Harvest and Delivery of Biomass: Current Developments

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Forest Operations Research
Bioenergy Harvesting

- Residue harvest (picking up after)
- Integrated harvest (energy is a co-product)
  - WT operations, CTL w/biomass recovery, etc
- Energy harvest (energy is the main output)
  - Early thinning, SRWC, understory treatments
Integrated Operations

Biomass Harvesting

Montana
Integrated Functions

- Felling
- Extraction
- Processing
Integrated CTL
Issues

- Objective is to determine the optimal system configuration
- Understand how “optimal” varies with factors such as stand, terrain, end products, etc
- Example: Daniel Boone NF--KY
Feedstock Specifications

- Physical size and distribution
- Moisture content
- Inorganic content
- Handling
Alabama Power Co-milling

- Fuel size requirement <1/4”
- No additional fuel handling
- Tested delimbed vs. wholetree
- Tested new horizontal chipper
- Ran 8 to 15% wood by weight
Fast Pyrolysis
Ft. Bragg/ROI Project

- 15 dtpd fast pyrolysis
- Comminution processing—capital and energy efficiency
- Logistics analysis
- Kickoff 9/08, operational summer 09
Inorganic Content

- Where does it come from?
Stump Harvesting

Feedstock Specifications
Moisture Content

Feedstock Specifications
Compaction of Material

- Slash in the stand
- Brush
- Small trees

Diagram: Slash, Wood and woodparts, Chips, Round wood
Forwarding or Skidding

Coconino NF--Arizona
Composite Residue Logs
Compacting Forwarder

- 14 ton forwarder
- 9 ton payload
- ~$90,000
Mulched and Baled
Univ. of Laval
Compaction

Woody Feedstocks: Logging Residues
Roll-off Bins
Get Distance/Time Between Two Points
Stinger-steer Chip Van

Biomass Transport
Summary

RECENTLY COMPLETED

- Field drying
- Co-milling and chipping
- Thinning costs
- Bundler
- Baler

IN FY09

- Integrated recovery
- Fast pyrolysis
- Baler 2
- Bundler 2
- Stump harvesting
- Revised Transport Model