

Mascoma: Frontier Biorefinery Project

This project involves the construction and operation of a biorefinery that produces ethanol and other co-products from cellulosic materials through advanced consolidated bioprocessing.

The project is expected to initially produce 20 million gallons per year of denatured ethanol from approximately 700 dry metric tons per day of cellulosic materials, primarily renewable woody biomass.

More information is available at:
www.frontier-renewable.com,
www.mascoma.com.

Project Description

The proposed biorefinery will be located on a 50-acre portion of a 355-acre site near the Kinross Charter Township in Chippewa County, Michigan.

The feedstock for the facility would consist of hardwood pulpwood obtained from within a 150-mile radius of the Michigan site. Feedstock would be purchased through local timber suppliers under contract with the biorefinery or from additional commercially viable sources as available.

Hardwood pulpwood would be debarked, chipped, screened, stored in chip silos, and conveyed to a biofuel pretreatment area. Once pretreated, the feedstock would be subjected to Mascoma's proprietary Consolidated Bioprocessing, which combines enzymatic hydrolysis to sugars and simultaneous fermentation to ethanol in one step. The ethanol/water mixtures would be sent to distillation and dehydration for final product purification. Lignin residues would be recovered from the distillation step, dewatered, and used on-site in a solid



The Frontier Biorefinery project site is located in Kinross Charter Township, Michigan.

boiler that would generate both steam and electricity. The ethanol would be denatured and loaded into trucks for off-site distribution and sale.

In order to finalize the design of the Frontier facility, intensive piloting work is being conducted at a Mascoma facility in Rome, New York. Extensive operation and analyses at 1,000 and 5,000 gallon scales have enabled a financeable engineering design of the final facility at Kinross.

Potential Impacts

A biorefinery of this type creates long-term, high-paying permanent jobs and provides replacements for imported oil. The bioethanol produced displaces gasoline and, using life-cycle models,

reduces net emissions of carbon dioxide.

Other Participants

Other participants in this project include:

- Valero Energy Corporation
- Michigan Economic Development Corporation (MEDC)
- Oak Ridge National Laboratory (ORNL)
- Purdue University
- New York State Energy Research and Development Authority (NYSERDA)
- New York State Power Authority (NYPA)
- J.M. Longyear, LLC
- Frontier Renewable Resources, LLC.

Prime	Mascoma Corporation
Location	Kinross Charter township, Michigan
Feedstock (s)	Hardwood pulpwood
Size	700 tons per day of cellulosic materials (with long-term potential for doubling usage to 1400 tons per day)
Primary Products	Ethanol; Lignin and bark used to produce heat and electricity
Capacity	20 million gallons per year of denatured ethanol (with long-term potential for doubling to 40 million gallons per year)
Award Date	February 27, 2009
GHG Reduction	Greater than 60% reduction versus fossil product
Anticipated Job Creation	Approximately 50 full-time permanent jobs; up to 150 construction jobs and 500 spinoff jobs
Company Contact	Steve Hicks, stevehicks@frontier-renewable.com , 806-228-7960