Potential Locations for Biorefinery in the Lower Peninsula of Michigan

Fengli Zhang, Dana Johnson, Mark Johnson
Michigan Technological University
Forestry Biofuels Statewide Collaboration Center

Nine potential locations to construct and operate an ethanol facility were identified in the lower peninsula of Michigan. This analysis was based on criteria used in a renewable assessment for Caterpillar Incorporated with additional items including：

- Location within one mile of a major state road；
- Location within one mile of railway；
- Location within a community size of at least 1,000；
- Location within ¼ mile of a water body (rivers, lakes, etc.);
- The minimum residues within a 100 mile radius of any select community have to be at least 0.7 million dry tons / 1.4 million green tons (a rough estimate of the ratio between green tons and dry tons is 2:1[1]) to support a facility producing 50 million gallons of fuel each year;
- Location does not have a co-fired power plant around (there are co-fired power plants in Grayling, Mancelona and Cadillac).

The list of the ten potential sites for biorefinery in the lower peninsula of Michigan, as well as the distance (miles) to a closest co-fired power plant, is shown in Table 1. The map in Figure 1 shows the distribution of the ten potential sites.

Table 1 Potential Site for Biorefinery in Lower Peninsula of Michigan

City / Village	Distance to a Nearest Biomass Power Plant (miles)
Manton city	11.19
Roscommon village	12.81
Kingsley village	23.86
Kalkaska village	23.94
Gaylord city	25.49
Clare city	33.97
West Branch city	35.29
Traverse City city	36.03
Boyne City city	41.24

[1] Minnesota Woody Biomass Facility Survey. Minnesota Department of Natural Resources Division of Forestry Forest Products Utilization & Marketing Program. http://files.dnr.state.mn.us/forestry/um/biomass/minnesotawoodybiomassutilization_report.pdf; 2008

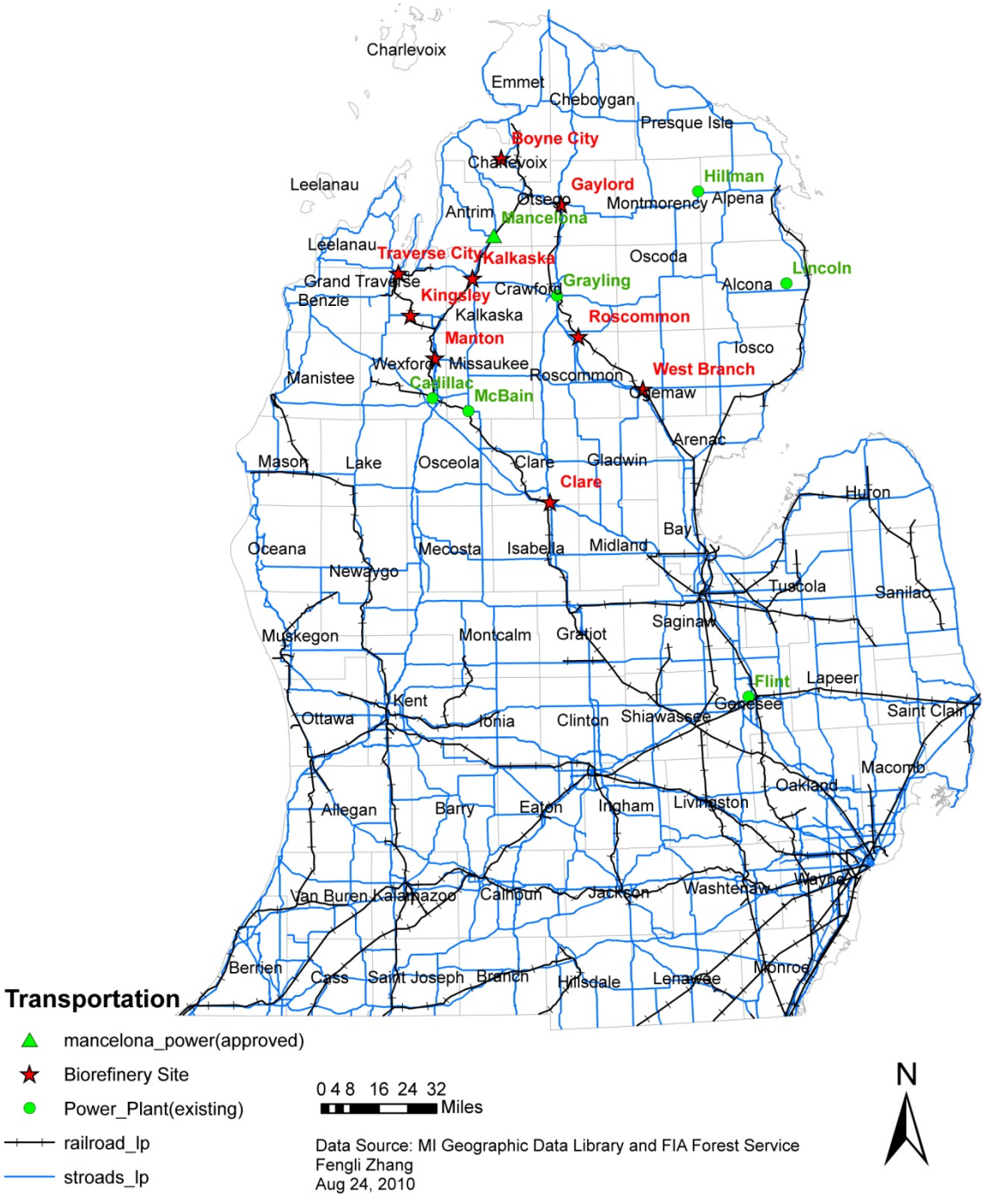

Figure 1: Map of Potential Sites for Biorefinery in Lower Peninsula of Michigan

Existing/Approved Wood-Fueled Biomass Power Plants in Michigan

There are several electric power facilities using wood fuel as feedstock in Michigan. These utilities have a combined capacity of 173,000 kW, or approximately half of Michigan's wood-based energy. Table 2 detailed these electric producing facilities information, including the name of the power plants, the locations, the capacities and wood fuel consumptions in tons per year. In order to avoid compete for, e.g., pulpwood, workforce and other resources, with the power facilities listed in the table, potential ethanol conversion plants will not be sitting in adjacent areas.

Table 2 Existing/Approved Wood-Fueled Biomass Power Plants in Michigan

Power Plants	Location	Capacity (kW)	Wood Fuel Consumption (tons/yr)
Grayling Generating Station[a]	Grayling	38,000	250,000-300,000
Viking Energy--McBain[a]	McBain	18,000	150,000
Cadillac Renewable Energy[a]	Cadillac	39,600	375,000
Hillman Power Co.[a]	Hillman	20,000	230,000
Viking Energy--Lincoln[a]	Lincoln	18,000	150,000
Genesee Power Station[a]	Flint	39,500	300,000
Mancelona Biomass Plant[b]	Mancelona	36,000	

[a]Source: REPIS, http://www.nrel.gov/analysis/repis/

[a]Source: http://www.michigan.gov/

[b]Source: http://record-eagle.com/antrim/x794091110/Mancelona-biomass-plant-awaits-utility-deal