



Packaging new equipment to displace high OpEx diesel units

Keystone Drill Services
Marcellus Shale, PA



Working with packagers and distributors to help customers lower costs and decrease emissions

GE's distributor Waukesha-Pearce Industries (WPI) sold Keystone Drill Services (KDS) four pilot Waukesha H24SE-EPA engines to displace diesel engines owned by KDS customer Dallas Morris Drilling (DMD). Because the H24SE-EPA runs on field gas available on site,

the new equipment will reduce operating and fuel expenses including issues relating to diesel fuel transport and logistics. The new engine also has lower emissions than diesels typically used in the industry—about 80 % less NO_x production.

With about 1,500 units packaged, KDS is an experienced packager of air drilling rigs with diesel engine drivers. KDS focuses on drilling-related products and services, evaluating each customer's individual needs and customizing a best-fit solution for each application.

Reduced costs and a complete emissions solution

Packagers and end-users long have wanted a "one-stop shop" for gas engines, air-fuel ratio (AFR) controls, and after-treatment systems. GE's new Waukesha models meet that demand by providing a complete emissions solution that includes the three-way catalyst and AFR control systems. This combination of technologies has also led to the availability of EPA mobile and stationary certification on these models.

The Waukesha H24SE-EPA has one of the most advanced control platforms in the segment, with broad protection features and capabilities. Advanced controls technology has improved overall engine performance control and stability, and added knock protection, fault logging, and more. Additional enhancements include extending the life cycle of the cylinder heads, a high efficiency closed crankcase breathing system and a high-altitude turbocharger coupled with a water-cooled wastegate.



For DMD and the end-user, this project delivers a reduction in drilling expense in a time of intense competition and cost control. In addition, it's the first time KDS has packaged natural gas-driven engine air compressors, and it's the first usage of EPA-certified natural gas engines for air drilling applications.

The engines were ordered by KDS in January 2015. The first two units were delivered in June, the third in September, and the fourth in October. Sales and ongoing service support is provided by WPI.

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GE's Distributed Power business is a leading provider of engines, power equipment and services focused on power generation and gas compression at or near the point of use. The business offers a diverse product portfolio that includes highly efficient, fuel-flexible, industrial gas engines, each generating 200 kW to 10 MW of power for numerous industries globally. In addition, the business provides life cycle support for more than 37,000 gas engines worldwide to help customers meet their business challenges and success metrics—anywhere and anytime. Backed by GE's authorized service providers in more than 180 countries, our global service network connects with our customers locally for rapid response to their service needs. GE's Distributed Power business is headquartered in Jenbach, Austria.

www.gepower.com/distributedpower

Customer advantages

- Across the board, significantly lower engine emissions than the diesels typically used in this application
- Significant savings on fuel cost (available field gas vs. diesel)
- Reduced impact to the local communities and environment by eliminating the need to transport diesel fuel to the drilling site
- Advanced controls technology for overall engine performance control and stability, knock protection, logging, etc.
- Reliability improvements on various engine subsystems, including oil cooling, oil filtration, cylinder heads, pre-lube, turbocharger, wastegate, and crankcase breathing
- Significant reduction in engine sound emissions, as much as -20 dBA over diesel
- Controls communication through panel-mounted HMI and GE's ESP software tool
- Advanced control platform with broad protection features and capabilities
- Comprehensive solution – GE carries a complete supply of engines, AFR controls, and GE-branded three-way catalysts
- Extended life-cycle intervals
- Overall estimated cost savings per drilled well: A typical wellpad drilling arrangement of 7 compressors and 2 boosters using natural gas Waukesha engines would cost approximately \$80/hr for fuel, while usage of diesel engines could consume up to \$400/hr of fuel (based on the assumption of natural gas at \$2.50/MMBtu and diesel at \$2/gallon)

Key technical data

Number of units	4 x Waukesha VGF* H24-SE
Continuous power output	415 – 530 BHP (310 – 400 kWb)
Speed range	1400 – 1800 rpm
Emissions	U.S. EPA mobile per 40 CFR Part 1048
Energy fuel source	Shale gas, CNG, LNG, LPG, etc.
Commissioning	October 2015

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