High Tonnage Forest Biomass Production Systems from Southern Pine Energy Plantations

a Consortium Led by Auburn University's Center for Bioenergy and Bioproducts
Consortium members: Corley Land Services, Tigercat, USDA Forest Service Forest Operations Unit
Collaborators: Coskata, Genera Energy, Precision Husky
Project Sponsor: U.S. Department of Energy
Project Cost: $10 million

Summary

Meeting U.S. biofuel production goals requires systems that can deliver large quantities of quality biomass feedstocks. Woody biomass from southern US forests, primarily softwood plantations, is a large potential biomass source. This project will develop and demonstrate a new logistic system, optimized for southern pine energy plantations, that will significantly reduce cost and optimize quality of woody biomass delivered to biorefineries.

Objectives of the project are:

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 full 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.

Consortium partners include equipment manufacturers, university and federal research engineers, biomass harvesting contractors and biorefineries.

The consortium will design and build a new high-speed track-type feller buncher, a high-capacity wheeled skidder and high-capacity chip vans to transport lowest-cost biomass from the forest to the biorefinery. The consortium will also develop advanced sensing and geospatial data collection systems to quantify system performance and provide data to improve system productivity. 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 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. Additional research is characterizing biomass quality in relation to harvest and chipping techniques as well as chip storage effects on final biomass quality. Focus groups will provide information on perceptions of forest landowners and loggers and their willingness to adopt southern pine energy plantations and the prototype harvesting system. The end result will be a commercially-viable biomass production system that can provide low-cost feedstock meeting a range of biorefinery requirements.

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