

CONSIDERATIONS IN IMPLEMENTING A COMPREHENSIVE CONTROL AND ENERGY MANAGEMENT SYSTEM

TABLE OF CONTENTS

2	Executive Summary
3	Challenges in Optimizing Asset-Wide Energy Performance
4	Uniting Controls and Energy Management
5	Benefits of a Comprehensive Industrial Energy Optimization Platform
6	Solutions
8	Analytics and Services
9	Use Case
10	Summary

EXECUTIVE SUMMARY

The growing trend of electrification across industries has transformed global energy production and consumption, making reliable energy supply a top priority for organizations. To enhance efficiency and reduce costs, energy management systems—comprising of intelligent devices, communication networks, and advanced software—have become more essential than ever. Microgrids play a crucial role in this transition by enabling enterprises to connect to local smart grids, integrate renewable energy sources, and monitor energy consumption, production, and storage. Global solution experts leverage their expertise to transform both physical and digital assets into an integrated energy management solution. These innovations not only optimize energy use but also strengthen business resiliency, ensuring enterprises remain competitive in an evolving energy landscape.



Complete, integrated control and energy management

CHALLENGES IN OPTIMIZING ASSET- WIDE ENERGY PERFORMANCE

Industrial customers face mounting pressure to enhance the energy efficiency, reliability, and cost-effectiveness of their operations while reducing environmental impact and ensuring safety and compliance. Geographically dispersed facilities, aging infrastructure, and the absence of integrated management systems, all impact the optimization of energy use.

Many businesses rely on disparate equipment and control systems that lack enterprise-wide visibility. Limited integration of control solutions prevent facility managers from accessing energy data, identifying optimization opportunities, and coordinating actions to meet the evolving market demands. Without full visibility into energy conditions and trends across facilities and assets, businesses cannot fully capitalize on opportunities to improve operations and achieve energy objectives.

UNITING CONTROLS AND ENERGY MANAGEMENT

The most effective solutions integrate control with data from power generating and transmitting assets — this includes wind, solar, gas turbines, diesel generators, Battery Energy Storage Systems (BESS), and utility grids — to enhance efficiency and resilience. An effective solution should support energy demand management, peak shaving, and energy source balancing to improve business continuity, optimize power usage, and enhance monitoring and control of electrical infrastructure across facilities.

Instead of relying on isolated point-of-use solutions, users benefit most from robust, vendor-agnostic systems that provide extensive control. A single, integrated solution enables organizations to implement a comprehensive energy management strategy — visualizing data, analyzing trends, and predicting conditions to optimize use of energy sources and storage assets.

BENEFITS OF A COMPREHENSIVE INDUSTRIAL ENERGY OPTIMIZATION PLATFORM

An optimal solution functions as a microgrid, integrating conventional fossil-fueled self-generation and backup sources, such as gas turbines and diesel generators, with renewable sources like solar and wind, in addition to utility grid energy to enhance decision-making for energy use across industrial operations. The benefits of an integrated platform for visualizing and managing these assets include:

- **Improved business continuity:** Isolating and managing available power sources improves facility power resilience when utility outages occur by enabling grid isolation or “islanding,” supplying power from local sources, and prioritizing the electrical loads of critical operations.
- **Reduced energy costs:** Integrated energy asset control, storage, and management capabilities enable facilities to store power when low-cost power is available and utilize it when utility rates are higher, or distributed power sources are unavailable. Applying this approach across all organizational assets maximizes overall benefits and enhances savings.
- **Peak shaving:** Monitoring and control helps facilities respond more effectively to utility curtailment directives during peak grid demand. This not only enables them to benefit from financial savings from lower utility costs, but also enhances power resilience when the risk of outages increases due to high public demand.
- **Revenue stacking:** Opportunities—such as reducing consumption, time-shifting stored power, market participation, and optimizing power source availability—often yield incremental energy benefits that are too small to be economically meaningful on their own.
- **Centralizing energy management across multiple facilities:** A unified control and energy management solution can aggregate these benefits across multiple facilities through high-level visibility, virtual power plant, enterprise-level maintenance planning and corporate sustainability strategy.

SOLUTIONS

Deploying a comprehensive solution relies on energy storage together with unified control and energy management. In addition to battery modules, a complete battery energy storage solution consists of a battery management system (BMS) and BESS subsystems for HVAC, fire safety, and cybersecurity equipment along with an energy management system (EMS).

A combined control and energy management system uses controllers and software to track historic, present, and predicted energy asset performance; monitor and control energy generation and storage assets and energy use across a single or multiple operating sites. Figure 1 below illustrates key components of the solution.

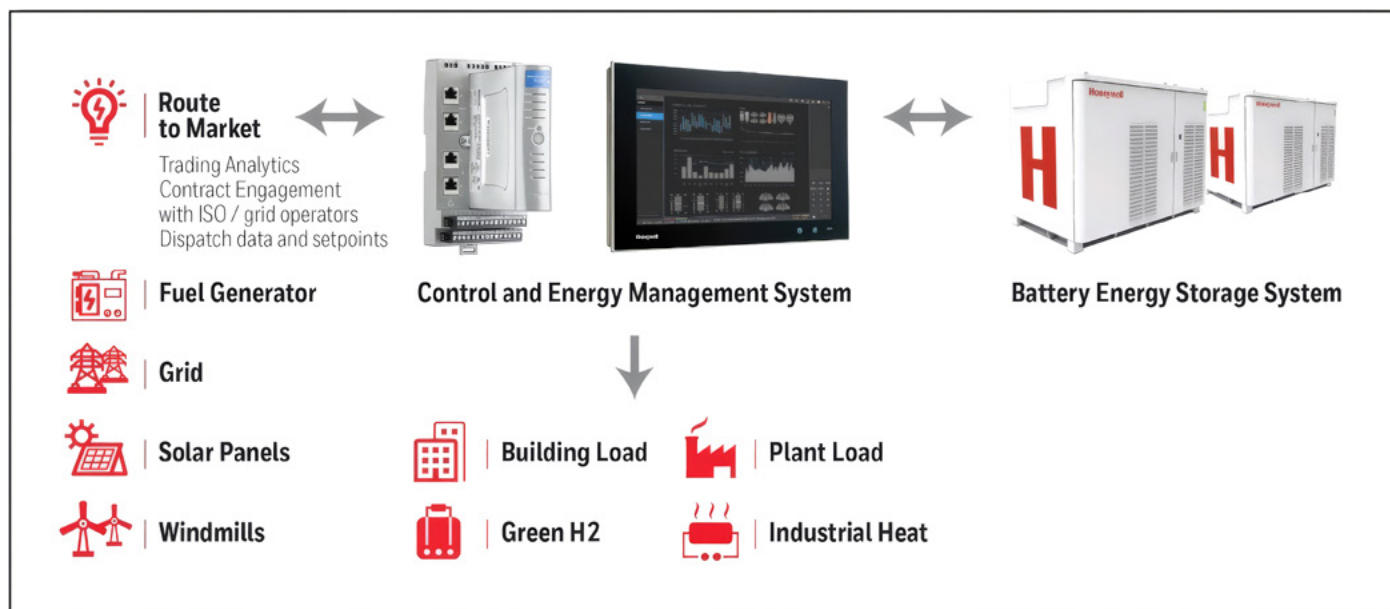


Figure 1: Typical Energy Management Solution

Notably, the **Control System** could offer scalable options for supervisory control, including either a software-as-a-service option or an on-premises solution. This master system could manage:

- SCADA to monitor and control equipment locally and centrally
 - An HMI
 - A built-in data historian
 - An alarm/event server
 - Automatic report generation
- Site controllers to manage all the energy sources and storage to form a microgrid
- Unit controllers to manage individual energy generation and storage assets
- A Power Plant Controller (PPC) to manage connection to the grid

Using standard and tested BESS unit controllers supporting third party BESS and PCS can reduce the amount of installation time because the solutions are fit for purpose for the particular hardware. This ultimately means faster time to first revenue and potentially to first cost savings or resiliency, depending on the BESS use case.

Together, the solution expands the resiliency benefits to industrial organizations because the larger solution can offer black start (energy to start offline assets) capabilities. It can reduce the need for “spinning reserve” – continually operating contingent gas turbine (or diesel) powered generation in case demand changes quickly. The facility can use the stored energy to address short-term changes in power demand.

In this application, the **Energy Management System** would tie everything together, supervising and optimizing the selection and timing of power sources to help improve efficiency across all the managed assets. Organizations benefit by centralizing a range of functions in an active remote monitoring center to enhance cybersecurity functions, asset management, predictive analytics, BESS warranty tracking, and redundant critical infrastructure controls.

ANALYTICS AND SERVICES

Industrials could rely on their vendors for any combination of services, giving organizations a means to focus on core operations, avail themselves of specialized expertise, and gain capability without the cost of developing and staffing a burdensome “in-house” solution.

Stakeholders can apply this model to on-site or remote maintenance, repair, monitoring, reporting, predictive analytics, and digital twins to forecast, recommend actions, and manage energy use, efficiency, and trading opportunities. This model also offers improved operability through capabilities to display data on web-based dashboards for desktop and mobile devices; secure integration to monitoring and weather service applications; and access to proactive maintenance and scheduling.

A unified control and energy management platform, combined with tailored analytics and service options, provides industrial organizations with a streamlined, cost-effective approach to achieving their operational, energy management, power resilience, and sustainability goals. Since every organization has unique needs, a tiered service model — offering options such as outsourced remote operation center services and risk-sharing arrangements tied to performance milestones — ensures the best fit. By delegating these functions, organizations can alleviate the challenge of retaining scarce skilled personnel while allowing end-users to focus on core operations and business objectives. Figure 2 below illustrates an example of BESS service levels.

SERVICE LEVEL	CAPABILITIES
 Core LEVEL 1	Lifecycle Management Corrective & Preventive Maintenance SCADA System Patching & Updates Remote Monitoring
 Proactive LEVEL 2	Performance Based Monitoring Predictive Maintenance Warranty Tracking and Management Demand Response
 Advanced LEVEL 3	Peak & Load Forecasting Frequency & Voltage Regulation Grid Stability Peak Shaving
 Premium LEVEL 4	Digital Twin Total Cost of Ownership Virtual Power Plant Energy Trading

Figure 2: Example Service Tiers

USE CASE

Honeywell's own efforts to become carbon neutral by 2035 while improving power resilience at its facilities provide examples of the benefits of applying a comprehensive control and energy management system. Honeywell has reduced its greenhouse gas emissions by 90 percent by implementing more than 5,700 sustainability projects across its facilities since 2004. Honeywell initiatives have focused on:

- optimizing operations
- deploying renewable energy sources
- improving energy efficiency and sustainability
- switching fuels and electrifying facility equipment
- capturing and sequestering carbon
- improving facility energy monitoring, control and storage systems

Honeywell's manufacturing facility in Lugoj, Romania is a case in point. A core problem at the Lugoj Plant was the frequent loss of grid-supplied power, resulting in plant shutdowns. The Honeywell team needed to increase power resilience while reducing emissions and energy costs. Key components to its success included installing a 1 MW photovoltaic panel array on the roof of this factory and another 1.7 MW array over the facility's parking area. Likewise, a Battery Energy Storage System (BESS) was installed to store power produced by the solar arrays as well as utility power when it is economical to do so. The BESS can deliver 1.6 MW to the facility in one hour. For outages that outlast BESS capacity, conventional diesel generators provide backup power.

Inverters on the solar and BESS systems converted their DC power to alternating current. Responding to changing power conditions require controlling the interactions of the utility power source with the solar and BESS system inverters and the backup generators. To do so, Honeywell deployed its Honeywell Ionic™ Control and Energy Management plus its Forge Sustainability+ Power Manager to optimize control of the facility's distributed energy resources. The outcome? Honeywell's Lugoj Manufacturing Facility now has complete electrical power backup, has reduced its cost for grid-supplied power by 30 percent, and has reduced its carbon footprint to advance Honeywell's worldwide sustainability goals.

SUMMARY

The growing trend of electrification across industries has transformed global energy production and consumption, making reliable energy supply a top priority for organizations. To enhance efficiency and reduce costs, energy management systems—comprising intelligent devices, communication networks, and advanced software—have become essential. Microgrids play a crucial role in this transition, enabling enterprises to connect to local smart grids, integrate renewable energy sources, and monitor energy consumption, production, and storage at the facility level. Global solution experts leverage their expertise to transform digitalized facility assets into integrated energy management solutions. These innovations not only optimize energy use but also strengthen business resilience, ensuring enterprises remain competitive in an evolving energy landscape.

For more information

automation.honeywell.com

Honeywell Industrial Automation

855 S Mint St

Charlotte, NC 28202

800-582-4263

www.honeywell.com

Document name Whitepaper | Rev A | MM/YR
© 2025 Honeywell International Inc.

Honeywell