Honeywell | Renewable Energy Solutions

HYBRID POWER SOLUTION REDUCES LCOE AND CARBON EMISSIONS

Solution Note

Solar PV and BESS Technologies Coupled with Energy Management Solution Augment Existing Diesel Generation Capabilities

Introduction

Around the world, there is a growing demand for green metals (i.e., metals produced using environmentally-friendly methods, including the energy required in processing of these metals). At the same time, major Oil & Gas (O&G) producers are striving to reduce their carbon footprint.

Facilities like natural gas production and mining sites are remote and inherently energy-intensive, with on-site power requirements ranging up to tens of megawatts for larger and more complex operations. Many site operators burn diesel or natural gas for their power needs as connecting to a power grid can be expensive and time-consuming. Moreover, a grid connection that is capital-intensive does little to reduce the operating expenses for electricity consumption.

Like any generator type, diesel generators have pros and cons. High and/or fluctuating diesel costs are a concern for many industrial organizations. Another major issue with diesel gensets is that they produce carbon dioxide, nitrogen oxide, particulate matter, and other dangerous exhausts that release into the atmosphere. Diesel units can also be very noisy, so they're often placed away from work areas. Furthermore, transport and storage of diesel is a safety hazard and adds to more emissions during transport.

By minimizing diesel fuel consumption, industrial firms can reduce their operating costs and lower their carbon emissions. Corporate goals for carbon reduction are taking on greater importance as organizations strive to extend their green energy initiatives.

Leading miners and O&G producers are seeking to transition from a traditional power supply based on diesel or gas to a hybrid power generation solution.

FEATURES & BENEFITS

- Reduced reliance on fossil fuels for power generation
- Lower diesel/gas consumption cost
- Decreased carbon emissions
- Improved compliance with industry environmental standards
- Improved reliability of critical energy assets
- Expanded use of renewable energy sources
- Lowest Levelized Cost of Energy (LCOE)
- Reduced Health, Safety and Environmental (HSE) risk

Overview

The advent of competitive Solar Photovoltaic (PV) technology, coupled with the trend towards Battery Energy Storage Solution (BESS) solutions, has provided an increasingly attractive option for microgrid deployments that have historically relied on diesel generators.

Indeed, the Levelized Cost of Electricity (LCOE) for solar is now comparable to or better than that of fossil fuels like diesel, if a carbon price is in place.

Solar PV and BESS technologies can be used to displace diesel In the form of a hybrid system to:

- Reduce costly diesel consumption
- Expand the usage of renewable energy
- Reduce carbon emission
- Increase power system reliability
- Reduce the hazards associated with fuel handling (both transport and storage)

A hybrid solution with Solar PV and BESS can not only lower diesel consumption, but also provide Health, Safety and Environmental (HSE) benefits by minimizing the need to handle a high volume of diesel fuel.

O&G and Mining operations are generally in extremely remote locations, making travel to these sites difficult and risky. The transport of diesel fuel to the facilities poses safety and environmental challenges.

Integrating Solar PV and BESS technologies into a microgrid also means switching over to a clean power source that has low or no Greenhouse Gas (GHG) emissions. Diesel, by contrast, produces ~3.2kg of CO_2 per liter of fuel consumed. This translates into environmental responsibility and a social license to operate, which are especially important for industrial organizations operating in environmentally-sensitive locations.

Honeywell's Solution

Honeywell Renewable Energy solutions help industrial organizations utilize energy more efficiently, reliably and economically, while reducing the environmental impact and improving safety and regulatory compliance. Honeywell's focus is on helping plant owners and operators make the most of new, smarter technologies and energy storage systems, and guiding them towards best practices for energy management.

Honeywell's solution is specifically designed to increase the use of renewable energy in a remote, off-grid environment. It hybridizes power supply capabilities through the deployment of advanced BESS and Solar PV technologies—reducing the need to rely on non-renewable energy generators, while improving reliability of the power supply and reducing overall costs.

Figure 1: Honeywell's Renewable Energy solution is designed to hybridize power supply capabilities through the use of an advanced BESS and Solar PV technologies.

Honeywell understands the operating requirements of modern industrial sites and can size a renewable energy solution to meet the end-user's specific needs. Its offering includes:

- Expert analysis of energy usage and potential sources
- Development of feasibility studies using Homer Pro modelling to look at potential savings through the optimization of diesel consumption with BESS within the site constraints
- Full, turnkey Solar PV and BESS solutions, including an Energy Management System (EMS) to manage the entire power generation system
- Integration of any other sources of energy such as wind

Facilities like mining and natural gas production sites must find ways to improve efficiencies and reduce carbon emissions during all stages of operation.

Honeywell is the only supplier that provides energy performance guarantees tailored to the customer's critical business KPIs.

Within the site constraints, system design is optimized for the lowest Levelized Cost of Energy (LCOE). On recent projects, Honeywell has been able to achieve 95% saving in diesel, and consequently emissions, and displace it with solar energy using a battery energy storage system to extend the solar resource beyond sunshine hours.

Operations	Diesel	Solar PV	BESS
Sunshine Hours	Off	On	Charge
Evening	Off	Off	Discharge
Night/ Morning	On+	Off	Charge*

Figure 2: A combination of high-quality and sustainable power supplies can be employed to optimize energy consumption at remote operating sites.

The hybrid energy system incorporates Honeywell's Energy Management System (EMS), a microgrid controller utilizing both fossil and renewable energy generation to optimize savings in electricity usage. The state-of-the-art EMS controls the entire energy operation in real-time, ensuring utmost efficiency in meeting a site's power consumption needs. It can communicate with a Supervisory Control and Data Acquisition (SCADA) system to provide expanded visualization of operating statuses.

Honeywell is unique among technology providers by offering risk-reward contracts based on guaranteed Key Performance Indicators (KPIs) for its renewable energy solutions. Typical outcome- based KPIs include fuel consumption savings and power system availability. If the customer and Honeywell achieve and exceed the KPIs, there's a financial incentive for the two companies—and there are consequences if they fall short.

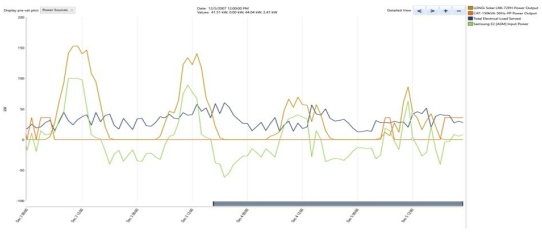

Figure 3: With Honeywell's solution, the Solar PV supports the load while simultaneously charging the battery system from the excess available energy. The BESS, in turn, supports the full load once the sun goes down. This approach allows the diesel gensets to remain offline for an extended period of time.

Customer Benefits

An effective renewable energy platform makes it easier to anticipate and manage power demand in today's complex energy ecosystem. Honeywell's technology solutions and outcome-based performance guarantees help end-users optimize their operations and realize significant savings.

Site operators can benefit from:

- Honeywell's patented battery energy management technology and global expertise in modelling and support for industrial power needs
- Integration of renewable energy solutions with existing Distributed Control Systems (DCSs) and other systems for automated operations and ongoing remote monitoring
- Integration with condition-based monitoring to extend the life of assets and optimize performance
- Integration of on-site service for monitoring, maintenance and cyber security
- Implementation of a performance-based guarantee program

Honeywell's unique, modular battery technology also minimizes installation and commissioning time, making it ideal for quick deployment and a fast Return on Investment (ROI)—typically 5 years.

Additional benefits from Honeywell's comprehensive renewable energy solution include:

- Increased reliability due to the use of solar during the day and BESS during most other times
- Significantly reduced fuel handling (HSE risk reduction)
- Decreased operating noise (especially at night)

Ultimately, the use of an advanced hybrid power solution will reduce reliance on non-renewable

sources of energy while providing greater resilience and reliability for the power supply system.

Why Honeywell?

Honeywell has proven expertise in turning data into actionable insights and delivering advanced technology and services with a complete edge-to-cloud strategy to help the renewable energy industry more easily reach its performance and sustainability goals.

Honeywell's robust energy management system enables customers to actively address their power consumption needs while subsequently reducing energy costs, thus supporting a vision of a sustainable environment for future generations.

Honeywell provides contractual guarantees on business KPIs supported by a reliable data strategy and infrastructure for customers with distributed assets. We focus on outcomes such as improved asset utilization, reduced operations & maintenance cost, increased worker efficiency, and reduced safety and compliance incidents.

For More Information

Learn more about how Honeywell's Renewable Energy Solutions can improve performance, visit www.hwll.co/RenewableEnergy or contact your Honeywell Account Manager, Distributor or System Integrator.

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