

## NARA Research Briefs

### Dr. John Sessions, Oregon State University Transportation of Residues: Would You Bundle?

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In the forest industry, timber harvesting supplies the demand for one of the world's most renewable resources: logs. Although the majority of consumers may only know about the final products purchased from mills and lumberyards, the harvesting operation is quite extensive. From stump to mill, the costs for extracting desirable trees to fulfill market demand range in cost depending on the size of the unit being harvested and the amount of trees to be cut.

In a recent interview with Dr. John Sessions, Professor of Forest Operations Management in the College of Forestry at Oregon State University, the topic of bundling and biomass transport was discussed. So, what is bundling you may ask? Forest harvest residues (slash) left after harvesting, are normally put into a roadside grinder to increase their bulk density before shipping to a plant because branches and tops occupy about 4-5 the volume of solid wood. Although density is increased significantly by grinding there are several disadvantages. First, the grinding takes place in the field using diesel. Diesel, in the Pacific Northwest, is about 3 times the cost per unit of energy as electricity. Second, the ground materials are transported in large chip vans that do not have the mobility that stinger-steered log trucks have. Chip vans are restricted to flatter grades, require wider roads, and must have a larger area to turn around. Third, forest residues, once ground, do not continue to dry, and under some conditions are subject to spontaneous combustion.

Bundling or baling has advantages of making "artificial logs" at the landing at bulk densities at least as high as ground materials. These artificial logs, bundles or bales, may have potential to be carried on truck trailers with greater mobility such as modified short log trailers. Bundles or bales are less subject to spontaneous combustion, and can be stored for longer periods of time. Bundles or bales can be ground at the plant on electricity at the plant, at a much lower energy cost than diesel grinders. Electric grinders are also less expensive to run. Although bundles are denser than ground materials, getting trailers up to weight can be a challenge, as staked trailers do not have the same volume capacity as large chip vans. Care also needs to be taken to ensure bundles or bales do not become safety hazards during transport over public roads.

Why isn't everyone bundling? The primary holdup is the cost of the bundle. The supply chain for the bundle is not currently competitive with the roadside grinding because of the high cost of bundling. That is not for lack of effort in Europe and North America, but it is still to be demonstrated under what conditions bundling can be competitive. Some potential avenues include mounting bundlers on lower cost carriers, reducing labor costs by combining bundling

with other log processing activities on the landing, and making denser bundles so that transport costs can be further reduced.

As part of the NARA project we are investigating all opportunities to reduce feedstock supplies including bundling and baling. Planned activities this year include grinding tests of residues and slash bales to compare energy requirements for comminution, examine opportunities to increase bale density, and to measure moisture content reduction over time for baled residues.

#### Works Cited

- <sup>1</sup> Laitila, Juha et. al. (2013). Productivity and Cost-Efficiency of Bundling Logging Residues at Roadside Landing, *Croat.j.for.eng.* 34(2):175-187.
- <sup>2</sup> Loeppky, J. – Interview with Dr. John Sessions concerning his research in biomass residues and their transportation (personal communication, December 8, 2013)
- <sup>3</sup> (2013). *ODOE: Bioenergy in Oregon*. Biomass Producer or Collector Tax Credits. Retrieved from: <http://www.oregon.gov/ENERGY/RENEW/Bio>