

FMG Case Study #1: Penobscot County

2010 home did not meet 2009 IECC code



In 2013, a frustrated new home owner hired FMG Inc. to provide a BPI certified building analyst to investigate inadequate heat capacity and high energy use.

FINDINGS:

Problem: Excessive air leakage (11 ACH), envelope heat loss and insufficient length of fin tube baseboard heating elements.

Cause: Not compliant with 2009 IECC code

Code Issues: No Attic Air Barrier with 12" fiberglass; no visual inspection and/or blower door test to meet recommended standard of 7 ACH; no ACCA Manual J Heating Load Calculations; no concrete basement wall insulation.



Net Boiler Output = 96,000 BTU/Hr.

Fin Tube Baseboard Output = 48,400 BTU/Hr.

Manual J Heating Load Calc. = 66,151 BTU/Hr.

Baseboard Deficiency = (17,751) BTU/Hr.

Recommendations:

Removal of (2,100 SF) air permeable 12" fiberglass attic insulation and creation of an air barrier with 2" spray foam & 12 inch cellulose insulation; 2" spray foam insulation on (500 SF) basement concrete wall and sill.



Results: BEFORE: 11 ACH; heating demand - 66,151 BTU/Hr.; 904 gallons #2 oil

AFTER: 4 ACH; heating demand - 31,879 BTU/Hr.; 435 gallons #2 oil


Savings: 469 gallons x \$2.50/gal = \$1,172

Payback: \$9,000/\$1,172 = 7.7 years.

FMG Case Study #2: Efficiency Maine \$600 Air Sealing Program

In 2015, FMG conducted 75 Air Sealing Projects in 9 counties. As an E.M. qualified partner, FMG provides: a BPI combustion safety inspection, energy audit and 6 man hours of blower door guided air sealing for a home owner cost of \$200.00 with E.M. \$400 incentive.

Ratings for Air Changes per Hour (ACH)

	<p>12 ACH - Very Leaky</p> <p>8 ACH - Existing Home Median</p> <p>7 ACH - 2009 IECC recommended</p> <p>5 ACH - 2015 IRC code</p> <p>3 ACH - 2012 IECC mandatory</p> <p>1 - Extremely Tight.</p>
--	---

Air Change per Hour (ACH) before and after:

Circa 1919 Victorian

3 Unit Apartment

1990's Modular

Post MUBEC 2009



13.7 to 10.3

11.6 to 10.3

12.9 to 6.9

5.4 to 2.5

Difficulty – Material Cost – Payback:



Difficulty: Low skill & 6 hours work

Materials: Caulk, Spray Foam, Insulation

Cost: inexpensive materials \$100-\$125

Savings: all homes saved 10% minimum air leakage or an average of \$200 per home

Payback: \$200/\$200 = 1.0 year

Case Study #3: Somerset County: A 2011 constructed home of 6,600 SF

Exceeds 2015 IECC code requirements

In 2011, a geothermal drilling/installation company hired FMG Inc. to provide home energy efficiency program services. This example illustrates how the diminishing returns principle of insulation can be improved by use of the Manual J Heat load calculation, to include savings with “right sizing” of the mechanical equipment.




Calculated & Projected* Annual energy use and operating cost

Without insulation & air leakage upgrade: Peak Heating Load - 75,669 BTU/Hr Yearly Energy Cost with GSHP: \$1,724.00	With insulation and air leakage upgrade: Peak Heating Load - 54,663 BTU/Hr Yearly Energy Cost with GSHP: \$1,327.00 Energy Savings \$407.00 Cost of added insulation: \$13,964; Payback: = 34 years *Saving in Avoided Mechanical Cost (down sized equipment) = \$7,000 Payback = 1.8 years
--	---

Note: Actual operating cost is \$1,100.00/year for heating cooling and DHW!

Key Items selected from the 2015 IECC code

Air Barriers Continuous Rigid Wall Insulation Blower door tested Envelope and Ducts Manual J Heat Load Calculations	Air Sealing: “intra” floor/room penetrations 
--	--

Case Study #4: Inadequate ventilation in new homes

In 2015, several home owners hired FMG Inc. to provide a BPI certified building analyst to test their homes for indoor air quality and determine if natural building air leakage was sufficient. All of the following are problematic at less than 5 ACH requiring either balanced ventilation or unbalanced ventilation. All home owners voiced concerns on why the building code does not require an assessment for ventilation.



Dexter – 2015 - 2,800 SF Modular with stick built walk out basement. Insulation ROXUL™ batts insulation with a sheetrock glued in place air barrier (i.e.no nail factory process).

ACH = 1.74

No Ventilation with 3 toilet exhaust & Range Hood



Rangeley 2013 - 2,092 SF Stick built. Insulation all spray foam.

ACH = 0.82

No Ventilation with 2 toilet exhaust and no Range Hood over propane range/oven used daily. Moisture reported on interior doors in the winter.



Newport 2013 - 2,143 SF Stick built. Insulation all spray foam.

ACH = 1.8

No Ventilation: 2 toilet exhaust and no Range Hood over propane range/oven.

end