Wood Pellet Opportunities in Atlantic Canada

Efficiency Nova Scotia Corporation
Bright Business Conference
October 15-16, 2013 | Halifax, NS

Gordon Murray, Executive Director

Topics

- Wood pellets 101
- Fibre sources
- Carbon cycle
- Canadian / Atlantic pellet industry
- Market situation
- Atlantic opportunities
Wood Pellets 101

- Made from compressed wood fibre.
- Lignin binds the fibre. No adhesives needed.
- Used as a coal substitute for power generation and for residential/commercial/institutional heating

Wood Pellet Fibre Sources

- Sawmill residues
- Logging residues
- Tops & branches
- Commercial thinnings
- Low grade logs
Wood Pellet Extrusion

Energy Content

24.8 gigajoules per tonne

17.0 gigajoules per tonne
Bioenergy - Low Carbon Alternative

- Biogenic carbon is part of a relatively rapid natural cycle that impacts atmospheric CO₂ only if the cycle is out of balance.
- Fossil fuel combustion transfers geologic carbon into the atmosphere. It is a one-way process.

Graphic source: Washington Forest Protection Association

Wood Pellet Uses

- Power generation
  Efficiency ~ 35%

- Heat, cooling, & hot water
  Residential/commercial/institutional
  Efficiency ~ 80%

Wood Pellet Association of Canada
Wood Pellets for Power Generation

Co-firing with coal or dedicated firing

Wood Pellet Association of Canada

Wood Pellets for Home Heating, Cooling, and Hot Water
Pellet Heating – This is No Wood Stove

- Automated feeding
- Hot water & radiant heating
- Low emissions
- Low maintenance
- Also used for cooling

Need to educate public about the potential for bulk home delivery

As convenient as heating oil delivery
Global Wood Pellet Production

![Global Wood Pellet Production Graph]

Source: REN21

Canadian Wood Pellet Plants

![Canadian Wood Pellet Plants Map]

Current Producers
Under Construction
Proposed Plants
Pots

Wood Pellet Association of Canada
First Load Shipped to Europe

- The first load of industrial pellets was shipped on the *Mandarin Moon* from Prince Rupert, Canada to Helsingborg, Sweden in 1998

![Image of ship](image.jpg)

Wood Pellet Association of Canada

---

Canadian Pellet Shipping Routes

- Asia - 8,000 km
- Europe - 16,500 km
- Europe - 5,000 km

![Map showing shipping routes](map.jpg)
Canadian Pellet Exports 2012

Thousands of Tonnes

Source: Statistics Canada

Wood Pellet Association of Canada

Eastern Wood Pellet Plants

Pellet Plants
- NB – 5
- NS – 3
- NL – 3

CANADIAN BIOMASS
2013 PELLET MAP
Canadian Power Market Potential

- Canada uses 60 million tonnes of coal annually
- Ontario: Atikokan coal power plant 100% conversion
- New coal emission regulations released Sept 2012
  - In force effective in 2015
  - Caps emissions at 420 tonnes CO$_2$/GWh
  - Compare to status quo at 1050 tonnes
  - Applies to new units and those aged 50+
  - Biomass emissions deducted from total
  - Potential pellet use – 4.4 mn t by 2019

Canadian Heat Market Potential

- Natural gas accounts for only about half of Canadian residential and commercial/institutional heat and hot water energy consumption.
- 100% conversion of all non-gas heat and hot water represents 60 million tonnes of wood pellets annually.
- So 100% conversion is not achievable? How about just 5% conversion? That represents 3 million tonnes annually.
Pellet Competitiveness Map

**Stoking the Home Fires**

Canada's Pellet Heat Market

**Legend**
- Heating Oil
- Electricity
- Firewood
- Biomass
- Pellet
- Propane

**Conversion Target**

<table>
<thead>
<tr>
<th>Conversion Target</th>
<th>Annual Pellets</th>
<th>Pellet Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>60 million tonnes</td>
<td>$16.2 billion</td>
</tr>
<tr>
<td>5%</td>
<td>3 million tonnes</td>
<td>$810 million</td>
</tr>
<tr>
<td>1%</td>
<td>600,000 tonnes</td>
<td>$162 million</td>
</tr>
</tbody>
</table>

Wood Pellet Association of Canada
Atlantic Provinces: Principal Energy Source for Heating

- Electricity: 42%
- Heating Oil: 34%
- Firewood: 13%
- Wood Pellets: 5%
- Natural Gas: 5%
- Other (including propane): 1%
- Other (including propane): 1%

Wood Pellet Association of Canada


<table>
<thead>
<tr>
<th>Fuels &amp; Heating Systems</th>
<th>Annual Fuel Utilization Efficiency</th>
<th>Cost/Million BTUs of Heat** <em>(HST Incl.)</em> (10% rebate available)</th>
<th>Average Cost per Year: 1700 sq. ft. house</th>
<th>Average GHG (CO₂ eq.) emissions in tonnes per Year: 1700 sq. ft. house</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NEW R2000 - 30 MBTU</td>
<td>NEW - 50 MBTU</td>
<td>OLD - 80 MBTU</td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td>$42.26</td>
<td>$1,268</td>
<td>$2,113</td>
</tr>
<tr>
<td>Natural Gas</td>
<td></td>
<td>$22.67</td>
<td>$680</td>
<td>$1,134</td>
</tr>
<tr>
<td>Oil</td>
<td>Furnace/Boiler - Medium Efficiency</td>
<td>80%</td>
<td>$36.11</td>
<td>$1,083</td>
</tr>
<tr>
<td>Propane</td>
<td>Furnace/Boiler - Medium Efficiency</td>
<td>80%</td>
<td>$49.89</td>
<td>$1,491</td>
</tr>
<tr>
<td>Wood Pellets</td>
<td>Stove / Fireplace</td>
<td>70%</td>
<td>$28.13</td>
<td>$644</td>
</tr>
</tbody>
</table>

Wood Pellet Association of Canada

Wood Pellet Association of Canada
The Atlantic natural gas network does not reach rural areas
Fuel GHG Emissions Comparison

Ave GHG emissions - tonnes per year for 1,700 square foot house

- Electricity: 12.18 tonnes
- Natural Gas: 3.37 tonnes
- Oil: 4.69 tonnes
- Propane: 3.94 tonnes
- Wood Pellets: 0 tonnes

Wood Pellet Association of Canada

Heating Oil Means Lost Jobs

- 80% of Atlantic crude oil is imported from Saudi Arabia, Nigeria, & Angola
- 1.3 billion litres per year of heating oil used, 1.0 billion litres from imported crude = 8.4 million barrels
- Assuming $106 per barrel (Sep 24/13), this means that $890 million is leaving the Atlantic economy to support foreign imports
Coal Means Lost Jobs Too

- Atlantic coal is imported from US and Columbia
- 65 PJ of electricity used for Atlantic heat and hot water annually, half produced from coal = 33 PJ
- 33 PJ of electricity requires 3.7 million tonnes of thermal coal in a plant operating at 35% efficiency
- Assuming $75 per tonne of coal (Sep 24/13) this means that $278 million is lost to the Atlantic economy

Atlantic Wood Pellet Opportunity

- Atlantic annual heat and hot water energy = 156 PJ
- Increase pellet use from <1% to 5% = 8 PJ
- 8 PJ would require 588,000 tonnes of wood pellets at 80% efficiency
- This would mean jobs and income for Atlantic Canada
- Would save .015 tonnes GHG per GJ; a total of 1.2 million tonnes of GHG emissions annually
Conclusions

- Modern pellet appliances are as convenient as those for gas and oil
- Need to expand bulk deliveries and move away from bags
- Wood pellets would be the lowest heat alternative for most of Atlantic Canada
- Would keep millions of dollars at home rather by eliminating fossil imports
- Would reduce greenhouse gas emissions
- Will require coordinated effort between government and industry

Thank you!

Gordon Murray
- gord@pellet.org
- (250) 837-8821

November 18-20 | Vancouver BC
http://www.pellet.org/wpac-agm-2013