

THE NEW DISRUPTIVE FORCES IN UPSTREAM OIL AND GAS

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Power generation in upstream oil and gas (O&G), traditionally led by diesel generator sets (gensets), is transitioning to new energy sources, methods, and business models. While the arguments for diesel—including broad fuel availability and ease of transport and storage—have not changed, technological advances, regulations, and macroeconomics are expanding the options available to exploration and production (E&P) companies. At the same time, new business models are emerging that cut costs, boost efficiency, or otherwise improve operations in this energy-intensive industry.

Technology, fuel availability, and regulations each play a part in deciding which source of power is best for a given site. In upstream O&G, safety and power reliability are paramount, meaning the battle-tested diesel engine was often the prime mover of choice. Technology is changing this; natural gas gensets are attractive thanks to improved reliability in recent years, even as falling battery prices quickly make that technology a viable and disruptive resource on the oil field. The availability of cheap natural gas, both at the wellhead and via the burgeoning liquefied natural gas industry, is making the economics of that fuel more attractive. And emissions regulations—especially in the developed world—are becoming ever tighter. Taken together, these developments are changing the upstream energy landscape and presenting both threats and opportunities.

This recovery has a new look

As O&G prices rebound, E&P activity is forecast to grow in 2017, and along with it demand for the key prime movers: diesel, dual-fuel, and natural gas gensets, and turbines and microturbines. However, upstream power generation looks set to evolve during this recovery. The catalysts of this change come from three key areas: efficiency, flexibility, and new value streams.

Efficiency. With plummeting profit margins in the lean years of 2015 and 2016, E&P companies focused on cutting costs everywhere, from manpower to energy use. Digitisation, automation, and incorporation of new energy technologies are all improving production efficiencies. In one example of new energy technologies, specialty storage companies like FlexGen are deploying batteries and other storage devices to oilfields to improve generator operations. Storage can allow designers to rightsize the system, preventing waste engine cycling, cutting fuel consumption and sometimes eliminating redundant prime movers entirely. This represents a disruptive threat to incumbent prime mover vendors but brings efficiency gains to the energy value chain at large. These efficiency gains will be welcome to counteract the high energy intensity of unconventional O&G production. For example, in North America, the home of unconventional production, the energy intensity of O&G production in 2015 was 3.3 GJ/tonne of hydrocarbon—more than double the global average. As these intensive methods spread, efficiency will be in even higher demand.

Flexibility. The rise of unconventional production in North America has also sped up average project lifecycles. Fracked wells have a much steeper decline curve than traditional wells, meaning their production lifetime is shorter. This encourages a shorter-term perspective on investments, often making grid power extensions less attractive (if even available) and rental generators more attractive. As fracking spreads to new regions including China, Latin America, and elsewhere, demand for flexible generation will grow.

New Value Streams. Opportunity exists for stakeholders that look at old problems in new ways. Flaring, the intentional burning of natural gas coming from the wellhead, is one example to consider. In 2015, 147 billion cubic meters of gas were burned in this manner, representing about \$20

billion worth of energy up in smoke (based on average prices). With more efficient generators and controls, greater incentives to cut emissions, and continuing rural electrification, the wasted energy of the past is becoming the microgrid business model of the future. Other wellhead conversion technologies (including gas-to-liquids) are improving as well. Places like Nigeria and Indonesia have high flare rates, and both governments have recently made moves to encourage more efficient use of such resources.

As with all disruptive forces, these changes are both a threat and an opportunity. Incumbent vendors of prime movers should consider partnerships with storage, microgrid, and other distributed energy resource players. This includes solar PV and other renewables, though only for certain cases due to their limited flexibility. Stakeholders should also reevaluate the nimbleness of their supply chains to ensure opportunities are captured—whether with a rental, capital sale, or energy as a service offering—as the industry's pace quickens. Stakeholders should also be on the lookout for new value streams for their products as technology, commodity prices, and regulations all change the industry. Many of these opportunities provide a mix of cost-cutting, energy-saving, and environmental benefits; a welcome combination in this dynamic landscape. 🚀



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