

2023

GENERAL INTRODUCTION

TROES Corp

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www.troescorp.com

<https://www.linkedin.com/company/troescorp/>

ABOUT TROES

INTRODUCTION

- Established in Canada;
- R&D, Manufacture and Deliver high-performance distributed battery energy storage systems (BESS)



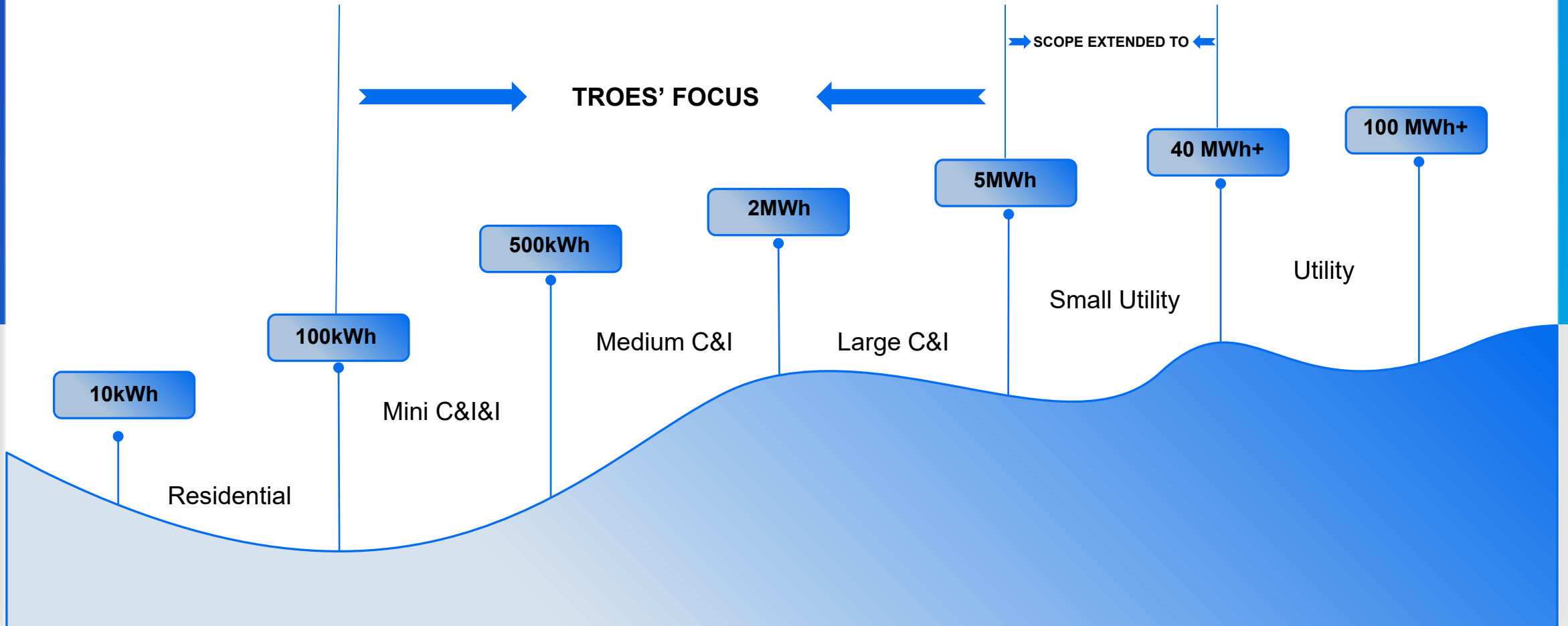
POSITION

- Positioning for Commercial, Industrial and Community based decentralized power applications

VALUES

TROES ("TROY-ce") is set-apart from the rest of providers by enabling mid-size projects with a Safer, Smarter, more adaptable and more economic turn-key solution

OUR FOCUS



RECENT DEPLOYED SYSTEMS

TROES' scalable module is capable of providing all range of systems



New Brunswick, CAN
528kWh / 100kW



Illinois, US
250kWh/100kW



Nova Scotia, CAN x2
1.12MWh / 500kW



Edinburgh, UK
542kWh / 250kW



Guangzhou, China
338kWh/150kW

Renewable Intermittency

Solar Power Storage
Wind Power Storage
Bio-mass/CHP efficiency boosting

Grid Issues

Off-Diesel
Transportable power

High Utility Bill

Half Off-Grid/Off-Grid
Peak shaving
Energy arbitrage

Demand Shortage

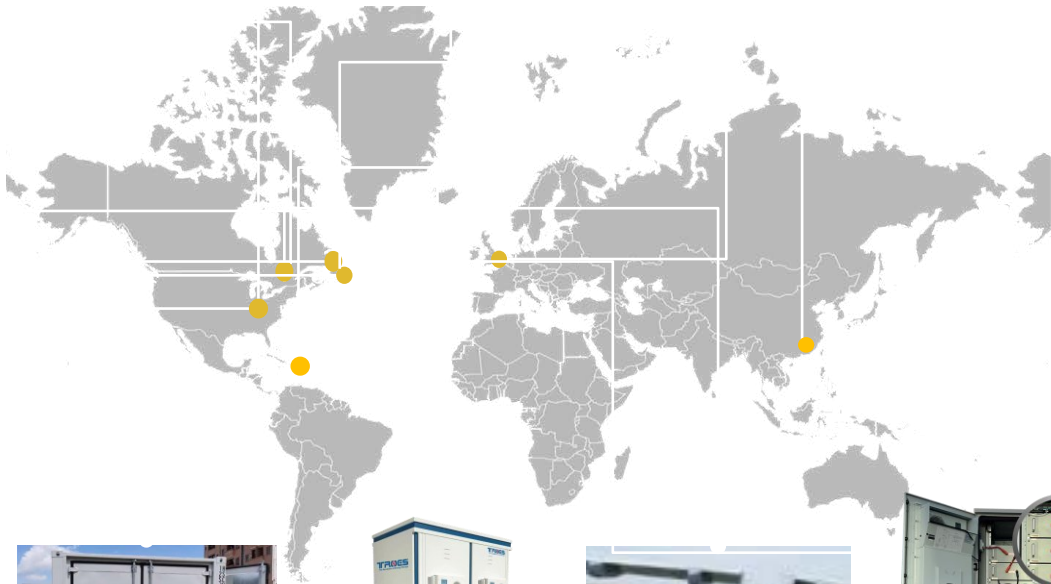
EV charger demand support
Local distribution line demand support



New Brunswick, CAN
124kWh / 30kW



Ontario, CAN
100kW / 30kW



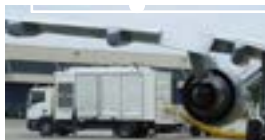
Ontario, CAN
100kW/368kWh
(HW+SW)



Illinois, US
250kWh / 100kW



Barbuda, Antigua,
Caribbean x4
1.3MWkWh/300kW
(HW+SW)



Ontario, CAN
77kWh / 60kW



Ontario, CAN
502kWh / 150kW

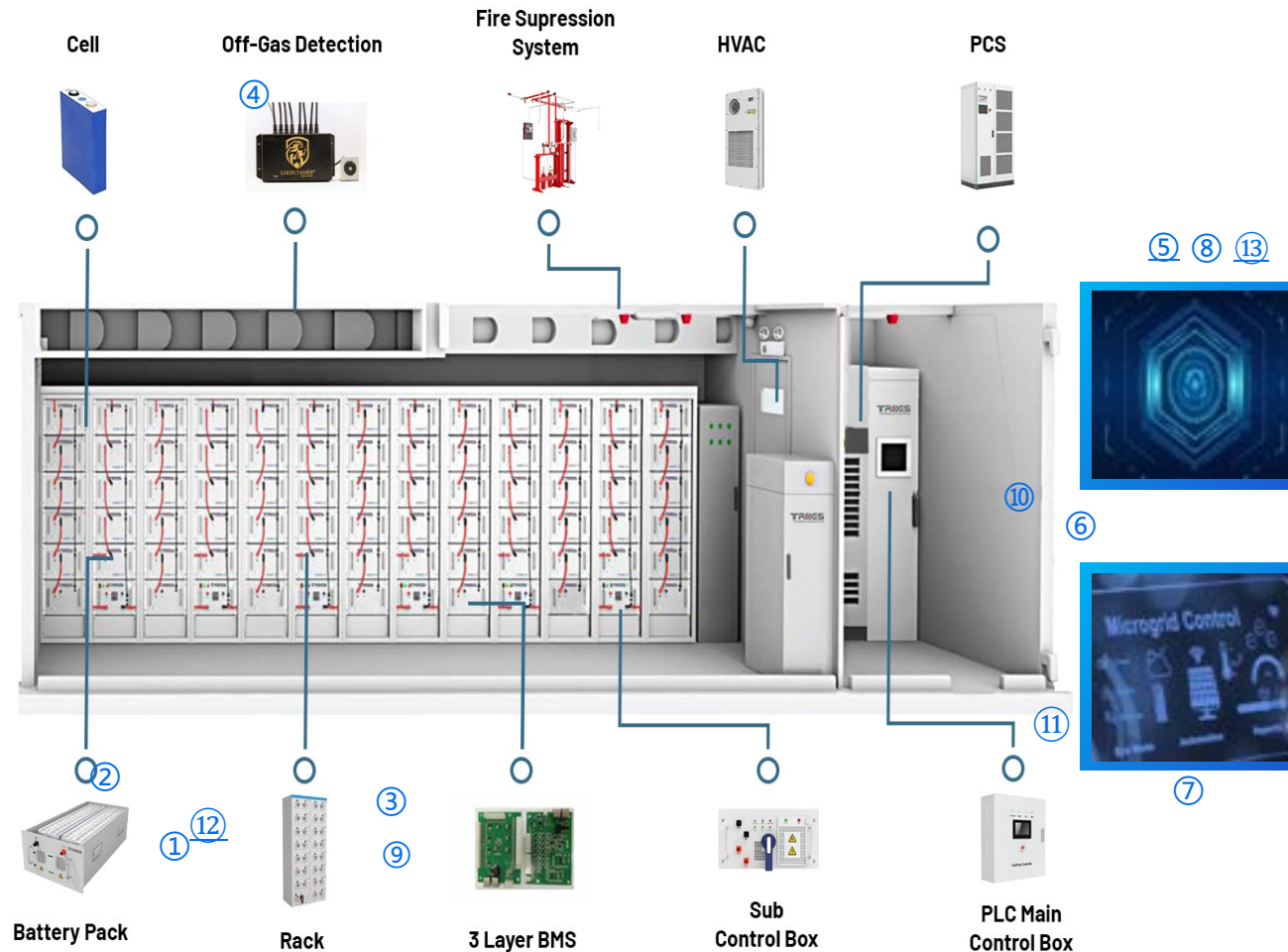
TROES BESS TECH HIGHLIGHT

- ① LFP Chemistry route
- ② 30+ Safety Tests
- ③ Multi-layer Software protection
- ④ Off-Gas detection tech
- ⑤ Early warning and prevention measures

Safer

- ⑨ Customizable-Off-The-Shelf design to support 1~10 hrs with flexible layout
- ⑩ Various enclosure types and customized designs

More Adaptable



- ⑥ MiGrid Simulator™ : system sizing and simulation
- ⑦ MiGrid Operator™ : Autonomous Operation supporting various cases
- ⑧ MiGrid Monitor™ – Lifecycle health monitoring

Smarter

- ⑪ 5%~25% less in < 5MWh design due to highly modular drawer design
- ⑫ Data-mining based augmentation tech to extend life-span

More Economical

TROES ONE-STOP OFFERING - VERTICAL

Pick Your Combination Of Needs

**Pre-selling sizing
simulation**



**BESS
Hardware**



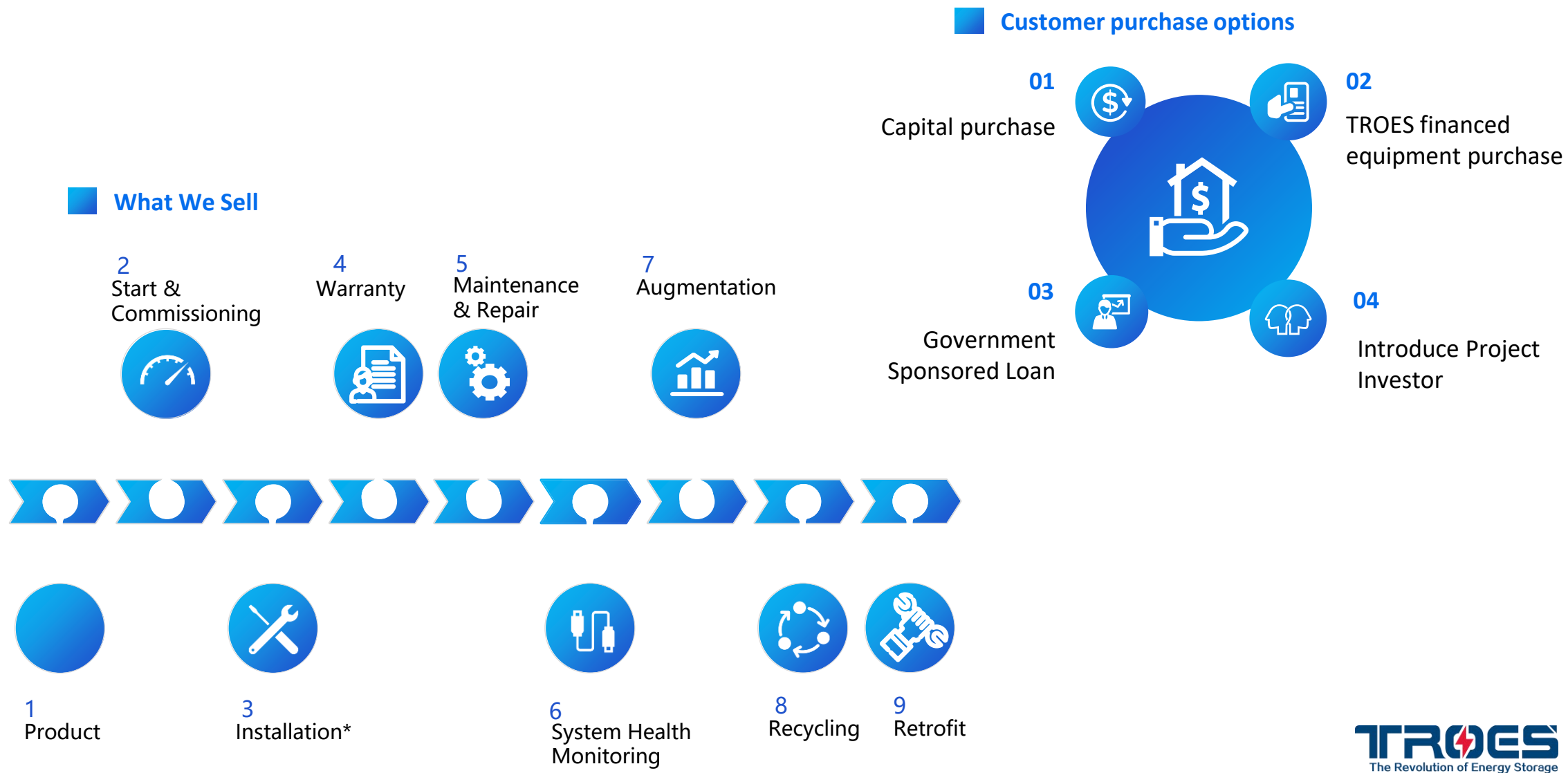
**BESS
Control**



**Monitoring &
Operation
Services**



TROES ONE-STOP OFFERING – HORIZONTAL



AFTERMARKET SERVICES

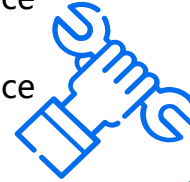
WARRANTY

- Ranges from 2 years to 10 years
- Customer is required to do maintenance during the warranty period



MAINTENANCE

- Provided by TROES, or a 3rd party to keep systems in a state of smooth operation
- Two types:
 - Schedule maintenance
 - Corrective maintenance



REPAIR

- Some repairs may be associated during corrective maintenance
- Can be performed regardless of warranty
- Occurs by replacing a part or putting together what is torn or broken

SYSTEM HEALTH

- Generate information from data acquired by TROES MiGrid-Monitor™
- Augmentation services ensure the system satisfies capacity or power requirements
- Meet objectives: Improved system availability & reduced maintenance costs



RECYCLING SERVICES

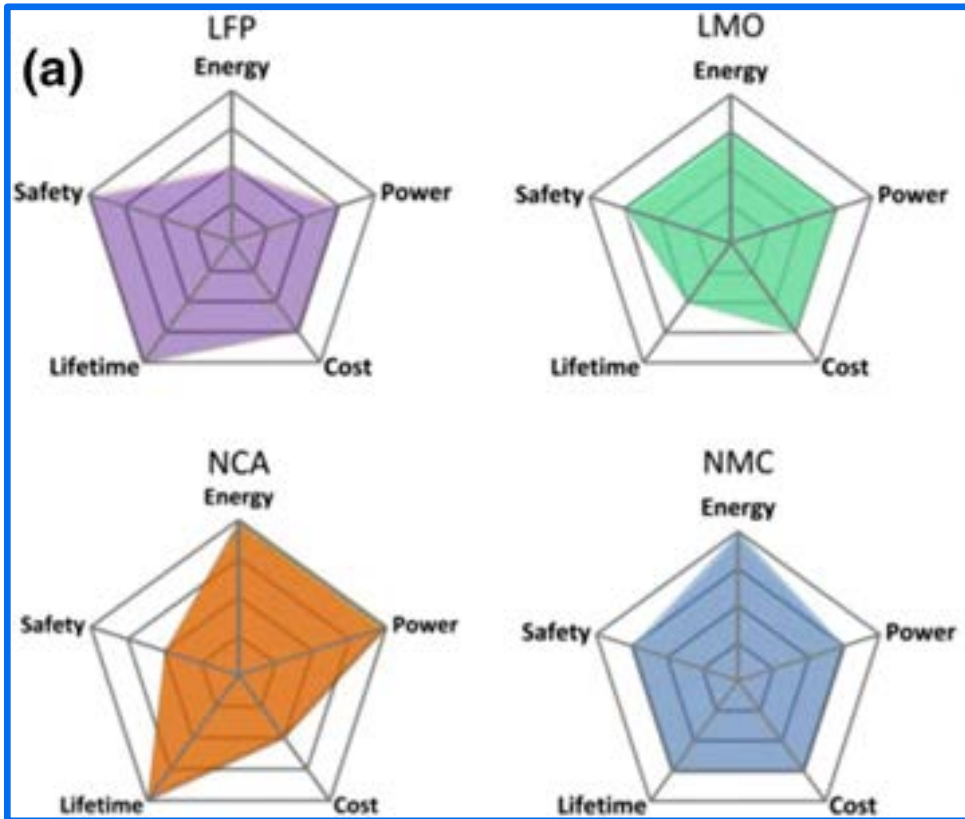
- Battery recycling reduces the number of batteries being disposed of as municipal solid waste
- TROES has partnered with a couple of localized recycling service companies



RETROFIT

- TROES' R&D team continuously evolves in advanced energy storage and microgrid control technology and provides advanced retrofit solutions
- TROES has an in-depth knowledge of LTO and flow battery technologies

SAFER: LFP Chemistry Route



Key performance parameters of four current battery chemistries (LFP, LMO, NCA, and NMC) for EVs. The inside and outside represent a low and high value, respectively.

SAFER: 30+ Safety Tests

UL1973

UL9540A

UN 38.3

High Quality Standards - Safety First

- ✓ **30+** strict UL standard safety tests from **2** international agencies
- ✓ Pass **Puncture test**
- ✓ **1-on-1 individual** battery cell monitoring reflects **higher safety standard**

MECHANICAL TESTS



ELECTRICAL TESTS

EXTREME CONDITION TESTS



TESTED AGAINST

Leakage of toxic gas

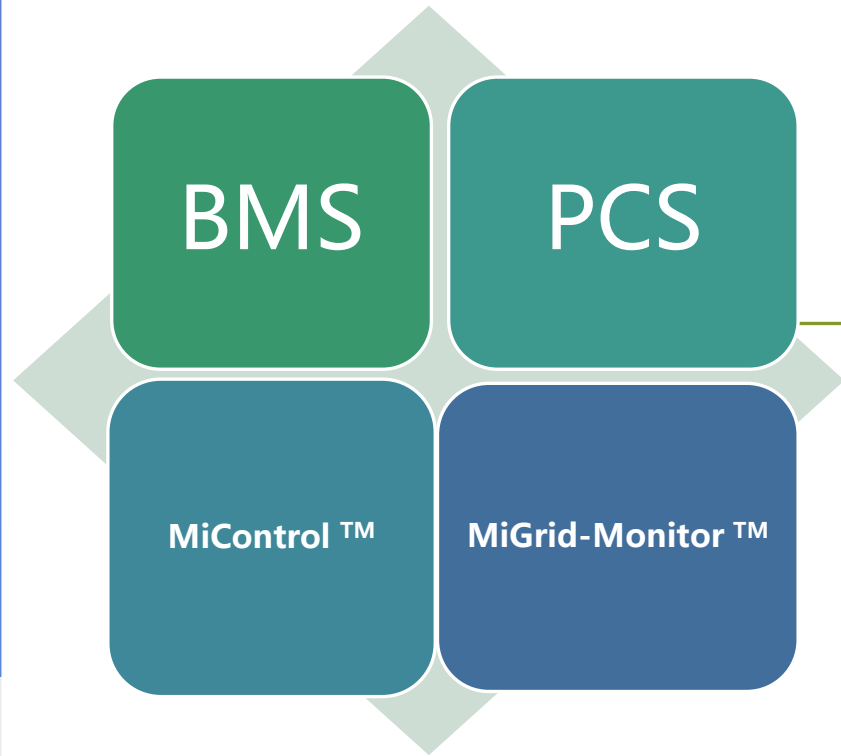
Fire or Explosion

Inflammable gas
exceeding standard

Protection Failure

Insulation or case
damage, liquid leakage

SAFER: 4-levels Software protection



BMS can **disconnect** the contactors by itself when BESS fault occurs

PCS can **shut down** in an emergent situation based on system status boundary setting;

MiControl™ BESS local controller protects the whole system according to environmental sensor (such as temperature and humidity, smoke, flooding and other signals).

MiGrid-Monitor™ predicts and send warning signal based on operational data statistics

SAFER:Off-Gas Detection

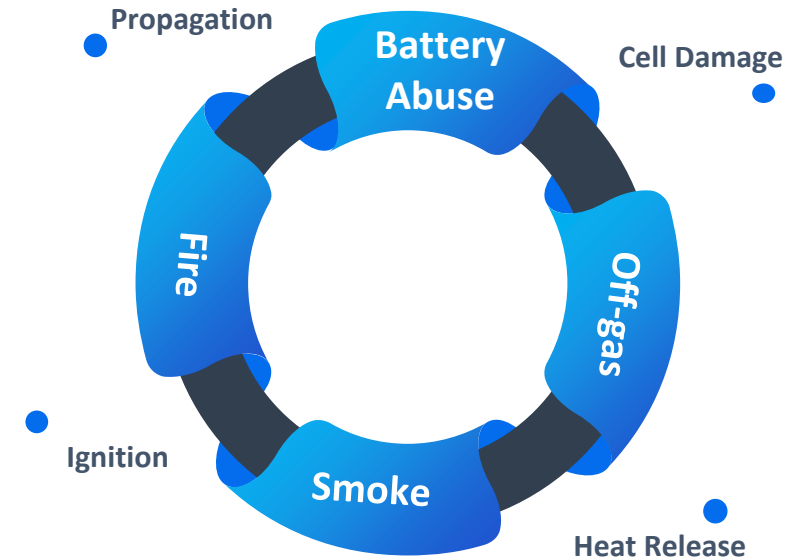


T

ROES offers Off-Gas detection technology with single cell off-gas event detection so that customers can be aware of the earliest sign of failure, enabling the option to prevent thermal runaway

M

ost other battery energy storage systems available in the market have Smoke Detectors that provide no early warning of failure



Remote alarm



Local alarm



Increased cooling

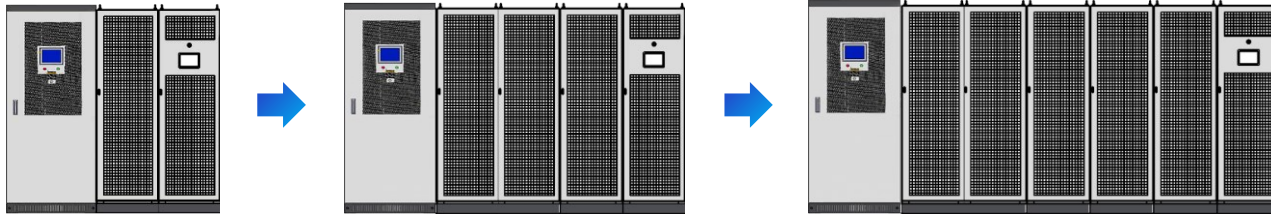


Initiate ventilation

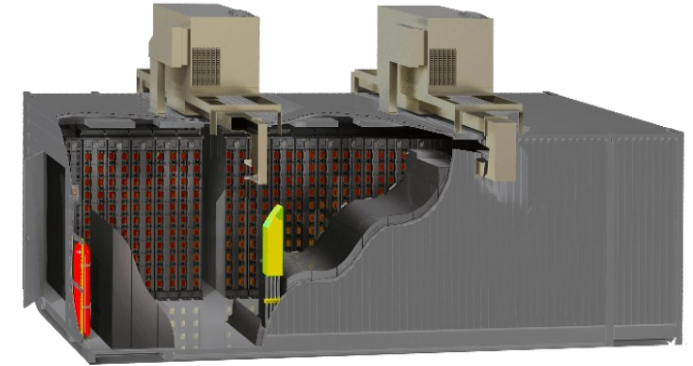


System shutdown

MORE ADAPTABLE : HIGHLY MODULAR FOR MASS CUSTOMIZATION



Customizable-Off-The-Shelf, very flexible in Width, Height and Length



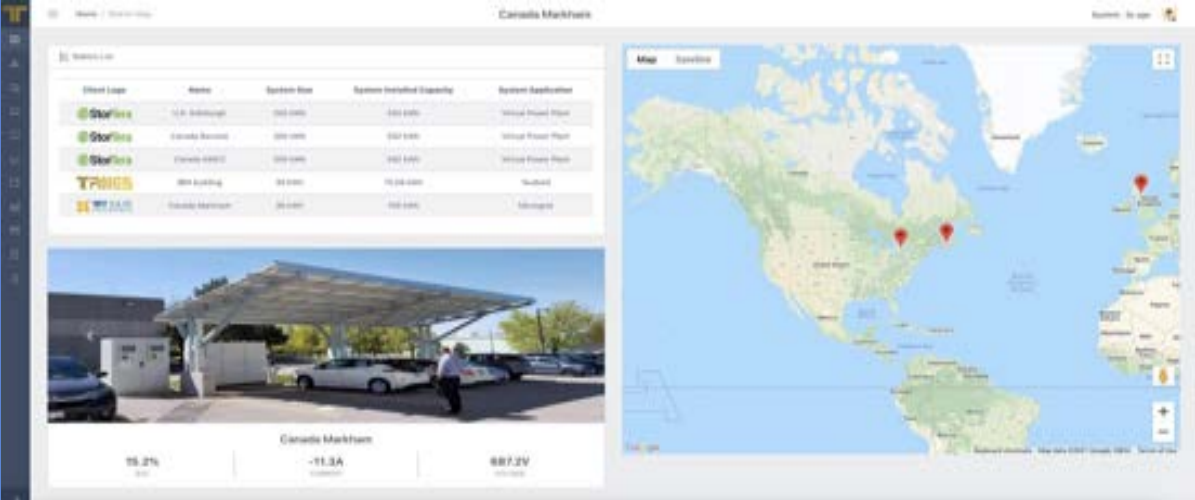
SAFER: BESS Controller - MiControl™

TROES proprietary local controller MiControl™ acts as brain of the BESS by offering a universal communication and control interface



SAFER AND SMARTER: Remote Monitoring - MiGrid™ Monitor

Life-cycle Health Monitoring and Management Platform



Real-time Performance Display



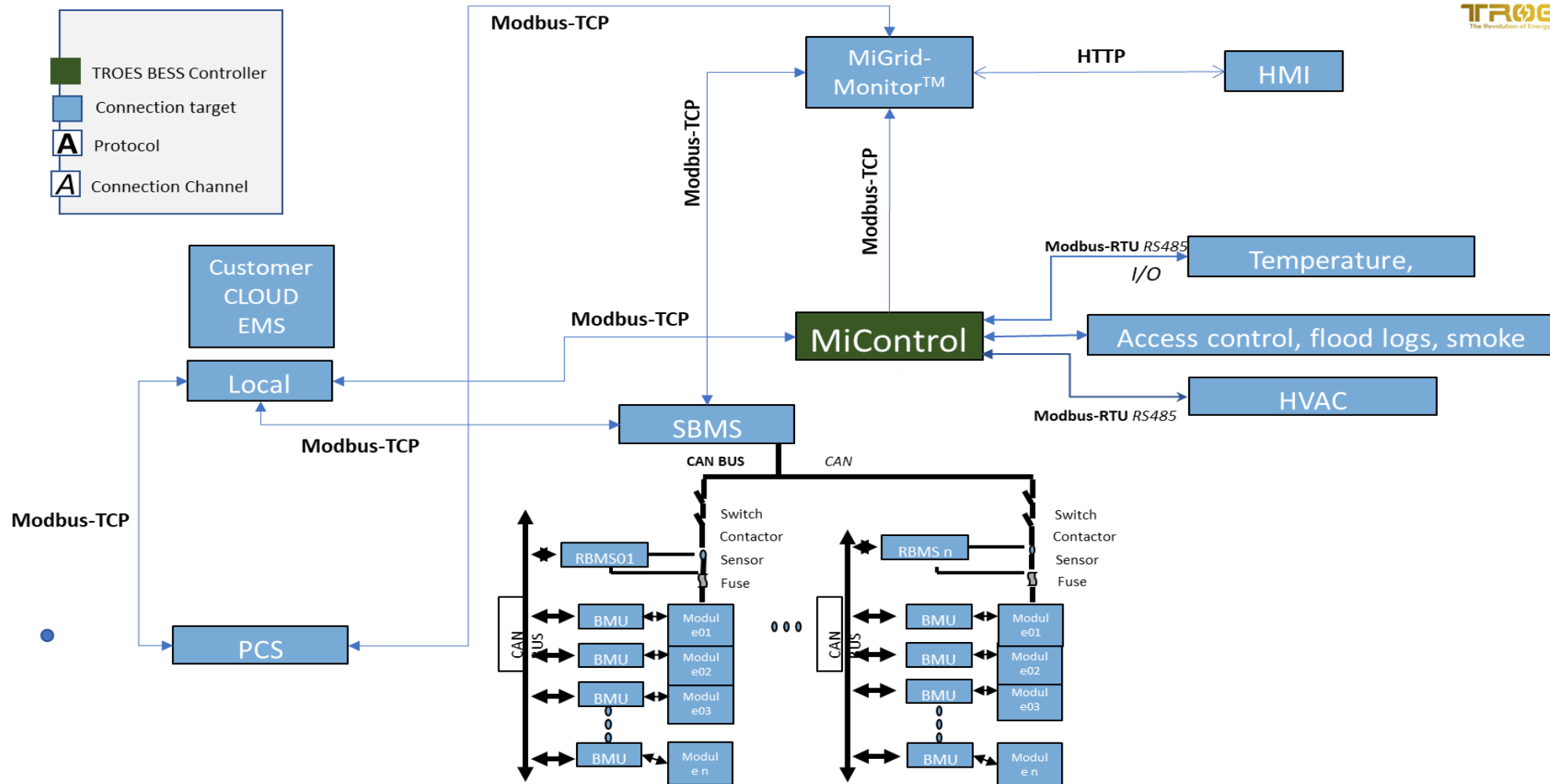
Cloud-based operation



Warranty and Operation Management

Three-level Alarm, Diagnostics & Early-Warning

TROES' Software Topology



Smarter : One Stop Shop Solution

Energy Source: ←



HM

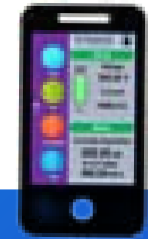


IoT based
BESS

S/W



MiGrid™ Operator Platform



EV charger support



Off diesel/off-grid



Transportable power



...

More Adaptable : Various Enclosure Types



Enclosureless Design

Indoor Cabinet Design

Outdoor Cabinet Design

Series Container Design

Transportable Design

30 minutes charge

DC coupled

US or TAA content

Ultra-low Design

UPS+Peak Shaving Design

-50 Ultra cold Design

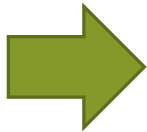


More Economical: Extend Life Cycle Through Augmentation

Online-to-Offline Augmentation leveraged TROES data-mining technology to offer our client the best augmentation strategy to lower initial BESS capital cost and increase BESS asset value



Online data monitoring and learning



Offline augmentation



THANK YOU



Leading Canadian Microgrid-Enabling Technology Firm

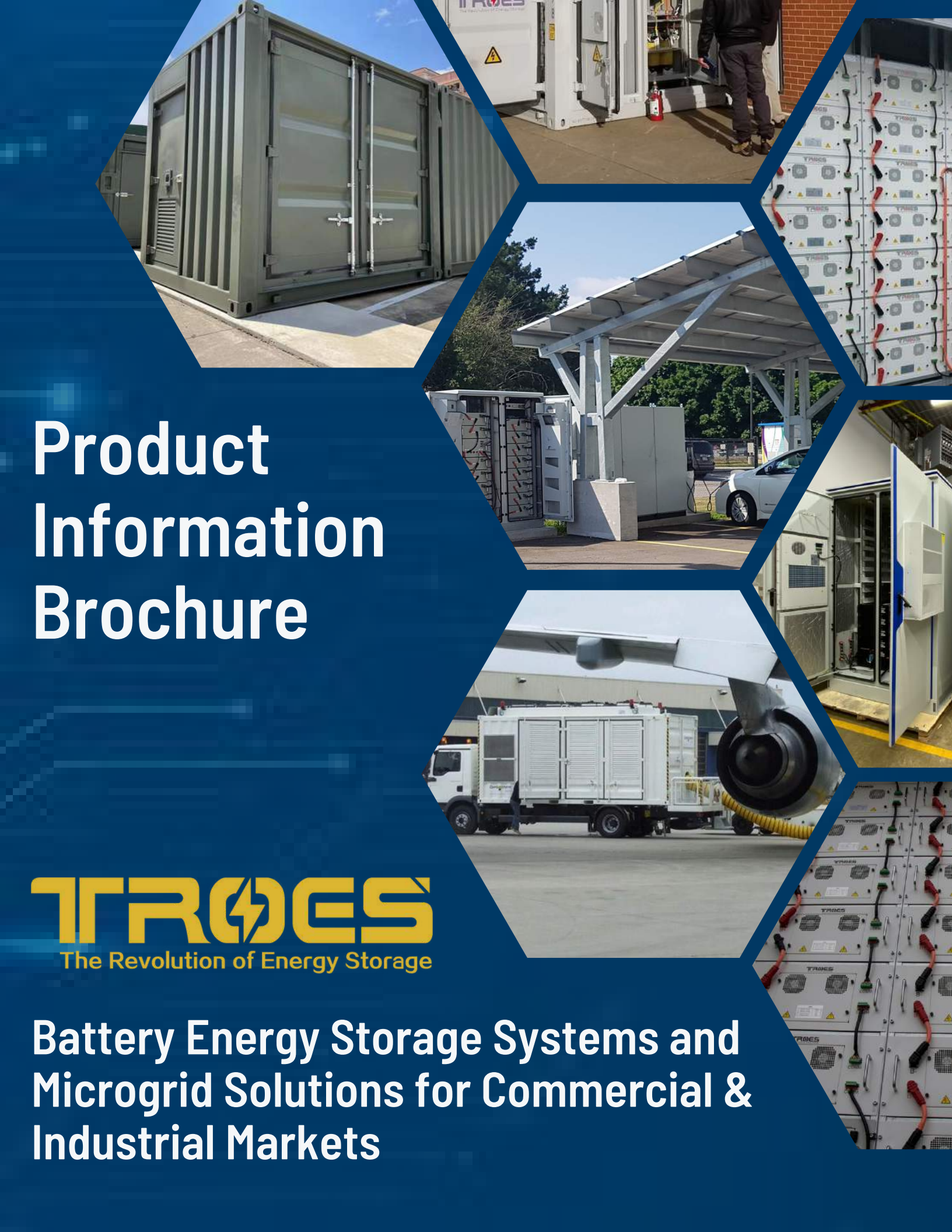
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Product Information Brochure

TRGES
The Revolution of Energy Storage

**Battery Energy Storage Systems and
Microgrid Solutions for Commercial &
Industrial Markets**

About TROES

TROES, established in 2018, is a North American advanced Battery Energy Storage Systems (BESS) provider with headquarters in Canada. TROES specializes in developing, designing, manufacturing, and delivering smart, modular, cloud-managed energy storage systems as a complete turnkey solution.

Using proprietary technology, TROES sets itself apart from other energy storage providers by enabling mid-size projects with safe, cost-effective, and adaptable plug-and-play battery energy storage products and solutions.

Why TROES?

TROES helps electric power developers and consumers solve pain points such as:

- High utility bills
- Power reliability issues
- Capacity shortage from existing grid infrastructure
- Unavailability of grid coverage

Applications

- Critical Load Back-Up
- Peak Shaving/Shifting
- Renewable Self-Supply
- Demand Response
- Capacity Enhancement
- Energy Arbitrage
- Diesel Replacement/Augmentation
- EV Charger Demand Support
- Lead Acid Replacement
- Power Quality Improvement
- Uninterruptable Power Supply



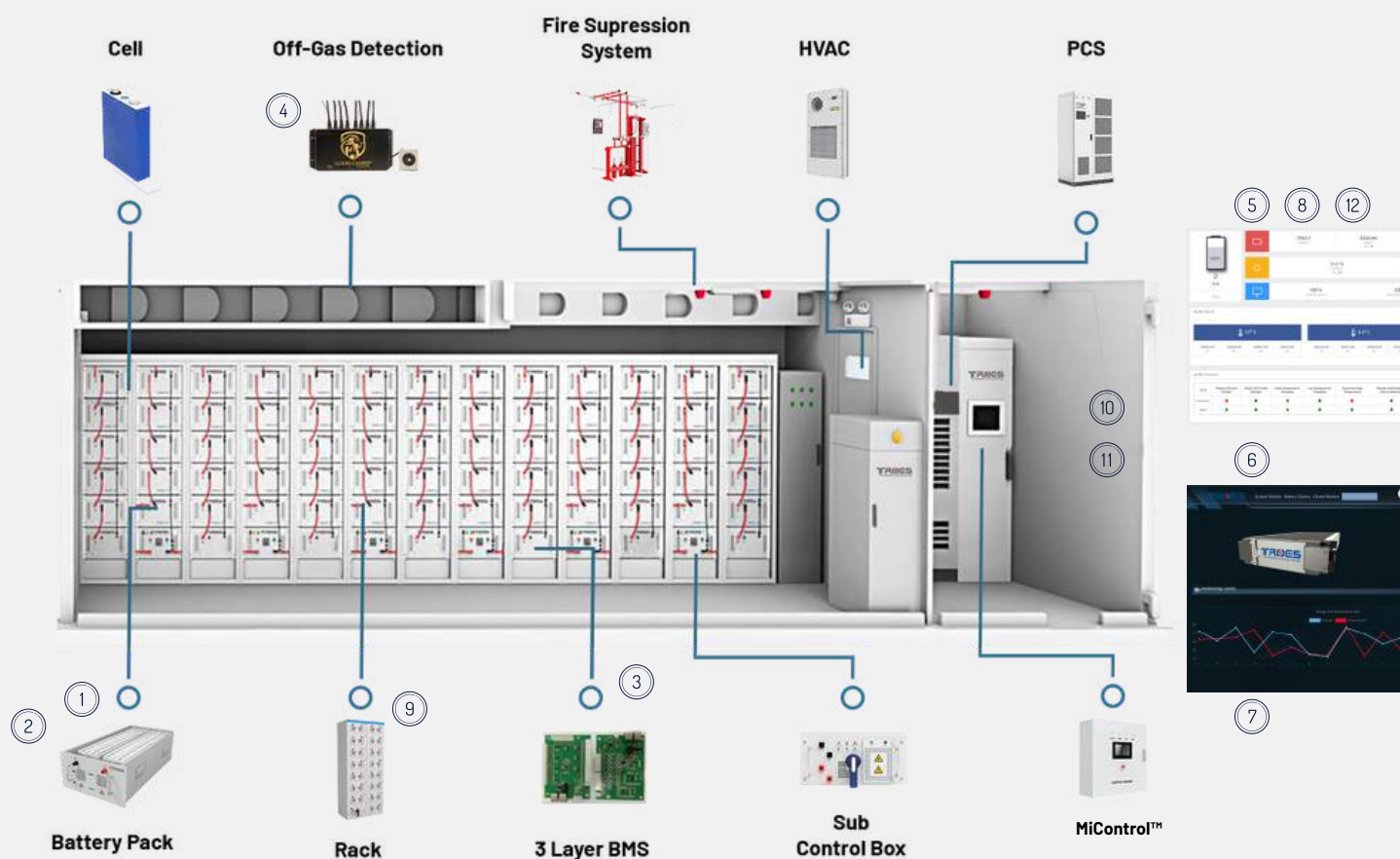
TROES' BATTERY ENERGY STORAGE STRUCTURE

1. LFP Chemistry route
2. 30+ Safety Tests
3. Multi-layer Software protection
4. Off-Gas detection Technology (Optional)
5. Early warning and prevention measures

Safer

6. MiGrid Simulator™: system sizing and simulation
7. MiGrid Operator™: use-case based autonomous operation software
8. MiGrid Monitor™: lifecycle health monitoring software

Smarter



11. Up to 30% reduced cost for under 5MWh systems due to highly modular drawer design
12. Augmentation technology extends life-span of batteries

More Economic

9. Customizable off-the-shelf design supports 1-12 hours with flexible layout
10. Various enclosure types and customized designs for indoor and outdoor projects

More Adaptable

WHY TROES IS DIFFERENT

SAFETY

LFP-Based Chemistry

TROES' batteries are based on Lithium-Iron Phosphate chemistry. It's the preferred battery chemistry for stationary applications. LFP provides better thermal and structural stability and longer life compared to other competing battery chemistries.

Key Active Material	Lithium-Iron Phosphate	Lithium Nickel Manganese Cobalt Oxide	Lithium Manganese Oxide	Lithium Nickel Cobalt Aluminium	Lithium Titanate
Technology Short Name	LFP	NMC	LMO	NCA	LT0
Cathode	LiFePO ₄	LiNi _x Mn _y Co _{1-x-y} O ₂	LiMn ₂ O ₄ (spinel)	LiNiCoAlO ₂	variable
Anode	C (graphite)	C (graphite)	C (graphite)	C (graphite)	Li ₄ Ti ₅ O ₁₂
Safety					
Power Density					
Energy Density					
Cell Costs Advantage					
Lifetime					
BESS Performance					

Source: International Renewable Energy Agency (IRENA), 2017

WHY TROES IS DIFFERENT (CONT'D)

SAFETY

Rigorous Cell Tests

TROES batteries have passed more than 30 safety tests. These tests include rigorous electrical, mechanical, material, environmental and failure tests. Two of the most demanding tests are the heat spread test and the cell puncture test.

380°C Heat Spread Test

Cell failure test measures and judges the condition of the battery cell after failure caused by extreme conditions such as extrusion, puncturing, short-circuit or ultra-high temperature. This optional test is passed if the batteries can withstand 380°C heat.

Results: TROES' battery cells withstood 380°C without igniting or exploding the cells. TROES is one of the few energy storage manufacturers to conduct the experiment and pass the test on the first attempt.

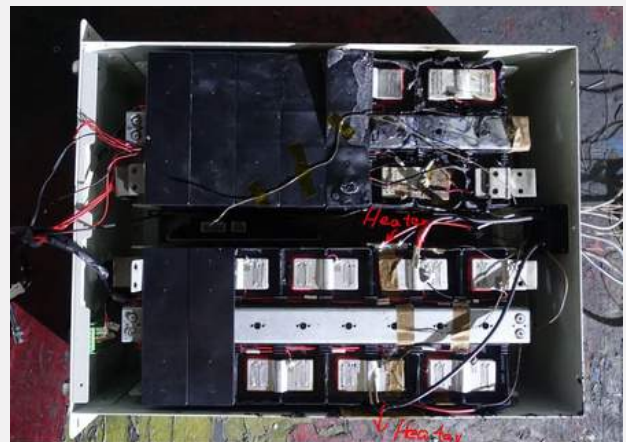


Figure 1: Heat Spread Test

Battery Cell Puncture Test

This test measures and judges the condition of the battery cell by charging it to the limit at a constant current and then puncturing it with a steel nail for 6 hours. The test is successful if the battery cell does not explode or catch fire.

Results: TROES' battery cells did not explode or catch fire while maintaining normal current levels, resulting in a successful test.

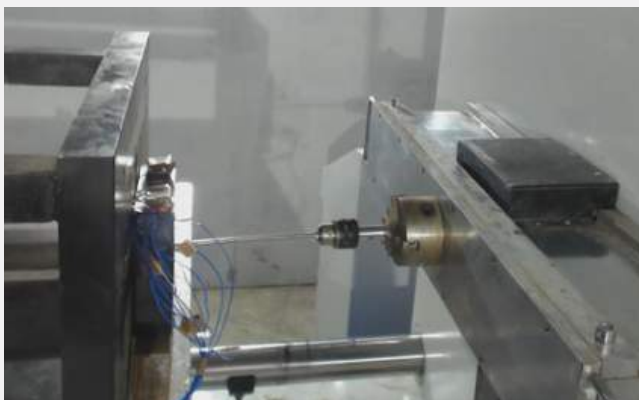


Figure 2: Battery Cell Puncture Test

WHY TROES IS DIFFERENT (CONT'D)

SAFETY

Battery Management System (BMS)

Safety is integrated into every layer of our system controls and hardware. TROES' 3-levels of BMS from the cell, string and system level plus TROES' MiControl™ technology is layered on top of all subcomponents to ensure system safety and functionality while extending the batteries' potential without accelerating degradation or damaging them.

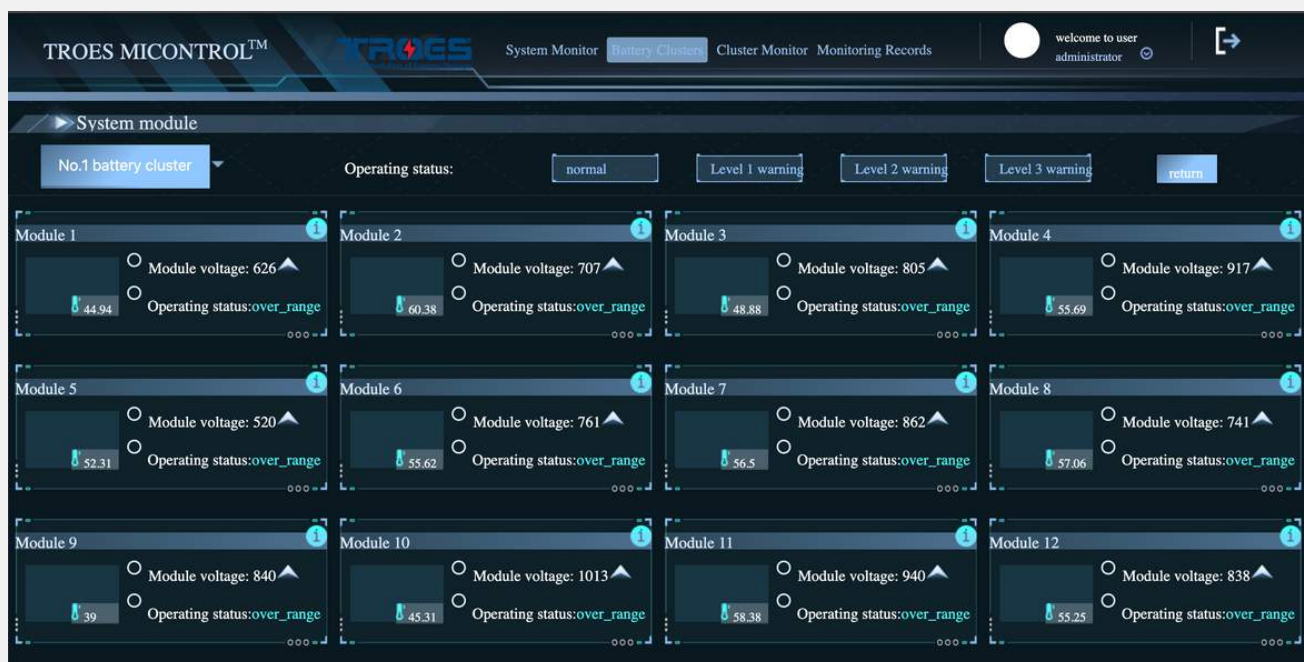


Figure 1: Image of MiControl™ Interface

ADAPTABILITY

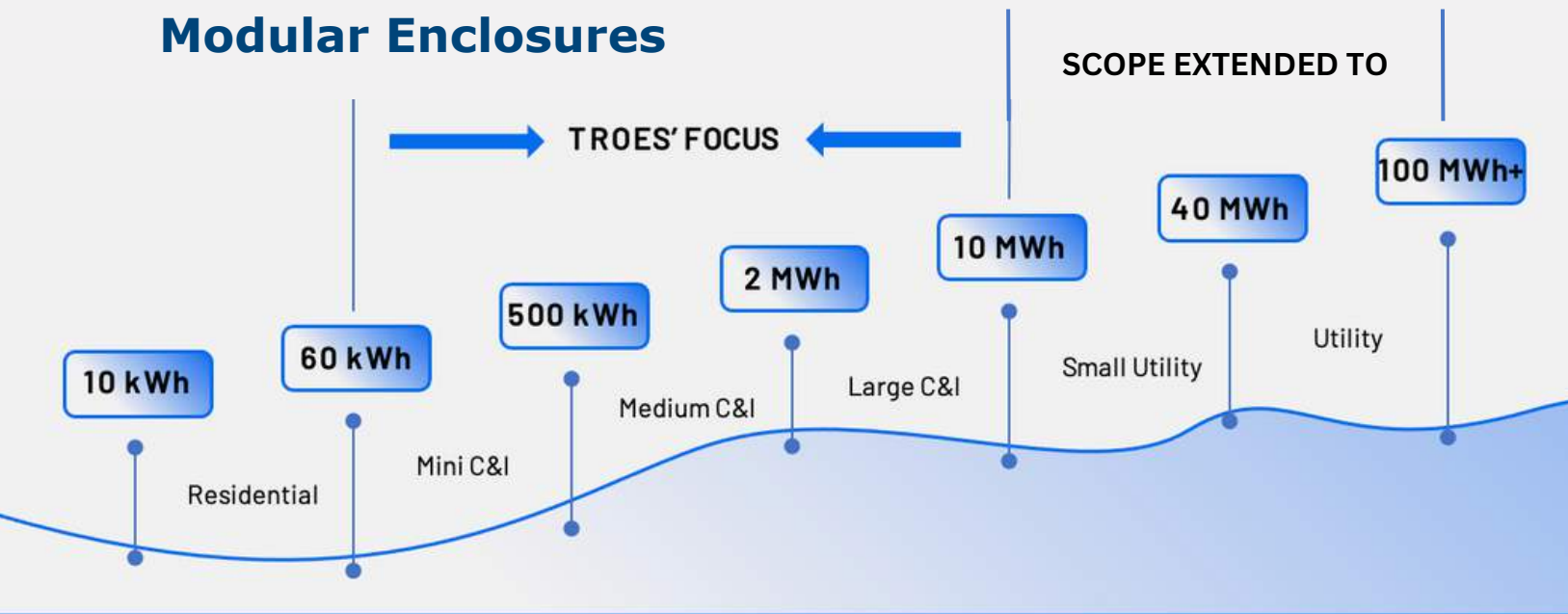
Power Conversion System

A Power Conversion System (PCS) is a device for bidirectional conversion of electrical energy connected between the battery system and the grid and/or load. This device has charge and discharge functions, active and reactive power control functions and off-line switching functions. TROES works with various PCS suppliers according to different factors such as: delivery time, pricing, functionality and service and support to maximize the potential of on-grid and off-grid functions. Our PCS models includes but is not limited to 30kW, 62.5kW, 500kW and 1MW offerings.

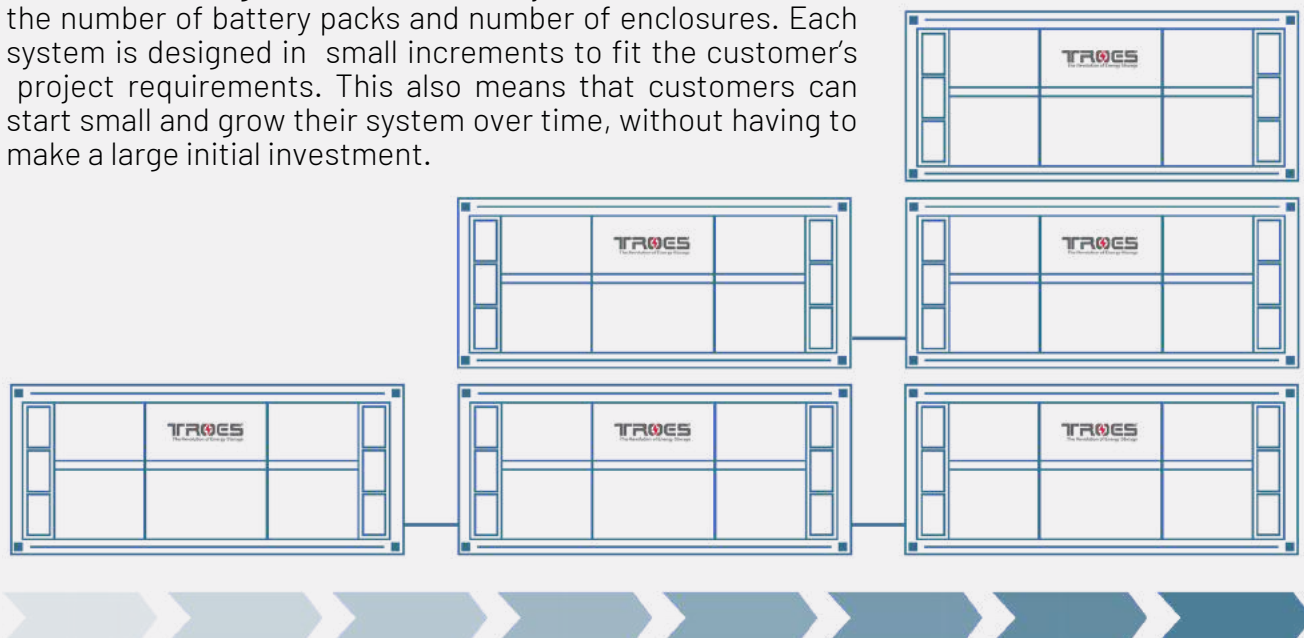
WHY TROES IS DIFFERENT (CONT'D)

FLEXIBILITY

Modular Enclosures



TROES energy storage systems are designed to be fully scalable, allowing customers to easily increase or decrease the number of battery packs and number of enclosures. Each system is designed in small increments to fit the customer's project requirements. This also means that customers can start small and grow their system over time, without having to make a large initial investment.



OPTIMIZE SPACE

Incorporate everything into one system to reduce physical footprint.

OPTIMIZE ENERGY

Additional energy storage systems can be added to achieve desired capacity.

WHY TROES IS DIFFERENT (CONT'D)

FLEXIBILITY

TROES' vs Competitors' Offerings

	Offered by Others	TROES Solution
Grid Connection	Always connected to the grid. Unable to switch to an islanded system.	BESS can be grid tied, off grid or able to switch from grid connected to an islanded system.
Supporting Hours	Traditional charge/discharge rate of 0.25C or 0.5C (2-4 hours)	BESS can charge/discharge from 30 minutes to 12+ hours.
Enclosure Type	Single configuration "one size fits all" solution.	Indoor & outdoor cabinet, and container design of 10-foot, 20-foot, or 40-foot solution.
AC/DC Coupling	Single configuration for renewable micro-grid system.	DC-Coupled, AC-Coupled and hybrid PCS solutions.
Flexible Design	Limited to one default size container for 10MWh+ utility sized projects	Flexible indoor & outdoor, cabinet & container for 60kWh+ small-medium size projects

Fire Suppression System Options

Every TROES BESS is equipped with one of three fire suppression gas agents: FM200, NOVEC 1230 or Aerosols. Regardless of choice, each solution is a clean agent, meaning they are safe for use in energy storage systems, don't leave behind a residue and use low toxic chemical agents to remove the presence of heat from a fire.

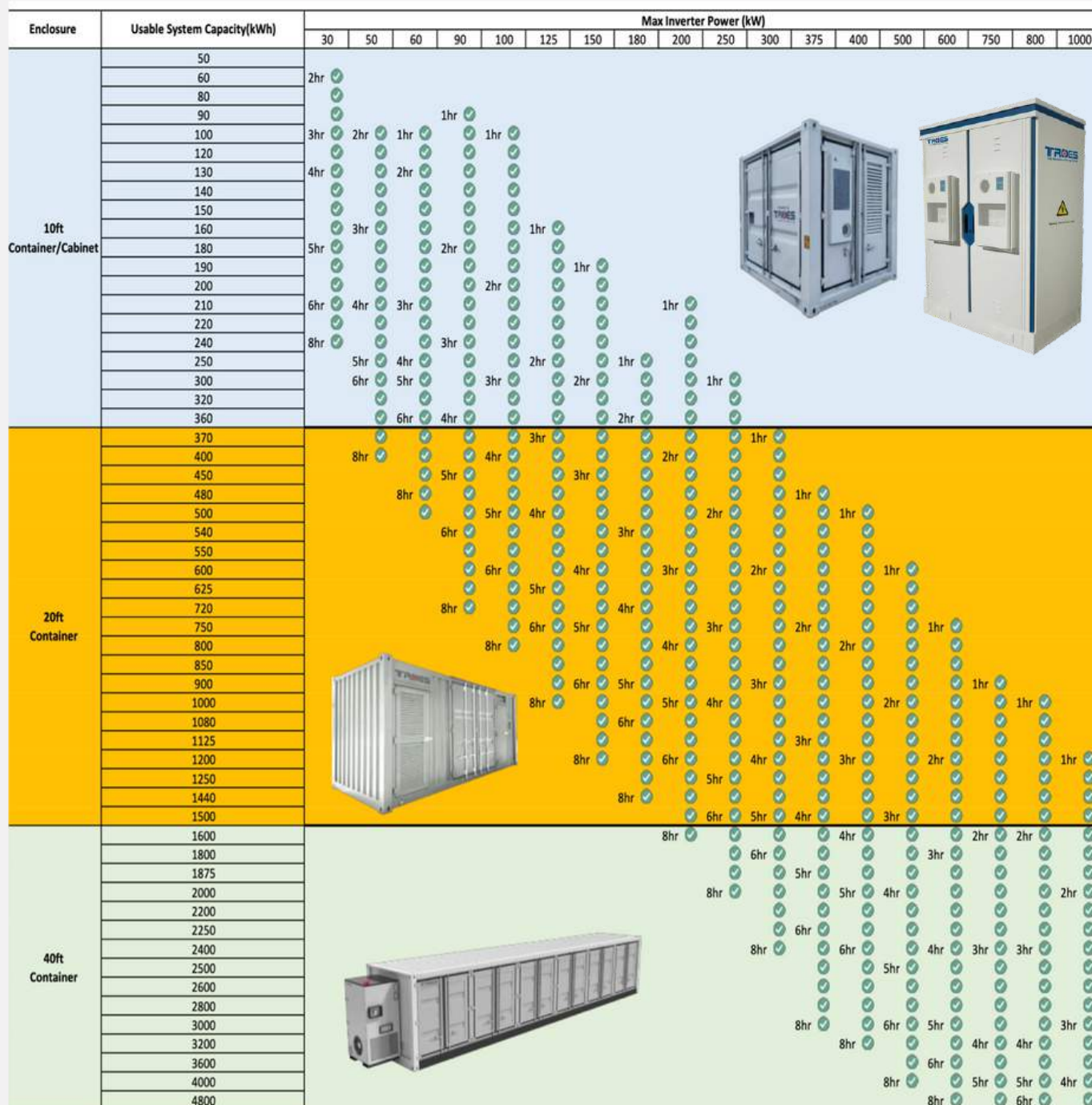
If a fire is detected, the pipeline communication control device opens the valve of the battery pack and the flame retardant liquid in the fire extinguisher is released. This method effectively prevents thermal runaway from spreading to other battery packs.



ADAPTABILITY

VERSATILE BESS DESIGN

TROES provides a modular, plug-and-play solution for optimal scalability and adaptability to a wide range of project requirements. Our advanced battery energy storage systems and microgrid control capabilities have been designed to support deployment configurations ranging from 30 minutes to 12 hours, with the ability to make incremental power adjustments as needed.



INNOVATIVE TECHNOLOGY HIGHLIGHTS

SMART TECH

SAFETY

MiControl™ Platform

MiControl™ is TROES' control platform responsible for the entire system scope of a BESS. MiControl™ collects all safety-related information in the battery cluster, PCS, HVAC, power distribution and fire protection. MiControl™ communicates with the BESS' EMS and SCADA equipment to run certain early warnings, alarms, protection, and cut-off strategies for all equipment.

SMART TECH

SAFETY

Microgrid Controller Compatibility

TROES' microgrid controller is responsible for controlling and managing the flows of electricity in and out of the microgrid, by integrating different energy sources and loads and balancing the energy supply and demand within the microgrid, while taking into account the varying storage capacity of the batteries.

It also has to ensure the safety and stability of the microgrid, which involves monitoring the grid and taking preventive actions to avoid overloads or blackouts. TROES' system is compatible with any microgrid controller and energy management system for a complete turn-key solution.

SMART TECH

SAFETY

Off-Gas Detection

TROES offers an off-gas detection technology setting as an option with single cell off-gas event detection. Working in collaboration with our MiGrid™ Remote Monitoring System, the off-gas detection technology provides alerts at the earliest sign of failure, enabling the option to prevent thermal runaway. Most battery energy storage systems available in the market have smoke detectors but when the smoke is detected, it might be too late.



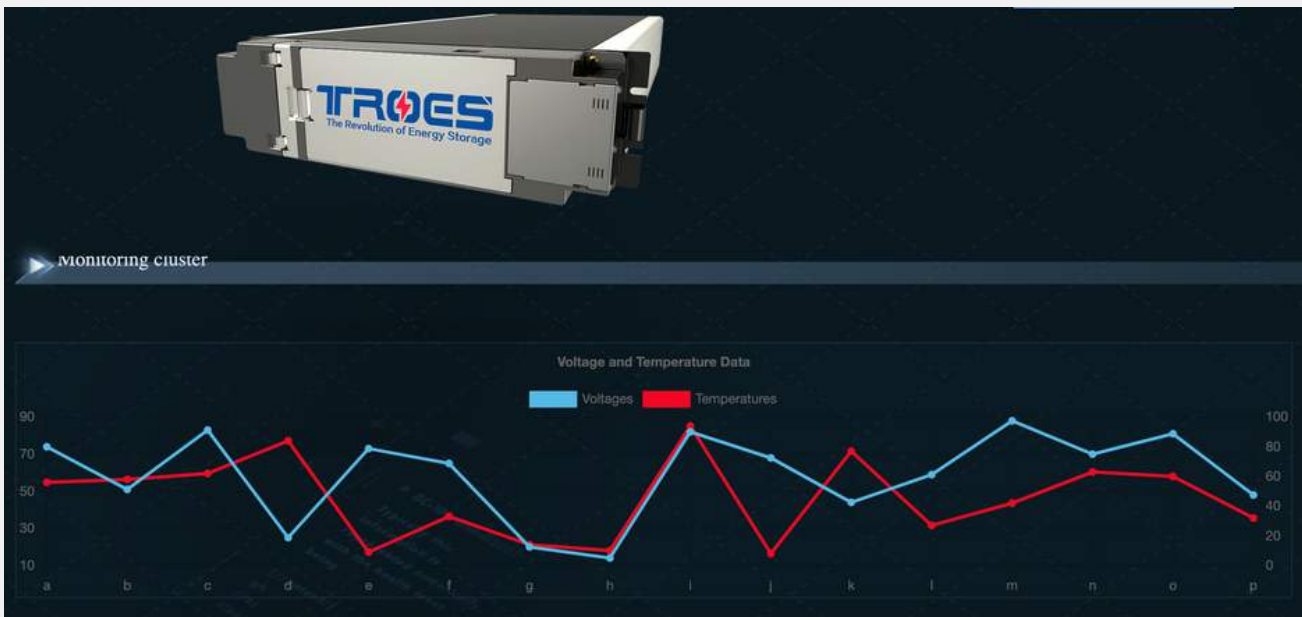
INNOVATIVE TECHNOLOGY HIGHLIGHTS (CONT'D)

SMART TECH

LONGEVITY

Dual-Equilibrium™

With the usage of lithium battery packs, it is difficult to maintain consistent performance for all individual cells. Different cell balancing techniques are implemented to increase the battery voltage when high performance is required or reduce battery voltage in favor of extended battery lifecycle. TROES' Dual-Equilibrium™ proprietary technology combines the advantages of both passive and active equalization in lithium iron phosphate batteries and avoids the shortcomings of both.



SMART TECH

LONGEVITY

Extended Operational Life

Our remote monitoring lifecycle health management system - TROES' batteries are based on Lithium-Iron Phosphate chemistry. It's the preferred battery chemistry for stationary applications. LFP provides better thermal and structural stability and longer life compared to other competing battery chemistries.



- Retention of system's usable capacity even after 10 or 20 years
- Optional augmentation of the system as part of the maintenance plan
- Taking advantage of new technology developments and decreasing battery costs
- Use of our life-cycle health monitoring & management system and proprietary battery technology

TROES FULLFILLMENT PROCESS



Manufacturing

TROES' battery test procedures adhere to UL certifications in North America, CE certifications in Europe, IEC and IEEE certifications internationally. Our battery packs and cells pass all tests & certifications before designing the system.



Assembly

TROES' assembly team begins connecting the cells with proprietary battery packs, followed by the battery management system, then racking the entire system into a UL & NEMA certified cabinet or container.



Factory Acceptance Testing

Extensive testing process is performed to ensure every major part of the system is working as intended from the system levels to the sensors, fans, and alarms. TROES follows and maintains the UL 9540A certification for thermal runaway fire propagation.



Shipping

TROES follows international certification UN 38.3 adhering to all shipping standards. All documentation is certified, signed and is up to date while all strict packaging protocols are maintained to ensure the system arrives safely at its designated location.



Commissioning

Once the system has arrived and has been installed, TROES performs a 2-day long commissioning test. Once the field evaluation is successful, the entire system receives UL, IEC & NEMA certifications.

FLEXIBLE FINANCING OPTIONS



All TROES products include a standard warranty.

Using AI and advanced data analytics, TROES provides optional on-site augmentation to predict the optimal time to add additional batteries into the system keeping it running effectively. All warranties include technical support hot line, remote troubleshooting, consumables and scheduled preventative maintenance.

TROES helps make the transition to energy more accessible and affordable by suggesting different governmental or financial institutions when looking at different purchasing options.

- Energy Storage as a Service (ESaaS)
- Asset Financing
- Capital Purchase
- Leasing
- Government Sponsored Loan

Extended warranty available for up to 10 years!



ENCLOSURE CATALOGUE

Specifications

- Single & Double Door Cabinet options available
- "Off-the-shelf" designs starting at 60kWh
- Lithium Iron Phosphate technology (LiFePO₄)
- Geared for Commercial, Industrial and Institutional businesses
- Additional systems can be added in parallel

Indoor Cabinet



Outdoor Cabinet



10 Ft. Container



20 Ft. Container



40 Ft. Container



Customized Solution



Maximum Cabinet Size Product Spec Sheet Sample¹

Electrical Specifications ²	
Enclosure	Cabinet Unit (0.5C)
Model	TO-60-133
Battery Technology	Lithium-ion / LFP
Max C-Rate (charge/discharge)	0.5C / 0.5C
DC Current Rating	100 A
DC Voltage	665.6 V
DC Voltage Operation Range ³	579.8 - 748.8V
Battery Efficiency	100%
Installed Capacity	133.1 kWh
Usable Capacity	120.1 kWh
Rated AC Power	60 kW
Rated AC Current	72.2 A
Auxiliary AC Voltage	480V, 3 Phase
Nominal AC Frequency	50/60Hz (configurable)
Mechanical Specifications	
Dimensions ⁴ (W x D x H)	730 x 1429 x 2400 mm
Number of Enclosures	1 for Battery + 1 for PCS
Operating Temperature	-10°C to 50°C
System Weight	~2700 kg
HVAC	Yes
Advanced Features (optional)	Ultra-low temperature; Low-cabinet design; Off-gas detector; Stainless Steel closure; and Others
Communications	
Integrated Control Function	MiGrid-Operator™
Remote Monitoring	MiGrid-Monitor™
Network	TCP/MODBUS/RS485
Safety & Grid Interface Certifications	UL1741, UL1973, UN38.3, 9540A
Protection	Thermal Runaway Protection; Rack Level Lockable Disconnect; Lightning Protection; Over-charge/Over-discharge Protection; Over-temperature Protection; External Accessible E-stop; External Accessible Fire Control Panel; Islanding Capability

1. The examples provided are for maximum capacity and may not reflect typical usage scenarios.

2. In the interests of continual product improvement, specifications are subject to change without notice. Contact us for the latest specifications.

3. Actual grid input requirement will depend on factors such as (but not limited to):

(i) actual equipment electrical requirements. (ii) utilization/duty cycle. (iii) daily duration of availability of input power supply. (iv) state-of-health and age of the BESS. (v) duration of daily construction site operations.

4. An additional 0.9m clearance on all sides of the battery energy storage system should be provided for maintenance access.

Maximum Container Product Spec Sheet Sample¹

Electrical Specifications ²				
Enclosure	20 Ft. Container (0.5C)	20 Ft. Container (1C)	20 Ft. Container (2C)	40 Ft. Container (0.5C)
Model	TC-1200-2496	TC-1000-2002	TC-3000-1600	TC-3000-5760
Battery Technology	Lithium-ion / LFP			
Max C-Rate (charge/discharge)	0.5C / 0.5C	1C / 1C	2C / 2C	0.5C / 0.5C
DC Current Rating	125 A * 10	201 A * 10	320 A * 10	125 A * 20
DC Voltage	998.4 V	998.4 V	998.4 V	1152 V
DC Voltage Operation Range ³	873.6 V - 1123.2 V	873.6 V - 1123.2 V	873.6 V - 1123.2 V	1008 V - 1296 V
Battery Efficiency	98%	95%	90%	98%
Installed Capacity	2496 kWh	2002 kWh	1599 kWh	5760 kWh
Usable Capacity	2265.7 kWh	1752.6 kWh	1326.1 kWh	5201.7 kWh
Rated AC Power	1200 kW	1000 kW	3000 kW	3000 kW
Rated AC Current	1448 A	1445 A	4335 A	2890 A
Auxiliary AC Voltage	480V, 3 Phase	400V, 3 Phase	400V, 3 Phase	600V, 3 Phase
Nominal AC Frequency	50/60Hz (configurable)			
Mechanical Specifications				
Dimensions ⁴ (W x D x H)	6058 x 2438 x 2591 mm	6058 x 2438 x 2591 mm	6058 x 2438 x 2591 mm	12192 x 2438 x 2896 mm
Number of Enclosures	1 for Battery + 1 for PCS			
Operating Temperature	-20°C to 45°C			
System Weight	~25000 kg	~25000 kg	~25000 kg	~50000 kg
HVAC	Yes			
Advanced Features (optional)	Ultra-low temperature; Low-cabinet design; Off-gas detector; Stainless Steel closure; and Others			
Communications				
Microgrid Control	MiGrid-Operator™			
Remote Monitoring	MiGrid-Monitor™			
Network	TCP/MODBUS/RS485			
Safety & Grid Interface Certifications	UL1741, UL1973, UN38.3, 9540A			
Protection	Thermal Runaway Protection; Rack Level Lockable Disconnect; Lightning Protection; Over-charge/Over-discharge Protection; Over-temperature Protection; External Accessible E-stop; External Accessible Fire Control Panel; Islanding Capability			

1. The examples provided are for maximum capacity and may not reflect typical usage scenarios.

2. In the interests of continual product improvement, specifications are subject to change without notice. Contact us for the latest specifications.

3. Actual grid input requirement will depend on factors such as (but not limited to):

(i) actual equipment electrical requirements. (ii) utilization/duty cycle. (iii) daily duration of availability of input power supply. (iv) state-of-health and age of the BESS. (v) duration of daily construction site operations.

4. An additional 0.9m clearance on all sides of the battery energy storage system should be provided for maintenance access.

PROJECT PORTFOLIO



Edinburgh, UK

250kW/542kWh
Virtual Power Plant
Powering Multiple Communities



Illinois, USA

244kW/1.3MWh
Transportable Power
Mobile Charging Solution



PROJECT PORTFOLIO (CONT'D)



New Brunswick, CA

130kW/652kWh

Peak Shaving

Powering Government Building



Illinois, USA

100kW/250kWh

Microgrid, Solar PV

Powering University Building



Nova Scotia, CA

500kW/1.12MWh

Virtual Power Plant

Powering a Library



Ontario, CA

30kW/100kWh

EV Charging

Powering EV Parking lot



New Brunswick, CA

100kW/250kWh

Peak Shaving

Powering a Hockey Rink



Antigua & Barbuda

90kW/650kWh

Power Resiliency

Powering Multiple Buildings



PROJECT PORTFOLIO (CONT'D)



Edinburgh, UK

250kW/542kWh

Virtual Power Plant

Powers Multiple Communities



Illinois, USA

244kW/1.3MWh

Transportable Power

Mobile Charging Solution



Guangdong, CH

250kW/250kWh

Peak Shaving

Powering Community Building



Ontario, CA

150kW/502kWh

Peak Shaving

Powering Industrial Factory



Ontario, CA

100kW/368kWh

Generator Optimization

Powering Farm



Ontario, CA

60kW/77kWh

Mobile Power Solution

Replacing Diesel Generator



TROES

The Revolution of Energy Storage

Solar + Storage Smart Microgrid

Sponsors

U.S. DEPARTMENT OF
ENERGY

Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY



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info@troescorp.com



401 Bentley St. Unit 3,
Markham ON, Canada L3R 9T2



2023



+1 888-998-7637



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2023

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TROES

INSTALLATIONS

ESS for Virtual Power Plant Application (*Nova Scotia, CA*)

Energy Storage System capacity: 1.12MWh

Energy Storage System power: 500kW

Location: Nova Scotia, Canada

Project Owner: Nova Scotia Government

Client: Available upon request

Application: Grid tied BESS that aggregates DERs in a community microgrid to form a virtual power plant.

Commissioned: May 2021



ESS for Transportable Solar and EV Charging Station (*Illinois, US*)

Energy Storage System Capacity: 1.4MWh

Energy Storage System Power: 120kW

Location: Ontario, CA

Project Owner: Day & Night Solar

Client: Day & Night Solar

Application: High-capacity portable EV charging station with BESS that is rechargeable with solar array and the grid.

Commissioned: Under delivery



ESS for Peak Shaving as a part of Smart Atlantic Grid program (New Brunswick, CA)

Energy Storage System capacity: 553kWh

Energy Storage System Power: 100kW

Location: New Brunswick, Canada

Client: Al's Electric

Project Owner: DSS Pension Centre

Application: Peak shaving with BESS, and demonstration of Siemens' Energy Systems Platform (ESP) to control distant DERs remotely.

Commissioned: January 2022



ESS for Peak Shaving as a part of Smart Atlantic Grid program (New Brunswick, CA)

Energy Storage System capacity: 92kWh

Energy Storage System Power: 30kW

Location: New Brunswick, Canada

Client: Al's Electric

Project Owner: Shediac Multipurpose Centre

Application: Peak shaving with BESS, and demonstration of Siemens' Energy Systems Platform (ESP) to control distant DERs remotely

Commissioned: February 2022



ESS for Virtual Power Plant Application (*Edinburgh, UK*)

Energy Storage System capacity: 540kWh

Energy Storage System power: 250kW

Location: Edinburgh, UK

Project Owner: Available upon request

Client: Available upon request

Application: Grid tied BESS in a community microgrid for the aggregation of DERs.

Commissioned: October 2020



ESS for University Solar Microgrid (*Illinois, US*)

Energy Storage System capacity: 248.83kWh

Energy Storage System power: 100kW

Location: Illinois, US

Project Owner: Southern Illinois University (SIU)

Client: Day & Night Solar

Application: This was a hybrid microgrid project wherein the system was tied to the grid for peak shaving.

Commissioned: October 2020



ESS for EV Charging Station with Solar PV (Ontario, CA)

Energy Storage System Capacity: 100kWh

Energy Storage System Power: 30kW

Location: Ontario, Canada

Project Owner: Sky Solar

Client: Sky Solar

Application: Solar and grid tied BESS for demand support in an EV charging station with Level 2 and Level 3 chargers.

Commissioned: Summer 2020.



ESS for Solar and Diesel Microgrid (Ontario, CA)

Energy Storage System Capacity: 368kWh

Energy Storage System Power: 100kW

Location: Ontario, Canada

Project Owner: Available upon request

Client: Available upon request

Application: Optimization of a diesel microgrid with solar and BESS, reducing fuel costs and additional generators.

Commissioned: Under delivery



ESS for Peak Shaving in an Industrial Facility (Ontario, CA)

Energy Storage System Capacity: 492kWh

Energy Storage System Power: 150kW

Location: Ontario, CA

Project Owner: Available upon request

Client: Available upon request

Application: BESS operated via a third-party EMS for peak shaving and back up support.

Commissioned: Under delivery

**ESS for Peak Shifting (Nantong, China)**

Energy Storage System Capacity: 8.8MWh

Energy Storage System Power: 2MW

Location: Nantong, China

Client: Available upon request

Project owner: Baichuan New Material

Application: Peak Shifting

Commissioned: 2019



ESS for Backup Power in a Military Base (*South Dakota, US*)

Energy Storage System Capacity: 277kWh

Energy Storage System Power: 75kW

Location: West River, South Dakota

Project Owner: West River Electric Association

Client: GoElectric Inc.

Application: BESS with Intellivent design to meet TAA and NFPA 855 requirements, to improve resiliency at the military base. This is the second ever Intellivent design and is partially funded by Pacific Northwest National Laboratories (PNNL) for R&D.

Commissioned: Under delivery

ESS for Solar and Diesel Microgrid (*Caribbean*)

Energy Storage System Capacity: 370kWh

Energy Storage System Power: 66kW

Location: St Lucia

Project Owner: Available upon request

Client: Available upon request

Application: BESS to support load demands of a sporting facility

Commissioned: Under delivery

ESS for Resiliency (*Caribbean*)

Energy Storage System Capacity: 61kWh / 133kWh / 492kWh

Energy Storage System Power: 10kW / 30kW / 50kW

Location: Antigua & Barbuda

Project Owner: Available upon request

Client: Available upon request

Application: BESS to support load demands of commercial buildings

Commissioned: Under delivery

MAJOR PROJECTS

IN DESIGN PHASE

ESS for on-site generation in a resort (Cabo San Lucas, Mexico)

Energy Storage Capacity: 12 MWh

Energy Storage power: 3MW

Locations: Cabo San Lucas, Mexico

Client: Available upon request

Application: TROES is involved in development of a 6 x 20' container microgrid solution to support the large energy demands of the resort's wave pool generators.

ESS for Peak Shaving in a Campus (Ontario, CA)

Energy Storage Capacity: 3.6 MWh

Energy Storage power: 2MW

Location: Etobicoke, CA

Client: Available upon request

Application: BESS for Class A peak shaving for the campus

ESS for Net Zero Implementation in an airport (New Brunswick, CA)

Energy Storage Capacity: 1.7MWh

Energy Storage Power: 500 kW

Location: New Brunswick, CA

Client: End User

Application: Solar integrated BESS to minimize the airport's reliance on the grid

ESS for remote microgrids (California, US)

Energy Storage Capacity: 1.9MWh

Energy Storage Power: 600kW

Location: Grass Valley, California

Client: Available upon request

Application: Remote microgrid operation by a major utility to alleviate power unreliability.

APPROVED

VENDORS LIST

TROES is approved as a vendor for:

NB POWER



HYDRO ONE



YMCA



Honeywell **Honeywell**

Wesco



TROES is pre-qualified for North America Incentive Program.



Massachusetts,
Clean Peak Energy Standard



New Brunswick,
Smart Grid Atlantic Program



California,
Energy Commission's Solar
Equipment Lists



TROES Battery Energy Storage Systems are under the **Ontario Made Program** for having undergone their last substantial transformation in the province of Ontario.

TROES is in process to be on Pre-Qualified vendors list of:

SGIP



MASSACHUSETTS
HYDRO



CLIENT

REFERENCE LETTER



SKY SOLAR (CANADA) LTD.

275 Renfrew Drive, Suite 104,
Markham, Ontario, L3R 0C8
Tel: +1 905 604 4436
Fax: +1 905 604 4437
www.skysolargroup.com

July 22, 2021

To whom it may concern,

Working with TROES was an enjoyable experience. We worked with TROES and their team in 2018/2019 to bring our project to life. The project consisted of a grid-connected 30kW/100kWh battery storage system with solar integration paired to a Level 2 and Level 3 EV charging station. The TROES team was exceptional to work with from beginning to end. Overall, we were satisfied by their work.

When it came to designing the system, TROES' high quality cabinet design with flexible properties made it easy to suit our needs. They meticulously developed a solution that catered specifically to our project needs, prioritizing safety, and sustainability. Their commitment to delivering the system before our deadline was a major advantage compared to other Energy Storage providers. Since the commissioning of the system in Q1 2019, we have decreased our overall costs for our EV charger.

After our experience with TROES, I would recommend their services and work with them again.

A handwritten signature in blue ink, appearing to read "Peter Liu".

Peter Liu
Director of Operations
Sky Solar American Region
647-981-6090



1605 Eastport Plaza Drive, Suite 135
Collinsville, IL 62234
o] 618.344.4001 f] 618.344.4085
www.dayandnightsolar.com

To whom it may concern,

Day & Night Solar has worked with TROES and their team on multiple projects such as the Sun Commander® and Southern Illinois University Carbondale Microgrid PV Storage. Communications were professional and prompt, and their team provided quality products and services. Any issues that surfaced were minor and handled swiftly. All timelines were, and have been, met by TROES.

Day & Night Solar and TROES have an ongoing working relationship, and overall, we are satisfied with their work. We confidently recommend TROES's services and will continue utilizing their services in the future as well.

Sincerely,

A handwritten signature in black ink, appearing to read "Bob Eaton", with a long horizontal flourish extending to the right.

Bob Eaton
Managing Partner
Day & Night Solar
618.344.4001



TELEPHONE: (506) 387-4018
FAX: (506) 387-7578
www.alselectric.ca info@alselectric.ca
8 TRITES ROAD, RIVERVIEW, N.B. E1B 2V6

July 21, 2002

To whom it may concern

Re: Reference Letter for TROES Corp

Working with TROES has been a pleasure. We worked with TROES and their team in 2021/22 to bring our project to life. The project consisted of two BESS units of sizes 30kW/92kWh and 100kW/553kWh for the purpose of peak shaving in DSS Pension Centre and Shediac Multipurpose Centre in Shediac, New Brunswick. The TROES team was professional, knowledgeable, and able to respond to our requests within a timely manner. Overall, we were very satisfied by their work.

When it came to last minute changes to the scope, shipping and logistical problems due to the pandemic, TROES worked with us and our client to help resolve the issues when other potential supplies could not.

TROES meticulously developed a solution that catered specifically to our project needs, prioritizing safety, and sustainability. Since the commissioning of the system in February of 2022, the batteries have been a significant asset to both these projects and our clients.

I would recommend TROES's services for all our future projects.

Lee MacWilliams, P.Eng
Al's Electric Services Ltd
8 Trites Road
Riverview, NB
E1B 2V6

Signature  July 22nd, 2022



425 Adelaide Street West - Toronto ON - M5V 3C1
TEL: (416) 628-4658 FAX: (888) 868-0960

July 28, 2022

TROES Corp.
3600 Steeles Ave. East,
Markham, ON,
L3R 9Z7

To whom it may concern:

RE: REFERENCE LETTER FOR: TROES CORP.

Internat Energy Solutions Canada Inc (IESC) has worked closely with TROES Corp to provide Battery Storage Energy Systems (BESS) solutions for four (4) Sites. This was as part of our client's goal to add resiliency to its buildings in response to acute climate stresses such as extreme weather events and to provide support during emergency situations to communities.

I was extremely pleased with the quality of Battery Systems TROES Corp had in their offerings and level of support provided in developing customised solutions to meet our client's needs. BESS solutions ranged from 275kWh to 700kWh for both indoor and outdoor installation. TROES Corp team were very methodical and diligent in their analysis for optimized BESS solutions, taking into consideration possible risks, constraints, code requirements and H&S requisites. Through a comprehensive and iterative process, final BESS solutions were present that met our requirements.

TROES Corp team were very professional, met all project timelines and made themselves available to answer any questions or provide additional support where needed. Whether it was on the engineering design, technical aspects or understanding code stipulations. This made the design process more pleasant and seamless as we had the surety that TROES Corp had the capacity to provide this support in this rapid evolving battery storage industry.

For the proposed indoor solutions, multiple criteria analysis was taken into consideration; these include but not limited to fire suppression system, ventilation, cooling requirement, structural analysis, and code requirement. This was to ensure solution was complete and adhered to all safety protocols as per industry standards, thus providing a safe product to client.

I am very happy to recommend TROES Corp to you, and trust that your experience with them will be as positive as mine. I would gladly work with them again and can recommend them without reservation to others in need of similar BESS solutions. If I can answer any additional questions about my experience with TROES Corp, please feel free to contact me. My telephone number is 416-628-4658 Ext 143 and email address is f.attai@internatenergy.com.

Yours very truly,
Internat Energy Solutions

Falon Attai

Falon Attai, PMP, M.Sc,
Project Manager
INTERNAT ENERGY SOLUTIONS CANADA INC.

ED1:1

1

COMPLIANCE

UN38.3	Prevailing United Nations standard that lithium batteries must meet to receive certification for safe transport.
UL50	This standard applies to enclosures for electrical equipment intended to be installed and used in non-hazardous locations in accordance with the Canadian Electrical Code, Part I, CSA C22.1, the provisions of the National Electrical Code, NFPA 70, and the provisions of Mexico's Electrical Installations, NOM-001-SEDE, as follows: a) Enclosures for indoor locations, Types 1, 2, 5, 12, 12K, and 13; and b) Enclosures for indoor or outdoor locations, Types 3, 3X, 3R, 3RX, 3S, 3SX, 4, 4X, 6, and 6P.
UL1642	Certification to cover lithium-ion batteries intended for use in technician-replaceable or user-replaceable applications. Made for avoiding the risk of fire or explosion when lithium-ion batteries are working in a product.
UL1741	UL Standard for Safety Inverters, Converters, Controllers, and Interconnection System Equipment for Use with Distributed Energy Resources. These requirements cover inverters, converters, charge controllers, and interconnection system equipment (ISE) intended for use in stand-alone (not grid-connected) or interactive (grid-connected) power systems. Interactive inverters, converters, and ISE are intended to be operated in parallel with an electric power system (EPS) to supply power to common loads.
UL1973	UL 1973, Batteries for Use in Light Electric Rail (LER) and Stationary Applications (UL 1973), is a safety standard for stationary batteries for energy storage applications that is not specific to any one battery technology or chemistry, and can apply to Li-ion battery ESSs, as well as ESSs using other battery chemistry. The standard includes construction requirements, safety performance tests, and production tests.
SPE-1000	Field testing to pass UL9540 and UL50 requirements for BESS system

UL9540A	Test method for evaluating thermal runaway propagation for battery energy storage systems.
NEMA 3R	Cabinet/container qualification



Access. Certification. Growth. / Accès. Certification. Croissance.

Women Business Enterprises Canada Council (WBE Canada)
confirms that / confirme que

TROES CORP.

has met the criteria for certification as a women's business enterprise / a répondu
aux critères de certification comme une entreprise des femmes d'affaires

CERTIFICATION OF COMPLIANCE / CERTIFICATE DE CONFORMITÉ

Certification number / Numéro de certification: CA202263

Expiration date / Date d'expiration: **July 31, 2023**



Silvia Pencak
President
WBE Canada

www.WBECanada.ca
WBE Canada, 401 Bay Street, Suite 1600, Toronto, ON Canada M5H 2Y4

WBE Canada is the nation's leading advocate of women-owned businesses as suppliers to North America's corporations. We are the first and largest third-party certifier of businesses owned, managed, and controlled by women in Canada - certifying Canadian WBEs since March 2009. / WBE Canada est le principal promoteur canadien d'entreprises à propriété féminine en tant que fournisseurs des sociétés de l'Amérique du Nord. Nous sommes le premier et le plus important tiers certificateur d'entreprises détenues, gérées et contrôlées par des femmes au Canada. Nous certifions des entreprises canadiennes à propriété féminine depuis mars 2009.





Certificate of Completion

Ralph Labong
TROES Corp.

has successfully completed Women and Gender Equality Canada's
Introduction to Gender-based Analysis Plus

Gina Wilson
Deputy Minister of Women and Gender Equality and Youth

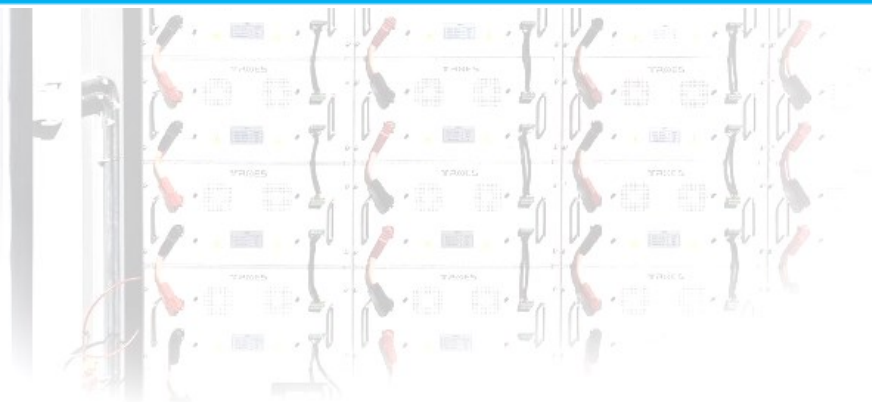
August 26, 2022

Date



Government
of Canada

Gouvernement
du Canada





proudly acknowledges

Ralph Labong

for participating in and actively completing the:

LGBTQ2+ Workplace Inclusion Certificate

Pride at Work Canada recognizes and commends your commitment to LGBTQ2+ inclusion in the workplace. You have successfully completed the curriculum required to start you on the path of being an active and engaged ally!

A handwritten signature in black ink, appearing to read "Colin Druhan".

Colin Druhan
Executive Director
Pride at Work Canada

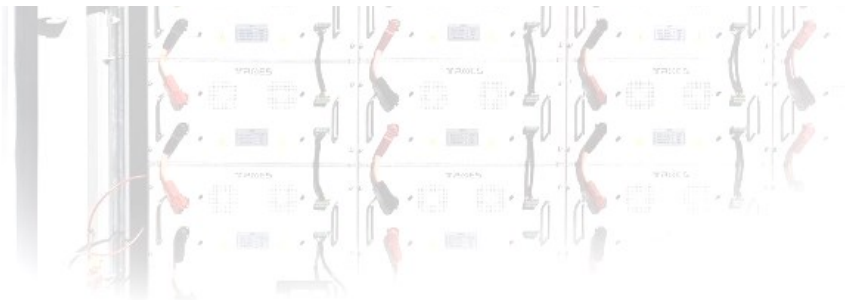
LGBTQ2+ 101 - History, Terms & Phrases

LGBTQ2+ 102 - Gender Identity & Gender Expression

LGBTQ2+ 103 - Employee Resource Groups & Executive Sponsors

LGBTQ2+ 104 - Identifying & Engaging Allies

LGBTQ2+ 105 - Identifying & Combatting Biphobia, Homophobia, and Transphobia



INTELLECTUAL

PROPERTY

TROES Corp & Design [™]	Trademark
Dual-Equilibrium [™]	Trademark
Method and System for Dual-Equilibrium Battery and Battery Pack Performance Management	Utility Patent Pending applied for US, Europe, and China
Method and System for Microgrid Control	Utility Patent Pending for US, and Canada
MiGrid [™]	Trademark (Pending)
MiControl [™]	Trademark (Pending)

AFFILIATION

 CAGBC Canada Green Building Council	 ENERGY STORAGE CANADA
 MEMBER IN GOOD STANDING MANA Manufacturers & Agents PROFESSIONAL PARTNERS IN PROFITS	 OSEA Sustainable Communities In Action
 WBE Canada	 MRC-CABC Canada

Batteries Decay - Degradation

In general, the performance of the metal rechargeable batteries in the Battery Energy Storage Systems (BESS's) degrade, because of aging (incl inactivity) and the active usage caused by the lithium metal / battery electrolyte reactions.

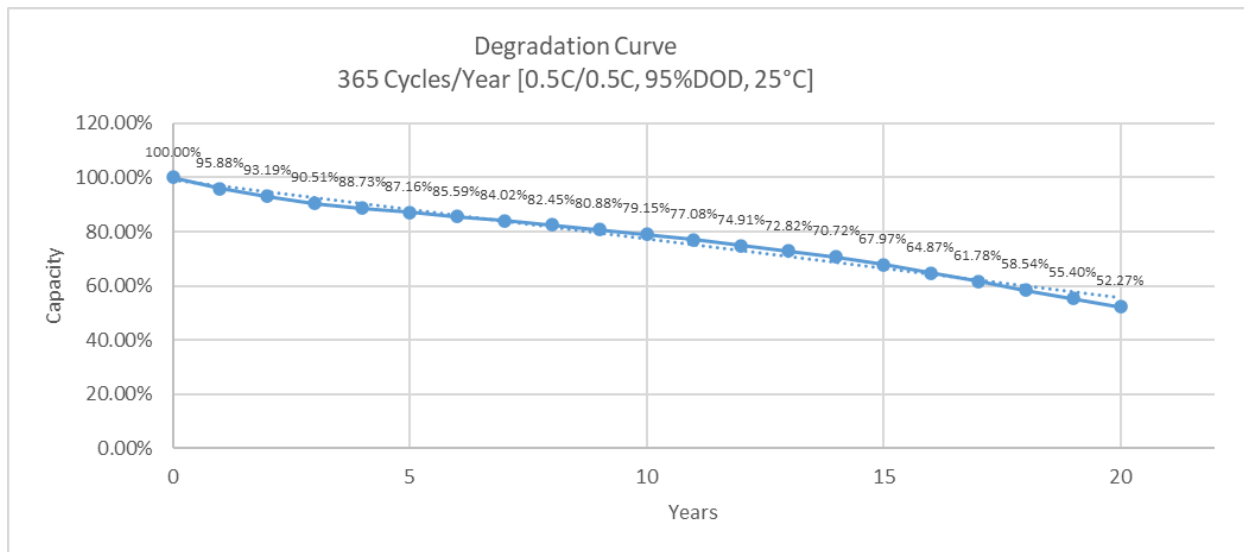
The rates of degradation can be related to several factors, such as the chemistry and discharge speed, storage temperature, temperature variations during operation and way of operation. We assume that the batteries are operated according to the operational standards and are not abused – i.e., ambient conditions, operational temperature, Depth of Discharge (DOD), etc.

The operational control and avoidance of abuse of the BESS is handled by our Remote Monitoring System (RMS), which checks and controls on-line and on real-time basis the condition and health of the BESS – down to individual cell level. We have incorporated 4 levels of protection – 3 for the batteries and 1 for the Power Conversion System (PCS).

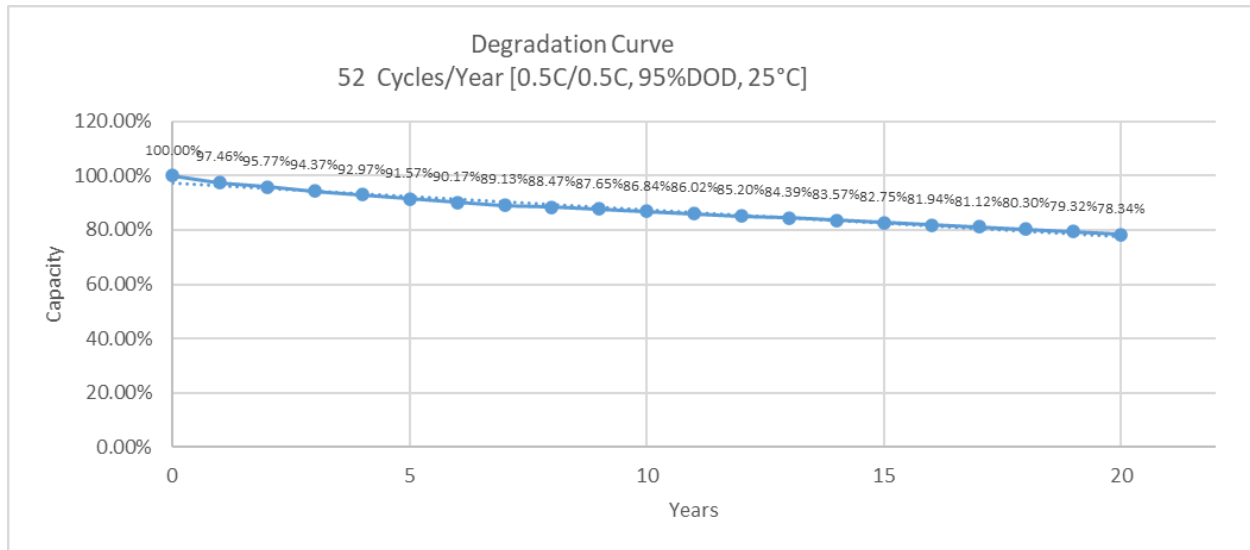
The LFP (LiFePO₄) chemistry we use offers longer lifecycle than the NMC (Nickel Manganese Cobalt) which most of the competitive BESS brands use – 25% to 30% longer life.

Examples of Degradation curves

Indication on the decay rates and available capacity can be seen in the below graphs. One with usage once a day (365 cycles p.a.) – most of the projects related to applications: Integration of BESS with Renewables (i.e., PV's farms), fall into this category.



One with usage once a week (52 cycles p.a.) – projects related to instable grid (backup), and Global Adjustment (in Ontario) fall into this category



Usually, we consider the battery at end of life stage (EOL) at 60% of capacity.

Solving Degradation - Augmentation

To respond to the decay of the BESS issue, especially for projects with over 10 years of lifespan, (i.e., projects with PV farms have 20-25 yrs lifespan) and to keep throughout the project lifespan the energy at the required by the project levels, we develop “Augmentation plans”. These plans are usually created in the beginning of the project and involve adding new batteries/capacity to the existing decaying BESS at specific years. The period/frequency and the required capacity to add throughout the project lifecycle depends on the type and nature of the project and its requirements, the size of the BESS, and the financial and technological implications.