Case Study: Effectively Gathering Biomass Materials with a European Bundling System

Residues to Revenues 2009:
NEW TECHNOLOGIES TO IMPROVE WOOD WASTE UTILIZATION
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Objective

To establish that a fully-mechanized John Deere Biomass Harvesting System can efficiently harvest and collect *merchantable trees*, *pre-merchantable trees*, and *residual slash* in a single entry while adhering to environmentally sound logging practices as defined by government agencies and their collaborative partners.

Our Opportunities

- Wood to energy (CHP, coal to wood conversions, etc)
- Industrial wood-pellets
- Bio-fuels (cellulosic ethanol, bio-diesel, etc)
- Fuels reduction / forest restoration projects
- Pyrolysis (fast or slow)
- Restrictive open-air burning regulations
Forestry Bioenergy Market Drivers

- Renewable Energy Standards
- Fossil fuel price increases
- Increased worldwide demand for energy
- Predicted peak in “dedicated-crop” ethanol production
- Structural changes in world pulp & paper markets
- Government Incentives / Tax Legislation
- Greenhouse gas legislation / Climate change protocols
- “Wood to Fuel” technologies
- 10 year Federal Stewardship Contracts (US)

John Deere Renewables

- JDR is a division of JD Credit
- JDR currently owns & operates 700+ megawatts of installed wind turbine capacity in 7 states.
  - Since 2005, John Deere has invested over $1.1 Billion US in renewable energy wind-farms.
- JDR has immediate plans to invest in “wood to energy” combined heat and power plants (CHP) in the US & Canada.
1490D Eco III Energy Harvester
(2 Choices)

Fixed Version
- Bundling unit permanently mounted
- 1010D rear frame

Detachable Version
- Bundling unit can be removed & replaced with bunks
- 1410D rear frame

FYI – Both Versions
- 10 to 15 liters/hr (2.5 to 4.0 gallons/hr)... slope dependent
- Less than 0.5 kg/cm (7.0 psi) ground pressure (without Eco-Tracks)

Production Capabilities
(Experienced Operators)

- Average BHS/1490D bundle production...
  - Slash wind-rows, slash piles, roadside slash
    - Per hour....................... 20 to 40 bundles
    - Per year/per shift..... 40,000 to 50,000+ (200 days/yr)

- A 1490D can bundle enough biomass to power 1490+ homes for 1 year, which is the equivalent of 2.5 mw's of CHP capacity.
A Bundle Is....

- Logging residuals (limbs, tops, leaves, needles, etc)
- 60 to 75 cm (24” to 30”) in diameter
- Any length, but 3 meters (~ 10 feet) is most common
- 340 to 680 kg (750 to 1500 lbs)
- Wrapped with ordinary baling twine
- Transported on log trailers or flatbeds

Advantages of Bundling

- Access to areas inaccessible to chip vans
- Allows for recovery of small quantities of biomass
- Reduces road & landing requirements/modifications
- Can reduce site-prep costs
- Less contamination in biomass
- Increases chipper/grinder efficiencies 10-50%
- Stores without spontaneous combustion
- Inventories like logs (Stored wherever and whenever)
- **Transported on log trailers (eliminates waiting times)**
- **Air-dries while being stored**
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Heating Value of Wood
(at Various Moisture Contents)

Source: Tillman, David A., Wood as an Energy Resource
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**Case Study: Bundling Eucalyptus**

- 10+ bundlers working with eucalyptus slash in Latin Europe
- Bundles are heavier than most species
- Bundles have a high energy content
- Bundles are sized to fit into logistical chain
- Cutting system challenges
- Excellent productivity
- Worksite management has been key to success
Biomass harvesting into piles

Both sides of clearing road

One side of clearing road

Kuva: Metsäteho Oy

Piles need to be properly oriented

Kuva: Metsäteho Oy
Another example of oriented slash piles

Quality of piles has biggest impact to the bundler productivity

To Recap....

- John Deere to invest in CHP plants in N.A.
- Advantages of bundling are measureable
- Worldwide demand for energy will continue to increase
- Bundles enhance transportation economics
- Worksite management is key to success in biomass harvesting
In Conclusion

- To attract investors biomass end-users will require:
  - long-term guaranteed biomass feedstock supplies.

- To invest in “biomass harvesting systems” contractors/loggers will require:
  - stable long-term markets for biomass feedstock.

Questions? Comments?

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