X-CAP

EU FRAMEWORK PROGRAMME FOR R&I - INNOVATION FUND SYNERGIES WORKSHOP

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PATRICIA GODEL

Project X-CAP developed the SuperBattery through an EIC Accelarator grant

Backed by the largest R&D team in the industry

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Li-ion Batteries

use a chemical reaction to store energy

Slow

- Limited power density (0.5 kW/kg)
- **High energy density** (205 Wh/kg)
- Limited cycle life (<6000)
- Slow charge rate (1.5 C)
- Safety concerns
- Utilizes critical raw materials (Li, Graphite, Co)

SuperBattery

Based on supercapacitor technology

Fast

- **High power density** (10 kW/kg)
- Increased energy density (65 Wh/kg)
- Long cycle life (50,000)
- Fast charge (60s)
- Extreme power (20 C continuous, 100 C peak)
- High inherent safety
- High recyclability and sustainability
- No Graphite, no Co, <5% Li

Solving Issues in Hydrogen Fuel Cell Transportation

The ideal combination of high power and energy technologies

”Wrightbus is working with world-class leaders such as Skeleton Technologies for supercapacitors. **SuperBatteries and fuel cells are the ideal combination for better performance and lower cost of ownership**.”

Jo Bamford
Chairman, Wrightbus

SuperBatteries can be charged and discharged up to 6X faster compared to LTO batteries, meaning the installed battery pack doesn’t have to be oversized for the power peaks. SuperBatteries also have a lower cost per kWh, they are more safe and sustainable, and have longer lifetime.

Hydrogen fuel cell and SuperBattery hybrid drive trains are an excellent solution for full electric buses and trucks, but require more testing and development before larger scale adoption is possible.

Decarbonizing Hard-to-abate Industries

SuperBattery-powered mining vehicles

"The challenge of decarbonisation is immense, but not impossible – providing collaboration and innovation go hand in hand at all times. **Skeleton's technology, providing ultrafast charging at ~< 90 seconds, means the solution can help mining companies reduce emissions without compromising on efficiency.**"

Grischa Sauerberg
VP of Mining, Sectors and Decarbonisation
Shell

SuperBatteries help electrify mining dump trucks, eliminating CO2 emissions and fuel costs. **Electrifying one dump truck is the equivalent of eliminating the CO2 emissions of 11 000 passenger cars yearly.**

Decarbonization of mining is an increasingly important topic and Skeleton is in active discussions with a number of mining companies, discussion SuperBattery-based solutions to replace diesel-powered machinery. To enable the use of SuperBatteries more widely, the technology for high-power charging network needs to be improved.

Increasing Safety And Sustainability At Sea

SuperBatteries replacing diesel generators

Reduction of more than

10%

in fuel consumption and CO2 emissions

Today, all ships have a secondary generator that is being replaced with energy storage. 1-2 minutes of reserve available every 6 minutes is needed to ensure power availability and safety on board.

Using SuperBattery energy storage to replace diesel generators **reduces fuel consumption and carbon emissions by more than 10%, but also reduces noise, increases safety, takes less space, and requires no maintenance.**

SuperBattery energy storage solutions are being tested by companies in the marine sector. One of the key steps is acquiring the necessary marine certifications before large-scale deployment.

Scaling up is next!

Large investments needed due to CAPEX intensity

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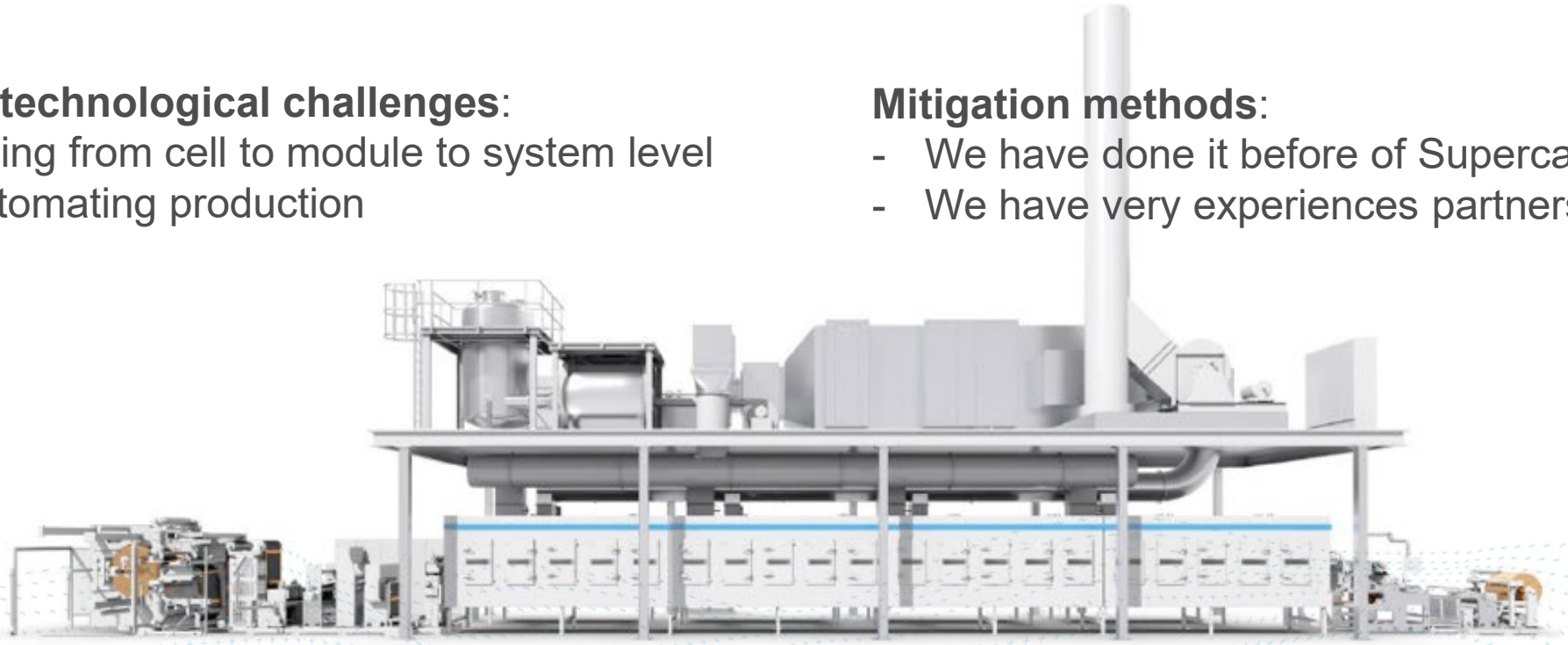
Energy storage production is not just an office or a lab. **SuperBattery needs a SuperFactory.**

The investment climate has gotten a lot harsher. **Investors price in public funding**.

Main technological challenges:
- Going from cell to module to system level
- Automating production

Mitigation methods:
- We have done it before of Supercapacitors
- We have very experiences partners



Thank you

https://www.skeletontech.com/superbattery

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