

Waukesha rich-burn engines demonstrate fuel flexibility in wet gas application

GE's Waukesha rich-burn engines operate on 1700 Btu/ft³, 99% ethane fuel while still allowing customers to meet stringent emissions standards.



Location

Evans City, Pennsylvania

Engines

VHP Series L7042GSI, F3521GSI

"Waukesha's rich-burn engines are the best option for us, offering the results we needed in terms of low emissions, cost efficiency, operational stability and fuel flexibility."

– Gary Davis, president of Kahuna Ventures



imagination at work

Situation

When Kahuna Ventures LLC was acquiring compressor engines for Keystone Midstream's Sarsen cryogenic processing plant near Evans City, in western Pennsylvania, there were significant challenges facing the project.

The plant has a design capacity of 40MMSCFD and is processing Marcellus gas from wells in the Butler County area. The primary issues considered when commissioning the project were low plant emissions, cost efficiency, engine operational stability and fuel flexibility. Current emission regulations require the company to operate at or below 0.5g BHP/hr NOx.

Most states, including Pennsylvania, are considering even more stringent emissions standards, making it necessary to be mindful of the future.



Solutions

"Waukesha's rich-burn engines are the best option for us, offering what we needed in terms of all those dynamics," said Gary Davis, president of Kahuna Ventures, who has been in the industry for more than 30 years.

Re-commissioned in November 2010, the original Sarsen processing plant was refurbished prior to installation in Pennsylvania. In addition, a de-ethanizer tower with heat exchanger skid and a refrigeration loop were added to the original plant design.

Ralph Lewis, director of operations of Kahuna Operations Management for the Sarsen project, and Davis were instrumental in selecting GE's Waukesha L7042GSI and F3521GSI rich-burn engines for this application, preferring these over lean-burn engines.

"We crafted a solution together that allows us to operate all seven engines on ethane fuel derived from the gas extraction. This also results in zero waste in the manufacturing process."

"We weren't really seeking a non-conventional approach, but the fact that we're using ethane for engine fuel enhanced our collaborative efforts with Waukesha, who supplied the seven engines on a short turnaround," said Lewis.

The six L7042GSI and one F3524GSI rich-burn engines — equipped with standard, three-way catalytic converters and GE's Waukesha Engine System Manager (ESM) control system—are operating at 90% load on 1700 Btu/ft³ fuel consisting of 99% ethane. The engines require only a single input to be changed in the ESM control software to account for the hot, wet fuel. "Obviously, we could have chosen another industrial use for the ethane, but that would have involved finding a customer for the ethane,

storing and transporting it or flaring it. Every step in that decision tree has additional economic and environmental ramifications. Ultimately, ethane is a good fuel if the operator understands how to operate the engines on high-BTU fuel."

Results

"Lean-burn engines could not meet our specifications for this project. With the Waukesha rich-burn engines, we are running at nearly 100 percent 'uptime,' so we're at maximum productivity. As long as we run at 1330 HP and we stay below the slated HP and don't exceed the ethane rating, we're in great shape," added Lewis. "This technology is proven: I've been using it since 1979, and they've been refining it over the years."

"GE's Waukesha VHP GSI series engine has been a proven workhorse in the gas compression industry for many decades. Each engine should reach approximately 40,000 hours (or five years) of operating time before an overhaul is required," according to Bob Schleifer, branch manager of the Ohio office of Kraft Power.

"The company already appreciated the distinct advantage of a rich-burn engine in a Marcellus gas operation. The fact that we are able to help them reduce their total cost of ownership by using the ethane to fuel the engines, and lower their emissions footprint in the process, was an additional bonus for this project," added Schleifer.

Keystone Midstream Services is a joint venture among Stonehenge Energy Resources, Rex Energy Gas Development and Summit Discovery.



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