

# Small –scale Thermal Heating Biomass Heating Feasibility in British Columbia

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“sustaining creation”



Woody Biomass Thermal Heating  
Project Development Workshop

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## Current State

Thermal wood biomass heating projects are operating or being developed:

- Revelstoke
- UBC - Nexterra
- UNBC – Fink Machine
- Prince George - city
- Quesnel – city and Nazco School
- Knapp forest – UBC research forest, Maple Ridge
- Fink Machine projects – MFR Vernon, West Bank First Nations
- Several thermal heating projects in the North are being supported by the Green Heat Initiative

# Current State

- Nakusp Secondary School – has decommissioned their pellet boiler system
- Dockside Green-Victoria has shut down the Nexterra system as they cannot supply the feedstock for the development

## Revelstoke – infrastructure and system



## Key Issue Impacting Thermal Biomass Feasibility

Changes to the BC Safety Standards Act  
This change will allow for:

- Boilers to operate (that are certified) without a steam operator present 24/7 (high pressure)
- Safety authority will now allow other certifying bodies i.e. EU to certify boiler manufacturers

# Benefits of the Changes to the Safety Standards Act

- Lower operating costs
- Promote competition and lower system costs for project development
- Shifts safety from a command and control approach to a market based approach for developing safety plans

# Key Considerations for Developers: Lessons from Europe

- Projects are complex: environmental, feedstock, finance issues all need detailed due diligence
- Need lots of technical advice: experienced team for success
- Must be technically sound: the learning curve can be steep
- Local fuel supply procurement needs to be secured
- Need community consensus

# Key Considerations for Developers

- Avoid political rivalries
- Strategic communications need to be managed in the process
- Need quality management criteria in place
- Austria has created a provincial agency to function as an “Info Hub”

# Getting Started

- ❖ Conduct an evaluation of your annual heating costs (GJ)
- ❖ Evaluate your current heating system and options for conversion
- ❖ Develop a feasibility team (internal and external)
- ❖ Review the funding opportunities available for assisting with project development
- ❖ Determine the types of partnerships that are supportable and feasible within your community
- ❖ Develop a business and operations plan





## Pre-feasibility Resources

<http://www.retscreen.net/ang/home.php>

- Energy production analysis,
- Fuel cost savings
- Financial risk,
- Emission reductions
- Viability and technology analysis

# Pre-feasibility Resources

**Prefeasibility Calculator** [www.greenheatinitiative.com](http://www.greenheatinitiative.com)

for Biomass Heating Annual Cost of Heating

*Factors*

- *\$/year* spent for heating costs
- Type of fuel used currently
- Size of heating system

*System BTU/hour*

A full professional version of the calculator is available –other global calculator tools are being used for various size biomass thermal projects.



# Pre-feasibility Resources

**Prefeasibility Calculator** [www.greenheatinitiative.com](http://www.greenheatinitiative.com)

## Calculations

- Annual energy use
- Annual full operating hours **xxx hours**
- Thermal Megawatts **xxx**
- *MWh* Hourly consumption **xxx**
- *BDT/hour* Annual consumption *BDT/year*
- Chips Pellets Capital Expense (\$)
- Fuel Cost (\$/year) **xxx \* xxx**
- Operating and Maintenance Costs (\$/year)
- Annual savings (\$/year)
- Simple Payback Period (years) **xxx \*\* xxx \*\***
- System Carbon Emissions *tCO2e/year*



# Economics

Your current fuel source is:	Your cost:
<b>Propane</b>	<b>\$3.00</b>
Your current cost per million BTU is	\$41.72
	<b>Heating</b>
<b>Alternative fuel sources:</b>	<b>value:</b>
Wood Green (50% MC)	\$239 /ton
Wood Semidried (30% MC)	\$373 /ton
Wood Air-dried (20% MC)	\$441 /ton
<b>Wood Owendried (0% MC)</b>	<b>\$576 /ton</b>
Softwood (kiln dried 13% MC)	\$513 /ton
Hardwood Wood (kiln dried 8%MC)	\$526 /ton
Wood pellets (premium)	\$567 /ton
Natural gas	\$3.42 /therm
Electricity	\$0.139 /kWh
Firewood(seasoned 20% MC)	\$638 /cord
Switchgrass (owendried)	\$517 /ton
Bituminous coal	\$1,085 /ton
Shelled corn (15% MC)	\$13.10 /bu
Fuel Oil #2	\$4.80 /gal
Fuel Oil #6	\$5.17 /gal
Propane	\$3.00 /gal

Source: USDA



# Getting Started – Feedstock Analysis

- What fuels are available?
- What are the estimated costs?
- Who are the potential suppliers?
- What are the risks?



# Economics

## Fuel supply

i.e. chips, hog fuel, feedstock for pellets

- Limited by harvesting/collection costs
- Need producers willing to produce the biomass fuel at a reasonable profit @ deliver to small scale operations.
- While chips and hog be may cheaper per tonne, pellets may have an advantage for thermal heating development in BC. Pellets would reduce feedstock variability, allow system efficiencies and provide less supply risk



# Economics

## ❖ Feedstock general economics

- Mill residues are the cheapest - \$ include hauling costs and minimal payment per BDT
- Wood demolition waste may generate a possible income stream from tipping fees in some areas of BC
- Logging residues may be feasible if slash is yarded roadside and sites are close to bioenergy plants
- Whole tree harvesting may work with payments for ecological services
- Wood pellets are available in bulk quantities, but may cost more per GJ



# Next Steps \$25 million PSECA fund (MOE)

public sector energy conservation agreement

- ❖ \$6 million for K-12 schools HVAC retrofit projects across BC
- ❖ \$12 million for district heating energy systems in BC
- ❖ \$5 million for an open call for proposals to all provincial public sector organizations





# PSCEA Eligibility

- Ministries and Agencies
  - Boards of Education
  - Universities/Colleges
  - Health Authorities
  - Crown corporations
- 
- [http://www.env.gov.bc.ca/cas/mitigation/pseca\\_faq.html](http://www.env.gov.bc.ca/cas/mitigation/pseca_faq.html)

# SCR Management Development Services

- ❖ Forest feedstock development and economic analyses
- ❖ Network and liaise with NGOs, technology providers and engineers
- ❖ Lead feasibility studies for boards and councils (partnering with others such as BEREC, engineers from EU etc.)
- ❖ Grant Writing – for MOE funding and others
- ❖ Project Management
- ❖ Business Plans
- ❖ Financing Proposal Development
  - ❖ Traditional credit lending (lending broker)
  - ❖ Local financial institutions
  - ❖ Bioenergy investors affiliated with SCR Management
  - ❖ Government programs



# SCR Development Team

- ❖ BA Blackwell and Associates – Vancouver, BC
- ❖ Atticus Financial Services – Vancouver, BC
- ❖ Engineering group – RFQ is underway for consulting engineers from Europe, and the USA
- ❖ Supporting NGOs – BC Bioenergy Network, CanBio, Life Sciences BC , BERC



Resources Available for  
Thermal Biomass Energy Development  
[www.greanheatinitiative.com](http://www.greanheatinitiative.com)

- Prefeasibility Calculator
- **NEW!** A Step by Step Guide to Biomass Heating Systems and Local Renewable Fuels:  
How to Evaluate and Implement a Wood Chip or Pellet Heating System for your Building or Community

# Resources Available for Thermal Biomass Energy Development

- BC Bioenergy Network – Bioenergy Guide (New!)  
<http://www.for.gov.bc.ca/pab/nfw/bioenergy-guide-2010.pdf>

Thank you for your time

For more info about thermal bioenergy development

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