

Low-Risk Solutions that Improve Availability and Reduce Costs

Ovation™ Green Solar PV and Battery Energy Storage Solutions



Table Of Contents

Click on the question for quick navigation to the answer

- [2 Are You Ready To Navigate The Challenges of Today's Dynamic Energy Landscape?](#)
- [3 Are you Prepared To Meet These Challenges? We Are. We Are Emerson.](#)
- [4 Why Should You Select Emerson As Your Trusted Renewable Automation Partner?](#)
- [5 What Solutions Does Emerson Offer As A Renewable Automation Partner?](#)
- [6 What Automation Technologies Do Emerson's Ovation™ Green Solutions Leverage?](#)
- [7 How Does Emerson Help Reduce Risk And Costs While Improving Operations?](#)
- [8 What Is Included With Emerson's Ovation Green Solar PV And Battery Energy Storage Solutions?](#)
- [9 How Has Emerson Demonstrated Impact And Proven Success Of Its Ovation Green Solutions?](#)
- [10 In What Ways Can Modern Energy Management And Automation Positively Impact Operations?](#)
- [11 Which Energy Management Functions Are Included With Emerson's Ovation Green Solutions?](#)
- [12 How Can Asset Management and SCADA Software Help Reduce Complexity?](#)
- [13 How Can Owners Or Operators Of Renewable Assets Address Cyber Threats?](#)
- [14 How Can Power Producers Guard Their Automation Platform Against Obsolescence?](#)
- [15 How Does Emerson Support Project Management And Implementation?](#)
- [16 What Resources Are Available To Support Emerson's Customers With Renewable Assets?](#)
- [17 Connect With An Ovation Green Solutions Architect.](#)

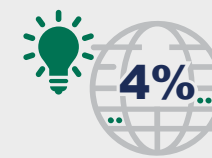


Are You Ready To Navigate The Challenges Of Today's Dynamic Energy Landscape?

The global solar PV and battery energy storage system markets are at an inflection point, fueled by technology advancements and the increasing demand for more sustainable energy solutions.

But the growth in solar PV and battery storage also brings several challenges:

- Market shifts driven by increasing load demand and the adoption of cleaner, sustainable energy
- Accelerating the expansion and diversification of renewable portfolios that require new technology and management approaches
- Greater complexity fueled by the increase in siloed data, higher maintenance costs and lack of scalability from the use of multiple disparate systems



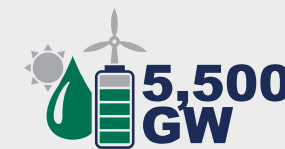
The unprecedented surge in **global electricity demand** is set to accelerate at close to 4% annually in the coming years as power-hungry sectors expand.

Source: International Energy Association(IEA)



Five-year U.S. load growth forecast surges 456%, to 128 GW; electricity demand driven by six regions is forecast to increase 15.8% within the next few years.

Source: Grid Strategies - Utility Dive



The world's renewable power capacity is expected to surge over the rest of this decade, with global additions between 2024 and 2030 forecast to almost triple to around 5,500 GW.

Source: International Energy Association (IEA)



Renewables produce significantly higher volumes of operational data than thermal sources, estimated at upwards of 50% more, because their distributed, weather-dependent nature requires monitoring many individual units with complex variables.

Source: Ovation Users' Group Presentation

Are You Prepared To Meet These Challenges? We Are. We Are Emerson.

As a global industrial technology and software leader, we:

- Leverage decades of expertise and a legacy of innovation to solve complex challenges across the world's most essential industries
- Deliver proven renewable solutions that scale to meet your changing needs
- Drive sustainable operations while improving efficiency, reliability, safety and profitability

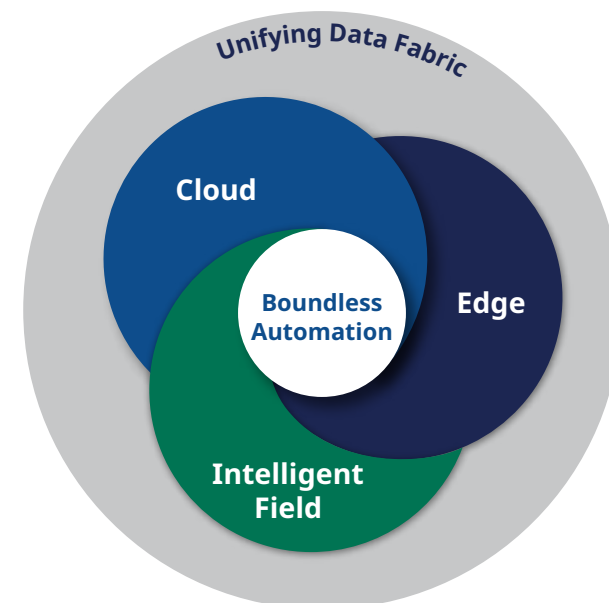
Partnering with Emerson can help ensure renewable operations meet the needs of your organization—and your customers—by:

- Navigating complexity and mitigating risk
- Reducing costs while improving multi-site operations
- Implementing engineered solutions backed by deep industry expertise and comprehensive support

The Future is Boundless Automation To Address Data Barriers And Modernize Operations

Unlock a future of multifaceted value with Emerson's Boundless Automation™ vision of a simplified architecture that drives operational excellence by removing data silos, liberating data and unleashing the power of software:

- Cohesive software-defined platform
- Spans cloud, edge and field
- Accessible, unrestricted data
- Holistic security
- Broad interoperability
- Unlimited scalability



Emerson drives innovation that makes the world healthier, safer, smarter and more sustainable.



Why Should You Select Emerson As Your Trusted Renewable Automation Partner?

We are committed to helping accelerate your clean energy transition with innovative, forward-thinking and supported solutions to meet your needs today ... and well into the future.

What Sets Us Apart?

1 Unrivaled Tech Stack
\$150 billion installed base of technology and software that serves the world's essential industries

2 Global Footprint
130+ manufacturing facilities worldwide provide local support

3 Proven Industry Expertise
20% of global power generation and 12 billion gallons of water treatment use Emerson solutions

4 Legacy of Innovation
Fortune Magazine's inaugural **"America's Most Innovative Companies"** and 6-time IoT Breakthrough Company award winner



We Help Our Customers Power A More Sustainable Future



#1 global
power automation market leader



Over **1.4 million** MWs total generating capacity



50% of North American power generation



20% of the world's generation



~50% largest U.S. cities' water and wastewater treatment



5+ Decades experience automating power and renewable assets

What Solutions Does Emerson Offer As A Renewable Automation Partner?

Emerson's dedicated Ovation™ Green renewable solutions combine our comprehensive power expertise, renewable applications, industry-leading automation platform and comprehensive service programs into a unified purpose-built portfolio.

As a trusted solutions provider, we work with global power producers every day to navigate decarbonization challenges and lead the transformation to a more intelligent power enterprise.

The result? Lower risk, increased availability, optimized performance and reduced costs.

OVATION™ GREEN

Our Solutions Provide ... That Enable You To:

Continuously evolving technology

Keep pace with changes and growth in a disciplined, balanced manner

An adaptive architecture

Easily scale from a single asset to secure, seamless integration of an entire fleet

Full data access

Obtain valuable insights that turn into actionable intelligence

A predictive, prescriptive approach

Make faster, data-driven decisions that drive efficiencies and reduce costs

A holistic operational view

Gain clear visibility and situational awareness of asset operations

Award-Winning Renewable Solutions

65,000+ wind turbines

3,500 sites - 42% NA hydro power

36,500 t/Year green hydrogen production

1,000's of MWs solar power

Over 10GWhr energy storage

100 nuclear reactors

Awards

2024 IoT Company of Year
2023 Frost & Sullivan Leadership

Scan for More About Ovation Green Solutions



www.Emerson.com/Ovation-Green



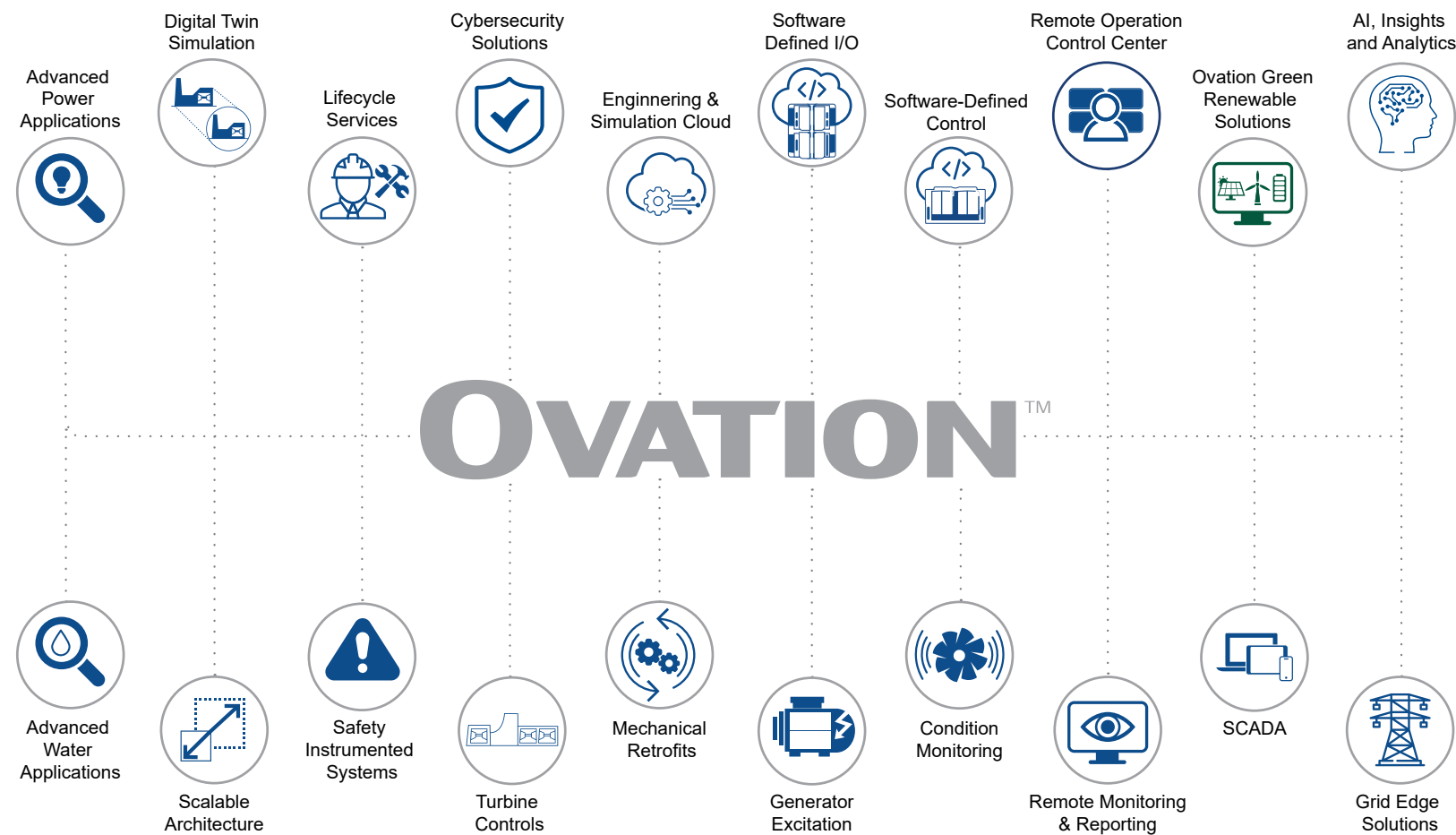
What Automation Technologies Does Emerson's Ovation Green Solutions Leverage?

Emerson's industry-leading Ovation™ Automation Platform provides the technology foundation for Ovation Green renewable solutions.

Ovation technologies and software embody over five decades of power industry expertise to form a modern, flexible, reliable and innovative platform for all generating types and fuels.

The Ovation platform keeps pace with rapidly changing automation technology and market demands by continuously evolving well beyond the bounds of traditional distributed control and data acquisition systems.

In addition to native, advanced applications for optimizing operations, the Ovation platform integrates cutting-edge technologies that will transform your operations with future-proof automation.



Ovation 4.0 Release To Deliver Software-Defined, AI-Ready Automation Platform for Power *Accelerates Plant Modernizations with a More Flexible and User-Centric Approach*

Our Innovations:

- Software-defined control and I/O
- Grid-edge ecosystem
- Ovation View HMI
- AI-based Ovation system assistance

Your Value:

- Achieve new levels of operational excellence
- Leverage interconnected data for better decision-making
- Unlock predictive strategies

Scan for More About Ovation 4.0



www.Emerson/Ovation-4

How Does Emerson Help Reduce Risk And Costs, While Improving Operations?

Emerson’s four key differentiators—Unrivaled Tech Stack, Global Footprint, Proven Industry Experience and Legacy of Innovation—work together to create a synergy of impact and value where the whole is greater than the sum of its parts. These combined strengths deliver customized solutions that are designed to mitigate risk while meeting specific business and operational objectives.



Unrivaled Tech Stack
Our integrated, data-driven platform removes complexity

- Drives profitability through improved safety, efficiency and reliability
- Reduces O&M costs and downtime via intelligent automation
- Optimizes asset performance through greater operational visibility
- Scales from a single asset to full power generation fleets
- Supports standalone or hybrid renewable deployments



Global Footprint
Our experienced worldwide teams reduce risk

- End-to-end system engineering, project management, factory acceptance tests and commissioning
- Responsive local, onsite support
- Skilled component and datalink mapping
- Established project management methodology

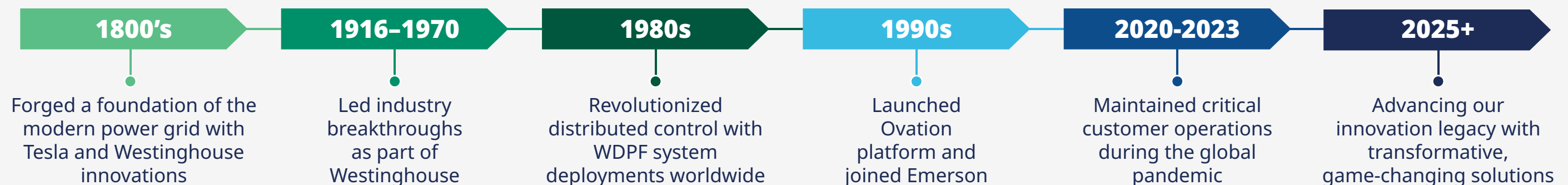


Proven Industry Expertise
We consistently deliver results backed by decades of proven success

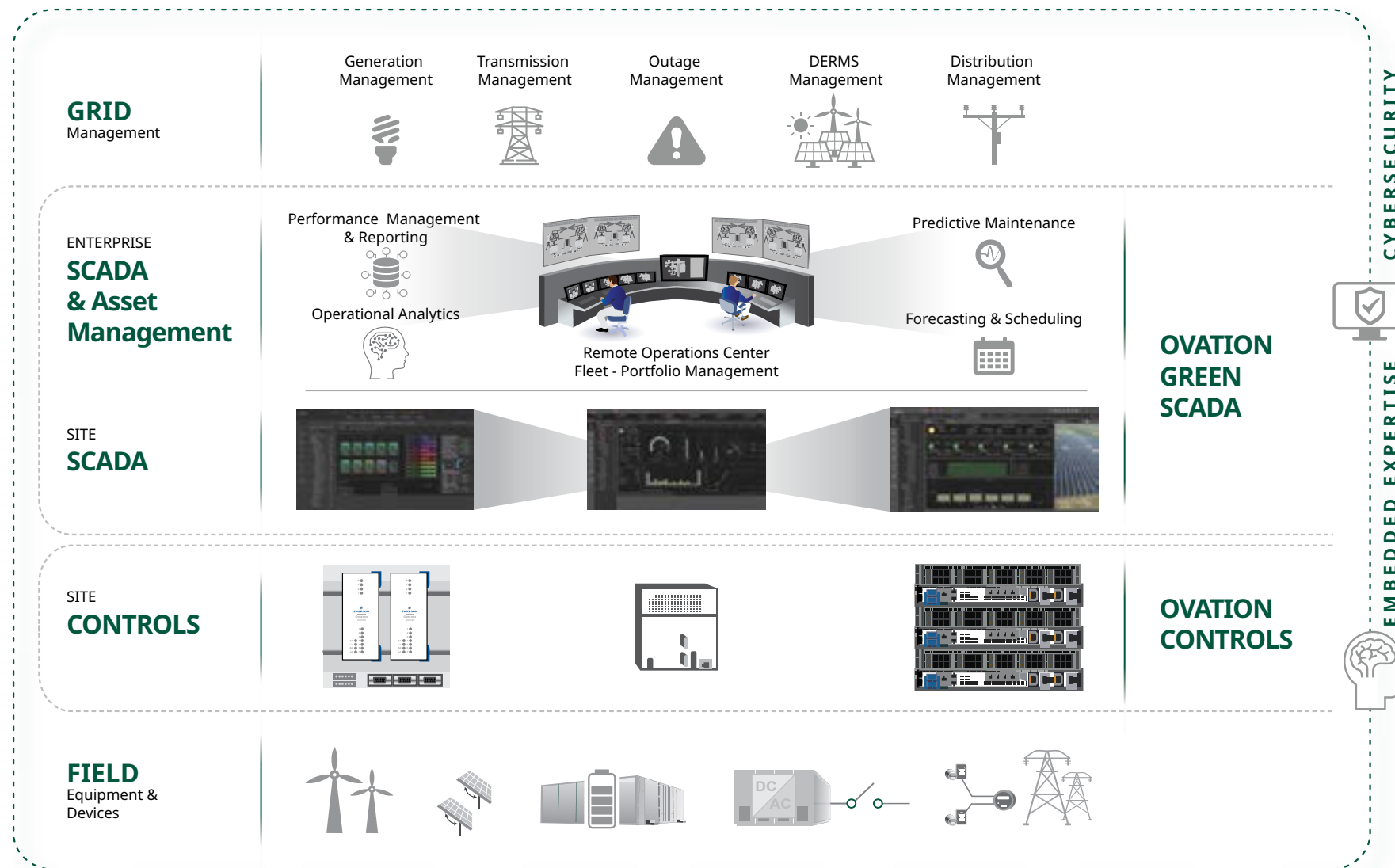
- Global project and support services from a single, trusted advisor, accessible 24/7
- Field-proven, high-value and low-risk control strategies
- Customizable, purpose-built logic
- Cybersecurity solutions and services
- Dependable, long-term lifecycle services and comprehensive support programs



Legacy of Innovation
We are embracing the future by leveraging a history of pioneering progress



What Is Included With Emerson's Ovation Green Solar PV And Battery Energy Storage Solutions?



Whether you're building new or retrofitting existing solar PV or battery energy storage sites, you can count on Emerson's purpose-built Ovation Green solutions.

Collaborate with a single trusted partner on comprehensive, integrated solar PV and battery storage solutions that combine our industry-leading Ovation automation platform, application expertise, project engineering and services to provide:

- Energy management
- Control and monitoring
- Asset management and SCADA
- Analytics
- Fleet management

- Open graphic-based control logic eliminates the frustration of 'black box' logic lockdown, providing you with the flexibility and scalability to adjust the logic and system configuration as your site expands and market conditions change. Plus, our redundancy options help to ensure increased reliability and resiliency.
- Obtain a clear view of your renewable operations through a single pane of glass with our Ovation Green asset management and SCADA software that provides full data access and actionable insights.
- Our site-to-grid control package seamlessly integrates individual components into a single control architecture. Ovation-based solutions maintain precise generation control by distributing proportioned setpoints from the system or grid operator to the inverters, helping to ensure consistent, reliable output and compliance with grid stability models.

How Has Emerson Demonstrated Impact And Proven Success Of Its Ovation Green Solutions?

Emerson is at the forefront of delivering innovative solutions that enhance operational efficiency, productivity and technological advancements across the power industry.

Below are two real-world applications of Ovation Green solar PV and battery energy storage solutions in action that address specific customer challenges, drive improvements and foster sustainable growth.



Lodestone Energy Helps Power New Zealand's Future with Nationwide Utility-Scale Solar Farms

Emerson's integrated, scalable solar PV solution:

- Helps ensure safety and reliability of the country's first large-scale solar PV projects
- Enables autonomous response and reaction to system operator dispatches
- Increases operational visibility or improved predictive decision-making
- Supports compliance with New Zealand's energy participation code



60MWh Texas Trio Battery Energy Storage Facilities Address Grid Stability in West Texas Wind Resource Area

Emerson's innovative battery energy storage solution:

- Integrates monitoring and asset control that reduces complexity while helping to ensure consistent operational performance
- Provides full data visibility that enhances situational awareness enabling faster, better decisions and more efficient asset management
- Enables operating with a single unified platform across all sites that simplifies system management and reduces costs

In What Ways Can Modern Energy Management And Automation Positively Impact Operations?

Emerson’s Ovation Energy Management System combines field-proven power plant controllers and purpose-built SCADA software to dynamically monitor, control and optimize asset performance. Its open architecture and standard protocols enable integration with diverse devices and systems, transforming aggregated and contextualized solar PV and energy storage data into actionable insights.

Our advanced, specialized algorithm suite streamlines battery and solar PV control through pre-built, out-of-the-box, customizable function blocks that distribute proportioned setpoints to individual components such as inverters and battery management systems. The control strategy automatically optimizes charge and discharge cycles and grid interactions for effective and efficient demand management.

This standardized approach enables quick deployment across multiple sites, reduces site visits and ensures consistent operations. Staff training is simplified since the system works uniformly across all equipment regardless of manufacturer.

Energy Management & Modern Automation Platform The Emerson Difference	
Feature	Value
Open Graphic-Based Logic	Easily adapt control strategies with full data access and user-led adjustments
Industry-Focused Software	Optimize operations with precise asset performance using proven, purpose-built, repeatable software and control logic
Self-Documenting Logic	Simplify maintenance and troubleshooting with automatic tracking of control updates
Common Engineering Tools	Deploy consistent strategies and reduce training with familiar engineering tools
Synchronized, Common Database	Instantly propagate control changes across the entire system with a single click
Comprehensive Protocol Suite	Unify multiple devices and systems into one integrated platform with an extensive communication library
High-Speed Data Capture And Recording	Quickly detect and analyze potential issues with high-frequency data recording
Built-In Redundancy	Ensure continuous operations with fault-tolerant, automatically self-healing system options



Which Energy Management Functions Are Included With Emerson's Ovation Green Solutions?



OVATION™ GREEN

Core Grid Code Requirements

Active Power Control

- Curtailment
- Ramp rate
- Setpoint dispatch
- Closed loop
- Delta (reserve)
- Frequency support

Reactive Power Control

- Power capability
- Setpoint dispatch
- Closed loop
- Fixed Q
- Fixed power factor
- Voltage support

Grid Compliance

- Grid fault detection and logging
- Single Point of Connection (PoC) grid measurements
- Grid losses calculation
- Energy produced/consumed

Extended Grid Services

Frequency Control

- Frequency containment reserve for downward disturbances
- Frequency reserve for upward disturbances
- Automatic frequency restoration reserve

PoC Grid Measurement

- Virtual PoC support
- Support for multiple PoC's at a single site

Power Plant Controller (PPC)

- PPC redundancy
- PPC – PoC grid meter redundancy
- Cluster PPCs

Substation RTU Interface

- Transmission system operator dispatch coordination
- Plant metering

Combined Solar PV and Battery Storage Functions

Energy trading support

Energy arbitrage

- Renewable energy smoothing
- Demand support
- Charge/discharge scheduling

Load leveling

- Peak load balancing
- Generation shaving

Production mirroring

Microgrid integration

Ancillary grid services

- Frequency and voltage regulation
- Reserves (spinning, non-spinning, supplemental)
- Black start support
- Voltage oscillation damping

How Can Asset Management And Scada Software Reduce Complexity?

Emerson’s purpose-built Ovation Green asset management and SCADA software features embedded renewable and power industry expertise that helps boost availability and enhance performance.

While renewable assets typically operate with equipment from multiple manufacturers and are managed by various control and monitoring technologies, Ovation Green SCADA communicates with other systems using a variety of protocols. This reduces complexity by enabling efficient management of single or multiple assets, regardless of equipment manufacturer or varying system types and vintages.

Clear visibility of an asset or fleet of assets regardless of type combined with full data access empowers owners or operators to anticipate operational or maintenance needs, enabling quick and confident decision-making to avoid costly problems.

Asset Management and SCADA Software The Emerson Difference	
Feature	Value
Open Graphic-Based Logic	Unlock actionable insights enabled by full data access
Scalable Software	Flexibly adapt SCADA capabilities to keep pace with evolving portfolio needs
Common HMI	Provide unified, secure operational visibility across assets and locations
Alarm Management	Enhance situational awareness with an integrated, comprehensive, navigable alarm management system
Live Logic Diagram View	Quickly adapt control processes with simplified, intuitive tuning and management tools
Standardized Strategies	Ensure consistent performance through proven strategies based on best practices and familiar engineering approaches
Trending	Proactively identify operational anomalies with advanced multi-view trend analysis and automatic reset capability
Reporting	Efficiently meet local, regional or national requirements with automated reporting functions
Enterprise Data Solutions	Enable secure, remote access to critical plant data
Historian	Seamlessly capture, store and retrieve comprehensive operational data with a fully integrated historian
Security Tools	Create a stronger, robust security posture with embedded system cybersecurity features and functions based on best practices

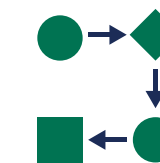
Expertly Engineered Renewable Solutions Any Asset – Any Application – Any Location

Emerson’s modular, adaptable Ovation Green solutions with integrated asset management and SCADA software are designed for universal compatibility across all generating assets, applications and installations.



Cross-Asset Interoperability:

Seamlessly integrate **ANY** generation type within a portfolio such as solar, energy storage, green hydropower, hydrogen, nuclear, wind and fossil generation



Application Flexibility:

Scalable, engineered strategies support **ANY** application such as local asset controls, enterprise performance management and grid-edge automation



Location-Independent Deployment:

Control and monitor assets from **ANY** place across diverse geographical sites or within an organization such as centralized operations centers



How Can Owners Or Operators Of Renewable Assets Address Cyber Threats?

The Ovation Automation Platform is designed with security in mind, with features built into the system and additional functions provided by Emerson's purpose-built Power and Water Cybersecurity Suite of solutions and services.

Our adaptable cybersecurity programs help to further safeguard your assets by proactively tackling threats to reduce risk and strengthen your security posture.

Applications

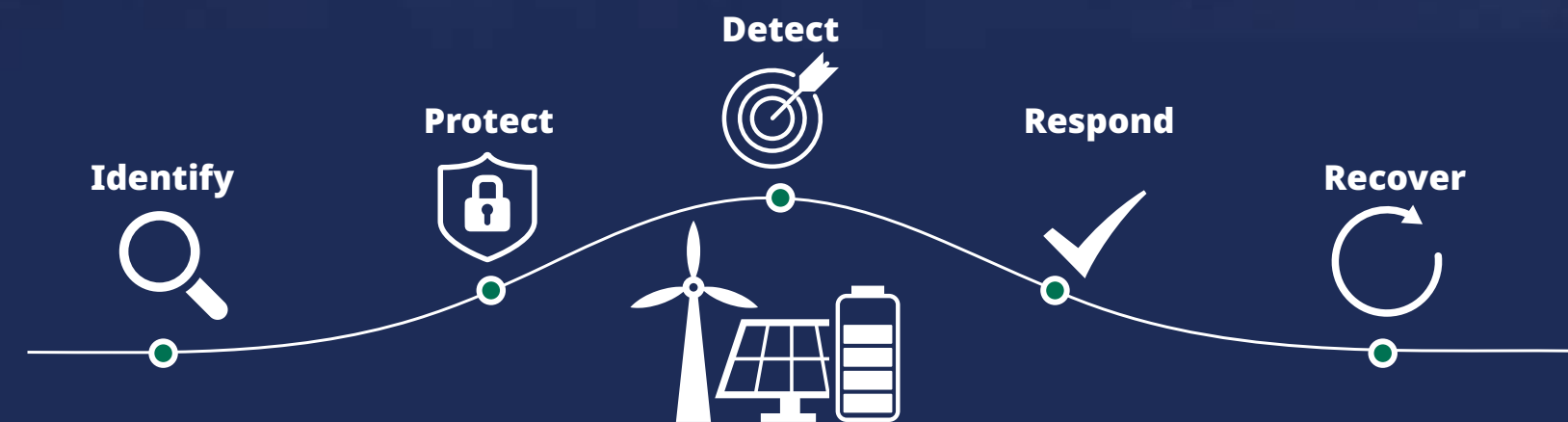
- Cybersecurity dashboard
- Antivirus protection
- Application control
- Configuration management
- Device control
- Network security monitoring
- Patch management
- Rogue system detection
- Security & incident event management
- System backup & recovery

Services

- Vulnerability assessment
- Scheduled services
- Emergency services
- Compliance programs
- Fleet or district programs
- Plant system assessment
- Network analysis
- Consulting – gap analysis

SAFETY ACT Designation and Certification

After a thorough application, review and testing process by the Department of Homeland Security (DHS) under the U.S. Support Anti-terrorism by Fostering Effective Technologies Act of 2022 (SAFETY Act), Emerson's Ovation control solution has been both Designated and Certified by DHS as Qualified Anti-Terrorism Technology.



Leading the Charge on Renewable Cybersecurity

The ever-increasing cyber threat landscape for the power grid becomes more challenging when addressing renewable assets, such as solar, wind and battery storage, due to their highly distributed and interconnected systems and ownership or operations by multiple organizations.

Hackers aren't standing still, and neither are we. Emerson's experts provide our customers with best practices, practical guidance and a risk-based, defense-in-depth approach to help strengthen cybersecurity postures and protect assets.

How Can Power Producers Guard Their Automation Platform Against Obsolescence?

It can be challenging to balance advancing technology with demands for performance, safety and reliability. Our customized end-to-end lifecycle management programs mitigate risk and extend the return on your automation solution investment with consistent, reliable operations. Comprehensive lifecycle services keep your automation platform and software performing safely and optimally through:

Ovation Product Support

- 24/7 expert phone support, remote diagnostics, operating system and antivirus patches, third-party hotfixes and Ovation patches and minor version updates
- Delivered through Emerson's Guardian™ digital platform

Ovation Lifecycle Services

- Extended support programs
- System upgrade programs
- General system services
- Specialty product services

Other Available Services

- Power and Water Cybersecurity Suite Services
- Educational Services
- Engineering Services

Comprehensive Service and Support The Emerson Difference	
Expertise	Value
Product Support	Prevent downtime or costly maintenance through proactive system performance management
Maintenance & Field Service	Ensure reliable and safe system operation with responsive local teams, supported by a deep bench of remote experts
Remote Monitoring	Diagnose and resolve system issues instantly, regardless of location, by virtually connecting with system experts
Training	Empower staff with tailored, performance-driven training solutions to drive success



GUARDIAN™



End-to-End Software Lifecycle Management

Emerson's Guardian digital experience enables Ovation users to efficiently manage the end-to-end lifecycle needs of their automation software.

How Does Emerson Support Project Management And Implementation?

Emerson experts are with you from concept to completion. We offer full-scope project management throughout the project lifecycle—from planning and testing to installation and commissioning. Our teams, steeped in power industry and automation experience, as well as ISO-certified quality procedures, ensure successful implementation of even the most complex projects.

Project Management and Implementation The Emerson Difference	
Expertise	Value
Project Implementation	Deliver customized solutions through collaborative, experienced power engineering teams
Communication	Provide comprehensive integration for diverse equipment with expert networking and data link engineers and a vast library of communication protocols
Project Management	Manage complete project lifecycle from planning, testing, installation and commissioning to service and support
Quality	Consistent, high-quality system design through ISO-certified procedures



Ensuring Quality Every Step of the Way

Customer satisfaction drives everything we do, especially when implementing projects. Emerson's commitment to project excellence is backed by a rigorous quality assurance program. Grounded in our ISO 9001:2015 certification, the program ensures systematic actions to consistently deliver the high-quality solutions, products, and services our customers expect.

1



START

Early engagement
Site walk-downs

2



INSTALL

Pre-outage work
Demo, install & power-up

3



PLAN-DESIGN

Kickoff meeting
System design & reviews

4



TEST-COMMISSION

I/O loop & functional tests
Startup & tuning

5



IMPLEMENT-TEST

Procurement & configuration
Factory acceptance testing

6



COMPLETE

Acceptance testing
Lifecycle services

What Resources Are Available To Support Emerson's Customers With Renewable Assets?

The Ovation Users' Group is a community for customers who operate with the Ovation Automation Platform and Ovation Green Solutions.

This unique group is where customers come together with Emerson leadership and experts to share insights, broaden perspectives, help envision our future and grow our skills so we can solve the unsolvable together.



A Customer Board: Executive and auxiliary boards, staffed by customer representatives, help ensure an open forum for the exchange of information, ideas and best practices among users.



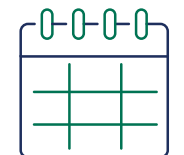
Committees: Focused committees, including a dedicated renewables committee, address member needs by tackling specific topics.



Direct Product Input: Top Ten Program provides a vehicle for customers to have a direct voice in the continued evolution and improvement of the Ovation Automation Platform.



Dedicated Website: Secure access to a users-only site for exclusive Ovation Automation Platform product, service and support information, documentation and an open forum for topics of interest.



Newsletter: A monthly communication that highlights important notifications, featured product and service updates and other notable topics.



Energizing Conferences For Users by Users



Ovation users gather annually at our industry-leading technical conference for power industry automation.

The conference features:

- **Technical breakout sessions** on cutting-edge technologies and solutions
- **Inspiring speakers** share insights and future visions
- **Interactive exhibits** for hands-on demos and expert guidance
- **Networking events** to connect with industry peers and expand your network



The Emerson Exchange technical conference provides a forum where professionals from numerous process industries exchange valuable information and learn about Emerson's broad portfolio of industrial automation solutions.

Connect With An Ovation Green Solutions Architect.

Discover how Emerson's team of power and automation experts can help accelerate your organization's clean energy transition.

Scan Now to Contact an Ovation Green Specialist



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