IEA Bioenergy Task 43 Workshop:
Mobilisation of Forest Biomass to Produce Bioenergy, Biofuels and Bioproducts: Challenges and Opportunities

Mark Brown
• Presented real case studies on deployment and the development of forest biomass supply chains.
• Stakeholders identified key opportunities, challenges, best practices and knowledge gaps
• Participants are drafting a report on best practices and recommendations for mobilization of forest biomass
Depot Concept to valorize low-quality and stranded biomass resources: Mission, BC, CAN

This coop is designed to enhance and transform the existing fibre residuals flowing through the Fraser valley and provide the right feedstock to the right process.
Multi Objective Optimization – Impact on pellet production on choice between different forest supply chains – Colorado, USA

Pure economic driven ($\lambda_e = 0$) vs Pure environment driven ($\lambda_e = 1$)

Net revenue: $4.42$ million VS $3.19$ million
Carbon reduction: $166$ kton CO$_2$-eq VS $211$ kton CO$_2$-eq
Integration of wood pellet production for coal co-firing, BC and Alberta, Canada

Unharvested standing timbers: 2.9 M odt

Harvested timbers: 30.61 M odt

Forest residues: 6 M odt

Wood chips: 7.4 M odt

Mill residues: 4.6 M odt

Primary and secondary forest products: 9.4 M odt

Delivered sawlogs to wood processing facilities: 23 M odt

Source: Roach and Berch, 2014; Industrial Forestry Service Ltd. et al., 2013; AEBIOM et al., 2013; FPInnovations, 2010; Bradburn, 2014; PricewaterhouseCoopers, 2007
There are currently 12 pellet plants in BC with the annual production capacity of 2.2 million tons.

The annual production level of wood pellets in BC is over 1.7 million tonnes.

Primary feedstocks for pellet production are mill residues (1,185,500 Odt) and low-grade logs (435,750 Odt).
**Assumptions:**
- No harvesting costs were transferred to logging residues.
- No operational costs inside the biomass or diesel generation plants were included.

---

**Scenario 1 – Base Case (current situation)**

- Equivalent emission impacts
- Nearly double the regional employment benefit with Nordic supply chain
- 60% higher cost per MWh for Nordic supply chain

---

**Scenario 2 – Canadian Biomass Supply Chain**

**Scenario 3 – Nordic Biomass Supply Chain**
Moisture content management in the supply chain - Ireland

Unconstrained scenarios

Constrained scenarios

- Transport
- Chipping
- Storage
- Harvesting

S1, S3, S5

S2, S4
Bio-refinery deployment in remote community - Chibougamau, Quebec, CAN

**Sources**

- Forest residues collection: 145,000 t/ye (400 t/day)
- Transport: 320 t/d

**Loss factor**:
- Wood powder: 20%
- Wood powder: 5%
- Wood powder: 5%

**Regional biorefinery**

- Storage
- Residues: 12 T/h
- Grinding / Drying (Kinetic Disintegration System - Micronex)
  - Wood powder: 9 T/h
  - Wood powder: 2.5 T/h
  - Wood powder: 19,800 T

- Catalytic pyrolysis (Fraunhofer – Thermo-Catalytic Reformer)
  - Biochar (15%): 10,700 T
  - Bio-oil (55%): 39,200 T
  - Syngas (30%): 21,380 T

**LOCAL applications**

- Mining site capping; reduction of humidity of other local residues for pyrolysis; additive for forest roads
- Activated char for treatment of mining wastewater or air
- Renewable biofuel or green diesel
- Combined Heat & Power (CHP)

**Sources**

- Bio-refinery deployment in remote community - Chibougamau, Quebec, CAN

**Forest residues collection**

- 145,000 t/ye (400 t/day)

**Transport**

- 320 t/d

**Loss factor**

- 20%
- 5%
- 5%

**Regional biorefinery**

- Storage
- Residues: 12 T/h
- Grinding / Drying (Kinetic Disintegration System - Micronex)
  - Wood powder: 9 T/h
  - Wood powder: 2.5 T/h
  - Wood powder: 19,800 T

- Catalytic pyrolysis (Fraunhofer – Thermo-Catalytic Reformer)
  - Biochar (15%): 10,700 T
  - Bio-oil (55%): 39,200 T
  - Syngas (30%): 21,380 T

**LOCAL applications**

- Mining site capping; reduction of humidity of other local residues for pyrolysis; additive for forest roads
- Activated char for treatment of mining wastewater or air
- Renewable biofuel or green diesel
- Combined Heat & Power (CHP)
La Tuque Project – Global Value Chain

- La Tuque project: ± 3500 bpd
- Comparison with refineries:
  - Valero (Lévis, QC): ± 265 000 bpd
  - Suncor (Montréal, QC): ± 160 000 bpd
THE IDEA OF BIOMASS PIPELINE HYDRO-TRANSPORT
Key outcomes of discussion

- Clear understanding of the resource, markets and how to connect them
- Practical planning and management systems
- Coordination and collaboration in supply
- Recognising and including all values of biomass use
- Pick the right battles – don’t be a cure looking for a disease
- Engage with social and community values/priorities
The Forest Industries Research Centre

Mark Brown

www.usc.edu.au
mbrown2@usc.edu.au
+61488123115