

Case Study

# Frontier Natural Resources

LNGo™ system installed at the Ten Man compressor facility

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## The Challenge

Increasing natural gas supplies have led to depreciating market value for gas all over the world. In areas like the Marcellus shale formation in eastern U.S., well operators are finding it more economical to leave natural gas in the ground until pricing conditions improve. This has a negative economic impact on stakeholders invested in the region that are looking for greater opportunities and near-term value from natural gas wells.

Due to these prolonged pricing constraints for natural gas, Tenaska Resources, LLC needed to diversify market opportunities for its shut-in natural gas supply. Tenaska was looking for an on-site liquefied natural gas (LNG) facility that could provide new revenue stream for its natural gas by bringing the liquefaction solution directly to the source.

## The Solution

New technologies enable manufacturers to reduce the footprint of gas liquefaction systems and construct smaller, modular systems that can be rapidly deployed to the field so shut-in gas assets can be monetized.

Frontier Natural Resources, an independent natural gas producer based in central

Pennsylvania, is focused on developing conventional and unconventional resources across the Appalachian Basin. Frontier approached Tenaska, the well operator at the Mainesburg field located near Mansfield, and negotiated a deal to monetize the natural gas resources there.

Frontier realizes that shut-in gas limits economic opportunities for well operators and for land owners who lease their land for natural gas production. With this in mind, Frontier assessed several alternatives for improving the economic opportunities for shut-in gas, including compressed natural gas (CNG) and liquefied natural gas (LNG) technologies.

They were looking for a reliable, robust solution to rapidly deploy and commission systems that could densify gas and move it to market in a cost-effective manner. Frontier also wanted a supplier with a successful legacy in the LNG market that would be able to provide exceptional aftermarket service and support.

After evaluating several alternative technologies, Frontier Natural Resources identified the Dresser-Rand LNGo natural gas liquefaction system as the most economical solution to monetizing shut-in gas assets at Tenaska's Mainesburg field.

## Client

Frontier Natural Resources

## Location

Marcellus Gas Field

## Natural gas source

Stranded natural gas

## Product

High-quality LNG

## LNG Use

Engine fuel, LNG storage

## Gas Supply

750,000 cfd  
(21,240 cmd)

## LNG Production

6,000 gallons per day  
(9.5 metric tonnes)

## Power Source

Self-contained power generation

## Engine Exhaust Emissions

NOX g/bHP: 0.1  
CO g/bHP: <0.2  
NMHC g/bHP: <0.2

## Sound Emissions

72 dB(A) at 25 ft (7.6 m)



LNGo system installed at the Ten Man compressor facility.

After the order was placed in May 2016, the Dresser-Rand business' Field Services team supervised the shipment of the LNGo system modules from the Dresser-Rand business' factory in Painted Post, NY, USA to Frontier Natural Resources' Ten Man LNG facility located next to Tenaska's Mainesburg field well. To prepare for installation of the LNGo system, Frontier personnel had to secure necessary permits, install a gas supply line, level the pad, and pour a foundation for the compressor module. By mid-September 2016, the system was successfully producing liquid, just six weeks from the start of commissioning. Today, the LNGo system at Frontier's Ten Man LNG facility is producing an average of 6,000 gallons (9.5 metric tonnes) of high-quality LNG per day.

Produced LNG is stored onsite for transfer to cryo-tankers for transport to market.

Frontier was able to rapidly deploy the gas liquefaction system within a few short months from system deliver to commissioning to meet the growing demand for LNG. The reliability of the LNGo system, combined with a support program from the Dresser-Rand business, provides Frontier personnel with confidence to monetize shut-in natural gas.

#### **LNGo System Benefits**

- Allows stakeholders to monetize stranded gas assets
- Modular components allow LNGo systems to be transported and installed using commercially available trucking services, mobile cranes and local craftspeople
- Rapidly deployable; short cycle time from installation to liquid production
- Service and support ensures system reliability and uptime

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