

Argonne, Energy Vision case studies show success of C-RNG

By NGO Energy Vision | February 02, 2018

The U.S. Department of Energy's Argonne National Laboratory and the sustainable energy NGO Energy Vision recently released two case studies assessing the results of pioneering projects that were among the first to produce renewable compressed natural gas (R-CNG) vehicle fuel, by using anaerobic digesters to capture the biogases from decomposing organic waste.



Energy Vision and Argonne produced the studies jointly. One study looks at Fair Oaks Farms, a large dairy cooperative in Indiana with roughly 36,000 cows. It converts manure to R-CNG using a large anaerobic digester, and uses the fuel to power its milk tanker trucks. The other study assesses the Sacramento BioDigester, the first food-waste digester in California to turn commercial organic waste into R-CNG vehicle fuel using anaerobic digestion.

“These projects are trail blazers, and their experience bodes well for the future of renewable natural gas,” said Matt Tomich, president of Energy Vision and co-author of the case studies. “Their success can serve as models for other places with large organic waste streams, which is virtually every urban and rural setting in the country.”

Nationwide, renewable natural gas has grown over 70 percent annually in recent years—facilitated by inclusion in the EPA's Renewable Fuel Standard (RFS2), which sets a minimum volume for the amount of renewable fuel that must be used in the transportation sector. Renewable natural gas production for transportation totaled 151 million gasoline gallon equivalents in 2017, up from 125M GGEs in 2016 and 90M GGEs in 2015.

R-CNG derived from organic waste is chemically similar to geologic compressed natural gas (CNG), and can be used in the same applications—heating or cooling buildings, generating electricity, or fueling vehicles. But unlike fossil CNG, it's a fully renewable fuel. According to Argonne National Labs GREET model, R-CNG produced from anaerobic digestion of food waste is net-carbon negative over its lifecycle, including production, use and avoided emissions. That means making and using it actually results in lower atmospheric GHG than if the fuel were never made or used. R-CNG derived from a food waste digester meets or exceeds international goals of reducing GHG emissions 80 percent from 2005 levels by 2050.

“R-CNG can achieve the greatest GHG reductions of any transportation fuel today -- 70% or more as compared to gasoline or diesel,” said Marianne Mintz of Argonne National Laboratory’s Energy System Division, who co-authored the case studies.

R-CNG also saves on fuel costs and allows truck and bus fleets to operate more quietly and efficiently, generating fewer pollutants that threaten public health. Compared to diesel, it reduces carbon monoxide up to 70 percent, nitrous oxide up to 87 percent, and particulate matter up to 90 percent, as well as reducing noise up to 90 percent.

Fair Oaks Farm’s digester generates enough R-CNG to displace some 1.5 million gallons of diesel, and to cut annual GHG emissions by 19,500 tons CO₂e. That’s a 43 percent reduction in carbon emissions per gallon of milk, a selling point that helped the company negotiate an exclusive supply agreement with the national grocery chain Kroger.

The Sacramento BioDigester was built by a public-private partnership in 2013. Atlas Disposal and other haulers collect the organic wastes from area businesses and deliver it to the digester, which produces enough R-CNG to displace 500,000 gallons of diesel a year and divert up to 40,000 tons of organic waste from landfills. Atlas’s subsidiary ReFuel Energy Partners uses that R-CNG to power its 30 natural gas powered refuse trucks. Atlas is committed to converting its entire refuse fleet to natural gas as older diesel vehicles retire.