



From the September 2009 Issue

New Systems and Strategies

Biodiesel Magazine speaks to new producers about their systems and strategies for being successful in the biodiesel industry.

by By Susanne Retka Schill

Starting a new venture is always risky. Have the markets been projected correctly? Have the potential challenges been anticipated accurately? In a series of profiles of new biodiesel producers, *Biodiesel Magazine* learned of several unique strategies for success. Some plants hope to time their production starts to tap into incentives or mandates. Others demonstrate new technologies they believe will give an edge over the competition. There are even soy-based biodiesel plants starting up, albeit carefully sized, and engineered for multiple feedstocks.

Crimson Renewable Energy LP is the largest of the new biodiesel producers profiled in this article. Based in Bakersfield, Calif., the 30 MMgy facility hopes to tap into the market demand expected from the California low carbon fuel standard, which will be phased in over the next decade to reduce the state's transportation carbon footprint by 10 percent. The Crimson plant is the newest in a group of companies owned by Crimson Resource Management Corp., a holding company with oil and gas assets, natural gas refineries, asphalt production, a pipeline group, terminal operations and oilfield services. The 30 MMgy plant resides at the site of sister company Delta Trading's terminal in Bakersfield.

Given Crimson's oil industry background, it's not surprising that the company developed its biodiesel process in-house, starting with a pilot plant that ran for several months in 2007 as the renovation of a mothballed natural gas plant at the Delta Trading terminal began. Harry Simpson, president and CEO of Crimson Renewable Energy, says the Bakersfield site has several advantages. The location has good rail and truck access, it is already home to two refineries, and it sits in the heart of California's Central Valley diesel market. Simpson expects that at least one of those refiners will begin blending B5 and possibly B20 by the end of the year. Another advantage to Delta Trading's site is that it was already zoned, although the company still had to clear the California permitting hurdles. "California is the strictest place in the world for air quality," Simpson says.

The plant also includes glycerin refining, which started refining purchased crude glycerin in early summer as the biodiesel plant was being commissioned. Initially refining high-grade technical glycerin (98 to 99-plus percent purity), Crimson expects to pursue United States Pharmacopeia (USP) certification in the near future.

With true multi-feedstock capabilities in mind, engineers designed the plant to store and process feedstocks separately, with individual storage tanks for finished B100s derived from different feedstocks. The fuels are stored in insulated and heated tanks, and can be blended on a load-by-load basis with up to four additives injected as needed. Diesel for B99 blends could be one of those additives. "We also nitrogen blanket our tanks," Simpson says. "By keeping nitrogen on all biodiesel and feedstock, it prevents oxidation and moisture getting in."

Crimson expects to source tallow, white grease and waste vegetable oil from within the state, and rail other feedstocks in when needed. The plant will process some soy biodiesel for blending, depending on customer requirements and winter needs.

Green Earth Biofuels

Across the country in Irvine, Ky., Green Earth Biofuels of Kentucky Inc. developed its own process technology that the company is patenting. Construction on the 25 MMgy plant in southeast Kentucky was completed in late May when a two-month commissioning process began. In early August, management was awaiting test results to ensure the fuel meets ASTM standards consistently before declaring the commissioning process complete.

Green Earth Biofuels is not producing a methyl ester, although its renewable diesel will be using the same feedstocks and targeting the same markets as biodiesel. Jeff Sewell, product procurement manager, describes the process as thermal depolymerization using heat and pressure with a standard acid catalyst to obtain 100 percent yields from vegetable oil feedstocks, without producing coproducts or a waste water stream. The process is not energy intensive, Sewell adds, producing a fuel with a positive energy balance of 3.24 comparable to biodiesel. The plant will initially use soybean oil as its feedstock, with plans to expand production to 100 MMgy with other feedstocks.

"Our process allows us to tweak the formula to meet different ASTM specifications," Sewell says. "One is for power generation, and the other is for on-road use." The company expects to market its renewable diesel to two petroleum jobbers, a transit system and power plant. "There's enough demand within a 50 mile radius for 100 million gallons a year" targeting B5 and B20 blends, he says. He adds that Green Earth has obtained a favorable two-year contract price agreement with a

soybean oil supplier.

Arkansas SoyEnergy

Soy oil is the intended feedstock at Arkansas SoyEnergy Group LLC in DeWitt, Ark., but shortly after starting up the new plant in March it shut down in order to retool for multi-feedstock processing. "We'd love to do only soybeans—we have a crushing facility here—but if the economics are not there, they're not there," explains Terry McCullars, general manager. The project broke ground on a 7 MMgy biodiesel refinery in February 2008, adjacent to Arkansas SoyEnergy's crush plant completed a year earlier. The refinery was designed by Bionerg Argentina, and Virtuoso Biofuels helped with retooling the process, which included an expansion from 7 MMgy to 10 MMgy. Commissioning was completed in July.

Arkansas SoyEnergy was formed by the Hornbeck brothers, Jeff, Troy and Jon, who have soybean breeding and seed supply businesses in addition to farming. Planning for the project began when the biofuels outlook was stronger than it is today, and when soybeans were \$6 or \$7 a bushel. "Who knew they would get as high as \$16 per bushel?" McCullars says. "We're hoping we're on the uphill side of things changing." He noted margins have been improving and petroleum pricing stabilizing.

The crushing facility and biodiesel plant are sized to capitalize on the typical basis advantage for local processing. Basis is the spread between the Chicago and local prices that reflects transportation costs and local demand. With the DeWitt basis generally running 60 to 70 cents per bushel under the Chicago price, Arkansas SoyEnergy should be able to offer farmers a better price than what they'd get trucking their grain to other markets, and still give the plant favorable pricing. "If we can't buy direct from farmers, we'll be buying at the Chicago board prices and paying shipping, possibly paying 50 cents over Chicago," McCullars explains. One of the original ideas to be explored now that the plant is operational is forming a cooperative where farmers would deliver their beans to the plant and receive biodiesel to use on their farms. Soybean farmers are willing to pay a nickel or dime more per gallon for soy biodiesel, McCullars adds, but if it's not made from soy oil then price becomes the determining factor. "Soy producers expect biodiesel to be made from soybeans."

Producers' Choice

Local farmers are the majority among the 310 local investors in the new Producers' Choice Soy Energy LLC biodiesel plant at Moberly, Mo. Its 10 MMgy biodiesel plant was built as a multi-feedstock facility to use waste feedstocks from area renderers along with soybean oil crushed in its own facility. The plant is sized to match supply needs with the area where the typical basis gives local processors an advantage. The basis at Moberly was running between 60 and 70 cents this summer although at times it has been over \$1, according to general manager Dave Zielke. "We won't use the crush facility to subsidize biodiesel," he says. The intention is to price the soybean oil at the crush plant, and when the economics aren't there for biodiesel production, sell the oil.

Producers' Choice expects to market its biodiesel in Missouri where a 30 cent per gallon incentive will cover every gallon produced at the plant for five years, Zielke says. In addition, nearby Illinois has a B2 mandate on publicly owned diesel vehicles where the fuel is available, as well as sales and use tax exemptions for biodiesel blends.

The Moberly facility was built by Process Concepts Inc. using process technology from SRS Engineering Corp. and deploys a new technology from Cavitation Technologies Inc. George Hawranik, founder and chief engineer of SRS Engineering, was on site in late July to begin the commissioning process, systematically flooding the miles of piping to test fittings and fix any leaks. Utilizing SRS technology for automated, continuous flow pretreatment of high FFA feedstocks has saved the plant money by reducing the tankage requirements, Hawranik says. The four-step process sends the product through acid esterification twice, with methanol and water removed at both stages for recycling before the product moves on to the transesterification process. "We're trying to restrict the use of high-cost catalysts," he says. "Our focus is on reducing the cost of production." This is the first commercial installation of Cavitation Technologies' process, which uses elevated pressures to give a more complete reaction in a shorter time. CTI describes its modular reactor as a continuous flow, hydrodynamic, Plasma 2000 nano-technology-based reactor.

Ever Cat Fuels

Commercialization of a new technology is at the heart of the 3 MMgy biodiesel plant completed at Isanti, Minn., this summer. Ever Cat Fuels LLC was formed by the principles in McNeff Research Consultants, holders of the intellectual property for the Mcgyan process, named after its developers. A 2,000-square-foot area holds two reactors, each measuring 6 feet long by 6 inches wide. The fixed bed reactor uses a metal oxide catalyst, which McNeff director of marketing Dave Wendorf says "allows us to make biodiesel in seconds." A wide range of feedstocks can be used, with pretreatment required for some feedstocks to remove insolubles. The feedstock must be in a liquid state to flow through the reactor where esterification and transesterification occurs simultaneously at elevated temperatures and pressures. "The actual temperature and pressure depend on how fast you want the reaction to take place, and the feedstock," Wendorf says. The fuel goes through a polishing state at the back end, although no chemicals or water washing are required. "We have no waste stream," he adds. "No glycerin is produced."

Ground breaking on the commercial-scale plant took place in February 2008 with the building and equipment installation completed by July, after which system testing began. Wendorf is confident that the commercial-scale reactors coming on line this summer will work as well as the slightly smaller reactors in the pilot system. In two years of testing at the pilot scale, the Mcgyan process converted a wide range of feedstocks to biodiesel meeting ASTM specifications. He reports the company has a number of potential licensees looking at installing 10 MMgy to 30 MMgy capacities, and the company is currently engineering a reactor with production capacity at 10 MMgy.

Susanne Retka Schill is assistant editor of Biodiesel Magazine. Reach her at sretkaschill@bbiinternational.com or (701) 738-4922.

© 2009 BBI International