

EPA approves RFS fuel pathway for biomass gasification project

By Erin Voegelé | May 22, 2020

The U.S. EPA in May approved a fuel pathway under the Renewable Fuel Standard for a biomass gasification plant under development in McFarland, California, that will produce renewable natural gas (RNG) for sale into the transportation fuel market.

The project, known as the San Joaquin Renewables plant, is currently majority owned by Frontline BioEnergy, a company that has been active in the bioenergy space for approximately 15 years.

Frontline BioEnergy first started up a commercial-scale biomass gasification plant at Benson, Minnesota-based Chippewa Valley Ethanol Co. LLPP's corn ethanol plant in 2008. That system converted up to 110 tons per day of wood residues into syngas that was burned in place of natural gas at the biorefinery.

T.J. Paskach, president of San Joaquin Renewables and chief technology officer of Frontline BioEnergy, said that Frontline has been working since that time on advancing its gasification and downstream technologies. The company has been operating a pilot plant for more than a decade and has patented several new technologies. The San Joaquin Renewables project is the culmination of that development work, he said.

The U.S. EPA in 2014 published regulations allowing RNG fuels to qualify as cellulosic biofuels under the RFS and generate D3 RINs. California also allows RNG to be used to meet the requirements of its Low Carbon Fuel Standard. Paskach said those developments are what have made it economically possible to develop the San Joaquin Renewables project.

Compressed RNG and liquefied RNG currently make up the vast majority of cellulosic fuels produced under the RFS. To date, RNG has been produced by upgrading biogas produced via either anaerobic digestion or captured from landfills. Animal manure and food waste are some of the materials currently used as feedstock in anaerobic digestion facilities. The technology employed by the San Joaquin Renewables plant, however, will allow woody biomass and other un-digestible feedstocks to be used to produce RNG through a thermochemical pathway.

The San Joaquin Renewables facility will take in orchard wood residue and almond and pistachio shells as feedstock and produce compressed RNG. According to the EPA's pathway approval document, the plant will employ a proprietary gasification process that uses steam generated from process heat and oxygen produced by an air separation unit to convert biomass feedstock into syngas, biochar and ash. The syngas is upgraded to remove contaminants and converted to methane. Water and carbon dioxide are removed to produce commercial-quality compressed RNG. Excess heat generated by the process is converted to electricity for use by the facility, thus reducing the total amount of power consumed by

Table 3: Lifecycle GHG Emissions for CNG Produced Through the San Joaquin Renewables Pathway (kgCO₂e/mmBtu)¹⁹

Lifecycle Stage	San Joaquin Renewables Pathway	2005 Diesel Baseline
Feedstock Collection & Transport		
Avoided Wood Burning	-161	
Avoided Shell Aerobic Decomposition	-48	
Wood Chipping	1	
Wood and Shell Transport	1	
Gasification & Upgrading		79
Material Inputs	1	
Feedstock Gasification	113	
Energy Use	31	
Co-Products	2	
Downstream		
Compression & Distribution	4	
Tailpipe	60	18
Net Emissions	4	97
Percent Reduction Relative to Baseline	96%	--

the plant. An air separation unit provides oxygen for the gasification and nitrogen for inert gas needs, and also produces excess nitrogen. Biochar, liquid nitrogen and argon may be produced as coproducts. Paskach noted the Frontline gasification platform can also be integrated with other downstream processes to produce biobased chemicals, such as methanol and its derivatives.

The EPA's analysis determined that fuel produced at the San Joaquin Renewables facility will achieve a 96 percent lifecycle greenhouse gas (GHG) reduction when compared to the 2005 diesel baseline emissions.

According to Paskach, the company also plans to apply for a California LCFS pathway. The plant has been under development for approximately two years. Paskach confirmed the company has selected a site for the plant and noted feedstock supply and fuel offtake agreements are already in place. He was unable to share a specific target date for the start of construction. Once construction starts, however, he expects it will take approximately 18 months to build the plant. The nameplate capacity of the facility will be approximately 5 million standard cubic feet of RNG per day.

Paskach said Frontline BioEnergy hopes to build additional, larger plants in the future, as demand for RNG fuels increases. He said a robust RFS and additional state-level programs like California's LCFS would help create demand for RNG-based transportation fuels and support the development of more biorefineries.

A full copy of the San Joaquin Renewables RFS pathway can be downloaded from the EPA website.