



OUR NAME IS INNOVATION



Forest Biomass Opportunities and Challenges in Port McNeill, BC

Marian Marinescu

Tim Caldecott

Dominik Röser

Forest Feedstocks Group

Solutions to deliver a sustainable feedstock supply for the emerging bioeconomy

Focus areas:

- Economics of biomass supply.
- Biomass processing and delivery systems.
- Biomass quality.
- Sustainable supply chains.



WHAT IS FOREST BIOMASS?

- Harvested wood
- Harvest residues
- Non-utilized timber
- Sawmill wastes (chips, sawdust, bark)



WHAT IS BIOMASS FEEDSTOCK?



BIOMASS ENERGY → BIO-ENERGY

- Biomass has heterogeneous properties
- In bio-energy applications, biomass is usually measured in **oven-dry tonnes (odt)** or **bone-dry tonnes (bdt)**
- 1 odt = $\sim 2.5 \text{ m}^3$
- 1 odt of biomass = $\sim 19 \text{ GJ}$ (gigajoules) = $\sim 5,200 \text{ kWh}$ (kilowatt hours)
- Net conversion efficiency biomass to electricity → 10% - 35%
- In Europe, electricity from biomass is a by-product of **heat generation**

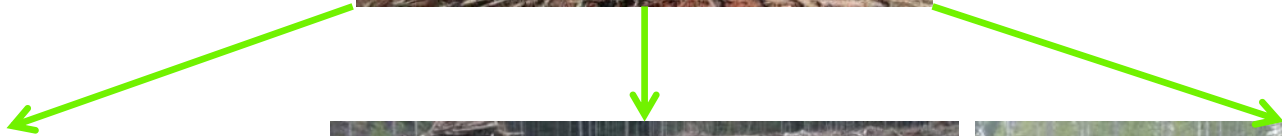


Critical Attributes for Biomass Fuel

- Moisture content
- Size
- Shape
- Source
- Chemical composition
- Contaminants



Sorting



Tops



Long Butts



Brush

Pellets

Local Combustion

Storage



Recent trials have shown a MC of 26-30% on Vancouver Island

What are some of the options?



electricity



pellets



heat



additives



transportation fuels



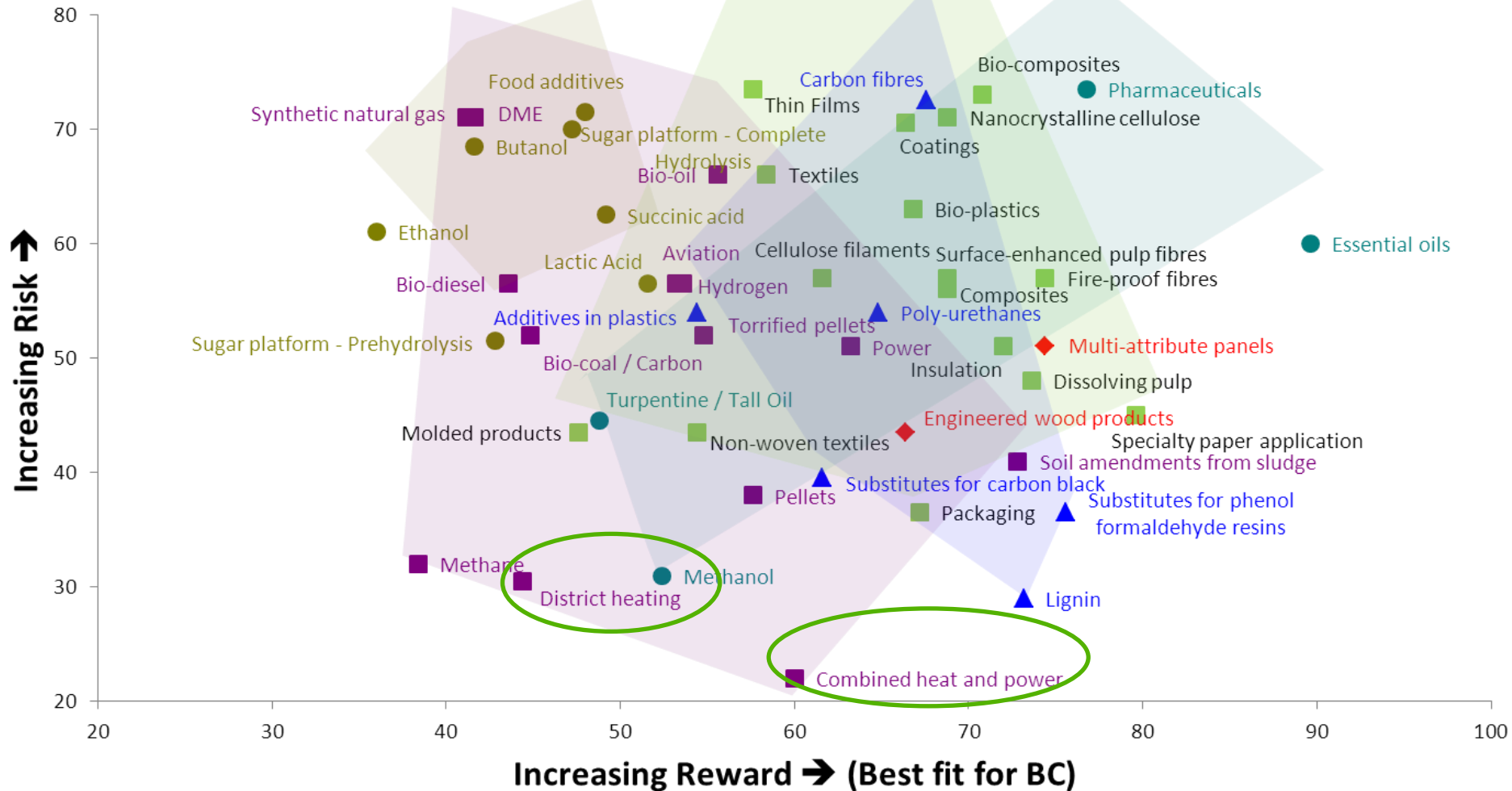
textiles



torrefaction products

BC Bio-product Best Bets – Grouped by Product Platform

- ◆ Wood-based products
- Pulp-based products
- ▲ Lignin-based products
- Extractives-based products
- Residue-based products
- Sugar-based products



Community Biomass Energy

~80,000 ODT/y Biomass offsetting NG/Diesel

Community Biomass Energy Projects



Ft. Babine Example:

- \$80,000 capital invested
- 8 new jobs, people trained
- Feasibility study for phase 2 CHP

Next Steps

- Integration of bioenergy into FireSmart treatments
- Heat & CHP in off-grid communities



Port McNeill, BC

Year 2010 estimates:

- 2,648 residents
- 175,000 GJ/yr., or 50,000 MWh/yr.* energy consumption
- ~ \$4,000,000 energy expenses*
- 2,800 tco₂/yr.*
- ~ 47% heat consumption**



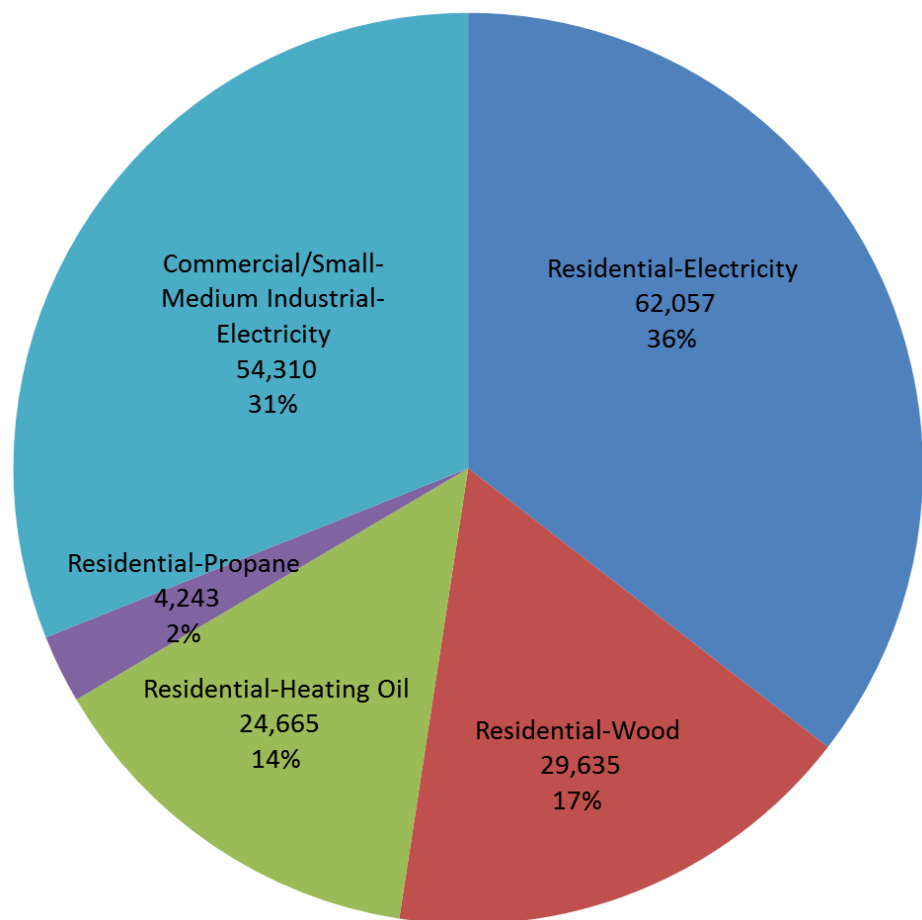
* Large industrial consumers not included

** Assumes 20% electrical heat

Source: 2010 Community Energy and Emissions Inventory Report http://www.env.gov.bc.ca/cas/mitigation/ceei/excel/CEEI_SummaryAll_jan23_2013.xls

Port McNeill, BC

Port McNeill, BC - 2010 Energy Consumption (GJ, % of total)

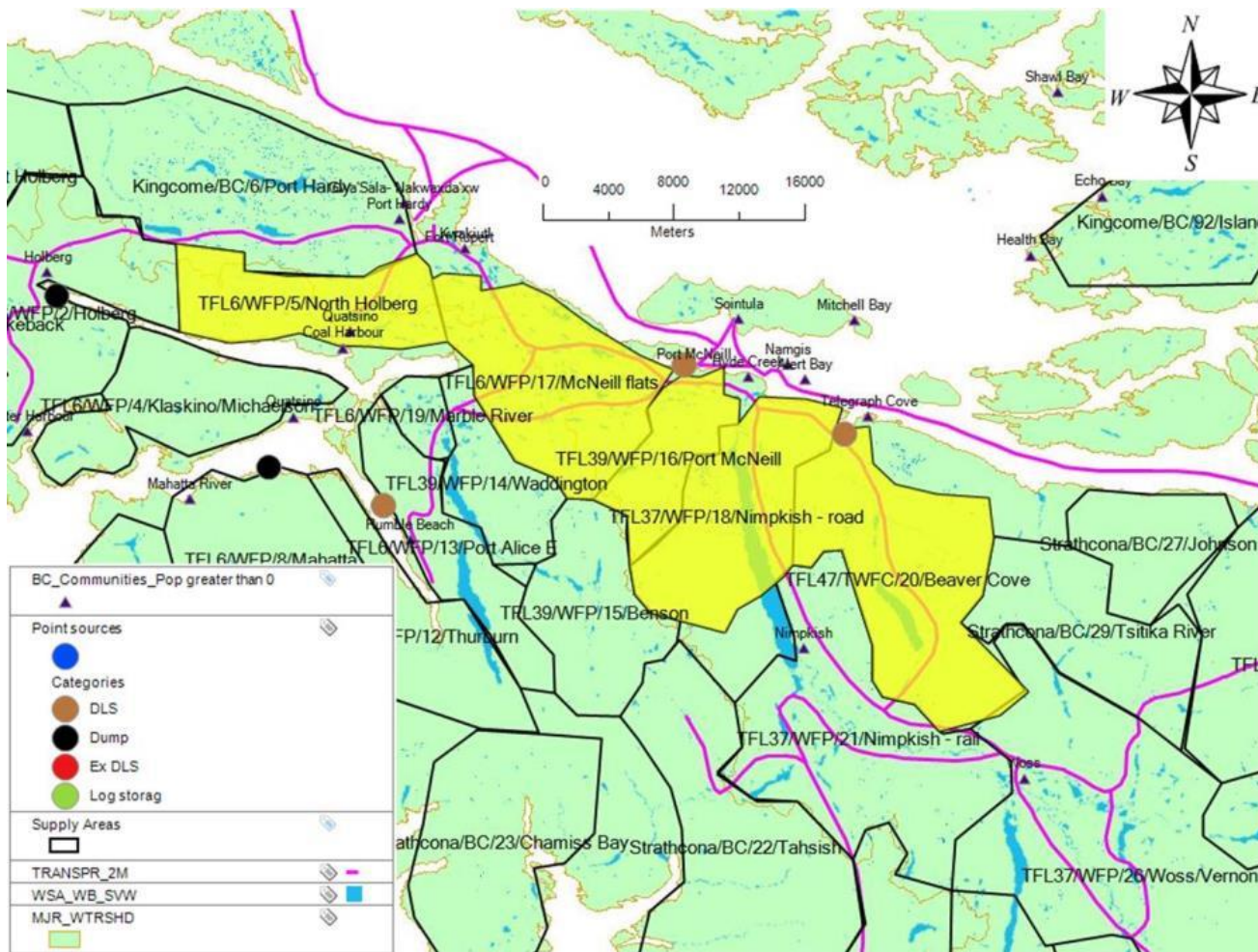


→ **81,800 GJ/yr., or 23,000 MWh/yr.** heat energy consumption
→ w/out firewood: **57,100 GJ or 16,000 MWh/yr. → 4,300 ODt biomass*** → **187 trucks** of wood chips/year (46.5 tonne 6 axle semi-trailer)

- Assumes biomass boiler with 70% net energy efficiency

Source: 2010 Community Energy and Emissions Inventory Report http://www.env.gov.bc.ca/cas/mitigation/ceei/excel/CEEI_SummaryAll_jan23_2013.xls

Forest Biomass Supply



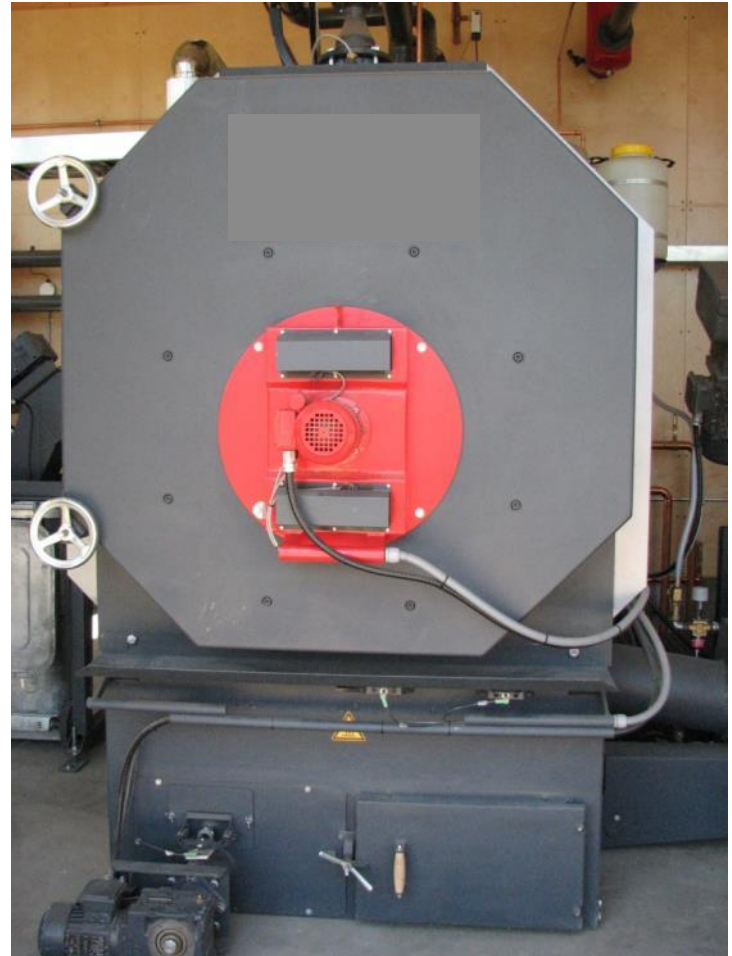
- 5 biomass supply areas within 20-35 km
- 45,000 ODt/year*
- Delivered cost of hog fuel ~ 40-50\$/ODt

* Estimate assumes entire AAC is harvested. Figure does not include biomass potentially available in Beaver Cove and Port McNeill dry land sorts

Source: A.J. MacDonald. 2009. *Assessment of Economically Accessible Biomass*. FPInnovations Technical Report, BC Coastal Forest Sector Hem-Fir Initiative.

Community Biomass Energy – Port McNeill

- Five scenarios:
 - ~ **0.5 MW Boiler** → large building or cluster
 - **1 MW Boiler** → ~30% of community
 - **2 MW Boiler** → ~60 % of community
 - **3 MW Boiler** → whole community
 - **5 MW Boiler + 1 MW Steam Turbine** → heat whole community + 1 MW green electricity



Scenario Comparison

- Capital cost: between \$1million to \$7.8 million
- Energy rate to cover costs: ~ 0.06 \$/kWh
- Delivered biomass cost: \$50/odt
- Simple Payback Values: 3.6 - 4.8 years → less than 5 years is considered acceptable by private investors; up to 20 years acceptable for public entities
- Forest biomass residues (hog fuel) potentially available locally for all scenarios
- Energy rates to cover operational and capital costs are significantly lower than current heating costs → plenty of room for expansion

Keys to success

- A community biomass plan → FPI can assist
- Feasible and realistic biomass projects → FPI can assist
- Long term biomass availability → FPI can assist
- Biomass quality standards and QC: → FPI can assist
 - Moisture content
 - Energy content
 - Particle size
 - Contamination



OUR NAME IS INNOVATION

Marian.Marinescu@FPIInnovations.ca

Tim.Caldecott@FPIInnovations.ca

Dominik.Roser@FPIInnovations.ca

Follow us on



www.fpinnovations.ca