

Energy Storage Systems



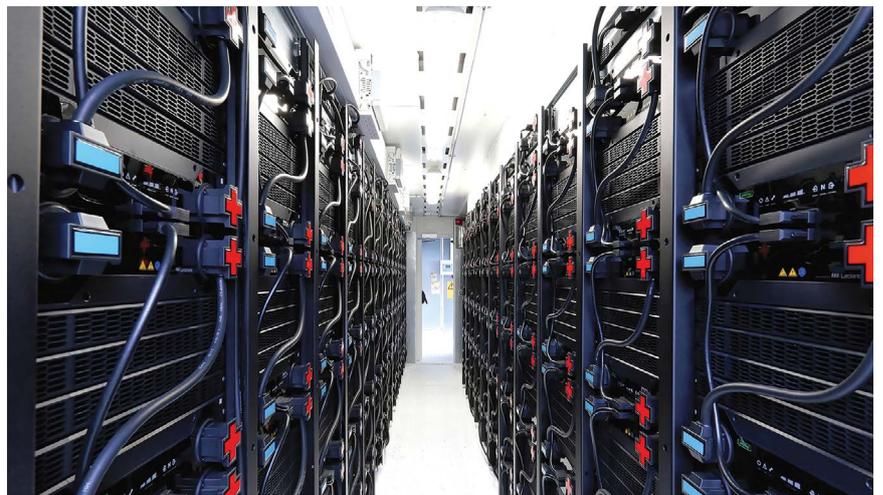
**STATIONARY
SOLUTIONS**



**e-TRANSPORT
SOLUTIONS**



**SPECIALTY BATTERY
SYSTEMS**



Providing our customers with high quality energy storage solutions for both transport & utility applications since 1909.

Cells

Leclanché engineers & manufactures its own cells. We are therefore able to develop cells to meet the exact requirements of our customers.



Leclanché Cells

Leclanché cells are available with both graphite/NMC (Lithium Nickel Manganese Cobalt oxide) and LTO (Lithium Titanate Oxide) technologies.

Our unique laminated bi-cell design, integrated with a ceramic separator, make Leclanché's cells very resistant to abuse and any thermal issues. Leclanché pioneered the use of water based technology in its coating process for both the anode and cathode of our cells.

LTO cells excel in applications requiring fast charging capability and operation in extreme temperatures, and also offer very long calendar and cycle life time. NMC cells have high overall performance and excellent specific energy levels.

	Cycle life (80% DOD)	Calendar life
LTO	20 000 cycle	20 years
G/NMC	6 400 cycles	10 years

	Capacity Range	Voltage Range
LTO	30 to 450 Ah	9 to 55 V
G/NMC	55 to 400 Ah	15 to 88 V

Cell Assembly into Modules

Cells are assembled into modules with the configuration needed to meet the energy & voltage levels for the vast majority of applications.



Leclanché Modules

Our robust and resilient modules have been tested for use in numerous demanding applications and are certified to international standards.

Each module is designed using careful thermal analysis to ensure even temperature distribution and heat sinking across all cells in the module.

All modules have built-in battery management electronics (BMU), which measures the voltage and temperature of the battery module.

Very large choice of capacity, voltage and sizes. There are 38 separate configurations based on 14 module sizes for both LTO & G-NMC cell types.

Module & Ancillaries

Modules & associated ancillaries are fitted into robust packs which can include air or water cooling systems as required.

Battery Management Systems are integrated within the packs, ensuring fully self contained energy storage systems.



Battery Management System (BMS)

This provides safety for overcharge/ deep discharge, over/under voltage, over current, over/under temperature, precharge, short circuit and other protection. All BMS have built-in technology specific algorithms such as SOC, SOH, cell/module balancing and real time control over charge/discharge current.

The BMS comprises of 3 parts :

- Master: the main BMS controller - BCU
- Slave: the module measurement units - BMUs
- Contactor module: the Battery Switch Box.



Cooling

Depending on the application, different cooling systems can be fitted: air cooling, forced air cooling & liquid cooling using conductive cooling plates.

ENERGY STORAGE SYSTEMS:

Designed with our Customers

Leclanché offers lithium ion energy storage solutions from packs up to full containerized battery systems with power electronics and control systems.

We have an experienced team of engineers and specialists who are able to design both cells, modules and battery packs which are totally optimised for each application. Through the whole development process we support our customers to ensure the best solutions.

Packs

Packs are adapted to operate faultlessly in the environmental conditions required by system, whatever the application: electric vehicles, home, industrial or grids and microgrids.



Battery Control Unit (BCU)

The BCU is the central control unit that monitors and controls the status of the batteries, including system charging and discharging and host communication. The BCU can be configured and integrated into the customer battery system via CAN or Serial communication interfaces.



Battery Switch Box

This is a switch unit for mobile applications. Functionalities include: main fuse, Battery Management System fuse, pre-charge circuits, charger fuse & main contactors.



Enclosures

The enclosure houses all the required components & protects them from their operating environment. Enclosures can be made to measure according to specific customer requirements, otherwise Leclanché offers a number of off-the-shelf solutions.

Commercial Vehicle Pack

The modular design of our packs and systems enables easy adaptation to a wide range of industrial machines. Both business operations and the environment will benefit from increased fuel economy and operational efficiency.



Marine Rack System (MRS)

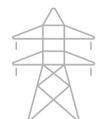
State-of-the-art battery system for marine applications. DNV-GL & RINA type approved, scalable in size, capacity and rated voltage and fitted with liquid cooling. Available with both water mist and foam based fire suppression systems.



Stationary Battery Energy Storage System

This system does it all: grid stabilization in on-grid applications, short term power supply during grid failure incident, management of the integration of renewable energy (solar and wind) into commercial/industrial and off-grid applications.

In addition, Leclanché's cutting-edge EMS software allows the remote management of large Battery Energy Storage Systems, and is designed to integrate flexibly with multiple battery/inverter combinations.

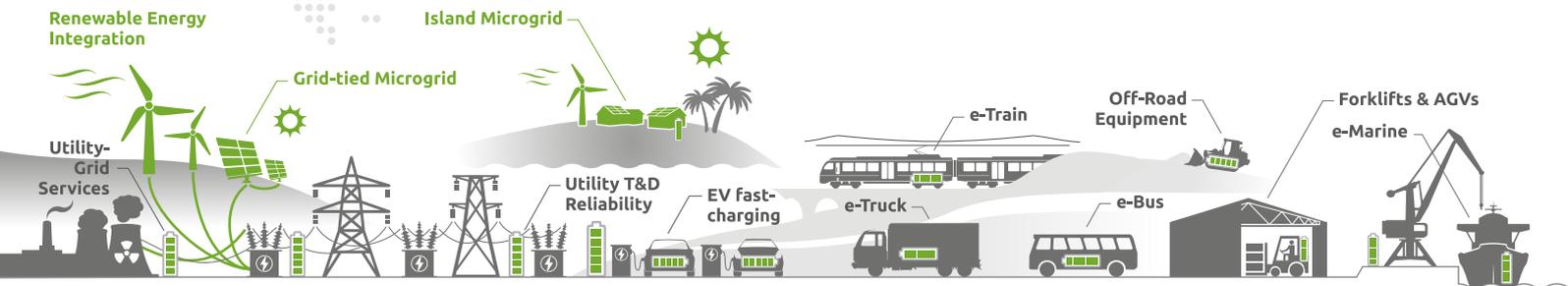


The Sites



Leclanché is a fully vertically integrated battery energy storage solution provider. It designs, manufactures and delivers a wide range of turnkey energy storage solutions for electricity grids, residential, commercial and industrial applications.

Leclanché also provides battery solutions for land based and electric marine transport systems.



Analysis & Optimization

- System Modeling and Opportunity Analysis
- Project Optimization
- FEED (Front End Engineering Design)

Flexible Sales Structure

- Turnkey EPC
- Supply & Commissioning
- PPA & Project Finance

System Control & Operation

- Multi-Application Energy Management System (EMS)
- System Degradation and Replenishment
- Remote Monitoring and Service

Total Integration

- Full process control: from in-house cell production to complete packs
- Infrastructure such as chargers and connectivity
- Fully integrated electric drive trains
- Homologation & Certification

System Engineering

- Scalable lithium-ion battery packs with thermal management
- State-of-art DNV-GL & RINA type approved battery racks for marine applications
- Battery packs engineered to operate faultlessly on the majority of vehicles

Fleet Management

- Dynamic route simulation
- System planning
- Remote monitoring of all system components via a cloud service

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WE ARE IN CHARGE