Wood to Wing: Site Selection Methods for a Biofuel Supply Chain

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Introduction

The Integrated Design Experience (IDX) team at Washington State University is currently researching how to efficiently improve a supply chain that takes woody biomass from forest residuals, and through the Northwest Advanced Renewables Alliance (NARA) procedure, create a sustainable aviation biofuel. For this process, slash piles are utilized as the primary biomass because it would add jobs and stability to the local communities; currently the slash piles are being burned on site for no capital benefit and act as a carbon source.

Site Selection Process

To begin the process of identifying potential sites the IDX team performed a regional analysis of the Pacific Northwest region of Washington, Idaho, Montana and Oregon by using various physical and social factors. This gave the team regional hot spots that could be analyzed for the most suitable site for the NARA process. These locations included sites such as current pulp and paper mills, chip mills, saw mills and ethanol plants.

Once the regional analysis was complete, the site process continued by choosing the top fifty sites from the regional analysis. The team then examined these top five sites on a site-by-site basis, and created a site inventory that utilized more detailed factors to further rank these top sites.

Factors include biomass availability, labor costs, electricity rates, building and operations taxes, creative vitality index, poverty rates, natural gas rates, acreage, transportation on site, environmental permitting, wastewater treatment availability, boiler availability, and the type of the facility being examined. These factors gave the team the ability to rank the top five potential site locations for each facility type that could be utilized for the NARA supply chain processes.

Conversion Depot Matrix

The next steps for the team are completing the site research, and the quality/quantity of the asset. This ranking system featured a matrix focused on economic, social and environmental aspects of each individual site. Each site was entered into this ranking matrix and the top sites were found for each type of facility in the NARA Supply Chain: Solids Depot, Liquids Depot, Conversion Facility, and Integrated Biorefinery.

Though the top sites were found for all these facilities, the focus of the IDEx team moved to the design of a Liquids Depot.

Top Sites

Conclusion and Next Steps

From our analysis, it was determined that biomass availability for sites largely dictated sites rankings. The factors that were created in order to rank the sites gave the IDX team the ability to rank the top five potential site locations for each facility type that could be utilized for the the NARA supply chain processes. The next steps for the team are:

- Sensitivity Analysis
- Gather more site specific/company information
- Further examine native American tribal lands
- Perform specific site design

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