Life Cycle Cost Analysis for Pellet Boilers versus Heating Oil and Natural Gas Boilers: an Interactive Dashboard

July, 2012

The decision to use a wood pellet boiler system should be carefully analyzed. At the core of the analysis is the life cycle cost analysis (LCCA) which compares the present values of the expected costs of the alternatives over the life of the project.

We have seen a number of LCCA’s and are concerned that, in some cases, the assumptions used to drive the analysis lead to incorrect conclusions. Therefore, we are offering a free dashboard that is set up for three specific wood pellet boiler systems. That interactive dashboard is embedded into this pdf document on the third page.

The three systems that the dashboard allows analysis for are:

1. A Maine Energy Systems (MESys) AutoPellet pellet boiler. The dashboard has three boiler sizes that can be selected: 191,000 BTU/hr (56kW), 109,500 BTU/hr (32kW), and 68,300 BTU/hr (20kW).

2. A Maine Energy Systems “Energy Box”. An Energy Box can have between two and four MESys 56kW AutoPellet boilers and the pellet fuel storage is included in a single container. The dashboard has three choices: four boilers in cascade totaling 764,000 BTU/hr (224kW), three boilers totaling 573,000 BTU/hr (168 kW), and two boilers totaling 382,000 BTU/hr (112 kW).

3. An ACT Bioenergy CP1700 498 kW (1,700,000 BTU/hr) pellet boiler.

Brief descriptions and photos of all three are in the appendix of this document starting on page 4.

Those three foundations have been selected for this analysis because FutureMetrics has detailed price and performance information on all three. FutureMetrics can easily set up the LCCA workbook for any system. Please contact us if you need LCCA analysis.

The dashboard allows the user to alter any number of assumptions and compare the systems to heating oil and natural gas boilers. The key metric, shown at the bottom of the dashboard, is the ratio of the present value of the life cycle costs of the pellet boiler to the alternatives. You can also view a chart of the cumulative costs.

As you will see, pellet fuel systems beat heating oil and natural gas systems beat pellet fuel under most sets of assumptions. However, there are significant areas within the northeast that do not have natural gas. The charts on the next page shows the residential and commercial opportunities for pellet boilers in the Northeast and Midwest.
Where natural gas is not an option, homes, businesses, schools, and other buildings without natural gas can be converted to pellet fuel with very significant savings to the users. As several of our papers have pointed out, the limits to the number of sites that can be converted are set by the sustainable supply of wood. At current levels of demand for wood by the pulp industry, FutureMetrics estimates that about 1.8 million locations in the Northeast and 1.4 million in the Midwest can convert and not exceed the sustainable output of these regions’ forests or significantly impact pricing for pulpwood and pellet fuel.
Maine Energy Systems 56kW AutoPellet Pellet Boiler

With more than 20 years of experience, ÖkoFEN is THE pioneer in the field of wood pellet heating systems in Europe. They have over 40,000 systems installed and operating in Europe. Much of what today is standard practice in the pellet boiler sector was developed in the ÖkoFEN research center.

Features

- Automated Three Way Ash Removal
- ASME Certified and UL Listed
- 87.7% Efficiency
- Two Stage Combustion
- Stainless Steel Combustion Chamber
- Programmable Logic Controller for Modulated Heat Output
- External Detachable Ash Box for Easy and Clean Ash Removal
- Digital LCD Controller Interface
- Automatic Electric Ignition with Low Energy (250W) Glow Plug
- Burner Mountable on Left or Right Side
- Burnback Fire Prevention Through Air-Tight Spring Actuated Valve
- Automatic Flame Tube Cleaning Mechanism
- Bottom Fed Pellet Burner Requires No Down Time for Burner Ash Removal
- Combustion Sensor Continuously Monitors Burner Efficiency
- Pressure Sensor and Flue Gas Fan Safely Control Draft
- Pellet Fuel Automatically Fed by Vacuum or Auger System from Bulk Storage

Programmable LCD Controller
Maine Energy Systems Energy Box

The Energy Box is a complete renewable energy system delivered to site in a mobile container constructed of 2-3/4” cross laminated wood panels. The floor and the ceiling of the Energy Box Boiler Room are covered with aluminum diamond plate. The roof is completely wrapped with ice and water shield and finished with steel roofing with the capacity to handle 70lbs/ft² snow load. The exterior covered with two coats of wood preservative and can be sided to match surrounding buildings.

The Energy Box can contain up to four 56kW pellet boilers. It has an automatic fuel supply with automatic ash compression system, fully automated digital staging controls, and certified burn back protection. The pellet storage rooms are at each end. The Energy Box holds 15 tons of pellets and is complete with filler connection, floor augers and self-feeding vacuum pellet distribution. The Energy Boxes are designed and built at the MESys facility in Bethel, Maine. More at www.MaineEnergySystems.com

<table>
<thead>
<tr>
<th></th>
<th>Ft./In.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>33’ 8”</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>7’ 10.5”</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>8’ 3.5”</td>
<td></td>
</tr>
<tr>
<td>Fuel store capacity</td>
<td>Tons</td>
<td>15</td>
</tr>
<tr>
<td>Estimated transport weight</td>
<td>Lbs</td>
<td>17,000</td>
</tr>
</tbody>
</table>
ACT Bioenergy 500kW Pellet Boiler

ACT Bioenergy LLC manufactures high-efficiency wood pellet and wood chip boilers for commercial, institutional multi-family residential buildings. Ranging in size from 0.5 to 3.5 Million BTU’s, ACT Boiler systems are specifically designed for high-efficiency, fully-automated, user-friendly operation. Our boilers are manufactured in Schenectady, NY and are certified to meet American Society of Mechanical Engineers (ASME) Standards. More information can be found at www.actbioenergy.com.