



Custom Environmental Technology/Custom Recovery Services

Project Description

Algae are simple plant organisms found in all wet environments. They range in size from microscopic forms to the simple macroscopic forms of 'pondweeds', and the large seaweeds.

These are spherical colonies of green cells clinging to a semi-transparent hollow ball of mucilage. A single colony may consist of over 500 cells, each one with a tiny pair of whip-like tails (flagella) their flagella in unison, propelling the colony through the water.

According to the U.S. Energy Information Administration, the total gasoline consumption by motorists in the state of North Carolina consumed over 4B gallons of gasoline. Gasoline distributors are allowed to blend up to 10% ethanol into gasoline, creating a demand for ethanol in the state of North Carolina of 400,000,000 gallons per year. North Carolina's first producing ethanol plant came online in 2010. When fully functional, this plant will produce 60,000,000i gallons per year, leaving North Carolina with an ethanol deficit of 340,000,000 gallons per year.

Blenders will preferentially blend ethanol into gasoline for the following:

- The federal government through the RIN system mandates the use of renewable fuels.
- The blenders enjoy a federal tax credit for blending ethanol into gasoline
- Some metropolitan areas require the addition of an oxygenate such as ethanol into gasoline.

Over 95% of all ethanol produced in the United States and 100% of the ethanol produced in the state of North Caroling is produced from Corn1. Ethanol production consumes over 27% of all the corn grown in the United States. North Carolina's ethanol production consumes the equivalent of 39% of all the corn grown in North Carolina. Clearly, any additional ethanol production in the state of North Carolina must come from feedstocks other than corn.

As depicted in Figure 1, most of the ethanol production in the United States is concentrated in the Corn Belt. Ethanol produced at these plants must be shipped via truck or rail to the blenders that add the ethanol to gasoline. Because of ethanol's affinity for moisture, it cannot be conveyed in pipelines. Custom Recovery Services will produce ethanol from locally derived waste products and sell to local blenders, significantly reducing transportation costs.

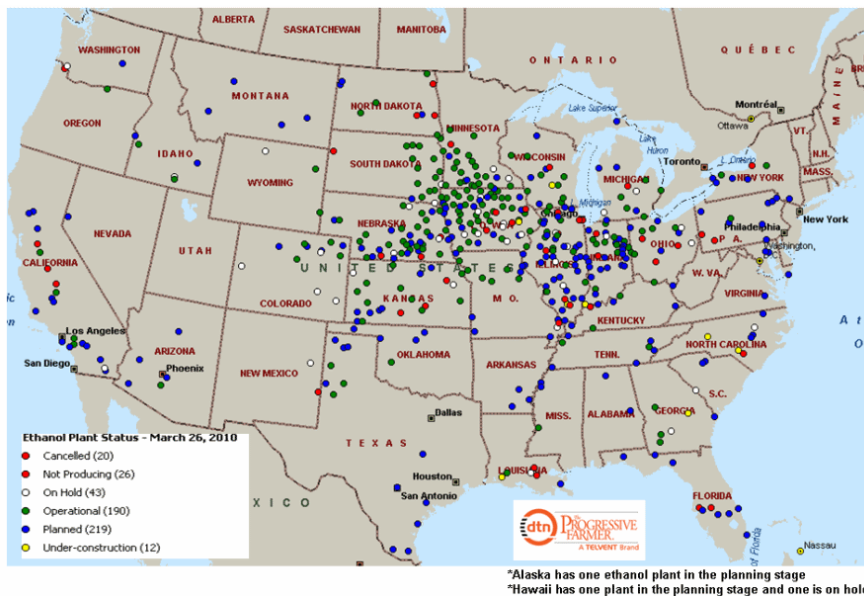


Figure 1

Food manufacturing has an important presence in North Carolina. According to Manufacturer News, Inc., the production of food products accounts for 10% of all manufacturing jobs in the state. Ever increasing waste disposal fees are challenging the industry’s ability to survive. In addition, municipalities must treat these waste streams at landfills and waste water treatment plants. CRS will capture the sugar and starches from these waste streams to use as a feedstock for ethanol production.

This project will also demonstrate the commercial viability of processing MSW derived paper waste into ethanol using proven process. The initial plant will help attract capital investment and synergistic green technologies in the expansion of this project.

Plan / Timetable

Custom Recovery Services has demonstrated the commercial viability of the recovery of waste sugars and waste starches with multiple commercial installations. CRS uses a multiple of proven technologies to recover these products including:

- Dissolved Air Flotation
- Filter Press
- Tangential Flow Micro Filtration
- Reverse Osmosis Water Treatment

The conversion of the sugars and starches to ethanol will utilize proven technology used in traditional ethanol plants as well as pilot scale proven technologies to increase efficiencies and reduce energy requirements

Project Goal

The goal of the project is to produce 100,000 gallons of fuel grade ethanol from waste products that are currently dispose.

Project Objectives

The project objective is to design and construct a functional, efficient ethanol plant to convert these recovered waste products. The project work plan follows standard engineering project management guidelines for the development and control of construction projects.

Direct Measureable Outcomes

1. The plant will produce 100,000 gallons of ethanol per year.
2. The plant will require 15,000 BTU's / gallon of ethanol produced compared to the industry standard of 30,000 BTU's / gallon.
3. The plant will create 4 direct jobs.

Growing North Carolina's Green Economy

This project will grow North Carolina's green economy by producing renewable bio-fuels from waste products. The plant will be registered to produce RINS, renewable identification numbers. Production can be monitored by reviewing RIN's produced. The project will also demonstrate the conversion of MSW derived paper waste into ethanol. The U.S. department of Energy has called paper waste conversion to "bridge to cellulosic ethanol." By demonstrating the effectiveness of the project's conversion of paper waste to ethanol, future conversion of cellulosic feed stocks can be evaluated.

Improving North Carolina's Economic Position

The project will improve North Carolina's economic position in two ways:

- Creation of direct jobs

The plant will employ (1) plant manager, (2) operators, and (1) lab manager. Because there is only one other ethanol plant within the state, these employees will come from outside the green technologies industries. These employees will gain valuable training, both formal and on the job.

- Improving competitiveness of food and beverage producers

CRS is working with food and beverage manufacturers that are being charged up to \$500,000 / year in waste disposal surcharges. By removing waste starch and sugars from the waste stream, these disposal surcharges will be eliminated. This will dramatically improve the competitiveness of the manufactures saving existing jobs and adding new jobs as the plants expand.

Product Prototype

The plant will produce fuel grade ethanol