CASE STUDY

EverGreenEnergy™

Battery Energy Storage System (BESS) Redefining Efficiency in Drilling Operations with Hybrid Power Solutions

57-60%
Natural gas substitution rate

33k Gal
Reduction in diesel fuel usage

144 t
Reduction in GHG emissions

THE CHALLENGE

In recent years, the increasing scale and complexity of drilling operations have significantly raised power requirements. Traditionally, these demands have been met using diesel-powered systems, often necessitating the use of multiple generators. While this approach provides the necessary power, it comes at the cost of reduced efficiency and increased diesel consumption. These challenges highlight the urgent need to explore and implement more sustainable and efficient power solutions.

THE SOLUTION

To tackle the challenges of fuel inefficiency and increased diesel consumption in drilling operations, we implemented a hybrid solution that integrates generator power with an advanced Battery Energy Storage System (BESS). This innovative system combines the reliability of generator power with the adaptability of BESS to reduce diesel consumption.

Using real-time data tracking and AI-driven analytics, the system intelligently manages generator operations by automatically starting and stopping them as needed, ensuring the rig's electricity demand is consistently met. During periods of high transient loads, the battery modules supply electricity, reducing the number of generators required online. The batteries recharge when electricity demand is low, maximizing efficiency.

By minimizing the number of active generators, the system increases their average load, improving natural gas utilization and overall fuel efficiency. This transformative approach delivers a more sustainable and cost-effective energy solution for drilling operations.

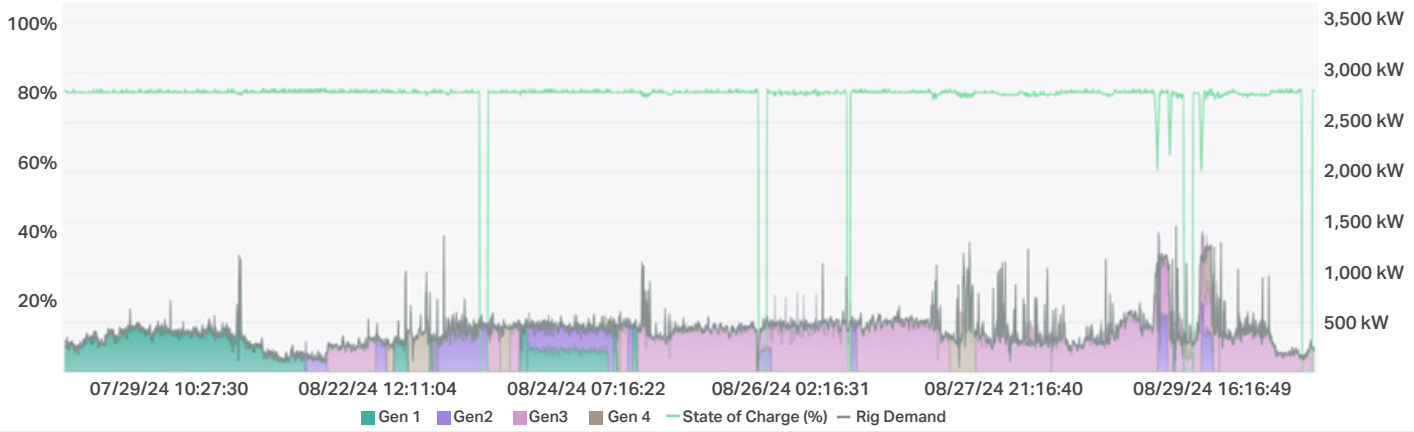
PERFORMANCE RESULTS

We analyzed data from both the combined surface and intermediate sections, as well as the production section, to calculate natural gas substitution rates and diesel savings.

The average and peak power demand for the combined surface and intermediate sections were approximately 400 kW and 1,500 kW, respectively (*see Figure 1*). More than 90% of the time, a single generator and the BESS were sufficient to meet the rig demand. The BESS handled all transient loads. Without the BESS, at least two generators would be required to satisfy the power demand. By operating with fewer generators and increasing overall generator load, the substitution rate for these sections of the well was 57%, resulting in fuel consumption of 3,379 gallons of diesel and 601 Mcf of natural gas. This approach led to diesel savings of 5,300 gallons compared to a diesel-only baseline over a 11-day period.

FIGURE 1

Power demand, generator output, and fuel consumption for the combined surface and intermediate sections.



Power Available	Power Consumed	Diesel Used	Nat Gas Used	Diesel/ Nat Gas Ratio	
288,728 kWh All Gens	104,237 kWh All Gens	3,379 Gal All Gens	601,161 ft³ All Gens	42.67%	57.33%

The average power demand for the production section was approximately 1,100 kW, with peak demand reaching around 2,500 kW (see Figure 2). During tripping operations and periods of low load, a single generator, supported by the BESS, was sufficient to meet rig demands. Additional generators were brought online as power demands increased. The BESS managed all transient loads effectively. By operating with fewer generators and optimizing overall generator loads, the substitution rate for this section of the well reached approximately 60%, with fuel consumption totaling 18,890 gallons of diesel and 3,142 Mcf of natural gas. This approach resulted in diesel savings of 27,400 gallons compared to a diesel-only baseline over a 21-day period.

FIGURE 2

Rig power demand, generator output, and fuel consumption for the production section.

Power Available	Power Consumed	Diesel Used	Nat Gas Used	Diesel/ Nat Gas Ratio	
1,203 MWh All Gens	556,713 kWh All Gens	18,890 Gal All Gens	3,141,855 ft³ All Gens	40.38%	59.62%

CONCLUSION

The integration of a Battery Energy Storage System (BESS) has significantly improved operational efficiency by reducing the number of generators online and enabling engines to run at higher, more efficient loads. Key outcomes include:

- BESS reduces the number of generators online, allowing the engines to operate at higher loads with optimal efficiency.
- During transient load events, such as tripping, a single generator paired with the BESS was sufficient to handle fluctuating loads effectively.
- The increased natural gas substitution rate led to diesel savings of approximately 33,000 gallons and a reduction of 144 tons of greenhouse gas emissions over a 32-day well.