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Fuels for a cleaner future

It may be an overused saying, but there really is no substitute for experience, especially in the burgeoning new world of synthetic fuels production. That mantra sits especially comfortably at one of Louisiana's newest establishments, Dynamic Fuels, LLC, where a little local knowledge goes a long way, Andrew Pelis finds



Dynamic Fuels, LLC, based in Geismar, Louisiana, is a 50/50 joint venture between Arkansas conglomerate Tyson Foods, Inc., and Syntroleum Corporation out of Tulsa, Oklahoma. The two parties have forged a partnership to build upon the growing area of renewable synthetic fuels aimed to produce energy in a manner that reduces life-cycle greenhouse gas emissions, while building forward-compatible renewable fuels infrastructure. The site currently being built in Geismar will represent North America's first commercially sized renewable, synthetic diesel fuels plant.

Synthetic fuels are one of the few economically viable and industrially scalable alternatives to petroleum capable of providing a major source of the liquid transportation fuels required to run the economy, and a potential new source of aviation fuel.

The plant is configured to produce diesel fuel but could switch to production of aviation fuel when aircraft are certified to use the synthetic fuel and pricing is competitive with diesel, according to plant manager Don Duga. "Dynamic Fuels can provide diesel fuel and is poised to supply jet fuel when the market becomes a reality. We're under construction and will soon be operational, so our priority remains the successful transition from pilot scale to full commercial operation. We expect to be mechanically complete in May and become fully operational throughout the summer months," he explains.

"The plant in Geismar is a commercial production facility," Duga continues. "It's not set up to do research and development; all our R&D is conducted at Syntroleum's laboratories and pilot facilities. We're just going to focus on producing our synthetic diesel initially and continue working closely with those markets to transition us into the jet fuels markets."

Experience comes to a large extent from location, according to Duga, who comes from a chemical background and most recently worked at starting up ethanol plants. He says that with so many refineries in this part of the country, he has been able to hire a team of experts with most bringing 10 or more years of petrochemical knowledge to the fledgling operation.

"At this stage our priority is to ensure that everything is installed correctly, that all the maintenance and quality processes are in place, and that all my staff are properly trained in the new process and clearly understand the importance and focus required for operating a safe and environmentally responsible facility," Duga says. "We're now fully staffed, and we've been very fortunate

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convert to an isoparaffin. The remaining steps are the standard fractionation process," Duga explains.

"The primary product is the synthetic diesel fuel, which can be sold as a blend for refineries to satisfy their RFS [Renewable Fuel Standard] requirements or can be used neat, meaning that it can go directly into any diesel engine from the pump at 100 percent, but we also produce naphtha and liquid petroleum gas [LPG]. As non-fossil fuels, our products are much cleaner burning and contain less than one part per million of sulphur. Our fuel generates 74 percent less greenhouse gas than burning a gallon of petroleum-based diesel."

"The pioneering technology we use was devised by Syntroleum and is known as Bio-Synfining," Duga says. "A couple of years ago, Syntroleum was talking to suppliers of animal fats as it began to commercialize its technology, and Tyson, who already had a renewable fuels division, decided it would rather be a partner than just a supplier."

According to Duga, a large proportion of the investment on site went into purchasing high-pressure reactors, heat exchangers and reciprocating compressors, which are all standard capital in the refinery business for pumping hydrogen up to high pressure levels and cracking animal fat molecules.

"In 2008, at the time the site was being designed, lots of refineries were retrofitting their plants, and there was not much shop space available for our equipment, so we ended up purchasing some equipment from Korea and India," he says.

Duga is looking no farther ahead than the start of production right now, but he says that Dynamic Fuels is currently utilizing only about half of the 25-acre site it has leased, offering plenty of scope for further development. The plant is designed to produce a nominal 5,000 barrels per day or approximately 75 million gallons per year of finished product.

Such a large-scale production is bound to throw up opportunities to improve efficiency, but Duga says that will take time to establish. "Post scale-up, we can look at how efficient our processes are, and I feel confident that with the experience we've brought in, we can look at improvements when we're fully functional. Similarly, our approach to quality control may change in time, and we know what process parameters we can change to alter the quality results that we generate." Asked if ISO accreditation was a goal for the future, Duga responds, "ISO is customer-driven, and if our customers require it, then it could be a route we might take in the future."

Of course, with production comes waste, or in the case of Geismar, wastewater specifically. "Once

that nearly all of our operators came here with prior knowledge of hydro-treating and refinery operations experience. Those that haven't worked in refineries have extensive chemical or ethanol process experience.

"The main focus at this point is to make sure that our process runs as designed," Duga adds. "We already have agreements in place with local companies to deliver many of our raw materials. We're in the final stages of setting up our service agreements while currently negotiating with potential customers ahead of production."

Producing the fuel, he says, is a three-step process that requires a very reliable supply of hydrogen, which is conveniently close at hand at nearby Praxair. Indeed, proximity to suppliers and customers was a primary consideration in the joint venture's selecting Geismar as the base for its nearly \$170 million project.

"We use a mixture of low-cost feedstocks delivered to the plant by a combination of rail and truck, and we react it with hydrogen to restructure the molecule to produce a normal paraffin, and then continue the process to

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we produce some of our first quantities and know specifically the concentrations of the by-products we're dealing with, we can then determine the magnitude of recycling. You can be assured that recycling is part of our improvement plan going forward," adds Duga.

The Dynamic Fuels story might just be getting started, but next year the target is to produce approximately 62 million gallons of diesel, about 7 million gallons of naphtha, and about 6 million gallons of LPG. At a time when the environment has never been more on the nation's conscience, it's good to know that hard work, ingenuity and experience are helping to secure a cleaner future. www.dynamicfuelsllc.com

