CASE STUDY: DRILLING COMPANY USES DUAL-FUEL TECHNOLOGY TO BOOST EFFICIENCY AND LOWER COSTS

CUSTOMER	LOCATION	SEGMENT	SCOPE OF USE	SOLUTION
Helmerich & Payne (H&P)	Eagle Ford Basin	Drilling	Optimizing Existing Assets	Cat® DGB Gen 2 Kit

CAT® DYNAMIC GAS BLENDING™ GEN 2 ENGINES PROVIDE H&P VALUABLE FUEL FLEXIBLE ADVANTAGES

RESHAPING SITE EFFICIENCY: NEXT-GEN DUAL-FUEL ENGINE KITS OPTIMIZE HELMERICH & PAYNE'S ONSHORE DRILLING FLEET

Cat® Dynamic Gas Blending™ Gen 2 Kits prove to be a "positive disruptor" to achieve greater total cost of ownership and performance advantages

For more than a century, Helmerich & Payne (H&P) has streamlined its drilling technologies and processes to deliver better outcomes for onshore operators in the Lower 48. It strives to be a force multiplier of advanced drilling technologies that drive greater efficiency as the oil and gas industry evolves and operators work to reduce greenhouse gas (GHG) emissions.

To futureproof its rig engines with lower-emissions technology, H&P engaged Caterpillar Oil & Gas to perform a major overhaul across its fleet. The company upgraded selected rigs with the Cat® Dynamic Gas Blending™ (DGB) Gen 2 Kit to capitalize on the latest generation of performance features while extending the longevity of driller's existing Cat 3512C engines. The DGB Gen 2 upgrade offers important fuel flexibility, delivering a high diesel displacement rate. This enables H&P to operate rigs with field gas or even compressed natural gas (CNG) to minimize diesel use, resulting in lower operating costs.

Balancing rising diesel costs with reduced consumption – and utilizing natural gas as an alternative fuel source – the Cat DGB Gen 2 Kit has been a valuable technology for H&P, improving performance with innovative port-injected technology to transform efficiency on site.

INNOVATIVE TECHNOLOGY UPGRADE MAXIMIZES RIG NGINE OVERHAUL

As drillers enter the engine overhaul cycle, they can benefit from optimizing their current fleet with a cost-effective and efficient upgrade solution that offers fuel-flexible advantages—without the added costs of investing in new engines. As H&P replace a significant portion of its modern fleet with DGB engines, the driller saw value in upgrading to the latest DGB Gen 2 kits to leverage Caterpillar's innovative port-injected technology for improved thermal efficiency and higher diesel displacement.

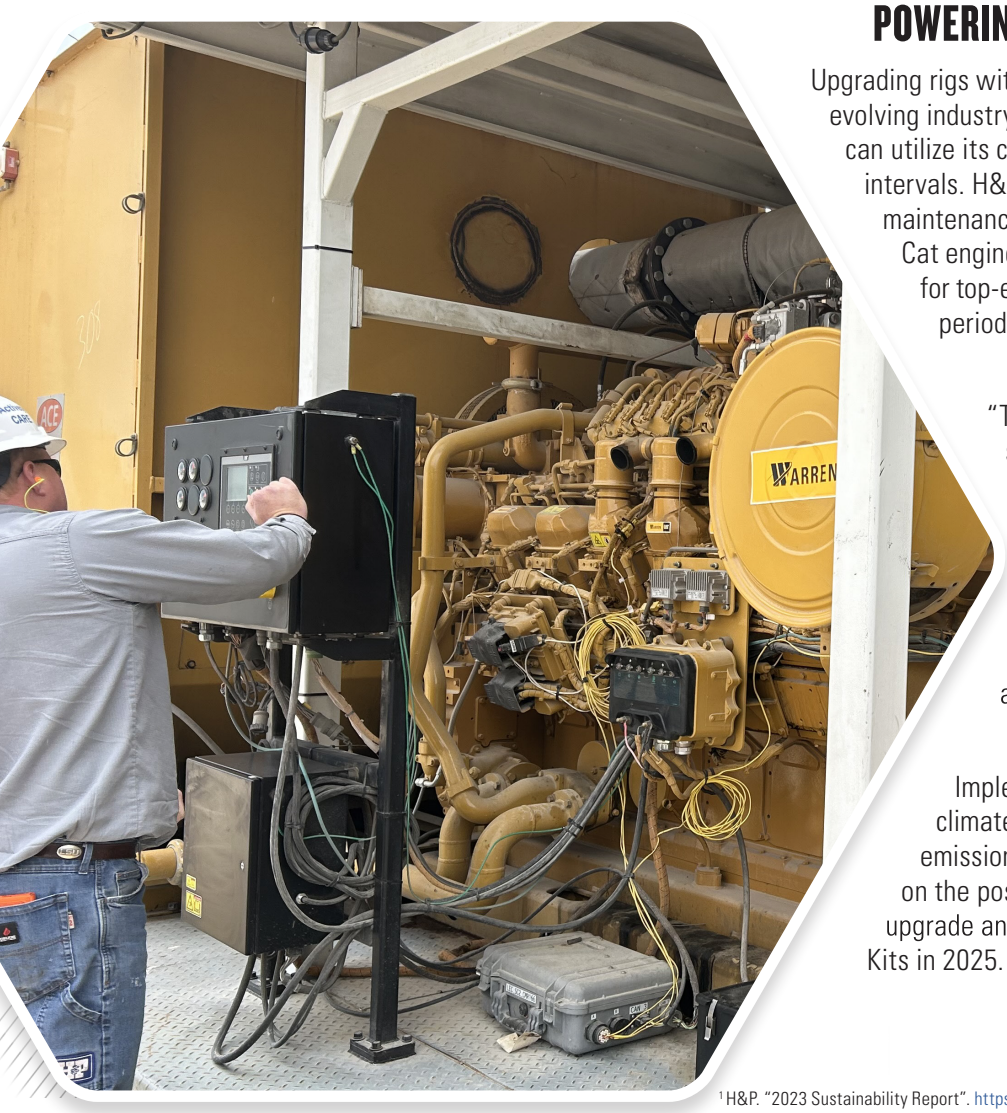
"Adding the DGB Gen 2 Kits was a positive disruptor for our drilling operations," said Sonny Auld, Product Manager at H&P. "This streamlined technology has enabled us to upgrade our existing rig engines during overhaul, saving us millions by reducing capital and operational costs while also lowering diesel consumption to support our GHG emissions-reduction goals."

CAT DGB GEN 2 SOLUTION DRIVES EFFICIENCY IN HARSH OPERATING CONDITIONS

H&P upgraded selected rig engines to the DGB Gen 2 kit to optimize performance at its Eagle Ford operations, where the fleet was subjected to hot, ambient temperatures in an extreme heat season during a 15-day trial. H&P evaluated the DGB Gen 2 upgraded engines' impact on costs and efficiency and noted that the dual-fuel capabilities helped reduce fuel consumption while increasing rig uptime. The driller observed that operating rigs with a diesel and natural gas combination positively impacts fuel efficiency while port injection capabilities enable real-time performance optimization. With precise air/gas ratio control at the individual cylinder level, H&P experienced faster response times and reduced unburned gas.

During the 15-day job, positive results were witnessed as CNG powered one engine while a second engine used field gas. With the DGB Gen 2, H&P achieved an average diesel displacement rate of 65% and saved more than 69,000 gallons of diesel on just one rig. The driller then leveraged Cat Smart Engine Management System (EMS) data to further enhance efficiency by reducing engine runtime to conserve fuel and limit engine wear, as well as lower diesel consumption. Collectively, these positive outcomes helped H&P decrease the number of days on-site and the cost per well.

"By reducing fuel consumption and costs and lowering overall emissions with diesel displacement, the DGB Gen 2 dual-fuel technology enables us to deliver operational excellence in both drilling performance and productivity, effectively bringing well expenses down," said JT Brady, Senior Manager, FlexRig Support Department at H&P.



POWERING RIGS IN A DYNAMIC ENVIRONMENT

Upgrading rigs with the DGB Gen 2 Kit positions H&P to meet evolving industry requirements while reducing fuel costs. H&P can utilize its current assets and enjoy extended maintenance intervals. H&P can utilize its current assets and enjoy extended maintenance intervals. With plans to equip more than 60 Cat engines with the kit, the driller has eliminated the need for top-end overhauls and prolonged overhaul servicing periods.

"The DGB Gen 2 kit solution enables us to substitute pipeline or wellhead, CNG or LNG gas, which not only lowers our diesel consumption but also lets our motor hands work on higher value tasks," said Todd Fox, Director of Product Management at H&P. "The Cat Smart EMS also improves our operational efficiency by automatically stopping and starting our engines as needed."

Implementing the DGB Gen 2 kit also supports H&P's climate-related objectives to maintain or reduce GHG emissions per drilled distance compared to 2018.[1] Based on the positive results experienced to date, H&P plans to upgrade an additional 48 Cat 3512 engines with DGB Gen 2 Kits in 2025.

[1] H&P. "2023 Sustainability Report". https://www.helmerichpayne.com/media/general/HP_2023_Sustainability_Report.pdf

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