

DOOSAN GRIDTECH SOLUTIONS

Distributed Energy Resource Optimizer[®] (DG-DERO[®])

A field-proven distributed energy resource management system (DERMS), providing control, monitoring and optimization of distributed energy resources (DER). Be it a single energy storage system or a fleet of thousands of devices, **DG-DERO[®] works to maximize the value of DERs** through a flexible, modular, and configurable set of applications.



BENEFITS AT A GLANCE

Optimizes Value

Multiple applications are optimized on intra-hour, hourly, or daily time horizons as conditions change.

Simplifies Fleet Management

Serves as a central hub for all DERs – no need for multiple custom portals as DERs proliferate.

Scales as the Fleet Grows

Modular, flexible architecture allows for scaling to '000s of devices.

Lowers Risk

Embrace of open-standards both lowers the cost and time for DER integration and preserves flexibility to add or swap components in the future.

FEATURES & FUNCTIONALITY

- Dispatch and scheduling interface for both system-wide and individual asset control.
- Optimization considers both the bulk power market – energy, capacity, and frequency services - and local grid operations – voltage support and congestion management.
- Integrated forecasting capability for load and prices.
- Web-based interface with detailed reporting functionality to monitor fleet performance.
- User-configurable secure system access – read-only users, users, and administrators – ensures the right level of access for every stakeholder.
- Standardized communication and control of aggregated resources through a common interface, avoiding custom interface confusion.
- Standards-based communication protocols (e.g., DNP3, MODBUS) aligned with DER open standards-based information models (MESA, SunSpec, and OpenADR).
- Architecture designed to interface with existing utility IT systems (e.g., market trading systems, historians, etc.).
- NERC-CIP compliant, Windows server-based software to minimize cybersecurity risks.



APPLICATIONS FOCUSED ON VALUE CREATION

DG-DERO® has an ever-expanding suite of value creating applications. Applications are optimized according to the relevant time-horizons. Value creation is maximized with optimization occurring every five minutes in response to changing conditions. Applications can be configured to meet each customers' unique needs.



Energy Arbitrage: 1 – 5 day look ahead, once per day



Renewable forecast variance: Looks ahead 60 mins; every 60 mins



Energy Imbalance Mitigation: Looks ahead 5-60 mins; every 5 – 10 mins



Peak Load Reduction: Looks ahead 5 mins - 6 hours, every 5 mins



Real-time Price Dispatch: Looks ahead 5 mins - 6 hours, every 5 mins



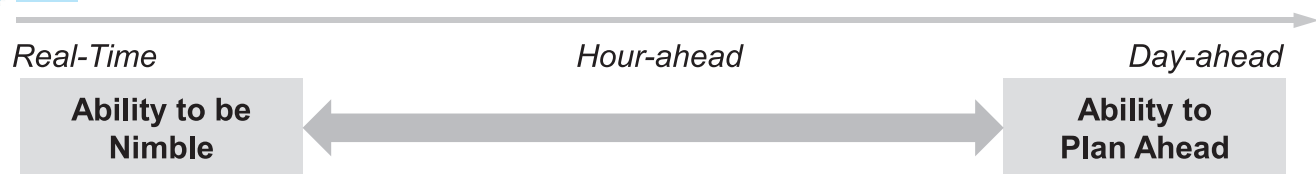
Congestion management: Looks ahead 5 mins - 6 hours, every 5 mins



SOC Correction: Every 5 mins, behind the scenes

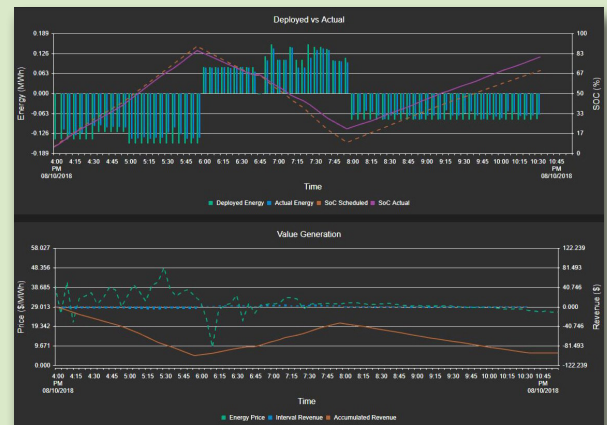


Voltage Support: Every 1-5 minutes



CUSTOMERS HAVE BENEFITED FROM DG-DERO® IN MULTIPLE USE CASES

- Distribution utility automatically dispatches energy storage to mitigate wind forecast variance – avoiding expensive purchases of power from the spot market.
- Unexpected deviations from a utility's load forecasts are avoided automatically by charging or discharging a fleet of ESSs – avoiding charges from the balancing authority.
- Distribution utility dispatches a set of behind-the-meter ESSs to minimize transmission system demand charges.
- Distribution utility engages a combination of ESS and solar photovoltaic (PV) resources to provide voltage support services on circuits with high penetration of rooftop PV.



About Doosan GridTech®

We are an award-winning team of power system engineers, software developers, and turnkey energy storage installation specialists. We help electric utilities and other megawatt-scale power producers evaluate, procure, integrate and optimize energy storage, solar power, and other distributed energy resources. Our multi-disciplined teams in Seattle, Melbourne, and Seoul have designed, built, and controlled over 30 energy storage installations in the Americas and Asian-Pacific regions – representing 310MW of capacity. Ranked as one of the top energy storage solution providers by Navigant Research and Bloomberg New Energy Finance, we are the proud recipients of two Grid Innovation Awards from GreenTech Media. Our parent company, Doosan Heavy Industries & Construction Co. Ltd., is a multi-billion-dollar global conglomerate that serves the infrastructure development needs of the power and industrial markets.