Food for Thought

Presented by
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Agroforestry and Woodlot Extension Society
Alberta Agriculture and Rural Development

Agroforestry and Woodlot Extension Society

“A joint venture of government, forest industry and conservation organizations”

Wood Bioenergy

Sources of wood biomass

Willow Baler

The HEAT is on!
Wood Combustion is currently the most feasible, most convenient and most reliable renewable energy source, BECAUSE of the No. 1 energy requirement ...

HEAT!
Alberta Energy Use-Industrial sector

- Total Energy Use for industrial sector is 170 PJ all from Natural Gas and from that
  - Space heating 103, 9 PJ
  - Water heating 16, 0 PJ
  - Auxiliary Equipment 17, 7 PJ
  - Auxiliary Motors 13, 0 PJ
  - Lighting 15, 3 PJ
  - Space cooling 3, 7 PJ

Total energy use for space heating, water heating and space cooling is 123, 6 PJ and which hold potential to be partly converted to using renewable sources like wood biomass.

Comparison of Fuel Costs

<table>
<thead>
<tr>
<th>FUEL</th>
<th>$ CAN</th>
<th>Unit</th>
<th>$/GJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>0.119</td>
<td>kWh</td>
<td>33.05</td>
</tr>
<tr>
<td>Propane</td>
<td>0.604</td>
<td>L</td>
<td>23.67</td>
</tr>
<tr>
<td>Fuel Oil</td>
<td>1.515</td>
<td>L</td>
<td>39.38</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>0.381</td>
<td>M3</td>
<td>4.96</td>
</tr>
<tr>
<td>Mill Residue</td>
<td>10.00</td>
<td>Ton</td>
<td>1.70</td>
</tr>
<tr>
<td>Tree Chips</td>
<td>40.00</td>
<td>Ton</td>
<td>2.22</td>
</tr>
<tr>
<td>Wood Pellets</td>
<td>220.00</td>
<td>Ton</td>
<td>12.09</td>
</tr>
</tbody>
</table>

Comparison of Fuel Efficiency

<table>
<thead>
<tr>
<th>Fossil Fuel</th>
<th>Energy Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dodds Coal</td>
<td>17.8 GJ/Tonne</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>38.0 GJ/m³</td>
</tr>
<tr>
<td>Fuel Oil</td>
<td>40.8 GJ/Tonne</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Renewable Fuel</th>
<th>Energy Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>17.1 GJ/Tonne</td>
</tr>
<tr>
<td>Wheat Straw</td>
<td>16.5 GJ/Tonne</td>
</tr>
<tr>
<td>Barley Straw</td>
<td>16.2 GJ/Tonne</td>
</tr>
<tr>
<td>Canola Oil</td>
<td>40.6 GJ/Tonne</td>
</tr>
<tr>
<td>Poplar</td>
<td>18.2 GJ/Tonne</td>
</tr>
<tr>
<td>Municipal Waste</td>
<td>11.0 GJ/Tonne</td>
</tr>
</tbody>
</table>

Customized Boiler Systems

The available and reliable Boiler Technology ranges from 10 kW (app. 35,000 Btu/h) to 40 MW (app. 16 bn Btu/h) and higher, allowing individual designs for specific requirements regarding space, fuel, energy demand and budget.

Hargassner technology

Turnkey Heating Project

- Container system
- Output: 300 kW (1.1 mill. Btu/h)
- Fuel: Wood pellets
On-Farm system  Germany

More Information
Toso Bozic, Woodlot Specialist
Alberta Agriculture and Rural Development
780-415-2681

Tree Plantations (Afforestation)

What is tree Carbon?
• As trees grow they consume CO2 through photosynthesis and release O2.
• Cellulose (wood) is built using carbon.

The Carbon Farmer Inc.
(www.thecarbonfarmer.ca)

Value Tree Plantation (rough estimates)
3 Trees (60 yrs) = 1 tonne of CO2e
3m x 3m = 313 tree / acre
104 tonne / acre
$1565 / acre ($15 / tonne)
Value Agroforestry – Shelterbelts
(Kort and Turnock, 1999)

Hybrid Poplar (32 yrs @ 2.5 x 2.5 m)
260 kg/tree; 104 t/km;
$1560 @ $15/tonne/row/1.6 km

White Spruce (54 yrs @ 3.5 x 3.5 m)
144 kg/tree; 41 t/km; 1.6 km
$615 @ $15/tonne/row/1.6 km

Value Added Comparison

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Value added</th>
<th>Price $ per thousand board feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing timber</td>
<td>$132 per fbm</td>
<td></td>
</tr>
<tr>
<td>Selling at mill site</td>
<td>$220 per fbm</td>
<td></td>
</tr>
<tr>
<td>Sawing and drying</td>
<td>from $360 to $550</td>
<td></td>
</tr>
<tr>
<td>Created edged-glued panels</td>
<td>Up to $1,200</td>
<td></td>
</tr>
</tbody>
</table>

Note: you have to have machinery to do value added

* Thousand board feet is approximately 4.4 m³

Beathke Woodlot Operations

Value Added Wood Products

Mike Leussink
Firewood (rough estimates)

- Birch = ~$6-800 / cord
  (~$9000 / acre)
- Poplar = ~$2-220 / cord
  (~$4000 / acre)
- Spruce / Pine = ~$250-350 / cord
  (~$6000 / acre)

Food for Thought!

Non-timber forest Products

- “products of biological origin other than wood derived from forests, other wooded land and trees outside forests. They may be gathered from the wild, or produced in forest plantations, agroforestry schemes and from trees outside forests.”
  
  United Nations Food and Agriculture Organization (FAO)

British Columbia

“In 1997 the sector was valued at $600M per year, with over 30 000 British Columbians earning all or part of their living from the sector. Over 200 species are harvested for sale, with mushrooms and floral greenery the largest “crops.”"
Alberta Opportunities!

Mushrooms (rough estimates)
- 4 ft log = 1 lb
- $25 / lb
- twice in growing season
- aspen logs

Birch Syrup (rough estimates)
- Native wild tree
- 40 l sap = 1 litre syrup
- ~C$43 / l

Birch Syrup - Alberta -

Fiddleheads (rough estimates)
- Native Ostrich Fern
- $13 – 16 US / lb

Take Home Messages
- Agroforestry can enhance traditional agricultural practices.
- Timing is everything!
- Trees are a long term investment.
- Trees can enhance crop production and are a great cover crop for non timber forest products!