

An Ideal Biodiesel Facility

Introduction

- The purpose of this project is to analyze the best possible options for the construction of a 30 million gallon per year biodiesel plant in Mount Vernon, Iowa.
- The topics to be explored are:
 - Reasoning for location
 - Feedstock to be used
 - Constraints to the project
 - Potential solutions to the constraints



Figure 1. A map of the rail lines in the state of Iowa.

- 9.45 million acres of soybeans planted in Iowa last year.
- 1 acre of soybeans produces roughly 60 gallons of biodiesel in Iowa.
- Need 500,000 acres of soybeans to produce name plate value.

Location

- There are a few reasons that make Mount Vernon, Iowa an ideal location for the construction of a biodiesel plant. Some of the larger points of interest are as follows:
 - Mount Vernon is located on a primary Union Pacific Rail Line that runs from Chicago to the west coast.
 - It is also located on Highway 30, a major highway that runs through multiple states.
 - It is located in a highly populated area, creating a larger talent pool to draw employees from.
 - There is a Soy Oil refinery located near by in Cedar Rapids making purchasing and transport of feedstock simple and cost effective.



Figure 2. A map of Mount Vernon, Iowa, showing the major highway, and rail line going through town.

Constraints and Opportunities

- Availability of different feedstocks.
- Transportation costs.
- Feedstock costs.
- Possible additional process steps based on feedstock.
- Additional/changes in process chemicals based on feedstock selection.
- Equipment compatibility
- Opportunities to facilitate a growing market.
- This solution will provide 30 million more gallons of biodiesel to meet the demand of the growing industry in the U.S.

Feed Stock	Average lbs / ac	Oil Content %	Gallons / ac	Acres Needed for 30M gal
Sun Flower Oil	1211	40	63	476190
Canola Oil	1366	43	76	394737
Soybean Oil	2562	19	63	476190
Palm Oil	3872	65	500	60000

Table 1. Feedstock options for suggested plant

Feedstock

The feedstock chosen for this plant was soybean oil, as seen in the table above, listed below are the reasons why:

- Refined soybean oil is readily available in the state of Iowa, and the Mount Vernon area
- The technology for the transesterification of soy oil is easily obtained.
- The energy content of Soy biodiesel is fairly comparable to that of petroleum diesel

Potential Solutions

- Build the facility next to the rail line in order to reduce shipping costs by shipping rail as much as possible.
- Ship by unit train as much as possible
- Easy soy oil access, due to near by soy oil refinery



Figure 3. Zero waste biorefinery facility

- To implement this solution we will need a good investment group and an intelligent designer that knows biodiesel refineries. Cedar Rapids will also provide a large labor force.

References

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