Biomass Harvesting and Utilization

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Outline

- Context
- Conventional operations
- Treatments in the stand
- Recovery
- Transport
A resource problem ...
A product problem ...
A Billion-Ton Feedstock

- Forests currently about 70%
- 2.5 x increase to 368M bdt
Future Woody Feedstocks

- 144M tons forest industry residues
- 64M tons logging residues
- 60M tons thinning/fuel treatments
- 52M tons fuelwood harvest
- 47M tons urban woodwaste
It works ...

- 265 MWh elec
- 160 MWh thermal

- 2000 tonnes/day
- 45% peat, 45% wood, 10% fossil
You can even run your car
2 acres of biomass
Biomass Recovery

- Must be economically-viable
  - Value to resource
  - Product value
- Must be ecologically-acceptable
  - Sustainable
  - Net gain
Biomass Recovery

Current Condition

• What to treat

Forest Products and Ecosystem Services

Future Condition

Forest Operation

• How to treat
Biomass—31 Flavors
Biomass is ...

- Smaller pieces
- Irregular shapes
- Low density
- Low potential value
- Non-merchantable material
Biomass has a cost
$trt - $tval = ?

$rem - $value - $tval
Treatment cost

- Depends on biomass type
- Fire
- Piling
- Mastication
Site prep costs
Brush disposal/activity
fuel treatments
Mastication
Treatment value
Treatment Values

- Tangible vs. intangible
- WTP ≠ value
- BD/Activity fuel treatments avoided
- Forest health
- Reduced fire risk
- Regeneration
- Nutrient cycling
Removal cost

"The cheapest way to get the 4" stick is when it is on top of an 8" stick." - Steve Aulerich
Bentley and Johnson, 2003

13% softwood volume
24% hardwood volume
Conventional operations

- Lowest cost extraction (?)
- Limits on material size
- Ground-based impacts
- Limits on tract size, total volume
Biomass Transport
Biomass Transport

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Comminution

$3 - $5/mt
Removal costs

- Stump-to-landing $10 - $12/gt
- Chipping/grinding $3 – $6/gt
- Trucking $3 - $9/gt
Roadside disposal
Going after biomass
Small Scale

- Low production/high cost per ton
- Impacts can be significant
- Safety issues
- Low capital investment
- Labor-intensive
- Niche applications
Biomass Bundling
Chip Recovery
Slash Transport
Slash transport
New System
$trt - $tval = ?

$rem - $value - $tval
Conclusions

- Lowest cost biomass to user—residues
- Higher volume per acre favors removal
- Higher product value favors removal
- Land mgmt needs may require special applications/equipment
- Biomass for energy will not pay for stump to mill without subsidy
- Wide variety of options