

2011 DOE Biomass Program Review

High Tonnage Forest Biomass Production Systems from Southern Pine Energy Plantations

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This project is designing and demonstrating a high productivity system to harvest, process, and transport woody biomass from southern pine plantations. The final product will be a system producing wood fiber at target harvest costs near \$35 per dry ton. Specific objectives are to:

1. Develop design improvements in tree-length harvesting machines for energy plantations;
2. Configure and assemble a high-productivity, lowest-cost harvesting and transportation system for biomass from southern pine energy plantations; and
3. Demonstrate at industrial scale and document performance of the harvesting, storage, pre-processing, and transportation system to provide the lowest delivered cost and optimal product quality for woody biomass.

The project is being conducted by a consortium of forest biomass providers, forest equipment OEMs, university research institutions, and the USDA Forest Service. The consortium will design and build high-speed track-type feller bunchers and high-capacity wheeled skidders to fell and skid small-diameter trees from southern pine plantations and high-capacity vans to transport chips from forest to biorefinery. Also, the consortium will develop advanced sensing and geospatial data collection systems to quantify system performance. Industrial-scale field tests over a 2.5-yr period will demonstrate the productivity and cost of various configurations of the system of felling, skidding, in-woods chipping, transport, and final chip processing at the biorefinery. One of the most innovative aspects of the project is the use of in-woods storage and transpirational drying of trees after felling and before skidding and chipping to reduce moisture content of the wood from 50% to 30% and significantly reduce transportation costs. Field tests will include: 1) transition from thinnings to clearcuts in 10- to 12-yr-old plantations; 2) high-speed, high-accumulation, track-type feller buncher with high-capacity skidder; 3) GPS-based sensing and monitoring systems; 4) high-capacity chipper; 5) transpirational drying; 6) high-volume chip trailers; 7) roadside inventory techniques; and 8) extended work schedules.