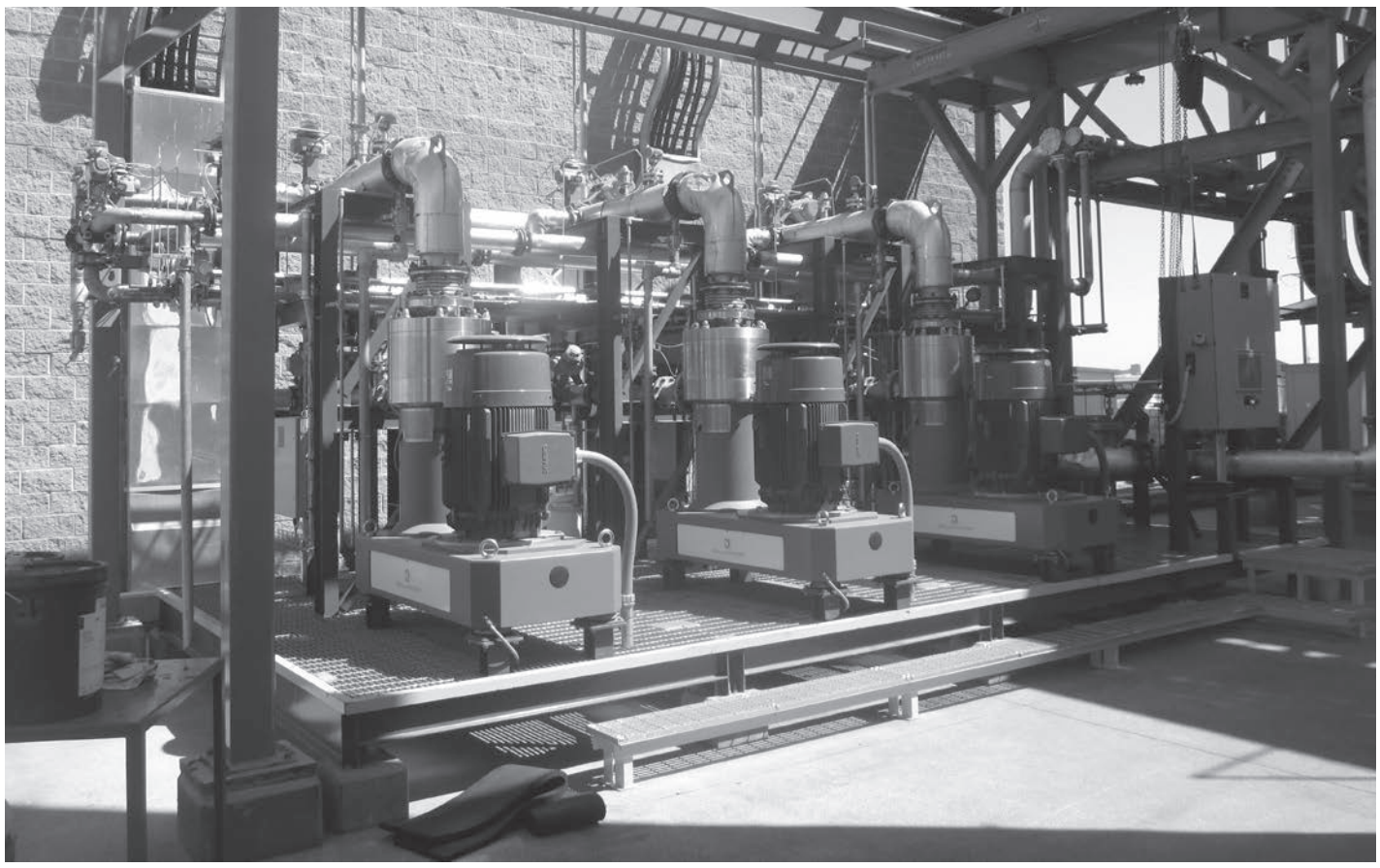

Contributed | **Edeniq's proprietary Pathway Technology utilizes high-shear milling equipment called a Cellunator to convert corn-kernel fiber, a by-product of corn-based ethanol production, into cellulosic ethanol.**

Landmark EPA approval paves way for low-cost cellulosic ethanol production

George Lurie – STAFF WRITER

In a first-of-its-kind ruling, the U.S. Environmental Protection Agency (EPA) has approved Pacific Ethanol's registration of its Stockton ethanol plant to generate valuable credits by producing cellulosic ethanol with the same equipment the company uses to produce corn-based ethanol.

The EPA approval now allows Pacific Ethanol to generate so-called "D3 RINs" (Renewable Identification Numbers) using proprietary technology from one of its partners, Visalia-based Edeniq.

"This approval is a landmark for the ethanol industry and our company," said Brian Thome, president and CEO of Edeniq, which is privately held and focuses on developing biorefining technology for cellulosic ethanol.

"This [approval] opens the door for low-cost production of cellulosic ethanol from corn kernel fiber in existing fermentation vessels," Thome added.

"While we have long heard that cellulosic ethanol will be here in five to ten years, Edeniq's Pathway Technology for profitably producing cellulosic ethanol is here today," Thome said.

"A 120 million-gallon-per-year corn ethanol plant can increase its revenue by up to $10 million or more through integration of Pathway, with very little investment and a less than one-year payback," Thome added.

Edeniq's technology will allow Pacific Ethanol to significantly increase yields and Thome called the EPA approval "a game-changer for the cellulosic ethanol industry."

Up to now, most cellulosic ethanol makers have focused on investing in new plants, but Edeniq's Pathway Technology is the "lowest-cost solution" for producing cellulosic ethanol from corn kernel fiber utilizing existing fermenters at corn ethanol plants, Thome said.

Edeniq — pronounced ee-den-ic — has been in business since February 2008. The company, which has several pilot plants at its facility on Shirk Road, has 20 employees in Visalia as well as six others working in a branch office in Omaha, Nebraska.

The company is an offshoot of Altra Biofuels, a now-defunct South Valley-based operation that at one time produced ethanol at the Western Milling plant in Goshen. Thome, 43, a Nebraska native and former banker, succeeded company founder Larry Gross and has run Edeniq since 2010.

Amid California's nation-leading push to combat climate change, Edeniq has established itself as an industry leader in developing analytical methods to quantify cellulosic ethanol co-produced with conventional ethanol during fermentation. The methods allow Edeniq's refining partners to tap into regulatory value including D3 RINs, California Low Carbon Fuel Standard credits and the Second Generation Biofuel Producer tax credit.

The EPA classifies renewable fuels in a number of value-based categories. D3 RINs, awarded to producers of cellulosic ethanol made from non-food biomass, are considered more valuable than D4 (biomass-based diesel), D5 (biodiesel and sugarcane ethanol) and D6 (corn-based ethanol) RINs.

Only renewable fuels produced from renewable biomass material qualify for RINs, which are saleable regulatory credits.

Edeniq's proprietary Pathway Technology utilizes high-shear milling equipment called a Cellunator to convert corn-kernel fiber, a by-product of corn-based ethanol production, into cellulosic ethanol.

In December 2015, Pacific Ethanol began producing cellulosic ethanol with Edeniq's pathway Technology at its 60 million-gallon-per-year Stockton plant.

"The EPA-approved registration for generating cellulosic ethanol and D3 RINs is an important milestone in our strategy to be a leading producer of cellulosic ethanol," said Neil Koehler, Pacific Ethanol's president and CEO.

Going forward, Koehler said he expects to produce over one million gallons per year of cellulosic ethanol at the Stockton facility.

"We're really excited about this development. It's something we've been working towards for years," said Lily Wachter, Edeniq's chief financial officer. "This is going to be a huge source of incremental revenue" for Pacific Ethanol's Stockton plant.

With the high-value D3 RINs, the carbon credit under California's Low Carbon Fuel Standard and the federal Second Generation Biofuel Producer tax credit, Koehler said he believes cellulosic ethanol production will "materially contribute to the profitability of our Stockton facility. As we confirm and optimize our cellulosic ethanol production process, we will look toward expanding this to other Pacific Ethanol plants," he added.

In addition to its flagship Stockton facility, Pacific Ethanol, which trades on the NASDAQ under the ticker PEIX, also operates biorefineries in Madera, Oregon, Nebraska, Idaho and Illinois.

In July 2015, Pacific Ethanol acquired large Midwestern ethanol manufacturer Aventine Renewable Energy, significantly boosting the company's production capacity and making Pacific Ethanol the sixth-largest U.S. ethanol producer.

The ability to now leverage Edeniq's technology to further increase production lifted Pacific's stock about 8 percent after the EPA approval was announced.

"Our Pathway Technology offers a very attractive value proposition for every plant configuration," said Cam Cast, chief operating officer at Edeniq. "Customer interest is very strong right now, and market adoption of our technology in the U.S. alone could add over 300 million gallons per year of cellulosic ethanol."

"We are excited to be working with ethanol plants on several new commercial trials in addition to previously announced licenses," Cast added. "Things are moving very quickly now. Our team is inside plants on a weekly basis working side-by-side with our customers, and our pipeline continues to grow. We particularly want to thank the Pacific Ethanol Stockton plant for their partnership in commercializing the Pathway Technology."

Edeniq officials also confirmed the company recently closed a financing round to support an accelerated rollout of the Pathway Technology.

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Renewable fuel standard, explained

Congress created the renewable fuel standard (RFS) program in an effort to reduce greenhouse gas emissions and expand the nation's renewable fuels sector while reducing reliance on imported oil.

The RFS program was authorized under the Energy Policy Act of 2005 and expanded under the Energy Independence and Security Act (EISA) of 2007.

Renewable identification numbers (RINs) created by the program are credits used for compliance, and are the "currency" of the RFS program.

- Renewable fuel producers generate RINs
- Market participants trade RINs
- Obligated parties obtain and then ultimately retire RINs for compliance

The Clean Air Act requires EPA to set the RFS volume requirements annually. The annual standards are based on the statutory targets.

EISA's four renewable fuel standards are "nested" within each other. This means that the fuel with a higher GHG reduction threshold can be used to meet the standards for a lower GHG reduction threshold. For example, fuels or RINs for advanced biofuel (i.e., cellulosic, biodiesel or sugarcane ethanol) can be used to meet the total renewable fuel standards (i.e., corn ethanol).

*Source: EPA