

HALLIBURTON

Halliburton Uses Clean-Burning U.S. Natural Gas to Power a Complete Hydraulic Fracturing Fleet

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New Dual-Fuel Technology Offers Environmental and Cost Benefits

HOUSTON--(BUSINESS WIRE)--Jan. 11, 2013-- Halliburton (NYSE: HAL), Apache Corporation and Caterpillar have developed innovative dual-fuel technology capable of safely and efficiently powering the pumping equipment used for fracturing treatments with a mixture of natural gas and diesel. With 12 pumps (24,000 horsepower), this is one of the largest-scale dual-fuel projects ever conducted in the oil and gas industry.

G. Steven Farris, Chairman and CEO of [Apache](#) and the Chairman of America's Natural Gas Alliance (ANGA), encouraged Apache and the industry to increase the use of natural gas as a fuel for engines. In response, Halliburton developed a technical solution for converting the pumping equipment used at a typical large-scale fracturing spread to a dual-fuel system including natural gas – one that would be more efficient and cleaner-burning than using diesel alone.

Halliburton and its supplier, [Caterpillar](#), teamed up to convert the company's new [Q-10 pumps](#) to dual fuel with a technology that would safely and efficiently accommodate high-quality liquefied or compressed natural gas. Collaborating closely with Halliburton and Apache to cover a wide range of performance, environmental and efficiency criteria, Caterpillar adapted its proprietary Dynamic Gas Blending (DGB) engine technology to power Halliburton's massive pumps.

"We anticipate that in the not-so-distant future, these DGB engines can be easily retrofitted to efficiently burn available on-site conditioned field gas, thereby saving operators additional fuel transport costs," said Marc Edwards, Senior Vice President of Halliburton's Completion and Production Division.

Halliburton also worked with [Linde North America](#) to establish a safe and efficient gas distribution system as well as the supply of the liquefied natural gas needed for this project.

"Apache is proud to be setting an example for the industry by using a clean-burning, abundant and inexpensive U.S. energy source in its operations," said Mike Bahorich, Apache's Executive Vice President and Chief Technology Officer. "Taking advantage of natural gas can lead to cost savings for the industry and for energy consumers, new jobs and a cleaner environment – it's time for us to use this resource to its full potential. We commend Halliburton for its ability to take on our dual-fuel challenge and quickly make it possible."

Apache has broadened the environmental scope of this project by showcasing at selected work sites – including the Granite Wash site outside Oklahoma City where the new dual-fuel technology has debuted – Halliburton's [Frac of the Future technology](#). Started in 2010, Halliburton's Frac of the Future initiative is designed to address the need to shrink wellsite footprints, improve environmental performance, cut supply chain costs and enhance the reliability of the equipment on site.

ABOUT HALLIBURTON

Founded in 1919, Halliburton is one of the world's largest providers of products and services to the energy industry. With more than 70,000 employees in approximately 80 countries, the company serves the upstream oil and gas industry throughout the life cycle of the reservoir – from locating hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimizing production through the life of the field. Visit the company's website at www.halliburton.com.



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