Wood Pellet Opportunities in Manitoba

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Topics

- Wood pellets 101
- Pellet fibre sources
- Agriculture pellets
- Carbon cycle
- Wood pellet uses
- Global and Canadian pellet industry
- Manitoba domestic heating situation
- Manitoba wood pellet opportunities
Wood Pellets 101

- Renewable fuel
- 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
Wood versus agricultural pellets

- Agriculture pellets have higher ash and chlorine content
- Higher ash content = high maintenance
- Ash can also cause clinkering
- Chlorine is corrosive
- Agriculture pellets are more suitable for commercial and industrial applications
- Straw pellets are used extensively in Europe

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 ~ 90%

Wood pellets for power generation

Co-firing with coal or dedicated firing
**Wood pellets for home heating, cooling, and hot water**

1. Once or twice a year the pellets are delivered by a silo tanker. A loaded storage room of 4.5 m³ is enough to keep a single-family house warm for one year.
2. The pellets are carried from the storage room to the boiler by a fully automatic pellet feed.
3. After the burning process all that’s left is ash – with a weight of only 0.3 per cent of the original pellet. The ash can be disposed of with the domestic waste.
4. If the pellet boiler is interconnected with a buffer storage, emissions can be reduced and efficiency increased.

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**Modern pellet boilers**

- As convenient as natural gas
- Automated feeding
- Ultra low emissions
- >95% efficiency
- Heat and hot water
- Control by smart phone
**Automatic pellet feeding system**

As convenient as heating oil delivery

**Need to educate public about the potential for bulk home delivery**

As convenient as heating oil delivery
Global wood pellet production

Canada
Production: 2 million tonnes
Exports: 1.8 millions tonnes

Source: REN21

Wood Pellet Association of Canada

Canadian wood pellet plants

2 tiny plants in Manitoba ~ 2,000 TPY
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.
Canadian pellet exports 2012

Thousands of Tonnes

- United Kingdom: 794
- Netherlands: 253
- Japan: 106
- United States: 87
- Italy: 85
- Switzerland: 21
- Denmark: 11
- Belgium: 6
- Korea: 2
- Rest of World: 3

Source: Statistics Canada

Manitoba Hydro facility map

- Natural gas distribution limited to southern 20% of Manitoba
- Extensive electrical grid
- Small northern communities off grid

Legend:
- Hydro generating
- Thermal generating
- Wind generating
- Nuclear plants
- Control structures
- Electrical substations
- HVDC transmission
- 500-kV transmission
- 230-kV transmission
- 138-kV transmission
- 115-kV transmission
- 66-kV transmission
- 25-kV transmission
- TransCanada Pipelines
- Gas distribution
Manitoba principal energy source for heating

- Natural Gas: 55%
- Electric: 34%
- Oil/propane/wood: 9%
- Geothermal: 2%
- Data source: Manitoba Energy Strategy 2012

Manitoba energy cost comparison

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Heat Value</th>
<th>Unit Cost</th>
<th>Appliance Efficiency</th>
<th>$/GJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>0.0375 GJ/m³</td>
<td>$0.28/m³</td>
<td>90%</td>
<td>$8.30</td>
</tr>
<tr>
<td>Wood Pellets</td>
<td>17.5 GJ/tonne</td>
<td>$270/tonne</td>
<td>90%</td>
<td>$17.14</td>
</tr>
<tr>
<td>Electricity</td>
<td>3.6 GJ/MWh</td>
<td>$72/MWh</td>
<td>100%</td>
<td>$20.00</td>
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<tr>
<td>Heating Oil</td>
<td>0.038 GJ/litre</td>
<td>$1.19/litre</td>
<td>85%</td>
<td>$36.84</td>
</tr>
</tbody>
</table>

Data sources: Manitoba Hydro, WPAC

Wood Pellet Association of Canada
Home heating cost comparison

Annual Household Heating Costs - Manitoba 2014

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>$653</td>
</tr>
<tr>
<td>Wood Pellets</td>
<td>$1,349</td>
</tr>
<tr>
<td>Electricity</td>
<td>$1,574</td>
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<tr>
<td>Heating Oil</td>
<td>$2,900</td>
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</tbody>
</table>

Data Sources: Manitoba Hydro, WPAC

Fuel GHG emissions comparison

Average GHG Emissions
Tonnes per year for 1,700 SF House

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Emissions</th>
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<tbody>
<tr>
<td>Hydro electricity</td>
<td>3.37</td>
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<tr>
<td>Natural gas</td>
<td>4.69</td>
</tr>
<tr>
<td>Heating oil</td>
<td>0.00</td>
</tr>
<tr>
<td>Wood pellets</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Data source: Nova Scotia Department of Energy
### Wood pellet equivalents - tonnes

- **Total, 2,951,000 T**
  - *Oil/propane/wood, 266,000 T*
  - *Geothermal, 59,000 T*
  - *Electric, 1,003,000 T*
  - *Natural Gas, 1,623,000 T*

Data sources: Manitoba Energy Strategy 2012, Statistics Canada, WPAC

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### Manitoba’s forests

- 95% public owned
- AAC is 8.9 million m³
- 2/3 allocated
- A substantial forest industry exists
- Possibility of a pellet industry exists
- Initially import from other provinces

Source: Forestry Branch, Province of Manitoba
Conclusions

- Wood pellets would be cost competitive in Manitoba
- Would reduce greenhouse gas emissions
- Modern pellet appliances are as convenient as those for gas and oil
- A provincial pellet industry could be established
- Could keep millions of dollars at home by eliminating fossil imports
- Will require coordinated effort between government and industry

Wood Pellet Association of Canada

Thank you!

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http://www.pellet.org/wpac-agm-2013

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