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The Cellulosic-RIN Revolution

Expanded cellulosic fuel pathways have led to a surge of biogas-based fuel credits, and producers are taking advantage of a significant boost to project economics.

By [Katie Fletcher](#) | March 02, 2015

Traditionally, the biogas project end market has been the sale of power to the grid, but transportation fuel may become the new end use of choice. Conversion of biogas into compressed natural gas (CNG) and liquefied natural gas (LNG) is now frequently considered when penciling out project financials, and not without reason. The volume of biogas-based transportation fuels used for compliance with the renewable fuel standard (RFS) has increased. As a recap, last July the U.S. EPA expanded cellulosic fuel pathways to include CNG and LNG from biogas created in landfills, municipal wastewater treatment plant (WWTP) digesters, agricultural digesters and separated municipal solid waste (MSW) digesters. A booming volume of cellulosic renewable information numbers (RINs) from renewable CNG and LNG pursued the ruling, and as a result has increasingly shown the potential for biogas as a source of transportation fuel.



CR&R Environmental Services is implementing German-based Eisenmann's biogas technology for its project in Perris, California. The high-solids anaerobic digestion system employs a continuously fed, horizontal plug flow design. PHOTO: CR&R ENVIRONMENTAL SERVICES

According to the EPA, the net number of cellulosic biofuel or (D3) RINs generated in 2014 was nearly 33 million. EPA's RFS2 data for the total production of biogas-based transportation fuel in 2014 by total volume in gallons and total quantity of RINs was nearly 15 million for CNG and over 17 million for LNG. In December alone, 8.5 million D3 RINs, the highest reported number for any single month in 2014, were generated.

Needless to say, biogas-to-fuel project activity is increasingly occupying the industry. Many, if not all, developing biogas projects that chose transportation fuel over power as the end product, did so because of the opportunity to generate RINs. In fact, some say the reason was, "100 percent," says Mike Silva, civil engineer and project manager with CR&R Environmental Services. "RINs and LCFS (low-carbon fuel standard) credits really helped us make the decision to go to transportation fuel versus electricity."

Expanding Compressed Potential

Southern California-based CR&R is a recycling and waste collection company that is in the process of building a biogas-to-fuel project, which "when it's all built out it will be the largest in the world," Silva says.

The estimated \$30 million capital cost of the project includes a number of components through a four-phase build out. The project broke ground at the end of June in Perris, California, and the first phase is scheduled to be completed this July. Each phase is designed to handle a capacity of 83,600 tons per year of municipal organic wastes, making full build out capacity nearly 335,000 tons per year. The commissioning of phase two is scheduled to commence within a few months, even before phase one's completion, and Silva expects both phases will be completed and operating by the close of the year. The remaining two phases will be subject to acquiring additional contracts to justify construction, but if all goes as planned the entire complex's anticipated completion will fall within the next three years.

The project stands on part of a 52-acre site where CR&R's waste and recycling facilities are located. A little over 9 acres of space is dedicated to the anaerobic digestion (AD) facility currently under construction on the site. The digester's infrastructure was just completed at the end of January, and according to Silva, the company will begin installing Eisenmann's digester technology over the next few months.

According to Silva, the digester will create between 450 and 500 standard cubic feet per minute (scfm) of biogas from phase one, which will then be converted in this phase into 1 million gallons of diesel gallon equivalent (DGE) renewable natural gas (RNG) per year. Initially these gallons are fueling 70 CR&R collection vehicles, and, when all is said and done, Silva estimates about 150 CNG vehicles will run on the fuel. CR&R already has a CNG slow-fill fueling station, and three facilities using the renewable fuel.

The gas conditioning system is supplied by Greenlane Biogas. The system uses water scrubbing and other advanced technologies to clean raw biogas to vehicle and pipeline quality gas. Once subsequent phases are completed, CR&R will have the capacity to inject the upgraded biogas into the Southern California Gas pipeline. "When the whole thing is built out we'll have the capacity to produce 4 million DGE," Silva says. "I can probably use about a million of that onsite, so down the road 3 million DGE will go into the pipeline."

The multimillion dollar project has received assistance with state grants. The first phase of the project received about \$5 million in grants, including \$4.5 million from the California Energy Commission, and another \$500,000 from the California Air Quality Management District. Subsequent to these grants, CR&R applied for grants on phase two, and was awarded a \$3 million grant from CalRecycle, which Silva says primed the pump for this phase. The company has also been awarded a contract with the city of Los Angeles, which has yet to be finalized.

The potential to produce 4 million DGE of CNG gives CR&R not only the ability to utilize the gas in its CNG-collection vehicles, but also to generate cellulosic RIN and LCFS credits. "Our research indicates that it is not cost effective to make electricity," Silva says. "If you can make vehicle fuel, and you can use vehicle fuel, that is the highest and best use in our analysis and market."

The City's Future

While CR&R's CNG project will utilize MSW-digester gas, a project that recently broke ground in Colorado will utilize biogas from an existing digester at the Persigo WWTP in Grand Junction. The determining factor in whether to undertake this type of biogas project is again, RINs. City of Grand Junction officials say without RIN generation, the costs of infrastructure could not be recouped during the life of the project. The project development company, BioCNG LLC, echoes the reasoning of the city regarding the opportunity to generate RIN credits. "I think that makes a big difference in somebody pulling the trigger and actually doing one of these," says Steve Wittmann, senior client manager with BioCNG. "Some clients say that they're going to look at the project financials without RINs, and not rely on the government program to make the project go forward, and then the RINs are just gravy on top, but everyone that gets into these projects looks at the RINs as a significant piece of revenue coming out of them."

The launch of this project occurred in December, after Grand Junction chose BioCNG to install a biogas conditioning system and gas pipeline to the WWTP. The conditioning system will produce about 500 gallons of gasoline equivalent (GGE) per day from 100 scfm of biogas, which will be channeled in a nearly 6-mile pipeline to an already existing CNG slow-fill fueling station upon its anticipated completion in April.

The fueling station also includes a fast-fill component privately owned by Monument Clean Fuels to meet the fueling needs of the public. Gas at the site currently comes from the public utility gas distribution system, but once the biogas connection is made will only be used in the event that there is not enough biogas to meet fueling needs. This fueling station is expected to serve 38 city-owned CNG vehicles by the end of the year, including utility trucks, pickup trucks, cars, street sweepers, dump trucks, refuse trucks and Mesa County-owned Grand Valley Transit bus fleet. The city presently has 28 vehicles, and plans to convert eligible fleet vehicles over to CNG as vehicles are replaced.

According to various city representatives, the vision is for Grand Junction to become the most livable community west of the Rockies, and this is why the city decided to pursue a project to capture and utilize the excess biomethane gas that is currently flared off at the WWTP. According to Don Tonello, wastewater services manager, the WWTP produces 120,000 cubic feet per day (cfm) of methane, 16 percent of which is used to heat the digester process, but 100,000 cfm is flared or wasted into the atmosphere. This amount is equivalent to 400 gallons of fuel a day. Upgrading the flared gas to CNG will result in offsetting 146,000 gallons of liquid fuel per year, enough to fuel 263 vehicles, and a total carbon dioxide reduction of 2.8 million pounds per year. Besides fueling the vehicles, BioCNG is adding a separate pipeline to the WWTP boilers so that the CNG can be used in lieu of natural gas, if desired, because it has a similar Btu value.

Besides utilizing a once-wasted resource, city representatives say the project will bring significant economic benefits. The financial plan for the project assumes a RIN credit and the city fleet and the county-operated bus system purchasing the fuel at \$1.50 per gallon equivalent. The city paid an average of \$3.28 per gallon for diesel fuel last year.

The \$2.8 million project will be jointly owned by the city of Grand Junction and Mesa County, Colorado.

The Larger Picture

The Persigo biogas project is BioCNG's seventh CNG project to date. All of the sites have the ability to generate RINs. Two of its projects are adding an additional BioCNG system to increase total fuel production. One such project is with Louisiana's St. Landry Parish Solid Waste District. The solid waste district is expected to add an additional BioCNG system and fueling station by October, expanding its RNG production capacity from 250 GGE of CNG per day to between 700 and 750 GGE per day. One end user is the St. Landry Parish sheriff's department fleet. "Interest in BioCNG for fleets has increased substantially over the last several years," Wittmann says. "The ability to lock in fuel prices is appealing to municipal and private fleets across the country. RINs increase the value of a BioCNG project as they bring overall fuel costs down. BioCNG is economically feasible, better for the environment, and CNG vehicles run quieter than diesel vehicles."

BioCNG was created specifically to work in the biogas market making CNG fuel, and there are a number of other developers who focus their expertise on converting biogas to fuel. For instance, CR&R's AD project isn't the only activity Greenlane Biogas has had this year. Mid-December, Colony Energy Partners Tulare LLC selected Greenlane to provide the upgrading technology to its proposed biogas project in California. The project is estimated to produce 2.8 million DGE each year, displacing diesel-fueled trucks in the San Joaquin Valley. "The highest-value market use is CNG," says Matt Schmitt, Colony Energy Partners vice president of project development.

Greenlane and BioCNG are joined by companies both developing upgrading technology, and performing natural gas vehicle conversions. Natural gas vehicle models are also being produced for purchase by Honda, Ford, GM, Chrysler and others. Although there have been multiple, effective biogas-to-fuel projects, and more on the horizon, the end use has to exist for continued success. "I think the projects that make the most sense are projects where an owner already has a fleet of vehicles, or has access to a fleet of vehicles, that are currently running on CNG," Wittmann says. "Being able to use the gas to fuel your own vehicles or identifying a fleet partner to purchase the fuel is a key component to a successful project."

Successful projects have an end use for the gas, as well as fueling infrastructure, which is currently one of the impediments with these ventures. Many projects have one fueling station. The St. Landry Parish project had only one fueling station at its landfill, and thus decided to build another 15 miles away to provide a more convenient location for the public to access the fuel. Limited infrastructure is one challenge, as well as associated costs. Investments must be made into gas upgrading technology, as well as natural gas vehicle conversions or new vehicle purchases. Even so, renewable CNG and LNG are low-cost, domestically produced transportation fuels, with proven, multidimensional benefits if the right components are in place. Silva speaks for his team at CR&R when he says, "we believe that this project we're building is the most cost-effective, environmentally intelligent and sustainable organic management solution."

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