Bioenergy has an essential role in the IEA’s 2°C Scenario.

Bioenergy in 2015 - 4.5% of total energy.

IEA’s goal for 2060 – 17% (fourfold increase).

Current deployment rate is too low to meet goal.
Global Wood Pellet Production

Average 14% growth for past 10 years
Figures are in millions of tonnes

Source: REN 21 Renewables 2018
Production by Region - 2017

- **Canada** - 2.7 mn tonnes
- **USA** - 7.6 mn tonnes

Sources: REN 21 2018 & IEA Bioenergy Task 40 Global Wood Pellet Study 2017
<table>
<thead>
<tr>
<th>Country</th>
<th>Imports (Mt)</th>
<th>Main use</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>6.8</td>
<td>Power</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.6</td>
<td>Industrial scale CHP</td>
</tr>
<tr>
<td>South Korea</td>
<td>2.4</td>
<td>Power</td>
</tr>
<tr>
<td>Italy</td>
<td>1.8</td>
<td>Home heating with stoves</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.1</td>
<td>Power</td>
</tr>
</tbody>
</table>
# Canadian Pellet Plant Profile - 2018

<table>
<thead>
<tr>
<th>Region</th>
<th>Plants #</th>
<th>Plants %</th>
<th>Regional Capacity t</th>
<th>Regional Capacity %</th>
<th>Average Capacity t</th>
</tr>
</thead>
<tbody>
<tr>
<td>West (1)</td>
<td>19</td>
<td>48%</td>
<td>3,140,000</td>
<td>77%</td>
<td>165,000</td>
</tr>
<tr>
<td>Central</td>
<td>13</td>
<td>33%</td>
<td>650,000</td>
<td>16%</td>
<td>50,000</td>
</tr>
<tr>
<td>Atlantic</td>
<td>8</td>
<td>20%</td>
<td>311,000</td>
<td>8%</td>
<td>39,000</td>
</tr>
<tr>
<td>Canada</td>
<td>40</td>
<td>100%</td>
<td>4,101,000</td>
<td>100%</td>
<td>103,000</td>
</tr>
</tbody>
</table>

(1) West includes Pinnacle’s new Entwistle and Smithers plants. Entwistle is presently being commissioned. Smithers is expected to be completed by the end of 2018.
Canadian Production and Exports

2014-2020 = forecast

Source: Global Trade Atlas export and import data & WPAC analysis
Canada’s Exports - 2017

UK, 1,490
Japan, 360
USA, 210
Belgium, 169
South Korea, 152
Italy, 55

Figures are expressed in thousands of tonnes

Source: Global Trade Atlas export and import data & WPAC analysis
UK Market

- 6.8 Mt imported in 2017, mainly for power.
- Dominated by Drax Power.
- Lynemouth Power is commissioning (+1.6 Mt).
- MGT Power is under construction (+1.1 Mt).
- Drax fourth boiler being converted.
- Relies on UK’s RO and CFD support schemes.
- Strict sustainability and GHG criteria.
Japanese Market

- Co-firing and dedicated biomass power.
- Expected to reach 8.4 Mt by 2025.
- Most interesting new market for BC & AB.
- Supported by: (1) feed in tariff, (2) energy conservation law, (3) GHG emission reduction targets.
- Quality, reliability, and sustainability are paramount.
USA Market

- Heating market using ~ 2.4 Mt. Pellets used to replace heating oil. Mainly stoves.
- Market has been stagnant. No signs of growth.
- Canada has a little less than 10% market share.
- Canada has a foreign exchange advantage.
Mainly a power market. Two large dedicated biomass power plants owned by Engie. Total market is 1.1 Mt with Canada contributing about 15%. Supported by a green certificate support scheme. Strict sustainability and GHG criteria. No near-term growth is foreseen.
South Korean Market

- Mainly a power market supported by an escalating RPS and tradeable renewable energy certificates.
- Market is 2.4 Mt. Canada has ~ 5% share.
- Almost all purchases through tendering.
- Little regard for quality or sustainability to date.
- Government has withdrawn REC support for new biomass projects. New market growth is unlikely.
Italian Market

- Entirely a heat market, mostly 15 KG bags.
- Requires ENplus quality certification.
- Total market is 2.5-3.0 Mt and growing.
- Difficult to serve from Canada. Complicated logistics, fragmented customer base.
- 22% VAT resulted in a black market of 300 Kt.
- Air quality concerns led to ban of A2 pellets.
- Canada’s exports declined from a peak of 220 Kt to just 50 Kt annually.
Canada’s Domestic Wood Pellet Market

- We have poor domestic statistics. Estimated market is 250-300 Kt annually.
- Pellets used for power generation in Ontario, and for residential and commercial heating, mainly in areas off the natural gas grid.
- Stoves dominate, but boiler installations are increasing slowly, especially in NWT and Atlantic Canada.
Canadian Annual Heat Energy Use by Fuel Type

Residential and Commercial Heat and Hot Water

- Natural Gas: 916 PJ
- Electricity: 766 PJ
- Oil: 183 PJ
- Firewood: 12 PJ
- Wood Pellets: 12 PJ
- Propane & Other: 60 PJ

Total: 2688 PJ

Source: Stats Canada
Magnitude of the opportunity

- Canadian annual non-gas commercial and residential heat and hot water energy consumption is 1,033,000,000 gigajoules.
- 1,033,000,000 gigajoules is equivalent to 71 million tons of wood pellets.
- Canada currently produces about 2.7 million tons of wood pellets.
Ontario domestic fuel costs

$/GJ, adjusted for efficiency

- Natural Gas: $8.52
- Wood Pellets: $20.76
- Heating Oil: $27.55
- Electricity: $42.78

Sources: Enbridge, National Energy Board, WPAC research
Ontario Power Generation

Ontario Power Generation uses about 100,000 tonnes of wood pellets annually for grid balancing.
Canada will phase out coal power in these provinces by 2030

- Currently consuming 35 million tonnes of coal per year
  - AB – 55% coal
  - SK – 44% coal
  - NB – 13% coal
  - NS – 60% coal
  - Stranded assets

So far, none of these provinces are willing to use Canadian wood pellets.
1) Positioning Canadian pellets: quality, reliability, sustainability & strong ethics.

2) SBP Certification:
   a) Governance – board and standards committee
   b) Regional risk assessments, BC, AB, NB, NS
   c) Information for commingled inventories
   d) All western plants certified by March 31, 2019
3) Post 2020 EU Renewable Energy Directive:
   a) Mandatory sustainability criteria
   b) Revised goals for 2030: -40% GHG; 27% RES; 30% energy efficiency
   c) Rules regarding biomass power generation
   d) Avoiding specific rules for EU member states
   e) Final trilogue scheduled June 13
4) Implement joint government-industry working group in NB.
5) Implementation of 2018 safety work plan including collaboration with AEBIOM.
6) Participating in governance of ENplus quality scheme.
7) Project to harmonize EU and Canadian boiler safety standards.
WPAC Priorities (4)


9) Fibre supply in BC
   a) Burn-free zones around pellet plants
   b) Implement fugitive emissions tax
   c) Mandatory biomass handling guidelines
   d) Mandatory sharing of plans by forest licensees
Useable pellet fibre is still being burned and wasted by BC’s primary forest industry.
Thank you!

For more information:
Contact Gordon Murray
gord@pellet.org
+1 250 837-8821