

Leclanché Energy Storage Solutions

Corporate Presentation

November 2022



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03 **Energy Storage Systems Business Unit**

01

Executive Summary



Leclanché, the 112-year-old Startup, is at the heart of the Energy Transition

Energy transition to reduce the overall Greenhouse Gas Emissions and pathway to Zero Emissions is being driven primarily by the changes in the electricity generation, transmission & distribution network; and electrification of transport sector.

Leclanché's strategy and business model is at the heart of the convergence of these drivers.

Leclanché E-Mobility: electrification of vehicles in medium & heavy transport sector

- We deliver integrated Battery Packs & Racks for Electric Vehicles of all sizes, with intelligent interface to the charging infrastructure.

Leclanché Energy Storage Solutions (ESS): renewable energies integration

- We deliver Energy Storage Systems that reliably add intermittent solar and wind energies in the electricity network as dispatchable power on as needed basis.

Specialised Battery Systems (SBS): electrification of Industrial machines

- Low-voltage portable battery packs for defense, medical and other industrial Machineries.

Leclanche At-a-Glance

...Enabling electrification...

Trains/ Locomotives



Maritime



Off-highway



On-highway



**Stationary Energy
Storage Systems**



... an undeniable market opportunity...

**Global shift to vehicle
electrification and
renewable energy**

2030

~115 GWh ⁽¹⁾
Medium and
Heavy Transport

~150 GWh ⁽¹⁾
Stationary
Storage

~1.25 TWh ⁽¹⁾
Automotive

...captured by the best player in the space

**Fully integrated
battery system
producer
Cells • Packs •
Software**

**200+ Patents
9 years of
knowhow in large-
scale production**

**USD 500 million+
in Order backlog
and qualified
pipeline**

**1.5 Million KM+ of
run-time>>>>**

**Actionable
expansion plan
with Fleet EV
OEMs in Europe
and Asia**

**Proven
complementary to
hydrogen fuel cell
applications**

¹ Based on IDTechEX Research Dec. 2020 (COVID Adjusted) and LUX report.

Trusted Customer Partnerships based on comprehensive offer

Broad-based strategic customers across the global battery value chain

Existing & Long-term Strategic Partnerships with Leading OEM Customers

Marine Customers



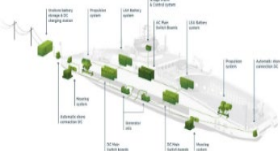
Ground Transport Customers



Stationary Storage Customers



Fast EV Charging Infrastructure



Port

Combined Onboard and Onshore Energy Storage solution for the first fully electric passenger/car ferry in North America



Amherst Island, ON, Canada

Automotive

Rapid and Ultra-rapid Charging for Electric Cars, LCVs, Bus and Trucks.



OEM Markets Expansion

Ultra-high Energy Densities
300 Wh/kg



Superior Battery Cycle Life
Up to 1,000 cycles

Functionally Safe Battery Management System

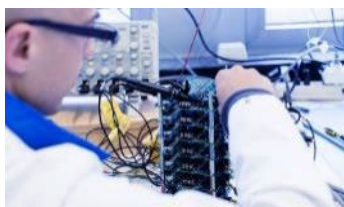
Vertical Integration Enables Greater Customization, Market penetration & Margin Advantage

Unique R&D and design capabilities across the complete battery system

Leclanché Vertical Integration Enables Control of the Full Process



In-House R&D, Manufacturing and Assembly Facilities



Research & Development
Germany, Switzerland & USA



Cell Production Line
Willstätt, Germany



Module Assembly Line
Yverdon, Switzerland



Key Benefits of Vertical Integration

Clear technology roadmap

Control of the full process

Solutions that exactly match customer specifications

Tighter cost control & higher margins

Highest Level of Certifications, Safe & Reliable Performance

Corporate Certifications

- **ISO 9001:2015**
Quality management System
- **ISO 14001:2015**
Environmental management System
- **ISO 45001:2018**
Occupational health and safety management system



Industry Certifications

- **Marine type approvals**



- **Railways applications**



- **Road Transport**



ECE R100.02

Executive Leadership Team



Pierre BLANC

CEO of Leclanché SA, chief technology & industrial officer of Leclanché e-Mobility SA

Joined in 2000

- Previous roles at Leclanché: Head of R&D, Chemical Engineer working for client brands such as Varta and Panasonic.
- Member of management groups supporting Swiss and Germany national research programs.
- BA Mod. Chem Trinity College, Dublin



Phil BROAD

CEO of Leclanché e-Mobility SA, chief sales & development officer of Leclanché SA

Joined in 2018

- 24 years in tier 1 Automotive & Commercial Vehicle industry
- Previous roles in Project Management, Global Account Management and Business Leader at Honeywell / Garrett.
- BEng (Hons) System Engineering, UK



Pasquale FOGLIA

Chief Financial Officer of Leclanché SA

Joined in 2022

- over 25 years of international corporate finance experience
- Previously key finance positions for Procter and Gamble, Duracell and Unilabs
- Master's degree in Business and Economics from LUISS University in Rome

Management: Previous Experiences



DURACELL

Garrett
ADVANCING MOTION

Honeywell

02

eMobility Business Unit



Leclanché E-Mobility: Senior Leadership Team



Dr Hilmi Buqa
VP – R&D Cells

- Joined in 2009
- Senior Scientist – High Power Lithium SA
 - Postdoctoral Scientist – Paul Scherrer Institut
 - 36 reviewed scientific papers
 - 10 patents issued
 - PhD Lithium-ion technology (1996)



Dr Olaf Luche
General Manager – Cells Production

- Joined in 2020
- Plant Manager – Stabilus
 - 25 years in global industrial companies for tier 1 automotive e suppliers, in Germany, France and China.
 - PhD Organic Chemistry – RWTH Aachen



Guillaume Mercay
VP R&D Systems

- Joined in 2016
- Development Engineer- Applied Material
 - 13 years experience in precision machine development and manufacturing process including laser welding, neural networks
 - 4 patents
 - Mechanical Engineer



Sylvain CHONAVEL
VP Systems Engineering

- Joined in 2018
- Project Director – Frazer Nash
 - Engineering Director – Whitfield Solar Ltd
 - McGill University
 - MBA Herriot Watt
 - Ecole Nationale Supérieure des Mines



Gerardo GIMENO
Global VP e- Ground Transport

- Joined in 2019
- Sales Mgr – Commercial & Off Highway Vehicles at Honeywell
 - Managing Director – Moldes Epila SA Special Machinery.
 - MBA – ESIC Business & marketing School



Guillaume Clément
Global VP e-Marine

- Joined in 2021
- Global Business Unit leader- Schneider Electric
 - 15 years international experience- France, Australia, China, Norway
 - Various company-wide positions from project to sales through manufacturing and services
 - Engineer Supélec, France, MBA IAE Rennes, France

Management: Previous Experiences

STABILUS

APPLIED MATERIALS

MONTAPLAST

Schneider Electric

FRAZER-NASH

NISSAN

B

ROLLS ROYCE

Strategy is Working... Winning in the Marine Marketplace

31 MWh delivered over 7 vessels and an additional 40 MWh planned for 12 vessels that are in the pipeline



e-Ferry, Denmark: Launch of the world's largest fully electric ferry, maiden voyage Aug 2019, equipped with 4.3 MWh Leclanché battery pack.



Damen, Canada/The Netherlands: 2 ferries with 1.9 and 4.6 MWh battery packs, delivery in 2020. Vessels under construction.



Grimaldi, China/Italy: 9 ferries each with 5.1 MWh battery packs, delivery from 2019 to 2022.



Hyseas III, Scotland: 0.7 MWh battery pack for world's first hydrogen hybrid marine vessel. Delivery in 2020.



Wasaline, Finland: Recent contract win to supply of 2.2 MWh battery packs. Project kick off 2020. Delivery May 2021.



Yara, Norway: "Yara Birkeland", the world's first electric, autonomous feeder vessel will reduce diesel truck haulage by 40k journeys per year. 6.7 MWh Leclanché battery packs. Delivery December 2019/January 2020.



Awilco, Singapore: Project 1 & 2- drilling platforms under construction, both with 1.9 MWh battery packs operating as spinning reserves (Acting as a generator set).



Siemens/Shiptec, Switzerland: MS Jungfrau & 3 other hybrid CGN vessels. Supply of battery packs of 169 kWh 599 kWh (x2) & 1.4 MWh.



[Click to see Leclanché eMarine movie](#)



[Click to see BBC Yara video](#)

Strategy is Working... Winning in the Ground Transport Marketplace

Reference projects with world leading OEMs



Train

Bombardier Transportation: Leclanché SA is selected as preferred global provider of Battery Systems, giving a potential business revenue of more than 100m € over the next 5 years.



Train

Alstom: Delivery of 840kWh battery systems for 11 BEMU trains in Germany from 2021 to 2023. Potential for 72 additional trains systems within Europe.



Bus

Skoda Electric: Specific Skoda battery packs supplied for use in electric buses. Discussion ongoing for further supply.



Truck

PACCAR group/TMNA: Hybrid electric truck in USA: delivered prototype packs. Long term development program with hydrogen fuel cells and Leclanché LTO battery pack.



FCC

Delivery of INTEG-39 Energy packs for use in municipal vehicles such as refuse trucks and water tankers. 156 kWh of packs delivered & potential for further 312 kWh.



URO

Supply of INTEG-39 Energy packs for TT Uro truck project. Negotiations in place to supply 5.6MWh of packs.



[Click to see Leclanché railway movie](#)

**1/3 of the global railway network
is still powered by diesel**

Differentiated Cell Technology Drives Customer Wins

Designing product for leading performance within targeted segments

**Water-Based Battery
Cell Production Process**



Cell cost reduction of
up to 10% compared to
solvent based¹

Lower electrode drying
temperature (50-60°C
lower)

No solvent recovery
system (lower Capex
and Opex)

Reduction in humidity
control space (70-80%
reduction)

	Typical Application	Energy Density	Cycle Life	Charging Time
High Power LTO First Production Deployment 2012		75 Wh/kg	20,000 (at 80% DoD)	10 mins
High Energy G/NMC First Production Deployment 2020		225 Wh/kg	8,000 (at 80% DoD)	20 mins
Ultra High Energy G/NMC First Production Deployment 2022E		270 Wh/kg	2,000 (at 80% DoD)	20 mins

Steady evolution of
Leclanché cell energy:



43 Ah
158 Wh/kg
2018

Graphite anodes
NMC-532/622
cathodes



65 Ah
225 Wh/kg
2021

Silicon anodes
NMC-811 cathodes
High voltage electrolytes



85 Ah
270 Wh/kg
2022



100 Ah
300 Wh/kg
2024

R&D Programmes

Solid State Electrolyte

High Voltage Cathodes

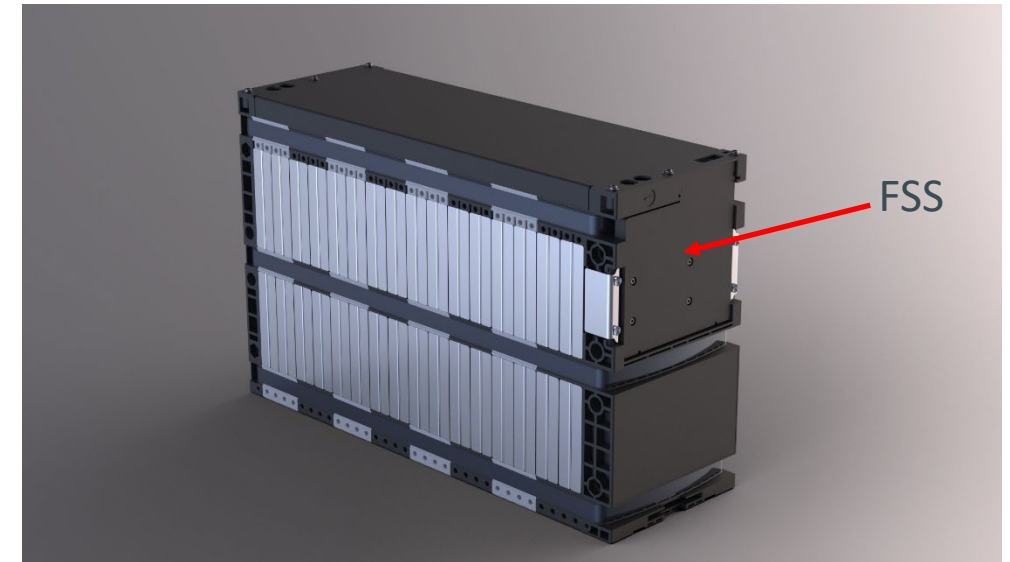
High Silicon Content Anodes

Next Generation Battery Module Design & Production Processes

Our advantaged technology: Leclanché battery pack comparison to key competitors

Modules-crucial building block to designing a wide range of solutions for electric vehicles

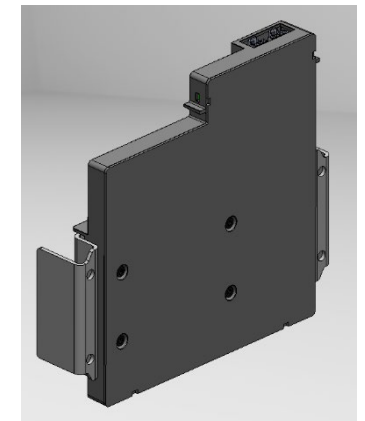
- **Production** - Designed for high volumes
- **Energy density (Wh/kg)** - 15 to 20% improvement relative to previous generation model
- **Configuration** - Up to 47 configurations possible
- **Size (volume)** - More compact with 7% volume gain relative to previous generation model
- **Construction** - Use of high precision laser assembly
- **Designed in a simultaneous engineering process with Comau, part of the Stellantis Group.**



BMS:
Functional Safe Master
Control



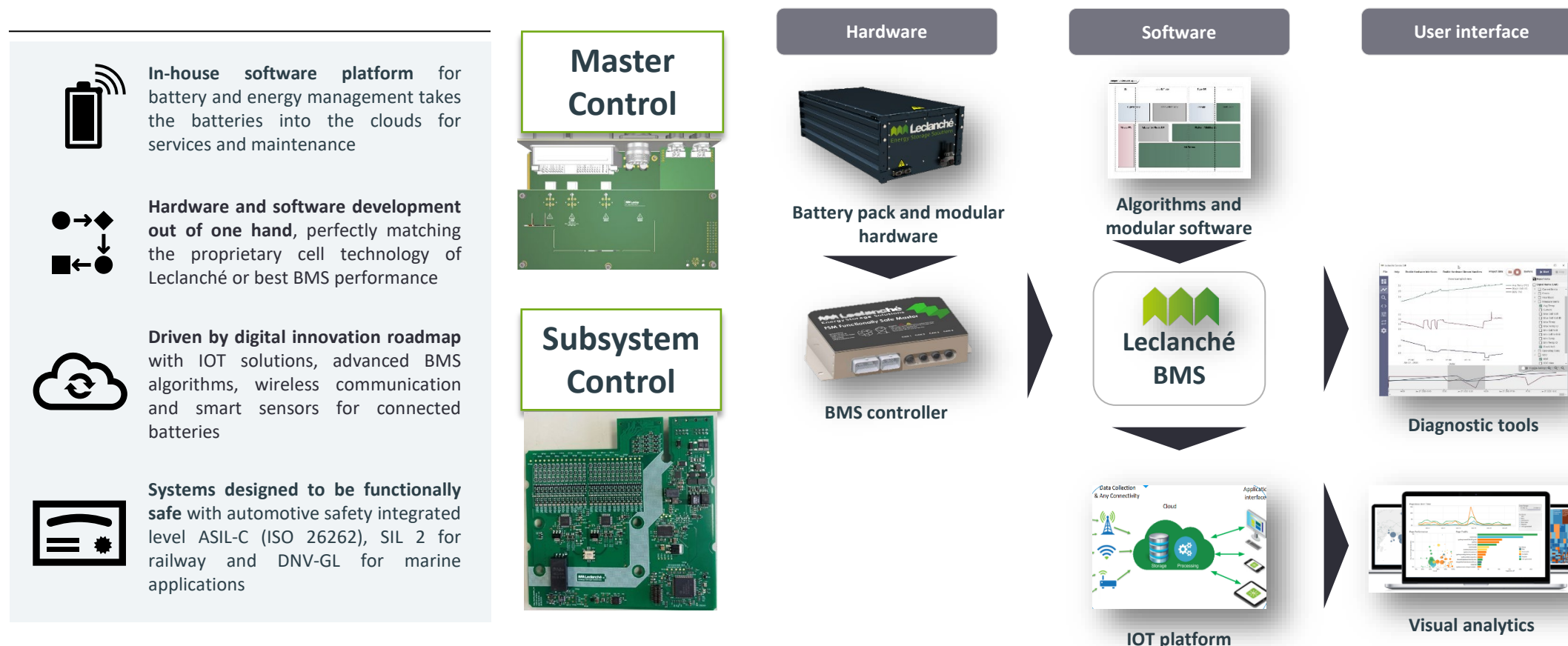
BMS:
Functional Safe Subsystem
Control



Industry Leading Battery Management System

Comprehensive solution maximizes product efficiency for customers

Leclanché battery management system (BMS) and internet of things (IOT) platform



Leadership In Electrification of Hard-To-Decarbonize Heavy Transport Sector

Hydrogen fuel cells are an ideal and complimentary technology with Leclanché battery systems

Leclanché is already actively working on multiple hybrid fuel cell projects

Marine



Hyseas III, Scotland

- 0.7 MWh pack for world's first hydrogen hybrid marine vessel.
- Delivery of Marine Rack System battery packs 2020.

Rail



Canadian Pacific Railways, Canada

- Leclanché nominated to supply prototype 1.2 MWh battery system on hybrid fuel cell locomotive, with delivery in 2021.
- CPR has 1,100 locomotive fleet with > 50 % potentially to be converted.

Truck



PACCAR Group / Toyota, USA

- Hybrid electric truck :
Delivered prototype packs.
- Prototype development program with hydrogen fuel cells and Leclanché LTO battery pack.

Expansion into Passenger EVs, Reaching Competitive-Scale

Entry led by proven technology leadership

- ▶ Almost doubles future addressable market with massive potential.
- ▶ Adds substantial scale to procurement activities reducing overall product costs for our other eTransport verticals.
- ▶ Allows monetization of R&D expenses through licensing agreements OR contributing as equity in joint ventures with partners.
- ▶ Offering a fully integrated product encompassing “Powder-to-Pack” proprietary technologies: electrochemistry, cells, battery modules, battery management systems, and battery pack design.
- ▶ One of the largest pools of ~350 trained personnel in Europe with extensive experience in electrochemistry and mass production, and protected IP with more than 200 patents over 13 families.
- ▶ European based and well-established supply chain relationships.
- ▶ Time-to-market advantage based on proven manufacturing processes.

OEM Markets Expansion

Ultra-high Energy
Densities
300 Wh/kg



Superior Battery
Cycle Life
Up to 1,000 cycles

**Functionally Safe Battery
Management System**

03

Energy Storage Systems Business Unit



Leclanché Energy Storage Solutions: Senior Leadership Team



Brian URBAN
Executive Vice-President

- Joined in 2014
- instrumental in the development of more than 9,000 MW of power generation
 - led over \$6.5 billion in project and corporate financings
 - Bachelor of Science degree in Accounting from Indiana University



Guido GUIDI
SVP Global Sales -
Stationary Storage

- Joined in 2018
- 10 years in tier 1 solar PV industry and energy efficiency market
 - Director Sales Mkt at Helexia
 - Development and Sr Mg European Corporate Accounts at SunPower Corporation
 - MSEE, Italy and MBA, Switzerland



Viorel MOGA
VP Engineering
Stationary Storage

- Joined in 2016
- Systems Engineering Manager – Vehicle Electrification - Delphi
 - 22 years in Automotive Industry
 - MSME University of Cincinnati



Mike LONG
Director Systems /
Software Engineering

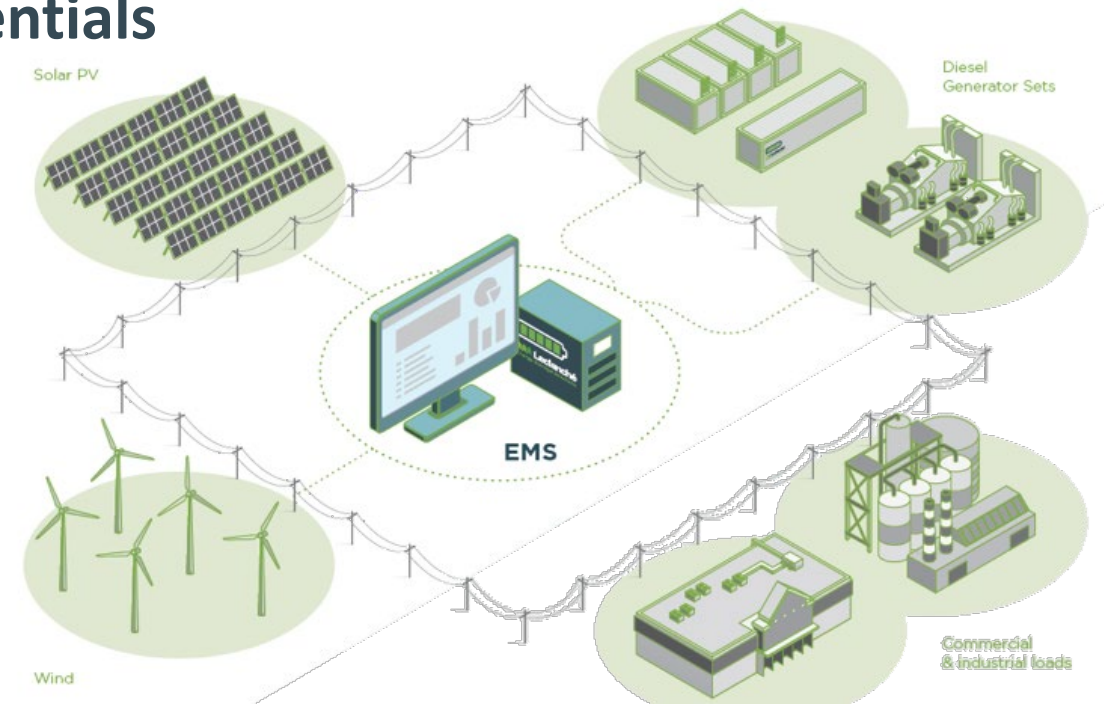
- Joined in 2021
- Director Software Engineering, Altaianano
 - BS Computer Technology, Indiana State University
 - MBA, Corporate Finance, Butler University

Management: Previous Experiences



Competitive offer based on established credentials

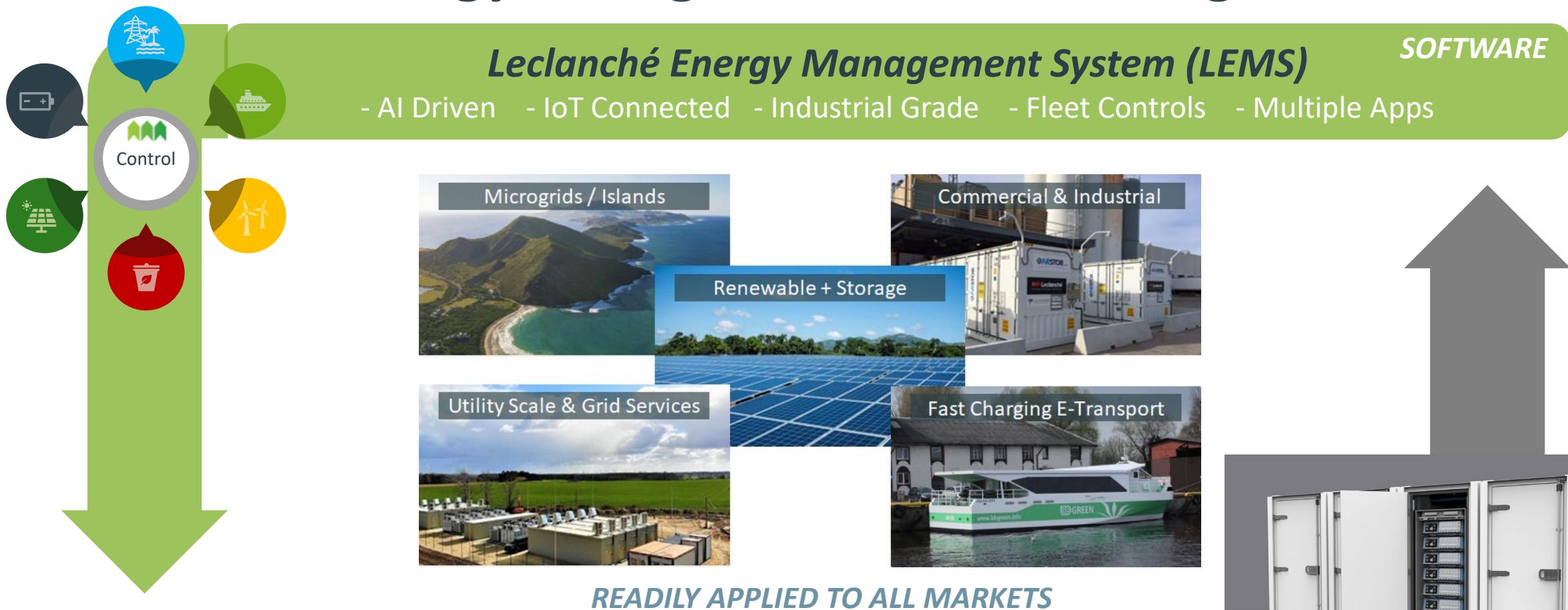
- 120+ MWh installed, targeting 1GWh by 2025
- ESaaS implementation expertise & experience
- EMS-enabled revenue stacking and extended battery life management
- Multi-platform design, integration, end-to-end solution with LeBlock™ modular system
- Positioned in high-growth markets such as fleet management, fast-charging, load displacement and off-grid expertise



Integrated Technology Partners



Leclanché Energy Storage Solutions enabling ESaaS



HARDWARE

Advanced Battery Solution (LeBlock™)

- Cost Competitive
- Fully Integrated
- Scalable
- FAST Deployment

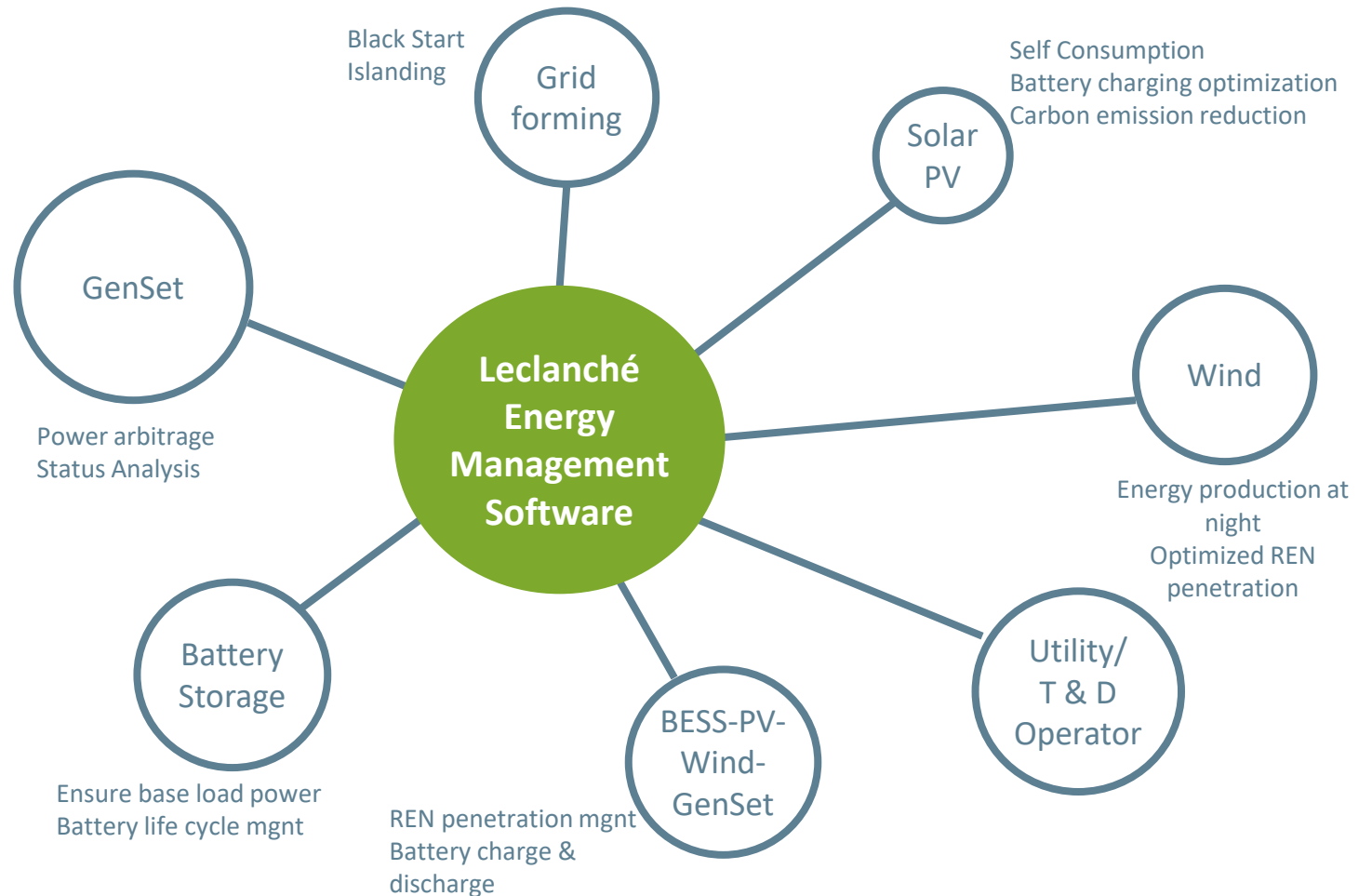


Smart Energy Management Software Architecture, the brain of the BESS

Leading stationary storage products & software

Energy Management System

- ▶ **Smart Energy Management drives the Energy Transmission**
- ▶ **Multi-applications-Revenue Stacking**
- ▶ **Smart Energy Management guaranties base load dispatchable power from battery to grid**
- ▶ **Maximize the REN penetration vs. GenSet use**
- ▶ **Energy Management for EV fast charge stations**



- ▶ **Modular and scalable concept**
- ▶ **Plug & Play: easy to interconnect**
- ▶ **Simplified logistic**
- ▶ **Fast installation on site**
- ▶ **Integrated Battery Auxiliaries**
- ▶ **Reduced Carbon Footprint**
- ▶ **Optimized LCOE**



Modular



**Simplified
logistic**



**Fast installation
on site**



**Easy
augmentation**



Lower TCO



**Minimal
environmental
footprint**

Different Blocks to Build LeBlock™



Battery Block

- 744 kWh up to 1C

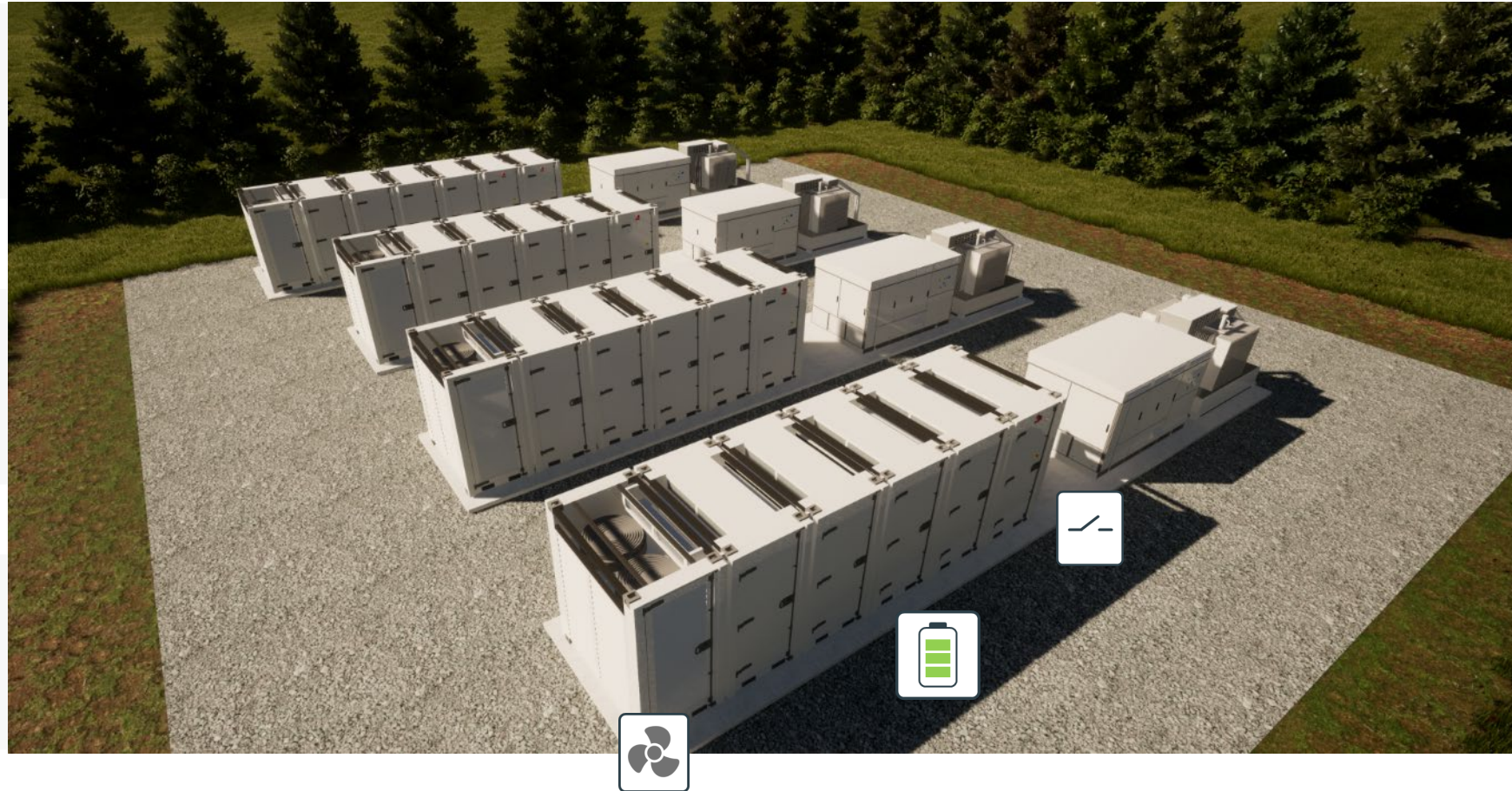


Thermo Block

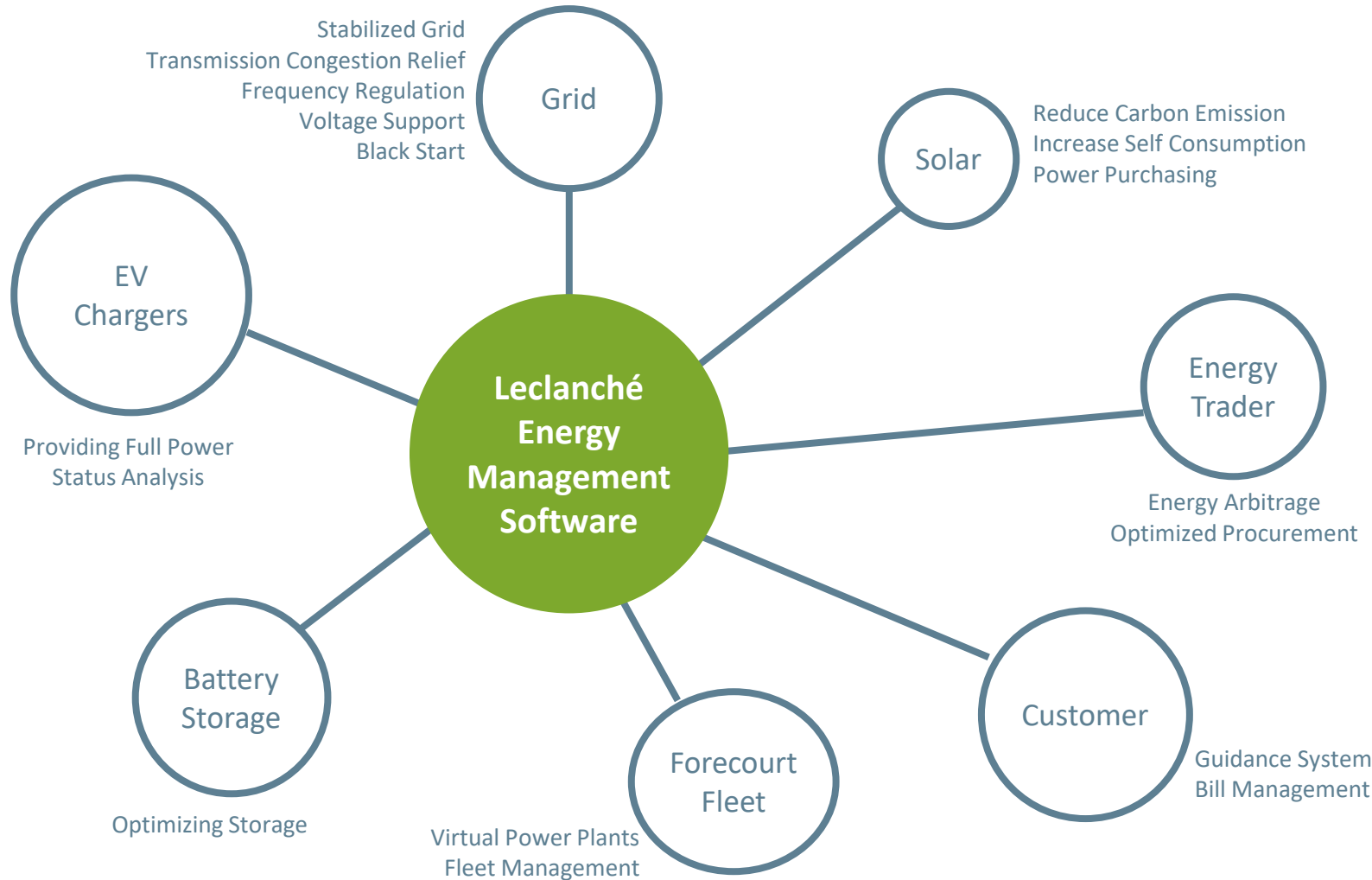


Combiner Block

- DC & AC protection
- Control / command



Enabling High Power Fast EV Charging



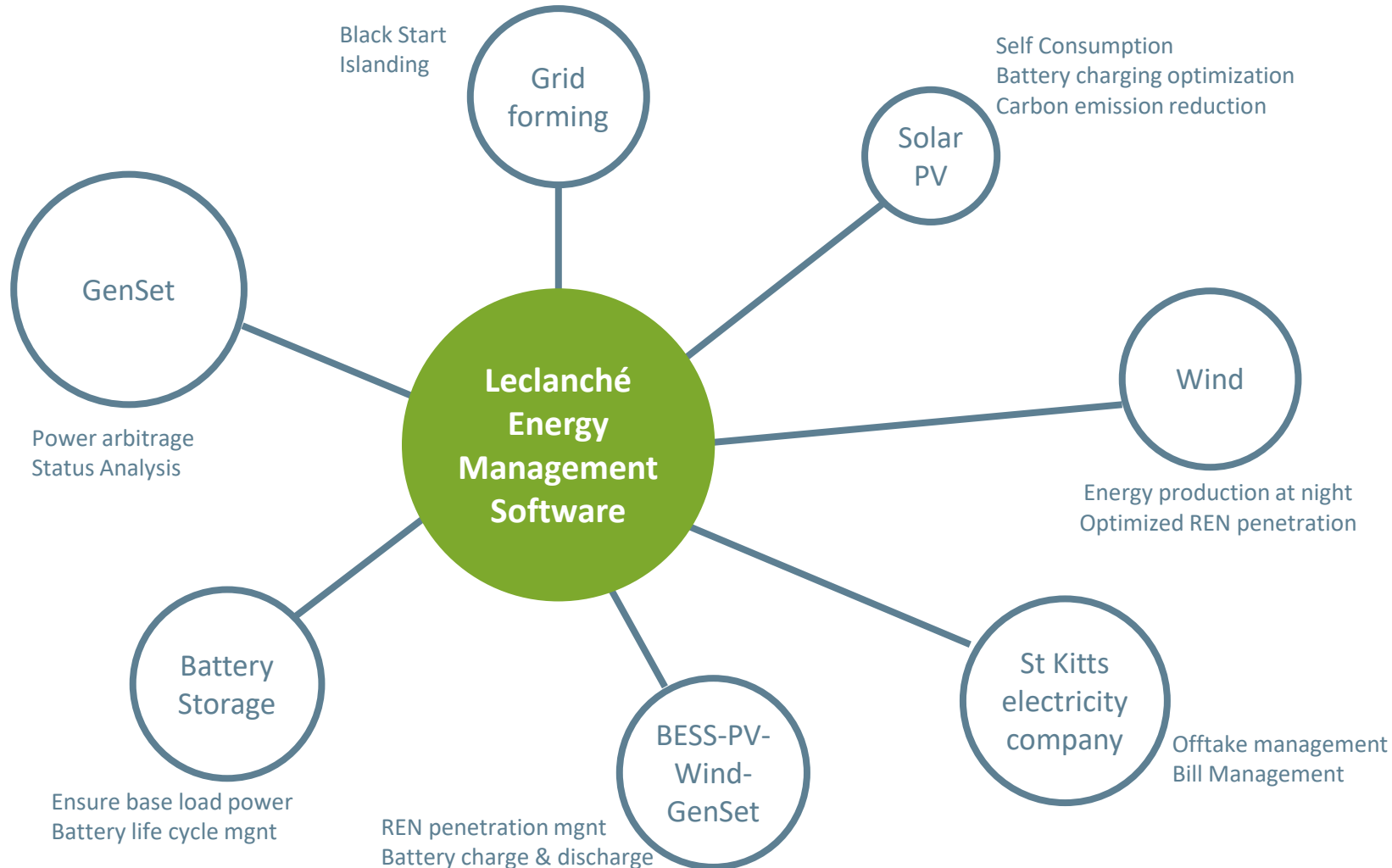
Smart Energy Management drives the Energy Transmission

AI enabled algorithms **anticipating** demand cycles, energy production and procurement prices

Creating **VPPs** and Networks of e-Forecourts

With many networked charges the EMS becomes more intelligent, creating more revenue and customer **value**

Enhancing renewable energy penetration in microgrids



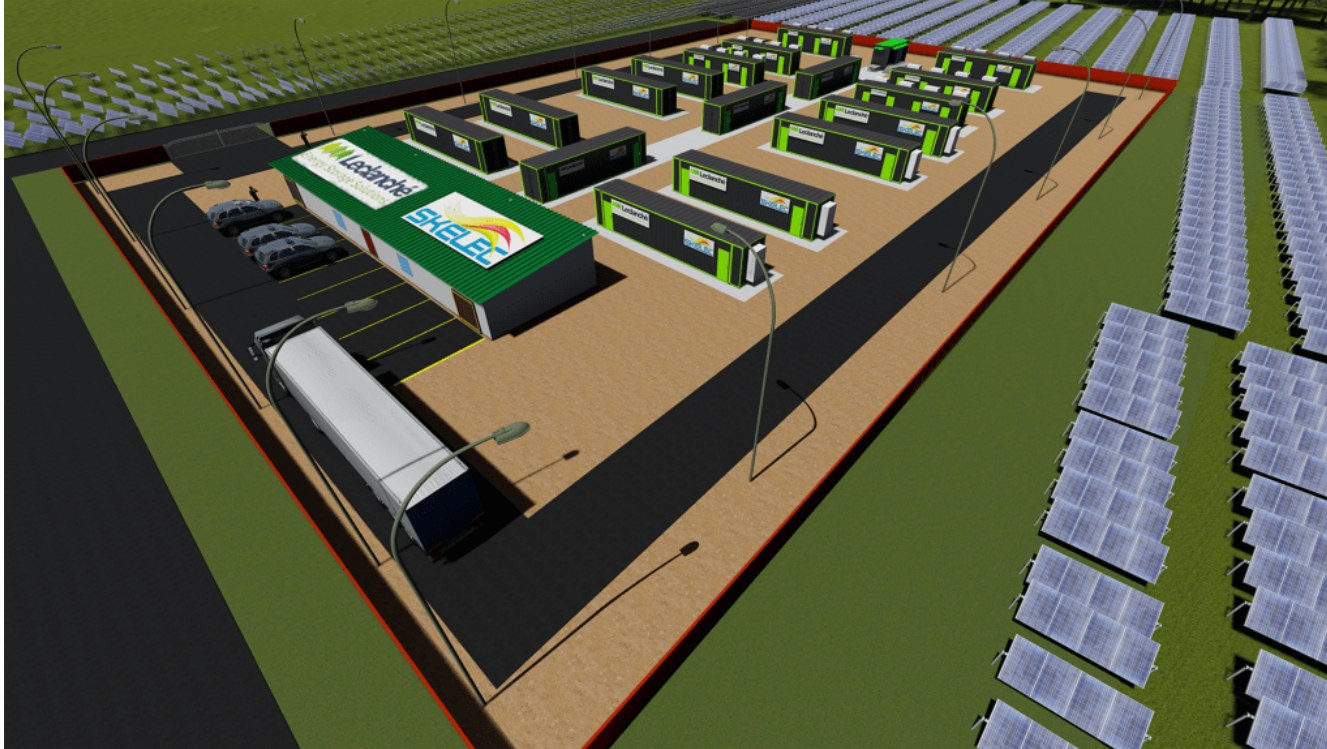
Smart Energy Management
guaranties **base load**
dispatchable power from
battery to grid

AI-enabled algorithms
optimizing the green energy
dispatch based on Time-of-the
Day demand cycles to
maximize Revenue

Maximize the REN **penetration**
vs. genset use

Multi-applications- **Revenue**
Stacking

St Kitts – the largest Solar + Storage project in the Caribbean



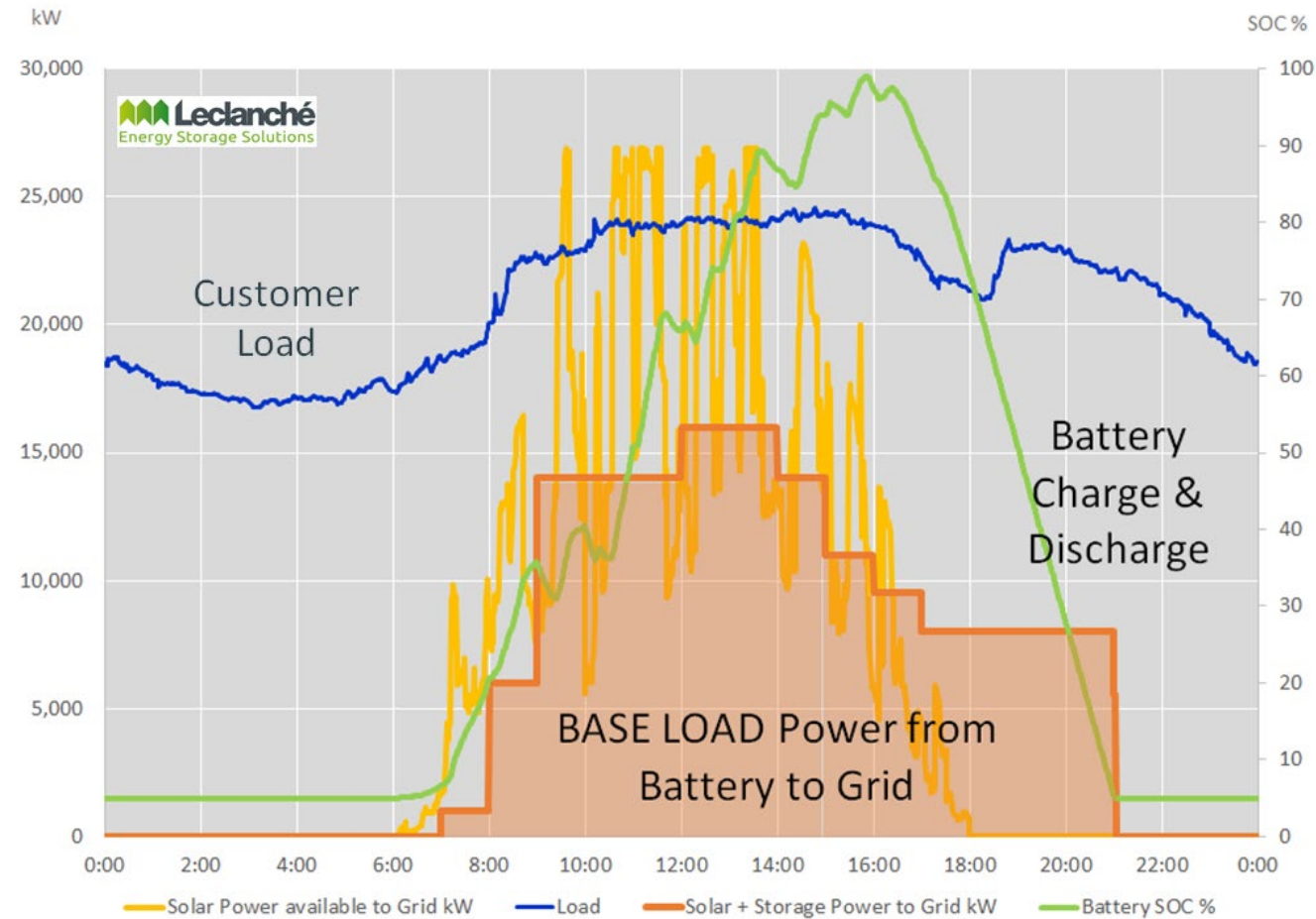
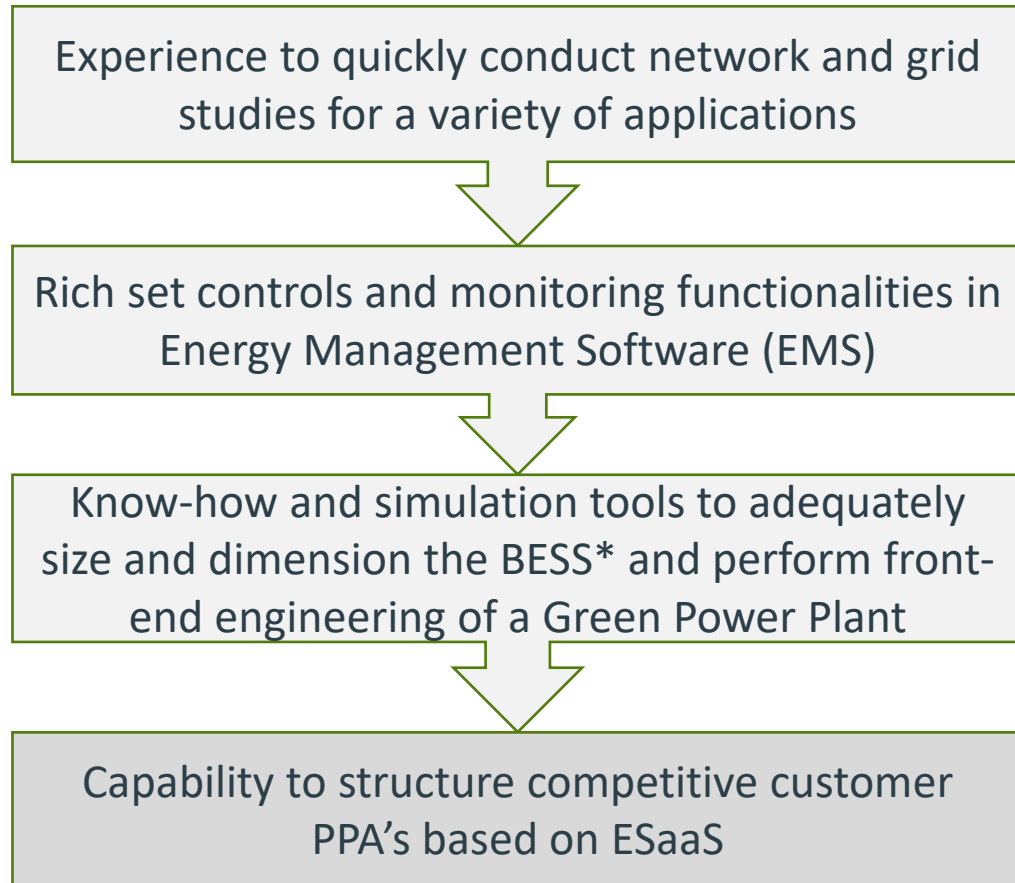
- Solar PV 36 MWp / 46 MWh
- 30% of the Island's baseload
- \$70 M capitalization / 20-year PPA



St Kitts prime minister Timothy Harris and Leclanché Bryan Urban at the groundbreaking December 15, 2020



What does it take



BESS – Battery-based Energy Storage System; PPA – Power Purchase Agreement; ESaaS – Energy Storage-as-a-Service

Typical Fast-Charging site layout with LeBlock™



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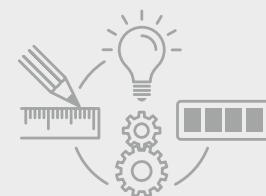
Thank you
Leclanché is on a clear path to deliver profitable growth.



**STATIONARY
SOLUTIONS**



**e-TRANSPORT
SOLUTIONS**



**SPECIALTY BATTERY
SYSTEMS**