

## **Biodiesel Production: Executive Summary**

The alternative fuel biodiesel can be used in current diesel engines just like regular petroleum diesel. Biojewicz Biodiesel has explored the guidelines for a biodiesel production facility that uses algae as an oil source. Algae uses the least amount of land in comparison to other oil producing crops. The production facility is to be located next to a natural gas power plant for its flue gas supply of carbon dioxide, its location in a high concentrated sunlight area and its abundant brackish water source of an underground aquifer. Several different scenarios were evaluated for this facility; however, two different options were focused on in detail. The larger the lipid content of the algae yields greater production rates of biodiesel. The lipid content of the algae can be manipulated by algae starvation or via genetic engineering. In addition to biodiesel, glycerol product is produced and sold raw, and the remaining biomass (sugars) after the oil is extracted are fermented to produce xanthan gum, a valuable commodity that is used in multiple industries. Several different possibilities for byproducts are discussed, but the fermentation of sugars to form xanthan gum proves to be the most profitable. The options considered the varying algae lipid content of 20, 30, and 40% and the various land usage of 1, 4 and 7 square miles. The only profitable option at \$0.72/gallon of biodiesel is a 7 square mile algae production with an algae lipid content of 20%. The NPW is \$12.6 million with a return on investment (ROI) of 3%. Risk was assessed and the lower lipid content showed in both of the main evaluated options that were the main focus to be the most promising to yield a profit at a biodiesel selling price of \$0.72/gallon. This is due to the fact that at this selling price, the byproduct fermentation is more profitable than the biodiesel production. The biodiesel production profitability surpasses that of the fermentation at a selling price of \$3.14/gallon. With this higher selling price, as would be expected, there is a greater NPW of \$203 million with a ROI of 56%.