



# //FACT SHEET

## /BIOMASS POWER

### What is It?



- > Biomass energy generation is the creation of heat and/or power from carbonaceous substances such as solid wood or wood residues, agricultural crop residues, aquatic plants, animal wastes, and dedicated energy crops such as tree farms.
- > Biomass energy can be stand alone heat generation such as the lumber dry kilns associated with sawmills. Conversely it can be stand alone power generation such as Capital Power's Williams Lake facility. It can also be cogeneration of both heat and electricity such as the configuration at many BC pulp mills. When configured as cogeneration, energy efficiencies often exceed 80%.
- > The technologies utilized to create bioenergy include direct combustion, gasification, fast pyrolysis, fermentation and gas collection.
- > Biomass technologies are generally considered to be renewable and carbon neutral. This is due to the short processing cycle involved, combined with the regeneration of carbon through replanting, referred to as "biogenic carbon".
- > Bioenergy production in British Columbia is limited to wood and wood residues, as well as landfill gas collection. Over 600 MW of capacity is currently in operation in the province at large pulp and paper facilities (largely self-generation). A further 30 MW is produced by plywood mills. 65 MW is currently produced by Clean Energy Producers (0.5% of the province's total generation portfolio).
- > Future woody biomass sources in the province include existing mill wood residues, roadside debris and standing pine beetle. Generation potential for existing mill residue is in excess of 200 MW. The total generation potential for all wood sources is in the order of 2,300 MW. Ultimately fuel crops will likely be utilized for bioenergy production. To put this potential in perspective, 1,000 hectares of fast growing poplar is capable of sustaining 1 MW of power.

### Why Biomass?



Roadside debris left from logging operations has significant power generation potential.

- > The 2007 BC Energy Plan calls for provincial energy self-sufficiency by 2016, and for a clean and renewable energy standard of greater than 90%.
- > Biomass power is considered firm power by utilities. Typical biomass power facilities operate with a capacity factor that often exceeds 92%. (Wind averages 30%; Run-of-River 40%)
- > Biomass generation will replace beehive burners and greatly reduce the amount of particulate emissions discharges into the atmosphere.
- > Over 600 million cubic meters of pine has been eradicated by the Mountain Pine Beetle to date. Much of that wood is unsuitable for high-value forest products. A successful biomass program will assist in recovering merchantable and non-merchantable fiber, thus advancing the regeneration of BC's forests.
- > The 2008 BC Bioenergy Strategy has identified the following action items for the province:
  - » \$25 million in funding for a Bioenergy Network
  - » \$10 million to advance provincial biodiesel production
  - » Directing BC Hydro to issue a two-part Bioenergy Call for Power, focusing on existing inventory from the forest industry
  - » Biofuel production to meet 50% or more of the province's renewable fuel requirements by 2020
  - » 10 community energy projects that convert local biomass into energy by 2020
  - » Establish one of Canada's most comprehensive biomass inventories to create waste to energy opportunities.

### The Technology

- > The most common technology used today is conventional boilers in combination with steam turbines to generate electricity. The conventional boiler vaporizes water to make steam, which is then used to produce electricity through a back-pressure, condensing or extraction turbine.

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Williams Lake Generating Station has been generating electricity from biomass continually for over 15 years.

- > Emerging technology in Canada is focused on gasification. Woody material is gasified in an oxygen-starved vessel to make synthetic gas, or syngas. The syngas can be transported via a pipeline or oxidized in an adjacent vessel, which can then be utilized directly as heat or converted into steam in a heat exchanger. The steam can then be used to generate electricity via a steam turbine, similar to the conventional boiler technology. Syngas can also be cleaned to the point that it can directly fire a gas turbine or reciprocating engine.
- > The advantages to gasification include simple design, very low emissions (natural gas levels), high fuel flexibility, and low operating and maintenance cost. When designed to direct fire an engine, gasification avoids the need for power engineers, lowering operating costs.

### Environmental & Regulatory Considerations

- > Installations require BC Environment Ministry authorizations for solid wastes and air emissions. Many local governments strongly endorse biomass generation.
- > Biomass facilities are heavily regulated and monitored by the BC Ministry of Environment for fine particulate emissions (PM), amongst other criteria. Proposed legislation may cap PM emissions for all new biomass facilities in urban areas and rural areas. The proposed cap is less than 2.5% of the emissions from beehive burners, based on historical data.
- > Biomass generation, pursued on a sustainable basis, is endorsed by Greenpeace, the Sierra Club, and the David Suzuki Foundation.

### Public vs. Private Ownership

- > Biomass facilities range from less than 2 MW up to 90 MW that requires significant capital commitment. The availability and quality of fuel over a long-term contract (typically 20 years) carries significant risk, that is assumed by the developer unlike gas power generation where fuel risk costs are most often assumed by the utility. Sharing the risk associated with construction and operation of these facilities is likely the best approach to protect ratepayers from cost escalations.
- > The fuel input, such as mill residues and roadside debris, is independently owned and generated from private-sector milling operations. Forestry companies have already paid for the timber and “waste” by-product through a complex stumpage formula, so the ‘waste’ used in biomass generation is at market prices. Further fuel is provided from harvesting residues and nearby standing timber not suitable for lumber manufacture. To encourage utilization of mountain pine beetle timber, the Ministry of Forests has created a new form of forest tenure known as a “Bioenergy License”. Such Licenses potentially give biomass power developers long term access to fuel. This is crucial to the financing of such facilities.
- > There is substantial competition in the wood biomass area, as seen by the recent BC Hydro Phase 1 Biomass Request for Proposals. BC Hydro’s goal is to secure 1,000 GWh (approximately 125 MW of capacity) of annual energy for the Phase 2 call. At registration, over 400 MW of capacity was proposed – almost four times BC Hydro’s target. A vibrant and healthy competitive bid process will yield the lowest cost of clean and green energy for BC Hydro’s ratepayers. BC Hydro has subsequently short listed approximately 1,600 GWh of capacity.
- > In the first phase of the Call, several proposals included First Nations as equity owners of biomass facilities and almost all had some degree of First Nations participation - this has not been a feature of publicly owned projects.

### Socio-Economic Benefits

- > Revenue stream for mill and roadside residues to mill operators, thus enhancing mill economics.
- > Utilizes Mountain Pine Beetle residue, providing a positive response to a potentially devastating problem affecting over 85 forestry communities in Interior BC.
- > First Nations involvement including ownership and participation.
- > Economic spin-offs including local job opportunities.
- > Remote community electrification, eliminating the use of diesel generators in non-integrated areas.
- > Tangible carbon dioxide reductions.
- > Vast improvement in local air quality with the elimination of beehive burners and roadside waste incineration.
- > Provides clean, reliable power for areas with transmission or distribution reliability issues today.
- > Provides community recycling depot for wood-based materials.
- > Bioenergy generation projects often connect to the local distribution grid, avoiding transmission losses associated with shipping electrons over long distances.

### /KEY LINKS

Wikipedia Biomass introduction  
[en.wikipedia.org/wiki/Biomass](http://en.wikipedia.org/wiki/Biomass)

BC Hydro  
[www.bchydro.com/info](http://www.bchydro.com/info)