

# Commercial & Technical Overview

**e-STORAGE**, a subsidiary of Canadian Solar, stands at the forefront of the energy storage industry, specializing in the design, manufacturing, and integration of battery energy storage systems tailored for utility-scale applications.



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# About us



e-STORAGE designs, manufactures, and integrates battery energy storage systems with optional turnkey EPC services for utility-scale applications.

**Together, we are building a brighter, greener future for all.**



## MISSION

To provide flexible and innovative energy storage solutions to meet the energy needs of our world, now and in the future.



## VISION

We envision a world where our innovative energy storage solutions make clean energy a way of life, not just a solution.



## VALUES

**Innovation:** We are driven by a passion for innovation, constantly pushing boundaries and exploring new horizons in energy storage solutions.

**Sustainability:** We are dedicated to driving the widespread adoption of clean energy through our solutions, contributing to a more sustainable and resilient future.

**Integrity:** We uphold the highest ethical standards in every decision we make, fostering trust with our clients, partners, and each other.

# e-STORAGE: Global Footprint

e-STORAGE is a brand of Canadian Solar, Inc., providing leading-edge, flexible, turnkey energy storage solutions across the globe.



3.3 GWh

Total of Energy Storage Projects

with

KEY LOCATIONS

in New York, New Jersey, California, Ontario, London, Melbourne, and Suzhou

and

357

EMPLOYEES GLOBALLY:

172

Manufacturing

41

Research & Development

86

Administrative & Procurement

24

Engineering/ Technical

18

Project Implementation and LTSA

16

Business Development

# e-STORAGE is a subsidiary of Canadian Solar

Founded in 2001 in Ontario, Canada, **Canadian Solar** has grown into a global market leader in sustainable energy projects and technology. Our accomplishments, to date:



22-year track record as a global, tier-1 player.



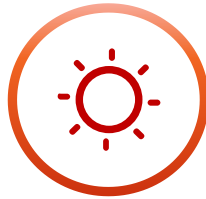
Over 18,000 employees globally



Over 2.7 GWh utility-scale battery storage deployed



10 GWh of battery manufacturing capacity



96 GW solar modules shipments



\$7.47 Billion in revenue in 2022.



6.1GWh in O&M contracts for PV and BESS projects supported by NERC/FERC complaint center.



Top 5 global module brand with 30% annual growth in shipments.



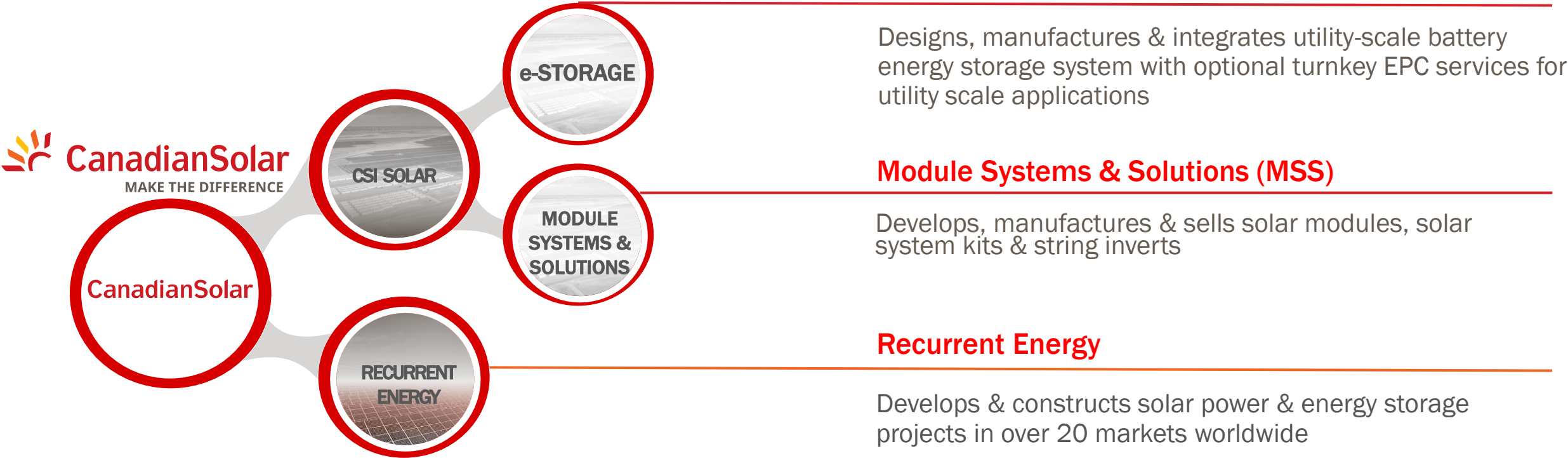
Average 16% ROE since 2013



Global presence in 23 countries

# Our Corporate Structure

Canadian Solar is one of the largest solar technology and renewable energy companies in the world.



# Trusted by Institutional Investors

e-STORAGE  
A subsidiary of Canadian Solar

We have the experience and a strong brand trusted by financial institutions across the world

**Goldman Sachs**

**Trusted by Goldman Sachs Renewable Power**  
to transact on CSI's first utility-scale Energy Storage projects and Long - Term Service Agreements.

 **PNC BANK**

**Tax Equity Commitments**  
to some of the largest energy storage projects deployed in US.

 **Pulse Clean Energy**

**Trusted by Pulse Clean Energy**  
to transact on CSI's first UK energy storage project

**AXIUM**  
INFRASTRUCTURE

**Trusted by Axiom Infrastructure**  
to transact on one of the largest PV + Energy Storage projects in the US.

 **DNV**

**DNV GL Bankability Reports (Independent Engineer)**  
are available for our products and solutions.

**AON**

**Project Insurance**  
full warranty and performance guarantee.



**Bankable at 100+**  
financial institutions globally



**Most Bankable Supplier**  
by BNEF with 100% bankability for 4 consecutive years



**Top AA-Rated**  
bankable Supplier by PV Tech



**#1 Bankable Manufacturer**  
rated by Bloomberg New Energy Finance (BNEF)



**Shipment growth to accelerate to c.45%** in 2022E from c.30% historical CAGR

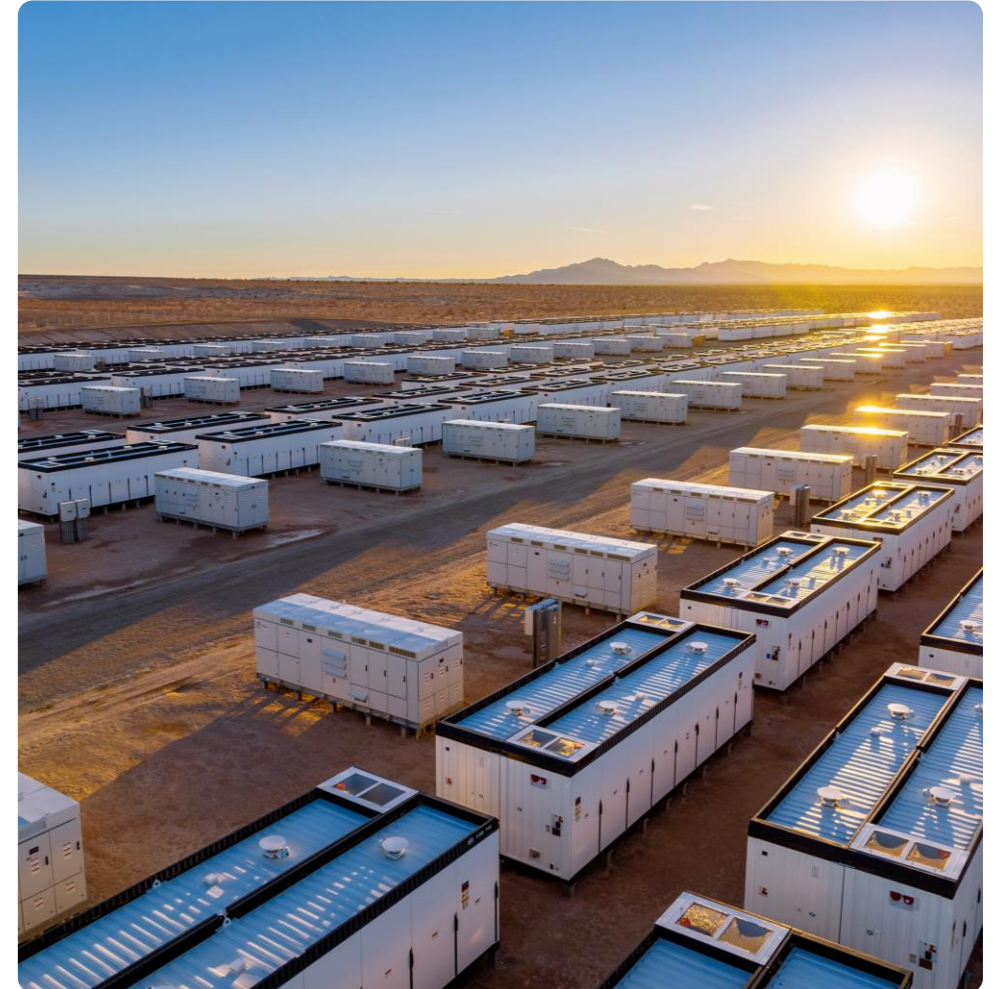


**Delivered Over 96 GW** of PV to Customers across the world

# e-STORAGE: Service Offering

We offer start-to-end energy storage solutions & services, made possible by our cutting-edge products and robust manufacturing capabilities.

- **e-STORAGE**, a subsidiary of **Canadian Solar**, is a world-class energy storage solution provider, specializing in storage system design, manufacturing, and integration of battery energy storage systems for utility-scale applications.
- **e-STORAGE Value Propositions:**
  - Comprehensive Solutions: We offer turnkey EPC services, featuring our cutting-edge LFP battery solution, SolBank.
  - Streamlined Experience: Our package includes LTSA, meticulous warranty management, performance guarantees, and innovative augmentation schemes for an unmatched customer experience.
- **Manufacturing:** Our fully automated factories are in full production, with an annual capacity of 10 GWh for 2023. With ongoing installations of automated production lines, we will reach the planned production capacity of 20 GWh by the end of 2024.



# Quality: Driving Success Through Excellence



**Our goal:** to deliver comprehensive storage solutions that meet the evolving energy demands of the modern world.

- From initial design to final production, we prioritize manufacturing quality to ensure that **SolBank** not only meets but exceeds industry standards.
- Our team of experts meticulously oversees every step, employing stringent quality control measures that guarantee the reliability and long-term performance of our storage solutions.
- The **e-STORAGE** state-of-the-art laboratories serve as the foundation of our commitment to quality. We conduct comprehensive performance testing, analyzing every aspect of our batteries to ensure they meet the highest benchmarks. This meticulous approach ensures that our customers receive battery systems they can rely on, even in the most demanding applications.
- **Highlights:** We hold ISO 14001 (environmental management) and ISO 45001 (Occupational Health and Safety) as well as ISO 9001 (Quality Management) certification.

# e-STORAGE Concept – ‘One-Stop Value’

e-STORAGE  
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We offer start-to-end energy storage solutions and services, made possible by our cutting-edge products and robust manufacturing capabilities.

## Project Planning

- Conceptual design
- System Performance Modeling
- Capacity Sizing
- Site Planning



## Products/ Manufacturing

- Product Development
- Battery Pack Manufacturing
- Battery Energy Storage Solution / Container Manufacturing
- Battery Management Systems and Controls
- International Standards Certifications



## Project Implementation

- EPC Turnkey Contracting
- Integration & Commissioning
- Plant Controllers & Telemetry
- Regulatory Engagements
- Safety Planning
- Supply Chain Management & Logistics



## Services

- Long Term Service Agreements
- Capacity Maintenance and Augmentations
- Operation and Maintenance
- Plant Optimization
- Spare Parts Management



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# Project Planning

ENERGY STORAGE APPLICATIONS  
INTEGRATION METHODOLOGY  
TECHNOLOGY HIGHLIGHTS



## Generating Multiple Revenue Streams

### Energy Arbitrage

Our 4-hour and longer duration solutions are optimized for charging when electricity price is low and discharging when the electricity price is high.

### Frequency Regulation

Our batteries have fast response times and are well-suited to charge and discharge on a second-by-second basis to regulate supply and demand to keep the grid frequency stable.

### Reserve Capacity

Our fast-acting storage solutions can be used as spinning reserves, allowing utilities to operate their generating assets closer to their rated values.

### Flexible Peaking Resource

Our batteries can work at high State of Charge levels and can serve as peaking resources on standby, ready to inject a surge of additional power into the grid.

## Voltage Support

Our battery systems are suitable for being installed close to end-users on the distribution grid, where they can be used to produce reactive power to help maintain grid voltage stability.

## Black Start

Our black-start capable systems can run in standby mode and independently energize other grid systems in the case of a power outage.

## Transmission Congestion Relief

Our systems can be installed downstream of congested transmission sections to store energy and release it during peak hours to reduce transmission costs.

## Transmission & Distribution Deferral

Our batteries can be quickly deployed by utilities to defer or even remove the need to upgrade T&D equipment.

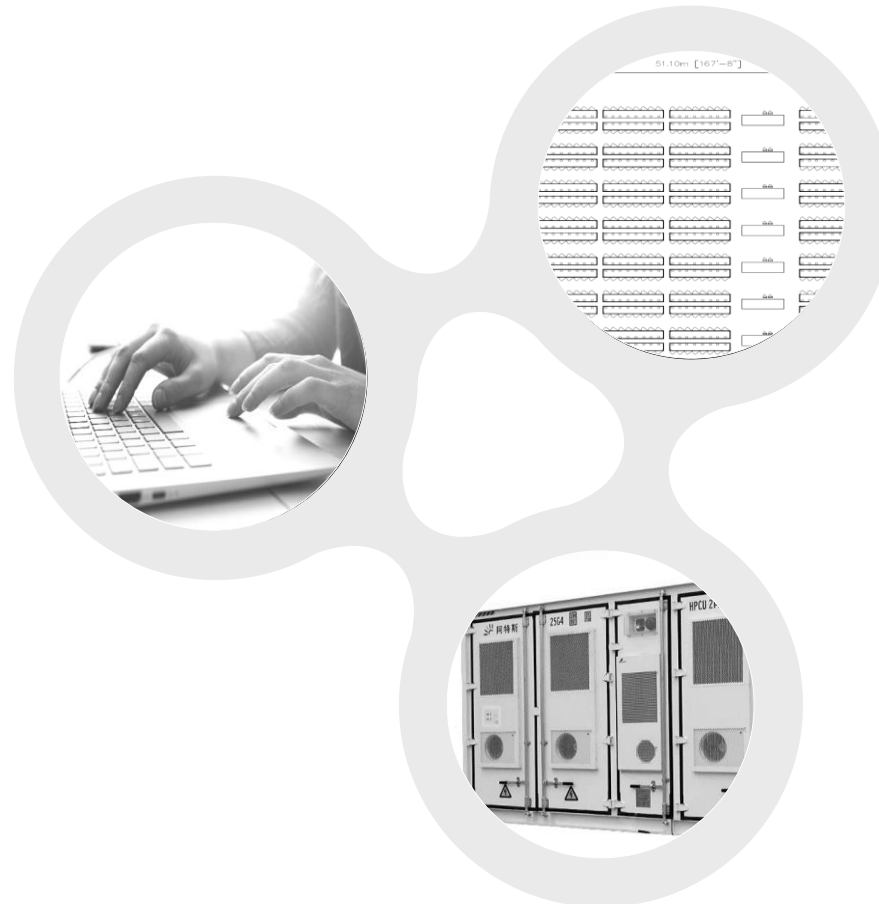
# Integrating Battery Energy Storage Solutions

## Integration Methodology

### Project Sizing

We size the project to meet all technical specifications all while considering project economics and financing requirements.

- Minimize Capex by advancing the first augmentation.
- Multiple augmentations to optimize the NPV of Opex.



### Design Methodology

Selecting equipment that meets local requirements and best suits the project's technical requirements.

- Augmentation schemes are customizable and technology agnostic.
- BESS is designed to meet capacity and other performance guarantees.

### Execution

Our integrated BESS supply scope includes:

- Engineering Design Package for the BESS, including as-built drawings.
- Procurement and delivery of BESS equipment.
- Commissioning Services, product documentation, and technical support.

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# e-STORAGE Solutions

SOLBANK

POWER BLOCK

R&D CENTER & TESTING FACILITIES



# Product Highlights

## Thorough Safety Design

Built to meet the latest fire and safety codes in the U.S., China, UK and Australia markets. SolBank units include:

- Complete fire propagation verification from cell, module (pack) to unit level based on the latest UL 9540A: 2019 (4th Edition).
- Explosion prevention systems via gas detection, active venting and passive pressure relief.

With integrated multi-level fire detection, units provide:

- Timely fire detection.
- Reporting of fire incidents.
- Linked actions with other system components.

## Extended Battery Life

We use durable, high cycling capacity LFP battery cell with proven long life track record and up to 20 years warranty.

- Active balancing BMS on cell level ensures a balance between all batteries during daily operation.
- A hybrid liquid + air cooling system maintains optimal temperature and humidity throughout the lifetime of the project.

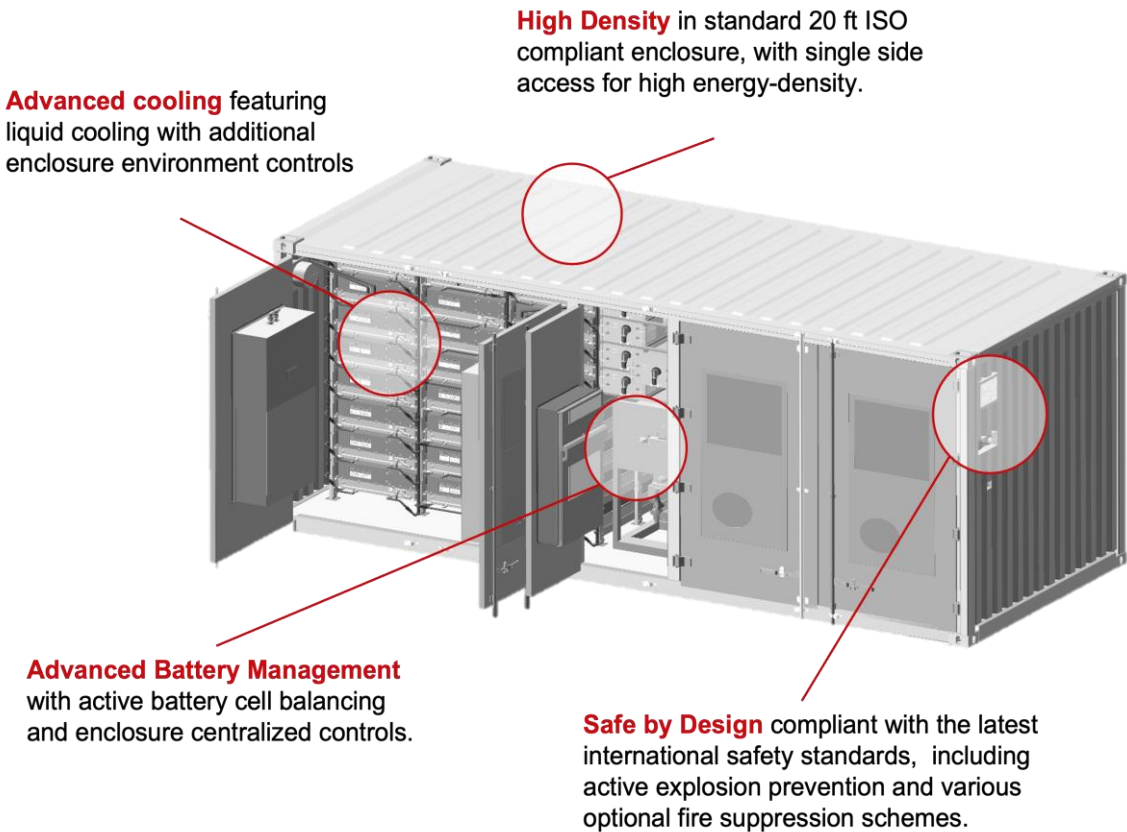


## Reduced Onsite Work

- All components are shipped with the product after factory testing, simplifying the installation and commissioning process.
- All external wirings are available in a central location at the bottom of the enclosure.

## Modular Design Integrated Product

| Model                          | 4-hour (0.25P)                                                                                | 2-hour (0.5P)    | 1.5-hour (0.67P)       |
|--------------------------------|-----------------------------------------------------------------------------------------------|------------------|------------------------|
| Battery                        | 280 Ah Lithium Iron Phosphate (LFP) Prismatic Cells                                           |                  |                        |
| Configuration                  | 8P414S (8 Racks)                                                                              | 8P414S (8 Racks) | 6P414S (6 Racks)       |
| Rated DC Voltage Range         | 1159.2V~1490.4 V                                                                              |                  |                        |
| Rated DC Power                 | 700 kW                                                                                        | 1375 kW          | 1300 kW                |
| Usable Energy Capacity (FAT)   | 2800 kWh                                                                                      | 2750 kWh         | 1950 kWh               |
| DC Round-Trip Efficiency (RTE) | 94%                                                                                           | 93%              | 90%                    |
| Thermal Management System      | Liquid cooling for battery system, air cooling for electrical components and humidity control |                  |                        |
| Enclosure                      | 20 ft ISO Container NEMA 3R 6058L x 2438Wx2896H (mm)                                          |                  |                        |
| Weight (Battery Included)      | 29,800kg (65,700 lbs.)                                                                        |                  | 24,900kg (54,895 lbs.) |



# SolBank 3.0: Cutting-edge technology

SolBank 3.0 features high-density LFP cells, an active balancing BMS, and an innovative liquid cooling TMS, ensuring optimal safety.

e-STORAGE  
A subsidiary of Canadian Solar



## Enhanced Energy Density

- Utilizes 314 Ah battery cells and compact integration, increases single container energy density up to 45%
- Reduces land cost by up to 35% in a 100MWh project

## Intelligent Control

- Liquid cooling cuts auxiliary consumption up to 30%
- Active balance and string-level management, guarantee high efficiency and availability

## Compatibility & Installation

- Supports Turn-key integration and stationery certification, reducing project schedule risks by up to 40%
- various PCS topologies
- Plug-and-play setup for streamlined commissioning

## Safety

- IP67-rated pack design
- Up to 20% faster detection of abnormal and automatic protection
- Advanced pack thermal isolation, electrical redundancy protection, and multi-level fire protection, effectively minimize potential issues

## Leading in Performance, Energy Density and Safety



### Product Development and Certification Timeline

- Cell Certification and Testing – Feb 2024
- Product Development – Mar 2024
- Product Prototyping – Apr 2024
- Product Certification – Jul 2024
- DNV IE review – Aug 2024

| Model                          | 4-hour<br>(0.25P)                                                                                | 2-hour<br>(0.5P)    |
|--------------------------------|--------------------------------------------------------------------------------------------------|---------------------|
| Battery Cells                  | 314 Ah Lithium Iron Phosphate (LFP)<br>Prismatic Cells                                           |                     |
| Configuration                  | 8P414S<br>(8 Racks)                                                                              | 8P414S<br>(8 Racks) |
| Rated DC Voltage Range         | 1159.2V~1490.4 V                                                                                 |                     |
| Rated DC Power                 | 780 kW                                                                                           | 1545 kW             |
| Usable Energy Capacity (FAT)   | 3130 kWh                                                                                         | 3095 kWh            |
| DC Round-Trip Efficiency (RTE) | 94%                                                                                              | 93%                 |
| Thermal Management System      | Liquid cooling for battery system, air cooling for<br>electrical components and humidity control |                     |
| Enclosure                      | 20 ft ISO Container NEMA 3R<br>6058L x 2438Wx2896H (mm)                                          |                     |
| Weight (Battery Included)      | 30,200 kg<br>(66,580 lbs)                                                                        |                     |

## Cell-Pack-Rack

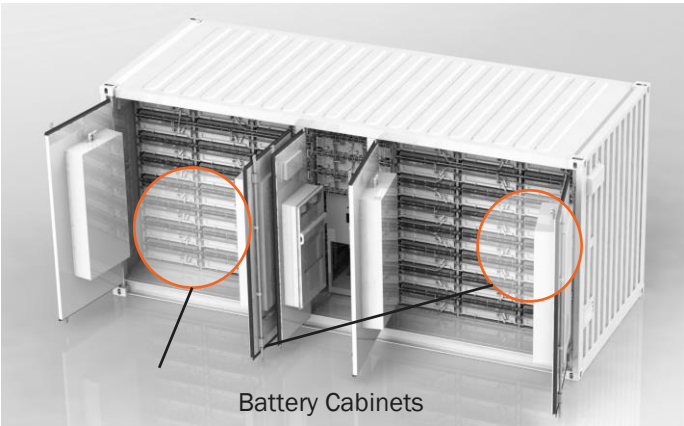
|      |                            |                              |
|------|----------------------------|------------------------------|
| CELL | Battery Chemistry          | Lithium Iron Phosphate (LFP) |
|      | Cell Nominal Voltage       | 3.2 V                        |
|      | Battery Cell Voltage Range | 2.8 - 3.6 V                  |



|      |                    |                     |
|------|--------------------|---------------------|
| PACK | Pack Configuration | 1P69S (69 Cells)    |
|      | DC Voltage Range   | 193.2 ~ 248.4 V     |
|      | Pack Weight        | 461 KG              |
|      | Dimensions (L*W*H) | 1806 × 730 × 260 mm |
|      | Ingress Rating     | IP65                |



|      |                           |                   |
|------|---------------------------|-------------------|
| RACK | Rack Configuration        | 1P414S (6 Packs)  |
|      | Rack DC Voltage (Nominal) | 1324.8 V          |
|      | DC voltage range          | 1159.2 ~ 1490.4 V |



### Cell Key features

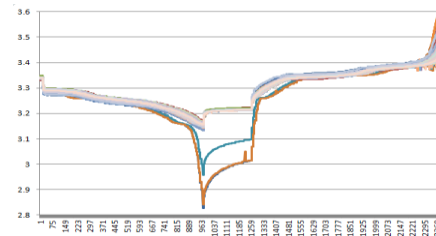
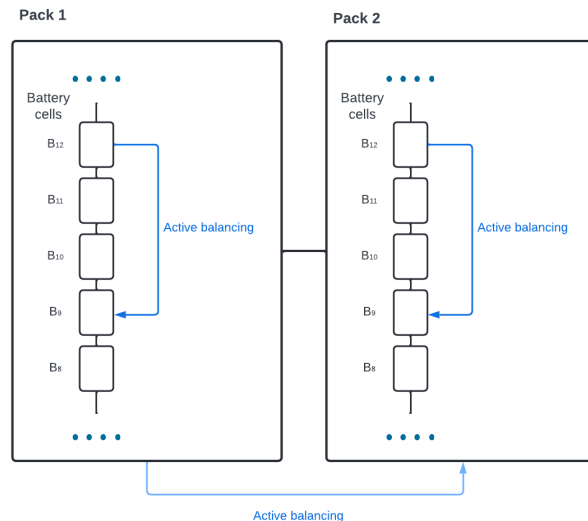
- Industry standard 280Ah LFP cell
- Diversified Supply Chain
- Best geometry for liquid cooling

### Pack Key features

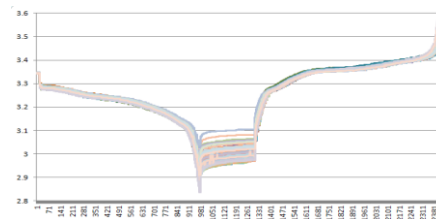
- Designed and Manufactured by Canadian Solar
- Optimized form-factor for 20 ft container
- High density, liquid cooled with integrated battery cell management

## Battery Control and Monitoring

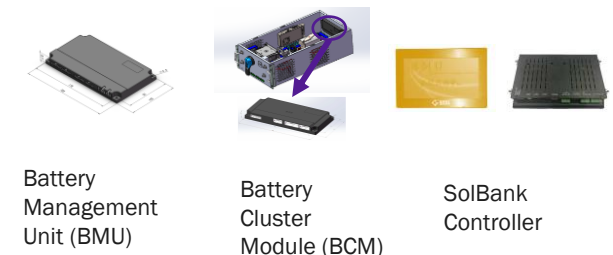
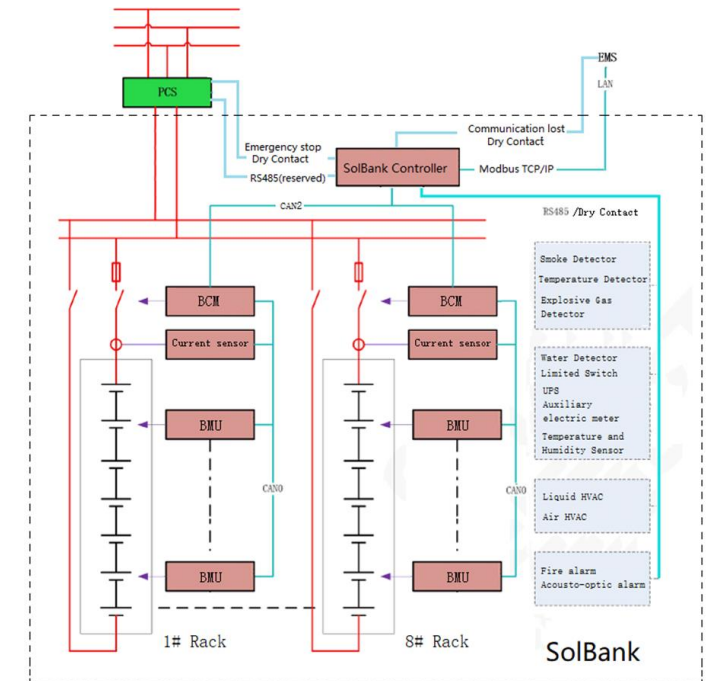
- Pack's active balancing can charge and discharge any battery cell during operation.
- Each BMU has two DC:DC converter (4 BMU per Packs) with 2A current capability.
- 1 DC:DC chip is shared per 12 cells in series (1 per 12S), only one balance route be turned on each time.
- Active cell level balancing provides improved system depth of discharge overtime with an estimated 1% capacity improvement capability per full cycle.



Without active balancing

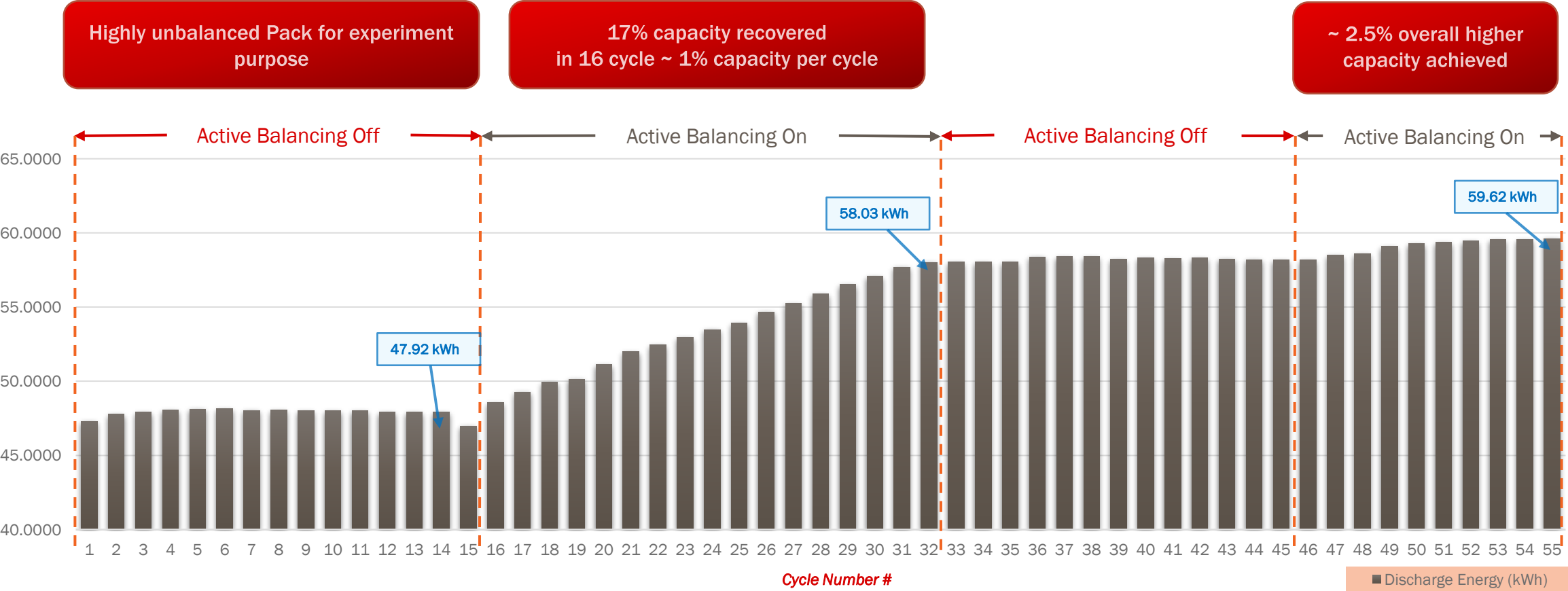


With active balancing



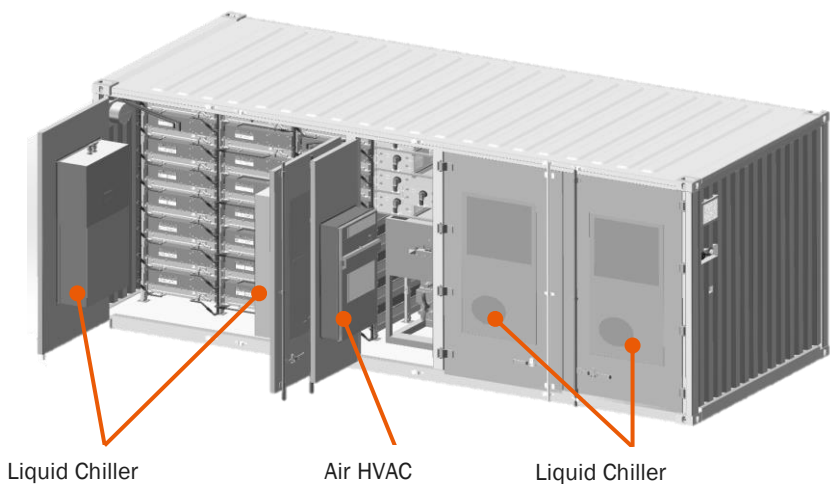
# SolBank BMS Active Balancing.

## Benchmark of active balancing worst case experiment

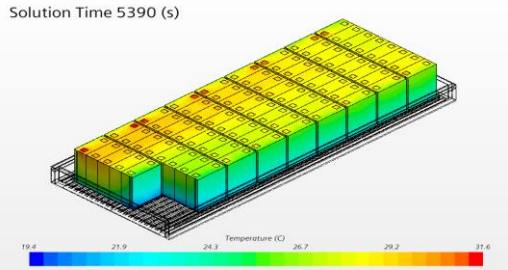
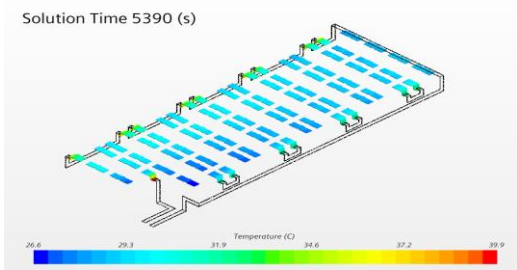


# SolBank Thermal Management

## Hybrid Cooling for Optimized Operation Environment



- Integrated liquid+air cooling system, designed to optimize battery temperature throughout product lifetime
- Liquid cooling/heating for battery system, with cooling pipe go through battery pipe to provide better cooling/heating capacity
- Air cooling for electrical components, maintain air temperature and control humidity inside the enclosure

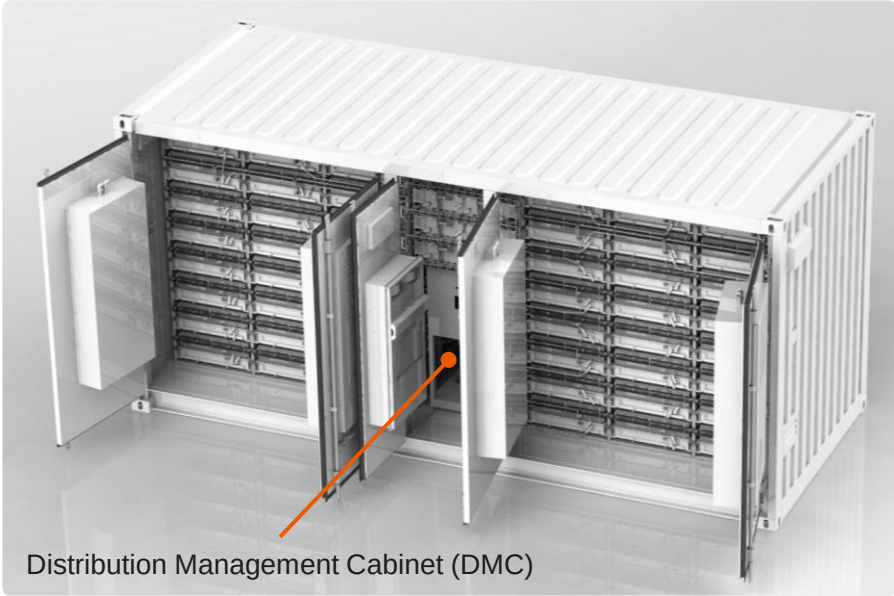


|                | Operating Temperature (Ambient) | -30 °C to 55 °C                 |                |                |
|----------------|---------------------------------|---------------------------------|----------------|----------------|
|                | Parameter-Model                 | 0.25P                           | 0.5P           | 0.67P          |
| Liquid Cooling | Quantity of Chillers            | 2                               | 4              | 4              |
|                | Cooling Capacity-Combined       | 20 kW (2*10)                    | 40 kW (4*10)   | 40 kW (4*10)   |
|                | Heating Capacity-Combined       | 4.6kW (2*2.3)                   | 9.2 kW (4*2.3) | 9.2 kW (4*2.3) |
|                | Refrigerant                     | R134a                           |                |                |
|                | Coolant (Refrigerating Medium)  | 50% Ethylene Glycol + 50% Water |                |                |
| Air Cooling    | Quantity of air AC              | 1                               |                |                |
|                | Cooling Capacity                | 5 kW                            |                |                |
|                | Heating Capacity                | 6.4 kW                          |                |                |
|                | Internal Air Flow               | 1400 m³/h                       |                |                |

## Aux Power and Power Distribution

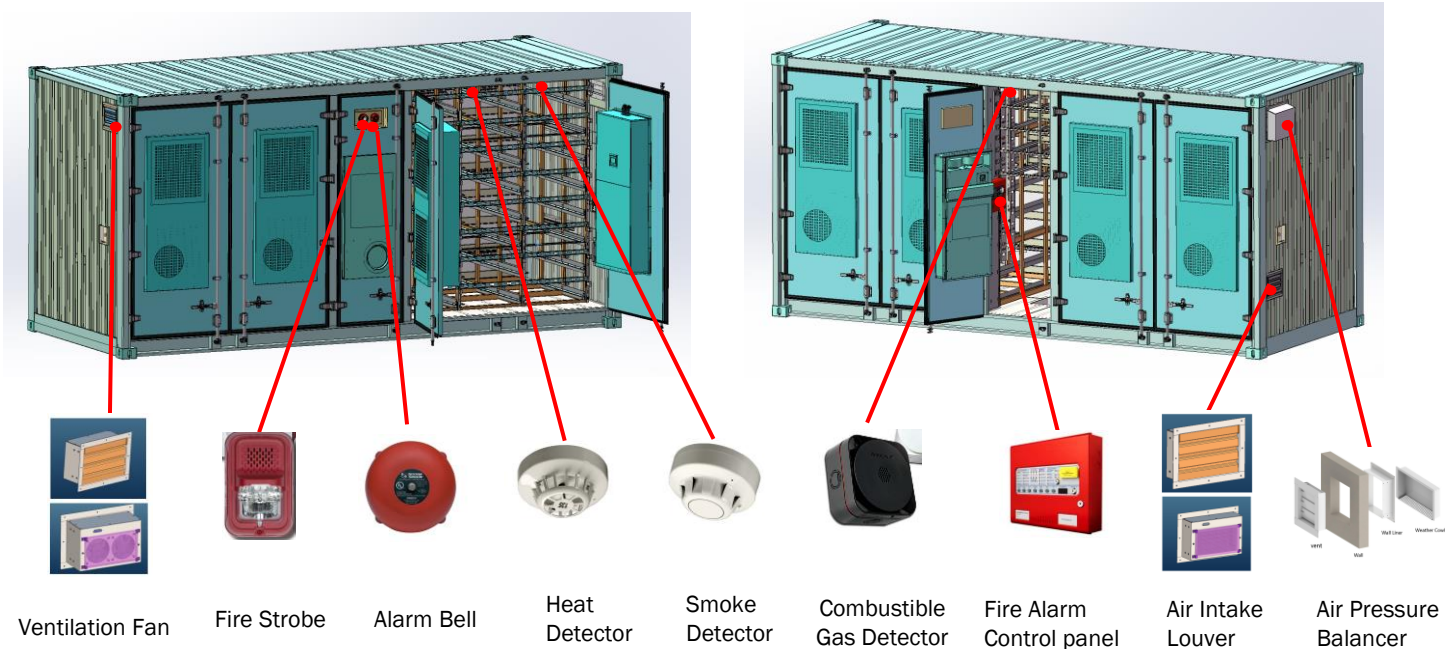
- 480V/400V AC, 60/50 Hz, 3 phase supply
- UPS for reliable data collection during power outage
- UPS for fire detection and ventilation system

| Parameter-Model                         | 0.25P                                 | 0.5P               | 0.67P              |
|-----------------------------------------|---------------------------------------|--------------------|--------------------|
| Aux Load (Standby/Peak)                 | 1.25 kVA/25 kVA                       | 1.25 kVA/37.5 kVA  | 1.25 kVA/37.5 kVA  |
| Aux Energy Estimates (During operation) | 11.89 kWh/hr @45°C                    | 18.43 kWh/hr @45°C | 18.43 kWh/hr @45°C |
| Auxiliary Power Interface               | AC480/400 V, 60/50 Hz, 3P4W           |                    |                    |
| Auxiliary Backup Power                  | 2-hrs UPS, installed in the container |                    |                    |
| Communication Interface                 | Ethernet                              |                    |                    |
| Communication Protocol                  | Modbus TCP/IP                         |                    |                    |



## Fire Alarm & Explosion Prevention

- Complete fire propagation verification from cell, module (pack) to unit level based on the latest UL 9540A: 2019 (4th Edition). Built to meet latest fire and safety codes in markets around the world.
- Integrated multi-level fire detection, timely detects and reports fire incident with linked actions on the other system components
- Explosion prevention with gas detection, active venting and passive pressure relief



|                                    |                                                                                    |
|------------------------------------|------------------------------------------------------------------------------------|
| Fire Detection                     | Heat and Smoke detection                                                           |
| Explosion Prevention & Mitigation  | Gas detection, active air ventilation system, passive pressure relief              |
| Fire Alarm                         | Strobes and bells - UPS Backup<br>Fire alarms monitored by both fire panel and BMS |
| Local Emergency Stop               | Yes                                                                                |
| Coolant Leak Detection             | Yes                                                                                |
| Interface with External Fire Panel | Available with options to network                                                  |

## Certification & 3<sup>rd</sup> Party Review

### Certification-Standard

#### UL

- UL1973 – complete
- UL9540 – complete
- UL9540A (cell, module, unit) – complete

#### NFPA comply

- NFPA69 - complete
- NFPA855 - comply
- NFPA72 - comply

#### UN

- UN38.3 – complete

### Independent Engineering Report

#### DNV

- Rev I – Dec 2022 complete

#### IEC

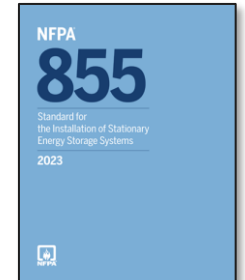
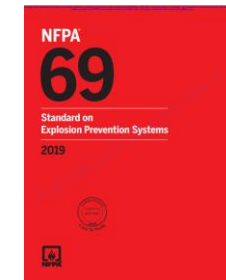
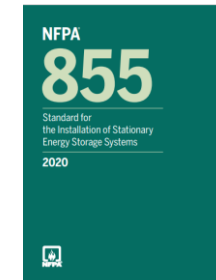
- IEC 62619 – complete
- IEC 63056 - complete
- IEC 62477-1 - complete
- IEC 60730-1 - complete
- IEC/EN 60204-1 – complete

#### China Market

- GB/T 36276 - complete

#### UK

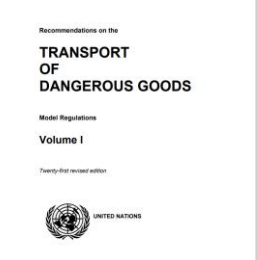
- BS EN 61000-6-2/-4 – complete
- BS EN 62477-1 – complete



IEC62619



GB/T-36276



UL9540

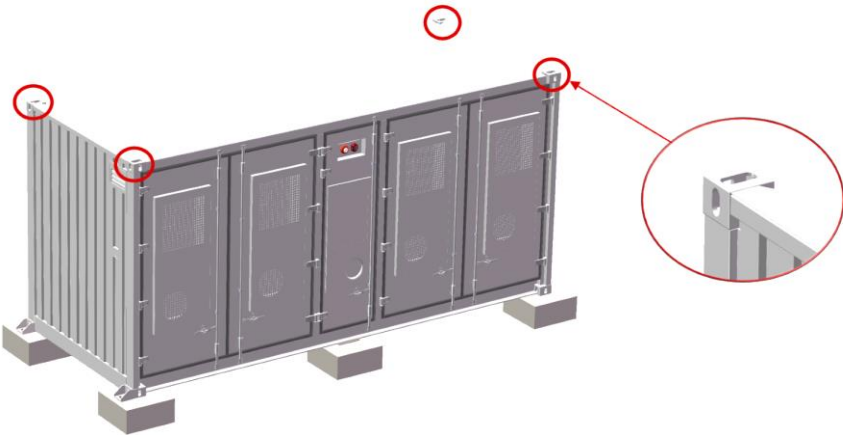
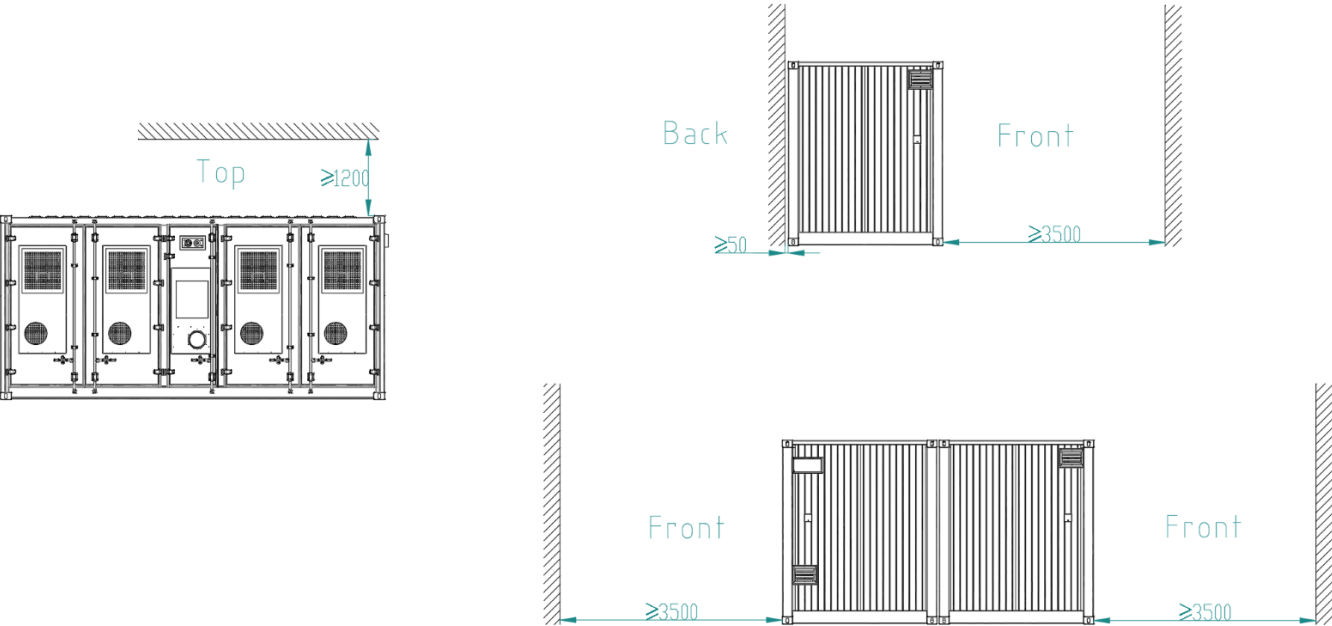


UL1973

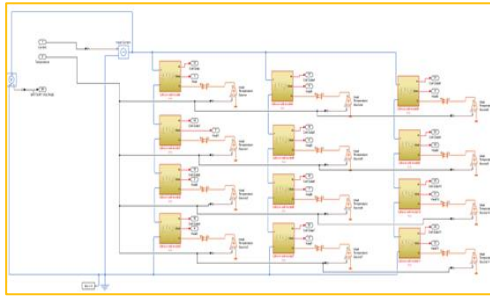


UL9540A

## Lifting Points & Clearance Requirements

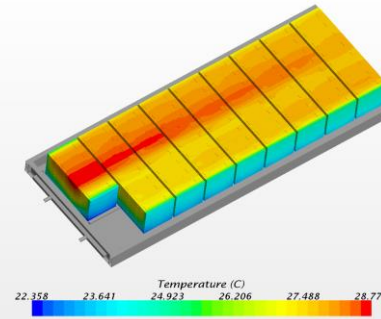


## Full Scale Design And Modeling Capability



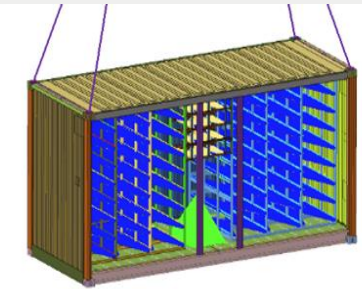
### Electrical Modeling

- DC electrical simulation
- Aging simulation
- Round-trip efficiency



### Computational Fluid Dynamic Simulation

- Pack cooling
- Enclosure airflow and cooling



### Finite Element Analysis Simulation

- Enclosure shell and lifting
- Pack assembly
- Seismic load simulations

## State-of-the-art Testing Lab



### Cell Performance Testing

- Various P rate and temperature conditions
- Calendar and cycling aging tests
- Efficiency and impedance testing



### Module and Pack Performance Testing

- Thermal behavior
- BMS accuracy



### Enclosure Performance Testing

- 5000 m<sup>2</sup> assembly workshop
- Final Pack to Enclosure Assembly
- Factory Acceptance Testing
- Capacity Testing
- Packaging

## Solution Tailored To Project Requirements

SolBank

1.5-, 2- or 4-hours configuration, with high-density back-to-back layouts. Configured for future augmentation and plant-wide fire safety strategy.

|                        |                                                      |
|------------------------|------------------------------------------------------|
| Energy Capacity        | 16.38 MWh+ (at MV output at BOL)                     |
| Power                  | 3.8 MVA (at MV output)                               |
| Performance Guarantees | Capacity, RTE, Availability                          |
| Certifications         | UL9540, UL9540A, UL1741 SA, UL1973, UN38.3, IEC62619 |

Power Conversion System (PCS)

High power central inverter and medium voltage transformer, with integrated battery controls and grid support functionalities.

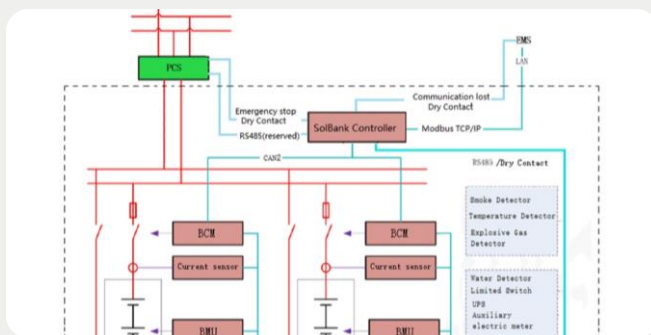
Energy Management (EMS)

Centralized EMS / SCADA system for Plant controls and supervision.  
Advanced battery balancing and performance monitoring.

POWERBLOCK EXAMPLE CONFIGURATION

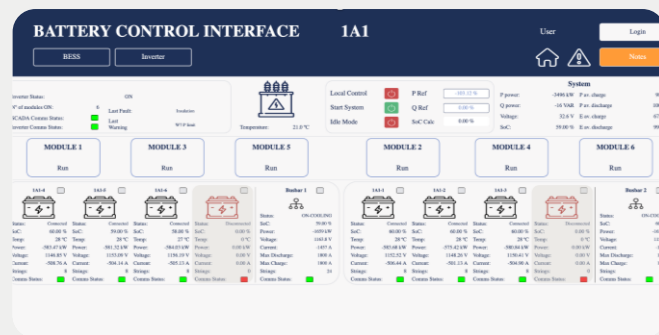
# PowerBlock Integration

## Vertically Integrated Control And Monitoring



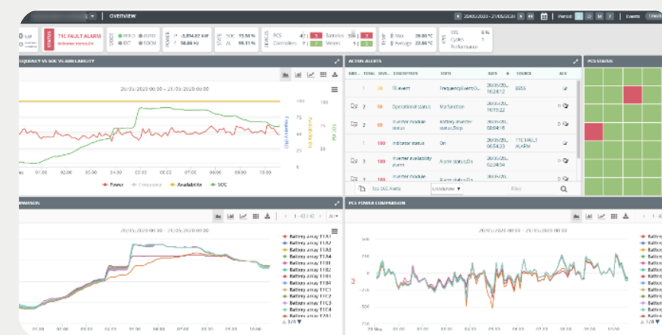
### Battery Management System (BMS)

- Monitors the status of battery and auxiliary systems
- Report faults, and alarms to the control and monitoring system
- Built-in UPS for monitoring during power outage



### Battery Control Interface (BCI)

- Control the inverter and SolBank in real time, and coordinate behaviors between these components
- Stop all inverters and SolBanks within the same energy station when there is a fire alarm, minimize fault impact



### Energy Management System (EMS)

- Monitors the status of all BESS equipment and report any fault detected to the operator
- Allow the operator, O&M to read and analyze operating data of the equipment, to optimize system health and identify issues from the early stage

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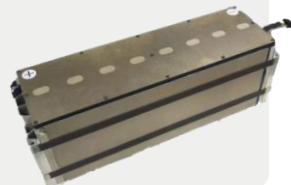


## Module, Pack & Enclosure Manufacturing



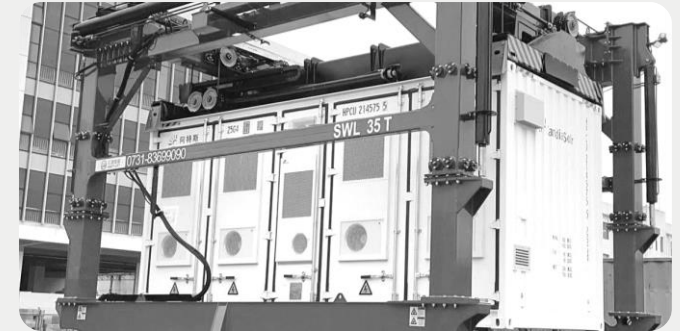
### Module Assembly

- 3000 m2 semi-automated workshop
- Automated laser welding process
- > 500 modules/shift



### Pack Assembly

- Robotic Module to Pack installation
- BMU installation
- Final pack interconnection
- Safety and Functional Test



### Enclosure Assembly

- 5000 m2 assembly workshop
- Final Pack to Enclosure Assembly
- Factory Acceptance Testing
- Capacity Testing
- Packaging



## Quality and Manufacturing Capacity

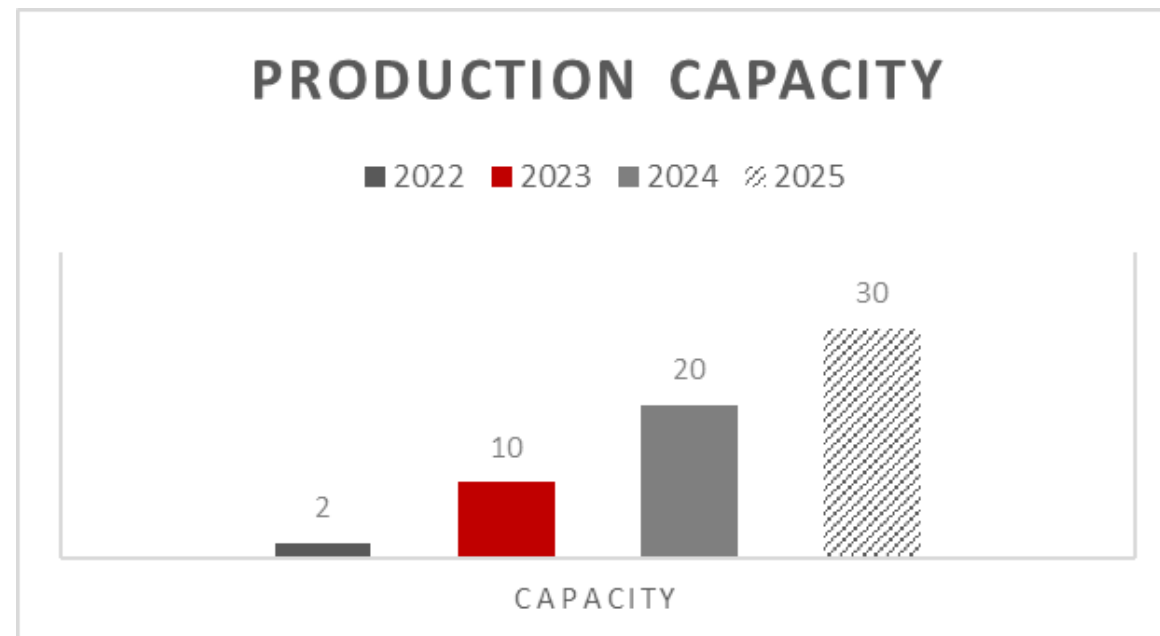
### Quality

- ISO9001 implemented as manufacturing quality management system (QMS); certificates June 2022.
- Extensive quality assurance and quality control covering all key manufacturing process steps following modern quality control processes such as Statistical Process Control systems, Six Sigma methodologies, and Manufacturing Execution Software (MES) systems.
- Additionally, CSI implements ongoing product reliability testing program where the various components and systems are subjected to extended-duration testing programs to ensure their quality standards are upheld.



### Capacity

- 10 GWh manufacturing capacity for 2023, ramping up to 20 GWh in 2024
- 30GWh manufacturing capacity for 2025.
- Over 200 manufacturing employees



## International ISO Certifications

- ISO9001 Quality management system
- ISO14001 Environmental management system
- ISO45001 Occupational health and safety system
- ISO50001 Energy management system



## Participation in the **United Nations Global Compact (UNGC)**

Supporting the **Ten Principles of the UNGC** on human rights, labor, environment, and anti-corruption

Contributing to the achievements of the **United Nations' Sustainable Development Goals (SDGs)**.

### ESG Recognitions 2023:

- ISS ESG Corporate Rating, Prime Status
- Achilles ESG Assessment – Excellent Rating
- CDP Climate Change disclosure (work in progress)
- SBTi: commitment letter submitted, aiming to achieve both the near-term and net-zero science-based emissions reduction targets
- RBA Validated Assessment Program (VAP): Silver-level Recognition with no findings in forced labor

Our work has contributed to the following UN SDGs, including but not limited to:

- Climate Action
- Affordable and Clean Energy
- Industry, Innovation, and Infrastructure
- Peace, Justice, and Strong Institutions
- Reduced Inequalities
- Good Health and Wellbeing
- Gender Equality
- Partnership for Goals

ESG report 2023 is available on our website: [www.csestorage.com](http://www.csestorage.com)

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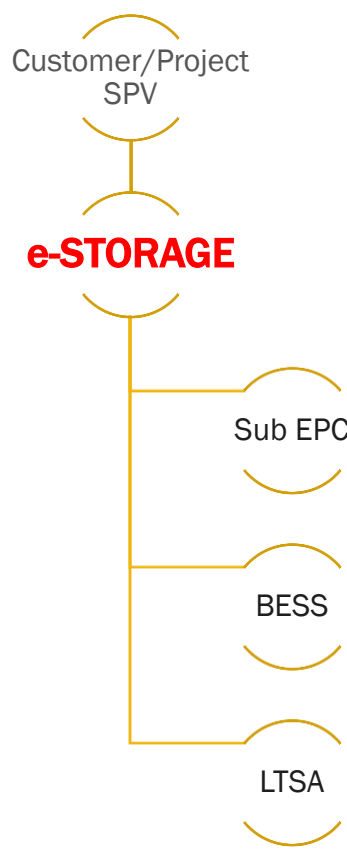


# Project Implementation

SUPPLY & EPC SERVICES  
OPERATIONAL SERVICES



## Turnkey EPC:



We provide optional **turnkey EPC and EPCM services** that can be tailored for the most pragmatic and cost-effective contracting structures available for the project.

We can act as the **single point-of-contact** for the entire service range removing the need to coordinate across multiple vendors.

- ELIMINATE SCOPE GAPS
- MANAGE PROJECT SCHEDULE RISKS
- MANAGE SUPPLY CHAIN & RISKS

## Typical EPC Scope

|                                              |
|----------------------------------------------|
| Project management                           |
| BESS & BOP design, integration & supply      |
| Training and documentation                   |
| Engineering studies & Regulatory Engagements |
| Permits and approvals                        |
| Interconnection                              |
| Site logistics and plan                      |
| Safety                                       |
| Construction                                 |
| Installation                                 |
| Commissioning                                |
| Fire and Emergency Response Plans            |
| Equipment Procurement                        |

## Project Management



### Engineering

- BOP design
- Engineering studies
- Permits and approvals
- Interconnection
- Fire and Emergency Response plans



### Procurement

- Major equipment supply
- BOP supply
- Logistics



### Construction

- Site logistics and plan
- Safety
- Installation
- Commissioning

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# Services

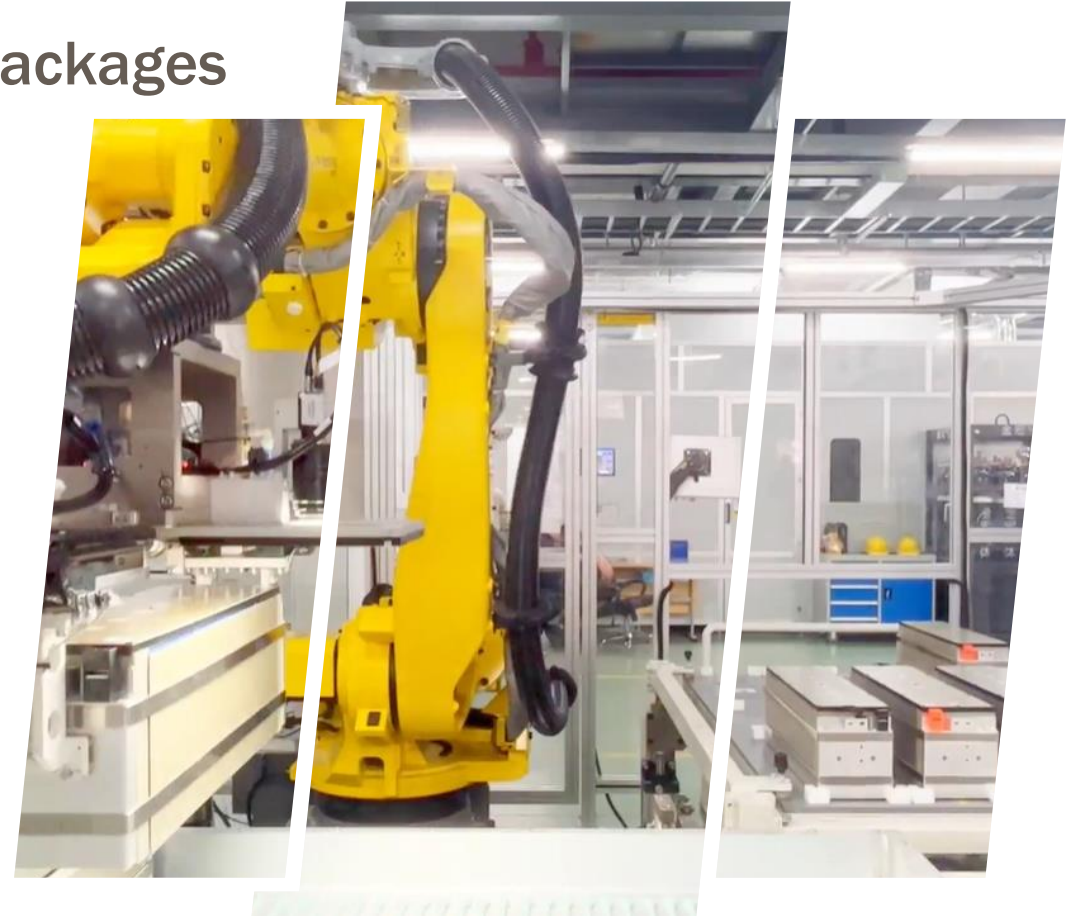
OPERATIONAL SERVICES



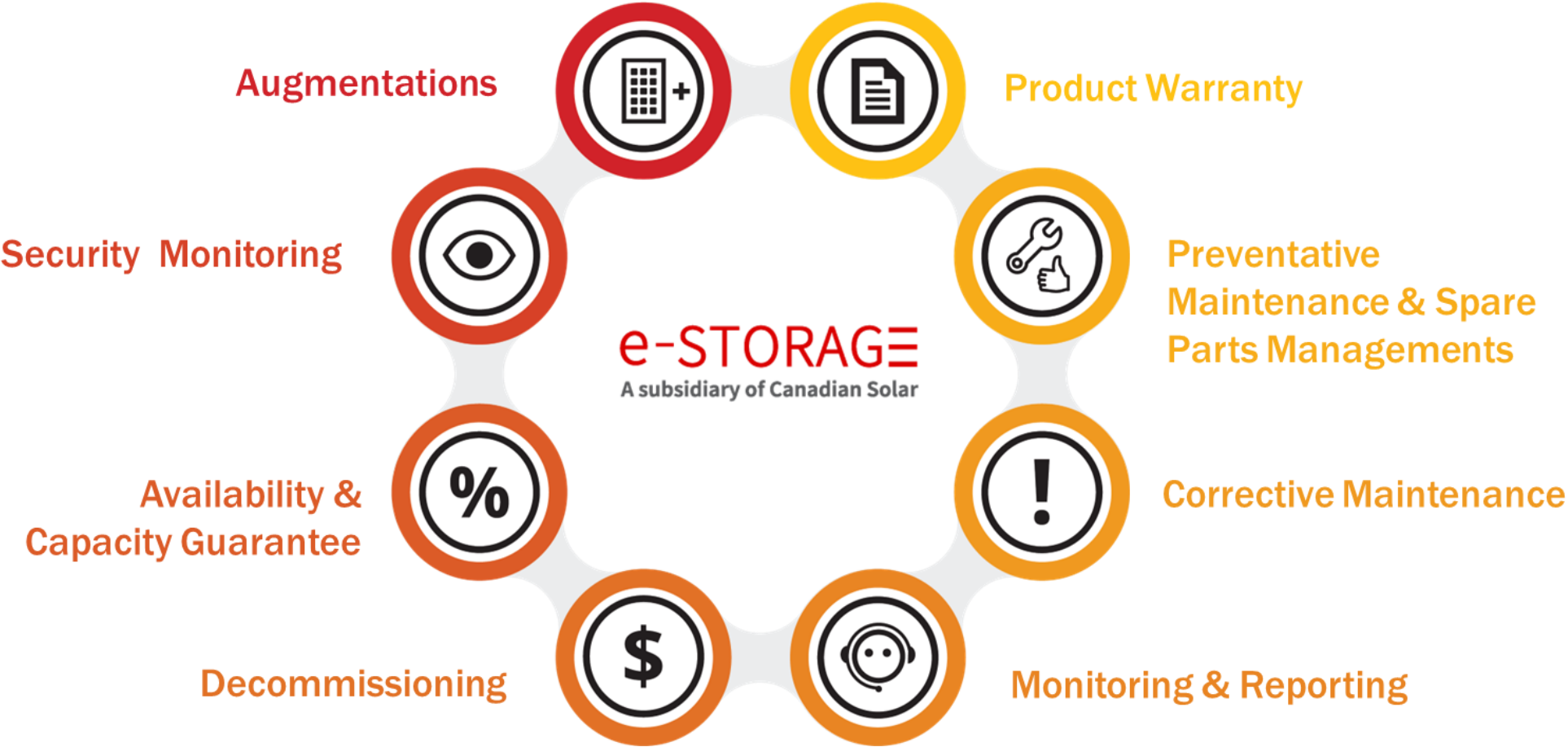
## Customizable Long-Term Service Agreement Packages

- Warranty Management: Let e-STORAGE track and manage the headache of product warranties, so you don't have to.
- Performance Guarantees: so you know operations are performing as they should.
- Augmentation Schemes available to maintain the capacity level over the project life.
- O&M with a dedicated 24/7 NERC/FERC compliant monitoring facility.
- Decommissioning services for your system at the end of its life.

Experience and knowledge to help throughout the life of the project, providing flexible services, warranties and guarantees to achieve high operational standards.

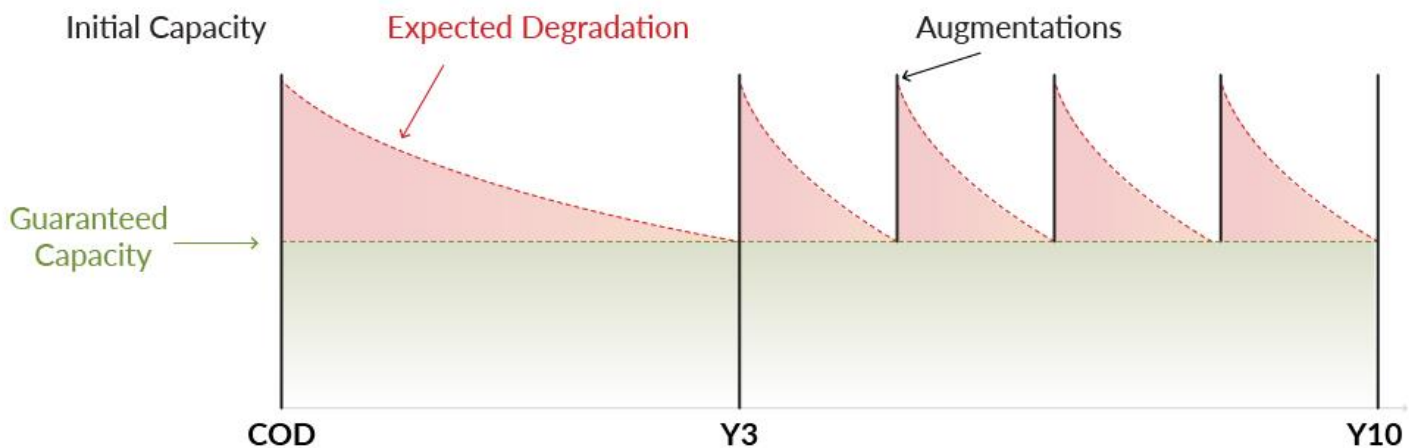


## Available LTSA Services



## Augmentation Schemes

e-STORAGE offers an Augmentation scheme option to keep your project at maximum performance for years to come. Augmentation helps offset degradation and keep the BESS performing consistently over the life of a project.



### Key Points

- Augmentation adds capacity to the site after the expected degradation.
- Augmentation scheme can be designed and included as the start of a project.
- Owner Augments as needed & benefits from cost curve decline.
- Technology Agnostic Augmentation.
- Owner has discretion to renew LTSA into varying contract lengths.

## Operations and Maintenance (O&M)

Our predictive maintenance strategy ensures that storage capacity is reliably available when it is needed, thus safeguarding your investment in a particularly sustainable way.

- **Active remote monitoring** of system performance 24/7/365 via our NERC-registered Operations Control Center (OCC).
- **Maintenance and Spare Parts Management** of all system components.
- **Trouble-free system communication** following the latest safety regulations.
- **Flexible Availability & performance guarantees.**



### Monitoring Center

In our monitoring center, we constantly check the performance of your plant around the clock.

- Fast on-site service.
- Optimized system performance.
- Live system status information.
- Safe-guarding against potential revenue losses.

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# Projects

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Some of our major projects implemented to date:

| Project          | Mustang, USA | Crimson I, USA | Crimson II, USA | Slate, USA | Minle, China |
|------------------|--------------|----------------|-----------------|------------|--------------|
| Project Capacity | 75 MW        | 200 MW         | 150 MW          | 140 MW     | 150 MW       |
| Battery Storage  | 300 MWh      | 800 MWh        | 600 MWh         | 561 MWh    | 300 MWh      |

Projects announced in 2023:

| Project          | Papago, US | Aypa, US | Unibal, UK | Cero, UK | Depcom, US | Engie, UK | Coalburn, UK | Summerfield, AU |
|------------------|------------|----------|------------|----------|------------|-----------|--------------|-----------------|
| Project Capacity | 300 MW     | 250 MW   | 20 MW      | 50 MW    | 200 MW     | 113 MW    | 500 MW       | 240 MW          |
| Battery Storage  | 1200 MWh   | 700 MWh  | 40 MWh     | 100 MWh  | 800 MWh    | 226 MWh   | 1170 MWh     | 480 MWh         |

## Project Highlight: Lemoore, California USA

|                    |                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 75                                                                                                                                                         |
| Size (MWH)         | 300                                                                                                                                                        |
| COD                | 9/16/2021                                                                                                                                                  |
| Developer          | Recurrent                                                                                                                                                  |
| Owner              | MN8 Energy                                                                                                                                                 |
| Solutions provided | Project Planning, Product, Project Implementation, Services: System design and optimization, battery supply and commissioning, LTSA, O&M service provider, |



Project Highlight:  
Lemoore, California USA



|                    |                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 140                                                                                                                  |
| Size (MWH)         | 560                                                                                                                  |
| COD                | 4/27/2022                                                                                                            |
| Developer          | Recurrent                                                                                                            |
| Owner              | MN8 Energy                                                                                                           |
| Solutions provided | System design and optimization, battery supply and commissioning, LTSA, O&M service provider, year five augmentation |



## Project Highlight: Blythe, California USA



|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 200                                                                                                                                |
| Size (MWH)         | 800                                                                                                                                |
| COD                | 9/30/2022                                                                                                                          |
| Co-Owner           | Axium/Recurrent Energy                                                                                                             |
| Solutions provided | System design and optimization, battery supply and commissioning, EPC services, LTSA, O&M service provider, performance guarantees |



## Project Highlight:

Blythe, California USA



|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 150                                                                                                                                |
| Size (MWH)         | 600                                                                                                                                |
| COD                | 10/7/2022                                                                                                                          |
| Co-Owner           | Axium/Recurrent Energy                                                                                                             |
| Solutions provided | System design and optimization, battery supply and commissioning, EPC services, LTSA, O&M service provider, performance guarantees |



## Project Highlight: Rosamond, California USA



|                    |                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 20.5                                                                                                                 |
| Size (MWH)         | 82                                                                                                                   |
| COD                | 10/31/2022                                                                                                           |
| Owner              | Matrix Renewables                                                                                                    |
| Solutions provided | System design and optimization, battery supply and commissioning, LTSA, O&M service provider, performance guarantees |



Project Highlight:  
Zhangye City, Gansu Province, China



|                    |                                                                  |
|--------------------|------------------------------------------------------------------|
| Size (MW)          | 150                                                              |
| Size (MWH)         | 300                                                              |
| COD                | 4/28/2023                                                        |
| Owner              | Suzhou Canadian Solar New Energy Development Co., Ltd.           |
| Solutions provided | system design and optimization, battery supply and commissioning |



## Project Highlight: Willoughby-On-The-Wolds, Leicestershire, UK

|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 26                                                                                                                                 |
| Size (MWH)         | 26                                                                                                                                 |
| COD                | 4/6/2023                                                                                                                           |
| Co-Owner           | Pulse Clean Energy                                                                                                                 |
| Solutions provided | system design and optimization, battery supply and commissioning, EPC services, LSTA, O&M service provider, performance guarantees |



## Project Highlight:

St. Thomas, Swansea, UK



|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 24                                                                                                                                 |
| Size (MWH)         | 24                                                                                                                                 |
| COD                | 4/13/2023                                                                                                                          |
| Co-Owner           | Pulse Clean Energy                                                                                                                 |
| Solutions provided | system design and optimization, battery supply and commissioning, EPC services, LTSA, O&M service provider, performance guarantees |

## Project Highlight: Briton Ferry, Port Talbot, UK

|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 22                                                                                                                                 |
| Size (MWH)         | 22                                                                                                                                 |
| COD                | 4/13/2023                                                                                                                          |
| Co-Owner           | Pulse Clean Energy                                                                                                                 |
| Solutions provided | system design and optimization, battery supply and commissioning, EPC services, LTSA, O&M service provider, performance guarantees |



# Pulse Portfolio IV Flatworth

Project Highlight:

North Shields, Tyne & Weir, UK



|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Size (MW)          | 18                                                                                                                                 |
| Size (MWH)         | 18                                                                                                                                 |
| COD                | 4/11/2023                                                                                                                          |
| Co-Owner           | Pulse Clean Energy                                                                                                                 |
| Solutions provided | system design and optimization, battery supply and commissioning, EPC services, LTSA, O&M service provider, performance guarantees |



# Thank You

[www.csestorage.com](http://www.csestorage.com)

