

GAS PROCESSING AND NRU SOLUTIONS HELP LANDFILLS SAY FAREWELL TO FLARING

BCCK PARTNERS WITH ARCHAEA ENERGY TO DEVELOP THE WORLD'S LARGEST HIGH-BTU LANDFILL GAS-TO-ENERGY PLANT

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An Aerial View Of A NiTech Style III Nitrogen Rejection Unit (NRU)



A NiTech Style III Tower

BCCK Holding Company (BCCK), an engineering, procurement, fabrication, and field construction services company, will provide Archaea Energy, a developer of renewable natural gas resources, with a 13,700-scfm (388-m³/min.) Style IV NiTech Nitrogen Rejection Unit (NRU). In addition to the NRU, BCCK is providing Archaea with oxygen and carbon dioxide (CO₂) removal systems and residue compression that will be integrated with the remainder of the gas plant being provided by Archaea Energy. BCCK's NRU and associated equipment will operate at Archaea's Assai facility located at the Keystone Sanitary landfill in Dunmore, Pennsylvania. With natural gas production of 12,000 MMBtu/d, the Assai project is expected to be the largest high-Btu landfill gas (LFG)-to-energy plant in the world.

LANDFILL METHANE EMISSIONS ARE A BIG PROBLEM

According to the US Environmental Protection Agency (EPA), municipal solid waste landfills contributed about 15% of human-related methane emissions in 2018, roughly equivalent to the greenhouse gas (GHG) emissions of 20.6 million passenger cars or 11 million US homes. Landfill emissions primarily come from LFG. A natural byproduct of the decomposition of organic material, LFG consists of about 50% methane and 50% CO₂.

One option is to flare LFG, which costs money and is harmful to the environment. Another solution is to turn LFG into useful energy, also called renewable natural gas (RNG), by either increasing its methane content or removing non-methane components. Archaea's Assai facility is the latter option. By removing non-methane components, it will create RNG that can be used for pipeline quality gas, compressed natural gas (CNG), or even liquefied natural gas (LNG). "Landfill renewable natural gas projects are becoming increasingly common worldwide," said Fraser McDowell, director of strategy and business development for renew-

ables at BCCK. “In the United States, landfill renewable natural gas projects are categorized as ‘renewable’ projects. Therefore, government subsidies and carbon credits are available to help make the projects even more economically attractive. As a result of BCCK’s track record in cryogenic gas processing, and specifically nitrogen rejection over the past 40 years, BCCK’s technology was the obvious choice for the project. Our NiTech NRU is just one part of the high-Btu gas plant being installed in Pennsylvania, and we are very proud to be a critical part of a facility that will contribute toward the global effort to reduce greenhouse gas emissions.”

NITECH NITROGEN REJECTION UNIT

BCCK’s NiTech NRUs are engineered in-house and fabricated at BCCK’s fabrication facility. They play a role in transforming LFG into useful energy. According to BCCK, its NRUs deliver less footprint and less compression requirements (in terms of horsepower) for lower cost than alternative solutions.

“Most nitrogen rejection technologies typically associated with landfills are not economically scalable to the larger landfills and require more compression, which translates directly to higher operating expenditures [opex] and capital expenditures [capex],” said McDowell. “BCCK’s NiTech NRUs feature a simple process design comprised of only a few major components, which requires minimal operator attention, a smaller footprint, and provides an overall more efficient and cost-effective solution when compared to other technologies.”

The NiTech NRU has been around for more than 30 years. The Style IV is its latest update and features a modular skidded design that can adjust to compositional changes or flow capacity changes. According to BCCK, it also has lower required horsepower compression and higher recovery. “In 2020, BCCK celebrated two major milestones,” said McDowell. “First, we celebrated our 40th year in business and, second, we completed the construction of our 30th NRU. The NiTech Style IV NRU being provided to Archaea is fully capable of the high recoveries seen previously in the Style III, but the Style IV also reduces overall emissions. With improved efficiencies on residue gas compression, NiTech Style IV can be modified to produce LNG from the incoming gas and can be customized to extract any incoming helium.”

According to BCCK, NiTech technology is not constrained by a low-mole percentage of nitrogen, which prevents a recycle stream and can increase opex. One of the seven basic units of measurement, the mole is the *Système Internationale* (SI) unit of the amount of substance, which can be an atom, molecule, ion, or electron. The NiTech NRU can process inlet gas to less than 1.0 mole percentage, allowing BCCK to slipstream and further reduce costs. The ability to handle a substance that contains varying concentrations of nitrogen (varying mole percentages of nitrogen) helps the RNG generated by the NRU meet downstream pipeline specifications. The NiTech process does not emit non-methane volatile organic compounds (VOCs), making it an environmentally friendly solution.

BCCK’S PROJECT UPDATES

The Assai project is the latest facility to showcase BCCK’s gas processing and NRU solutions, and it marks the third notable project in just a few years. “In 2018 we were part of



A NiTech Processing Skid

another renewable natural gas project when we completed a 7.5-MMscf/d [$2.1 \times 10^5\text{-m}^3\text{/d}$] NiTech Style III NRU, which was installed at the H.W. Hill Landfill Gas Project, located at the Roosevelt Regional Landfill in Klickitat County, Washington,” said McDowell. “In 2020 we completed our 30th NRU when we built and installed a 100-MMscf/d [$2.8 \times 10^6\text{-m}^3\text{/d}$] NiTech Style III NRU in West Texas for Energy Transfer. Additionally, we are continuing our efforts to expand our NiTech NRUs at landfill sites across the United States where our technology can be installed to upgrade the gas. BCCK’s NRU technology is an optimal fit for landfills with flow rates starting at approximately 3000 scfm [$85\text{ m}^3\text{/min.}$] with no constraints for the maximum flow rates. We are seeing a significant number of requests for NRUs at high-Btu plants across the United States.”

ARCHAEA’S NATIONWIDE ASPIRATIONS

Founded in 2018 and based out of Pennsylvania, Archaea is aggressively developing seven projects throughout the United States with the goal of reducing GHG emissions from existing natural gas infrastructure. Six of the seven projects aim to produce a combined 21,000 MMBtu/d of RNG, over half of which will be from the Assai plant. The seventh project will utilize gas from two landfills in Newport Beach and Colton, California, to produce 7 tons (6.4 tonnes) per day of hydrogen. Archaea received funding from the Rice Investment Group and Saltonstall & Co. and has partnered with notable institutions, including the University of California (UC) system. Archaea’s Bernie project in San Bernardino County will deliver clean methane to an on-site treatment plant that will turn it into RNG for use on UC campuses.

BCCK’S EXPOSURE TO THE RENEWABLE ENERGY MARKET

BCCK’s decades of experience pair nicely with Archaea’s up-and-coming projects. In recent years, BCCK has been looking to pursue more opportunities within the renewable energy market. The NiTech NRU is a key driver behind this push because it acts as a direct incentive for green infrastructure development in the RNG or landfill gas industry. “BCCK is continuing to further expand our presence in the renewable gas industry, and our patented technology is contributing to the reduction of greenhouse gas emissions,” said McDowell. “We are very excited to be working with Archaea Energy at the largest high-Btu landfill gas plant in the world, while providing the renewable gas market with another landfill gas NRU.” 