

Biomass

Biomass Power

What is It?

- Biomass generation is the creation of bioenergy (heat and/or power) from wood or wood residues, agricultural food and feed crop residues, aquatic plants, animal wastes, and dedicated agricultural energy crops and tree farms.
- The technologies utilized to create bioenergy include combustion, gasification, pyrolysis, digestion, and gas collection.
- Biomass technologies are generally considered to be sustainable 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. While over 600 MW of capacity is currently in operation in the province at large pulp and paper facilities (largely self-generation), only 65 MW is in operation from Independent Power 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 bug kill. 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.

Why Biomass?

- 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%.
- The provincial government is encouraging sawmill operators to discontinue the use of beehive burners to dispose of mill waste, in an effort to improve local air quality. Biomass generation will replace beehive burners and greatly reduce the amount of particulate emissions discharged into the atmosphere.
- Over 600 million cubic metres 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 fibre, thus advancing the replanting cycle necessary to regenerate 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
 - 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.



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



Red trees have been killed by Mountain Pine Beetle.



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

Key Links:

Wikipedia biomass introduction:
en.wikipedia.org/wiki/Biomass

BC Hydro:
www.bchydro.com/info

IPPBC Contact Information

President, Steve Davis
Steve.davis@ippbc.com

IPPBC
 26-181 Ravine Drive,
 Port Moody, BC
 V3H 4T3
 Phone: (604) 461-4778
 Fax: (604) 469-3717
 Administration: melissamcarthur@ippbc.com
 Website: www.ippbc.com

The Technology

- Bioenergy technology in the province as it currently exists includes conventional boilers, Circulating Fluidized Bed (CFB), and gasification.
- The most common technology used today is conventional boilers in combination with steam turbines to generate electricity. This is generally referred to as the Rankine cycle. The conventional boiler vaporizes water to make steam, which is then used to produce electricity through a back-pressure, condensing or extraction turbine.
- 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 is oxidized in an adjacent vessel, which is then converted into steam in a heat exchanger. The steam is then used to generate electricity via a steam turbine, similar to the above technology.
- The advantages to gasification include simple design, very low emissions (natural gas levels), high fuel flexibility, and low operating and maintenance cost.

Environmental & Regulatory Considerations

- Biomass facilities are not exempt from local government jurisdiction. Many local governments strongly endorse biomass generation, as a result of local investment, First Nations ownership, and improvements to local air quality through the elimination of beehive burners.
- Biomass facilities are heavily regulated and monitored by the 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 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 tend to be small in nature (10 to 30 MW) but require significant capital commitment. The availability and quality of fuel over a long-term contract (typically 20 years) carries significant risk, which is best assumed by the private sector. Transferring the risk associated with construction and operation of these facilities is 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. With private sector development, that waste price risk is not borne by the ratepayer but the developer.
- 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 annual energy for this 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.
- 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 is not 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.