DOOSAN GridTech

END-TO-END FLEXIBLE & SCALABLE ENERGY STORAGE SYSTEMS

01 DOOSAN GROUP OVERVIEW

DOOSAN GRIDTECH

Doosan Group

Oldest Company Incorporated in Korea

- One of top 10 conglomerates in Korea, active in engineering and manufacturing of power plants, construction equipment, industrial facilities, engines, construction
- Doosan is the oldest conglomerate in Korea with over 126 years of history but one of the fastest growing company, achieving 10% average annual growth in Sales over the last 17 years.
- Strong aspiration for accelerated globalscale growth, with focus on Infrastructure Support Businesses
 (ISP) reaching total sales of \$16.3 billion

(ISB) reaching total sales of \$16.3 billion in 2017

Doosan Corporation

- Electro-Materials
- Fuel Cell Power
- Digital Innovation
- Retail

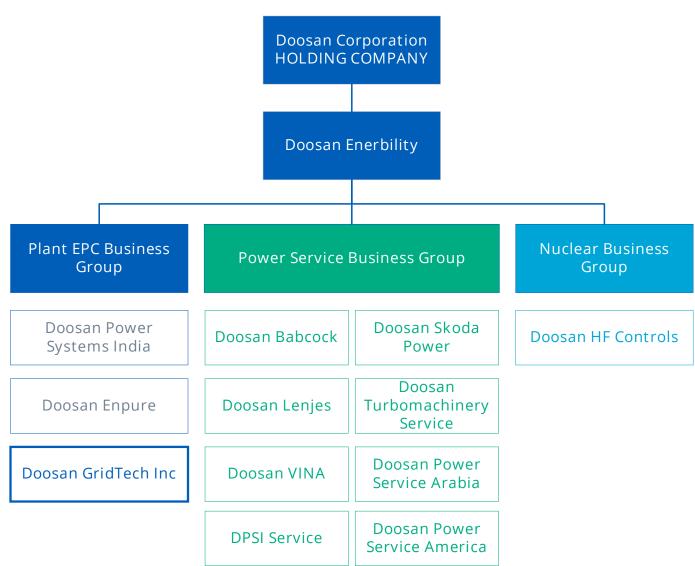
Affiliates

- Doosan Enerbility
- New energy solutions
- Power plant equipment / Services 🜉
- Plant EPC / Construction
- Material manufacturing
- Doosan Bobcat
- Doosan Industrial Vehicle
- Doosan Fuel Cell
- Doosan Mecatec
- Doosan Robotics
- Doosan Mobility Innovation
- Doosan Logistics Solutions
- Oricom
- Hancomm
- Doosan Magazines
- Doosan Bears
- Doosan Cuvex



Doosan Enerbility

Core Business Organization



Extensive Global Operation

Doosan Enerbility has strategically organized global networks of engineering, manufacturing, and service to be a global leader in the power & water business.



02 ABOUT US

Doosan GridTech

Delivering sustainable power where and when it is required.



Our Vision

Our vision is to deliver flexible and scalable energy storage systems through the design of intelligent, award-winning software built on open standards for the delivery of renewable and sustainable power where and when it is required.

Our Mission

Our mission is to enable a safe, reliable, and sustainable low-carbon power grid to withstand the energy demands of the future. With environmental stewardship and economic growth at the forefront, our intelligent software and energy storage systems are bankable, scalable, and reliable. Our state-of-the-art end-to-end energy storage solutions are key to the longevity of energy distribution. We bring flexibility at all project execution levels from Design and Delivery, Control & Optimization Software, System Integration, and Operations and Maintenance.



Creating the **flexible**, **low-carbon**, **digital grid** of the future

DOOSAN GridTech

| Put intelligence where its needed | Develop interoperable solutions | Provide end-to-end services | Optimize renewable energy integration |
|--|--|--|--|
| Develop a multi-tiered software platform to make the right decisions at the right places on the grid | Embrace open standards and flexibility to lower customer costs and preserve their choice as they adopt distributed resources | Provide power systems expertise at all stages of the DER and renewable lifecycle, capturing the resource's full potential | Find ways to optimize the integration of renewable energy on the grid, lowering costs to deliver it and maximizing its consumption |

Executive Leadership Team

Our dedicated leadership team possesses a depth and breadth of knowledge and experiences that are unmatched in the battery storage and clean energy industry.

- Seasoned leadership team with decades of experience in the software and energy space
- Leadership experience at technology, energy, and industrial companies

Steve Levy Chief Sales Officer



Australia Paul Mazlin Managing Director, A

Young



General Counse retary,



• 75+ employees



Financial Office lmo Kim nief



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Dawn

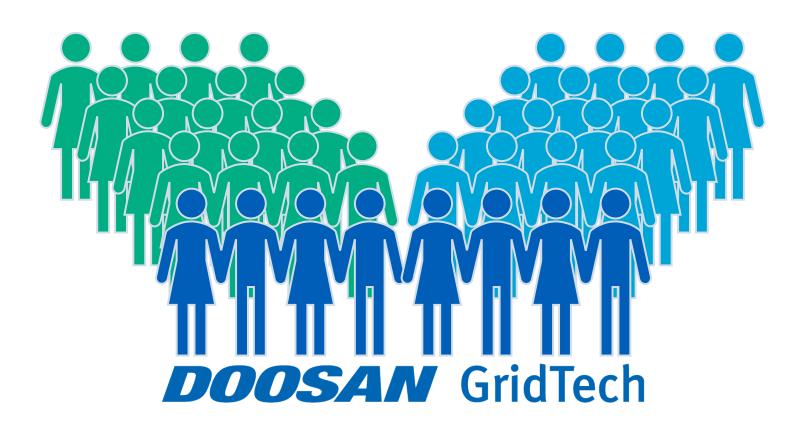


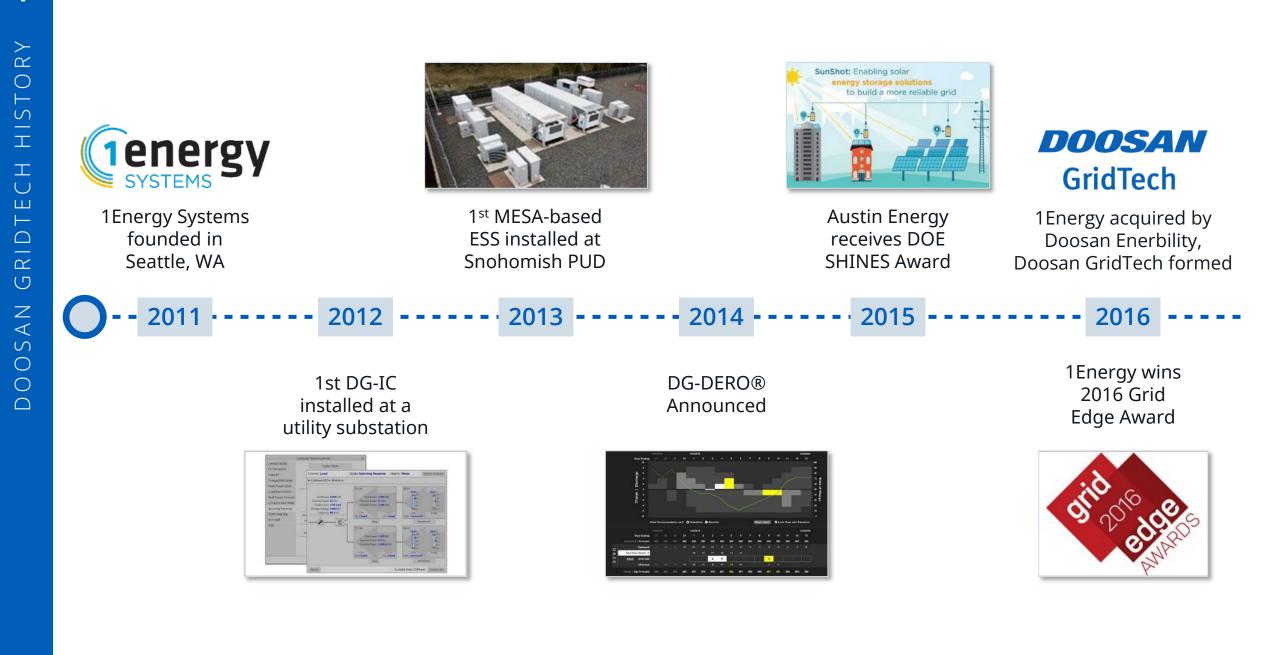
The Right Team

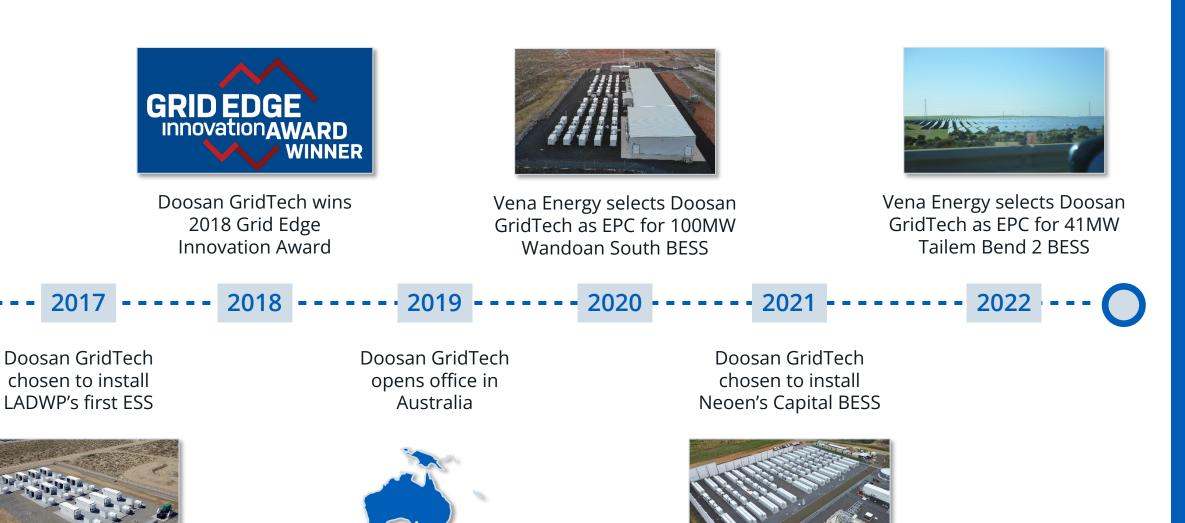
Software + Power Experience

Software Engineering

Power Systems Engineering







03 END-TO-END ENERGY STORAGE SOLUTIONS

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What We Do

Doosan GridTech provides utility-scale energy storage system integration utilizing our intelligent control software platform, DG-IC[®], and an agnostic approach to hardware. Our design solution enables Doosan GridTech to procure major equipment with a range of top-rated suppliers to provide a more flexible approach to project execution and customer cost savings.

BESS Design & Delivery



We take your operational and energy storage objectives, field practices, and equipment requirements and design reliable, highperforming turnkey systems. Dedicated to safety, operational excellence, and an ontime/on-budget delivery, we work collaboratively with you to maximize your energy storage investment.

Energy Storage System Control Software

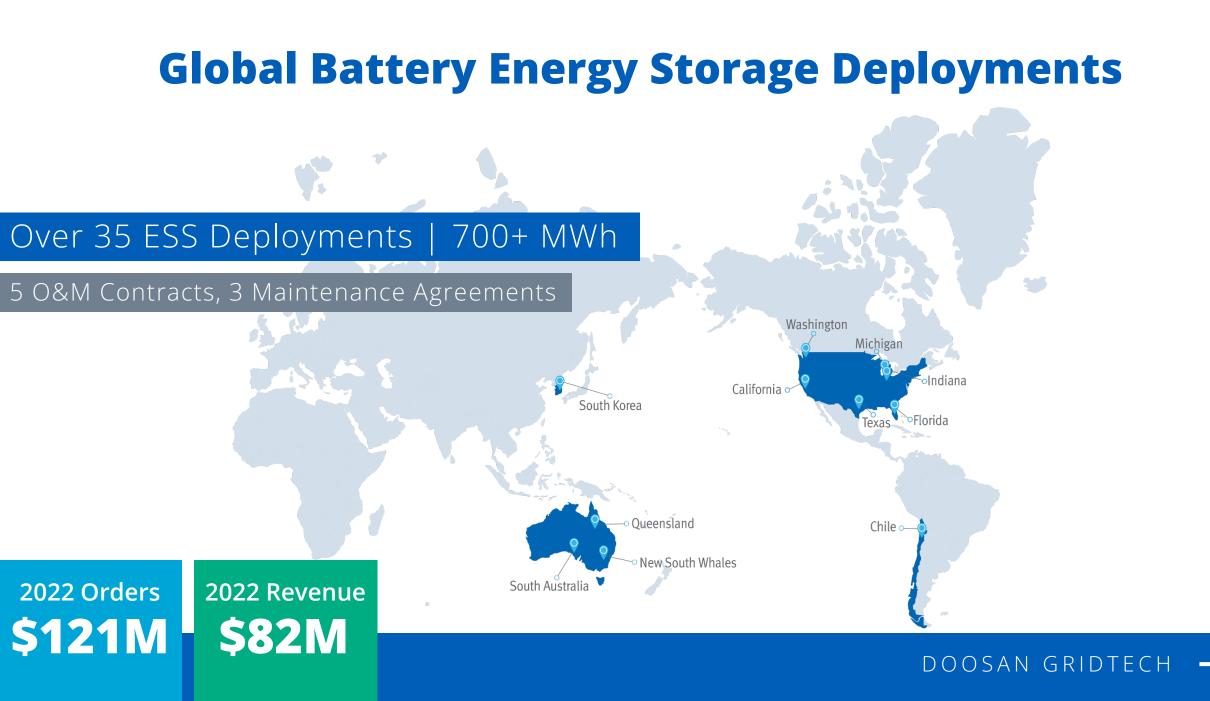


Our fully-flexible, multi-tier intelligent controller operates at both site and fleet dispatch levels and provides the predictive intelligence needed to realize the highest value from your ESS system. Our timetested, field-proven, award-winning software has more than 600,000 hours of run time on field installations.

System Integration & Maintenance Support



We offer a wide range of installation and commissioning services, and we can assume responsibility for the network and software integration, installation, and performance. We can also provide maintenance and longterm service agreements over the life of the warranty.



Our Client Partnerships

Trusted to be BESS and EMS provider on series of first BESS's for early market progressive utilities.













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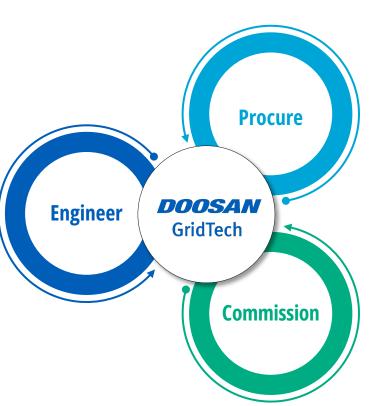




Solid EPC Capabilities and Supplier Network

Engineering Center of Excellence

- Engineering experts with a wide range of experience in EPC projects (large-scale, standalone, hybrid BESS (PV), etc.)
- Software, application, power systems, network and control, compliance, commissioning, and civil structural engineers with 10+ years of experience, master's degree in engineering
- Customer-oriented services for end-to-end design and implementation of the balance of plant
- Strong understanding of grid system
- Sophisticated software development capability for command-and-control system, including multiple applications
- Optimization of AI-enabled algorithms based on historical or simulated data



Global Supply Chain

- Track record working with top-tier global manufacturers on the back of DGT's chemistry-agnostic software technologies
- Key global battery suppliers:
- GOTION CATL SAMSUNG SDI CLG Energy Solution
- Key global PCS suppliers:





Strong capability of project management and commissioning

- Strong capability in implementing industry best practices
 - Full PM, site, delivery, QC & HES management
 - Commissioning & performance test
 - Operation & maintenance

04 ENERGY MANAGEMENT I SYSTEM

Doosan GridTech's fully-optimized, market-leading control platform **places decision making intelligence where it is most effective**

Flexible, Autonomous, Scalable, Reliable, and Safe DG-IC® Intelligent Controller

PERFORMANCE ANALYZER

DG-DERO® Distributed Energy Resource Optimizer

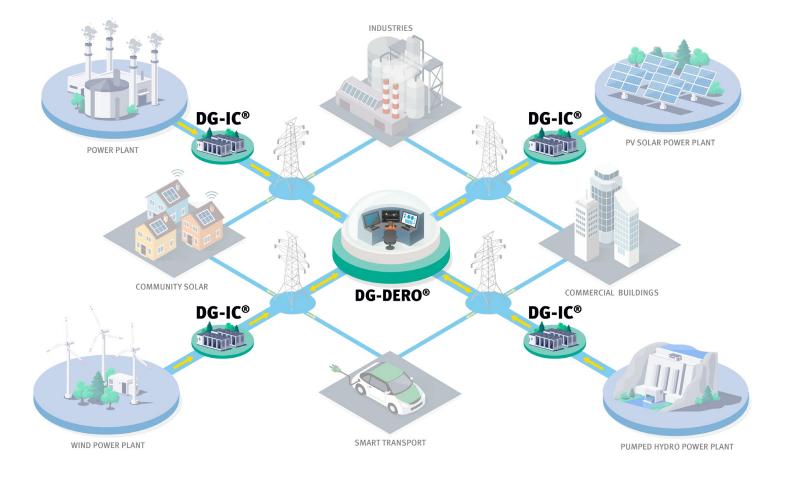
Extensible artificial intelligence amplifies energy management performance for battery energy storage and hybrid power systems. Maintain the health and forecast performance of system

Works to maximize the value of Distributed Energy Resources through a flexible, modular, and configurable set of applications.

BESS Applications

We created this control platform to be able to serve any ESS use-case.

From bulk power system applications to remote community backup support and reliability to integrating renewable power on a circuit using multiple ESSs.





Intelligent Software



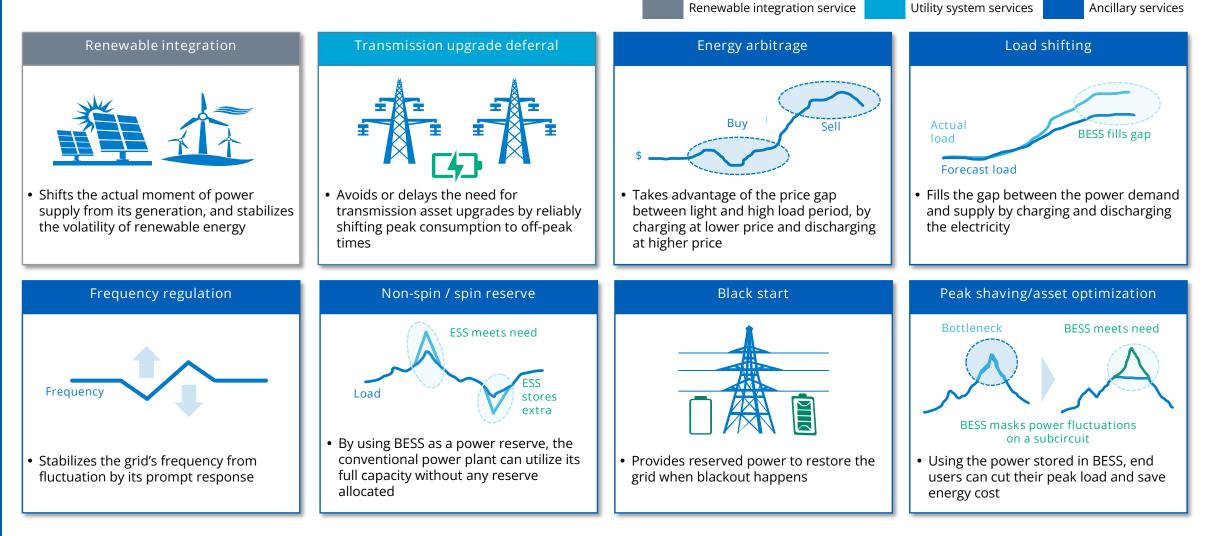
Grid Energy

Storage

Distributed Generation

Software Applications and Benefits

Doosan GridTech offers a wide range of identified key energy storage value streams with the AI-enabled platform, satisfying each customer's objective and specific environment



DG-IC® Doosan GridTech Intelligent Controller®

Extensible artificial intelligence energy management for battery energy storage and hybrid power systems. Fully flexible, precision programming delivers safe, reliable control, and optimization with rapid response to changing conditions in real-time. The DG-IC® provides the interface for communications between the devices in the system and remote operators and other data collection systems, such as SCADA.

Cost-effectively integrate renewable energy while maintaining high power quality and reliability



DG-IC®

Benefits at a Glance



DOOSAN GRIDTECH

Responds Quickly

Prioritized operating modes with sub-second response to variations in real or reactive power, voltage, and frequency mean a quick response to your most pressing needs.

Adapts Readily

Configurable parameters, constraints, and settings and a commitment to open standards-based communications ensure the systems can meet your specifications in AC and DC coupled applications.

Delivers Safely & Reliably

Built-in features - maintenance mode, three-tier alarm system, failsafe shutdown – ensures personnel, the grid, and the system are safe.

DOOSAN GRIDTECH

Operating Modes Align with Value Streams

DG-IC® covers multiple use cases

The DG-IC® provides opportunities to avoid costs and losses as well as opportunities for income.

| ESS Real / Reactive Power | ESS Power Limit | ESS Power Factor |
|------------------------------|----------------------------|----------------------|
| SOC Management | Power Following | Load Following |
| Generation Following | Power Factor Correction | Power Smoothing |
| Peak Power Limiting | Volt/VAr | Volt/Watt |
| Frequency/ Watt | AGC | Spinning Reserves |
| | Voltage Smoothing | |

Optimizing Value

Optimizing value across the power and energy application spectrum for new systems and retrofits.

| | APPLICATION | USE CASES | DG-IC OPERATING MODES |
|--------|----------------------|--|---|
| POWER | Voltage Regulation | Renewable Power IntegrationRemote community support | Voltage Smoothing Dynamic Volt/VAr Dynamic Volt/Watt |
| | Frequency Regulation | Ancillary servicesContingency reserves | Automatic Generation Control (AGC) Frequency/Watt Spinning Reserves |
| | Islanding | Outage ManagementNon-wires Alternatives | SOC Management |
| | Solar + Storage | Power FirmingEnergy Shifting | Generation FollowingESS Real Power |
| | Peak Management | Demand Charge ManagementPeak Shaving | Demand Charge ManagementReal Power Response |
| ENERGY | Energy Arbitrage | Energy Market Participation | ESS Real Power |

DOOSAN GRIDTEC

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DG-PAN

Doosan GridTech Performance Analyzer™

- Using historical data and sophisticated models underscored by artificial intelligence, provides meaningful predictions to assist operational decision-making
- Allows automated reporting that sends customized reports to various stakeholders
- Allows system operators to create custom key performance indicators, benchmarks, and visualizations

Secure visibility into the current and expected status of assets in real-time



DG-DERO®

Distributed Energy Resource Optimizer®

A field-proven distributed energy resource management system, providing control, monitoring and optimization of distributed energy resources. 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.

Better management of the grid and less electricity wastage



DG-DERO®

Benefits at a Glance





Optimizes Value

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

DOOSAN GRIDTEC

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 1,000's of devices.

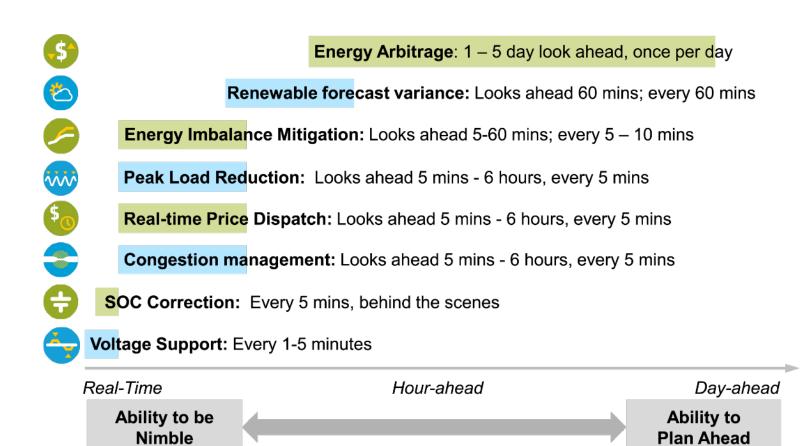
Lowers Risk

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

Applications Focused on Value Creation

DG-DERO® applications cover multiple use cases

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.



How We Cybersecure Your Investment

Our "Defense in Depth" Pledge

We will uphold these layers of protection — each working to contribute to the overall security of your digital assets Information integrity and access controls

Employee policy, practices, and procedures

Internal and perimeter network-level protections

Server and client-based logical and physical protections

Application logic, error checking, and data validation controls

05 KEY EPC EXPERIENCE

Tailem Bend 2 41MW BESS – Hybrid

Vena Energy



Location: Tailem Bend, Australia Utility Offtaker: ElectraNet Battery: CATL Inverter: Power Electronics Control Software: DG-IC[®]

Open Standards for Energy Storage

Purpose:

To counter the intermittent nature of solar generation and maximize the solar plant's profit while providing ancillary services to the National Electricity Market.

Challenge:

Frequency and voltage support in 250ms

Doosan Role:

EPC Contractor, System Integrator & EMS Provider. O&M included.



Capital 100MW BESS – Standalone

Neoen



Location: Australian Capital Territory – Australia Utility Offtaker: Neoen Battery: CATL Inverter: Power Electronics Control Software: DG-IC® Open Standards for Energy Storage

Purpose:

Support and stabilize ACT's electricity grid by providing power to help avoid blackouts during periods of high demand and when large fossil fuel generators fail in heatwave conditions

Challenge:

Respond to frequency changes to prevent voltage and frequency collapse

Doosan Role:

EPC Contractor, System Integrator & EMS Provider. O&M included.



Wandoan South 100MW BESS – Standalone

Vena Energy



Location: Western Downs Region – Australia Utility Offtaker: AGL Energy Battery: Samsung SDI Inverter: Power Electronics Control Software: DG-IC[®]

Open Standards for Energy Storage

EPC Contractor, System Integrator & EMS Provider. O&M included.



Purpose:

To play a major role in improving grid stability and support the state's shift to renewable energy. Part of Wandoan South Project, approved to generate 1GW of solar energy and 450MW of energy storage

Challenge:

Doosan Role:

Frequency and voltage support in under 100ms

First registration of ESS into the Australian "National Electricity Market"

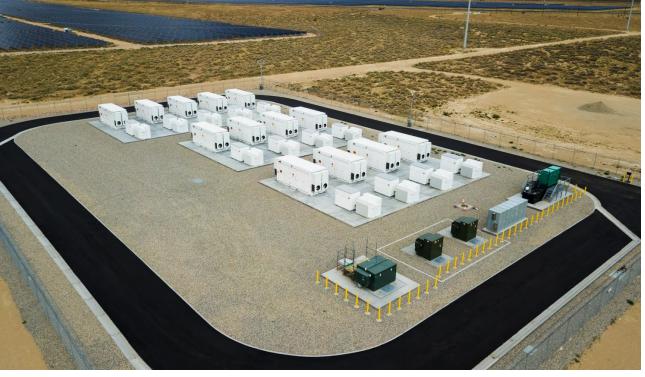
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Beacon Solar Plant 20MW BESS – Co-located with Solar

Los Angeles Department of Water & Power



Location: Kern County, CA Utility Offtaker: LADWP Battery: Samsung SDI Inverter: SMA Control Software: DG-IC[®]

Purpose:

To allow greater use of solar and wind generation in the area as well as helping maintain grid reliability and lowering use of LADWP's natural gas generators

Challenge:

Deliver modular turnkey design to confront harsh desert conditions at an availability of over 99% for 10 years

Doosan Role:

EPC Contractor, System Integrator & EMS Provider. Maintenance agreement included.



Kingsbury 1.5MW BESS – Co-located with Solar

Austin Energy

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Location: Austin, TX Utility Offtaker: Austin Energy Battery: LG Chemical Inverter: Parker Control Software: DG-IC[®] and DG-DERO[®]

Purpose:

• Kingsbery ESS is co-located with the La Loma community solar array (2.6 MW). It will provide voltage support services on the local circuit and perform energy arbitrage within ERCOT market to maximize local use of solar production

Challenge:

 Integrate high levels of renewable energy on distribution level circuit

Doosan Role:

• System Integrator & EMS provider



MESA 1 & 2 BESS – Standalone

Snohomish County Public Utilities District



Location: Everett, WA Utility Offtaker: Snohomish County PUD Battery: Mitsubishi, LG Chemical, and UET Inverter: Parker and Siemens Control Software: DG-IC[®] and DG-DERO[®] Open Standards for Energy Storage

Purpose:

 Two ESSs were deployed at the same substation and demonstrated the capability of the DG-IC[®] to manage more than one ESS at the substation. The third ESS is an energy dense vanadium redox flow battery, with another DG-IC[®] control system. All ESSs were deployed using the MESA standards, ensuring that SnoPUD has standardized communication interfaces, uniform scheduling capability, and reliable security parameters. Doosan GridTech's DG-DERO[®] is the keystone of SnoPUD's program.

Challenge:

• Holistically design, grid integrate, and optimize a set of energy storage systems

Doosan Role:

• System Integrator & EMS provider



Atterbury 5MW BESS + 2MW PV - Hybrid

Duke Energy



Location: National Guard – Camp Atterbury, IN Utility Offtaker: Duke Energy Battery: Samsung SDI Inverter: SMA Control Software: DG-IC[®] Open Standards for Energy Storage

Purpose:

Improves customer reliability and ensures power supply to mission critical military operations, accesses the fast frequency regulation market, and integrates with distribution operations to provide grid support services as needed

Challenge:

Deliver microgrid for large National Guard base as a utility resiliency service

Doosan Role:

EPC Contractor, System Integrator & EMS Provider. O&M included.



Jennings 5.5MW BESS – Standalone

Duke Energy

GRIDTECH

DOOSAN



Location: Jennings, FL Utility Offtaker: Duke Energy Battery: Samsung SDI Inverter: SMA

Open Standards for Energy Storage

Purpose:

Improves customer reliability and ensures power supply to mission critical military operations, accesses the fast frequency regulation market, and integrates with distribution operations to provide grid support services as needed

Challenge:

Capture revenue from the MISO Frequency Regulation market to improve economics for investment.

Doosan Role:

EPC Contractor



Micanopy 8.25MW BESS – Standalone

Duke Energy



Location: Micanopy, FL Utility Offtaker: Duke Energy Battery: Samsung SDI Inverter: SMA



Purpose:

Provides a cost-effective solution for focused power quality and reliability for the town of Micanopy and nearby neighbors.

Challenge:

Capture revenue from the MISO Frequency Regulation market to improve economics for investment.

Doosan Role:

EPC Contractor



John Hopkins 2.5MW BESS + 1MW PV – Standalone

A MESA

Duke Energy



Location: John Hopkins Middle School, St. Petersburg, FL Utility Offtaker: Duke Energy Battery: CATL Inverter: Dynapower

Purpose:

The microgrid consists of a 1-megawatt solar parking canopy array and a 2.5-megawatt battery and controls, which will store and deploy clean, renewable energy to the school and grid. The project enhances electric service and grid operations for customers.

Challenge:

Support grid operations and provide backup electric power to the school when it must operate as a special need's hurricane evacuation shelter.

Doosan Role:

EPC Contractor



06 O&M SERVICE EXPERIENCE







10 yrs ①

Beacon BESS 10MW/20MWh

Maintenance and performance guarantees

10 yrs 🕔

JFB BESS .2MW/.8MWh

Maintenance and performance guarantees





25 yrs



Horn Rapids BESS 1MW/4MWh

Maintenance and performance guarantees



12 yrs 🔶

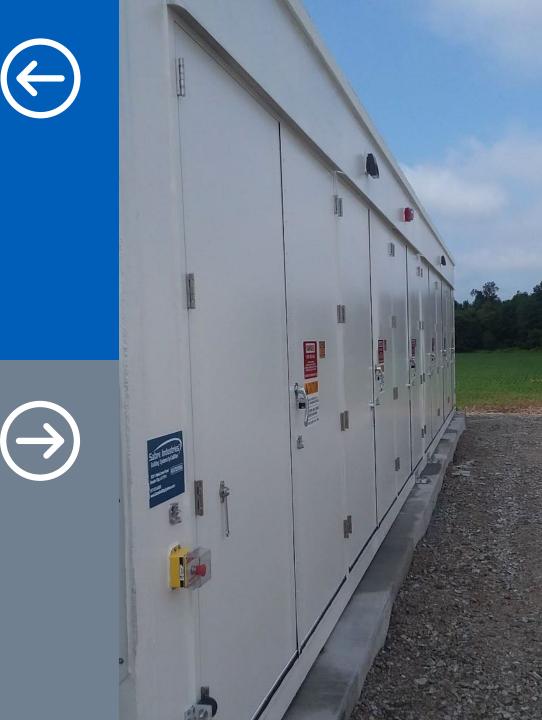
Atterbury BESS 5MW/5MWh

Operations & Maintenance

12 yrs

NABB BESS 5MW/5MWh

Operations & Maintenance





20 yrs



Capital BESS 100MW/200MWh

Operations & Maintenance

Operating **O&M Experien** rating 700+GWh of capa capacity



Tailem Bend 2 41MW/45MWh

Operations & Maintenance



Wandoan South 100MW/150MWh

Operations & Maintenance





DOOSAN GRIDTECH

THANK YOU