No. 0003-05-05 June 2009

Project Summary

Technology Transfer Outreach Publication

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Sponsor
Frontier Renewable Resources

Project Title
COEE Transportation Research Study

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CENTER OF ENERGY EXCELLENCE PROJECT 3

Improving Forest Feedstock Harvesting, Processing and Hauling Efficiencies

Center of Energy Excellence is to promote the development, acceleration, and sustainability of the energy sectors in Michigan. Among Michigan's greatest potential for the sustainable production of cellulosic biomass lies in her 19 million acres of natural forests. A forest products industry has grown during the last century to take advantage of this abundant supply of wood. Project will address high priority research needs for an efficient harvesting, wood processing, and transportation supply chain for forestry biomass production. Research tasks are focused on providing the most advanced knowledge possible for supplying high quality wood to produce cellulosic ethanol at a proposed new biomass plant in Kinross, MI by Frontier Renewable Resources (FRR) facility.

Transportation Research

The objective of this project is to assist in the optimization of the delivery of feedstock (logs) to a proposed new forestry biomass ethanol plant in Kinross, MI. The project will investigate a multi-modal (rail/water/truck) surface transportation solution set within the 150 mile supply radius and evaluate the effects of transportation optimization on total delivered cost and air emissions. It will also evaluate the tradeoffs between different modes of transportation.

We will be responsible for mapping current road, rail and marine transportation infrastructure within the 150 mile radius study area including some relevant locations outside the area (such as one or more ports with potential to supply wood feedstock to the plant) The road network includes state trunk lines and county and local roads and railroad infrastructure data includes identification of active main lines and industrial spurs and their operators. For the marine supply chain potential origin port(s) will be selected, including the destination port at Sault St. Marie. In addition to the physical location of transportation infrastructure, an effort will be made to incorporate other information of the transportation infrastructure that effects the productivity of the system, such as seasonal weight restrictions of highway system, location, capacity and condition of truck / rail landings and yards used for storing and loading logs, and condition evaluation of the docks and access roads.

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University Facts

Total Enrollment	6,550
Graduate Enrollment	916
Number of Faculty	417
Placement Rate	95%

Michigan Tech is located in Houghton, MI on the south shore of Lake Superior. This rural area is known for natural beauty, pleasant summers, abundant snowfall, and numerous all-season outdoor activities. In addition, the University maintains its own downhill and cross-country ski facilities and golf course. There are numerous cultural activities and opportunities on campus and in the community. Michigan Tech has also been rated as one of the safest college campuses in the United States, and the local community provides excellent resources conducive to an outstanding quality of life.

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Methodology

- Evaluation and mapping the current transportation infrastructure in the study area, including road, rail and water transportation.
- Create cost gradient maps of transportation prices to the Kinross by different modes.
- Understand economic and environmental impacts of various systems through life cycle energy and greenhouse gas assessment from cradle-to-delivery gate at Kinross, MI.
- Determine best practice transportation alternatives to Kinross, MI.
- Provide scenarios to help understand system capabilities, such as equipment availability, potential service challenges, etc.

Anticipated Research Findings

The results from this project will be used in a larger simulation and modeling effort to create cost factors for the entire supply chain in the study area for both current technology used in Michigan and for modern industry best practices in the U.S., the E.U. and other parts of the world. Our findings will provide information on transportation infrastructure, asset availability, and will reveal potential obstacles, costs and tradeoffs. With the input from the project, environmental impacts of the forest biomass feedstock supply chain will be evaluated for fossil energy consumption and greenhouse gas emissions for all supply chain scenarios, including truck, rail and marine modes with an efficient intermodal linkage.

Benefits

This research will be completed by August 2011. The final product will be a narrated report that outlines the following: inventory of relevant transportation infrastructure, evaluation of available assets for feedstock transportation, transportation service capabilities of each mode and cost gradient maps presenting prices of transportation from key harvesting areas to the Kinross facility. The supply chain simulation and optimization by parallel projects will assist Frontier Renewable Energies to develop efficient and sustainable feedstock supply chain to their facility.

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