, and other knowledgeable sources. Experts were asked to review the list and to evaluate each river segment's statewide significance in relation to others on the list. They were then asked to group rivers in priority categories from high to low. The following criteria were offered as guidelines in making these determinations.

General criteria with relevance to all the boating categories included:

1. Existing use
2. Access
3. Navigability
4. Length of season and flow regularity
5. Scenery and aesthetic experience
6. Economic importance

Specific criteria for each of the recreational boating categories included:

- Canoe Touring – safety, use by organizations
- Whitewater Boating – presence of significant rapids
- Backcountry Excursion – length of trip, lack of corridor development, availability of camp sites

Concurrent with this expert review process, study team members assembled available river use statistics, identified commercially significant rivers, and researched each river segment in an attempt to identify unique recreational features. Individual expert evaluations were then combined, and a list which represented a consensus of opinion was developed. This list was cross checked with the study team's independent evaluation, and the final list of outstanding recreational rivers was produced.

The following rivers were identified as outstanding (the state's most significant) in each category, and identified with an asterisk on the Final List of Rivers.

Backcountry Excursion:

Allagash River
Machias River (Washington County)
East Branch Penobscot River
Upper West Branch Penobscot River
St Croix River
St John River

Whitewater Boating

Carrabassett River
Dead River
East Branch Penobscot River
Upper Kennebec River
Machias River (Washington County)
West Branch Penobscot River
Rapid River
Seboeis River
Wassataquoik River

Canoe Touring

Moose River
Saco River

Many other canoe touring rivers have importance to regional recreational boaters, including the following rivers:

Royal River
St George River
Kennebec River
Aroostook River
Upper Androscoggin River

5. Information Sources and Expert Review

Information and expert opinion was provided to the study team by the following agencies and organizations.

Appalachian Mountain Club, Maine Chapter
High Adventure BSA
Maine Audubon Society
Maine Professional Guide's Association
Maine State Planning Office
Natural Resource Council of Maine River Committee
Penobscot Paddle and Chowder Society
White Water Outfitters Association of Maine

The following references were used by the study team to identify and document resource values.

AMC River Guide, Appalachian Mountain Club, Volumes 1 and 2, Boston: AMC, 1980

New England White Water River Guide, Gabler, Ray, New Canaan, Conn: Tobey Publishing Co., Inc., 1975

Canoe Trails Directory, Makens, James C., New York: Doubleday and Company, Inc., 1979

Maine Rivers, Thorndike, Maine: The Thorndike Press.

Maine's Whitewater Rapids, McMahon, Janet, Augusta, Maine: Maine State Planning Office, 1981

Pole, Paddle, and Portage, Riviere, William A., Boston: Little, Brown, and Company, 1969

Canoeing Maine (#1 and #2), Thomas, Eben, Thorndike, Maine: The Thorndike Press, 1979

Canoeing Racing: Hot Blood and Wet Paddles, Thomas, Eben, Hallowell, Maine: Hallowell Printing Company, 1974.

The Maine Atlas and Gazetteer, Yarmouth, Maine: Delorme Publishing Company, 1981.

V. Final List of Rivers

The following is the list of all rivers and streams in the state of Maine which have been determined through the study process to have significant and/or unique natural and recreational resource values. This list represents the product of the river evaluation, documentation, and expert and public review process and are judged to possess resource values of regional, statewide, and greater than statewide significance.

The list defines for each river the segment of the river with one or more resource values. The matrix accompanying the list identifies the total number of resource values associated with each river segment. Resource values which are the state's most outstanding in a particular resource category or greater than statewide significance are highlighted on the matrix with an asterisk.

The following guidelines were used to define the limits to the segment of river containing a significant resource value. The river segment for each specific resource value for a particular river is defined in the appendices following this report. River segments were defined by the following criteria:

1. Segments were described using readily identifiable physical locations.
2. Distinct river segments were identified for each natural and recreation value by determining the length of river required to preserve a given natural value or to support a given recreational activity.
3. Segments were identified such that each exhibits a relatively consistent level of resource quality throughout the segment.
4. A river segment could extend through a natural or man-made lake if the upstream and downstream portions of the river segment were of consistent resource quality and type, and if the lake did not significantly disrupt the river's natural values or recreational use. Rivers which flow through urban or other developed areas were handled in a similar manner.
5. In recognition of the importance of upstream tributaries to the resource value of a river segment, the designation "to headwaters" was used to describe segment boundaries whenever the segment location and resource values justify such a description.
6. Segment boundaries were determined by associated resource values alone and did not take into account jurisdictional boundaries or the location of potential development.

Chapter 10 Key Insights

Insights from the Maine licensed and Traveling sportsmen surveys

- The state of Maine is well positioned as one of the “Best” destinations among Maine licensed hunters and anglers across a majority of attributes that are important to them - ranging from climate, safety, pricing, and amenities. Maine’s particular strengths among Traveling sportsmen are its attractive natural setting and its sense of safety.
 - The state’s natural amenities, beauty and sense of security or safety are also identified to be among the most important characteristics of a site that hunters and anglers say are important when making the decision to hunt or fish.
- The abundance of game species and the ability to target native populations are critical factors that influence destination choices. Maine Department of Inland Fisheries & Wildlife supports management and conservation efforts aimed at maintaining healthy populations of native species.
- Interestingly, one of the key destination factors for hunters and anglers is the remoteness of the location. However, travel distance also factors into their decision. The geographical size and travel distance to the more remote areas can be a challenge to bring sportsmen to the state. Among traveling sportsmen, it may be important to highlight other services in the area for non-sportsmen to influence the travel decision.
- Maine’s primary market from which to recruit visiting hunters and anglers is the Northeast, North Atlantic, and mid-Atlantic regions. Findings indicate that, given the size of the traveling sportsmen market in those areas, there remains growth potential to increase the state’s level of penetration within that market.
- Word-of-mouth is an important marketing tool among Maine’s sportsmen. Both hunters and anglers rely on recommendations from friends or family about hunting and fishing destinations. Maine sportsmen report a high degree of satisfaction with their hunting and fishing trips in Maine and are likely to recommend the experience to friends and family
- Traditional media outlets such as television, magazine, and online are also effective means to reach sportsmen. Top media titles consumed by sportsmen in Maine’s market area include The Bassmasters (TV), Field & Stream (magazine), and North American Hunting Club (online), among others.
- When not hunting or fishing, sportsmen and their travel companions are typically enjoying the opportunity to relax and unwind and to see the local sights.

Insights gained from other research about hunter and angler recruitment and retention

- Nationally, only 15% of anglers typically purchase a license five out of five years.¹¹ Among hunters, 35% of resident hunters and 7% of nonresident hunters typically purchase a licensed five out of five years.¹² And, the number of hunters and anglers had been on the decline since the early 1990's.¹³
- Sportsmen cite a variety of reasons for not hunting or fishing. The most commonly cited reasons are: not enough time, takes time away from family, and other obligations such as work or family.¹⁴ The argument of “not enough time” can actually be reflective of shifting preferences and other activities providing the same or more benefits than hunting or fishing had in the past.
- When hunters and anglers take a hiatus from the sport, the largest percent of sportsmen (41% for hunters and 38% for anglers) return within 3 years.¹⁵ A recent effort, spearheaded by the Recreational Boating and Fishing Foundation, focused on lowering the rate of lapsing anglers or shortening the time away from the sport through used communication and outreach to encourage anglers to renew their license. Findings show that that these efforts have not been effective at reducing the rate of lapsing by a significant degree.
- What competes for free time among sportsmen? Among anglers, the most commonly cited preferred indoor recreational activity is relaxing or watching TV. The most commonly preferred outdoor activities included hiking, camping, hunting, and gardening.¹⁶ A similar study has not been completed for hunters but it is possible the same preferences exist, particularly given the number of sportsmen who both hunt and fish.

¹¹ Southwick Associates and Responsive Management. 2011. Understanding Activities that Compete with Recreational Fishing. Prepared for the American Sport Fishing Association under a U.S. Fish and Wildlife Service Grant VA M-24-R.

¹² Southwick Associates. 2010. *A Portrait of Hunters and Hunting License Trends: National Report*. Prepared for the National Shooting Sports Foundation.

¹³ U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

¹⁴ American Sportfishing Association, Responsive Management, Oregon Department of Fish and Wildlife, and Southwick Associates. 2013. Exploring Recent Increases in Hunting and Fishing Participation. U.S. Fish & Wildlife Service Multi-state Conservation Grant F12AP00142.

¹⁵ Ibid.

¹⁶ Southwick Associates and Responsive Management. 2011. Understanding Activities that Compete with Recreational Fishing. Prepared for the American Sport Fishing Association under a U.S. Fish and Wildlife Service Grant VA M-24-R.

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1 **I. STATEMENT OF QUALIFICATIONS**

2 **Q. Please state your name, position, and business address.**

3 A. My name is Dean M. Murphy. I am a Principal with The Brattle Group in the Boston
4 office, located at One Beacon Street, Boston, Massachusetts 02108.

5 **Q. Please describe your professional experience and educational background.**

6 A. I have over twenty-five years of experience in economic consulting, with the majority of
7 my work focusing on the electricity sector. My work has encompassed topics such as
8 resource and investment planning (including power and fuel price forecasting), valuation
9 for contract disputes and asset transactions, climate change policy and analysis,
10 competitive industry structure and market behavior, and market rules and mechanics. I
11 have experience examining these and other electric-sector matters from the perspectives
12 of investor-owned and public electric utilities, independent producers and investors,
13 industry groups, consumers, regulators, and system operators. I hold a Ph.D. in Industrial
14 Engineering and Engineering Management and an M.S. in Engineering-Economic
15 Systems, both from Stanford University, and a B.E.S. in Materials Science and
16 Engineering from the Johns Hopkins University.

17 **Q. Have you previously testified before any regulatory body?**

18 A. Yes. I have testified before the New Hampshire Public Utilities Commissions, the
19 Connecticut Department of Public Utility Control, the New Jersey Department of Public
20 Utilities, and the Public Utilities Board of Manitoba, and have presented to advisory
21 committees to the Pennsylvania Department of Environmental Protection. I have
22 testified before committees of the state legislatures in New Jersey, New York, and
23 Pennsylvania. I have also testified before the United States Court of Federal Claims, the
24 U.S. Bankruptcy Court (both New Jersey and Southern District of New York), and the
25 United States District Court (Vermont). I have submitted written testimony on behalf of

1 the Massachusetts Attorney General’s Office addressing the procurement of offshore
2 wind in the Section 83C proceedings. My CV is attached as Attachment 1.

3 **II. PURPOSE OF TESTIMONY**

4 **Q. On whose behalf are you testifying?**

5 A. I am testifying on behalf of the Massachusetts Attorney General’s Office.

6 **Q. What is the purpose of your testimony?**

7 A. Pursuant to Section 83D of the Green Communities Act, (“Act,” or “Section 83D”),
8 Eversource, National Grid, and Unitil (collectively, the “Distribution Companies” or
9 “EDCs”) jointly sponsored a competitive solicitation for Clean Energy Generation for an
10 annual amount of electricity equal to approximately 9,450,000 MWh (9.45 TWh), to be
11 procured by the Distribution Companies entering into cost-effective long-term contracts
12 by 2022.¹ In accordance with Section 83D, the Distribution Companies issued a Request
13 for Proposals (“RFP”) for Long-Term Contracts for Clean Energy Projects. Thereafter,
14 the Evaluation Team received and evaluated the proposals.²

15 The New England Clean Energy Connect Hydro bid (“NECEC Hydro”) was ultimately
16 selected for contract negotiations, following the siting denial of the Northern Pass
17 Transmission Hydro bid (“NPT Hydro”), which had initially been selected. The NECEC
18 Hydro bid consists of energy supplied by Hydro Renewable Energy, Inc. (“HRE”) and a
19 new HVDC transmission line constructed by Central Maine Power (“CMP”) that
20 interconnects Québec with the New England power grid in Maine.³ The contract

¹ Section 83D of Chapter 169 of the Acts of 2008 (the “Green Communities Act”), as amended by chapter 188 of the Acts of 2016, *An Act to Promote Energy Diversity* (the “Energy Diversity Act”).

² The Evaluation Team was comprised of the Distribution Companies and the Department of Energy Resources (“DOER”).

³ HRE is a wholly-owned indirect unit of Hydro-Québec.

1 negotiations resulted in power purchase agreements (“PPAs”) for energy and
2 Environmental Attributes (“EAs”) between the EDCs and H.Q. Energy Services (U.S.)
3 Inc. (“HQ”), and Transmission Service Agreements (“TSAs”) between the EDCs and
4 CMP. The PPAs specify the obligation of HQ to supply Qualified Clean Energy and
5 Environmental Attributes from Hydro-Québec Power Resources (“HQPR”).⁴

6 The purpose of my testimony is to discuss the reasonableness of the Section 83D
7 solicitation process and the resulting PPAs and TSAs.

8 **Q. What are the major findings from your analyses?**

9 A. The proposed contracts, as written, do not ensure that the Qualified Clean Energy
10 acquired via the contracts will comprise fully incremental energy deliveries into New
11 England, as the RFP specified. The RFP required that the Qualified Clean Energy under
12 the contract should be incremental to (*i.e.*, in addition to) the hydroelectric energy that
13 HQ has delivered to New England historically, or that would otherwise be expected to
14 be delivered. The proposed contracts implement much weaker requirements for
15 incrementality and would allow most (and potentially all) of the contract energy
16 delivered to substitute for historical deliveries. This aspect of the contracts must be
17 corrected in order to conform with the RFP requirements, and the overall purpose of the
18 Act. This could be done by modifying the requirements of the proposed contracts,
19 assuming HQ is able and willing to provide fully incremental Qualified Clean Energy
20 into New England. If HQ is unable or unwilling to provide fully incremental Qualified
21 Clean Energy, other sources of clean energy could supplement or substitute to satisfy this
22 requirement. For example, the HQ deliveries of hydroelectric energy could be
23 supplemented with some renewable energy that does meet the RFP’s incrementality

⁴ The PPAs define HQPR as “those existing hydroelectric generating stations, located in the Province of Québec and owned and operated as a system by Hydro-Québec or its subsidiaries from time to time, that produce electric energy, which consists predominantly of low-carbon and renewable hydro-electric energy services during the Services Term.” Exh. JU-3-B, at 14.

1 requirement, or the HQ energy could be replaced in its entirety with energy from other
2 renewable bids (which might have different transmission requirements). There were
3 several alternative bids comprised of new renewable generation (and transmission) that
4 would provide fully incremental clean energy, and some of these alternative bids scored
5 well in the evaluation.

6 In addition, I have concerns about the selection process. Neither of the two top-scoring
7 bids, [REDACTED]
8 [REDACTED], nor a potential portfolio comprised of just those two bids, were carried
9 forward from the second stage of the evaluation into the third and final stage.⁵ These
10 alternatives that were dropped from consideration may have performed better than the
11 NECEC Hydro project that was selected. This selection issue may be related to the
12 previous question of whether the proposed contracts provide fully incremental clean
13 energy, because the [REDACTED] projects would have fully satisfied the
14 incrementality requirements of the RFP.

15 I am also concerned about the inclusion of bidders' affiliates in the Evaluation Team.
16 This is generally considered inappropriate because it can bias the evaluation and selection
17 process. Such concerns arose in multiple instances in the 83D evaluation process and
18 were noted by the Independent Evaluator.⁶

19 My final concerns regard the potential for the scaling approach used in bid scoring to
20 inadvertently and improperly affect the bid scores and ranking, and the metric used to
21 calculate the Global Warming Solutions Act ("GWSA") benefits. Although these appear
22 to be less important issues in this solicitation than the concerns noted above, they should
23 be addressed in any future solicitations.

⁵ Revised Independent Evaluator Final 83D Report Confidential, at 68, 70 (August 7, 2018). These two high-scoring bids were included as components of portfolios that scored relatively poorly in the evaluation; the lower scores for these portfolios may have been due to the inclusion of still other, lower-scoring bids in those portfolios.

⁶ See, e.g., *id.*, at 27-28, 32, 36, 48-49.

1 **III. REVIEW OF KEY DOCUMENTS IN THE PROCEEDING**

2 **Q. What documents have you reviewed in this proceeding?**

3 A. I have reviewed the RFP, the Independent Evaluator’s report submitted by Peregrine
4 Energy Group, responses to Information Requests, and the direct Joint Testimony and
5 accompanying exhibits submitted by the Distribution Companies, including the Tabors
6 Caramanis Rudkevich (“TCR”) evaluation report, the bid selection letters, the scoring
7 protocols, the qualitative scoring, portions of the bids, and the proposed contracts.

8 **IV. THE PROPOSED CONTRACTS DO NOT PROVIDE INCREMENTAL**
9 **HYDROELECTRIC GENERATION AS CONTEMPLATED BY THE RFP**

10 **Q. What is your concern regarding whether these proposed contracts will provide**
11 **incremental hydroelectric generation?**

12 A. The proposed contracts do not require that HQ provide incremental hydroelectric
13 generation as specified in the RFP. The stated goal of the Act is to “facilitate the
14 financing of clean energy generation resources.”⁷ That is, the legislature intended to
15 bring additional clean energy into the Commonwealth. This goal is reflected in the RFP,
16 the stated intent of which, in the context of a hydroelectric bid, was to acquire
17 “Incremental Hydroelectric Generation”⁸ that would be incremental to historical
18 hydroelectric energy deliveries into New England.⁹ My understanding of the purpose of
19 this RFP requirement is to ensure that the hydroelectric or renewable energy resources
20 procured under the long-term contracts would not substitute for historical clean energy
21 deliveries, but rather would provide a long-term net increase in the amount of clean
22 energy delivered into New England. As written, the proposed contracts include much

⁷ Section 83D(a).

⁸ Exh. JU-2, at 18.

⁹ Bids for renewable resources were required to be provided from new generation, which would necessarily be incremental to historical energy. Hydro suppliers were permitted to offer “Incremental Hydroelectric Generation” from existing resources but were required to show that the generation would be incremental.

1 weaker requirements. Although each EDC's contract has its own incrementality
2 provisions, even the most stringent contract requires that less than half of the newly
3 contracted clean energy provided be incremental to historical average generation.

4 **Q. What did the RFP require in terms of incrementality?**

5 A. The RFP defines incremental hydroelectric generation:

6 "Incremental Hydroelectric Generation" means Firm Service Hydroelectric
7 Generation that represents a net increase in MWh per year of hydroelectric
8 generation from the bidder and/or affiliate as compared to the 3 year historical
9 average and/or otherwise expected delivery of hydroelectric generation from
10 the bidder and/or affiliate within or into the New England Control Area.¹⁰

11 That is, to be considered "incremental," the RFP requires the bidder to provide energy in
12 addition to the bidder's 3-year historical average of deliveries into New England (or more
13 than the bidder would have otherwise delivered). The 2014-2016, 3-year imports from
14 HQ into New England is 14.8 TWh.¹¹ Thus, for the 9.55 TWh of Qualified Clean Energy
15 from the contracts to be fully incremental energy delivery, total deliveries would need to
16 be 24.35 TWh annually.

17 **Q. Do the proposed contracts adopt the RFP definition of incrementality?**

18 A. Although the preamble that appears in each of the proposed contracts asserts
19 "WHEREAS, the output of the Hydro-Québec Power Resources, delivered through the
20 New Transmission Facilities (as defined herein), shall constitute incremental
21 hydroelectric generation during the Services Term,"¹² the contracts themselves do not
22 define the term "incremental hydroelectric generation." Rather than repeating or
23 referring to the definition in the RFP, or implementing equivalent requirements, each of
24 the proposed contracts establishes considerably less stringent requirements.

¹⁰ Exh. JU-2, at 5.

¹¹ Exh. NEER-1-8.

¹² See, e.g., Exh. JU-3-A, at 7.

1 The contracts require two types of energy to be delivered: 1) “Guaranteed Qualified
2 Clean Energy,” which is the contracted total of 9.55 TWh across the three contracts, to
3 be delivered through the NECEC,¹³ and 2) “Baseline Hydroelectric Generation Imports”
4 (“Baseline Hydro”), which consists of all other power deliveries from Hydro-Québec to
5 New England.¹⁴ Exhibit H to the proposed contracts establishes Minimum Required
6 Baseline Hydroelectric Generation Imports (“Minimum Baseline”) quantities.¹⁵
7 Conceptually, to provide incremental generation, the Minimum Baseline should equal
8 historical energy deliveries. But the values established for the Minimum Baseline
9 quantities are substantially below the historical average, and so the contracts do not
10 actually require the clean energy deliveries to be incremental.

11 The three EDCs’ proposed contracts establish different requirements for the Minimum
12 Baseline quantity. The National Grid contract establishes a Minimum Baseline of 9.45
13 TWh, which is substantially below the 14.8 TWh of historical deliveries.¹⁶ This implies
14 that HQ must deliver a total of 19.0 TWh annually to New England (9.45 TWh of
15 Minimum Baseline plus 9.55 TWh from the contract). Even though the contracts

¹³ Exhibit B to the proposed contracts provides the Schedule of Guaranteed Qualified Clean Energy for each hour. For Eversource, this number is 579.335 MWh/hour (Exh. JU-3-A, at 72); for National Grid it is 498.348 MWh/hour (Exh. JU-3-B, at 80); and for Unitil it is 12.317 MWh/hour (Exh. JU-3-C, at 72). Summing across EDCs and multiplying by 8,760 hours/year yields total Guaranteed Qualified Clean Energy of 9.548 TWh/year.

¹⁴ See, *e.g.*, Exh. JU-3-A, at 86. The Baseline Hydro amount refers to all other deliveries to New England, not the amounts that are specific to each EDC or their contracts.

¹⁵ Exh. JU-3-B, at 92. While the Eversource and Unitil contracts do not use the phrase “Minimum Required Baseline Hydroelectric Generation Imports,” the contracts do require a minimum level of “Baseline Hydroelectric Generation,” against which damages are measured. Exh. JU-3-A, at 86.

¹⁶ According to National Grid’s response to Exhibit NEER-1-8, due to “the difficulties of predicting what differences from HQ’s 3-year historical average annual delivery of approximately 14.8 TWh from HQ to New England from 2014-2016 could reasonably be expected over the twenty years following the targeted commercial operation date for this project, it is reasonable and acceptable to move forward with the contract based on HQ’s agreement to the 9.45 TWh Minimum Required Baseline Hydroelectric Generation Imports.”

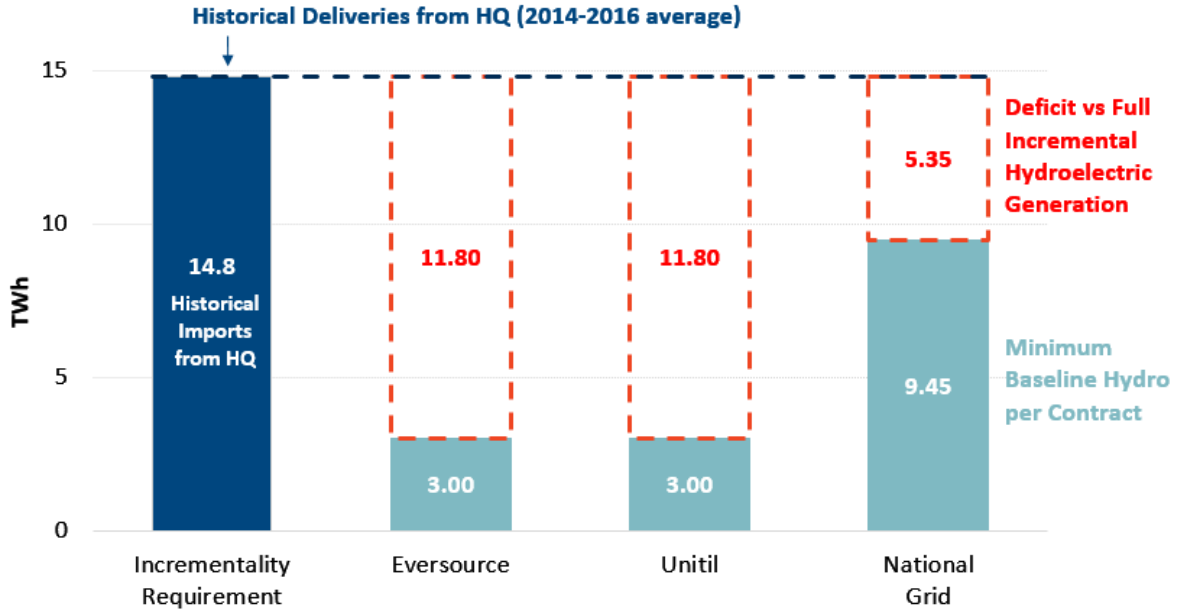
1 nominally represent incremental hydro of 9.55 TWh annually, HQ will be required to
2 deliver to New England only 4.2 TWh more than it has delivered historically. In other
3 words, less than half the contract energy is required to be incremental; for the remainder,
4 HQ can simply substitute contract energy at the contract price for energy that it has
5 historically sold into New England. In fact, the Minimum Baseline for National Grid
6 may be reduced further (though not increased) by several potential adjustments.

7 The incrementality requirements of the Eversource and Unitil contracts are even less
8 stringent. They are based on a Minimum Baseline quantity of 3.0 TWh,¹⁷ so that the total
9 clean energy deliveries into New England, including deliveries under the new contract,
10 can be below historical average deliveries. Thus, HQ could satisfy its long-term contract
11 obligations by delivering only 12.55 TWh annually (9.55 contract + 3.0 Baseline), which
12 would be 15% less clean energy than it has delivered historically. The difference could
13 then, for example, be sold into the market to another buyer offering a higher price, which
14 might include a premium for the fact that the hydro energy is clean.

15 Figure 1 below illustrates the contract quantity requirements, contrasting what would be
16 required for full incrementality as described in the RFP, shown by the first column, with
17 what is required by each of the proposed contracts. The figure shows that the Eversource
18 and Unitil contracts require HQ to deliver just 3.0 TWh of Baseline Hydro to New
19 England, 80% (11.80 TWh) below the historical average. The National Grid contract
20 requires somewhat greater Baseline deliveries of 9.45 TWh, but still 36% (5.35 TWh)
21 below the historical average. The Deficit indicated relative to each contract is the amount
22 by which total hydro deliveries to New England (Qualified Clean Energy plus Baseline
23 Hydro) can fall short of full incrementality without penalty.

¹⁷ According to Exhibit NEER-1-9, Eversource and Unitil found that the requirement to deliver incremental generation was met in the bid response, and the 3 TWh Minimum Baseline that was negotiated would not make “the administration of such a provision problematic.”

**Figure 1: Baseline Hydro Deliveries into New England
Required by Proposed Contracts**



1 Sources and Notes: Minimum Baseline Hydro per Contract is from contracts (Exhs. JU-3-A, JU-3-B, JU-3-C).

2 **Q. Do the Minimum Baseline hydro generation levels established in the proposed**
3 **contracts provide a reasonable assurance to Massachusetts ratepayers that the total**
4 **clean energy delivered to the Commonwealth will increase if the proposed contracts**
5 **are enacted?**

6 A. No. As discussed above, the contract provisions do not ensure that energy deliveries
7 under the contracts will be fully incremental relative to historical imports from HQ. In
8 the case of Eversource and Unitil, total clean energy deliveries could fall below historical
9 levels without penalty. Furthermore, the stated goal of the Act is to “facilitate the
10 financing of clean energy generation” through “cost-effective long-term contracts.”¹⁸ If
11 the proposed long-term contracts allow HQ to provide less clean energy to New England
12 than it has historically, then it is not apparent that the contracts would be financing clean
13 energy generation. It is also not clear that the contracts would be cost-effective, as
14 ratepayers could be paying for energy and EAs as if they would be incremental to

¹⁸ Section 83D(a).

1 historical deliveries, but the deliveries would not necessarily be fully incremental
2 because the contracts do not require it.

3 **Q. How do the contracts enforce the Minimum Baseline requirements that they do**
4 **include?**

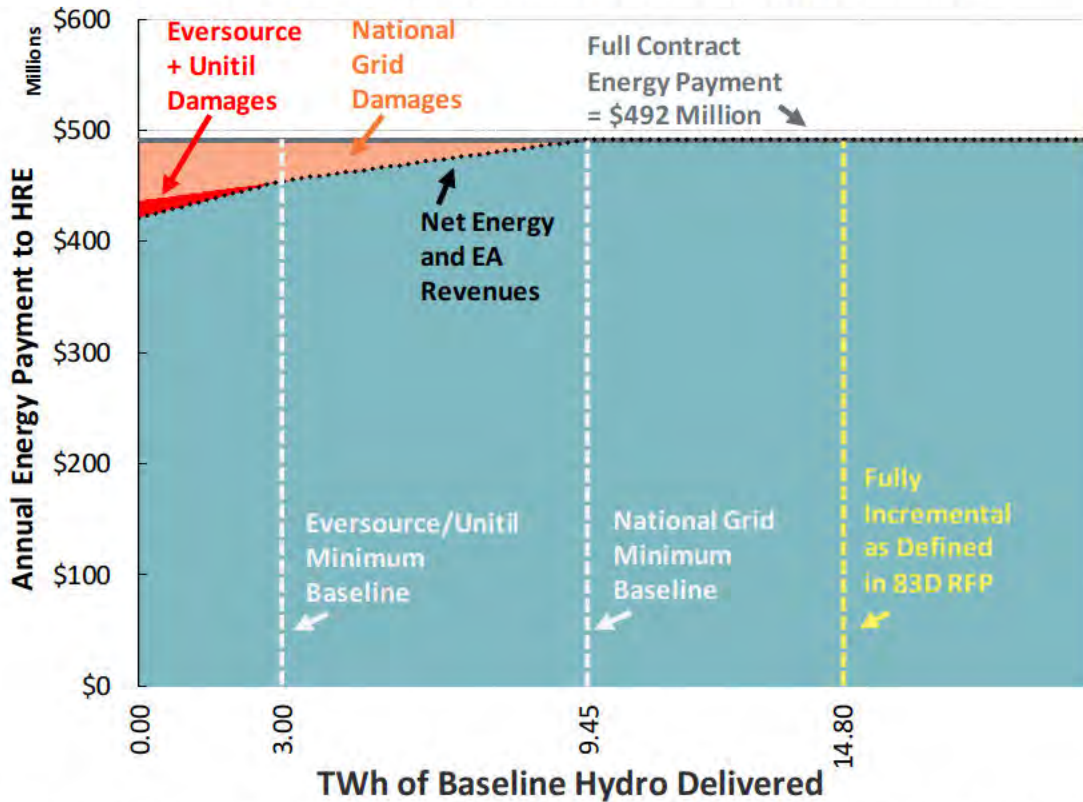
5 A. The Minimum Baseline requirements are enforced by a damages calculation that
6 penalizes any Shortfall, the amount by which Baseline Hydro is below the Minimum
7 Baseline. The damages, which would be applied to the energy payment to HQ, are
8 calculated as a share of the TSA payments proportional to the Shortfall. For National
9 Grid, the damages share is the Shortfall divided by the Minimum Baseline (9.45 TWh);
10 whereas for Eversource and Unitil, the damages share is the Shortfall divided by the
11 Minimum Baseline (3.0 TWh) plus the contract energy, totaling 12.55 TWh. In both
12 cases, the damage amount is the relevant share multiplied by the annual TSA payments,
13 with some time averaging and rolling average adjustments. Several factors may reduce
14 the damages amount and/or reduce the Minimum Baseline deliveries that are required to
15 avoid damages.¹⁹

16 Figure 2 below illustrates the contract incentives facing HQ to provide incremental
17 energy, showing how the aggregate contract payments for energy and EAs change as the
18 level of Baseline Hydro delivered changes. If HQ delivers fully incremental Baseline
19 Hydro (equal to the historical average of 14.8 TWh), there are no damages and no

¹⁹ Damages are only calculated if the Shortfall is positive (*i.e.*, HQPR delivers less than the Minimum Baseline). The Eversource and Unitil contracts provide a reduction in the Minimum Baseline subject to a *Force Majeure* provision, and a provision related to negative pricing in New England. Exhs. JU-3-A, at 86-87; JU-3-C, at 84-85. The National Grid contract provides for several factors that can reduce (but not increase) the Minimum Baseline, including on-peak prices relative to a floor, total transfer capabilities for deliveries into New England, total net electricity exports from Hydro-Québec, and changes in Hydro-Québec's firm transmission rights. The National Grid damages for Shortfall are also scaled down by 20% after each five years of the contract, starting at 100% of the Shortfall share times the TSA payment in the first 5 years, and falling to 40% in the last 5 years. Exh. JU-3-B, at 94.

1 reduction to the net revenues earned under any of the EDCs' contracts. Damages are
2 incurred when Baseline Hydro deliveries drop below the Minimum Baseline of the
3 National Grid contract, 36% below the level that would be fully incremental. As Baseline
4 Hydro falls below this level, net energy and EA revenues from National Grid are reduced
5 according to the Shortfall relative to the National Grid Minimum Baseline, at a rate of
6 \$5.80/MWh of Shortfall. Below the 3.0 TWh Minimum Baseline of the Eversource and
7 Unitil contracts, which is 80% below full incrementality, Eversource and Unitil damages
8 begin to be incurred as well; total damages across all three contracts in this range are
9 \$10.98/MWh of Shortfall. Even at zero Baseline Hydro, total energy and EA payments
10 across the three contracts are reduced by only 14.3%. These measures do not account
11 for any of the other adjustments noted above, which could reduce (but not increase) the
12 damage amounts.

Figure 2: EDC Energy Payment vs. Baseline Hydro Generation



Source and Notes: Contracted energy prices, contracted clean energy delivery, and contract details in relation to Baseline Hydro are from Exhibits JU-3-A, JU-3-B, JU-3-C. Transmission unit price and contract capacity are from Exhibits JU-

4-A, JU-4-B, JU-5-C. For the purposes of this chart, it is assumed that all contracted clean energy (Guaranteed Qualified Clean Energy) is delivered. The chart reflects prices from contract year 1 (Nominal 2017 \$).

1 **Q. Do the damage mechanisms in the contracts give HQ sufficient incentive to provide**
2 **fully incremental hydro deliveries?**

3 A. No, the damage mechanisms do not give HQ the proper incentives to provide fully
4 incremental deliveries of clean energy. There is no disincentive for HQ to under-provide
5 Baseline Hydro until it falls well below the historical average, and even then, the
6 disincentives for further Shortfall are modest.

7 **Q. Has this potential for Massachusetts ratepayers to receive the same total clean**
8 **energy generation but pay for it at an above market rate been raised previously?**

9 A. Yes. The Department of Public Utilities (“Department”) explicitly acknowledged this
10 risk in response to HQ’s comments,²⁰ in which HQ proposed amending the
11 incrementality requirements in the RFP by changing the definition of incremental hydro
12 generation to require only the capability to deliver incremental power, rather than the
13 actual delivery of incremental power:

14 The Department agrees that there would be a risk to ratepayers if an electric
15 distribution company entered into a contract with a bidder based on the

²⁰ HQ proposed that Incremental Hydroelectric Generation be defined as: “Firm Service Hydroelectric Generation that is capable of providing a net increase in MWh per year of hydroelectric generation from the bidder and/or affiliate as compared to the 3 year historical average delivery of hydroelectric generation from the bidder and/or affiliate within or into the New England Control Area.” *Fitchburg Gas and Electric Light Company d/b/a Unitil, Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid, and NSTAR Electric Company and Western Massachusetts Electric Company, each d/b/a Eversource Energy*, D.P.U. 17-32, Comments of H.Q. Energy Services (U.S.) Inc., at 8 (February 21, 2017). This proposed definition is aligned with HRE’s response to how it provides incrementality in its bid for this solicitation: “

[REDACTED]

.” *Section 83D Request for Proposal Application Form, NECEC RFP Response* (HRE) Confidential, Section 4.2, at 20 (emphasis added).

1 bidder's capability to provide a net increase in MWh/year of hydroelectric
2 generation. If the bidder subsequently failed to provide a net increase in
3 generation, ratepayers would have paid for a service (*i.e.*, Incremental
4 Hydroelectric Generation) that the bidder did not deliver.²¹

5 In its 2016 background document on regulations to limit greenhouse gases ("GHG"),
6 including the Clean Energy Standard ("CES"), the Massachusetts Department of
7 Environmental Protection ("DEP") explicitly expressed a concern that "resource
8 shuffling" of Canadian hydro (*i.e.*, the contractual or transactional reassignment of clean
9 energy without increasing the total amount of clean energy overall) could result in the
10 CES delivering no additional clean energy to the Commonwealth:

11 Excluding existing resources from the CES would not be sufficient to prevent
12 resource shuffling with respect to transmission of electricity from Canada.
13 Currently, electricity imported from Canada is an important source of clean
14 electricity for Massachusetts, but the ability to import additional electricity
15 from Canada is limited by the amount of transmission capacity. Resource
16 shuffling could occur if new hydroelectric generation resources were to
17 displace existing hydroelectric resources as the source of the electricity
18 traveling through existing transmission lines. In this case, CES compliance
19 could occur without any change in the amount of clean energy available for
20 use in Massachusetts.²²

21 Although the DEP's comments were focused on the role of transmission, the issue of
22 incrementality is not limited to transmission. Adding new transmission without requiring
23 that deliveries be incremental would fail to address the issue, as illustrated in this
24 proceeding and the development of the RFP.

²¹ D.P.U. 17-32, at 33 (2017).

²² Massachusetts Department of Environmental Protection, *Background Document on Proposed New and Amended Regulations*, at 30 (December 16, 2016).

1 **Q. Does the fact that the contracts add significant transmission capacity to enable**
2 **greater deliveries to New England alleviate the concern about whether the contract**
3 **energy would be incremental?**

4 A. Energy deliveries from Québec are often constrained by the limits of the transmission
5 interface between Québec and New England.²³ Thus transmission must be expanded to
6 enable the delivery of incremental clean energy into New England. However, merely
7 adding transmission does not ensure that clean energy deliveries will be incremental
8 relative to historical deliveries, unless the contracts explicitly require this. As the
9 proposed contracts are written, that will not necessarily be the case; clean energy
10 deliveries could be far less than fully incremental and still satisfy the requirements of the
11 proposed contracts.

12 **V. ADDITIONALITY AND OFFSETTING GREENHOUSE GAS EMISSIONS**

13 **Q. Must the contracts require full incrementality for the 83D clean energy to create**
14 **the desired offset to greenhouse gas emissions?**

15 A. Even if the proposed contracts required energy deliveries to be fully incremental, this
16 would not necessarily guarantee that GHG emissions would decrease by an amount
17 corresponding to the Qualified Clean Energy of the contract. Incrementality is defined
18 in the RFP only with respect to deliveries into New England, while GHG emissions must
19 be measured at a global level.²⁴ It would be possible, at least in principle, to satisfy the
20 requirements of full incrementality (*i.e.*, the Qualified Clean Energy is incremental to the
21 full historical average deliveries into New England), and still not offset a corresponding
22 amount of global GHG emissions. This could happen through resource shuffling—
23 reassignment of a fixed amount of clean energy so as to increase the clean energy

²³ *Section 83D Request for Proposal Application Form*, NECEC RFP Response (HRE) Confidential, Section 4.2, at 20.

²⁴ Exh. JU-2, at 5-6.

1 delivered to a particular destination without increasing the total amount of clean energy
2 overall.

3 For instance, with the new NECEC transmission link, if HQ increased deliveries into
4 New England by the contracts' 9.55 TWh relative to historical New England deliveries,
5 this would achieve full incrementality as defined in the RFP. But if HQ accomplished
6 this by reducing its exports to other neighboring regions rather than by increasing clean
7 energy generation overall, then global GHG emissions would not necessarily be reduced.
8 Diverting clean energy from other regions to New England would enable a reduction in
9 fossil generation and emissions within New England, but the reduced deliveries to other
10 regions may need to be replaced by additional fossil generation in those regions. This
11 would effectively substitute fossil generation in other regions for fossil generation in
12 New England, shifting emissions from one region to another, without causing a material
13 decrease (the actual impact would depend on the relative emissions intensities of each
14 region).²⁵

15 **Q. What would be required to ensure a reduction in GHG emissions?**

16 A. For the 83D contracts, or any project, to reliably reduce GHG emissions, they would need
17 to provide clean energy that is "additional." Additionality is a commonly-used concept
18 in the climate change discussions; it refers to emissions reductions that occur because of
19 a proposed action, reductions that would not have occurred otherwise under "business as
20 usual." Importantly, it must involve overall global emissions reductions, not reductions
21 in one region or sector that might be offset by a corresponding increase that is triggered
22 elsewhere, or reductions that would have occurred regardless of the proposed action. For
23 example, a PPA that supports the development of a new wind farm will generally be
24 additional. The new wind farm produces clean energy that would not otherwise be

²⁵ This shifting of emissions from one region to another through resource shuffling is analogous to "leakage," defined as "the offset of a reduction in emissions of greenhouse gases within the commonwealth by an increase in emissions of greenhouse gases outside of the commonwealth." G.L. c. 21N, § 1.

1 produced, displacing fossil energy and reducing emissions, so the clean energy and the
2 emissions reductions are additional to what would have occurred without the PPA. Clean
3 energy, however, is not always additional in this sense. If an existing wind farm with an
4 expiring PPA signed a renewed PPA with a different buyer, the renewed PPA does not
5 result in additional clean energy. The existing wind farm would have continued to
6 produce clean energy even without the renewed PPA; the output may have been sold to
7 a different buyer or in the spot market. The renewed PPA does not increase the total
8 clean energy produced and consumed or reduce emissions; it just reallocates clean energy
9 that would be produced in any case. It can sometimes be challenging to define and
10 determine additionality in practice, primarily because doing so can require a very precise
11 specification of the alternative “business as usual” circumstance—*i.e.*, additional to
12 what? But for the purposes of the 83D procurement, the important point is that a global
13 perspective is necessary. The RFP requirement that the contract energy be incremental
14 to New England (even if the proposed contracts required full incrementality) does not
15 ensure that it would be additional or necessarily result in corresponding GHG reductions.

16 **Q. Do the proposed contracts require the energy to be additional in this sense of**
17 **offsetting GHGs globally?**

18 A. No, not necessarily. HQ has committed to using existing HQPR facilities to supply the
19 contracted energy.²⁶ If these facilities were spilling significant amounts of water due to
20 transmission constraints that would be relieved by the NECEC transmission, or if Hydro-
21 Québec undertook investments to expand its system—to increase output from existing
22 facilities or add new generation or storage capability—then a portion of the generation
23 may be considered additional. But the contracts do not require this, nor has HQ indicated
24 that it is the case.

²⁶ See, e.g., Exhibit JU-3-A, at 70-71 for a list of existing facilities that will be used to provide the contracted energy.

1 **VI. POTENTIAL CHANGES TO THE PROPOSED CONTRACTS TO ENSURE**
2 **INCREMENTALITY**

3 **Q. How could the proposed contracts be modified to ensure the energy provided is fully**
4 **incremental relative to historical deliveries?**

5 A. Increasing the Minimum Required Baseline Hydroelectric Generation Imports quantity
6 in Exhibit H to the proposed contracts will increase the amount of energy that is required
7 to be incremental. Unfortunately, it may not be as simple as increasing this value to equal
8 the 14.8 TWh historical average of deliveries into New England (and removing the
9 provisions that can reduce the Minimum Baseline). This simplistic approach could create
10 difficulties because the amount of hydroelectric energy that HQPR is able to produce can
11 vary from year to year based largely on hydrologic conditions. Dry years will have less
12 total energy available, and it may not be possible to export the historical average amount;
13 similarly, the appropriate Baseline Hydro amount could exceed the historical average in
14 years with above-average energy. Some further adjustment mechanisms may be
15 necessary; these might include indexing the Minimum Baseline to water conditions or to
16 total exports from Hydro-Québec, and/or making the Minimum Baseline a multi-year or
17 rolling requirement (the National Grid contract contains some such adjustments). A
18 desirable principle for defining the Baseline Hydro energy (as well as the 83D contract
19 energy) is that it should take priority over HQ exports to other regions to ensure that the
20 contract energy is incremental to what would have been delivered to New England absent
21 the contracts. But the existing low minimum thresholds for Baseline Hydro delivery in
22 the proposed contracts, and the modest incentives to meet even those minimum
23 thresholds, are insufficient to ensure that Massachusetts ratepayers will receive the fully
24 incremental clean energy that was solicited in the RFP.

25 **Q. Would HQ be able to provide fully incremental energy to meet such a contract**
26 **requirement with its existing system?**

27 A. In Section 4.2 of its bid materials, HRE [REDACTED]
28 [REDACTED]

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[REDACTED]

Q. If HQ is unable or unwilling to provide hydro production that is fully incremental, are there other options that could improve the performance of the contracts on this dimension?

A. If HQ is unable or unwilling to provide fully incremental hydro, as that might be reasonably defined, then another option could be to include other energy sources that can provide incremental energy. For example, if some new renewable energy was used to supplement the HQ hydro supply, the demands on HQPR’s existing hydro system could be reduced while maintaining the total amount of incremental energy provided to New England under the contract. An alternative bid included both wind and hydro generation with the NECEC transmission, the “NECEC Wind/Hydro” bid [REDACTED]. In this bid, SBx (a joint venture of Gaz Metro and Boralex) would develop the wind generation as a complement to the existing hydro power. [REDACTED]

[REDACTED]

²⁷ Section 83D Request for Proposal Application Form, NECEC RFP Response (HRE) Confidential, Section 4.2, at 20.

28 [REDACTED].
29 [REDACTED] he
difference between [REDACTED] and the [REDACTED] provided in the wind portion of the bid,
leaves [REDACTED] TWh of the contract to be fulfilled by hydro generation.

1 **Q. Would this amount of supplemental wind energy enable HQPR's existing hydro**
2 **system to provide the balance of the energy requirements for fully incremental**
3 **energy?**

4 A. It may, though it is possible that even with the [REDACTED]
5 [REDACTED], HQ might not be able or willing to provide the lower [REDACTED]
6 [REDACTED] of hydro required for incremental generation. In that case, it may be necessary to
7 turn to other suppliers for the required amount of incremental energy. [REDACTED]

8 [REDACTED]
9 [REDACTED].³⁰ If the NECEC Hydro bid cannot provide fully incremental
10 energy, these other bids would be unable to do so. Fortunately, there were other bids that
11 could supply the desired fully incremental clean energy requirements. In fact, because
12 many of these other bids were based on new renewable generation, they would be
13 additional, and thus would ensure that the clean energy delivered to New England would
14 offset GHG emissions, which even fully incremental energy from existing hydro
15 resources might not necessarily do, as discussed above. The Evaluation Team created
16 and evaluated several portfolios of renewable energy projects in Stage 3 that could be
17 candidates if the NECEC Hydro bid [REDACTED] could not provide
18 incremental clean energy. In addition, the two highest-scoring bids in the Stage 2
19 evaluation were [REDACTED] bids; although they were not
20 evaluated on a standalone basis in Stage 3, they could be potential candidates.

21 **VII. PROJECT SELECTION**

22 **Q. What is your concern regarding project selection?**

23 A. There appear to be some issues regarding which projects and portfolios were selected to
24 carry forward into Stage 3 of the evaluation. Specifically, the two highest-scoring
25 projects in Stage 2, [REDACTED], were not carried forward into the

30 [REDACTED]

1 Stage 3 evaluation individually. This may have been because each bid offers less clean
2 energy than the 9.45 TWh desired in the solicitation, though that would not necessarily
3 disqualify these projects as standalone bids, since there was no requirement that the full
4 amount be acquired in a single solicitation, and multiple solicitations were contemplated.
5 Further, a portfolio consisting of just these two projects would have provided about [REDACTED]
6 of the energy targeted by the procurement and may have performed very well. These
7 two projects were included as components in several larger portfolios, though these larger
8 portfolios included other, lower-scoring bids that may have diluted their value.

9 **Q. Do your concerns regarding project selection relate to the question of whether the**
10 **NECEC Hydro bid offers fully incremental clean energy?**

11 A. Yes. The [REDACTED] bids both [REDACTED], and so there
12 is no concern about whether they would offer incremental energy to New England. In
13 fact, they would be additional as well, in the sense discussed above, and are not subject
14 to concerns over resource shuffling, so they would offer confidence regarding global
15 GHG reductions.

16 **Q. Please briefly describe the evaluation of bids and bid selection process.**

17 A. The bids were evaluated in three stages, which was followed by bid selection. In Stage
18 1, bids were evaluated against the RFP threshold requirements. Bids that met the
19 threshold requirements were carried to Stage 2, where they were evaluated on both
20 quantitative and qualitative dimensions. The Evaluation Team then selected several large
21 proposals from Stage 2, plus several portfolios made up of multiple projects, for further
22 evaluation in Stage 3, and ultimately project selection.

23 **Q. Were all the bids that were evaluated in Stage 2 also evaluated in Stage 3?**

24 A. No. As stated in the RFP, it was not expected that all bids from Stage 2 would be
25 evaluated in Stage 3. The RFP provides three metrics for including bids in Stage 3:
26 1) the rank order of the proposals at the end of the Stage 2 evaluation; 2) the cost

1 effectiveness of the proposals based on the Stage 2 quantitative evaluation; and 3) the
2 total annual generation of the proposals relative to the procurement target.³¹

3 **Q. Were the proposals with the highest rank order and highest cost-effectiveness from**
4 **Stage 2 brought forward into Stage 3?**

5 A. As standalone projects, no. [REDACTED] were the two most highly
6 ranked large proposals in Stage 2. They received the highest Net Total Benefit scores
7 and highest Net Direct Benefits scores.³² Both the [REDACTED]
8 [REDACTED], and thus would provide energy to New England
9 that would be both incremental to New England and additional globally. [REDACTED]
10 [REDACTED] was the top ranked bid in Stage 2, receiving a total score of 85.94; [REDACTED]
11 was the second highest ranked bid in Stage 2, with a total score of 80.24. The NECEC
12 Hydro bid was ranked third with a score of 79.95, more than 5 points below the top-
13 ranked [REDACTED]

14 [REDACTED]
15 [REDACTED] Each of these portfolios included between [REDACTED] other smaller
16 projects that had lower net direct benefits and higher costs,³³ which may have depressed
17 the portfolio scores. The Evaluation Team did not evaluate [REDACTED]
18 bids individually or in a portfolio composed solely of these two projects.

³¹ Exh. JU-2, at 41.

³² [REDACTED]

³³ As previously discussed, the [REDACTED] is an exception. *See supra* note 32.

1 **Q. Is it likely that the [REDACTED] bids would have scored well in Stage 3,**
2 **either individually or combined in a portfolio consisting of just these two bids?**

3 A. Yes. [REDACTED] bids were ranked first and second in the Stage 2
4 evaluation. The Stage 3 scoring used the same quantitative and qualitative evaluation
5 approaches as Stage 2, so these bids would have ranked first and second in Stage 3 as
6 well, above the NECEC Hydro bid.³⁴ I believe that these two bids should have been
7 considered on a standalone basis, so that an explicit tradeoff could be made [REDACTED]
8 [REDACTED] and their better performance.

9 Further, a portfolio consisting of just these two bids would likely have scored quite well,
10 and would have provided most of the energy targeted in the procurement. The Stage 3
11 portfolios that included [REDACTED] along with other projects likely scored
12 lower due to the inclusion of these other lower-scoring projects, and so do not offer good
13 guidance regarding the value of a portfolio consisting solely of these two bids. To
14 calculate the total benefits of this new portfolio would require a full evaluation, including
15 a new simulation with TCR's Enelytix model, as requested in Information Request AG
16 3-2.³⁵ I believe that a portfolio consisting of just the [REDACTED] projects
17 would have been attractive and might have been preferred to the NECEC Hydro bid, and
18 thus should have been evaluated. Further, these bids, either individually or in a portfolio,
19 would provide greater confidence regarding the delivery of fully incremental clean
20 energy to New England, and GHG emissions offsets.

³⁴ The scaling of quantitative scores was performed independently in Stage 3, so the scoring would differ slightly from the Stage 2 scoring (*see* Section IX on the impact of scaling). The Stage 3 scaling slightly increases the advantage of the [REDACTED] bids over the NECEC Hydro bid.

³⁵ While the direct benefit portion of the total quantitative benefits should be additive and thus not require another simulation, and the qualitative benefits are not affected by inclusion in a portfolio, the indirect benefits may not be additive and would require a separate simulation to evaluate.

1 **Q. In combination, would the [REDACTED] bids satisfy the full clean energy**
2 **procurement requirement under section 83D?**

3 A. [REDACTED]
4 [REDACTED] the Act allows
5 the EDCs to carry out multiple procurements to acquire the full 9.45 TWh of desired
6 clean energy.³⁶ Had the EDCs selected a bid or a portfolio that did not satisfy the full
7 9.45 TWh goal, a second procurement could have been held to acquire the remaining
8 clean energy. In fact, several other portfolios evaluated in Stage 3 offered less than the
9 9.45 TWh desired, though none fell short by as much as [REDACTED]

10 **VIII. EVALUATION TEAM COMPOSITION**

11 **Q. In your opinion, is it appropriate that the utilities participated in bid evaluation,**
12 **given that their affiliates had submitted bids in this solicitation?**

13 A. In general, I do not find it appropriate that the Evaluation Team included the utilities
14 whose affiliates had submitted bids. This apparent conflict of interest raises serious
15 concerns, for several reasons.

16 **Q. Is this just a perceived conflict of interest, or are there reasons that this could**
17 **influence the outcome of the procurement process?**

18 A. The perception of a possible conflict of interest is rooted in real reasons for concern. One
19 concern is the possibility of information sharing that could offer the affiliate a bidding
20 advantage. This is particularly relevant in this procurement, where bidders were not
21 generally aware of the precise scoring mechanism that would be used to evaluate bids.
22 The risk that bid evaluators might share information with some bidders and not others is
23 increased if members of the bid Evaluation Team are affiliated with some bidders.

³⁶ Section 83D(b).

1 **Q. Does walling off the Evaluation Team from direct or indirect communications with**
2 **the bidding team alleviate the concerns regarding bidder affiliates on the**
3 **Evaluation Team?**

4 A. An ethical wall can be established between members of the Evaluation Team and the
5 bidding teams, with the intent of minimizing the possibility of inappropriate information
6 sharing. I understand that Standards of Conduct were established to create such ethical
7 walls in this instance, though I cannot attest to their efficacy.

8 But in addition to concerns about inappropriate information sharing, incentive problems
9 can arise. If the EDC stands to benefit if its affiliate prevails in the procurement process,
10 then the EDC members on the Evaluation Team may—consciously or subconsciously—
11 be influenced by those incentives, and favor bids from the affiliate. An apparent bias in
12 evaluation toward an EDC affiliate’s bid, either intentional or unintentional, occurred at
13 several points in this 83D solicitation, and was explicitly identified and documented by
14 the Independent Evaluator:

15 Based on our observations, Eversource favored, or had the appearance of
16 favoring, NPT in various stages of the evaluation and selection process,
17 especially toward the end. This included the deliberations with respect to the
18 interest rate assumption in the quantitative evaluation and the qualitative
19 evaluation with respect to several criteria, [REDACTED]
20 [REDACTED]. This was also the
21 case with respect to the Stage 3 and bid selection process, where Eversource
22 focused on aspects of the evaluation, evaluation metrics and assumptions that
23 supported selection of Northern Pass. It was perhaps even more apparent
24 when Eversource sought to keep NPT in play for contract negotiations even
25 after the required New Hampshire siting approval was denied, with a remote
26 possibility for a prompt reversal in order for Northern Pass to be able to build
27 the project anywhere near the timeframe proposed.³⁷

28 The issue of favoritism toward an affiliate’s bid is clearly problematic both in theory, and
29 in practice in this solicitation. Here, if it had not been for the removal of the NPT Hydro
30 bid from consideration due to the siting denial, there might have been good reason to
31 contest the final winner on these grounds.

³⁷ Revised Independent Evaluator Final 83D Report Confidential, at 48–49 (August 7, 2018).

1 **Q. Did having affiliates on the Evaluation Team cause a problematic outcome?**

2 A. The possibility that affiliate favoritism may have influenced the evaluation and selection
3 process in some subtle way cannot be ruled out, even after NPT Hydro was removed
4 from consideration. Project selection was ultimately made by the DOER, as the EDCs
5 did not agree on the selection. Eversource and Unitil favored NPT Hydro, a bid affiliated
6 with Eversource. National Grid favored NECEC Hydro. After the DOER selected NPT
7 Hydro, this bid was removed from consideration and the non-affiliated NECEC Hydro
8 bid was selected. But this does not eliminate all concern, because the DOER only
9 discussed the NPT Hydro and NECEC Hydro bids in its selection letter.³⁸ It did not, for
10 example, consider the high-scoring [REDACTED] discussed above for
11 potential final selection. In the end, I do not have enough evidence to either exclude the
12 possibility that affiliate favoritism may have affected bid scoring or selection, nor to
13 conclude that the outcome was tainted by having affiliates on the Evaluation Team.
14 Nonetheless, I would not recommend this for any future solicitations.

15 **IX. SCALING OF QUANTITATIVE NET BENEFIT**

16 **Q. Please summarize your analysis and findings regarding the scaling of quantitative**
17 **net benefit in Stage 2 and Stage 3.**

18 A. The quantitative net benefit calculated for the proposals in the evaluation process is
19 scaled onto a 75 point scale, with qualitative scoring accounting for up to another 25
20 points.³⁹ The scaling approach implies that the dollar value of each point depends on the
21 particular values of the Net Total Benefit of the proposals, and the dollar value of a point
22 affects the relative importance of quantitative vs. qualitative dimensions. The value of
23 Net Total Benefit depends in turn on other analytic assumptions used in the evaluation.
24 Thus using this scaling approach means that the choice of analytic assumptions could
25 alter the relative importance of the qualitative vs. quantitative dimensions in the

³⁸ Exh. JU-10, at 1.

³⁹ Revised Independent Evaluator Final 83D Report, at 11 (August 7, 2018).

1 evaluation, potentially influencing the ranking of proposals in ways the Evaluation Team
2 may not intend or even understand.

3 In this solicitation, quantitative and qualitative scores are negatively related among
4 several of the higher-scoring proposals, with bids that scored high on quantitative
5 measures scoring low qualitatively, and vice versa. For example, [REDACTED]
6 [REDACTED] had a Stage 3 quantitative score of 65.69 and a qualitative score of 19.13.
7 Conversely, the NECEC Hydro bid had a higher Stage 3 quantitative score of 75, and a
8 lower qualitative score of 15.63.⁴⁰ These are conditions under which the scaling
9 approach, with its potential to influence the relative weighting of quantitative and
10 qualitative factors, could influence the ranking of portfolios, and potentially the outcome
11 of the solicitation. While the weighting would have had to change significantly in this
12 case to influence the ranking of these two bids, this potential impact illustrates why this
13 scaling approach should be reconsidered for future energy solicitations.

14 **X. EVALUATION OF GWSA BENEFITS**

15 **Q. Please describe the metric used to evaluate the GWSA impact of the proposals.**

16 A. The GWSA metric is designed to measure “the value of the Proposal’s contribution
17 toward meeting the Global Warming Solutions Act (GWSA) over and above compliance
18 with the RPS and CES.”⁴¹ It was calculated in the 83D bid evaluations as the dollar value
19 of the difference between the emissions decrease (relative to the Base Case) and the
20 amount of RECs or CECs created by the project and used for compliance with the RPS
21 or CES. According to the Evaluation Team (excluding National Grid), the RECs and
22 CECs are subtracted off in an attempt to avoid double-counting the REC and CEC value
23 of the projects.⁴²

⁴⁰ Exh. JU-6, at 25.

⁴¹ *Id.*, at 31.

⁴² Revised Independent Evaluator Final 83D Report Confidential, at 17–18 (August 7, 2018).

1 **Q. Does the GWSA metric accurately reflect a proposal's contribution toward meeting**
2 **GWSA requirements?**

3 No. The GWSA requires an economy-wide reduction in GHG emissions. The
4 appropriate metric regarding GWSA benefits involves the GHG reduction attributable to
5 the project relative to the Base Case, without deducting the REC/CEC quantity.⁴³ This
6 is the same position that National Grid has expressed.⁴⁴ Ultimately, the GWSA
7 calculation error did not impact the ranking of NECEC Hydro as the highest ranked bid.⁴⁵

8 **Q. Does this conclude your current testimony?**

9 A. Yes.

⁴³ D.P.U. 18-76/18-76/18-78, Exh. AG-DM-1, at 17 (November 5, 2018).

⁴⁴ Revised Independent Evaluator Final 83D Report Confidential, at 18; D.P.U. 18-77, Exh. NG-TJB-1, at 6 (November 30, 2018).

⁴⁵ Exh. AG-2-2-C, Attachment.

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Dr. Dean Murphy is an economist with a background in engineering. He has expertise in energy economics, competitive and regulatory economics and finance, as well as quantitative modeling and risk analysis. His work centers on the electric industry, encompassing issues such as resource and investment planning (including power and fuel price forecasting), valuation for contract disputes and asset transactions, climate change policy and analysis, competitive industry structure and market behavior, and market rules and mechanics. He has addressed these issues in the context of business planning and strategy, regulatory hearings and compliance filings, litigation and arbitration. Dr. Murphy has examined these matters from the perspectives of investor-owned and public electric utilities, independent producers and investors, industry groups, regulators, system operators, and consumers.

Dr. Murphy holds a Ph.D. in Industrial Engineering and Engineering Management and an M.S. in Engineering-Economic Systems, both from Stanford University, and a B.E.S. in Materials Science and Engineering from the Johns Hopkins University. Prior to joining The Brattle Group in 1995, Dr. Murphy worked as an associate with Applied Decision Analysis, Inc.

AREAS OF EXPERTISE

- Resource Planning, Investment, and Forecasting
- Valuation for Energy Contract Disputes and Energy Asset Transactions
- Climate Policy Analysis
- Market Structure and Competitiveness
- Electricity Markets: Energy, Capacity, and Ancillary Services
- Procurement and Restructuring

EXPERIENCE

Resource Planning, Investment, and Forecasting

- For Manitoba Hydro, which is evaluating large investments in hydroelectric capacity and transmission expansion that would facilitate significant off-system sales, Dr. Murphy testified in a public hearing regarding the potential evolution of long-term power prices in the export market. He also developed a set of future scenarios based on the possible future evolution of several key market drivers, and forecast long-term market prices of power for each scenario. The scenario drivers included fuel prices, climate policy, coal plant retirements, renewable energy portfolio standards, and load levels, which are affected by price feedback and active demand management programs. This assignment has been repeated in subsequent years to

understand how changing market drivers have influenced the potential range future of power prices.

- Dr. Murphy assisted the investor-owned utilities and regulators in Connecticut in complying with a legislative mandate to develop annual resource and procurement plans for the state, over several annual cycles. He focused particularly on the development of a set of scenarios against which alternative resource plans were evaluated, in order to illuminate the risks that might be associated with such plans. Key issues were potential federal climate legislation, natural gas prices, electricity demand, and demand side management strategies, and the complex interplay between these factors. He also evaluated energy security issues, including interactions between natural gas availability and electric reliability, as well as the potential role of nuclear power and emerging technologies, and their impacts on energy security.
- For a consortium in the initial stages of developing a major long-distance offshore DC transmission link designed to integrate multiple thousands of megawatts of new wind generation into several electric markets, Dr. Murphy performed a preliminary evaluation of the potential energy and capacity value of the project, and the approximate customer cost impact. These analyses were designed to assist in securing FERC approval for incentive rate treatment and abandoned cost recovery.
- For a merchant electric generator contemplating renewing or replacing an expiring output contract for a gas-fired generator, Dr. Murphy used a power market simulation model to forecast potential long-term power price trends under several scenarios involving fuel costs, generator retirements and renewable additions. Using the forecasts of potential long-term trends, he simulated the plant's short-term operations and its resulting financial performance. A key factor that had a significant effect on the plant's value in this analysis was characterizing the short-term volatility of power prices and the plant's ability to respond to capture short periods of attractive prices.
- Dr. Murphy developed a long-term forecast of Renewable Energy Credit (REC) prices across multiple states and interconnected electricity markets for a renewable generation developer. He considered state-level Renewable Portfolio Standard (RPS) requirements over time, as well as potential federal renewable requirements, looking at the cost and geographic availability of several potential renewable resource types and incorporating the effect of in-state requirements and alternative compliance payments.
- Dr. Murphy worked with a manufacturer of an energy storage technology to estimate its value on several dimensions across a range of potential applications. He used simulated charge-discharge cycles with historical prices in several markets to demonstrate not only the technology's energy and capacity value, but also its potential ancillary service and reliability benefits.
- For the Tennessee Valley Authority (TVA), Dr. Murphy assisted in the development of TVA's long-range Strategic Plan to deal with the development of competitive markets and a changing regulatory environment. He organized and performed numerous operational and financial analyses to understand TVA's performance under a wide variety of scenarios, and

integrated the results into a strategic framework, considering numerous potential outside influences (e.g., fuel price scenarios) and TVA responses (e.g., product unbundling or changes to TVA's pricing structure).

- For a utility client interested in building a merchant transmission line, Dr. Murphy evaluated the benefits of the line, designed and implemented an auction for the rights to use the line once constructed, and evaluated the bids received in the auction.
- For an entrepreneurial client investigating the opportunities for an electric storage technology in the deregulated electric market, Dr. Murphy developed a model that optimizes facility operations with respect to a set of forecasted electric commodity price profiles. The model was used to evaluate the technology's potential profitability on several different electricity systems. Commodity price profiles for each system were projected by integrating historical real-time system marginal cost data with the projected cost of additional capacity.

Valuation for Energy Contract Disputes and Energy Asset Transactions

- In a bankruptcy hearing, Dr. Murphy testified regarding the fair market value of the post-petition energy services (electricity, chilled and hot water) provided under contract by a creditor, in order to determine the debtor's responsibility for these costs.
- Dr. Murphy assisted the Staff of the New Hampshire Public Utility Commission in understanding the customer cost savings associated with a proposed utility divestiture of generating assets, as assessed by the utility. Key issues were whether the utility's analysis had correctly represented the operational benefits of the assets to customers in reducing their energy costs, and whether the capacity value of the assets had been accurately captured.
- Dr. Murphy assisted an Asian energy company in deepening their understanding of U.S. electricity and natural gas markets, as part of their plan to acquire assets in the region. Brattle helped to characterize market rules, including recent and proposed changes, in several regional ISOs, and how these rules may affect the financial opportunities of generators located in these ISOs.
- In a major arbitration dispute, Dr. Murphy assisted a merchant generating company in determining the value lost when the government agency with whom it had contracted to develop a gas-fired power plant decided to terminate the contract before the plant was completed. A key contributor to the value lost was the potential riskiness of the contract revenues. The contract's unusual structure insulated the merchant generating company from many of the risks normally associated with electricity markets, transferring these risks to the government agency over the contract's twenty-year term. This transfer of risk had a major effect on the value of the contract and thus on the magnitude of the arbitration claim.
- Dr. Murphy calculated the damages that resulted from several partial derates of a nuclear plant. The plant's owner had a unit-contingent output contract with a regional utility, and during the derate events, the plant delivered less power than it would have if it had operated normally. The utility had to replace the missing power (or equivalently, in some hours lost

the opportunity to resell the power) at higher market prices, and also lost some of the capacity value of the plant in the regional capacity market.

- For an investor exploring the acquisition of several gas-fired generators in markets without retail deregulation, Dr. Murphy helped to analyze the potential profitability of the assets under a range of assumptions about future natural gas and CO₂ allowance prices. Building on simulation results developed by another consultant, Dr. Murphy and the Brattle team were able to investigate several factors specific to the individual assets in question but not captured by a broad market simulation model.
- Dr. Murphy advised a committee of bondholders of a foreign subsidiary of a U.S. merchant power company that was undergoing restructuring. He advised regarding the value of several power contracts and assets in which the subsidiary had an interest, including a potential damage claim for a terminated long-term contract.
- In a dispute related to a terminated long-term power contract for an electric generating facility, the original contract contained clauses that may be triggered in the event of a default, based on the value of available replacement opportunities. For a group of bondholders of the facility, Dr. Murphy prepared an affidavit regarding the market value of the available replacement opportunities, and how they related to the facility's debt and operating costs.
- For an independent power producer, Dr. Murphy supported expert testimony to value damages due to termination of a long-term electric generator tolling contract, requiring power market forecasting and finance valuation techniques. Key to this case was the increase in risk caused by the loss of the contract, in an environment (following the collapse of the power sector in 2001) in which it was not possible to obtain a long-term replacement contract.
- For a bondholder of a power marketing company, Dr. Murphy evaluated the likely outcome of an arbitration hearing regarding damages due as a result of the termination of a long-term generation contract.
- For an independent power producer forced into bankruptcy by the rejection of a long-term power contract by its counterparty, Dr. Murphy assessed the economic damages due to the loss of the contract.
- In the context of a dispute over damages in a terminated gas supply contract, Dr. Murphy analyzed and provided written testimony regarding the potential to resell contracted natural gas that could not be utilized by the purchaser.
- For a utility client attempting to acquire a partially completed generating station to be held as a utility affiliate, Dr. Murphy analyzed the acquisition and affiliate transaction to determine whether there would be any violation of market power regulations.

Climate Policy Analysis

- With a Brattle co-author, Dr. Murphy evaluated the contributions of nuclear plants to the U.S. economy, as well as their environmental effects in reducing carbon and other emissions. This study used a power sector simulation model in combination with a dynamic input-output model of the U.S. economy, and found that the primary economic effect was that nuclear plants hold down power prices, reducing what all consumers pay for electricity. This savings, because it is significant and widespread, gives a substantial boost to the economy overall.
- Similar to the study described above, Dr. Murphy and his co-author have performed more detailed evaluations at the level of several individual states where nuclear is an important generation source. They have examined specific nuclear plants that are facing financial challenges to determine how these plants affect electricity prices, economic activity, and emissions of CO₂ and other pollutants within their state.
- Dr. Murphy helped the senior executives of a major coal producer to assess the long-term implications of U.S. climate policy on the electricity generating infrastructure. He characterized the effects of different potential policy structures and stringency on CO₂ prices, the economics of existing and future electric generating technologies, and likely generation expansion and retirement decisions over several decades, in order to forecast power sector costs and CO₂ emissions under these policy approaches. The project also involved estimating the long-term effects on CO₂ emissions in the transportation and other sectors.
- In seeking regulatory approval for a generation expansion plan, an investor-owned utility engaged Dr. Murphy to help understand the interrelationship between potential climate policy, the cost of natural gas, and the cost of generation technologies. He helped the client to incorporate these interacting factors into the client's existing planning models.
- Dr. Murphy assisted the executives of a major U.S. electric company in developing a proposed policy structure to mitigate greenhouse gas emissions (carbon dioxide) that would be economically efficient, effective, and manageable for industries and the economy. The research evaluated the impact on the electric industry, addressing overall, regional, and company-level effects of alternative policies and stringency of legislation. It also addressed the effects on consumers and other industries.

Market Structure and Competitiveness

- Dr. Murphy leads the Brattle team as the Independent Auction Monitor for the Southern Companies' Energy Auction, which has been in operation since April 2009. The auction is governed by FERC tariff, which is designed to mitigate potential market power. The tariff requires Southern to administer auctions for standard day-ahead and hour-ahead energy products for delivery "Into SoCo," and to offer its available capacity at a cost-based rate into these auctions. The Brattle team has developed data structures, monitoring protocols and automated tools to track Southern Companies' load forecasting, purchases and sales, outage declarations, and unit capabilities and costs. On this basis, Brattle monitors Southern's offers

into each auction to ensure in compliance with the FERC cost-based tariff. Brattle also ensures that the auction functions and clears properly, and monitors the behavior of third party participants in the Auction. Monitoring is done on a daily basis, with reports annually on auction performance and tariff compliance to the FERC.

- Dr. Murphy participated in a market power analysis in the context of a major electric utility merger, focusing on the analysis of how transmission availability and constraints affect the potential for the exercise of market power. He coordinated the collection and interpretation of transmission data from numerous utilities. To correct for the inherent data weaknesses, he designed and oversaw a separate, integrated transmission modeling effort to determine the ability of the grid to support short-term power transactions.
- Dr. Murphy evaluated the potential anti-competitive effects of a merger between a major regional natural gas company and an electric utility in a region where electric generation is highly dependent on natural gas as a fuel. He examined the potential for the merged company to exercise vertical market power by manipulating the price of natural gas to influence the competitive price of electricity, and what effect that would have on the competitiveness of the electric market.
- In several other cases, Dr. Murphy analyzed whether proposed energy company mergers or acquisitions would create the potential for the exercise of horizontal and/or vertical market power, developing mitigation strategies where appropriate.
- In a proposed merger involving an East Coast electric utility, Dr. Murphy assisted senior management in evaluating the effects of retail access on the financial health of both the client company and the potential merger partner, taking into account projected operating costs, the timing of open access, market prices for power, customer loss, and stranded cost recovery.

Electricity Markets: Energy, Capacity, and Ancillary Services

- For a competitive energy supplier and generation owner, Dr. Murphy analyzed the role of demand-side resources, such as interruptible load, in an ISO-sponsored capacity market. He examined the extent to which demand-side resources could supply capacity needs, and the risk that frequent utilization of such resources might dissuade their participation in the market.
- Dr. Murphy assisted a U.S. electric ISO with understanding the implications of expanding ISO membership on the ancillary service requirements of both existing and proposed new ISO members.
- For a major hydroelectric generator, Dr. Murphy assessed the planning and decision system used to determine when and how to allocate energy (e.g., in spot or forward markets). Both value and risk implications are important, and both are affected by large uncertainties and correlations in forward and spot prices, weather, energy (water) availability, and non-electric restrictions, among other factors. Dr. Murphy developed a number of recommendations for improving the accuracy of the utility's forecasts and models, thus improving the decisions based on them.

- Dr. Murphy assisted a major Northwest hydroelectric generator in understanding the role of electric ancillary services, including voltage control and reserve generating capacity, in a restructured electric market. Issues included the interaction between the energy market and the ancillary services market, and the implications of embedded cost pricing as compared to competitive market-based pricing of ancillary services. This engagement involved coordinating work across the generation and transmission groups within the client organization to determine appropriate tariff rates for these ancillary services.
- In a series of projects for the Electric Power Research Institute (EPRI), Dr. Murphy examined the potential for hydroelectric generators to provide reserve generating capacity in a restructured electricity market. Dr. Murphy developed an economic framework for understanding how the markets for electric energy and reserve capacity interact, and whether hydro's technical advantages in providing reserve capacity are likely to make reserves a natural niche market for hydro. Dr. Murphy also evaluated the probable effect of industry restructuring on the value of hydroelectric power assets, taking account of their technical capabilities to store and release energy according to market conditions, and provide ancillary services.
- For a utility client, Dr. Murphy evaluated the effects of pricing structure on demand for electricity, load shape, and revenues. Changes in pricing structure can stimulate electric demand, increasing revenue without increasing the per unit electricity price. This may be a useful mechanism for mitigating a utility's stranded costs as the industry is restructured.

Procurement and Restructuring

- Dr. Murphy assisted the Staff of the New Hampshire Public Utility Commission in an analysis of customer savings that would result from the divestiture of a New Hampshire utility's remaining generation assets. Concerns and disagreements about an earlier analysis had led to disputes over whether to move ahead with the divestiture, including a split within the PUC Staff. Dr. Murphy's analysis and his testimony before the NHPUC helped to unite the parties in support of moving ahead with the divestiture.
- Dr. Murphy assisted an electric utility client with regulatory strategy regarding a state proposal to allow utilities to earn a "premium" on long-term power purchases, in order to account for the risks involved in committing to purchased power contracts.
- Dr. Murphy assisted a California utility in hearings before the California Public Utilities Commission regarding the establishment of a process for the California utilities to resume power procurement in the wake of the western power crisis of 2000-2001.
- In several engagements, Dr. Murphy assisted utility clients facing potential customer loss through municipalization. As part of these analyses, he determined the stranded costs (unrecovered investment) that municipalization would involve.
- Dr. Murphy assisted an electric utility client in planning for industry restructuring by characterizing alternative paths that restructuring could take, and developing potential strategies that respond to a competitive market and regulatory changes. He developed a

detailed spreadsheet-based system and financial model to evaluate the effects of various strategies and scenarios on the magnitude of stranded costs and the client's financial performance. This modeling effort required analysis and forecasting of the changes in the structure of the market for electricity, as well as probable regulatory changes and their implications. The model served as the basis for several follow-up studies addressing more specific decisions and issues, performed by the client and by The Brattle Group.

Other Engagements

- In eight different litigation cases involving 14 nuclear reactors at 11 plants, Dr. Murphy has evaluated the Department of Energy's (DOE) failure to honor its commitment to remove spent nuclear fuel from U.S. nuclear plants. He led the analytical effort in all of these cases, and provided expert witness testimony in one of them, to characterize how the government should and would have carried out its contractual obligation. Dr. Murphy simulated a nationwide market for the exchange of spent fuel removal rights, as was enabled by the contract, which made it possible to determine the timing of spent fuel removal from each individual plant in the non-breach world. The results of these analyses were used to support the damage claims of the client nuclear owners for ongoing spent fuel storage costs that would have been unnecessary if the DOE had performed its contract obligations.
- Dr. Murphy assisted in a review of the auction of an ownership share in a nuclear generating plant, in order to determine whether the sale was performed using commercially reasonable means to ensure mitigation of the regulated seller's stranded costs.

PUBLICATIONS AND PRESENTATIONS

Murphy, Dean M, Mark P. Berkman. Comment on Acadian Consulting Group's " Report on Nuclear Portion of Senate Bill 877" Prepared for PSEG and Exelon, February 12, 2018

Berkman, Mark P., Dean M. Murphy. "Salem and Hope Creek Nuclear Power Plants' Contribution to the New Jersey Economy," Prepared for PSEG and Exelon Generation, November 2017. This report finds that the Salem and Hope Creek nuclear power plants make substantial contributions to the environment, reducing CO₂ emissions by 14 million tons annually. They also keep New Jersey power prices lower by \$400 million per year, which boosts New Jersey's GDP by \$800 million.

The Future of the U.S. Coal Generation Fleet., by Metin Celebi, Marc Chupka, Dean M. Murphy, Samuel A. Newell and Ira H. Shavel, Excerpt from the Fall 2017 newsletter for the ABA Antitrust Section, Transportation and Energy Industries Committee, November 30, 2017. The article analyzes the decline in coal-generated electricity in North America and discusses the implication of a recently proposed U.S. Department of Energy (DOE) rule that could shield certain coal and nuclear plants from competitive market forces.

Efficiency and Nuclear Energy: Complements, not Competitors, for a Low-Carbon Future., by Dean M. Murphy and Mark P, Berkman, August 2017, To be submitted to The Electricity Journal in response to

Amory Lovins, “Do Coal and Nuclear Generation Deserve Above-Market Prices?,” *The Electric Journal* July 2017, Vol. 30, Issues 6, Pages 23-30

Berkman, Mark P., Dean M. Murphy “Ohio Nuclear Power Plants’ Contribution to the State Economy,” Prepared for Nuclear Matters, August 25, 2017. This report finds that Ohio’s nuclear energy plants will contribute approximately \$510 million to the state gross domestic product (GDP) over the next ten years (2018-2027), in addition to other economic and societal benefits.

“Hurry or Wait? Pacing the Roll-Out of Renewables in the face of Climate Change,” Presented at Boston University’s Institute for Sustainable Energy’s Spring 2017 Seminar Series, by Jürgen Weiss and Dean M. Murphy, April 13, 2017

Murphy, Dean M. and Mark P. Berkman. “Perserving Upstate Nuclear Saves New York Consumers Billions, Compared With Additional Renewables Beyond CES Goals,” December 8, 2016

Berman, Mark P. and Dean M. Murphy. “ Pennsylvania Nuclear Power Plants’ Contribution to the State Economy,” December 2016. Prepared for Pennsylvania Building and Construction Trades Council, The Pennsylvania Chamber of Business and Industry, Allegheny Conference on Community Development, and Greater Philadelphia Chamber of Commerce

Celebi, Metin, Marc Chupka, Frank C. Graves, Dean M. Murphy and Ioanna Karkatsouli. “ Nuclear Retirement Effects on CO₂ Emissions: Preserving a Critical Clean Resource,” Published by The Brattle Group, December 2016

Murphy, Dean M. and Mark P. Berkman. Comment on "Green Overload" - an Issue Brief by the Empire Center, October 18, 2016

Berkman, Mark P. and Dean M. Murphy. “Electricity Cost and Environmental Effects of Retiring the Quad Cities and Clinton Nuclear Plants,” Prepared for the Chicagoland Chamber of Commerce, the Illinois Hispanic Chamber of Commerce, and the Illinois Retail Merchants Association, October 2016. The report estimates the effects that two Illinois nuclear plants, the Quad Cities and Clinton plants, have on electricity costs to Illinois consumers, and on emissions of CO₂ and other pollutants.

Preliminary Comment on New York Department of Public Service “Staff’s Responsive Proposal for Preserving Zero-Emissions Attributes” by Dean M. Murphy and Mark P. Berkman, July 12, 2016. Prepared for the New York State IBEW Utility Labor Council, Rochester Building & Construction Trades Council, and Central and Northern New York Building & Construction Trades Council

Berkman, Mark P. and Dean M. Murphy. Comments on the New York DPS "Clean Energy Standard White Paper – Cost Study," April 21, 2016, Prepared for the New York State IBEW Utility Labor Council, Rochester Building & Construction Trades Council, and Central and Northern New York Building & Construction Trades Council

Berkman, Mark P. and Dean M. Murphy. "New York's Upstate Nuclear Power Plants' Contribution to the State Economy," December 2015, Prepared for the New York State IBEW Utility Labor Council, Rochester Building and Construction Trades Council, and the Central and Northern New York Building and Construction Trades Council

Berkman, Mark, Dean Murphy. "The Nuclear Industry's Contribution to the U.S. Economy," Nuclear Matters, July 2015. In addition to this national report, similar state-level reports were produced for New York, Pennsylvania, Maryland, Michigan and Ohio.

Celebi, Metin, Kathleen Spees, J. Michael Hagerty, Samuel A. Newell, Dean Murphy, Marc Chupka, Jürgen Weiss, Judy Chang, and Ira Shavel. "EPA's Proposed Clean Power Plan: Implications for States and the Electricity Industry," Policy Brief. June 2014.

Electricity Market Overview for Manitoba Hydro's Export Market in MISO, with Onur Aydin and Kent Diep, The Brattle Group, July 2013.

Plugging In - Can the grid handle the coming electric vehicle load?, by Dean M. Murphy, Marc Chupka, Onur Aydin, and Judy Change, Public Utilities Fortnightly, June 2010.

"Connecticut 2010 IRP Overview," presentation before the Energy and Technology Committee of the Connecticut General Assembly regarding the Connecticut 2010 Integrated Resource Plan, January 8, 2010.

"Integrated Resource Plan for Connecticut," with Sam Newell, Marc Chupka, Judy Chang, and Mariko Geronimo, The Brattle Group, January 2010.

"Promoting Use of Plug-In Electric Vehicles Through Utility Industry Acquisition and Leasing of Batteries, Chapter 13 of 'Plug-In Electric Vehicles: What Role for Washington?,' with Peter Fox-Penner and Mariko Geronimo, *The Brookings Institution*, 2009.

"When Sparks Fly: Economic Issues in Complex Energy Contract Litigation," Energy 2009 No. 1, The Brattle Group.

"Connecticut 2009 IRP Overview," presentation before the Energy and Technology Committee of the Connecticut General Assembly regarding the Connecticut 2009 Integrated Resource Plan, February 5, 2009.

“Integrated Resource Plan for Connecticut,” with Onur Aydin, Judy Chang, Marc Chupka, Mariko Geronimo, Samuel Newell, and Joseph Wharton, The Brattle Group, January 2009.

“Reviving Integrated Resource Planning for Electric Utilities: New Challenges and Innovative Approaches,” Energy 2008 No. 1, The Brattle Group.

“Integrated Resource Plan for Connecticut,” with Marc Chupka, Ahmad Faruqui, Samuel Newell, and Joseph Wharton, The Brattle Group, January 2008.

“U.S. Climate Policy: Effects on Business and the Environment,” presentation before The Conference Board, September 26-28, 2007.

“On Setting Near-Term Climate Policy While the Dust Begins to Settle: The Legacy of the Stern Review,” with Gary Yohe and Richard S.J. Tol, *Energy and Environment*, Vol. 18, No. 5, 2007.

“Guest Commentary – U.S. Should Price Carbon, Directly,” *Carbon Market North America*, Point Carbon, June 6, 2007.

“The Economics of U.S. Climate Policy: Impact on the Electricity,” Technical Paper, The Brattle Group with FPL Group, March 2007.

“Transmission Management in the Deregulated Electric Industry: A Case Study on Reactive Power,” with Frank Graves and Judy Chang, *The Electricity Journal*, October 2003.

“Price-Responsive Electric Demand: A National Priority,” with Peter Fox-Penner, presented at the EPRI International Energy Pricing Conference, Washington, DC, July 26, 2000.

“Opportunities for Electricity Storage in Deregulating Markets,” with Frank Graves and Thomas Jenkin, *The Electricity Journal*, October 1999.

“Competitive Markets for Reserve Services,” presented at the 1999 National Hydropower Association Annual Conference, Washington, DC, March 1999.

“The FERC, Stranded Cost Recovery, and Municipalization,” with Peter Fox-Penner, Gregory Basheda, Darrell Chodorow, Jason Hicks, Eric Hirst, James Mitchell, and Joseph Wharton. *Energy Law Journal*, Vol. 19 (1998): 351-386.

“Ancillary Services in the Restructured Electric Industry,” presented at the EUC Conference on Reliability and Competition, Denver, CO, November 1998.

“Mechanisms for Evaluating the Role of Hydroelectric Generation in Ancillary Service Markets,” (with others), for the Electric Power Research Institute, TR-111707, November 1998.

“The Future of Hydro Resources under Deregulation,” presented at HydroVision ‘98, Reno, NV, July 1998.

“Electricity Price Volatility and Implications,” presented at the Electric Power Research Institute Conference on Technology Directions, Business Opportunities and Success Strategies, San Francisco, CA, December 1997.

“Ancillary Service Benefits of Hydroelectric Power,” presented at the 1997 National Hydropower Association Annual Conference, Washington, DC, March 1997.

“Utility Capital Budgeting Notebook,” (with others), for the Electric Power Research Institute, TR-104369, Palo Alto, California, July 1994.

TESTIMONY

Oral testimony before the New Hampshire Public Utilities Commission regarding the divestiture of the generating assets of Public Service of New Hampshire (Eversource). At issue were the customer savings that would result from divestiture. February, 2016.

Oral testimony before the United States Bankruptcy Court, District of New Jersey, on behalf of Revel AC, Inc., Debtor (Case No: 14-22654-CMB) regarding the fair market value of energy services received from creditor ACR Energy Partners, December 4, 2014. Expert report October 22, 2014.

Before the Public Utilities Board of Manitoba, in the Needs For and Alternatives To Review (NFAT) of Manitoba Hydro's Preferred Development Plan: provided oral testimony regarding future energy prices and price drivers in Manitoba Hydro's U.S. export market in MISO, March 2014.

Deposition, Central Vermont Public Service Corporation and Green Mountain Power Corporation, Plaintiffs, vs. Entergy Nuclear Vermont Yankee, LLC, Defendant. Docket No. 2:12-cv-10-wks, United States District Court, Vermont, April 2013. Expert report February 14, 2013; revised June 5, 2013. Case settled before trial.

Oral testimony before the Connecticut Department of Public Utility Control, in support of several annual versions of the Integrated Resource Plan for Connecticut, [Dean M. Murphy](#) and [Samuel A. Newell](#), September 2008, June 2009, June 2010

Oral testimony before the United States Court of Federal Claims, on behalf of Kansas Gas & Electric Company, et al., (Case No. 04-99C), regarding the removal of spent nuclear fuel, [Dean M. Murphy](#), March 2010

Oral testimony before the United States Court of Federal Claims, on behalf of Wolf Creek Operating Company, (Case No. 04-99C), regarding the removal of spent nuclear fuel, March 2010. Expert report September 15, 2009.

Oral testimony before the Connecticut Department of Public Utility Control, in support of the “Integrated Resource Plan for Connecticut,” for several subsequent versions of the Plan: June 3, 2010; June 30, 2009; September 22-25, 2008.

Affidavit to the Supreme Court of New York on behalf of Trilogy Portfolio Company LLC, Harbert Distressed Investment Master Fund LTD and Freedom Power Corporation (Index No. 601380/2005), regarding the economic value of the replacement options for a terminated power contract, April 2006. Case settled before trial.

Expert report before the United States Bankruptcy Court, Southern District of New York, on behalf of Contrarian Funds, LLC (Case No. 01-16034), regarding economic damages due to the termination of a natural gas supply contract, August 19, 2005. Case s



**GREENWASHING AND CARBON EMISSIONS:
UNDERSTANDING THE TRUE IMPACTS OF
NEW ENGLAND CLEAN ENERGY CONNECT**

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Prepared for: Maine Renewable Energy Association
Natural Resources Council of Maine
Sierra Club

October 2018

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EXECUTIVE SUMMARY

GREENWASHING AND CARBON EMISSIONS: UNDERSTANDING THE TRUE IMPACTS OF NECEC

This report was commissioned by the Maine Renewable Energy Association, Natural Resources Council of Maine, and Sierra Club to understand the potential impacts of the New England Clean Energy Connect (“NECEC”) on carbon emissions.

NECEC is a proposed transmission line with a capacity of 1,200 MW that would import around 9.5 TWh of energy from Québec into New England for purchase by Massachusetts utilities under Section 83D of the *Climate Protection and Green Economy Act*.¹ Although Central Maine Power (“CMP”) and Hydro-Québec² claim that the electrical energy delivered via NECEC would be “clean energy” from Québec’s existing hydroelectric system, there are a number of reasons why the energy flowing through NECEC may not be “clean,” may not be hydroelectricity, and may not even be sourced from Québec. Furthermore, the NECEC project – a high voltage direct current (“HVDC”) transmission line crossing 145 miles in Maine, including 53.5 miles of pristine areas -- also could hinder Maine’s efforts to develop its own renewable energy resources which otherwise could reduce carbon emissions and create local jobs and economic opportunities. This report examines the impacts of NECEC on carbon emissions and concludes that NECEC will not result in a significant reduction in greenhouse gas emissions, and may even increase them.

Hydro-Québec has a financial incentive to sell as much excess energy that it can, subject to water and generation constraints, and divert exports from other markets into NECEC to achieve a higher price. Given its system characteristics and profit goals, Hydro-Québec could even purchase energy from other markets during low-priced hours in order to retain energy in the form of water waiting in its reservoirs for subsequent sale at higher prices to New England through NECEC. Furthermore, the significant inflow via a 1,200 MW transmission line into Maine could adversely affect the economic prospects for Maine renewables, which are likely to be deferred or delayed as a result of the project’s impacts

¹ Mass. Gen. Laws Ch. 21N, Section 3 (a – d).

² Hydro-Québec refers to the parent company of Hydro Renewable Energy, Inc. (“HRE”) which submitted a bid in response to the Massachusetts Section 83D request for proposal and Hydro-Québec US, the entity that is the counterparty to the Massachusetts contracts. Hydro-Québec is a provincially-owned company that manages the Québec power system via Hydro-Québec Power (generation), Hydro-Québec TransÉnergie (Transmission) and Hydro-Québec Distribution (distribution system delivery and retail services).

on the local transmission network. The net result would be a minimal impact on efforts to reduce total carbon emissions.

NECEC could divert energy sales from another market into New England; shifting flows between markets may not reduce total greenhouse gas emissions and could even increase total carbon injections into the atmosphere.

It is important to note that intertie capacity from Québec into other markets is not a constraining factor for Hydro-Québec exports. Even during 2017 when Hydro-Québec exports reached a record high, there was a significant amount of unused transmission capacity throughout the year, indicating that the constraint on increasing exports from Québec into other markets is due to limited availability of water to produce energy or other production constraints, not the amount of transmission capacity. Therefore, a new intertie merely allows Hydro-Québec to access a higher-priced, long-term contract with Massachusetts instead of selling into competitive spot markets at lower, more uncertain prices. The NECEC transmission line is not necessary to export additional clean energy from Québec into external markets.

Hydro-Québec's proposal in response to the Massachusetts Clean Energy RFP explicitly states that it would supply energy to NECEC from existing generation resources, and not from new sources of renewable energy developed to serve the line. Given that Hydro-Québec would maximize its exports without NECEC and sell whatever excess energy that it had into external markets,³ Hydro-Québec would supply NECEC by simply shifting those exports into New England via NECEC at a higher contracted price. This shift in energy flows could create an offsetting impact in the other markets which would have to produce replacement energy, potentially resulting in offsetting carbon emissions. While Maine power plants would be forced to shut-down to accommodate energy flowing into NECEC, fossil fuel plants in other markets (including oil, natural gas and coal units), would fire-up in response to Hydro-Québec's shifting its energy sales, negating any potential climate benefits.⁴

Hydro-Quebec can and does buy energy from low-priced markets and then sells its "clean energy" at a higher price into other markets, potentially creating a similar impact

³ External markets into which Hydro-Québec sells energy includes Ontario, New Brunswick, New York, Mid-Continent ISO, PJM, and New England.

⁴ The relative carbon emissions impact of displacing New England generation with new generation in other markets depends on the carbon intensity of power plants on the margin in each market.



on carbon emissions in the atmosphere as if Hydro-Québec were generating power from fossil fuels directly.

As a result of its reservoir storage capability, Hydro-Québec can buy lower cost energy from markets where fossil fuel generators are operating, retain water in its reservoirs and then sell that water as hydropower at higher priced periods back into the same or other markets. This strategy was described publicly by the government of Québec back in 2004:

. . . Hydro-Québec is able to purchase electrical energy from neighbouring markets at lower prices during certain periods, and then resell it later to neighbouring networks at higher prices.⁵

Hydro-Québec continues to declare its ability to engage in the buy-low/sell-high arbitrage opportunities in its Annual Reports.⁶ At the Maine Public Utilities Commission (Maine PUC), CMP admitted on the record that the proposed power purchase agreements for energy via NECEC allow Hydro-Québec to use its existing resources and import/export interties to optimize profits.⁷ In this way, Hydro-Quebec can claim that the electricity it sells is “clean” hydropower even if it is buying fossil fuel electricity to enable those energy sales. There is no way for anyone in New England to know when this happens, even though Hydro-Quebec has publicly acknowledged that this is their business model. So long as NECEC can assign energy from its dams to New England, the Massachusetts contracts ignore how Hydro-Québec is managing its system to meet its energy sales obligations.

NECEC would suppress the development of new renewable energy generation in Maine which, in contrast to Hydro-Québec’s market-switching strategy, actually could lower greenhouse gas emissions and provide more local jobs and economic benefits than NECEC.

⁵ Ministère des Ressources naturelles, de la Faune et des parcs, Gouvernement du Québec. 2004. “The Energy Sector in Québec, Context, Issues and Questions,” p. 41.

⁶ Hydro-Québec Annual Report 2017, p. 48, “Hydro-Québec supplies the Québec market with electricity and also sells power on wholesale markets in Canada and the United States. In addition, it is active in arbitrage transactions.”

⁷ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Technical Conference Transcript (Aug. 1, 2018), pp. 21-25.



The proposed transmission project is a direct line from Québec into New England via Maine that does not allow other renewables in Western Maine to interconnect. NECEC is anticipated to consume the existing transmission availability and could make the cost of interconnection by in-state renewable resources to the ISO-NE system at a different point in Maine more expensive. This means that new renewable energy projects, such as solar arrays and wind projects, would not be able connect to the grid as easily and could be unable to compete with renewables in other states. In contrast to Hydro-Québec's energy flows through NECEC, potential Maine-based renewable energy projects would result in greenhouse gas reductions, would employ people in Maine and New England, and provide greater environmental benefit.

The Massachusetts contracts pay a higher price for energy than Hydro-Québec otherwise would earn by selling into other markets under current conditions. Although there are certain penalties if threshold levels of hydroelectric energy are not delivered, the contracts do not require the energy to be incremental to historical levels or to what Hydro-Québec currently can produce. Hydro-Québec is allowed to replace its "clean energy" with substitutes, even if it results in higher emissions.

Adjusting CMP's model to reflect lower runoff conditions while maintaining Hydro-Québec's exports at historical levels illustrates how and why Hydro-Québec would have to resort to diverting exports and greenwashing.

CMP's model assumes that heavy water conditions would continue throughout the term of the contract. Changing one simple assumption in CMP's model of Hydro-Québec's system while maintaining exports at levels experienced during the past five years indicates that energy supplied via NECEC could be required to divert exports into other markets and even engage in greenwashing to meet its obligations.

The reality, however, is that Hydro-Québec is not confined to a single strategy or objective over the course of the contract. Hydro-Québec will manage its system, sales, exports and opportunities according to water conditions, market prices and production constraints. Such optimization will include diverting sales into other markets and greenwashing, as required to optimize profits.

The Massachusetts contracts do not preclude Hydro-Québec from engaging in purchasing energy from other markets to supply NECEC. The net result could be higher emissions.

GREENWASHING AND CARBON EMISSIONS: UNDERSTANDING THE TRUE IMPACT OF NECEC

This report examines the environmental impact of the proposed New England Clean Energy Connect (“NECEC”) project on carbon emissions.¹

NECEC is a 1,200 MW high voltage direct current (“HVDC”) transmission line that would cross 145 miles of Maine natural resources from Bettie Township on the Québec border to Lewiston, Maine – of which 53.5 miles in Somerset Country would require construction of a new clearing along a previously undeveloped right of way. While this transmission project would have significant impacts on Maine’s natural resources and ecosystems, the focus of this report is on whether the project would have a net impact on carbon emissions globally.

Greenwashing

The term greenwashing was created in 1986 in response to an increase in marketing and advertising that created the perception that a company’s products, aims or policies were sustainable, clean and/or green, regardless of reality. The term greenwashing subsequently was applied to the electricity sector with respect to concerns that renewable energy claims did not reflect the true nature of the underlying energy source.

Hydro-Québec claims that NECEC will deliver 100% clean energy 100% of the time via NECEC.² This claim, however, is unsupported by the terms of the contracts with the Massachusetts utilities. Given Québec’s interconnections with other markets, NECEC effectively allows Hydro-Québec to divert its energy sales from other markets into New England for a higher contractual price. In addition, under the terms of the contracts with

¹ This report was commissioned by the Maine Renewable Energy Association (“MREA”), Natural Resources Council of Maine (“NRCM”), and Sierra Club.

- MREA: According to its website, “MREA leads the local and statewide policy debate on renewable energy generation in Maine, and works to ensure its efforts are united with those of its member companies.” <https://www.renewablemaine.org/>
- NRCM: NRCM is a “nonprofit membership organization protecting, restoring, and conserving Maine’s environment,” <https://www.nrcm.org/>
- Sierra Club: With over 3.5 million members and supporters focused on “defending everyone’s right to a healthy world,” the Sierra Club is “the most enduring and influential grassroots environmental organization in the United States.” <https://www.sierraclub.org/home>

² Commonwealth Magazine, John Carroll and Lynn St. Laurent, “Hydro-Quebec, Central Maine Power respond to critics,” September 8, 2018,

<https://commonwealthmagazine.org/opinion/hydro-quebec-central-maine-power-respond-to-critics/>



Massachusetts utilities, Hydro-Québec would not be precluded from purchasing energy from other markets to sell directly into NECEC or for purposes of conserving water in its reservoirs for future supply to NECEC at a later time.

The practice of purchasing energy from one market in order to sell it into another market as hydroelectric energy at a later time can be referred to as “greenwashing.” In effect, Hydro-Québec can procure supply from other markets in order to meet its clean energy obligations delivered via NECEC even though the environmental impact in those other markets could be the same as if the energy were supplied directly from fossil fuel generating resources. Massachusetts ratepayers effectively could be paying above-market prices for energy from existing resources outside of Québec that provide no incremental environmental benefit and could even increase carbon emissions.

There are many indicators that this project would not reduce carbon emissions and could even increase them. Hydro-Québec’s interconnected system with significant reservoir storage, makes the origin of the energy being sold through NECEC into Massachusetts difficult to confirm, and thus the true impact on carbon dioxide emissions impossible to measure. The following factors make it likely that this proposed transmission line will have adverse environmental consequences despite being marketed as a “clean” energy project:

- **Incentive and Opportunity to Buy Low and Sell High:** Hydro-Québec’s highly interconnected system configuration, especially with respect to other markets, creates opportunities for Hydro-Quebec to source the energy sold to Massachusetts via NECEC from other markets, where nuclear energy and fossil fuel generation is operating and effectively would supply Hydro-Québec’s purchases.
- **Potential for Increased Carbon Emissions in other markets:** The diversion of existing sales of hydroelectricity from other markets, for example in New York, New Brunswick or Ontario, could increase carbon emissions in those markets, offsetting or even exceeding claimed carbon benefits of NECEC in New England.³

³ The ultimate impact on total carbon emissions will depend on the relative carbon emissions intensity of the last plant required to generate energy or shut-down in response to Hydro-Québec’s activities. If the states in the Northeast pursue their stated carbon reduction goals, the relative impact should go to zero as relative carbon emissions across markets converge.



- **Displacement of Existing and New Maine Renewable Resources:** Maine's potential for new renewable resources will be adversely impacted, delayed and deferred as a result of NECEC.

The outcomes described in this report are not theoretical. Under realistic assumptions about water conditions, Hydro-Québec would not be able to maintain exports at 2017 levels with NECEC unless it diverted sales from other markets and engaged in greenwashing during the first half of the contract. Hydro-Québec has engaged in the described behavior in the past and has every incentive to engage in this behavior to optimize its profits going forward.

1. OVERVIEW OF NECEC

Central Maine Power is proposing to build a new transmission line to bring existing Canadian hydroelectric energy into New England via Maine. NECEC was developed in response to the Massachusetts solicitation for clean energy under Section 83D of the *Climate Protection and Green Economy Act*.⁴

Of the forty-six submissions to the Massachusetts Section 83D Request for Proposal ("RFP"), NECEC is one of three projects that proposed to supply existing hydroelectricity from Hydro-Quebec via new transmission lines into New England. Northern Pass Transmission (NPT) was selected initially and offered 1,200 MW; NECEC was the next choice after New Hampshire refused to site Northern Pass, also offering 1,200 MW; and TDI's New England Clean Power Link (NECPL) would have transmitted up to 1,000 MW of energy from Québec's existing hydroelectric power system.⁵ Aside from one other transmission project proposed by Emera, the forty-two (42) other projects included wind, solar, hydroelectricity or some combination, and includes renewable energy projects being developed in Maine.⁶

The assertion that NECEC supply would come from existing resources appears multiple times in Hydro-Québec's proposal in response to the Massachusetts clean energy request for proposal, as illustrated by the following excerpt.⁷

⁴ Mass. Gen. Laws Ch. 21N, Section 3(a – d).

⁵ See the public versions of the bid submitted for each project located on the Massachusetts Clean Energy website: <https://macleanenergy.com/83d/83d-bids/>.

⁶ Ibid.

⁷ See for example, pages 4, 6 and 56.



All of the hydroelectric generation units that comprise the HQ Hydropower Resources are in operation and, therefore, have already been constructed. Although new hydroelectric generation units may be added to the HQ Hydropower Resources portfolio in the future, **no new facilities or capital investments for hydroelectric generation units are required as part of this Proposal.**⁸

(emphasis added).

The RFP initially required bidders proposing to supply from existing projects to explain how the delivered energy would be incremental to historical levels. The requirement that the delivered energy be incremental also was incorporated into the template for the Power Purchase Agreement which defined “Qualified Clean Energy” to include “Incremental Hydroelectric Generation,” defined as:

“Incremental Hydroelectric Generation” means hydroelectric generation that represents a net increase in MWh per year of hydroelectric generation from the Seller as of the Effective Date as compared to the three-year historical average for the period January 1, 2014 through December 31, 2016 and/or otherwise expected delivery of hydroelectric generation from the Seller within or into the New England Control Area.⁹

Following negotiations between Hydro-Québec and the Massachusetts utilities, however, the signed version of the contract dropped the definition of “Incremental Hydroelectric Generation” and changed the definition of “Qualified Clean Energy” to exclude any reference to incremental hydroelectric generation.¹⁰ Furthermore, there is no requirement that total deliveries into New England versus the historical averages be incremental, only

⁸ HRE Section 83D Application Form, submitted July 27, 2017, p. 63 (emphasis added).

⁹ DRAFT* POWER PURCHASE AGREEMENT FOR FIRM QUALIFIED CLEAN ENERGY FROM HYDROELECTRIC GENERATION BETWEEN [_____] [Buyer] AND [_____] [Seller] As of [_____] , 201_ , p. 7.

¹⁰ See for example, *Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232*, Exhibit No. NECEC-16, POWER PURCHASE AGREEMENT FOR FIRM QUALIFIED CLEAN ENERGY FROM HYDROELECTRIC GENERATION BETWEEN MASSACHUSETTS ELECTRIC COMPANY AND NANTUCKET ELECTRIC COMPANY d/b/a NATIONAL GRID AND H.Q. ENERGY SERVICES (U.S.) INC., as of June 13, 2018, [REDACTED].



penalties if Hydro-Québec fails to meet the new set of requirements, which is described in Exhibit H to the power purchase agreement. Although Exhibit H is redacted, CMP witnesses testified before the Maine PUC in public session that Hydro-Québec does not have to make incremental delivery of power into New England, but can pay penalties instead.¹¹

The Maine PUC Technical expert, London Economics, testified that this ability to trade between markets and obtain a higher price is a “key motivator” for NECEC.¹²

Key Insight

The signed contracts do not require Hydro-Québec to deliver incremental energy from its existing hydroelectric projects. Instead, if it is economic or strategic to do so, Hydro-Québec can choose to not deliver incremental energy and pay penalties instead. The contracts do not monitor or preclude Hydro-Québec from engaging in purchases from other markets for its own domestic use to allow for sales of its hydroelectricity at a premium to Massachusetts utilities under the contracts.

The NECEC project, as submitted to the Section 83D RFP, is a collaboration between CMP and two wholly-owned subsidiaries of Hydro-Québec -- Hydro-Québec TransÉnergie (HQT) and Hydro Renewable Energy (HRE). HRE subsequently was replaced by Hydro-Québec US in the signed power purchase agreements, placing the obligation on a US-based affiliate of Hydro-Québec that has limited assets in the event of default.

Under publicly available contracts and proposals, the NECEC transmission line would have a capacity of 1,200 MW. HQT would build and operate the transmission line on the Québec side and CMP would build and operate the portion of the transmission line located in Maine. Hydro-Québec would make available to Massachusetts a minimum of 8.5 TWh up to 9.5 TWh of electricity per year at the discretion of the Massachusetts distribution utilities engaged in the procurement.¹³

¹¹ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Technical Conference Transcript (Aug. 1, 2018), pp. 28 – 35.

¹² *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Technical Conference Transcript (Sep. 19, 2018), pp. 21-25.

¹³ Section 83D, Request for Proposal Application Form, submitted by Hydro Renewable Energy Inc., p. 3, <https://macleanenergy.com/83d/83d-bids/>

Figure 1 illustrates the proposed path of the NECEC project and interconnection between Québec and Lewiston, Maine.

Figure 1: Proposed NECEC Project¹⁴



The injection point at Lewiston, Maine, is not ideal. Maine is connected to the ISO-NE system through a long high voltage AC line and energy must pass through at least four interfaces before arriving in Massachusetts. The Maine generation system produced only 11.5 TWh of energy in 2017 compared to 17 TWh in 2010. According to the U.S. EIA,

¹⁴ NECEC, <https://www.necleanenergyconnect.org/map>



electricity imports from Québec that already have occurred are one of the reasons for the reduction in Maine generation:

Maine’s Renewable Portfolio Standards (RPS) require electricity providers to fuel 30% of their electricity generation with renewable resources. In addition to policy initiatives, electricity imports from Canada—notably from Quebec—have been contributing an increasingly larger share to Maine’s total generation, displacing natural gas-fired generation as the primary source. Since 2012, electricity imports from Canada have more than tripled . . .¹⁵

Imports into Maine from Québec already have displaced a significant portion of Maine’s natural gas plants. NECEC would continue the trend of displacement by nearly matching the total amount of energy generated by Maine power plants in 2017. If NECEC were to proceed injection of such a significant amount of energy into Maine, Maine’s existing generators, including biomass plants, will be displaced. NECEC also will have an adverse impact on transmission availability, congestion and losses. As a result, new renewable energy generation would find it more costly to connect to the system in Maine for delivery into the rest of New England. These higher interconnection costs would make it more difficult for Maine renewable resources to compete with the rest of New England.

Under the agreement with Hydro-Québec, CMP would build the transmission line on the Maine portion of the line. CMP anticipates the need to invest in a number of transmission upgrades to incorporate NECEC into the system; a critical part of the existing ISO-NE transmission system, Surowiec-South, currently has only 200 MW of availability for incremental energy flows without upgrades.¹⁶ CMP’s proposed upgrades, however, would simply move congestion down to the Maine-New Hampshire Interface which has an interface limit of around 1,900 MW and does not have enough capacity to flow NECEC out of Maine in all hours without the additional cost of congestion and incremental line losses.¹⁷

¹⁵ EIA Form 923 data, https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/

¹⁶ ISO-NE, Final Maine Resource Integration Study (“MRIS”), March 2018, Available at https://www.iso-ne.com/staticassets/documents/2018/03/final_maine_resource_integration_study_report_non_ceii.pdf

¹⁷ *Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. TLB-1, “Testimony of Tanya L. Bodell,” April 30, 2018.*



The total cost for CMP’s transmission line build-out and upgrades is estimated to be \$950 million. Under the proposed structure, Maine ratepayers would not be responsible for any payments to build the transmission line. However, Maine ratepayers also would not obtain any direct rights to capacity on the transmission line or energy being delivered across NECEC. Therefore, any benefit to Maine that could result from the proposed transmission line would be indirect impacts.

Given the global nature of carbon emissions, the impact on Maine’s carbon emissions alone or even New England’s carbon emissions across the broader region cannot be examined without consideration of the impact on surrounding areas. In assessing the net impacts of NECEC on carbon dioxide emissions, therefore, it is necessary to consider the total impact of NECEC across multiple markets.

Key Insight

NECEC does not offer any direct benefits to Maine residents. Whereas Massachusetts is estimated to receive hundreds of millions of dollars in direct benefits, Maine would not receive any direct benefits associated with energy deliveries dedicated to Maine ratepayers. Instead, the potential impact of NECEC to Maine includes the net impact of NECEC on global emissions and should be examined across multiple markets.

2. SOURCE OF QUÉBEC HYDROELECTRIC SUPPLY

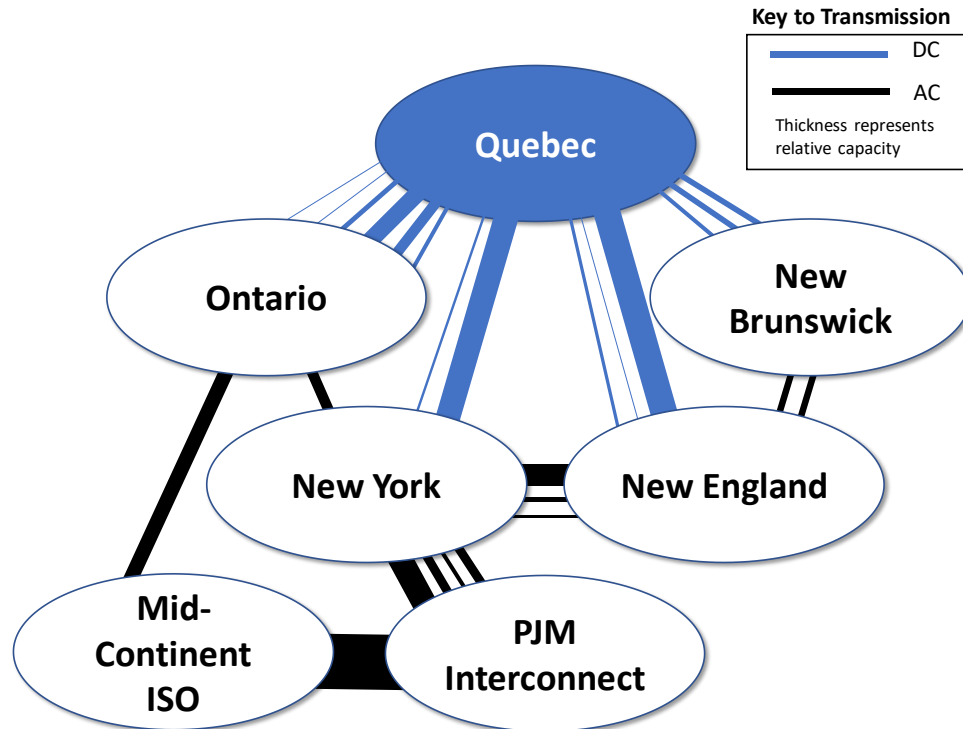
Hydro-Québec owns and operates a large system of hydroelectric generation and other power generating capabilities along with an extensive transmission network. In order to understand how Hydro-Québec is likely to supply energy via NECEC, it is important to understand the current and anticipated state of its system, the amount of excess energy it could produce with or without NECEC and what Hydro-Québec otherwise would do with that energy in the absence of NECEC.

This section provides a high-level summary of the Hydro-Québec system; Appendix B provides a more detailed overview.

2.1 Québec is interconnected with multiple markets

Québec is physically interconnected to four other markets via DC tielines – New England, Ontario, New York and New Brunswick (**Figure 2**).

Figure 2: Interties and transmission lines between Québec and major markets



In addition, by wheeling through other markets, Hydro-Québec can sell into PJM and the Mid-Continent ISO -- two markets that are explicitly listed in Hydro-Québec's application for a blanket export license.¹⁸ Both New York and New Brunswick connect with New England via an AC transmission interconnection, allowing Hydro-Québec to sell energy into New England via New York and New Brunswick. In addition, Hydro-Québec can and does sell into New York via Ontario.¹⁹

The ability to purchase from other markets and store an equivalent amount of energy by

¹⁸ National Energy Board, Application by Hydro-Québec, "Application for a Blanket Electricity Export Permit Pursuant to s.119.03 of the National Energy Board Act and s.9 of the National Energy Board Electricity Regulations," Application Submission Date 19/02/2010, p. 4.

"(3) Provide a brief description of the export markets (e.g. geographic area, NERC region, etc.) to be served. Les marchés visés sont les marchés nord-américains desservis par le New York Independent System Operator, Inc., l'ISO New England Inc., le Midwest Independent Transmission System Operator, Inc. et la PJM Interconnection, LLC."

¹⁹ National Energy Board, Analysis of Commodity Tracking System Data,

<https://apps.neb-one.gc.ca/CommodityStatistics/Statistics.aspx?language=english>

reducing flow through its turbines provides valuable flexibility to Hydro-Québec. This flexibility is particularly profitable during low water conditions when Hydro-Québec would have less energy to sell into external markets or high-priced years when the difference between peak and off-peak energy prices is greater.

The higher-priced, long-term NECEC contract is an example of the way Hydro-Québec can arbitrage between markets – buying low in one market and then reselling that energy at a higher price elsewhere. The above-market price of the contracts with Massachusetts utilities also would allow Hydro-Québec to maximize profits through optimization of its imports and exports while selling under a lucrative long-term contract.

2.2 The National Energy Board issues energy export licenses

In order to sell any energy commodity products into the US, Hydro-Québec must obtain a license from the National Energy Board (NEB). The NEB considers a number of factors before issuing a license, including:

- **Other Provinces:** Whether or not there could be adverse consequences to other provinces in Canada; and
- **Environment:** Impact on the environment.

As explained below, these requirements, combined with the characteristics of Hydro-Québec's system, makes it very clear that Hydro-Québec would have to divert sales from other markets in order to deliver electricity products via NECEC (thereby negating any impact on carbon emissions) and/or purchase electricity products from other markets in order to meet its firm commitments under the Massachusetts contracts (i.e., greenwashing).

2.2.1 Other Provinces

Specific export licenses for Hydro-Québec indicate that the NEB also looks at whether or not there would be an adverse impact on other provinces. The license issued to Hydro-Québec for contractual sales to Vermont specifically notes in the preamble:

AND WHEREAS the Board is satisfied that the parties interested in buying electricity for consumption in Canada have been given fair market access to any electricity proposed for export under this permit;



AND WHEREAS the Board is satisfied that the proposed exports will not cause any unacceptable effects on provinces other than those from which exports will occur;²⁰

The focus on potential impacts on other Canadian provinces could make it difficult for Hydro-Québec to reduce sales into Ontario or New Brunswick or engage in behaviors that could adversely impact those provinces. Therefore, the bulk of the export reductions could come from New York.

2.2.2 Environment

The NEB also is tasked with considering the environment and would be required to perform a detailed review of potential environmental impacts if the proposed source of energy sales is to come from new generation facilities. In the case of the 10-year blanket export license issued to Hydro-Québec in 2010 for up to 30 TWh of firm and interruptible energy for export, the NEB specifically noted:

Regarding the impact of the proposed exportation on the environment, the Board is of the view that there is no nexus between the proposed export and new facilities, changes to existing facilities, or modifications to the operation of existing facilities and environmental effects. As a result, the Board is satisfied that further consideration of the environmental effects of the proposed export is not required.

To ensure that a potential nexus would not arise in the future, the Board has incorporated a condition into the permit, which in relation to any single export contract, limits the ability of the Applicant to rely on the permit to a maximum period of five years. The Board is of the view that a sales contract of five years or less is not sufficient to support the construction of new facilities or modifications to existing facilities, to serve the demands of an export contract.²¹

²⁰ National Energy Board, Permit EPE-370, IN THE MATTER OF section 119.03 of the National Energy Board Act (the Act) and the regulations made thereunder; and IN THE MATTER OF an application by Hydro-Québec for authorization to export electricity to H.Q. Energy Services (U.S.) Inc. dated 4 March 2010 by Hydro-Québec for authorization to export electricity to H.Q. Energy Services (U.S.) Inc., pursuant to section 119.03 of the National Energy Board Act (the Act), Issued August 18, 2011.

²¹ National Energy Board, "Letter accompanying the issuance of a licence in response to Application dated 19 February 2010 for authorization to export electricity pursuant to Section 119.03 of the National Energy Board Act (Act)1 by Hydro-Québec," October 29, 2010, p. 3.



In this context, it is understandable why Hydro-Québec so clearly indicated that it would only supply energy from its existing portfolio of hydroelectric projects that already are built for purposes of the Clean Energy RFP – to say otherwise may run afoul of the NEB licensing requirements. If supply were to be from new construction, the NEB could require an extensive environmental review.

2.3 Québec's energy versus capacity

In order to understand the source of Hydro-Québec's energy into New England via NECEC, an examination of Hydro-Québec's system – both energy and capacity -- is in order. Capacity is provided by existing or planned generating plants that could be available to generate electrical energy when needed. Energy is the electricity that flows when those generating plants are operating. The distinction is important because the contracts with Massachusetts are for energy only – not capacity.²²

Furthermore, the contracts are for firm energy; firm energy that is not backed by specified resource capacity needs to be firmed with another resource. In this case, Hydro-Québec's system and the ability to optimize energy purchases and sales across its four system interties could provide the firming without the need to dedicate specific hydroelectric units to the contract. This section explains further why the contracts with the Massachusetts utilities are for firm energy only and the implications for greenwashing and carbon emissions.

Québec's system is a winter-peaking system and, as such, Hydro-Québec is required to maintain generation capability above its peak demand in the winter. However, water flow is at its lowest during the winter months, requiring Québec to rely on stored water in its reservoirs to produce energy. Therefore, Hydro-Québec's energy production capacity is limited by its already-built generation capacity and reservoir levels.²³

²² Although the contracts require Hydro-Québec to attempt to qualify to provide capacity into the ISO-NE market, there is no penalty if such capacity is not available or does not clear the market, "For the avoidance of doubt, but without limiting the condition set forth in Section 3.4(b)(ii), **Seller shall have no obligation during the Services Term** to pay for such Network Upgrades or **to complete the Forward Capacity Auction qualification process**" (emphasis added).

²³ As with any large hydroelectric system operator, Hydro-Québec manages its reservoir levels to be able to meet its energy needs over the course of the year and under adverse run-off conditions over multiple years as well as during peak periods.

The North American Electric Reliability Council (NERC) projects that Québec could be short of its required reserve margins by 2024 unless another 1,100 MW of prospective resources are obtained.

Under the Prospective Scenario, a total of 1,100 MW of expected capacity imports are planned by the Québec area. These purchases have not yet been backed by firm long-term contracts. However, on a yearly basis, the Québec area proceeds with short-term capacity purchases (UCAP) in order to meet its capacity requirements if needed.²⁴

In other words, Québec is projected to require nearly the equivalent of NECEC's potential capacity by 2023 according to NERC. If Hydro-Québec must purchase capacity to meet its own provincial needs, it would not be able to sell capacity into another market such as ISO-NE unless it is purchasing sufficient capacity from other markets.²⁵ In fact, Hydro-Québec already appears to be engaging in capacity arbitrage – purchasing short-term capacity from New York's UCAP market and Ontario (500 MW), and selling 462 MW into the higher-priced ISO-NE Forward Capacity Market ("FCM") for FCA9 (June 2018 –May 2019).²⁶

ISO-NE explicitly requires that a resource bidding into the capacity market as a New Import Capacity Resource backed by an external control area such as the Québec system to show that its load and capacity projections for the external Control Area has sufficient excess capacity to back the bid.²⁷ If Hydro-Québec intends to rely on specific generating

²⁴ NERC, 2017 Long-term Reliability Assessment, pp. 55-56, Under the prospective scenario, a total of 1,100 MW of expected capacity imports are planned by the Québec area, although these purchases have not yet been backed by firm long-term contracts.

https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_12132017_Final.pdf

²⁵ Ibid., pp. 53-54. Ontario also will not be in a position to renew the current sale of 500 MW of capacity to Québec.

²⁶ ISO-NE, "Forward Capacity Auction Capacity Obligations," <https://www.iso-ne.com/markets-operations/markets/forward-capacity-market/>

²⁷ See ISO-NE Market Rules (Effective Date, 9/28/2018 - Docket # ER18-2078-000), Market Rule 1, Section 13, paragraph III.13.1.3.5.3:

III.13.1.3.5.3. Imports Backed by an External Control Area. . .

If the New Import Capacity Resource will be backed by an external Control Area and the capacity will be imported over an Elective Transmission Upgrade and the capacity will be imported over an interface that has not achieved Commercial Operation as defined in



resources to bid power, those resources must be identified and shown to be unencumbered from other capacity supply obligations.²⁸

The shortfall in capacity does not correspond to a shortfall in energy because Québec has reservoirs and can store water to generate excess energy across the year whereas capacity requirements are an instantaneous need at the point of peak demand on the system. Given the natural flows of precipitation and snow melt in Québec, the province is flush with water in the late spring and early summer months. That water is used to produce energy as well as to replenish the reservoirs for the winter. Water is converted into energy and sold into other markets in order to maximize profits.

In addition to energy sales, Hydro-Québec also engages in arbitrage opportunities where it purchases from one market at a lower price and either sells directly into another market or stores the purchased energy in the reservoir in order to sell energy at a later time.

Figure 3 illustrates how Hydro-Québec has used purchased energy imported into Québec historically to support its export sales into other markets. For example, in 2010, imports supported nearly half of its exports (10.7 TWh imported versus 23.3 TWh exported). Without those purchases, Hydro-Québec either would have had to reduce exports or fall below minimum reservoir levels.²⁹

Schedule 25 of Section II of the Transmission, Markets and Services Tariff, the provisions regarding site control (Section III.13.1.1.2.2.1) and critical path schedule (Section III.13.1.1.2.2.2) shall apply in addition to the requirement that the Project Sponsor **submit system load and capacity projections for the external Control Area showing sufficient excess capacity during the Capacity Commitment Period to back the New Import Capacity Resource for the length of the multi-year contract** (emphasis added).

²⁸ Ibid, Section III.13.1.3.5.2.

²⁹ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Response to NRCM-002-021, Attachment 1.



Figure 3: Hydro-Québec total exports and imports³⁰

Year	[1] Exports (TWh)	[2] Imports (TWh)	[3] Net Exports (TWh)
2008	21.3	6.1	15.2
2009	23.4	4.9	18.5
2010	23.3	10.7	12.6
2011	26.8	6.0	20.8
2012	31.8	1.7	30.1
2013	32.2	1.4	30.8
2014	26.6	1.2	25.4
2015	29.9	0.6	29.3
2016	32.7	0.1	32.6
2017	34.9	0.5	34.4

NOTES:

[1] See “Hydro-Québec at a Glance, p. 2 across the Annual Reports for a consistent set of data on electricity sales outside of Québec. For 2012 and earlier, there is conflicting information in other areas of the report, which is ignored for purposes of developing this table.

[2] Derived as the difference between reported Exports and Net Exports.

[3] Net Electricity Exports, p. 12 (2016 Annual Report), p. 12 (2014 Annual Report).

As a general proposition, Québec has excess energy over the course of the year that it can sell into other markets at a profit and already is doing so. Revenue from sales to external markets has exceeded \$1.5 billion over the past few years.³¹ In 2017, Hydro-Québec earned \$1.575 billion from electricity exports and issued more than \$2 billion back to the Québec government as a dividend for the fifth consecutive year.³² Selling exports has become a necessity for Hydro-Quebec, as indicated by Hydro-Québec CEO Éric Martel’s recent comment, “Without exports, our profits are in trouble.”³³

³⁰ Compiled using Hydro-Québec Annual Reports 2012 – 2017.

www.hydroquebec.com/about/financial-results/annual-report.html

³¹ Hydro-Québec Annual Reports.

³² 2017 Hydro-Québec Annual Report, p. 3,

<http://www.hydroquebec.com/data/documents-donnees/pdf/annual-report.pdf>

³³ Financial Post, “Without exports our profits are in trouble: Hydro-Quebec plugs into U.S. markets for growth,” April 20, 2018, <https://business.financialpost.com/commodities/energy/without-exports-our-profits-are-in-trouble-hydro-quebec-plugs-into-u-s-markets-for-growth>.

The Massachusetts contracts represent a higher value opportunity for Hydro-Québec than their existing exports because it is an above-market, fixed price contract. It is an arbitrage opportunity across markets that Hydro-Québec describes in its Annual Reports as an activity in which it engages. As the Maine PUC Technical Expert noted,

With a new outlet for its energy, such as NECEC, HQP will have an increased ability to capture higher energy prices in ISO-NE's energy markets, forfeiting sales to other lower-priced markets . . . This arbitrage opportunity is the core of HQP's exporting strategy and the key motivator for HQP in contracting with NECEC.³⁴

2.4 Economic Incentives to Buy, Divert or Build

There are multiple ways that Hydro-Québec could meet its firm energy commitment to NECEC:

- 1) **Buy:** Purchase energy directly from other markets.
- 2) **Divert:** Reduce energy sales into other markets.³⁵
- 3) **Upgrade:** Invest in existing hydroelectric facilities to obtain higher maximum output levels.
- 4) **Build:** Invest in new impoundments and associated hydroelectric facilities to increase system output.

Hydro-Québec's response to the RFP indicated that Hydro-Québec would use only existing facilities; there would be no upgrades or new facilities required to meet the requirements in the contracts.³⁶ A new license with the NEB also would have to use existing facilities or be subject to an extensive environmental impact review. According to

³⁴ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Technical Conference Transcript (Sep. 19, 2018), pp. 21-25.

³⁵ Rob Ferguson, *The Star*, "Ontario signs deal for electricity from Quebec in bid to defuse anger over hydro bills," October 21, 2016, <https://www.thestar.com/news/queenspark/2016/10/21/ontario-signs-deal-for-electricity-from-quebec-in-bid-to-defuse-anger-over-hydro-bills.html>.

³⁶ HRE Section 83D Application Form, submitted July 27, 2017, pp. 4, 6, 56, and 63.

Hydro-Québec's own study, a new facility would cost more than the contract price for at least the first half of the contract, making it an uneconomic solution at least initially (see Appendix B, **Figure B - 10**). Furthermore, a new hydroelectric facility in Québec would take around 10 years to build, well into the NECEC contract period even if it could be economically justified.

Hydro-Québec would not be able to use the upgrades for NECEC. The response to the RFP explicitly noted that no new upgrades would be required.³⁷ Furthermore, Hydro-Québec's own load projections indicate that it would need around 6.2 TWh of upgrades to meet incremental load by 2023; additional load growth through 2034 would require the entirety of potential upgrades to keep sales into other markets constant during the 20-year NECEC contract period.³⁸

CMP has argued that Hydro-Québec has sufficient water in storage to supply NECEC without diverting sales into other markets.³⁹ This conclusion, however, is based on the assumption that recent high water conditions will continue; under an assumption of lower runoff conditions, Hydro-Québec would need to divert sales to meet its obligations to supply NECEC (see Appendix B, section B.5). Furthermore, there is no reason why Hydro-Québec would not sell any available energy that it had in the absence of NECEC, subject to economic prices and transmission availability, which is plentiful and has not been fully utilized in the past (see Appendix B, section 8.3).

Therefore, in order to supply NECEC, Hydro-Québec would either have to divert sales that otherwise would occur and/or purchase energy from other markets.

³⁷ Ibid., p. 63.

³⁸ Hydro Québec, *Deep Decarbonization in the Northeastern United States and Expanded Coordination with Hydro-Québec*, April 2018, pp. 27-28 ("Load in Québec was assumed in all scenarios to grow by 0.42% per year for a total increase of 28.7 TWh between 2015 and 2050."). If, as reported in footnote 5, 144 TWh of hydroelectricity is available, there would be only 13 TWh of additional energy available through upgrades. This amount would be consumed by Québec load growth by around 2034 given the 0.42% load growth assumed by the study.

³⁹ *Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect*, Maine P.U.C. No. 2017-000232, Rebuttal Report of Dickinson, et. al., July 13, 2018, pp. 30 – 35.

Key Insight

It would be uneconomic for Hydro-Québec to build new hydroelectric facilities to meet the need of NECEC energy supply under current conditions. This buttresses the case that Hydro-Quebec would not provide new renewable energy and therefore NECEC would not lower greenhouse gas emissions.

Under the Massachusetts contracts, Hydro-Québec receives an energy price that starts at \$51.50 / MWh in 2023 and rises to around \$82.40 / MWh in 2042. The starting price is lower than the cost of building new facilities which Hydro-Québec assumes to be \$70/MWh.⁴⁰ Instead, Hydro-Québec would simply divert energy from other markets which have been trading at between \$20 and \$40/MWh, consistent with futures prices for energy to be delivered into New York (see Appendix B, **Figure B - 12** and **Figure B - 13**). Although upgrades could cost less, those reported upgrades already are required to meet Québec's domestic load growth. Therefore, it would be more economic for Hydro-Québec to divert lower-priced energy sales from other markets into NECEC or greenwash low-priced purchases.⁴¹

Key Insight

Given the stated source of this energy and economic incentives, the natural source of supply would be a diversion of energy away from other markets.

3. GREENWASHING: SOURCING PURCHASES FROM OTHER MARKETS

Hydro-Québec also could purchase energy from markets with low or even negative prices to meet its energy commitments. The ability to purchase imports in order to conserve water in its reservoirs for use during higher-priced periods creates a profit-maximizing opportunity that Hydro-Québec is uniquely positioned to pursue. The impact on the environment could be the same as if Hydro-Quebec were generating energy in those

⁴⁰ Energyzt confirmed that all dollar figures in the Deep Decarbonization study are in US dollars via conversation with Evolved Energy Research, one of the authors of the report.

⁴¹ Hydro-Québec notes in its Section 83D application form that it may upgrade or build new facilities in the future, but that these are not required to supply NECEC. Given Hydro-Québec's need for new capacity, if any upgrades or capacity additions could occur regardless of NECEC, then they should be incorporated into the scenarios with and without NECEC when estimating the impact of NECEC on carbon emissions.

markets from fossil fuels directly. This section describes how Hydro-Québec has engaged in greenwashing in the past and is incentivized to continue to do so in the future.

3.1 Hydro-Québec's strategic plays across markets

The ability to buy-low and sell high is an arbitrage opportunity, and is cited in Hydro-Québec's annual reports as an activity that it engages in along with selling energy into other markets.⁴² Hydro-Québec has engaged extensively in such arbitrage opportunities in the past, purchasing nearly 50 percent of its exports in 2010 (Appendix B, **Figure B - 6**). Such purchased energy is likely to include carbon-emitting resources.⁴³

This strategy has been a long-standing approach for Hydro-Québec, referenced in 2004 by the Government of Québec:

Hydro-Québec is able to purchase electrical energy from neighbouring markets at lower prices during certain periods, and then resell it later to neighbouring networks at higher prices. If rainfall conditions permit, and once Québec's own energy security has been guaranteed, Hydro-Québec Production's unused supplies can be exported (net export sales) to neighbouring markets.⁴⁴

While this type of arrangement can help Hydro-Quebec to maximize its profits, it also creates a “greenwashing” situation where Hydro-Quebec can create the perception that its energy is clean and renewable when it is not. Specifically, Hydro-Quebec's interconnectedness would allow the NECEC energy to appear to come from Hydro-Québec's hydroelectric plants when, in reality, such excess energy was only enabled through purchases from fossil fuel plants.

⁴² For example, see 2017 Hydro-Québec Annual Report, Notes to Consolidated Statements, p. 50 of 94.

⁴³ Many of the surrounding markets have stated objectives to decarbonize the grid in order to achieve lower carbon emissions from the power sector. This decarbonization would make the impact of import/export optimization converge over time.

⁴⁴ Ministère des Ressources naturelles, de la Faune et des parcs, Gouvernement du Québec. 2004. The Energy Sector in Québec, Context, Issues and Questions. p. 41.

3.2 Greenwashing is possible under the contracts

The Massachusetts contracts have no way to monitor, prevent, or penalize Hydro-Québec for engaging in purchases from other markets in order to conserve water in its reservoirs for sale through NECEC. Although the Massachusetts contracts do require Hydro-Québec to “tag” its electrons through the ISO-NE Generation Information System (GIS), the tracking system simply tags imports from Hydro-Québec as coming from a specific hydroelectric facility. However, the GIS does not track Hydro-Québec’s total system dispatch or decisions.

Under the contracts with Massachusetts utilities, Hydro-Québec is not required and therefore is unlikely to provide the details for its entire system operations, energy imports and energy sales. Without an understanding of Hydro-Québec’s entire system, it will look as if the Massachusetts utilities are purchasing hydroelectricity when, in fact, those purchases may be enabled by purchases from other markets that allowed Hydro-Québec to conserve the water in its dams for production when NECEC supply was required.

The inability to track energy flows into and out of Hydro-Québec’s system allows Hydro-Québec to effectively “greenwash” any energy it purchases from other markets and convert it into “clean energy” for purposes of its contracts. At best, Hydro-Québec would be receiving the system mix which would include whatever was operating at the time of the purchases. In reality, Hydro-Québec’s purchases from other markets could be enabling carbon-emitting resources to operate when they otherwise would be turned off. For example, low cost coal from New Brunswick or natural gas from New York could be the incremental plant’s fuel source that effectively allows Hydro-Québec to purchase from another markets in order to conserve water to service NECEC. Under such conditions, NECEC actually would be increasing fossil fuel use in other markets outside of ISO-NE that would not have occurred in the absence of NECEC.

There is no reason to assume that Hydro-Québec would not engage in the same strategy that it described in 2004, and clearly executed upon from 2008 through 2012, referenced in its annual reports as recently as 2017 and could pursue without penalty under the Massachusetts contracts. As a result, Massachusetts ratepayers would be paying multiples on the market price for something that is not truly Québec hydroelectricity. Hydro-Québec effectively would be an expensive broker purchasing energy that Massachusetts ratepayers otherwise could obtain through competitive markets.

Key Insight

The higher price in the NECEC contract and the inability to accurately account for the Hydro-Quebec system creates perverse incentives for Hydro-Québec to engage in arbitrage opportunities by purchasing cheaper and, potentially, higher emitting energy from other markets to meet the NECEC firm energy supply obligations.

3.3 NECEC energy may not come from Québec

The risk of Hydro-Québec engaging in buy-low/sell-high opportunities is not theoretical. Futures prices in New York for peak hours are trading at around \$41/MWh for 2023; off-peak prices would be even lower.⁴⁵ It therefore would be economic for Hydro-Québec to divert energy away from New York to sell via NECEC.

The estimated energy price discrepancy between market prices and energy prices in the NECEC contract undoubtedly will incentivize Hydro-Québec to ensure that there is enough water in its reservoirs to meet the requirements of the GIS tracking system and contract requirements to be able to claim that its energy supply via NECEC is “clean energy.”⁴⁶ Although it would appear that the energy was coming from Québec, it actually would have been sourced from another market either via diversion of exports or purchases from lower-priced markets.

Key Insight

Hydro-Québec has every incentive to arbitrage between markets, and already does so. The lucrative arrangements under the NECEC contract create an even greater incentive for Hydro-Québec to greenwash energy by buying from other markets to supply NECEC.

⁴⁵ CME Group, NYISO Zone A Day-Ahead Peak Calendar-Month 5 MW Futures Quotes, October 11, 2018, <https://www.cmegroup.com/trading/energy/electricity/nyiso-zone-a-5-mw-peak-calendar-month-day-ahead-lbmp-swap-futures.html>.

⁴⁶ The actual price for energy under the NECEC contract has been disclosed to the public as part of the filings to the Massachusetts Department of Public Utilities. The energy price starts at around \$51 / MWh in 2023, rising to around \$82 in 2043. Adding in transmission charges over NECEC, the delivered energy price in Lewiston starts at \$66/MWh, rising to around \$103/MWh in 2042. In addition, Massachusetts ratepayers would have to pay for the cost of transmission, including congestion and losses, required to bring the energy from Lewiston, Maine into Massachusetts.



3.4 No guarantee that NECEC would be incremental to New England

The Massachusetts contracts do not guarantee that energy flowing through NECEC would be incremental.

The Massachusetts RFP originally required hydroelectric imports to be “incremental to New England” and required a showing of what Québec’s imports into New England has been over the prior three years.⁴⁷ The template for the contract included as part of the RFP also included a definition for incremental energy to be delivered:

“Incremental Hydroelectric Generation” means Firm Service Hydroelectric Generation that represents a net increase in MWh per year of hydroelectric generation from the bidder and/or affiliate as compared to the 3-year historical average and/or otherwise expected delivery of hydroelectric generation from the bidder and/or affiliate within or into the New England Control Area.

However, the final contracts excluded the entire definition of “Incremental Hydroelectric Generation.” Although the contract does include penalties for Hydro-Québec’s failure to deliver adequate amounts of “clean energy” under the Attachment H to the contract, the penalties are limited, allowing Hydro-Québec to make an economic decision as to how to manage its system to optimize profits taking into account the opportunity costs of sales into other markets versus NECEC.

Key Insight

Hydro-Québec’s system characteristics plus the AC transmission connections between those interconnected markets and a contract that does not even have a definition for “Incremental Hydroelectric Generation” makes it difficult to track and ascertain the true source of Hydro-Québec’s energy that would flow via NECEC. There is no guarantee that the energy would be incremental. There is no guarantee that it would come from Québec. There is no guarantee that it would be “clean” and there is no guarantee that total carbon emissions would be reduced.

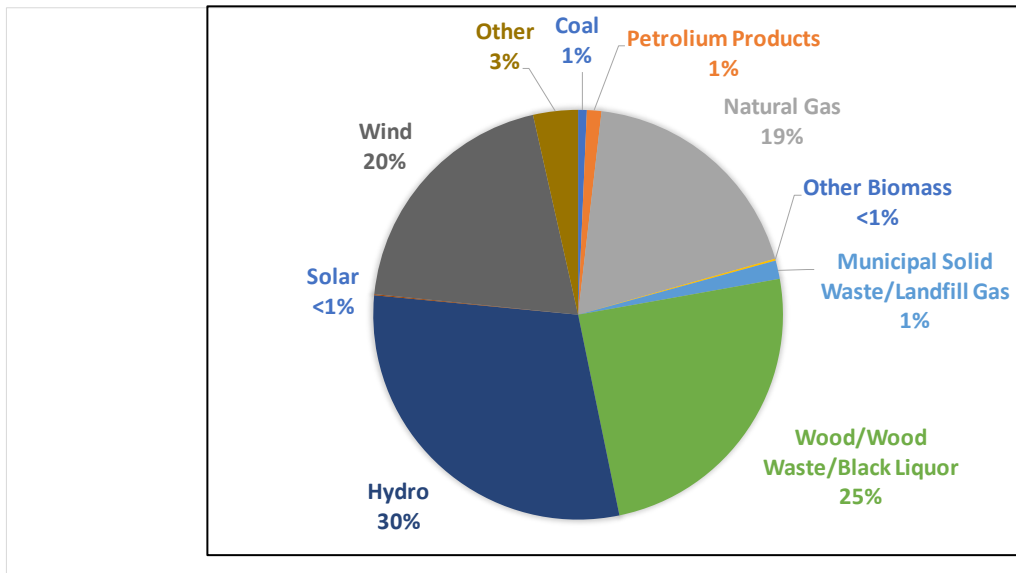
⁴⁷ NECEC Section 83D Application Form, p. B (redacted).

4. ADVERSE IMPACT ON MAINE RENEWABLES

Another adverse environmental impact of NECEC relates to its consequences on the development of renewable resources in Maine. According to the U.S. Energy Information Administration, Maine’s in-state retail customers consumed around 11.5 TWh of energy in 2016.⁴⁸ ISO-NE’s load forecasts underlying the 2018 CELT report project that Maine load will total around 13.5 TWh in 2023.⁴⁹ Regardless, adding 9.5 TWh to a system with nearly equivalent amount of supply and demand could be extremely disruptive to existing and new resources.

In 2017, approximately 75 percent of the electrical energy produced was from renewable resources (**Figure 4**).⁵⁰

Figure 4: Maine generation mix by fuel type⁵¹



⁴⁸ U.S. EIA, State Profiles, Maine, <https://www.eia.gov/electricity/state/maine/>

⁴⁹ ISO-NE, 2018-2027 Forecast Report of Capacity, Energy, Loads, and Transmission (CELT), <http://isonewswire.com/updates/2018/5/8/2018-forecast-of-capacity-energy-loads-and-transmission-is-p.html>

⁵⁰ U.S. EIA, State Profiles, Maine, <https://www.eia.gov/state/?sid=ME>

⁵¹ Energyzt analysis of <https://www.eia.gov/electricity/data/eia923/> and <https://www.eia.gov/state/print.php?sid=ME>

Maine frequently exports energy from its diverse system mix to the rest of New England across long transmission lines, especially when natural gas supply is constrained during extreme winter conditions.

According to the US EIA, the amount of Maine-based generation output declined over the past decade partially due to increasing imports from Québec.

Maine’s Renewable Portfolio Standards (RPS) require electricity providers to fuel 30% of their electricity generation with renewable resources. In addition to policy initiatives, electricity imports from Canada—notably from **Quebec—have been contributing an increasingly larger share to Maine’s total generation, displacing natural gas-fired generation as the primary source. Since 2012, electricity imports from Canada have more than tripled**, increasing from 0.8 GWh in 2012 to 2.7 GWh in 2017.⁵²

(emphasis added).

NECEC would bring even more Québec imports directly into Maine and would have adverse impacts on existing and future renewable developments in Maine. Existing renewable resources – primarily biomass and hydroelectric dams in Maine – could face reductions to energy margins as a result of NECEC. New renewable developments would face higher costs to connect and higher price premiums, making them less competitive than potential similar renewable developments in other New England locations outside of Maine.

4.1 Reduced operating margins

Adding around 9.5 TWh into Maine’s system would have adverse consequences for Maine’s existing renewable resources, particularly biomass and hydroelectric generators. NECEC would decrease energy prices that those plants receive from ISO-NE for energy they generate and reduce the energy margins required to keep the plants operational.⁵³

⁵² US EIA, Natural Gas Weekly Update, “Renewables surpass natural gas as the primary electricity-generating source in Maine,” https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/.

⁵³ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. TLB-1, Prepared Surrebuttal Testimony of Tanya L. Bodell, August 17, 2018, p. 8.



The total impact of potentially lower prices would be less than 0.6 percent of an average Maine residential ratepayer bills.⁵⁴ Most of the decrease in energy prices to Maine ratepayers would be due to increased congestion and losses tied to transporting so much more energy out of Maine into the rest of New England.⁵⁵ In effect, the majority of any potential energy price reduction resulting from NECEC is due to inefficiencies tied to the higher waste of energy through increased losses.⁵⁶

Key Insight

NECEC would adversely impact existing renewable resources in Maine for very little economic and carbon emissions benefit.

4.2 Higher costs for Maine renewables to connect to ISO-NE

A recent study performed by ISO-NE estimated that there is currently around 200 MW of capacity available for new renewables to connect in Western Maine and an additional 600 MW of estimated transmission capacity that can be accessed with upgrades.⁵⁷ NECEC's Section 83D Application Form claims that it can increase the capacity at the Surowiec-South line with upgrades by 1,000 MW. Regardless, the fact that NECEC would use the 200 MW of existing headroom and add only the incremental amount it requires leaves little excess transmission capability for Maine renewables under development.⁵⁸

⁵⁴ This calculation assumes a delivered retail rate of around \$130/MWh.

⁵⁵ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. TLB-1, Prepared Direct Testimony of Tanya L. Bodell, April 30, 2018, Figure 8, p. 23.

⁵⁶ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Technical Conference, September 7, 2018, pp. 37, 50, 53, 68. See also EXM-004-006_Uplan Results.xlsx.

⁵⁷ ISO-NE, *Maine Renewable Integration Study*,

Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. NECEC-36 originally submitted as Attachment 1 to CMP-014-001.

⁵⁸ This argument was posed by Francis Pullaro from RENEW in his submission on April 30, 2018, to the *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232.



Furthermore, congestion would simply shift from the Surowiec-South Interface to the Maine-New Hampshire Interface, where no new upgrades are planned.⁵⁹ The Maine-New Hampshire Interface currently allows for up to around 1,900 MW of energy flows at any point in time. The addition of NECEC pushes those flows to the maximum level more often, increasing losses and congestion charges.

In addition, NECEC increases losses that would be incurred by all generators in Maine. Losses represent wasted energy that is lost because of transmission line inefficiencies. As current increases, losses increase by the square of the energy flows. The exponential relationship ensures that losses increase as flows increase. Higher losses mean that more energy has to be produced to deliver the same amount to demand.

In ISO-NE, this translates into a lower price for energy produced at the generator site in Maine. Lower prices are a market signal that discourages new generation plants from being built. Therefore, NECEC's adverse impact on losses and congestion effectively will send the signal to renewable resource developers that they should not build in Maine, all else equal.

Currently, several western Maine renewable developments are in front of NECEC. Some of the renewable resource developments slated for northern Maine already have fallen behind NECEC in the queue as of May 22, 2018. Although the renewable developments in front of NECEC would not face higher upgrade costs, CMP in its Section 83D Application Form noted that it expects to supersede most of the Maine renewable resources in the ISO-NE queue.⁶⁰

These other generation projects are instead being evaluated as part of the ISO-NE MRIS in a "clustered" basis. As discussed in Section 6.9, CMP believes that these projects will fall below the NECEC Transmission Project in the queue through the cluster study process that ISO-NE is seeking to implement, thereby leaving the NECEC Transmission Project only behind

⁵⁹ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. TLB_1, Testimony of Tanya L. Bodell, April 30, 2018.

⁶⁰ Both the northern and western clusters were ahead of NECEC in the queue when it issued its proposal in response to the Massachusetts Clean Energy RFP. Since then, the northern cluster did not fund a cluster study and fell behind NECEC in the queue.



the three queue projects included in the NECEC system impact study performed by the Avangrid transmission planning group.⁶¹

...

Should each of these projects decline to commit to fund the necessary transmission upgrades in order to participate in the cluster study, they will drop down in the queue (or drop out entirely), thereby significantly reducing the number of projects holding queue positions before the NECEC Transmission Project and expediting the timeline for ISO-NE to complete the required system impact studies for the NECEC Transmission Project.⁶²

For those renewable resources that are behind NECEC in the queue, the net impact would be increased costs for Maine renewable resources to upgrade transmission as part of their interconnection requirements if NECEC were to proceed. Such renewable resources would be deferred or delayed – potentially indefinitely – with a lost opportunity to create a net reduction in carbon emissions.

Key Insight

Because of the increased cost of upgrading transmission due to the NECEC, development of renewable resources in Maine could be deferred or indefinitely delayed.

5. IMPLICATIONS FOR CARBON EMISSIONS

Given the interconnectivity of Québec and New England, the analysis of NECEC's impact on carbon dioxide emissions must extend beyond the boundaries of New England to other interrelated markets. Such an analysis requires a detailed production cost model that can run a projection of what the markets would do with and without NECEC and the associated diversion of Québec excess energy exports.

Two studies are in the public domain that apply two different production cost models to analyze the impact of carbon dioxide emissions under the assumption that total excess

⁶¹ NECEC Section 83D Application Form, p. 83, footnote, 21.

⁶² Ibid., p. 85.



energy available for export into other markets by Hydro-Québec is held constant:⁶³

- **Energyzt Analysis:** Assessment of the impact of NECEC on carbon emissions, presented in the testimony of James M. Speyer before the Maine PUC Docket No. 2017-00232, April 30, 2018; and
- **ESAI Study:** “Analysis of Greenhouse Gas Emissions Impacts: New Class I Resources vs. Existing Large Hydro,” Prepared for GridAmerica Holdings, Inc., September 2017, focused on the impact of Northern Pass Transmission.

Even though the ESAI study examines the impact of Northern Pass Transmission, the findings are relevant to NECEC which is a similar type of project that includes a new 1,200 MW transmission line between Québec and New England, as well as around 9.5 TWh of baseload energy flows from Hydro-Québec under contract with the Massachusetts utilities.

These studies make four significant conclusions that are consistent with the discussion above:

- 1) **Excess energy is the same with or without a new Intertie (e.g., NECEC or Northern Pass):** Hydro-Québec exports into other markets are limited by water availability, not transmission delivery capability. Therefore, the total amount of excess energy that Hydro-Québec has available to sell into external markets will remain the same with or without NECEC.
- 2) **Hydro-Québec would divert external sales to meet new energy requirements:** In order to meet new firm energy requirements associated with a long-term power purchase agreement to be delivered over a new tieline such as NECEC or Northern Pass, Hydro-Québec would reduce energy sales into other markets.⁶⁴
- 3) **Higher carbon emissions elsewhere offset the impact in New England:** As a

⁶³ Interestingly, both CMP’s expert (Daymark) or the Maine PUC Expert (London Economics) calculated the impact on carbon emissions for New England only, and did not present an estimate of how NECEC would impact total carbon emissions across other markets that would be impacted by NECEC.

⁶⁴ The Maine PUC Technical Expert, London Economics Incorporated, makes the same assumption for purposes of its analysis of the NECEC Minimum Offer Price Rule. *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Transcript (Sep. 19, 2018).

result of Hydro-Québec's diversion of energy sales from other markets into New England via a new transmission line from Québec, carbon dioxide emissions would be higher in other markets from which energy sales are diverted.

- 4) **The offset in other markets could result in higher total emissions in some years:** The amount by which carbon emissions would exceed the savings in New England depends on where Québec sources its energy. However, it is NECEC could result in higher total carbon emissions than otherwise would occur if the transmission line were not to proceed.

Each of these points is elaborated upon below with respect to the impact on total carbon dioxide emissions from importing Québec hydroelectricity across a 1,200 MW HVDC transmission line into New England.

5.1 Excess energy is the same with or without a new intertie

Both the Energyzt Analysis and the ESAI Study conclude that Hydro-Québec has a limited pool of excess energy that already is and would continue to be optimized subject to constraints such as water conditions, reservoir management decisions, and firm commitments.

Intertie capacity into other markets is not a constraining factor. Both studies conclude that it is economical for Hydro-Québec to export all of its surplus energy and that Hydro-Québec has a low marginal cost of production and sufficient transmission capacity into external markets to continue to do so going forward. Therefore, a new intertie merely allows Hydro-Québec to access a higher-priced, long-term contract market in Massachusetts and is not necessary to transport clean energy that otherwise would be wasted.

The total amount of excess energy available to Hydro-Québec to sell into other markets varies between the studies, but would be somewhere between 33 to 38 TWh per year, of which between 20 and 25 TWh would be exported to the United States in the base case.⁶⁵ Hydro-Québec's own study assumes that exports to the U.S. would remain constant at

⁶⁵ ESAI provides a projection for 2017 to 2026 that ranges from 36.2 to 38.2 (ESAI, p. 5). The Energyzt Analysis projects that there would be 33.5 TWh in 2023 if purchases were reduced to reflect Romaine-3 coming online.

22.4 TWh without a build-out of new hydroelectric facilities.⁶⁶

The Technical Expert of the Maine PUC estimates that the amount of firm energy that would be available to flow into the US would total 21.5 TWh in 2021 based on a supply and demand comparison.⁶⁷ Existing transmission lines would allow for the entirety of this amount of excess energy to be sold into US markets. Therefore, there appears to be consensus about the amount of excess energy that Hydro-Québec would have available for sale into the United States. Regardless of the estimate, the NECEC energy supply obligation of up to 9.4 TWh would be a sizable portion of any available excess energy that Hydro-Québec would sell.

Key Insight:

A new transmission line from Québec into New England such as NECEC would not create an incremental increase in total exports of hydroelectric power from Quebec into other markets.

5.2 Hydro-Québec would divert exports to meet new energy requirements

Accepting that Hydro-Québec’s excess energy is the same with or without a new intertie, each study applies a different methodology to divert energy from other markets into the new intertie.

The Energyztt Analysis used historical averages for the base case flows from Québec into the U.S.. Assuming that exports to the U.S. would remain the same, the Energyztt analysis then removed the equivalent of the NECEC flows from New York into NECEC, starting with the lowest-priced hours first.

ESAI created a base case that: 1) held contractual flows fixed; and 2) applied the remaining excess energy into the highest priced markets during the highest-priced hours first, followed by the next highest priced hours/markets until the surplus energy was allocated. For the case with a new transmission line and flows from Québec, ESAI then reallocated energy from the base case starting with the lowest-priced hours in the lowest-priced markets first. The result is that energy tends to be diverted predominantly from

⁶⁶ Deep Decarbonization Study, p. 30.

⁶⁷ See *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, London Economics response to GINT-001-049.



New York and Ontario into Northern Pass.⁶⁸

The models were then rerun with the reallocated energy to calculate total carbon dioxide emissions generated by each power plant in the model.

5.3 Higher carbon emissions incurred elsewhere offset emissions in ISO-NE

In both analyses, higher emissions in other markets resulting from Québec’s diversion of exports into those markets offset the impacts from the proposed transmission line and Québec energy supply in New England. A comparison of the results of the two analyses for 2023 under projected low gas price and low carbon price conditions is presented in **Figure 5**.

Figure 5: Impact on carbon emissions in 2023 under low gas and low carbon prices

Market	Change in Carbon Emissions by Market (Million MT)	
	ESAI Analysis ⁶⁹	Energyzt Analysis ⁷⁰
New England	(2.4)	(3.3)
NYISO	1.0	2.3
PJM	0.1	0.5
MISO	0.2	0.5
Ontario	1.0	0.1
TOTAL Across Markets	(0.1)	0.1

⁶⁸ ESAI, Table 5, p. 15.

⁶⁹ ESAI Study, Table 5, p. 15. For comparative purposes, the signs have been switched. ESAI denotes decreases in carbon emissions as a positive number whereas Energyzt denotes it as a negative value. In addition, the ESAI results were presented in short tons and converted to metric tons for comparison with the Energyzt Analysis results using a conversion rate of 0.9072 metric tons per one short ton.

⁷⁰ *Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. JMS-4.*



Key Insight:

Under low natural gas and low carbon price conditions, an increase in carbon emissions from the diversion of Québec exports from other markets into a transmission line into New England offsets the impact from the proposed transmission line and Québec energy supply into New England, resulting in no net impact, and in the case of the Energyzt Analysis, results in an increase in total carbon emissions.

The impact that NECEC has on total carbon emissions will depend on market conditions. The Energyzt analysis also examined an alternative case of high natural gas prices and high carbon prices that were assumed by the NECEC expert in its application to the Maine PUC. Under those conditions, carbon dioxide emissions in New England would be lower than the low natural gas-price case due to the fact that less efficient units would be more expensive and therefore displaced by operating the more efficient units more often. Under this scenario, diverting exports from Québec from New York into Massachusetts tends to have a much greater impact on carbon emissions, resulting in an increase in total carbon emissions of 0.4 million metric tons in 2023 (Figure 6).

Figure 6: Carbon emissions impact in 2023 under high gas and high carbon prices

State/Region	Carbon Emissions (Million MT)		Net Carbon Emissions Impact (Million MT)
	No NECEC	With NECEC	
ISO-NE	26.8	23.8	(3.0)
NYISO	25.8	28.1	2.3
PJM	396.8	397.8	1.1
MISO	351.0	350.9	(0.1)
Ontario	3.6	3.7	0.1
Total	804.0	804.4	0.4

As noted in the Energyzt testimony summarizing the results of the analysis, the increase in total emissions is the equivalent of building “a new 250 MW combined cycle gas power plant running at a 40 percent capacity factor or average emissions from around 80,000 automobiles averaging 4.75 metric tons of carbon emissions over the course of a year.”⁷¹

⁷¹ Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. JMS-1.



Key Insight:

Under conditions of higher natural gas prices and higher carbon prices, carbon emissions could increase.

In summary, NECEC would have a negligible impact on total carbon emissions and could even increase them when the effect on other markets is considered. Hydro-Québec's diversion of energy exports from other power markets to service NECEC results in incremental carbon emissions as power plants in those markets fire-up generators to make up the missing energy flows. In effect, there is no net impact to carbon emissions, and possible adverse consequences, when Hydro-Québec diverts its surplus energy resources into NECEC.

6. ANALYSIS OF GREENWASHING POTENTIAL USING CMP's MODEL

As part of the Maine PUC hearing, CMP offered a model to assess the ability of Hydro-Québec to meet its NECEC obligations while maintaining exports at historical levels. The model purports to determine whether or not Hydro-Québec's sales via NECEC can be incremental.⁷²

The simplistic model suffers from three fundamental flaws (described in more detail in Appendix B):

- 1) **The CMP Model Answers the Wrong Question:** The real question is whether NECEC reduces global emissions, and the CMP model does not address this question at all. To do so would require an analysis of what carbon emissions would be with and without NECEC, which the model does not do.
- 2) **CMP Assumes a Sudden Availability of Incremental Exports:** CMP assumes that Hydro-Québec does not sell its excess energy into other markets unless NECEC is built. In fact, there is plenty of excess transmission capacity servicing the interconnected markets that Hydro-Québec could use to sell its excess energy that currently is stored in its reservoirs and the incentive to do so prior to NECEC coming online.
- 3) **Sensitivity to Key Assumptions:** The model is incredibly sensitive to key

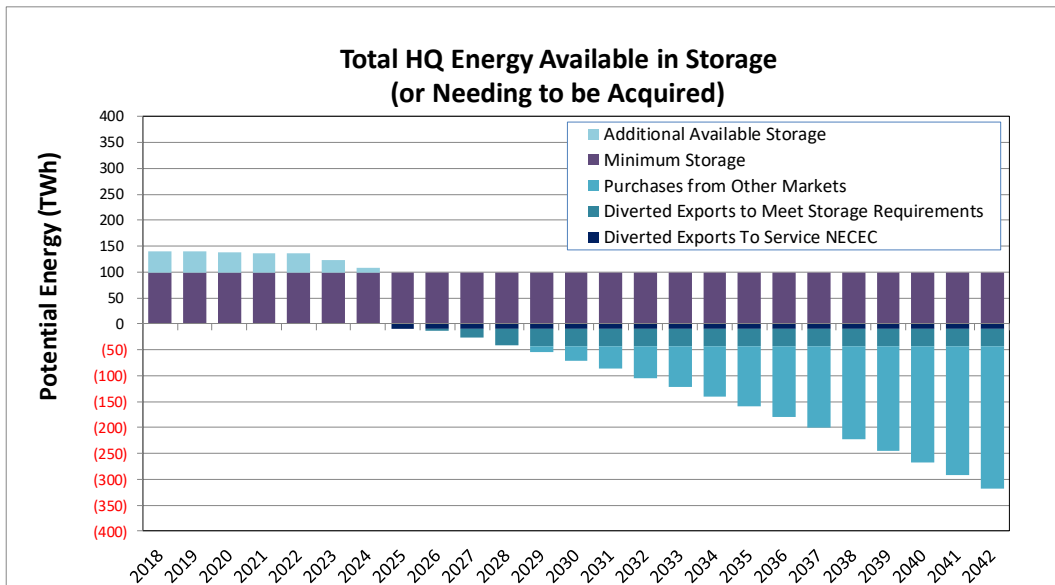
⁷² *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, CMP Response to NRMCC-032-021, Attachment 1.



assumptions, including how much runoff would Hydro-Québec receive. CMP implicitly assumes high water conditions that have been experienced in 2017 and the years before will continue for the entirety of the contract, allowing for high levels of energy availability that allows incremental exports compared to historical levels. Making a small adjustment to this assumption has a significant impact.

Adjusting a single assumption -- the assumed availability of water and potential generation output by only six percent to reflect lower runoff than the high water conditions experienced in 2017, it is clear that Hydro-Québec would not be able to service NECEC without diverting energy from other markets and engaging in greenwashing through purchases from other markets (Figure 7).

Figure 7: Hydro-Québec operations per the CMP Model with lower runoff



In reality, Hydro-Québec is not confined to a single strategy over the course of the contract. Hydro-Québec will manage its system, sales, exports and opportunities according to water conditions and market prices. NECEC simply imposes another fixed obligation onto the system against which Hydro-Québec will optimize its operations. Such optimization will include diverting sales into other markets and greenwashing, as required to optimize profits.

This activity is allowed under the “clean energy” contracts with Massachusetts utilities.

7. CONCLUSION

Under the terms of the contracts with Massachusetts utilities, Hydro-Québec would not be precluded from purchasing energy from other markets to sell directly into NECEC or for purposes of conserving water in its reservoirs for future supply to NECEC at a later time. Massachusetts utilities would have no ability to monitor or prevent this possibility from occurring. Massachusetts ratepayers effectively could be paying above-market prices for power from existing resources outside of Québec that provide no incremental environmental benefit and could even increase carbon emissions.

CMP's own model of the Hydro-Québec system does not include realistic assumptions. Adjusting the model to reflect lower runoff conditions and an objective of maintaining exports at historical levels illustrates a realistic scenario under which Hydro-Québec would have to divert energy and engage in greenwashing behavior. Under these conditions, Hydro-Québec would have to do both in order to maintain exports at 2017 levels.

Hydro-Québec's sales via NECEC do not have to be incremental to Québec's historical hydroelectric generation sales into New England. The energy does not have to be incremental to what Hydro-Québec otherwise would sell into other markets. There is no guarantee that Massachusetts ratepayers would receive 100% "clean energy" given the greenwashing game that Hydro-Québec is able to play. There is no guarantee that the environment would receive a net reduction in carbon emissions; total carbon emissions in other markets could increase to a level that any reduction in New England carbon emissions would be negated or even exceeded. If NECEC were allowed to proceed, the only guarantee is that Québec would receive billions of dollars in future dividends and Maine's renewables industry will be adversely impacted.

It is unlikely that NECEC will benefit the climate. At best, the NECEC could have negligible impact on global greenhouse gas emissions. However, there are a number of conditions under which NECEC actually could increase global carbon emissions as Hydro-Québec engages in profit-maximizing behavior around its firm rights to capacity on the NECEC transmission line and contracts with Massachusetts utilities.

APPENDIX A: BIBLIOGRAPHY

Articles

- Financial Post, “Without exports our profits are in trouble: Hydro-Quebec plugs into U.S. markets for growth,” April 20, 2018,
<https://business.financialpost.com/commodities/energy/without-exports-our-profits-are-in-trouble-hydro-quebec-plugs-into-u-s-markets-for-growth>
- Rob Ferguson, The Star, “Ontario signs deal for electricity from Quebec in bid to defuse anger over hydro bills,” October 21, 2016,
<https://www.thestar.com/news/queenspark/2016/10/21/ontario-signs-deal-for-electricity-from-quebec-in-bid-to-defuse-anger-over-hydro-bills.html>.

Canada National Energy Board, Energy Commodity (2013 - 2018)

<https://apps.neb-one.gc.ca/CommodityStatistics/Statistics.aspx?language=english>

Government of Canada, Hydrometric Flow Data,

- Daily Discharge Graph for BALEINE (RIVIERE A LA) À 40,2 KM DE L'EMBOUCHURE (03MB002) [QC]
- Daily Discharge Graph for CHURCHILL RIVER ABOVE CHURCHILL FALLS TAILRACE (03OD008) [NL]
- Daily Discharge Graph for Monthly Discharge Statistics Data for MILLE ILES (RIVIERE DES) A BOIS-DES-FILION (02OA003) [QC]

https://wateroffice.ec.gc.ca/mainmenu/historical_data_index_e.html

CME Group, Chicago Mercantile Exchange

- NYISO Zone A On-peak Price as of October 11, 2018,
<https://www.cmegroup.com/trading/energy/electricity/nyiso-zone-a-5-mw-peak-calendar-month-day-ahead-lbmp-swap-futures.html>

Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232

- CMP Response to NRMC-002-021, Attachment 1.
- CMP, Rebuttal Testimony of Thorn Dickinson, Eric Stinneford, and Bernardo Escudero on Behalf of Central Maine Power Company, July 13, 2018
- Daymark Energy Advisors, NECEC Transmission Project: Benefits to Maine Ratepayers, Docket No. 2017-00232, September 17, 2017
- Daymark Energy Advisors, Rebuttal Testimony of Daymark Energy Advisors: Daniel Peaco, Douglas Smith, and Jeffrey Bower on Behalf of Central Maine Power Company, July 13, 2018
- Exhibit No. JMS-1, Testimony of James M. Speyer, April 30, 2018
- Exhibit No. JMS-3, Technical Report: Hydro-Québec Exports, April 2018
- Exhibit No. TLB-1, Testimony of Tanya L. Bodell, April 30, 2018
- Exhibit No. TLB-8, Prepared Surrebuttal Testimony of Tanya L. Bodell, August 17, 2018
- Exhibit No. NECEC-16, POWER PURCHASE AGREEMENT FOR FIRM QUALIFIED CLEAN ENERGY FROM HYDROELECTRIC GENERATION BETWEEN MASSACHUSETTS ELECTRIC COMPANY AND NANTUCKET ELECTRIC COMPANY d/b/a NATIONAL GRID AND H.Q. ENERGY SERVICES (U.S.) INC., as of June 13, 2018, [REDACTED].
- London Economics response to GINT-001-049.
- Transcript of August 1, 2018, Testimony of CMP's witnesses
- Transcript of September 19, 2018, Testimony of Julia Frayer and London Economics

Commonwealth Magazine

- John Carroll and Lynn St. Laurent, “Hydro-Quebec, Central Maine Power respond to critics,” September 8, 2018, <https://commonwealthmagazine.org/opinion/hydro-quebec-central-maine-power-respond-to-critics/>

ESAI, “Analysis of Greenhouse Gas Emissions Impacts: New Class I Resources vs. Existing Large Hydro,” Prepared for GridAmerica Holdings, Inc., September 2017, <https://granitestatepowerlink.com/wp-content/uploads/2017/10/ESAI-GSPL-CO2-Analysis-9-13-17-FINAL.pdf>

Evolved Energy Research, Sustainable Development Solutions Network & Hydro Québec, Deep Decarbonization in the Northeastern United States and Expanded Coordination with Hydro-Québec, April 2018

Hydro-Québec

- Annual Report, 2017, <http://www.hydroquebec.com/data/documents-donnees/pdf/annual-report.pdf>
- Annual Report, 2012, <http://www.hydroquebec.com/data/documents-donnees/pdf/annual-report-2012.pdf>
- Hydro-Québec - TransÉnergie, Plan Directeur, 2020, <http://www.hydroquebec.com/data/transenergie/pdf/hqt-plan-directeur-2020.pdf>
- Hydro-Québec Distribution Plan, ÉTAT D'AVANCEMENT 2017 DU PLAN D'APPROVISIONNEMENT 2017-2026, http://www.regie-energie.qc.ca/audiences/Suivis/SuiviR-3986-2016_PlanAppro2017-2026/HQD_SuiviPlanAppro2017-2026_31oct2017.pdf
- Hydro-Québec, HQ Annual Reports (2012 – 2017)

<http://www.hydroquebec.com/data/documents-donnees/pdf/annual-report.pdf>

- Hydro-Québec, Strategic Plan 2016–2020, Strategic Plan 2017
- Hydro-Québec Production, Power Generation, Purchases and Exports (Data drawn on 4/5/2018)
- Hydro-Québec Sustainability Report
<http://www.hydroquebec.com/data/developpement-durable/pdf/sustainability-report-2016.pdf?v=20170529>
- Hydro-Québec website: FAQs about exports,
www.hydroquebec.com/international/en/faq.html

ISO-New England

- 2018-2027 Forecast Report of Capacity, Energy, Loads, and Transmission (*CELT*),
<http://isonewswire.com/updates/2018/5/8/2018-forecast-of-capacity-energy-loads-and-transmission-is-p.html>
- Final Maine Resource Integration Study (“MRIS”), March 2018, https://www.iso-ne.com/staticassets/documents/2018/03/final_maine_resource_integration_study_report_non_ceii.pdf
- “Forward Capacity Auction Capacity Obligations,”
<https://www.iso-ne.com/markets-operations/markets/forward-capacity-market/>
- “Forward Capacity Market (FCA 12) Result Report,” <https://www.iso-ne.com/static-assets/documents/2018/05/fca-results-report.pdf>
- IESO LMP Prices and Interface flow data
- ISO-NE Market Rules (Effective Date, 9/28/2018 - Docket # ER18-2078-000), Market Rule 1, Section 13, https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_sec_13_14.pdf

- ISO-NE Market Rules (Effective Date, 9/28/2018 - Docket # ER18-2078-000), Market Rule 1, Section 13, <https://www.iso-ne.com/participate/rules-procedures/tariff/market-rule-1>

Independent Electricity System Operator (IESO), Ontario

- Data: <http://www.ieso.ca/en/power-data/data-directory>

Massachusetts General Laws Chapter 21N, Section 3 (a – d), *Climate Protection and Green Economy Act*.

Massachusetts Clean Energy RFP, <https://macleanenergy.com/83d/>

- DRAFT* POWER PURCHASE AGREEMENT FOR FIRM QUALIFIED CLEAN ENERGY FROM HYDROELECTRIC GENERATION BETWEEN [_____] [Buyer] AND [_____] [Seller] As of [_____].
- Hydro Renewable Energy (HRE), Section 83D Application Form, submitted July 27, 2017

Ministere des Ressource naturelles, dela Faune et des parcs, Gouvernement du Quebec, "The Energy Sector in Québec, Context, Issues and Questions."2004, <https://mern.gouv.qc.ca/english/publications/energy/strategy-2004.pdf>

National Energy Board

- Application by Hydro-Québec, "Application for a Blanket Electricity Export Permit Pursuant to s.119.03 of the National Energy Board Act and s.9 of the National Energy Board Electricity Regulations," Application Submission Date 19/02/2010

- National Energy Board, “Letter accompanying the issuance of a licence in response to Application dated 19 February 2010 for authorization to export electricity pursuant to Section 119.03 of the National Energy Board Act (Act)¹ by Hydro-Québec,” October 29, 2010.
- National Energy Board, Permit EPE-370, IN THE MATTER OF section 119.03 of the National Energy Board Act (the Act) and the regulations made thereunder; and IN THE MATTER OF an application by Hydro-Québec for authorization to export electricity to H.Q. Energy Services (U.S.) Inc. dated 4 March 2010 by Hydro-Québec for authorization to export electricity to H.Q. Energy Services (U.S.) Inc., pursuant to section 119.03 of the National Energy Board Act (the Act), Issued August 18, 2011.

New England Clean Energy Connect (NECEC)

- NECEC Section 83D Application Form
- NECEC Project Benefits, <https://www.necleanenergyconnect.org/benefits/>
- Map: <https://www.necleanenergyconnect.org/map>

NERC, “2017 Long-Term Reliability Assessment,”

https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_1213_2017_Final.pdf

US Energy Information Administration

- Gas Weekly Update, “Renewables surpass natural gas as the primary electricity-generating source in Maine,”
https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/

U.S. EIA

- Form 923 data,
https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/

- Maine Electricity Profile, 2016, <https://www.eia.gov/electricity/state/maine/>
- Maine: State Profile and Energy Estimates, <https://www.eia.gov/state/?sid=ME>
- Natural Gas Weekly Update, “Renewables surpass natural gas as the primary electricity-generating source in Maine,”
https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/

APPENDIX B: OVERVIEW OF QUEBEC'S ELECTRICITY SYSTEM AND EXPORTS

Hydro-Québec owns and operates a large system of hydroelectric generation and other power generating capabilities along with an extensive transmission network. Hydro-Québec's generating capacity in 2017 was 37,309 MW from 87 generating stations. Additional sources, such as wind, solar and purchases from third parties create total nameplate capacity of 47,857 MW.¹

In understanding what electricity products are likely to be sold via NECEC, it is important to distinguish between energy and capacity. Capacity is provided by existing or planned generating plants that could be available to generate electrical energy when needed. Energy is the electricity that flows when those generating plants are operating. The distinction is important because the contracts with Massachusetts are for energy – not capacity.²

Furthermore, the contracts are for firm energy; firm energy that is not backed by capacity needs to be firmed with another resource – in this case, Hydro-Québec's ability to optimize energy purchases and sales across its four system interties. This section explains further why the contracts with the Massachusetts utilities are for firm energy only and the implications for greenwashing and carbon emissions.

¹ Hydro-Québec - TransÉnergie, Plan Directeur, 2020,
<http://www.hydroquebec.com/data/transenergie/pdf/hqt-plan-directeur-2020.pdf>

² Although the contracts require Hydro-Québec to attempt to qualify to provide capacity into the ISO-NE market, there is no penalty if such capacity is not available or does not clear the market (see NECEC-16, section 7.5., "For the avoidance of doubt, but without limiting the condition set forth in Section 3.4(b)(ii), **Seller shall have no obligation during the Services Term** to pay for such Network Upgrades or **to complete the Forward Capacity Auction qualification process**" (emphasis added).

B.1 QUÉBEC’S CAPACITY

In order to meet reliability standards, each region is required to maintain an amount of generating resources above its maximum demand for power. In Québec, where the system peaks in winter, Hydro-Québec strives to maintain a level of installed and purchased capacity above its winter peaking load. Targeted reserve requirements are 12.9 percent above peak demand.³ However, waterflow is at its lowest during the winter months, requiring Québec to rely on stored water in its reservoirs to produce energy in addition to its normal flows. Its energy production capacity is limited by its available generation capacity and reservoir levels.

The North American Electric Reliability Council (NERC) projects that Québec will be short of its required reserve margins by 2024 unless another 1,100 MW of prospective resources are obtained.⁴ Québec is not in a position to sell 1,200 MW of capacity into New England or any other market during the winter months. If anything, Québec will need to purchase that level of capacity resources from other markets to meet its required reserve margins. Assuming that NECEC will provide 1,090 MW of capacity into New England results in an immediate shortfall for Québec against its targeted reserve margins, as shown in **Figure B-1**.⁵

This is particularly problematic for New England which requires capacity to be sold year-round. In other words, Québec will not be in a position to commit capacity into New England via NECEC– which is why the contracts with Massachusetts are for firm energy only. Therefore, Québec either would have to withdraw its current capacity sales into New England and New York to meet its own reserve requirement

³ NERC, 2017 Long-term Reliability Assessment, pp. 55.

⁴ NERC, 2017 Long-term Reliability Assessment, pp. 55-56, Under the prospective scenario, a total of 1,100 MW of expected capacity imports are planned by the Québec area, although these purchases have not yet been backed by firm long-term contracts.

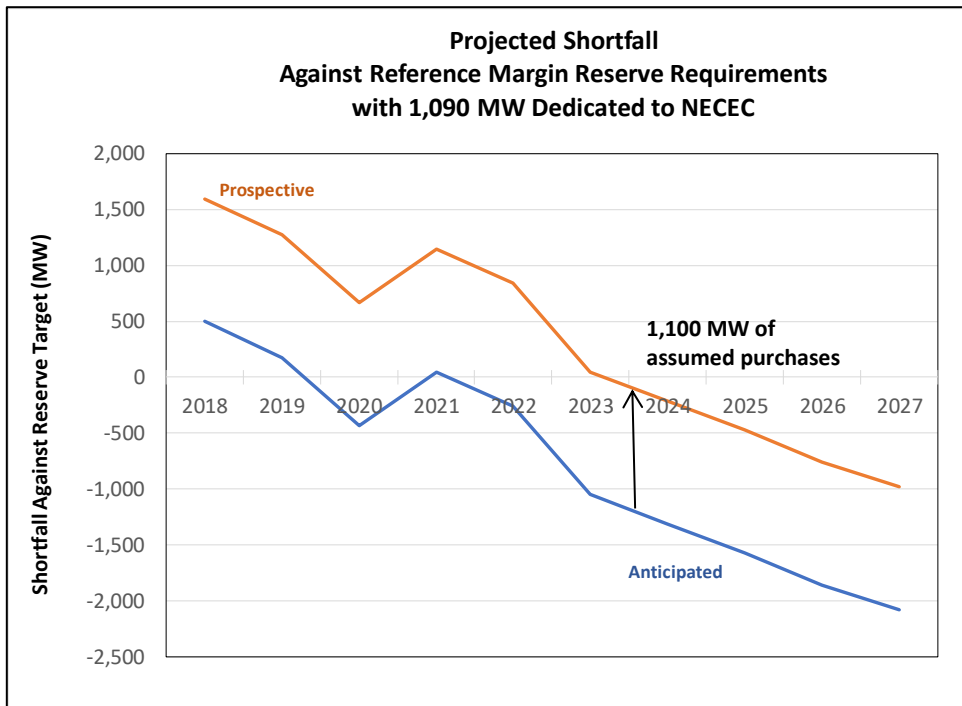
https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_12132017_Final.pdf

⁵ NERC, 2017 Long-term Reliability Assessment, pp. 53-54. Ontario will not be in a position to renew the current sale of 500 MW of capacity to Québec. However, the Maritimes, New York and New England are projected to have excess capacity that could be sold to Québec.



levels or optimize its purchases and sales of capacity across the interconnected markets. NECEC could be used to meet Québec’s shortfall in capacity, not the other way around.

Figure B - 1: Hydro-Québec shortfall against reserve margins with NECEC⁶



NOTE: Anticipated resources reflect what already exists or is being built; prospective resources include potential purchases that could be used to meet the targeted levels.
 Reference Margin Level = Installed Reserve Margin Requirement

Therefore, if Québec is going to build any new upgrades or new impoundment structures, it would be because of its own need for new capacity, not to service other markets. Those additional capacity investments would occur regardless of NECEC.

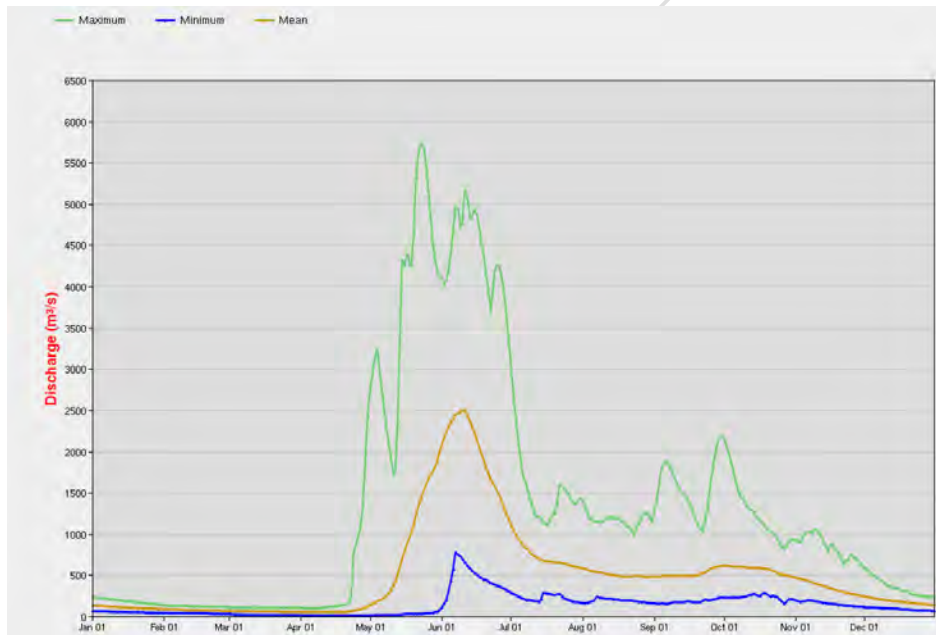
⁶ NERC, 2017 Long-Term Reliability Assessment, p. 55 adjusted for 1,090 MW reduction for potential NECEC commitments.

B.2 HYDRO-QUÉBEC’S ENERGY

The shortfall in capacity does not correspond to a shortfall in energy because Québec can store water to generate excess energy across the year whereas capacity requirements are an instantaneous need at the point of peak demand on the system. Québec’s generation capacity is dominated by large hydroelectric generation, some renewable resources predominantly purchased from third parties, and small percentage of thermal plants located in remote regions.

Given the natural flows of precipitation and snow melt in Québec, the province is flush with water in the late spring and summer months (**Figure B - 2**). That water is used to produce energy as well as to replenish the reservoirs for the winter.

Figure B - 2: Daily flow for Baleine River (1956 – 2013)⁷

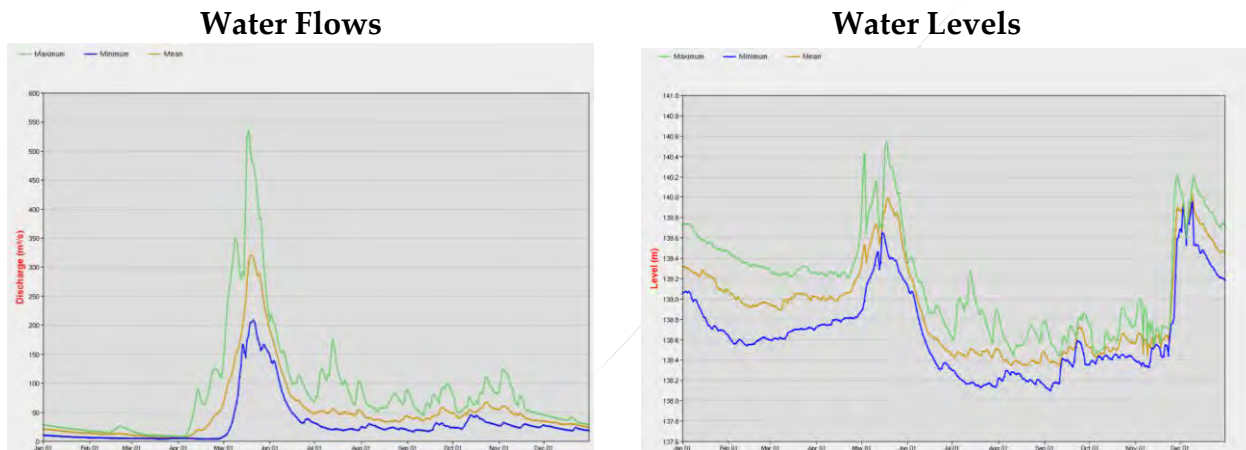


⁷ Government of Canada, Hydrometric Flow Data, Daily Discharge Graph for BALEINE (RIVIERE A LA) À 40,2 KM DE L'EMBOUCHURE (03MB002) [QC],

https://wateroffice.ec.gc.ca/mainmenu/historical_data_index_e.html

Reservoir management is a critical function of Hydro-Québec, which must meet its firm commitments while balancing between ensuring that reservoir levels do not drop below optimal levels for production in the winter and early spring while ensuring that snow melt does not exceed reservoir capacity and spill in the summer months. **Figure B - 3** illustrates the management of reservoir levels versus average snowmelt for Churchill Falls, the largest single resource that Hydro-Québec Power has access to (5,428 MW under contract). Although waterflows are negligible November through March and peak in May and June, reservoir management allows Hydro-Québec to draw down on its reservoirs during the winter periods and maximize generation during peak periods as require.

Figure B - 3: Daily discharge for Churchill Falls (2009 – 2014)⁸



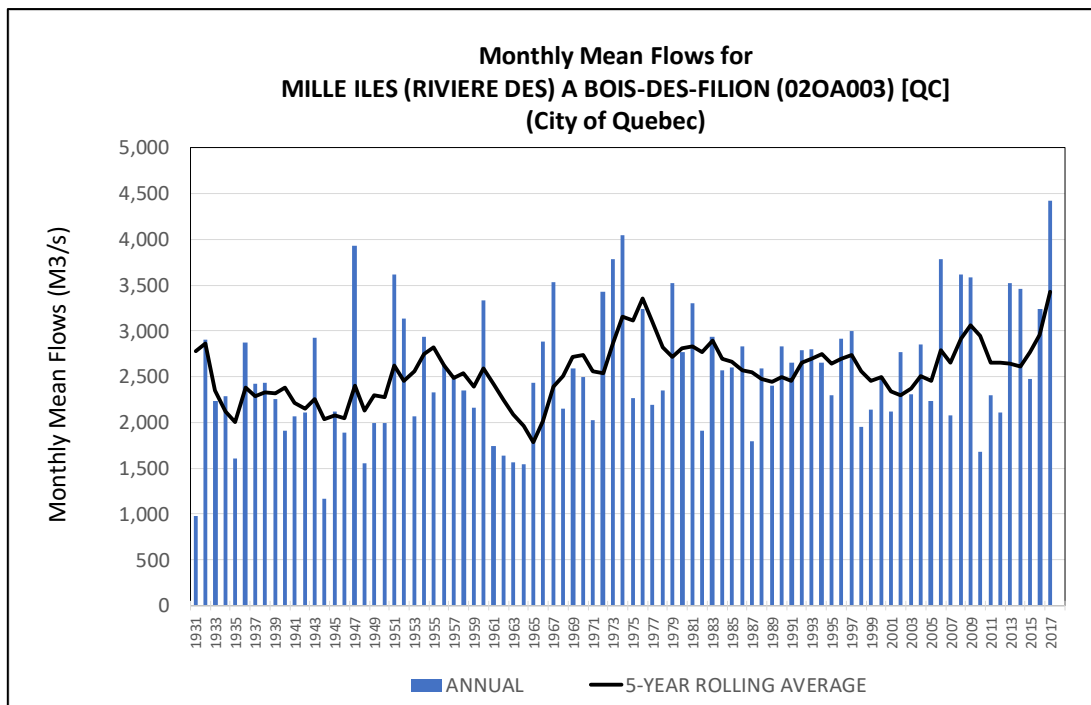
Hydro-Québec also manages its reservoirs to ensure that potential energy is optimized. If reservoirs cannot be too low or the water will fall below the generator intake tunnels, preventing the production of electricity. If too high, water may have to be spilled – released through upstream chutes without producing electricity. Reservoir management allows Hydro-Québec to manage the energy available in its system over multiple years.

The ability to manage across multiple years is important as the average precipitation varies on a year-by-year basis, as illustrated above with the range of water flows at Baleine

⁸ Government of Canada, Hydrometric Flow Data, Daily Discharge Graph for CHURCHILL RIVER ABOVE CHURCHILL FALLS TAILRACE (03OD008) [NL], https://wateroffice.ec.gc.ca/mainmenu/historical_data_index_e.html

and Churchill Falls. **Figure B - 4** shows variation in monthly flows at Québec City, the location with the most consistent records of monthly water flows. The bars are annual water flows; the line represents a 5-year rolling average for the past 90 years. As can be seen, 2017 was a record water flow year and the five-year average flows ending 2017 exceed the previous high set in 1976.

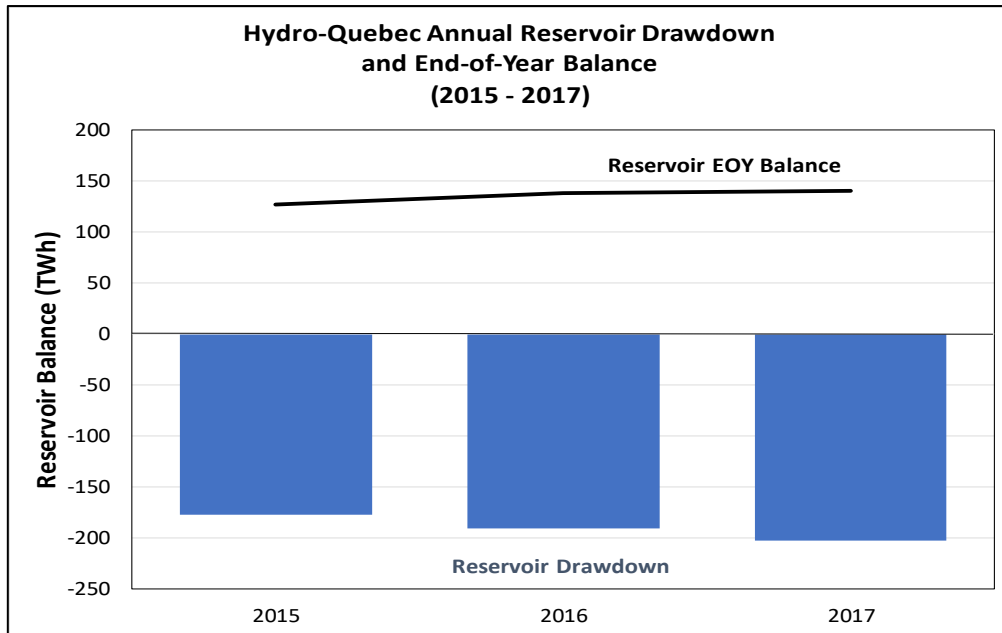
Figure B - 4: Daily flows for Québec City (1931-2017)⁹



The high precipitation and flow levels required significant drawdown on its reservoirs to maintain levels below maximum. Despite the increasing draw-down, year-end levels remained higher in 2017 than at the end of the previous three years (**Figure B - 5**). This is indicative of heavy water conditions through precipitation and snow melt.

⁹ Government of Canada, Hydrometric Flow Data, Daily Discharge Graph for Monthly Discharge Statistics Data for MILLE ILES (RIVIERE DES) A BOIS-DES-FILION (02OA003) [QC], https://wateroffice.ec.gc.ca/mainmenu/historical_data_index_e.html

Figure B - 5: Hydro-Québec reservoir draw-down (2015-2017)¹⁰



Hydro-Québec’s annual reports support the fact that 2017 and the prior years experienced high runoff conditions.

Per the 2017 HQ Annual Report:

In 2017, net electricity exports reached a historic volume of 34.4 TWh and contributed \$780 million to net income. As a result of an effective sales strategy, smooth operation of generating and transmission facilities **and high runoff**, net exports increased by 1.8 TWh over the previous record, set in 2016.¹¹

(emphasis added).

¹⁰ Calculated based on Hydro-Québec Annual Reports.

¹¹ Hydro-Québec Annual Report 2017, p. 22.

Per the 2016 HQ Annual Report:

EXPORTS REACH A HISTORIC HIGH Net electricity exports rose by 3.3 TWh compared to 2015, reaching a historic high of 32.6 TWh and contributing \$803 million to net income. This is a 1.8-TWh increase over the previous record, set in 2013, made possible by the smooth operation of generating and transmission facilities, in particular, **as well as high runoff and favorable weather conditions**. These factors, combined with the skillful development and deployment of the sales strategy, enabled the company to take advantage of business opportunities on external markets. The record volume of exports is all the more remarkable given the unavailability of a major power transmission link between Québec and New England in April and May 2016 due to scheduled maintenance. Finally, **because of the high runoff in 2016**, Hydro-Québec ended the year with record reservoir storage of 138.2 TWh.¹²

(emphasis added).

These annual reports also make it clear that variability in runoff is one of the key uncertainties and one which Hydro-Québec manages in various ways:

One of the principal uncertainties that Hydro-Québec faces relates to natural water inflows . . . It therefore manages its reservoir storage on a multiyear basis and maintains an adequate margin between its generating capacity and its commitments. This allows the division to compensate for variations in runoff, replenish its reserves or take advantage of business opportunities.¹³

(emphasis added).

¹² Hydro-Québec Annual Report 2016, p. 25.

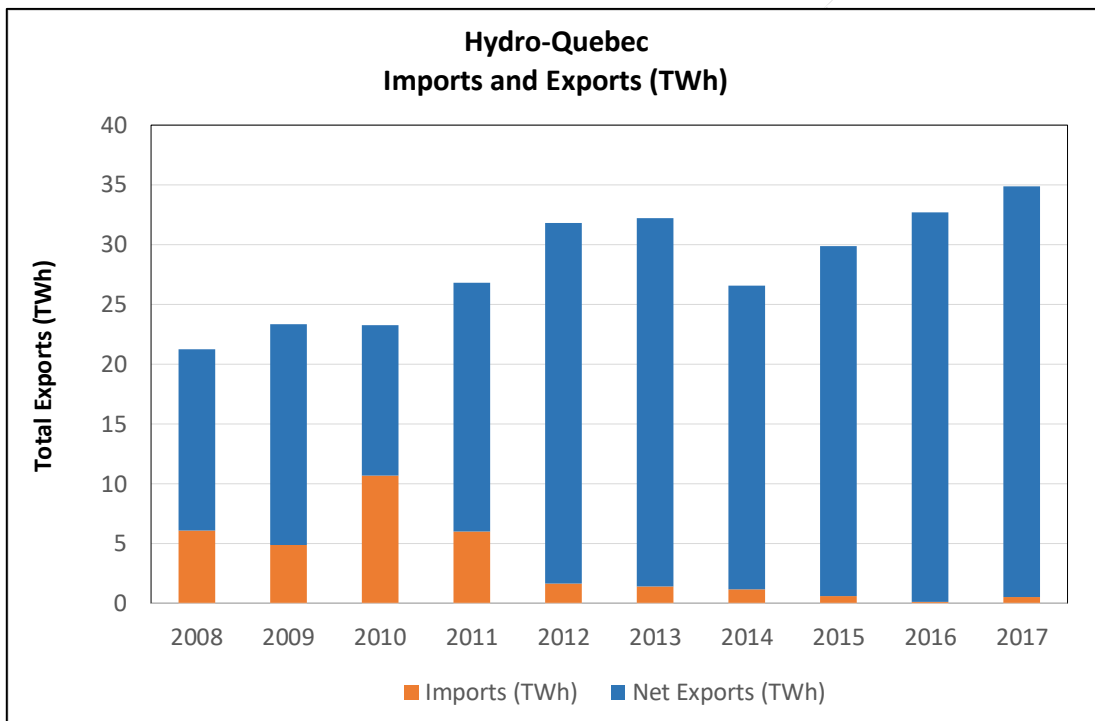
¹³ Ibid., pp. 42, 44.

B.3 HYDRO-QUÉBEC’S EXPORTS

Given the extensive water flows that had occurred in 2017 and the previous five years, it is not surprising that Hydro-Québec exported a record amount of energy at around 34.4 TWh for 2017. This record amount included annual snowmelt as well as significant draw-down of its reservoirs to maintain appropriate reservoir levels. In addition, Hydro-Québec imported less energy than it had in the past.

Hydro-Québec’s annual reports show the historical amount of excess energy it has sold into external markets, net of imports (Figure B - 6).

Figure B - 6: Hydro-Québec total exports and imports (2008-2017)¹⁴



In general, Québec has excess energy over the course of the year that it can sell into other markets at a profit. This was especially true during the past five years when water flows

¹⁴ Calculated based on Hydro-Québec Annual Reports.

were particularly heavy. During the mid- to late-2000s, when water flows were not as heavy, Hydro-Québec exported less and purchased from other markets. Between 2008 and 2012, imports were approximately one-third of Hydro-Québec’s total exports; in 2010, Hydro-Québec purchased nearly half of the energy that it exported.

The percentage of imports as a portion of exports has declined over the past few years, as a combination of heavier water conditions and increased capacity build-out has allowed Hydro-Québec to engage in greater export transactions without purchases. However, history shows that Hydro-Québec is in a position to arbitrage between markets – buying low-priced energy from one market and selling stored reservoir water converted into energy into higher-priced markets.

Figure B - 7: Sales Outside of Québec in 2017¹⁵

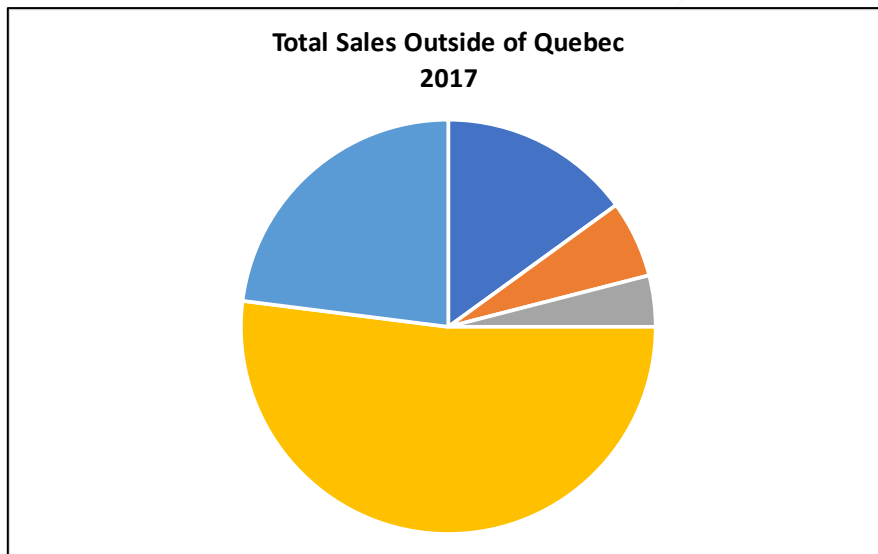
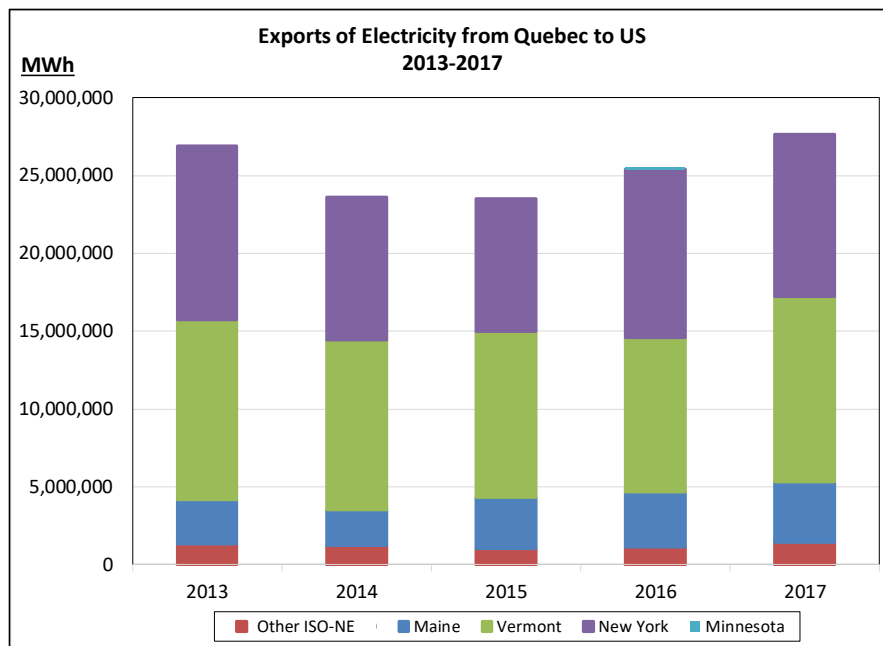


Figure B - 8 illustrates the level of exports from Québec over the past five years into the US. Total electricity exports into New York, New England and other markets ranged from 23.5 TWh to 27.7 TWh between 2013 and 2017. This is consistent with Hydro-Québec’s website which claims, “Every year, Hydro-Québec has approximately 25–30 TWh

¹⁵ Hydro-Québec 2017 Annual Report.

available for sale to markets outside Québec.”¹⁶ Approximately 90 percent of all exports into the United States from Québec are sold by Hydro-Québec or one of its affiliates.¹⁷

Figure B - 8: Electricity exports from Québec to the US on an annual basis¹⁸



Revenue from sales to external markets – which has ranged from \$750 million to \$1.5 billion over the past few years¹⁹ -- is paid as a dividend to the Québec government. This level of profitability relies on exports, as indicated by Hydro-Québec’s CEO Éric Martel.²⁰ The vast majority of Hydro-Québec’s energy exports are sold to the United States.

¹⁶ Hydro-Québec website: FAQs about exports, www.hydroquebec.com/international/en/faq.html

¹⁷ Energyzt analysis of National Energy Board, Monthly Electricity Export Reports for Canada to the US.

¹⁸ National Energy Board, Monthly Electricity Export Reports for Canada to the US; New England ISO represents sales into ISO-NE outside of flows into Maine and Vermont.

¹⁹ Hydro-Québec Annual Reports.

²⁰ Financial Post, “Without exports our profits are in trouble: Hydro-Quebec plugs into U.S. markets for growth,” April 20, 2018, <https://business.financialpost.com/commodities/energy/without-exports-our-profits-are-in-trouble-hydro-quebec-plugs-into-u-s-markets-for-growth>

Figure B - 9: Electricity exports from Québec to the US on a monthly basis²¹

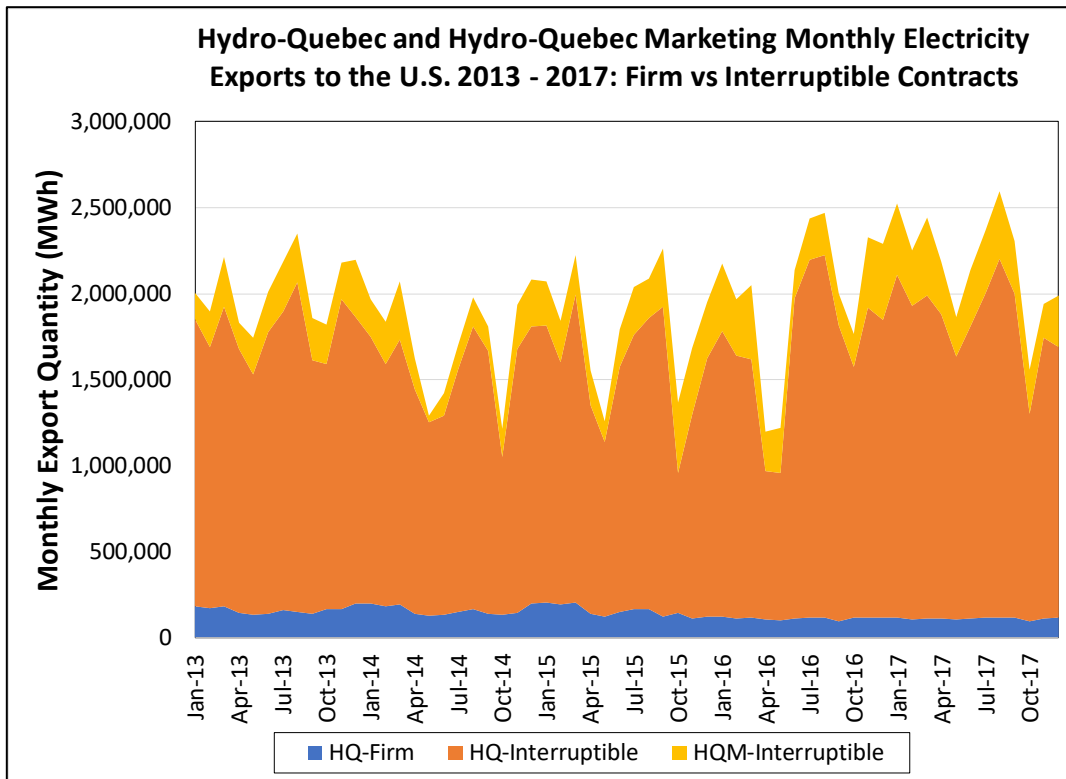


Figure B - 9 graphs sales from Hydro-Québec into U.S. markets on a monthly basis. Most of Hydro-Québec’s sales are interruptible, which means that they are non-firm energy sales into non-firm spot markets. This chart also illustrates seasonal increases in sales during higher priced seasons (i.e., summer and winter). This pattern is consistent with opportunistic sales into other markets in the summer and winter peaks. Hourly flows from Québec into external markets (not shown) tell the same story -- exports generally increase during peak hours and fall during off-peak hours, illustrating Hydro-Quebec’s profit motive to maximize sales during higher-priced periods.

Although total energy sales vary from year to year and month to month based on weather conditions, new capacity, reservoir management decisions and market conditions, Hydro-

²¹ Energyzt analysis of National Energy Board, Monthly Electricity Export Reports for Canada to the US.



Québec has an incentive to maximize its available energy sales to the highest-priced markets during the highest-priced periods. Such sales are subject to Hydro-Québec’s own firm commitments, water management decisions, generation capacity limits, and transmission constraints.

B.4 PROJECTED LOAD GROWTH IN QUÉBEC

There are multiple ways that Hydro-Québec could meet its firm capacity commitments going forward: Buy, divert, upgrade and build. **Figure B - 10** presents Hydro-Québec’s own estimates of potential expansion opportunities and estimated costs (reported in US Dollars) to compare the cost of these alternatives.

Figure B - 10: Cost comparison of meeting NECEC obligations²²

Hydro Bin	Potential (TWh)	Levelized Fixed Cost (\$/kW-yr)	Levelized Cost of Electricity (\$/kWh)
1	157	Current: 106 Post-2030: 133	Current: 0.02 Post 2030: 0.025
2	10	372	0.07
3	10	531	0.10
4	15+	690	0.13

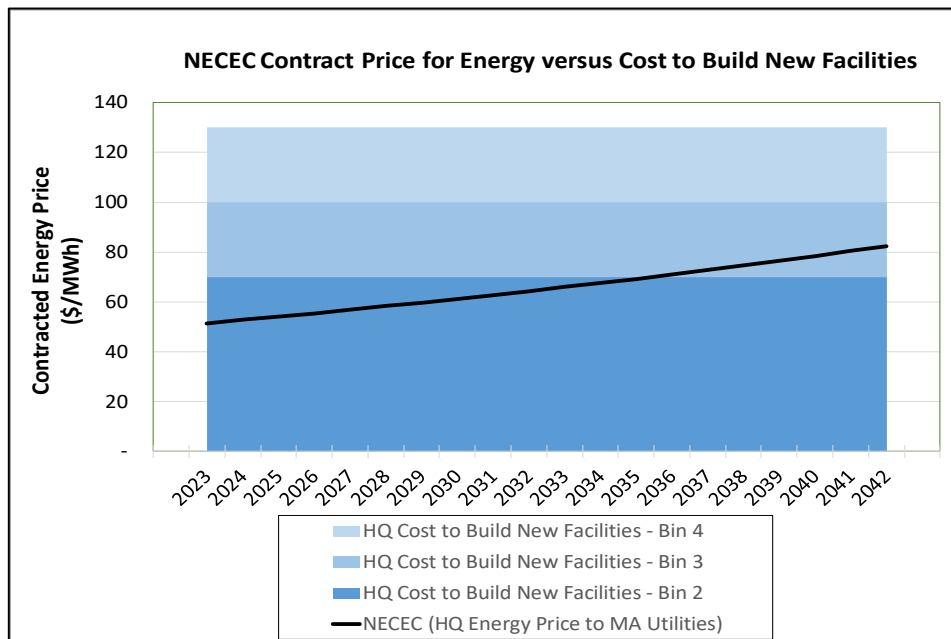
Although upgrades are the least costly option, this option is not available to Hydro-Québec for purposes of exports. Upgrades only offer 13 TWh of additional energy all of which is required to meet Hydro-Québec’s growing load through 2034 (half of that amount is required through 2023, when the NECEC contract takes effect).²³ Furthermore, some of

²² Ibid., p. 28. All dollar values are reported in US Dollars per Energyzt conversation with Evolved Energy Research, one of the authors of the report.

²³ Hydro Québec, Deep Decarbonization in the Northeastern United States and Expanded Coordination with Hydro-Québec, April 2018, pp. 27-28. Per Footnote 5 which indicates 144 TWh already is available, there would be only 13 TWh of additional energy available through upgrades. This would be consumed by Québec load growth by around 2034 given the load growth assumed by the study:

the potential for increased storage depends on wetter conditions than historically has been the case.²⁴

Figure B - 11: Comparison of NECEC contract price to a new hydro facility²⁵



The cost of building new impoundments is significantly higher – around \$70 to \$130 / MWh. The energy price in the contracts with Massachusetts utilities starts at \$51/MWh and rises to around \$82/MWh. As the contracted energy price is higher than the NECEC contract price for energy, it would be uneconomic for Hydro-Québec to build new facilities to meet its obligations under the contracts with Massachusetts utilities (**Figure B - 11**).

In contrast, Hydro-Québec has only been making between \$20 to \$40 / MWh on its exports

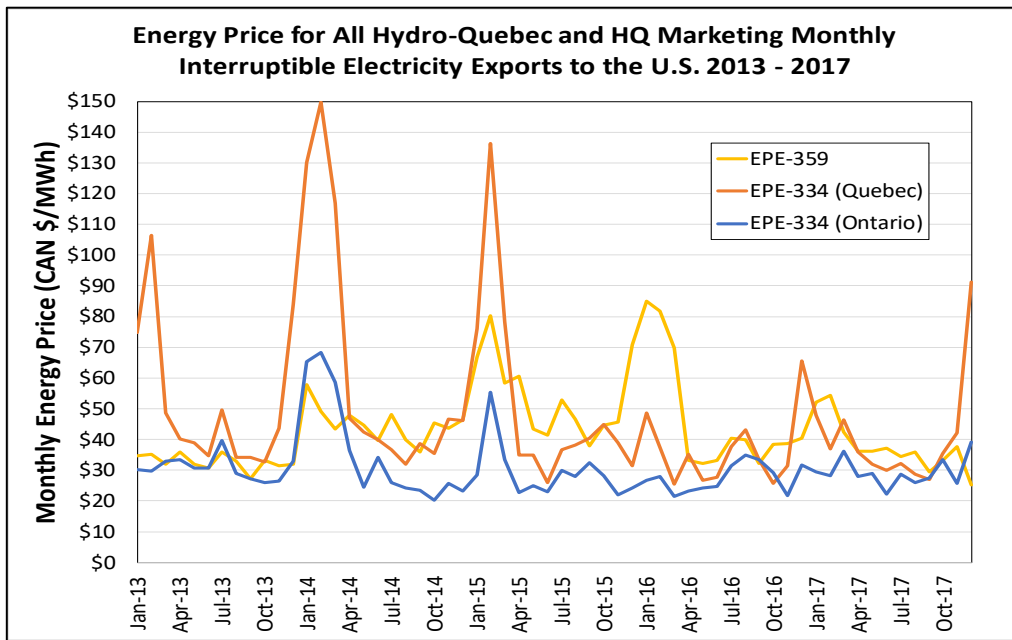
“Load in Québec was assumed in all scenarios to grow by 0.42% per year for a total increase of 28.7 TWh between 2015 and 2050.”

²⁴ Hydro-Québec et. al., “Deep Decarbonization in the Northeastern United States and Expanded Coordination with Hydro-Québec,” April 2018, p. 28.

²⁵ Contract prices derived from publicly-available information concerning the price under the Massachusetts contracts presented to the Massachusetts Department of Public Utilities. Cost to build new facilities is based on the Deep Decarbonization Study

(peak and off-peak) except during winter price spikes (**Figure B - 12**). Off-peak hours, the periods when Hydro-Québec would be most likely to divert energy for sales to NECEC, is likely to be on the lower end of this range.

Figure B - 12: Hydro-Québec average price for interruptible energy by license²⁶



The futures market indicates a projection of electrical energy prices in New York that is consistent with historical prices, and would be significantly below the contract price. Futures for New York peak prices for zone A, which tend to be higher than the North Zone where Hydro-Québec interconnects into New York, are averaging around \$41/MWh for 2023. If off-peak hours are considered, Hydro-Québec could make money by simply diverting the entirety of its exports into New York into NECEC, or buying from other markets during off-peak hours to conserve its water for sale via NECEC.

²⁶ Energyzt analysis of National Energy Board, Monthly Electricity Export Reports for Canada to the US.

Figure B - 13: CME Group, NYISO Zone A – Peak Hour Futures Contract Price²⁷

	Trading	Clearing	Regulation	Data	Technology	Edu			
DEC 2022		-	-	37.30	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
JAN 2023		-	-	50.60	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
FEB 2023		-	-	48.25	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
MAR 2023		-	-	37.55	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
APR 2023		-	-	34.20	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
MAY 2023		-	-	35.60	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
JUN 2023		-	-	38.70	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
JUL 2023		-	-	54.60	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
AUG 2023		-	-	50.50	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
SEP 2023		-	-	38.80	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
OCT 2023		-	-	34.50	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
NOV 2023		-	-	34.20	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018
DEC 2023		-	-	38.75	-	-	0	No Limit / No Limit	16:45:00 CT 11 Oct 2018

Legend: Options Price Chart [? About This Report](#)

Given where market prices are trading, it generally would be more economic for Hydro-Québec to simply divert sales away from markets with prices below that level in order to service NECEC or, if it is more economic to do so, purchase energy from lower priced markets to generate energy to sell to Massachusetts under a long-term contract.

²⁷ CME Group, NYISO Zone A On-peak Price as of October 11, 2018,
<https://www.cmegroup.com/trading/energy/electricity/nyiso-zone-a-5-mw-peak-calendar-month-day-ahead-lbmp-swap-futures.html>

Hydro-Québec notes in its Section 83D application form that it may upgrade or build new facilities in the future. Given Hydro-Québec’s need for new capacity, any upgrades or capacity additions that do occur would happen regardless of NECEC, and should be incorporated into the scenarios with and without NECEC when estimating the impact of NECEC on carbon emissions.

B.5 RECALCULATION OF CMP’S PROJECTIONS

In response to claims that Hydro-Québec would supply NECEC by diverting sales from other markets, CMP presented a calculation of energy available from Hydro-Québec’s system going forward.²⁸ The calculation purports to show that Hydro-Québec would have a sufficient amount of incremental energy as a result of higher storage levels and therefore would not have to decrease exports into other markets below historical levels.

The simplistic model suffers from three fundamental flaws:

- 1) **The CMP Model Answers the Wrong Question:** The real question is whether NECEC reduces global emissions, and the CMP model does not address this question. To do so would require an analysis of what carbon emissions would be with and without NECEC. Given the recent set of high water conditions, Hydro-Québec has stored energy that it could use to generate energy going forward. This does not mean that sales via NECEC would be incremental over the entire term of the contract or that the stored water would not otherwise be sold as exports into other markets in the absence of NECEC. Therefore, the model cannot address what the net effect on emissions would be.
- 2) **CMP Assumes a Sudden Availability of Incremental Exports:** According to the CMP model, Hydro-Québec does not sell its excess energy into other markets unless NECEC is built. This results in reservoir levels remaining high up to the point where NECEC comes online. In fact, there is plenty of excess transmission

²⁸ *Central Maine Power Co.*, Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Rebuttal Testimony of Thorn Dickinson, Eric Stinneford, and Bernardo Escudero on Behalf of Central Maine Power Company, July 13, 2018; CMP Response to NRMCMC-032-021, Attachment 1.

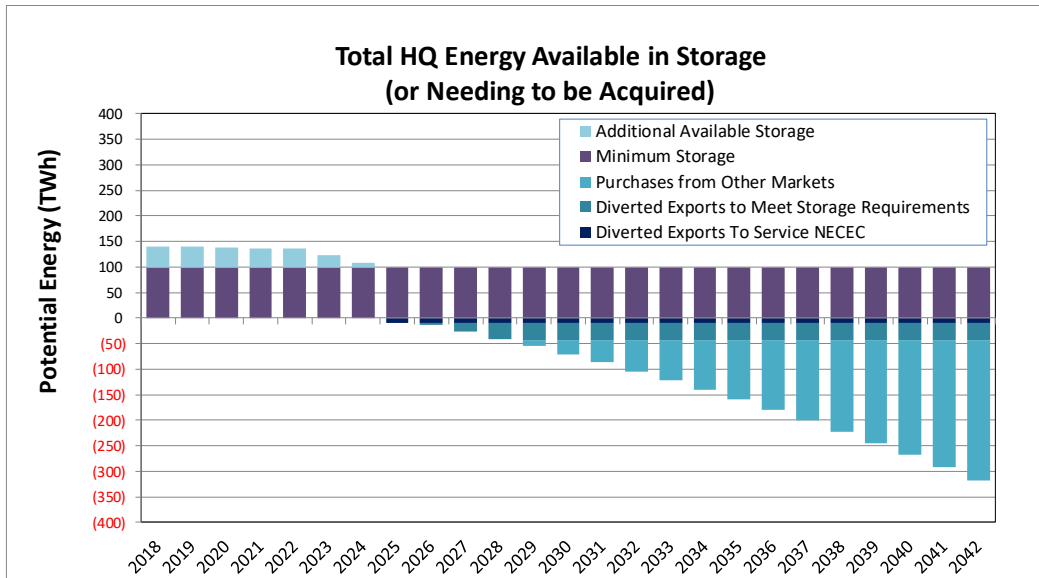
capacity servicing the interconnected markets that Hydro-Québec could use to sell its excess energy that currently is stored in its reservoirs. Historically, there has been around 16 to 18 TWh of unused transfer capacity across the tielines that Hydro-Québec could have used to sell its energy.²⁹ Intertie capacity is not the constraint for Hydro-Québec exports. Furthermore, by conserving water in storage to service NECEC, there would be an adverse impact on environmental emissions in other markets that otherwise could be mitigated if Hydro-Québec were to sell that energy prior to the NECEC contract.

- 3) **Water Conditions:** The model is incredibly sensitive to one key assumption – how much runoff would Hydro-Québec receive implicitly assumes high water conditions that have been experienced in 2017 and the years before will continue for the entirety of the contract, allowing for high levels of energy availability that allows incremental exports compared to historical levels. Assuming that Hydro-Québec will enjoy lower run-off levels – even a small reduction in the CMP assumption of 6 percent – dramatically changes the result. With this one change, Hydro-Québec would be unable to meet NECEC obligations while maintaining historical export levels without having to reduce exports and purchasing energy from other markets to meet its obligations.

Addressing only the assumed water conditions to reflect lower runoff conditions going forward compared to the recent high water years confirms that there are conditions under which: 1) Hydro-Québec would not have the excess energy required to maintain exports at recent levels; and 2) if Hydro-Québec did not divert energy from other markets into NECEC or reduce its exports to below historical levels, it would have to make other adjustments. Specifically, Hydro-Québec would have to divert exports into NECEC for sale into New England almost immediately under the contract and would have to begin greenwashing sometime during the first half of the contracts (**Figure B - 14**).

²⁹ *Central Maine Power Co., Request for approval of CPCN for the New England Clean Energy Connect, Maine P.U.C. No. 2017-000232, Exhibit No. JMS-3, Technical Report: Hydro-Québec Exports, April 2018, Figure 6, pp. 7-8.*

Figure B - 14: Hydro-Québec operations with lower runoff conditions



In other words, doing nothing more to the CMP model other than reducing the assumed starting point for generation to reflect reasonable runoff conditions shows that Hydro-Québec will need to add new capacity to the system which is counter to what Hydro-Québec has stated NECEC would require and would be uneconomic given the NECEC contract prices for energy. Therefore, Hydro-Québec would have to manage its total export levels to meet its NECEC obligations and/or greenwash purchases from other markets.

In reality, Hydro-Québec is not confined to a single strategy over the course of the contract. Hydro-Québec will manage its system, sales, exports and opportunities according to water conditions and market prices. NECEC simply imposes another fixed obligation onto the system against which Hydro-Québec will optimize its operations. Such optimization will include diverting sales into other markets and greenwashing, as required to optimize profits.

B.6 CONCLUSIONS ON QUÉBEC’S SYSTEM AND SALES

According to NERC’s long-term reliability assessment projections, Québec’s system currently is projected to be short on capacity – without another acquisition of 1,100 MW of

potential capacity resources, the province will be short of its targeted reserve requirements by 2023. Therefore, it would be unlikely that Hydro-Québec would be able to sell additional capacity into the ISO-NE market via NECEC unless it increases purchased capacity from other markets beyond what is required to maintain its own targeted reserve margins.

In contrast to its projected shortfall in capacity, Hydro-Québec has excess energy. Hydro-Québec maximizes its profits by selling that excess energy into other markets. Historically, there has been a significant amount of unused capacity on the transmission interties between Québec and other markets indicating that the constraint is not transmission, but Hydro-Québec’s availability of energy (i.e., water). Therefore, if NECEC were built, the energy would be supplied by diverting energy sales from other markets.

Hydro-Québec has issued public statements that it could meet NECEC requirements with existing reservoir storage and upgrades. Any energy available through reservoir storage could be, and most likely would be, sold into other markets. The entirety of the upgrades are required to meet projected domestic load growth through 2034. Therefore, NECEC would be supplied by diverted energy.

CMP has testified that Hydro-Québec has enough water in its reservoirs to meet its obligations to NECEC while maintaining exports into other markets at historical levels. Their conclusions, and the underlying model supporting those conclusions, assumes that the high water conditions of 2017 and the previous years would continue indefinitely. This is unrealistic. Simply changing the assumed level of potential energy to reflect alternative conditions indicates that Hydro-Québec would be unable to maintain its sales into other markets plus its energy obligations into NECEC without diverting exports and greenwashing energy purchased from other markets.

Understanding Québec’s system is key to understanding potential environmental impacts of NECEC. Hydro-Québec is not likely to upgrade its system to meet incremental sales into other markets as those upgrades are needed to meet its own projected load growth. Hydro-Québec is not likely to sell capacity via NECEC as it requires an incremental 1,100 MW of capacity in order to meet its projected requirements in 2023. Lastly, Hydro-Québec is not likely to sell incremental energy into NECEC as it has the incentive to maximize sales of its excess energy into other markets and divert the lowest-priced hours into NECEC.

NECEC reflects an alternative way for Hydro-Québec to sell energy into an existing market in which it already trades. The large size of NECEC and associated energy supply commitment would enable Hydro-Québec to convert roughly one-third of its existing sales into low-priced spot markets into a higher-priced contract. In order to meet this commitment, Hydro-Québec will be able to manage its system, reservoirs, exports and imports given water conditions and market prices. The net impact on carbon emissions in the environment could be negligible and may even have adverse consequences if NECEC diverts energy from markets with higher emissions on the margin compared to New England.

**Winter Recreation Impact Survey
February 2019
Conducted by Sandra Howard, PhD**

Summary:

This online survey was distributed electronically and participants responded during a 4-week period between January 18-February 18, 2019. The prompt to participants read as follows: “We are collecting data about the winter recreation experience in western Maine. These data will be used in response to a proposed 145-mile transmission line through Maine, which would include crossing many mountains, wetlands, and waterways in an undeveloped region of western Maine.”

- 163 Participants
- State of Residence
 - Connecticut (8.0%)
 - Maine (65.6%)
 - Massachusetts (17.8%)
 - New Hampshire (4.3%)
 - Other – Maryland, New York, Virginia, Pennsylvania (4.3%)
- Year of most recent trip to Maine
 - 2019 (84.6%)
 - 2018 (13.5%)
 - 2017 (1.9%)
- Duration of most recent trip to western Maine
 - 1-2 days (14.1%)
 - 3-4 days (40.4%)
 - 5 or more days (30%)
 - Seasonal Resident (3.9%)
 - Year-Round Resident (11.6%)
- Number of times traveled to area to participate in winter rec. activities
 - 1-5 times (8.6%)
 - 6-10 times (11.6%)
 - 11-15 times (7.4%)
 - 16-20 times (7.4%)
 - 20+ times (65%)
- Activities engaged in on most recent trip to area (*select one or more)
 - Purchased Fuel (91.4%)
 - Purchased Meals/Drinks at Local Restaurant (90.8%)
 - Snowmobiling (86.5%)
 - Purchased Grocery Items (81.6%)
 - Viewed scenery (75.5%)
 - Purchased Retail Items (68.1%)
 - Stayed at Area-Owned Home (55.2%)

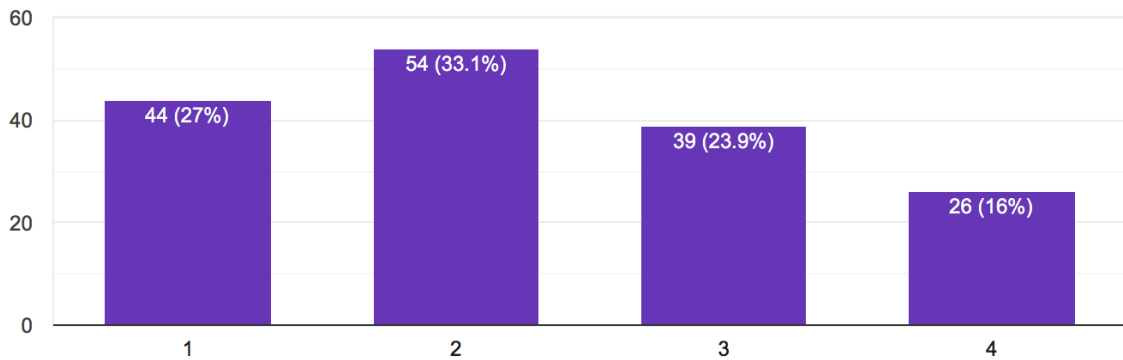
- Stayed at Area-Lodging Accommodations (50.3%)
- Snowshoeing/Winter hiking (39.9%)
- Ice Fishing (39.3%)
- Cross-country skiing (19%)
- Rented Snowmobile (6.7%)
- Other (6.6%)
- Hired Snowmobile Guide (1.8%)

- RATE EACH FACTOR FOR SELECTING A SNOWMOBILE DESTINATION:

Driving distance from home



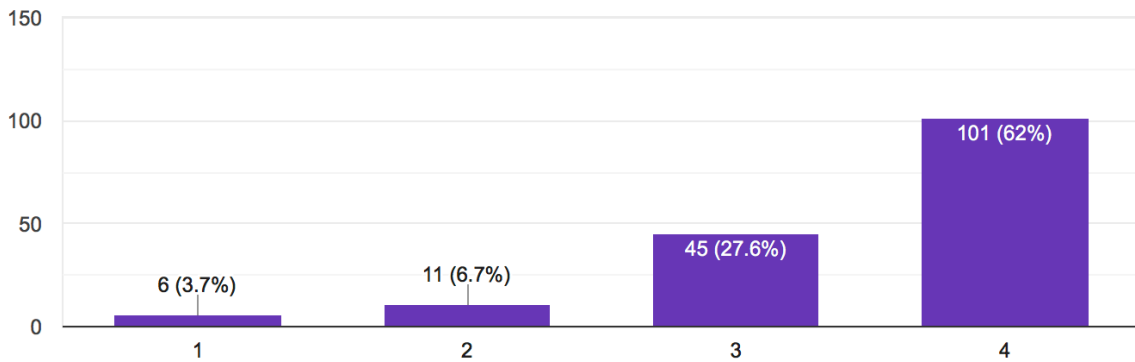
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Trail conditions

163 responses

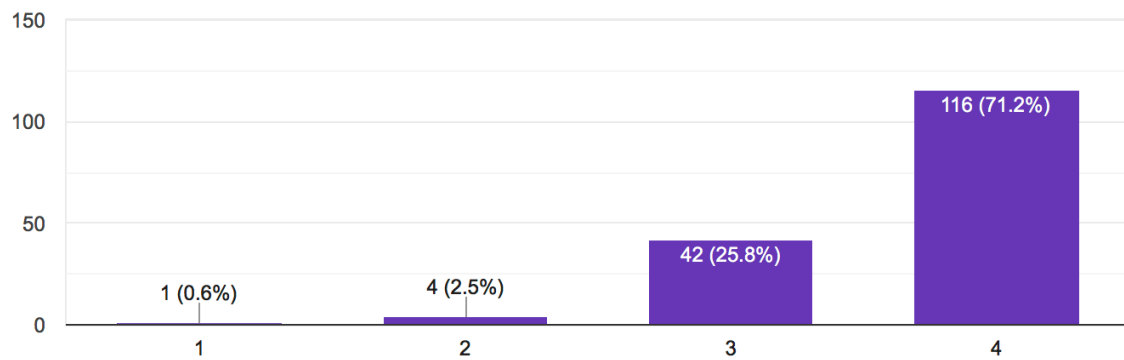


SCALE (1 = Less Important; 4 = Very Important)

Scenic beauty along snowmobile trails



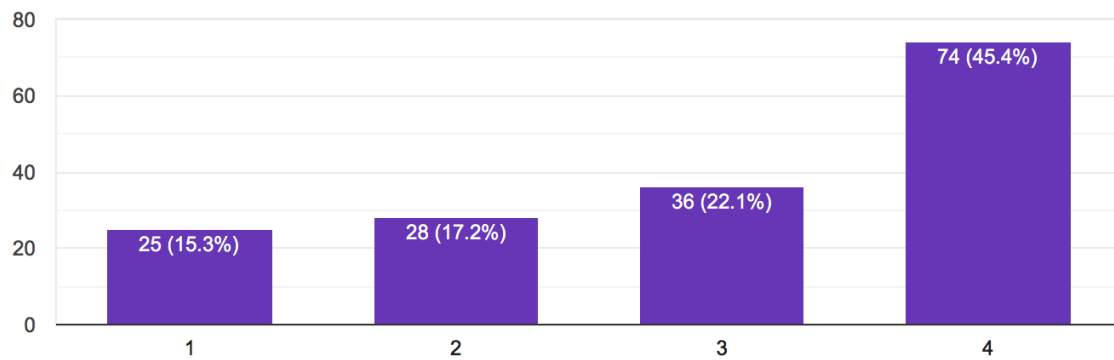
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Ability to participate in other recreation activities (i.e. ice fishing, snowshoeing, x-country skiing, etc.)

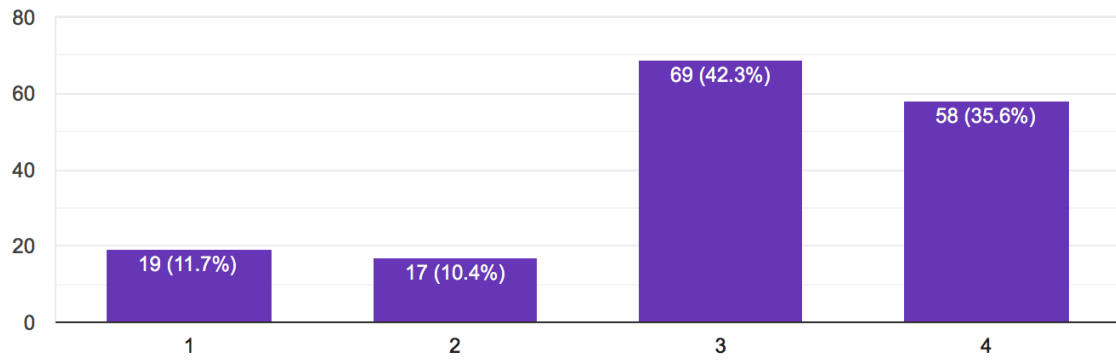
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Accommodations

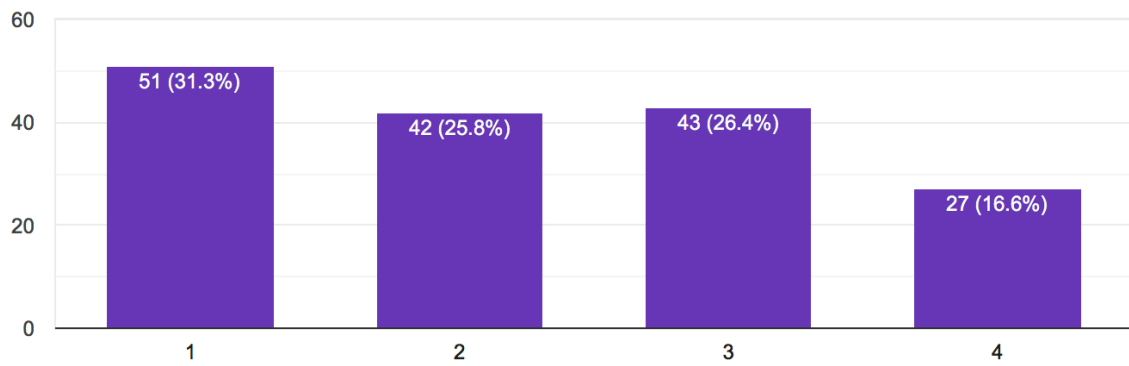
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Internet Access

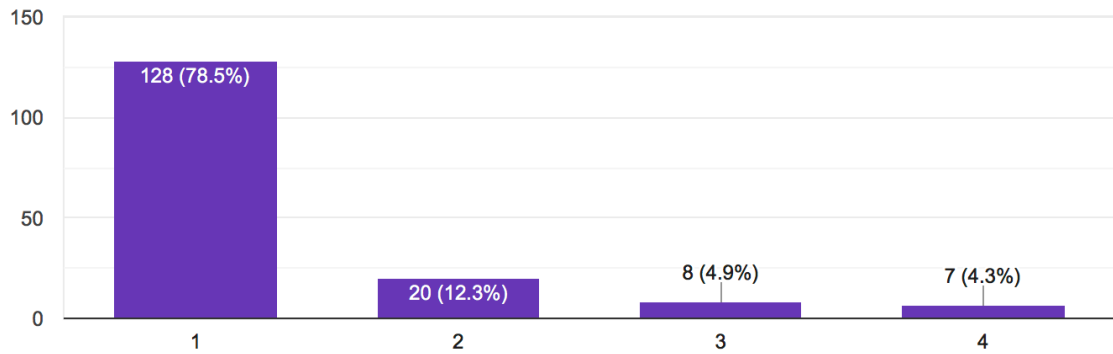
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Opportunity to view large-scale utility infrastructure in the area

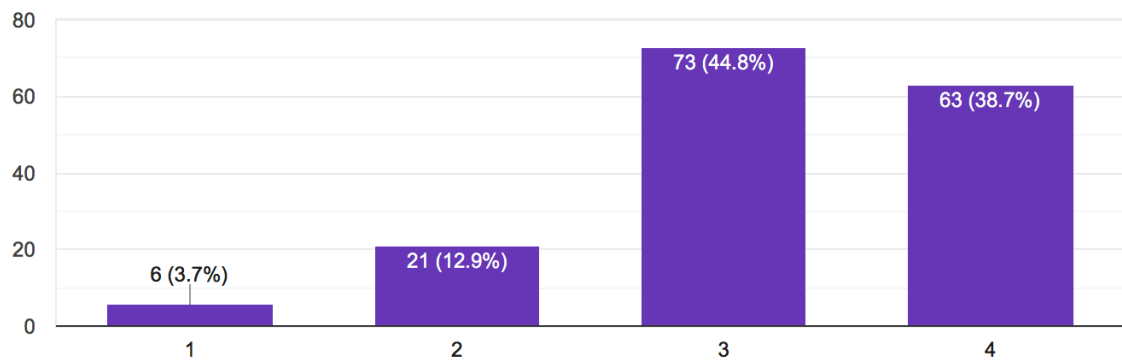
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Restaurants

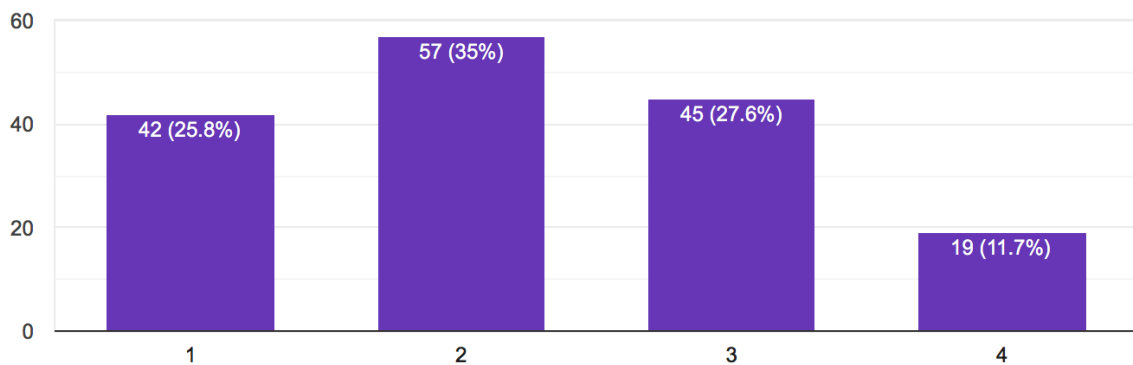
163 responses



SCALE (1 = Less Important; 4 = Very Important)

Area Shopping

163 responses

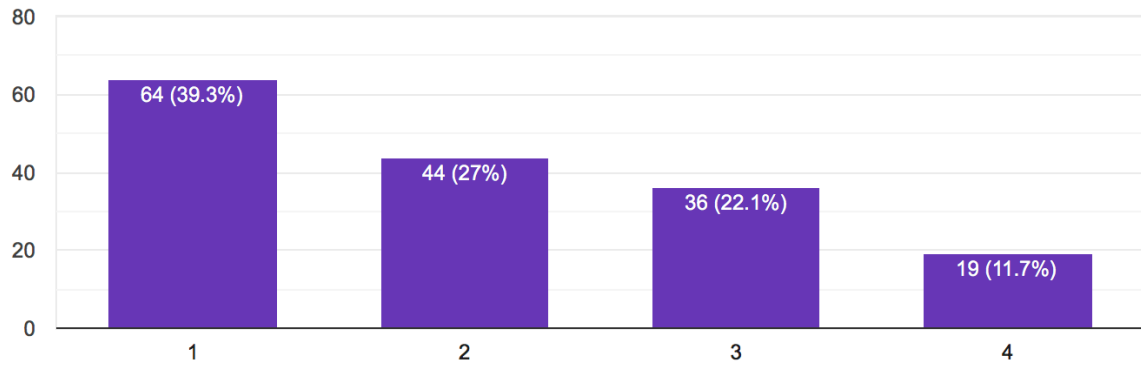


SCALE (1 = Less Important; 4 = Very Important)

Area Rentals



163 responses

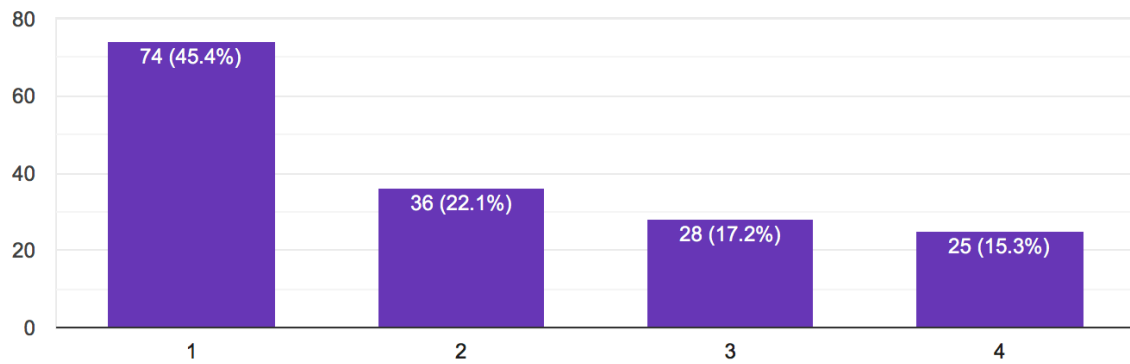


SCALE (1 = Less Important; 4 = Very Important)

Area Guides



163 responses

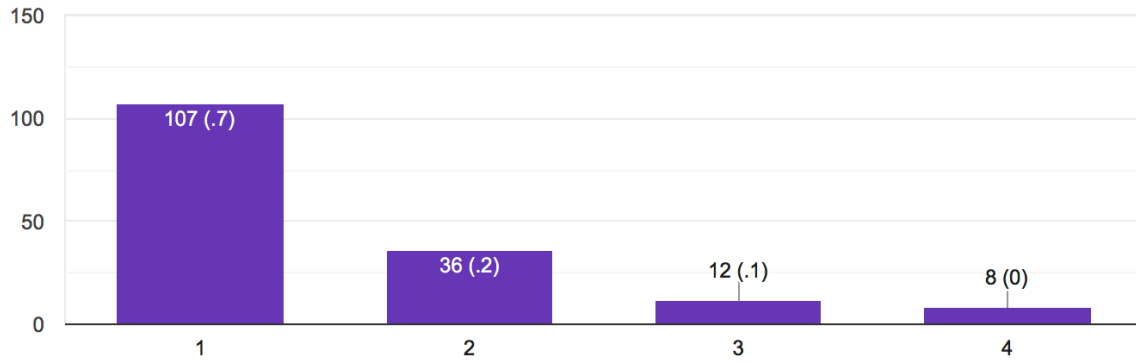


SCALE (1 = Less Important; 4 = Very Important)

- RATE YOUR PREFERENCE FOR EACH TYPE OF SNOWMOBILING EXPERIENCE BELOW:

Riding along a power line trail

163 responses

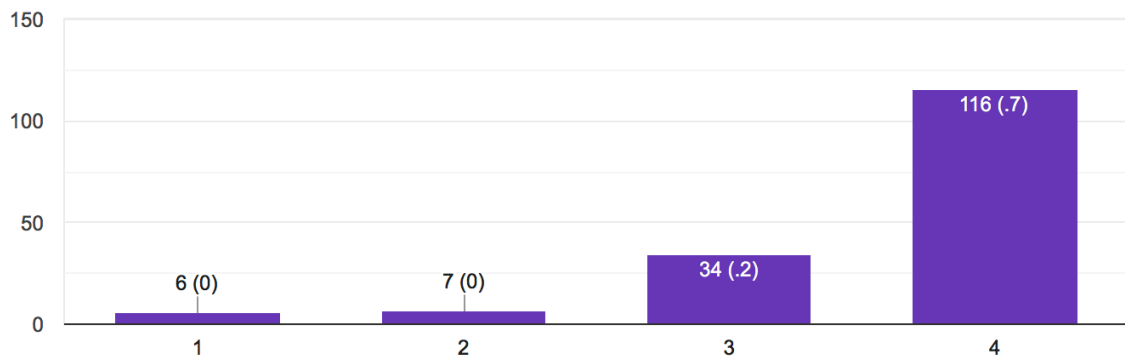


SCALE (1 = Least Preferred; 4 = Most Preferred)

Groomed trail riding in forested areas



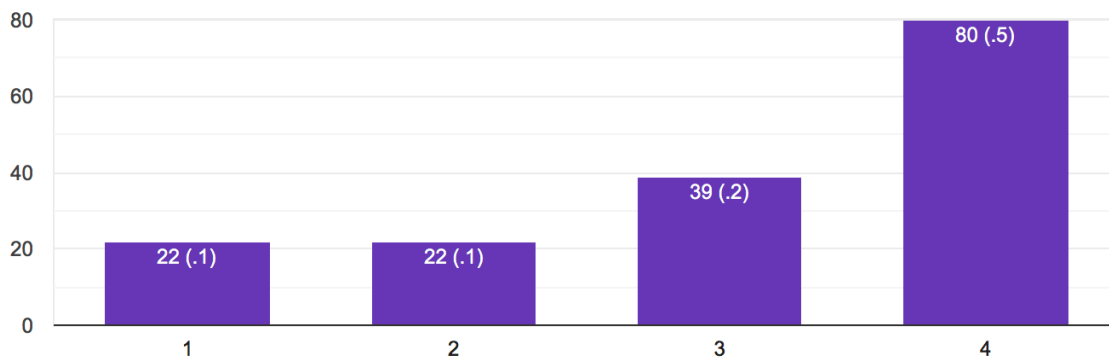
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Riding with few road or power line crossings

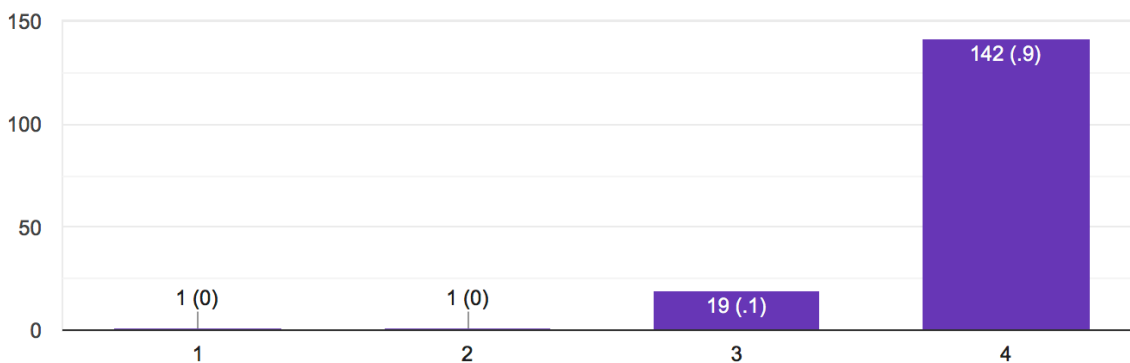
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Riding along mountain view trails with overlooks

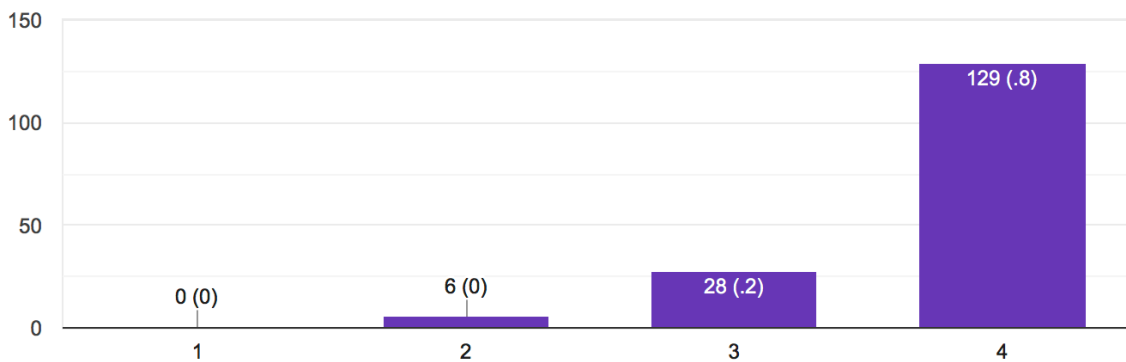
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

Seeing wildlife in their natural setting

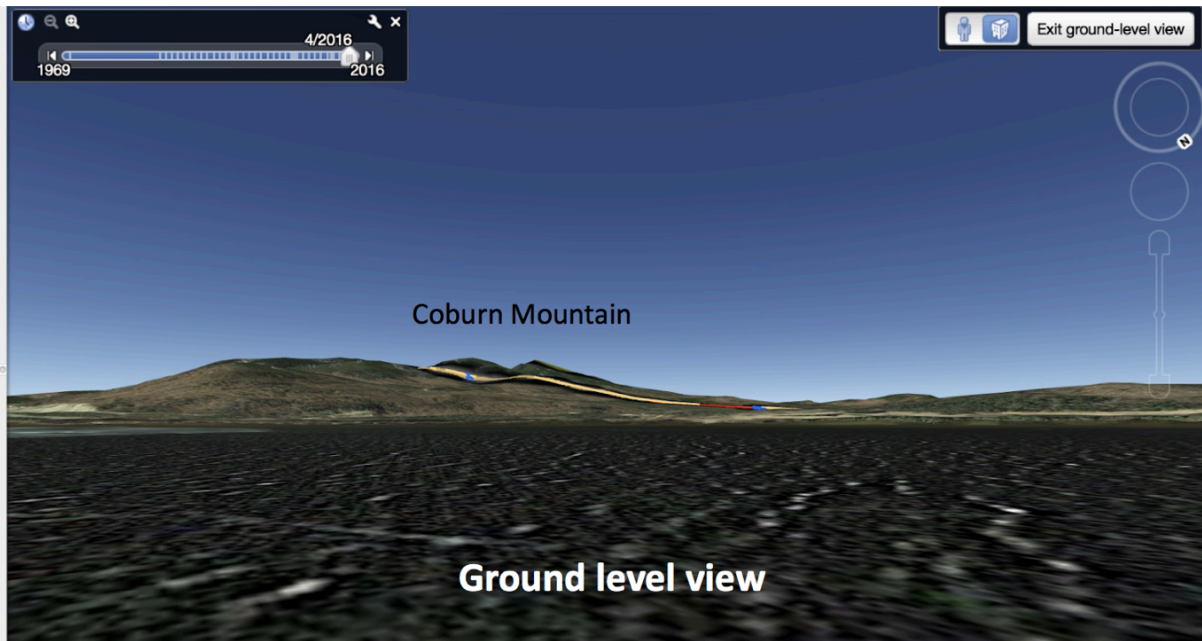
163 responses



SCALE (1 = Least Preferred; 4 = Most Preferred)

- Participants were asked to “look at the scenic photos and GIS simulation photos that show a 150-foot wide cleared corridor with 100-foot transmission towers.”

GIS simulation of proposed transmission corridor at Coburn Mountain



Snowmobilers at the top of Coburn Mountain



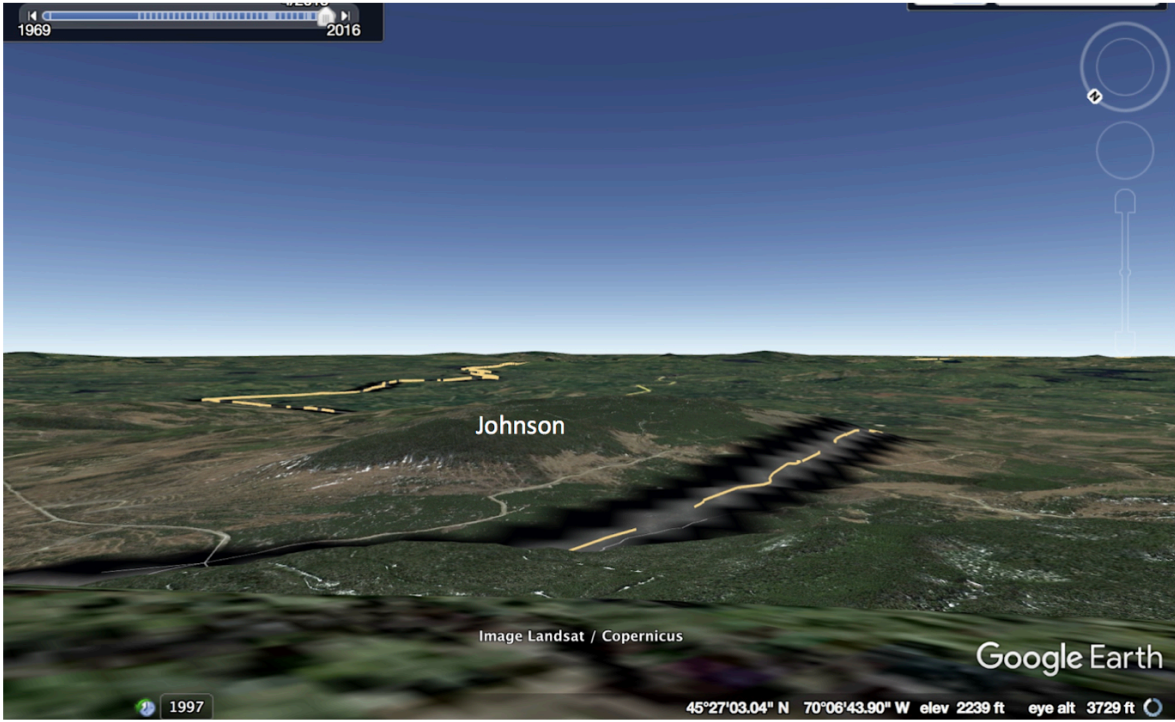
View of Grace Pond from the top of Coburn Mountain - GIS simulation of transmission corridor



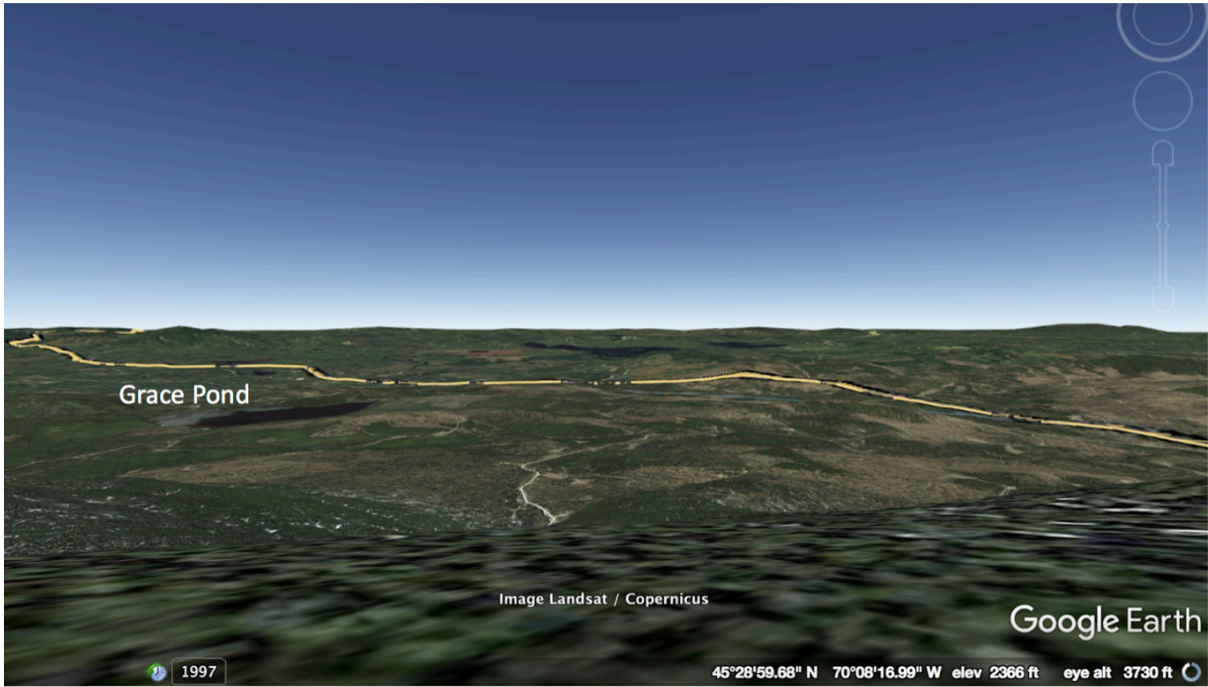
View of Grace Pond from the top of Coburn Mountain



View of Johnson Mountain from the top of Coburn Mountain - GIS simulation of transmission corridor

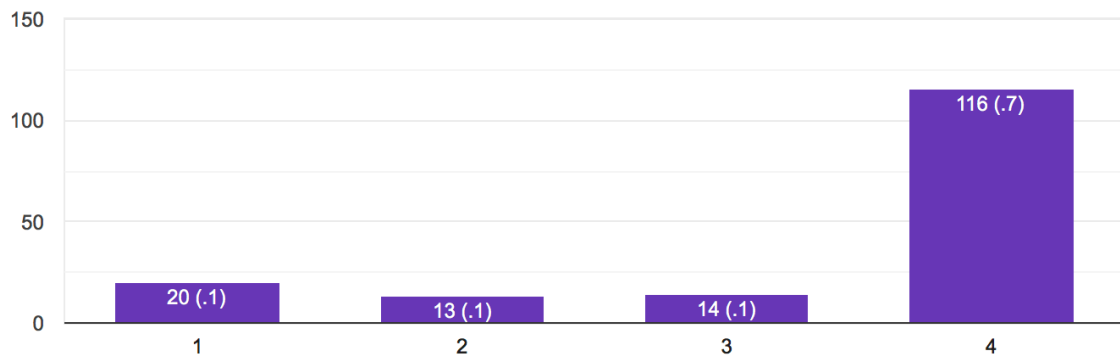


View of Grace Pond from the top of Coburn Mountain - GIS simulation of transmission corridor



What visual impact would a 150-foot wide cleared corridor with 90-foot transmission towers have on your wilderness snowmobiling experience?

163 responses

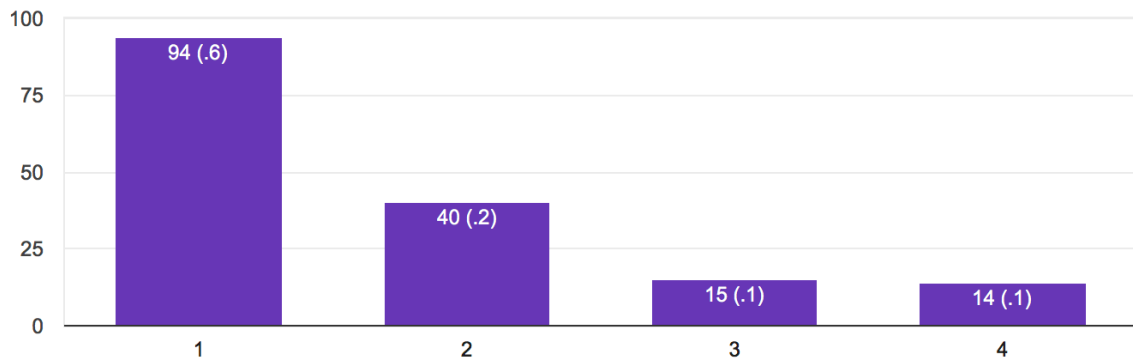


SCALE (1 = Little Negative Impact; 4 = Strong Negative Impact)

Would you be more or less likely to visit a scenic area which contains large-scale developments for a snowmobiling destination?



163 responses

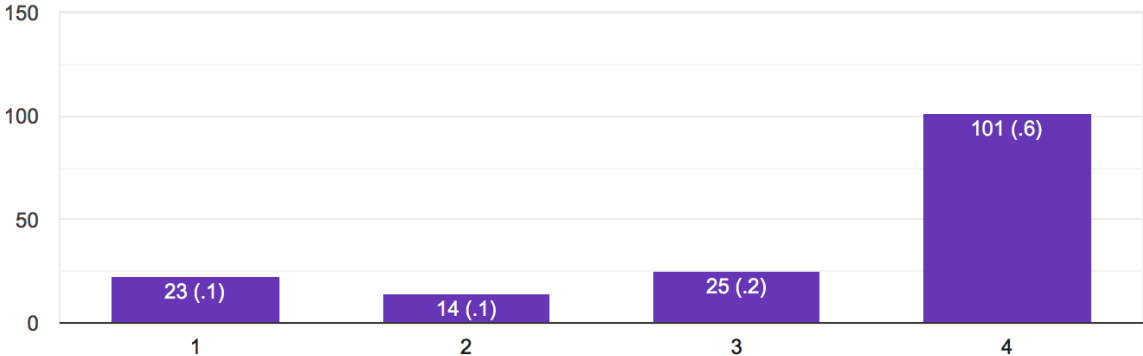


SCALE (1 = Less Likely; 4 = More Likely)

What impact would the presence of a 150-foot wide cleared corridor with 90-foot transmission towers have on your decision for a return visit the area in the future?



163 responses



SCALE (1 = Little Negative Impact; 4 = Strong Negative Impact)
