MAINE ANTIQUE REHAB (80% reduction)

Short Case Study – For Full Case Study
William Turner

Year-round home, 3,600 ft², 8,000 degree days

1st Home in Maine & 27th Project to Officially Meet the 1000 Home Challenge!

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After Fixes, How Did We Do (until 2012)?

Typically, 6-7 cords of wood a year & ½ tank of oil, then switched to 100-200 gallons of propane & always evaporated lots of water on top of wood stoves

2012 Paradigm Shift: THC inspiration

1. Wood supplier stopped supplying 3 cords a year
2. I now know enough to fix house to use much less energy
3. Major flying squirrel infestation (15) in 1st floor ceiling
2012: Interstitial cavity between floors accessed for cellulose dense packing
(185 bales added, including attic)
Interstitial cavity between floors accessed for cellulose dense packing in May 2012 & April 2013
Interstitial floor space is where flying squirrels were living & commuting
2012: Interstitial cavities between 1st & 2nd floors were accessed for cellulose dense packing
# Blower Door Results & Fuel Use

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Before/After</th>
<th>Tests 1</th>
<th>Tests 2</th>
<th>Tests 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>prior to attic VB: not testable</td>
<td></td>
<td>10+ cords</td>
<td>+ 200 gal. oil</td>
<td></td>
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<tr>
<td>2011</td>
<td>prior to dense pack: 12 ACH&lt;sub&gt;50&lt;/sub&gt;</td>
<td></td>
<td>6 cords</td>
<td>+ 200 gal. propane</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6,675 CFM&lt;sub&gt;50&lt;/sub&gt;</td>
<td></td>
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<tr>
<td>2012</td>
<td>after dense pack: 7 ACH&lt;sub&gt;50&lt;/sub&gt;</td>
<td></td>
<td>3 cords (8,900 lbs)</td>
<td>+ 200 gal. propane</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5,000 CFM&lt;sub&gt;50&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>additional dense pack:</td>
<td></td>
<td>1,249 lb. of wood</td>
<td>+ DHP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,000 CFM&lt;sub&gt;50&lt;/sub&gt;</td>
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</table>
2013: Remaining Air Leakage Areas to Address

Small corners of dormers

North side between floors
2013: Now Very Even Temperature Distribution (unless very windy, NW wind)
Now: Thermal Enclosure
2013 Insulation Levels
2013: Ductless Heat Pump Application:
Current home, one DHP serves about 2/3 of home, 1.5 ton
Outside Unit
(3 ft. above earth, out of snow, SW exposure)
Inside Unit & Low Wattage Ceiling Fan
2014 – 2015 Upgrades

2nd 18,000 Btu ductless heat pump installation
Expansion of solar PV; added 7 kW
More air sealing & dense pack cellulose
Solar hot water system modifications

Implications for Other Homes?
• Ductless heat pumps offer great synergy with insulation & air sealing for deep reductions

• Significant potential to add electric heating load without increasing household electric use – with a motivated homeowner
August 2014-July 2015

- Coldest winter in memory
- PV array covered with ice for over a month
- 1000 Home Challenge does not adjust for year to year variations in weather

Officially met the 1000 Home Challenge based on energy use during this period!
Household Energy Use Compared with THC Threshold & 50% Milestone
(kWh/year, site energy)

OPTION B Inputs: AUBURN_LEWISTON ME weather station, 7,615 HDD; 3,500 Ft² FFA; 1.83 households; 3.67 occupants; 30% electric heat

- **BASE**
  - 6 cords wood
  - 409 gal propane

- **5/2012-4/2013**
  - 4 cords wood
  - 283 gal propane

- **THC 50% Milestone**

- **8/2014-7/2015**
  - .4 cord wood
  - 229 gal propane

- **THC OPTION B**

13,041 kWh net; PV = 3,905 kWh

13,105 kWh/Yr.
Thank You to

The 1000 Home Challenge, Curry Caputo, & “Sustainable Structures” dense packers, & Talmage Solar Engineering

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Case studies on 1000 Home Challenge website
www.thousandhomechallenge.org