Bark Volume: Assessing Bark as Fuel for Biomass Energy

Timber Measurements Society: Central Meeting

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The Beck Group

- Planning, consulting and benchmarking services for the Forest Products Industry.
- 5 consultants on staff
- Sawmill planning & design
  - Collins Companies Hardwood Sawmill, Boardman, OR
  - Capital improvement projects
- More than 30 North American benchmarking studies completed over the past 10 years.
  - Softwood and Hardwood Lumber (various species, products and regions)
  - Particleboard and MDF
  - OSB and Plywood

Benchmarking Report

Western Stud Mills (2004; 13 Mills)

Statistic	Mill A	Mill B	Mill C	Survey Average	Range
Annual Production (MMBM)	50	125	220	71	50-220
Production/Manhour (bm/mh)	715	544	518	496	383-715
Employees (hourly)	30	117	203	120	30-203
Total Conversion Cost ($/MBM)	95	80	123	103	75-140
Net Sales Average ($/MBM)	313	283	316	288	268-316
Lumber Recovery (MBM/MBF) Westside Log Scale	2.46	2.51	2.44	2.55	2.26-2.80

Additional Beck Group Services

- Biomass Fuel Supply Studies
- Biomass Power/Cogen Feasibility Studies

- Issues associated with estimating bark volume

Biomass Power Feasibility

- Fuel Supply
- Plant Size
- Power Market
- Capital Cost
- Operating Cost
- Incentives
- Regulatory
- Financial Analysis

Cogeneration Scenario

5 MW cogeneration plant in Oregon;
~ 100,000 MBM Lumber Production

OUTPUTS

Sell 42,900 mWh of power at $71 per mWh

Sell 40,200 mWh of RECs at $30 per mWh

Sell 4K pounds of steam/hour at $8.10 per K pounds

INPUTS

Average fuel price of $30.00 per bone dry ton; 38,400 BDT/year

Sawdust	**8,400 BDT ($25/BDT)**	**Shavings**	**5,600 BDT ($29/BDT)**
Bark	**13,000 BDT ($23/BDT)**	**Logging Slash**	**11,400 BDT ($42/BDT)**

9.7 percent IRR; 100 percent equity investment of $25.5 million

The Easy Scenario – All Mill Residues are Sold

- Sawmill sells green lumber – no need for dry kilns; all mill residues are sold
- Sales records
- Account for production changes due to market conditions

The More Difficult Scenario: Sawmill burns bark/hog fuel to heat kilns

- Bark conveyed to boiler
- Typically no measurements…. or Metered, but how accurate?
- What to Do?

Option 1: BDT/MBM ratios

	CO	WY	MT	OR	ID
Chips	0.35	0.39	0.47	0.31	0.35
Sawdust	0.14	0.15	0.19	0.11	0.14
Shavings	0.11	0.13	0.15	0.07	0.11
Bark	0.24	0.18	0.20	0.15	0.17
Total	**0.84**	**0.85**	**1.00**	**0.64**	**0.77**

Option 1: Oregon Example

	Oregon BDT / MBM	MBM / YEAR	BDT's / Year
Chips	0.31	100,000	31,000
Sawdust	0.11	100,000	11,000
Shavings	0.07	100,000	7,000
Bark	0.15	100,000	**15,000**
Total	0.64	100,000	64,000

Option 2: Weight/Volume Factors

2 mills producing 100,000 MBM Lumber/Year

Weight	Weight (green tons)	Bark % of Log Weight	Bark Weight (green tons)	Bark Weight (BDT's)
SYP	500,000	15.0	75,000	37,500

Volume	Volume (Cubic Feet)	Bark % of Log Volume	Bark Volume (Cubic Feet)	Bark Weight (BDT's)
Douglas Fir	9,630,000	20.1	1,940,000	27,200

100 MMBM/Yr; 10.5" SED; 12 feet long;
78 BM/block; 1.28 million blocks/year

Another Issue

Summary

- Estimating bark volume is increasingly important with the emergence of biomass power
- Estimating bark volume isn't always easy
  - Sales records (13,000 BDT/year)
  - BDT/MBM ratios (15,000 BDT/year)
  - Weight/Volume factors (27,200 BDT/year)
  - Mechanized Logging
- Research Opportunity?

Questions?