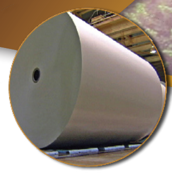
BC Coastal Forest Sector Hem -Fir Initiative






Technote

FPInnovations
Creating forest sector solutions

Assessment of Economically Accessible Biomass

There is growing interest in using forest harvesting residue as feedstock in industrial processes such as power generation or chemical extraction. Before investment can be made in biomass recovery systems, the amount of biomass available under different conditions should be known to the industry, but such information has generally been lacking.

Vancouver Island and the south coast mainland were divided into 110 supply areas based on tenure boundaries and established road systems. The tenure holder for each supply area reported the expected harvest volume in each forest strata for the next 5-10 years, based on established patterns and expected trends. The tenure holders also reported the percentage of old-growth and second-growth stands that are accessible by road using semi-trailer cip vans. The average haul distance from each supply area to the nearest pulp mill was estimated by road class and requirement for water transportation.

The study considered three biomass sources: the residues left at roadside or in landings, the dispersed residues remaining in the cutover after harvesting is completed, and point sources such as dryland sorts. Of the three sources, the roadside residue was initially considered to be most significant because it is relatively accessible for recovery. In principle, the roadside residue volumes were calculated by multiplying the harvest volumes by the biomass ratio[1] .

FPInnovations measured residue pile volumes in 28 cutblocks, then calculated and summed the bulk volumes in each cutblock. The tenure holders supplied FPInnovations with the as-produced volumes harvested from each of the cutblocks, which were then used to calculate the biomass ratio (Table 1). The waste and residue annual summaries of the coastal districts for 2002-2007 were consolidated and the average volume per hectare of avoidable waste was calculated for each district.

Table 1 *Biomass ratio used in residue calculations*

		Biomass Ratio (%)			
		Ground		Aerial	
Stand Atributes, Bucking		Logs to Roadside	Trees to Roadside	Logs to Roadside	Trees to Roadside
Fir	Old Growth	3	6	2	2
	Second Growth	6	20	1	1
Cedar	Old Growth	4	6	2	2
	Second Growth	3	6	1	1
Hemlock	Old Growth	4	6	2	2
	Second Growth	4	6	1	1

[1] Biomass ratio is the ratio of the tonnes of biomass recovered from an area to the tonnes of merchantable logs harvested from the same area.

FPInnovations brings together Feric, Forintek, Paprican and the Canadian Wood Fibre Centre of Natural Resources Canada to create the world's largest private, not-for-profit forest products research institute. With more than 600 employees spread across Canada, FPInnovations unites the individual strengths of each of these internationally recognized forest research and development institutes into a single greater force.

In partnership with the
BC COASTAL FOREST INDUSTRY

British Columbia The Best Place on Earth | Ministry of Forests and Range

Natural Resources Canada | Ressources naturelles Canada

Costs for comminution (grinding) and loading were estimated using FPInnovaiton's standard costing methods for a large horizontal grader plus companion hydraulic loader. These costs include the direct owning and operating costs for the equipment plus 15% overhead. Productivity rates were form recent trials of similar grinders operating in the BC interior. Transportation costs were calculated for semi-trailer chip vans usng estimated travel speeds, payloads, and operating costs. The initial biomass residue calculations were reduced to account for areas that were inaccessible by sem-trailer cip vans, required water transportation to a power plant, or were far enough from a pulp mill to make transportation uneconomical (Table 2). The costs for delivering various volumes of residue were plotted in Figure 1 for each of the mill catchment areas.

Table 2 *Summary of annual harvest volmes and accessible residue amounts*

	Annual Harvest (m^3/yr)	Roadside Residues (ODt/yr)	DIspersed Residue[2] (ODt/yr)	DLS Residue (ODt/yr)
Gross amount	19 600 000	465 000	697 000	160 000
Accessible by chip-van	15 600 000	390 000	-	160 000
No water transportaiton	14 300 000	320 000	-	160 000
no long-distance transport	10 300 000	250 000	280 000	160 000

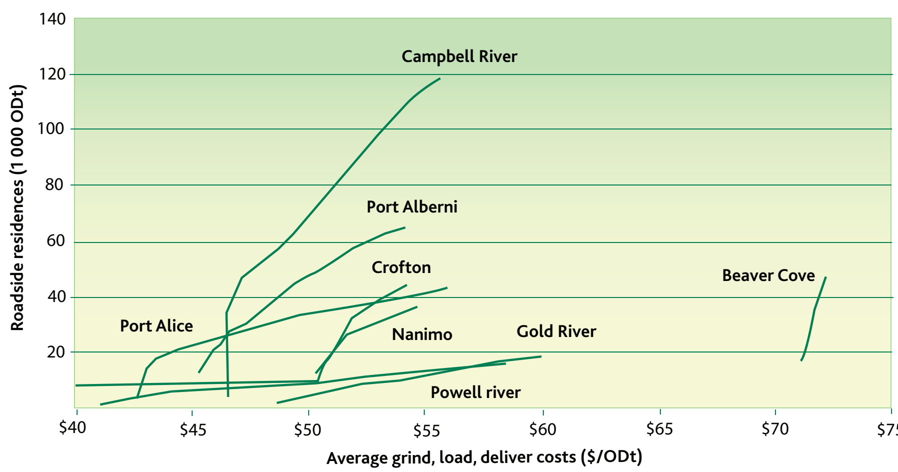


Figure 1 *Cumulative volume of van-accessible roadside residue versus average delivered cost*

Of the 19.6 M m^3 of annual harvest, about 10.3 M m^3 is potentially available for biomass recovery after reductions for limited accessibility by semi-trailer cip vans, the requirement for water transport, and long haul distances. The 10.3 M m^3 generated about 250 000 ODt/year of roadside residues, with the largest concentration of biomass in the Campbell River area, at about 210 000 ODt/year from all three sources. The residue volumes were based on 5-10 year average harvest volumes that have been reduced substantially due to recent economic conditions. The residue volumes shown here must be reduced proportionately.

The biomass ratios were substantially lower than those measured by FPInnovations in trials in BC Interior and Alberta. This study generally found biomass ratios between 3 and 6% in contrast to the 20% or more biomass ratios found in other locations. Not only is the total volume of roadside residue lower than expected, the residue is distributed across a wide geographical area, with few opportunities to move biomass economically between the sites to achieve economies of scale.

[2]Dispersed residues that remain attached to the stem for harvesting as a single piece may not be subject to the same accessibility restrictions as the roadside residues. However, as a conservative estimate, FPInnovations used the same volume reductions for dispersed residues as for roadside residues.

[3]At 365 days x 24 hours per day, 18 GJ/ODt, and 30% efficiency, 100 000 ODt/year can support approximately a 17 MW electric power plant.

FPInnovations™

For more Information contact:

Jack MacDonald
Resarch Scientist

Tel: (604) 228-155
Jack.MacDonald@fpinnovations.ca