

*BlueSolutions*  
BOLLORÉ

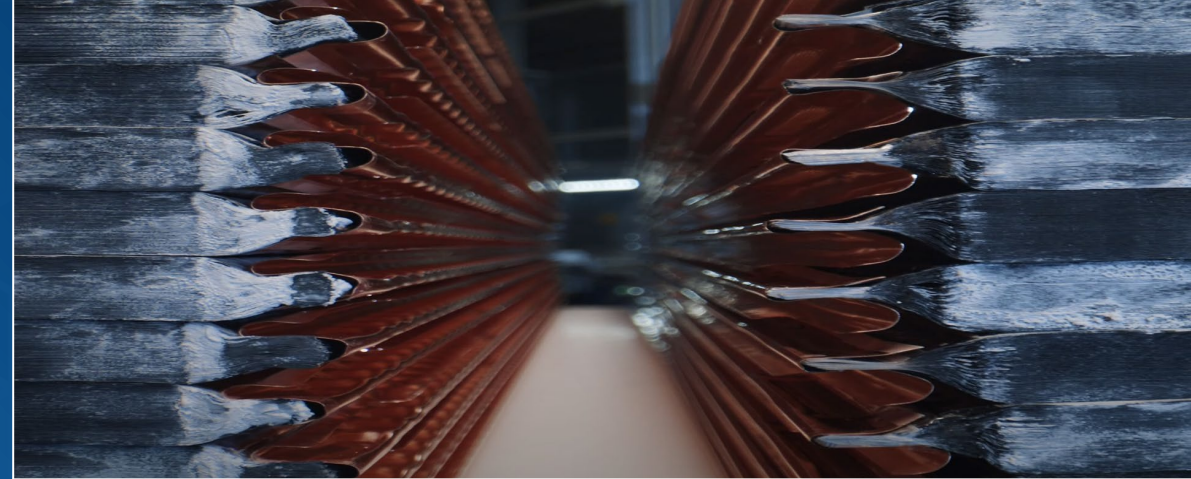
# Solid-State Batteries

“The only commercially available all-solid-state battery.  
Powering vehicles every day, all over the world”



Annual Meeting & Conference

Phoenix, AZ | 20-23 February 2023





**Revenues**  
€ 20 Bn\*



**People**  
73,000\*



**vivendi**

*BlueSolutions* **bluestorage**  
BOLLORE **bluebus**

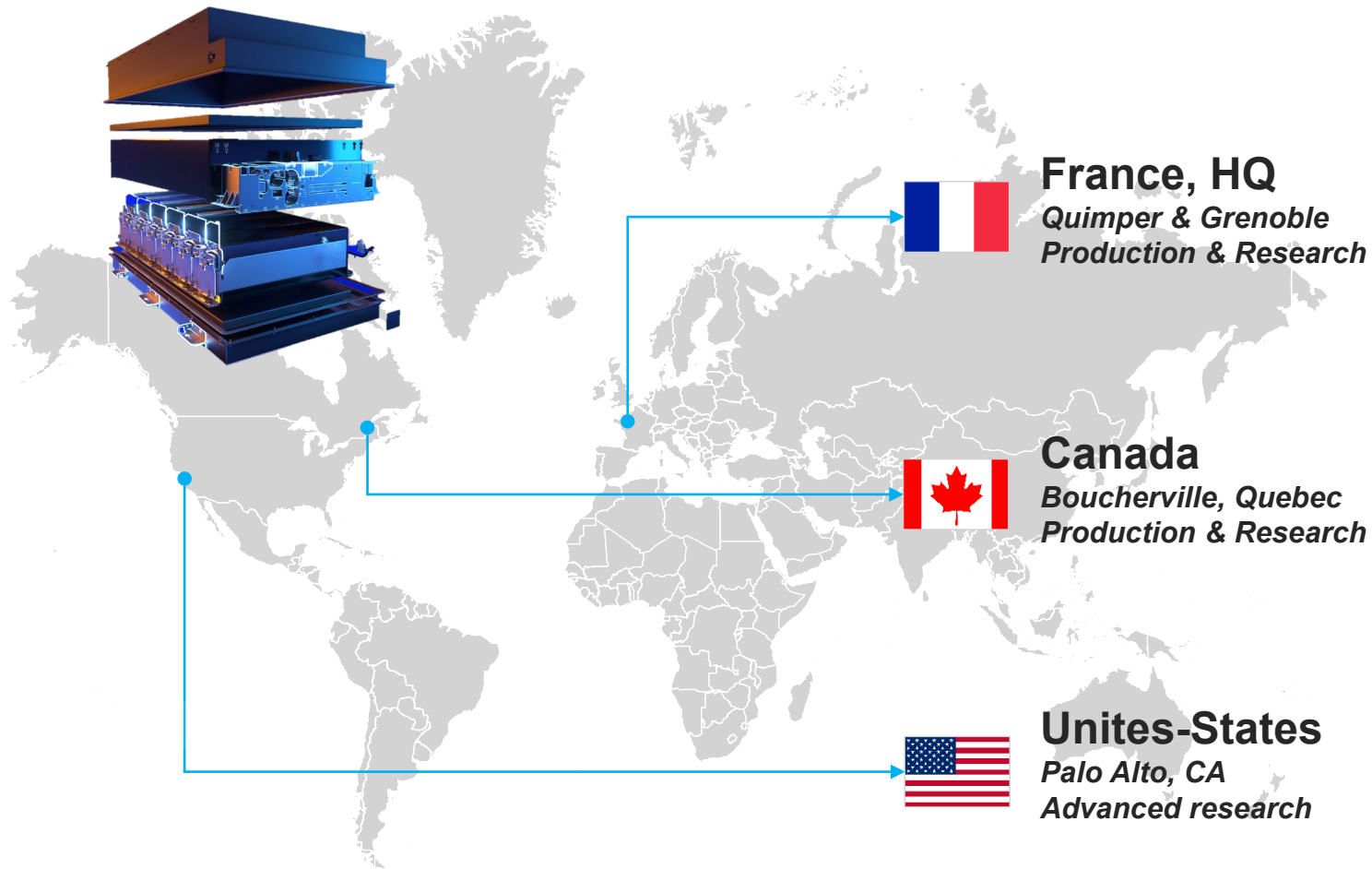
*BlueSolutions*  
BOLLORE

Founded in 1822 as a paper manufacturer, the French company and family story successfully navigated through the 20th and 21st centuries with activities diversification in Transportation, Logistics, Energy distribution and storage as well as Media and Communications.

The group is publicly listed and chaired since 2019 by Cyril Bolloré.



# A global research & industrial footprint



# Dedication to a decarbonized mobility



## Production



600 MWh, 48,000m<sup>2</sup>, 2 sites\* in France, Canada & advanced research in the USA (CA).



## R&D

**400+** Technicians & Engineers



## Intellectual Property

**620** Patents.



## Innovation

Gen3 for Commercial vehicles to **Gen4** for **Passenger EVs**.



## Sustainability

Innovations et developments in response to major environmental challenges, committed towards a long-term positive impact.

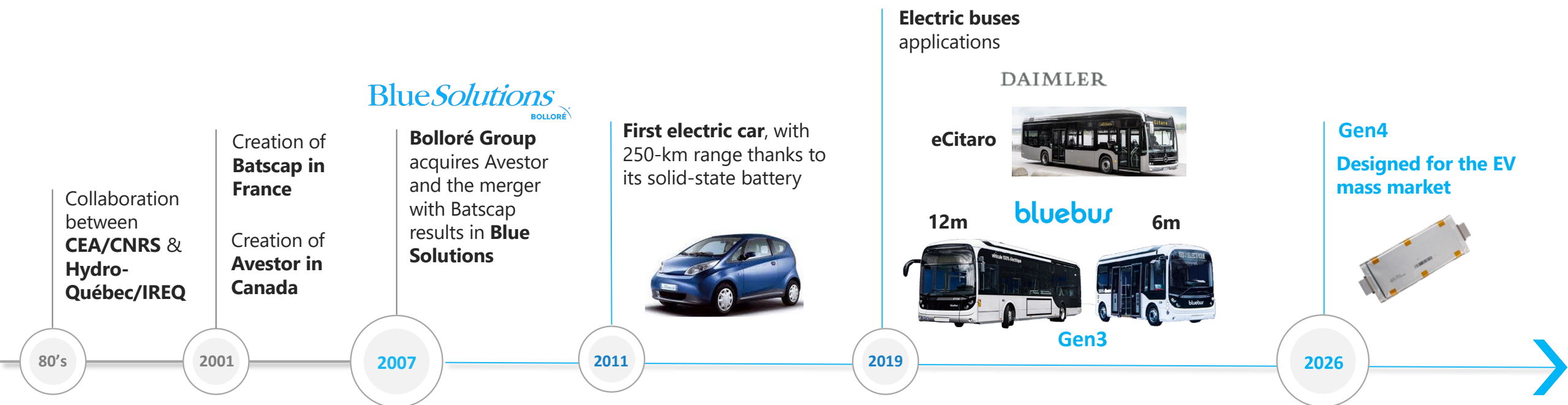
\*Certified plants

**ISO 14001** (environment),  
**ISO 9001 & IATF 16949** (quality)

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**Blue Solutions**  
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# A long & solid history going back 40 years!

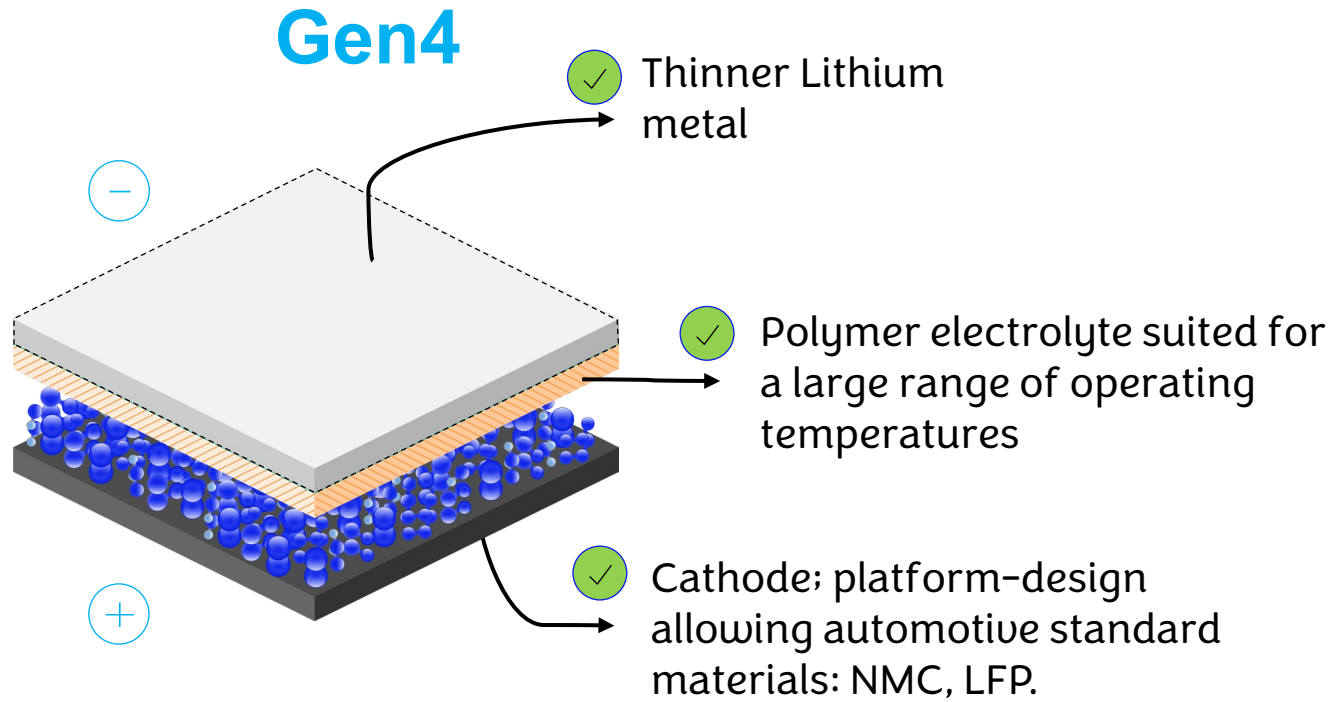


**3 Million units**  
# of cells produced

**500 Million km**  
Distance achieved



# Gen4: towards passenger e-mobility needs



Development with the support and collaboration of  
global industry & ecosystem partners



**Higher energy density:**  
900 Wh/L - 450 Wh/Kg



**Operating at room Temperature**

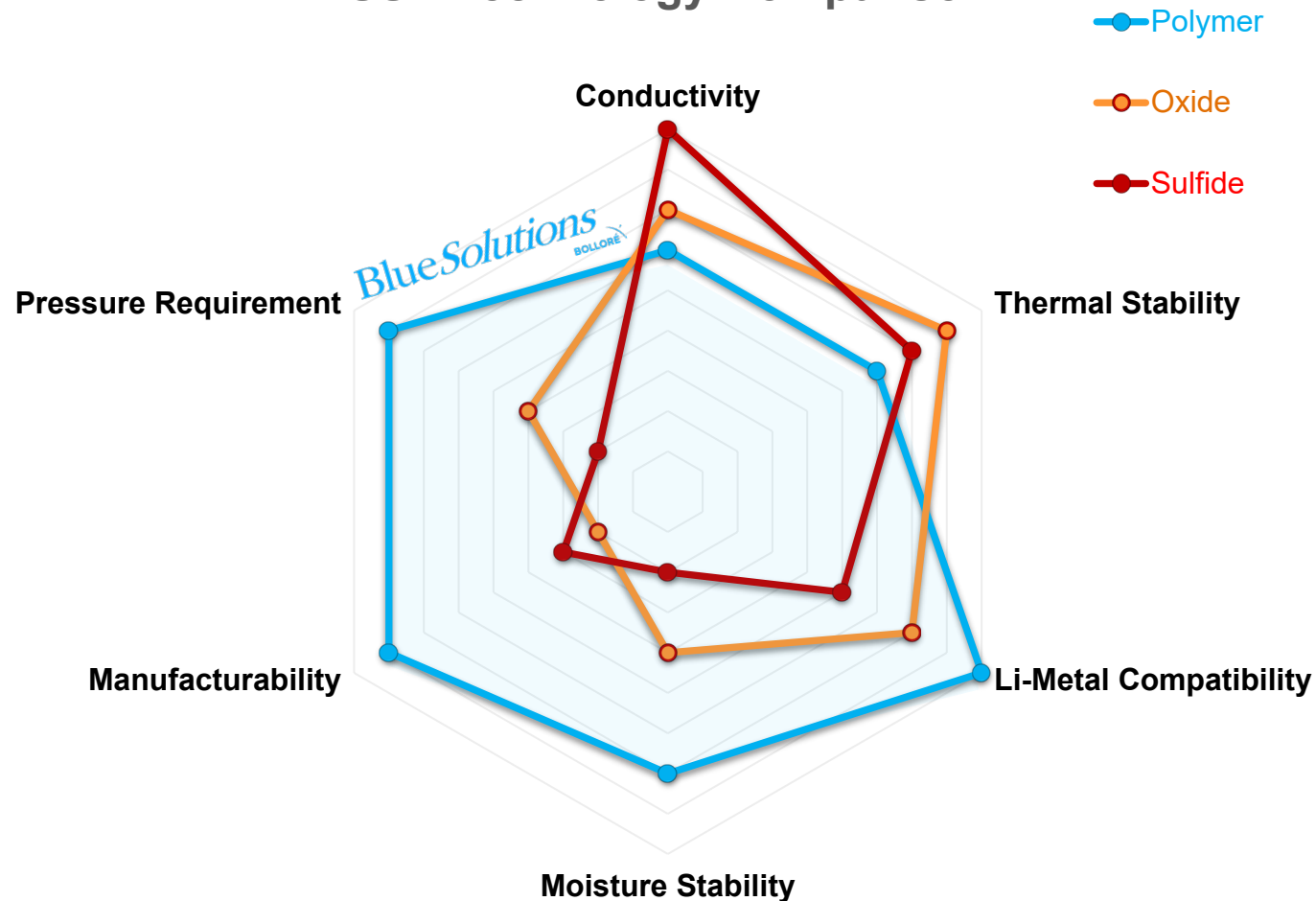


**Enabling Fast charging**



# Blue Solutions: Polymer path as the best choice for SSB

SSB Technology Comparison



Multiple industrialization and integration roadblocks are expected for Oxide and Sulfide technologies: process in inert environment and high levels of cell stack pressure required detrimental to pack-level energy density.

Polymer technology is the most polyvalent solution, already industrialized today with major ramp-up experience and quality control.



# Gen4 Specifications for the EV Market

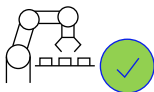
Gen4 targeted properties		
Chemistry	Electrolyte	Polymer-based
	Cathode	High Voltage Cathode NMC / LMFP - LFP
	Anode	Lithium Metal
Safety	Fire hazard	Thermally stable electrolyte up to 250°C
Performance	Operating temperature	Ambient, system operation from -20°C to 60°C
	Fast charging rate	3C
	Cycle life	1000 +/-
	Volumetric density	>900 Wh/L
	Gravimetric density	>450 Wh/kg
Packaging	Pressure	<2 bars
	Format	Cell designed for integration (cell to pack/chassis)



Use of Polymer, lithium metal processing, low stack pressure, module/pack integration & scale-up experience:



Know-How



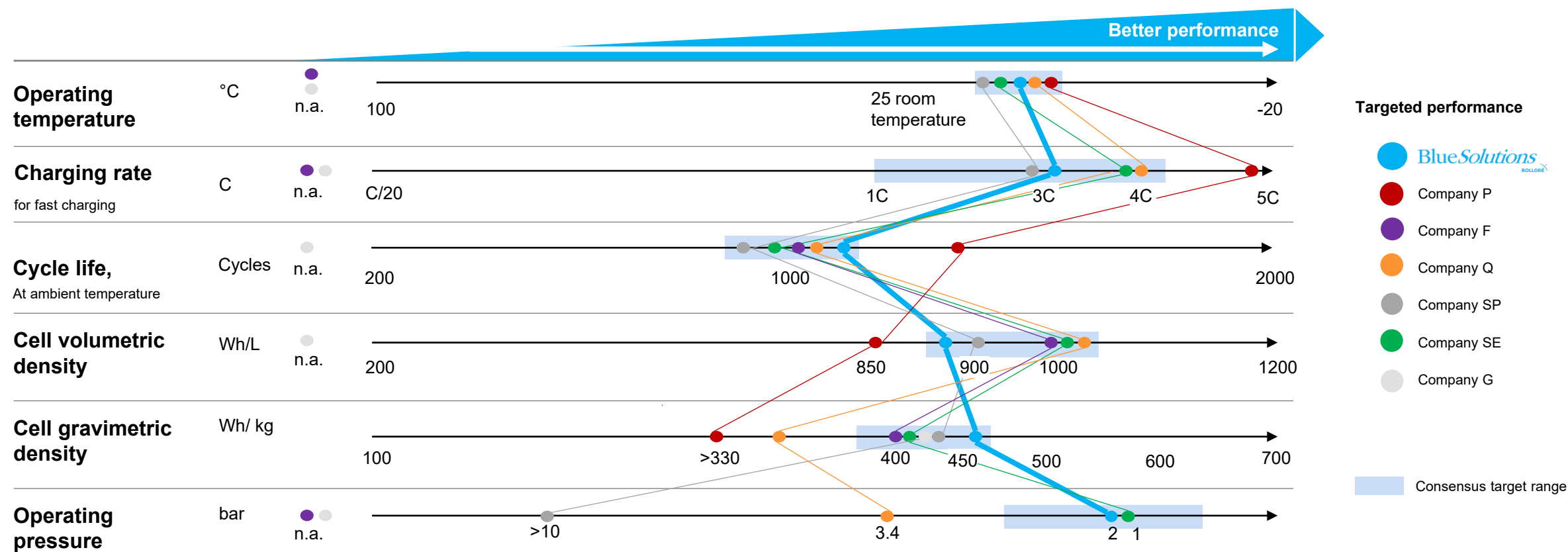
Manufacturability



Maturity



# Benchmark of target specifications

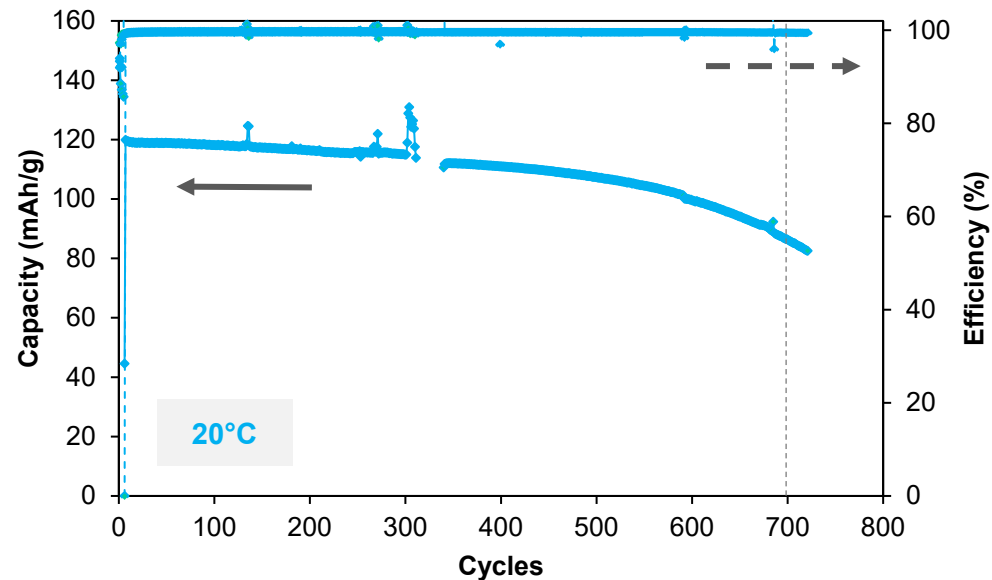


Comparing a set of 6 SSB players value propositions illustrate similar level of targeted performances, **despite various actual cell sizes, number of layers and test conditions.**

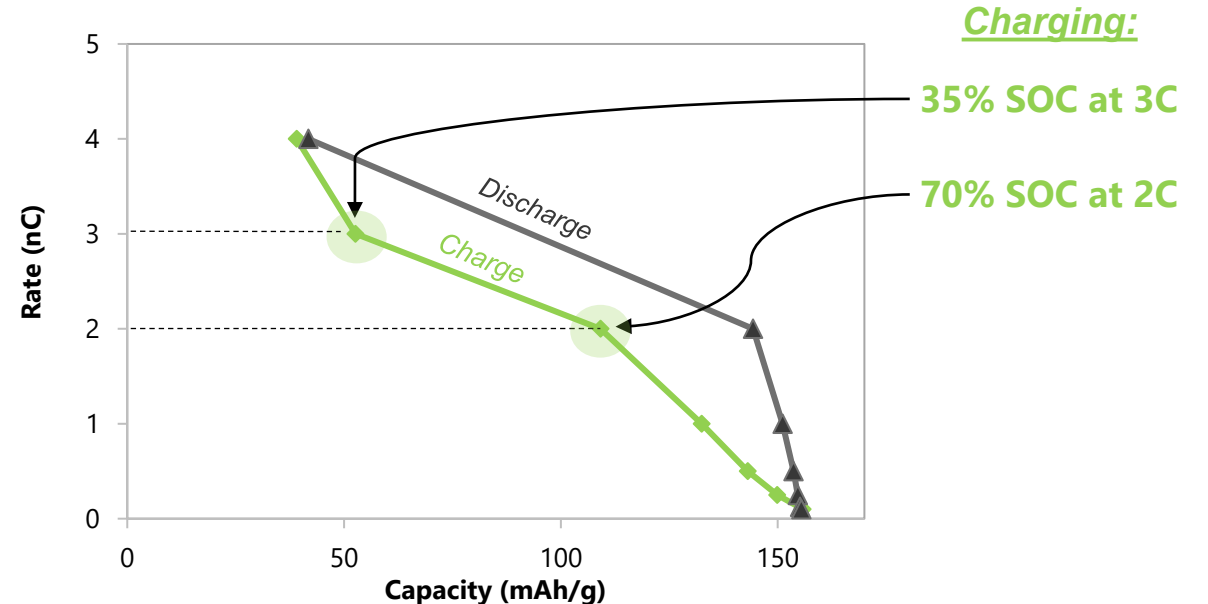
Blue Solutions' SSB is expected to be highly competitive on density level vs. start-ups

# Where do we stand?

## Cyclability



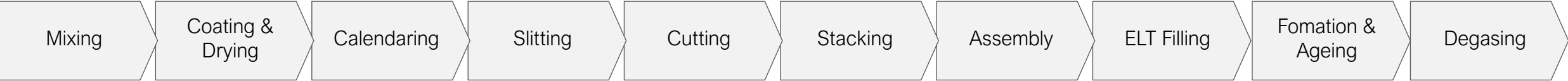
## Power performances



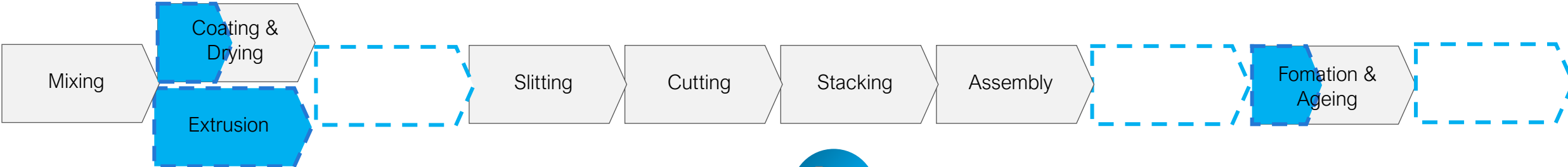
**New generation cycling capability demonstrated at 20°C with HV cathode material.  
Charging performances show promising results by achieving 35% SOC at 3C and 70% SOC at 2C!**

# SSB Manufacturing Differentiation vs. Li-ion

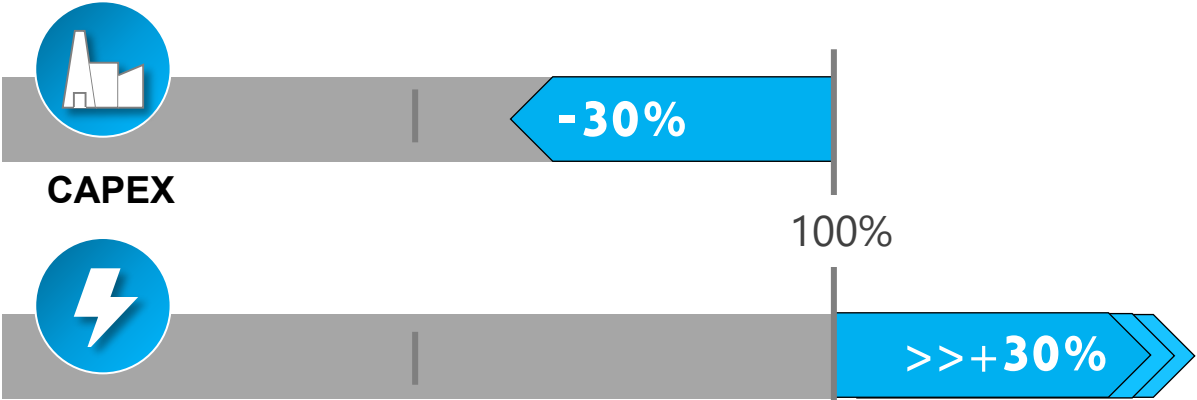
## Li-ion Battery Steps



## Blue Solutions Steps

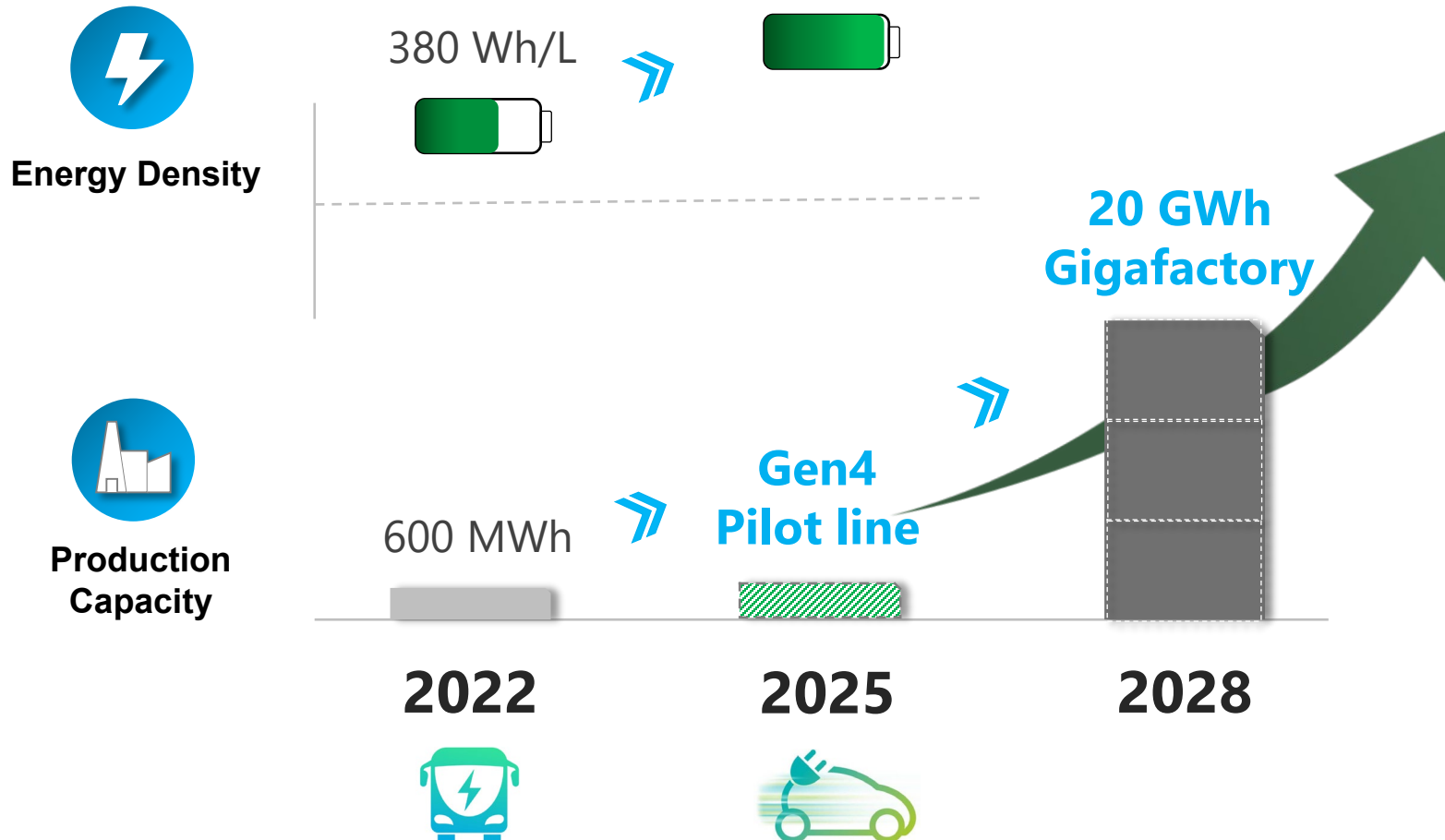


**3-fold advantage for new and transformed lines: fewer steps, less m<sup>2</sup> and less labour**



Energy Density

# Industrial Roadmap



## Ambition

145 M€ in R&D effort till 2025 and 70+ additional research engineers to pave the way towards breakthrough performances for passenger cars.

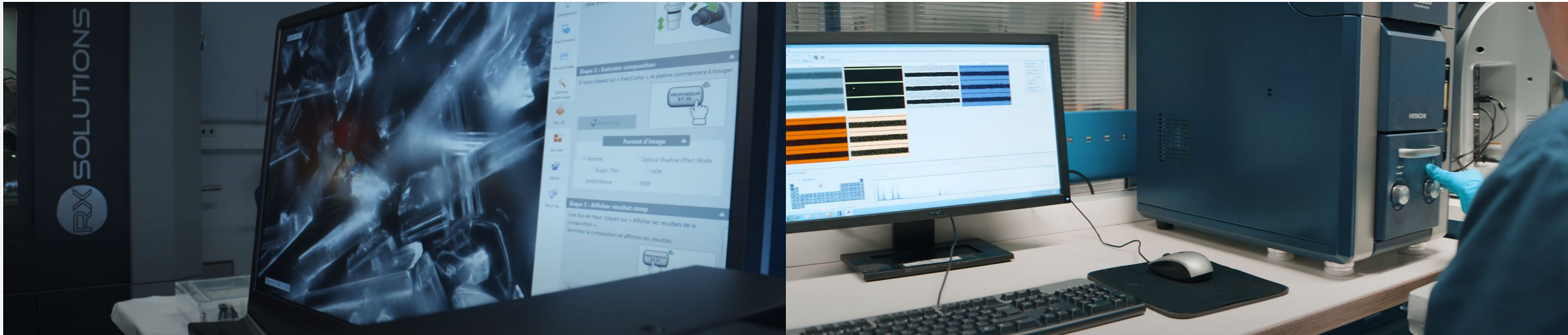
## Gigafactories

Launching production capacity in accordance to the expanding EV market.



“Our Strengths,”

# At the heart of the cells lies chemistry



**Solid-state & Lithium metal chemistries: a 40+ years expertise**

Blue Solutions is the all-solid-state battery pioneer with a unique expertise on: **lithium metal and polymer-type solid electrolyte**.

Unparalleled **in-depth practical knowledge of interfaces management and ageing phenomena experienced in batteries**.

# Manufacturing at scale of large cells

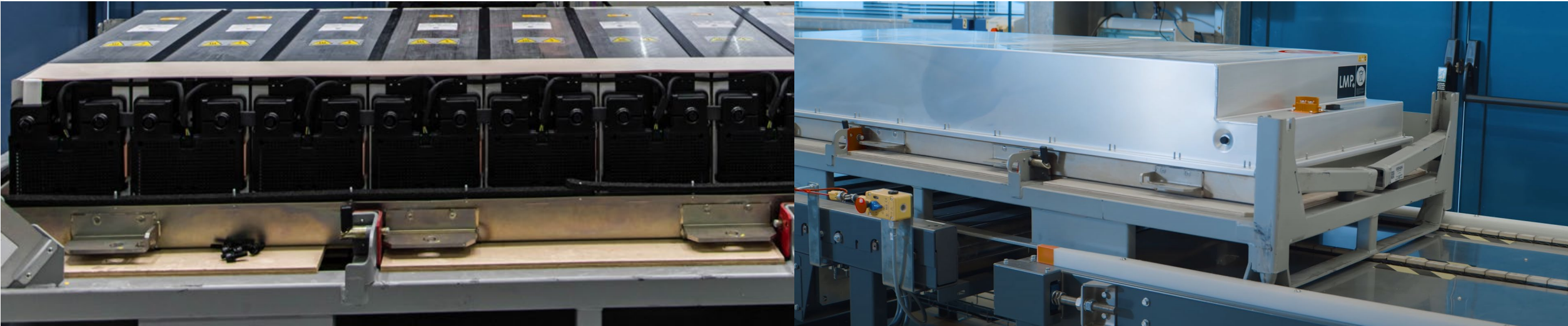


**Blue Solutions masters the full value chain of solid-state cells' industrialization process**

Blue Solutions is the only company in the world to have designed, developed and **industrialised at scale for the last 11 years all-solid-state batteries: 3 million cells have been produced in cumulative.**

Blue Solutions' cells are larger (105 Ah, 610x175mm) than any lithium-ion ones in the market and without any match from the prototype cells developed by new comers in the solid-state space.





## Modules, packs & BMS: demonstrating full system and integration competences

Cells are assembled in modules and packs with a simple pressure system, illustrating **Blue solutions abilities for system design and in-vehicle (buses, trucks, cars) and stationary integration.**

Blue Solutions develops proprietary software solutions from cell monitoring tools (temperature, voltage) to overall system control and interfaces with vehicle ECUs.





**Key words: Recyclability,  
Re-use & Sustainability**

Blue Solutions develops its own recycling solutions to **re-use all critical metals and to re-inject them in new cell manufacturing flows**, in compliance with European battery regulation.

Thanks to an unmatched experience with lithium metal, Blue Solutions has filed a new patent for an **innovative method to extract lithium metal from the heart of the cells**.

*Thank you*

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