

WAUKESHA ENGINE DRILL RIG POWER



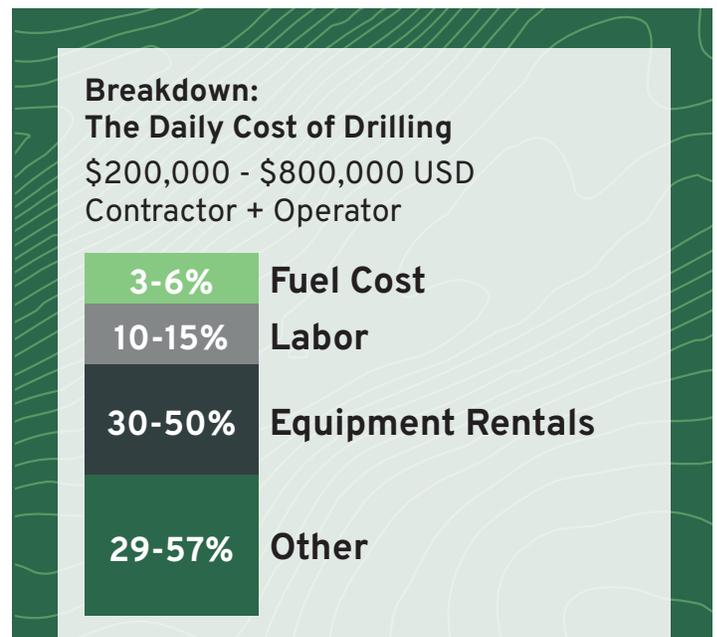
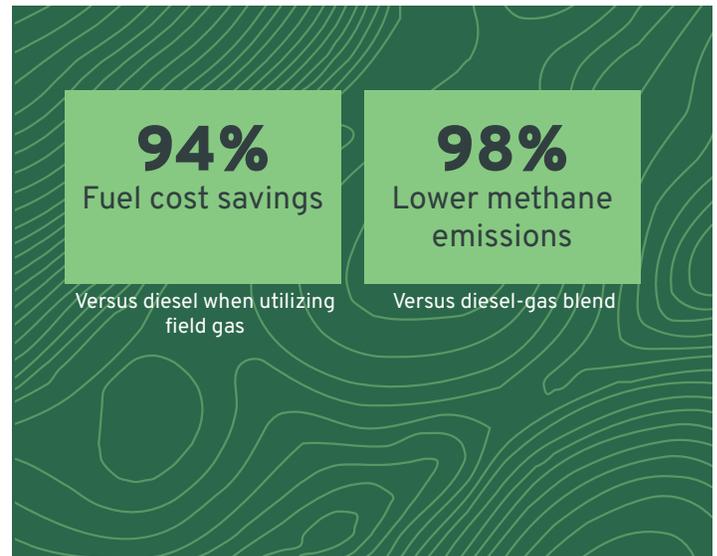
Waukesha

DRILLING OPERATIONS: PROTECT INVESTMENTS WITH LOW FUEL COSTS AND LOW EMISSIONS

Drill rig operating costs range from \$200,000 to \$800,000+ per day depending on location, depth of drilling, and numbers of wells. With large investments on the line, producers and contractors alike need reliable, continuously running equipment that provides fuel cost savings while meeting emission standards. INNIO Waukesha's mobileFLEX natural gas engine offers a best-in-class low-emissions engine designed with oil production in mind. mobileFLEX can run on a wide variety of fuels including LNG, CNG, propane, and virtual pipeline gas. Achieve a 94% savings on fuel costs by using field gas vs. diesel, while still achieving diesel-like performance. Achieve up to 98% lower methane emissions and 40% lower CO₂e versus diesel-gas blend. mobileFLEX can be used on existing rigs with modifications or can be part of the design for new rigs.

Oil and Gas Drilling Requirements

- Transient load capability
- Continuity of power
- Readily available fuel supply
- EPA certification



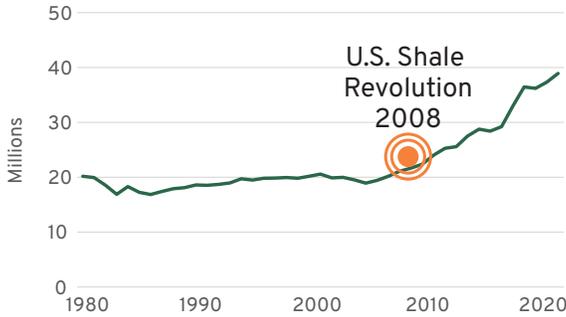
Sources: ipieca, 2013; Drilling Contractor (IADC), 2022; Reuters, 2021; FreightWaves Ratings; Tidal Petroleum; ScienceDirect Topics; The Pricer; and Tulane.edu

Today's Drilling Industry

U.S. gas production continues to rise, while on average, gas prices have decreased over the past three years compared to diesel. With an increased emphasis on sustainability, and

socio-economic and governmental influences, natural gas will continue to be an important resource and a desirable investment.

U.S. Natural Gas Marketed Production (MMcf): 1980 to 2022



Diesel Prices vs. Natural Gas Prices



Based on the three-year average retail diesel price versus average natural gas spot price: 2006-2008 versus 2020-2022.

Source: EIA.gov

Fuel Cost Comparison (per mmBTU)

Diesel
\$28.80 USD

Assumes 1 gallon of diesel = 138,700 mmBTU and \$4 USD per gallon diesel price.

Natural Gas
\$4.12 USD

3-year average spot price of natural gas 2020 - 2022 (EIA)

Switch from Diesel to a mobileFLEX Natural Gas Engine



Fuel Cost Savings



Reduce Emissions and Carbon Footprint



Diesel-like Performance

Performance reliability in the harshest environments

The mobileFLEX engine is designed with features to deliver reliable and efficient performance in challenging oilfield environments. These features include a three-way catalyst with elements and bellows, an I/O box with display and MIL functionality, an oilfield skid designed

for three-point mounting, a single-point fuel inlet and an oilfield specification-two-bearing 600V genset alternator. In addition, the engine comes with five spin-on oil filters, a closed crankcase breather system, main bearing temperature sensors and exhaust temperature sensors.



Quick Start
Less than 10 second start-up



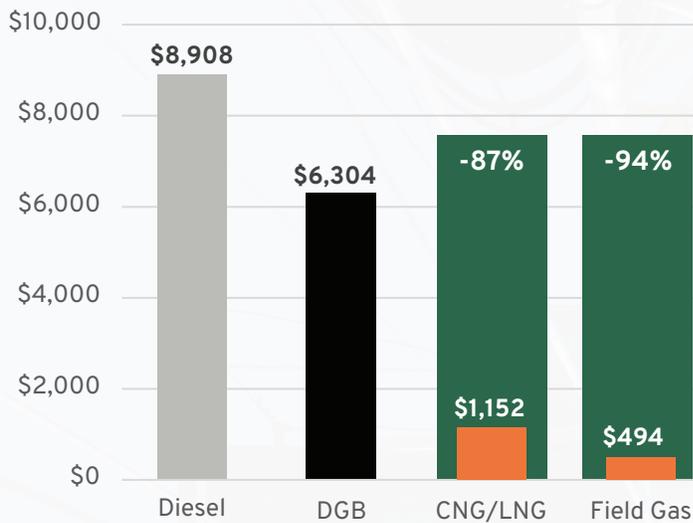
Performs in extreme heat or altitude -
No derate up to 8000 ft at 100° F



Fuel flexible from field gas and propane to commercial quality natural gas

mobileFLEX Fuel Savings vs. Diesel

DAILY FUEL COST PER RIG



Typical Drilling Duty Cycle:
Time spent in each load range as percent of total run hours

0 - 100 kWe	35.0%
100 - 200 kWe	22.5%
200 - 300 kWe	15.0%
300 - 400 kWe	12.5%
400 - 500 kWe	5.0%
500 - 600 kWe	5.0%
600 - 700 kWe	2.5%
700 - 800 kWe	2.5%
800 - 900 kWe	0.0%
900 - 1000 kWe	0.0%
1000 - 1150 kWe	0.0%
Total	100%

Assumptions: diesel @ \$4.52/gal, LNG/CNG \$3.50/mmBTU, field gas @ \$1.50/mmBTU, 1,500 hp daily average load across 3 gensets, 5,000 hours/year

Reliable Performance For The Toughest Rigs

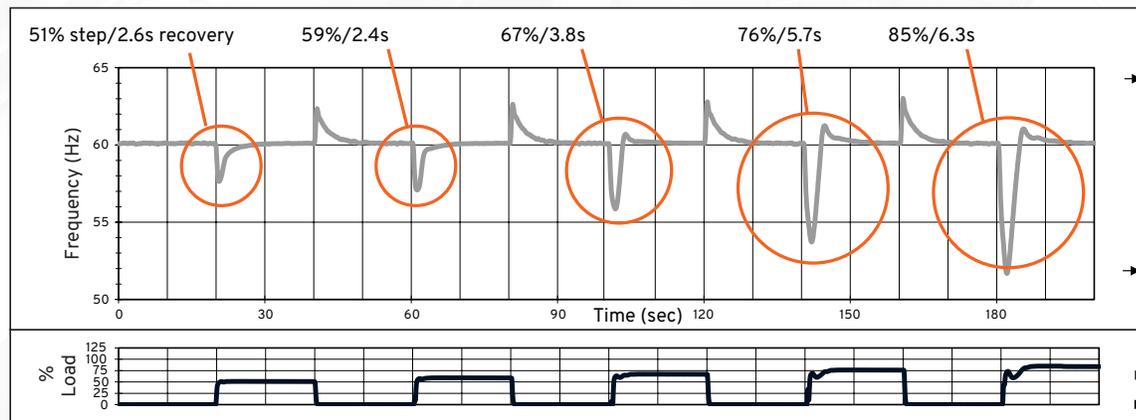
In addition, achieve diesel-like transient performance without requiring load banks, ensuring optimal performance in multi-fuel oilfield power generation.

mobileFLEX can handle transients from 0 to 60% load with less than a 5% frequency drop. Operators can even step from 0 to 100% load depending on site power demands.

Lean burn engines are typically limited to 25% load steps. mobileFLEX has quicker transient response due to its greater displacement and rich burn technology.

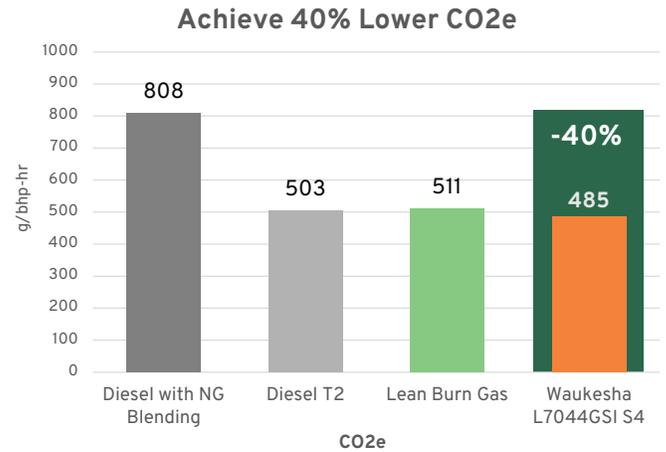
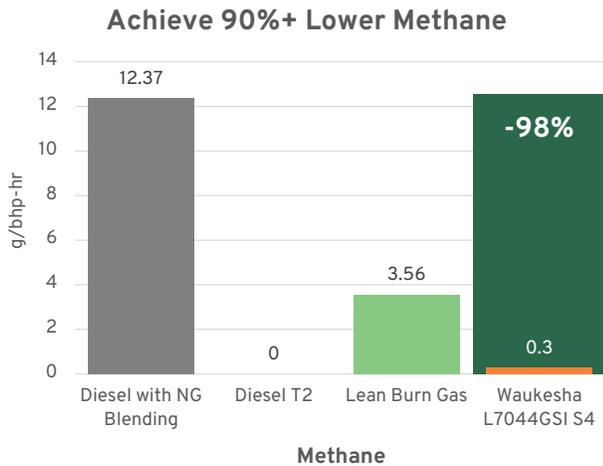
mobileFLEX is built for drilling with a specialized piston optimized for low load conditions. This piston shows a 60% improvement in low load oil consumption versus VHP Series Four. In addition, this unique design minimizes emissions of CO, VOCs, and formaldehyde.

VHP7104GSI (1200kW) Load and Frequency Chart



Meet Emission Regulations with 90%+ Lower Methane

Non-road mobile certified by the US EPA

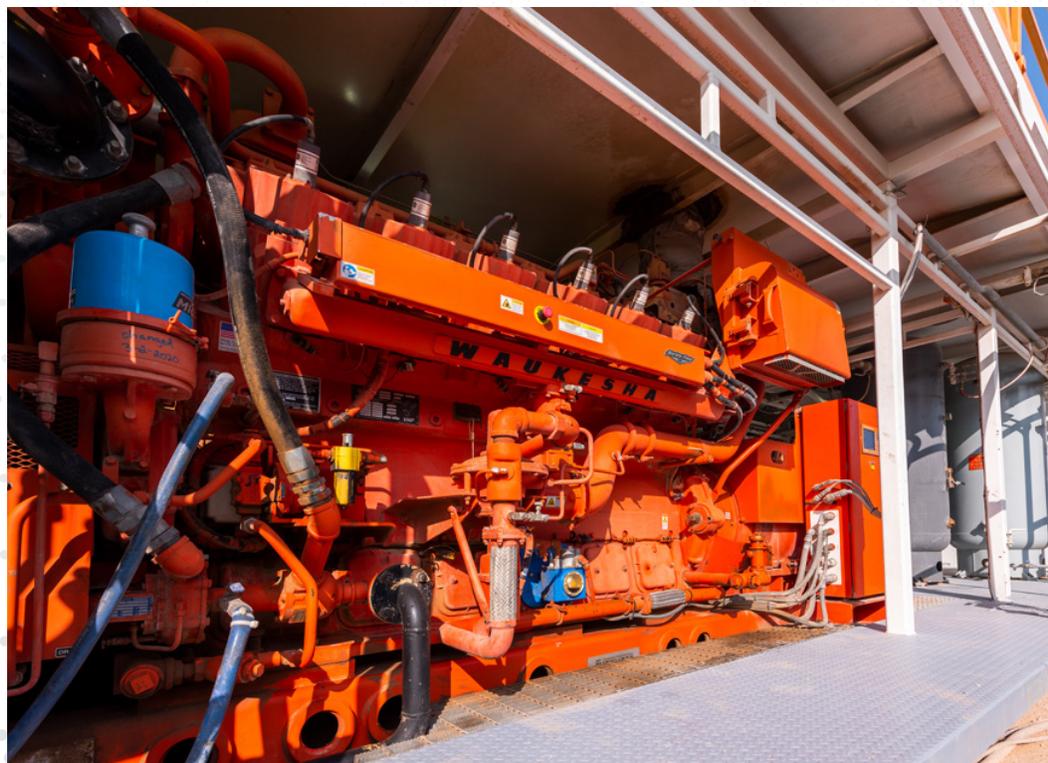


Assumptions:

- Diesel @ \$4.52/gal, LNG/CNG \$3.50/mmBTU, field gas @ \$1.50/mmBTU, 1500 hp daily average load across 3 gensets, 5000 hours/year
- Emissions estimated at 100% load
- Generator efficiency based on Waukesha engine genset
- Diesel gas blend engine, substitution ratio is 24% from 0-400kWe, 62% from 400-700-kWe, and 50% from 700-1150 kWe
- Diesel gas blend engine methane slip is 20%
- Methane GWP is 28
- 90 hp fan load

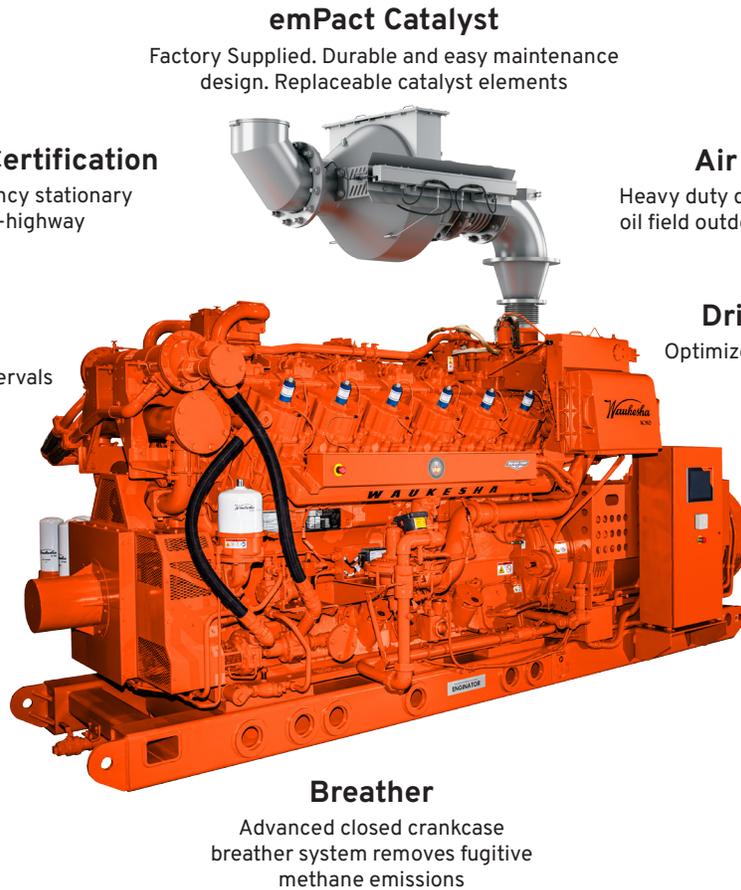
SUCCESS STORY: Waukesha mobileFLEX Reduces Emissions Over 99% Compared to Diesel Generators

A natural gas drilling company in Monongalia County, West Virginia switched from diesel generators to Waukesha's mobileFLEX engines. They achieved emission reductions of over 99% for NOx and PM, as well as 34% and 7% reductions in CO and CO2 emissions, respectively. The shift to mobileFLEX engines also offset an average of 2,000 gallons of diesel fuel consumption per day.



mobileFLEX Redefines Sustainable Drilling

The mobileFLEX engine is designed with enhanced features to deliver reliable and efficient performance in challenging oilfield environments.



emPact Catalyst

Factory Supplied. Durable and easy maintenance design. Replaceable catalyst elements



EPA Factory Certification

EPA non-emergency stationary & mobile off-highway

Air Filters

Heavy duty design suitable for oil field outdoor environments

Spark Plugs

Knock detection. 2,000 hours service intervals

Drill Rig Piston

Optimized design for low load operation

Lube Oil Filters

2,000 hours service intervals (with oil analysis)

Kato 600V Alternator

Kato 6 Pole/ 2-bearing optimized for drilling applications

ESM2/ AFR2 Controls

Integrated control system, superior performance and improved diagnostics

Oilfield Pony Skid

4-point lifting, 3-point mounting

Breather

Advanced closed crankcase breather system removes fugitive methane emissions

Technical Specifications

Engine Rating (50/60Hz):	1,153/1,253kWb (10% overload available)
Genset Rating* (50/60Hz):	1,100/1,200kWe (10% overload available)
Engine Speed (50/60Hz):	1,000/1,200rpm
Engine Displacement:	115L (7,040 cu.in.)
Cylinders:	Vee - 12
Fuel System Architecture:	Rich Burn
Flexible Fuel Range:	850-2,400 BTU
Engine Control System:	ESM2/AFR2
Genset Control System:	ECP8000
Emissions Certification:	EPA non-emergency stationary and mobile off-highway
Generator model:	KATO 600V

* Remote radiator

WAUKESHA ENGINE

LEADING THE ENERGY TRANSITION WITH RELIABLE SOLUTIONS

INNIO's Waukesha engines are at the forefront of the energy transition, providing reliable and compliant energy solutions for distributed gas compression and power generation applications. The brand's rich and lean-burn engines, ranging from 400 hp to 5,000 hp, set an industry standard for low emissions, high reliability, and fuel flexibility.

Waukesha products are continuously upgraded to help operators stay emission-compliant without sacrificing operational excellence. These upgrades include new and remanufactured engines and parts, as well as conversion and modification kits, all of which are backed by OEM warranty and more than 115 years of engine expertise. Additionally, Waukesha's digital solutions include a collaborative solution with Detechtion Technologies for gas compression applications and INNIO's myPlant platform for power generation applications. Both solutions provide customers with enhanced monitoring and optimization capabilities, resulting in improved performance and reduced downtime.

We connect locally with our customers to enable a rapid response to their service needs, providing enhanced support through our broad network of distributors and solution providers with parts, services, and digital offerings.

Waukesha engines are engineered in Waukesha, Wisconsin, U.S., and manufactured in Welland, Ontario, Canada. To learn more about the company's products and services, please visit INNIO's Waukesha website at www.innio.com.



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Waukesha