

## **Canada's wood supply potential for bioenergy use**

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Canada covers 979.1 million hectares of land and water. The total treed area is 402 million hectares. Of this, forests cover 310.1 million hectares, with an additional 92 million hectares classified as "other wooded land", composed of areas such as treed wetlands and land with scattered trees. Ninety-three percent of Canada's forests are publicly owned, with about 145 million hectares currently accessed for potential commercial activities through a road or water transportation route. All of Canada's forests are subject to strict sustainable forest management regulations protecting the environmental, economic, and social objectives for the forest. Subject to these regulations, 0.9 million hectares are harvested annually.

Bioenergy feedstocks in Canada can be considered under three potential source categories: wood waste from mills, residual biomass after harvest, or from stands grown specifically for biomass production. Of these three sources, only the first – wood waste from mills – is widely utilized. With mill residue sources fully utilized for biomass and other products in many areas of the country, there is significant interest in exploring the potential for other biomass sources, including important environmental and economic limitations.

### *Wood waste from mills*

The Canadian forest sector, particularly from the pulp and paper industry, derives 57% of its energy needs from forest biomass. The Forest Products Association of Canada has announced that Canada's forest industry is taking aim at becoming the first carbon neutral sector by 2015, which suggests efforts to increase use of bioenergy. Bioenergy use of mill wood waste is in competition with other uses, particularly composite panel and pellet production. Most residue is fully utilized in central and eastern Canada, with some potential for increased use in British Columbia.

Approximately 78% of a typical sawlog from a roundwood harvest is useable: 40% is harvested for lumber and 38% is chipped for pulp and paper production. The remaining 22% is the residue fraction, which consists of sawdust, bark and shavings. In 2004, Natural Resources Canada estimated the production of wood residues in Canada (excluding coastal B.C. and the Territories) to be 21.2 million bone-dry tonnes (BDt), of which 2.7 million BDt was unused. Most of the surplus was located in western Canada and in particular B.C., which accounted for 66 percent of the total. While 11.5 million BDt of sawdust, shavings and bark was produced in eastern Canada, the unused surplus was estimated at 265,000 BDt. In their 2003 Biomass inventory, BIOCAP Canada estimated the available wood waste from Canadian mills to be approximately equivalent to 18 million bone-dry tonnes per year. It should be noted, however, that measurements of residue production vary greatly by province and by year due to the fluctuating nature of the market place.

### *Residual biomass after harvest*

Amounts of biomass available as residue in stands after harvesting have been calculated using the National Forest Carbon Monitoring and Reporting System in conjunction with the Carbon Budget Model of the Canadian Forest Sector in a study by Natural Resources Canada. The simulation model examined all managed forest land in Canada, projecting harvest levels, growth and yield, disturbance rates and other relevant factors in projecting potential biomass amounts. Analysis established an upper limit of 90 million bone dry tonnes per year that could be collected in association with ongoing harvesting operations. This upper limit should not be considered an annual target, as environmental and economic considerations explicitly not considered in the exploratory study will reduce the practical availability of biomass by a significant percentage. Most of the production is concentrated in the western (42%) and eastern (44%) regions of Canada, with the large, central boreal forests providing the small remainder.

A second potential source of biomass in this category is salvage operations after disturbances. Fires burn approximately 2 million hectares per year, while pests severely damage or kill another 16 million hectares. This is currently particularly relevant in the province of British Columbia because of the large-scale mountain pine beetle epidemic. The beetle has currently killed more than 530 million m<sup>3</sup> of lodgepole pine trees covering 8.7 million hectares. The infestation is projected to eventually kill 78% of all lodgepole pine stands in British Columbia by 2018, which will amount to approximately one billion m<sup>3</sup> of timber. However, it should be noted that access to these areas and poor economics limit their availability for use as biomass feedstocks.

### *Stands grown for biomass production*

Slow growing conditions in Canada limit the potential economic success of most afforestation efforts in Canada, however there has been renewed interest in plantations now that a biomass and/or carbon sequestration market could provide secondary revenue stream along with timber production. Little area in Canada is currently under afforestation/plantation systems of any type, and even less area is planted with biomass production as a specific output. However, in carefully chosen locations, fast-growing hybrid poplar or pine stands have the potential to contribute as a biomass source with positive economic returns.