



Power with care.

A Shift in Technology – driven by environment and economy



Increased focus on environmental issues



Stricter environmental policies



CO2 requirements for trucks and busses



Diesel free cities

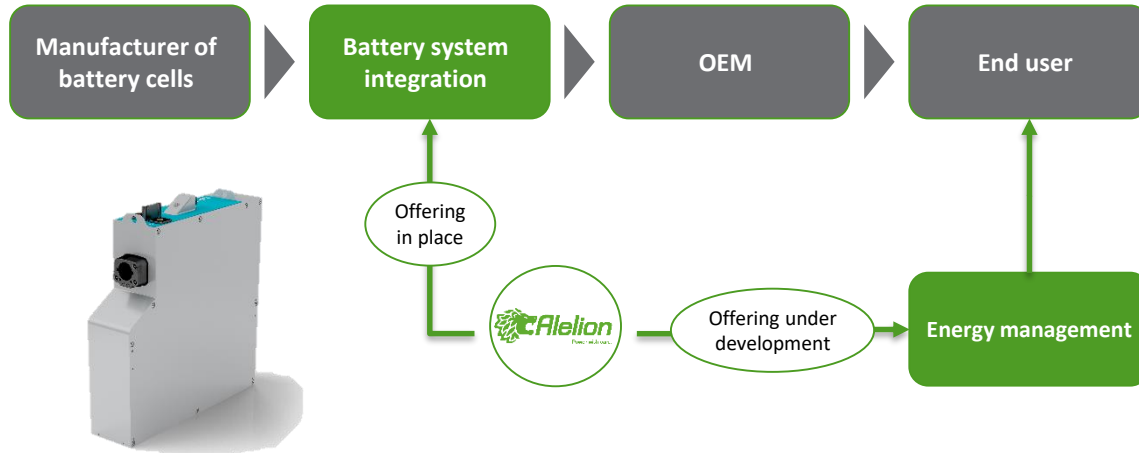


Battery prices are dropping fast



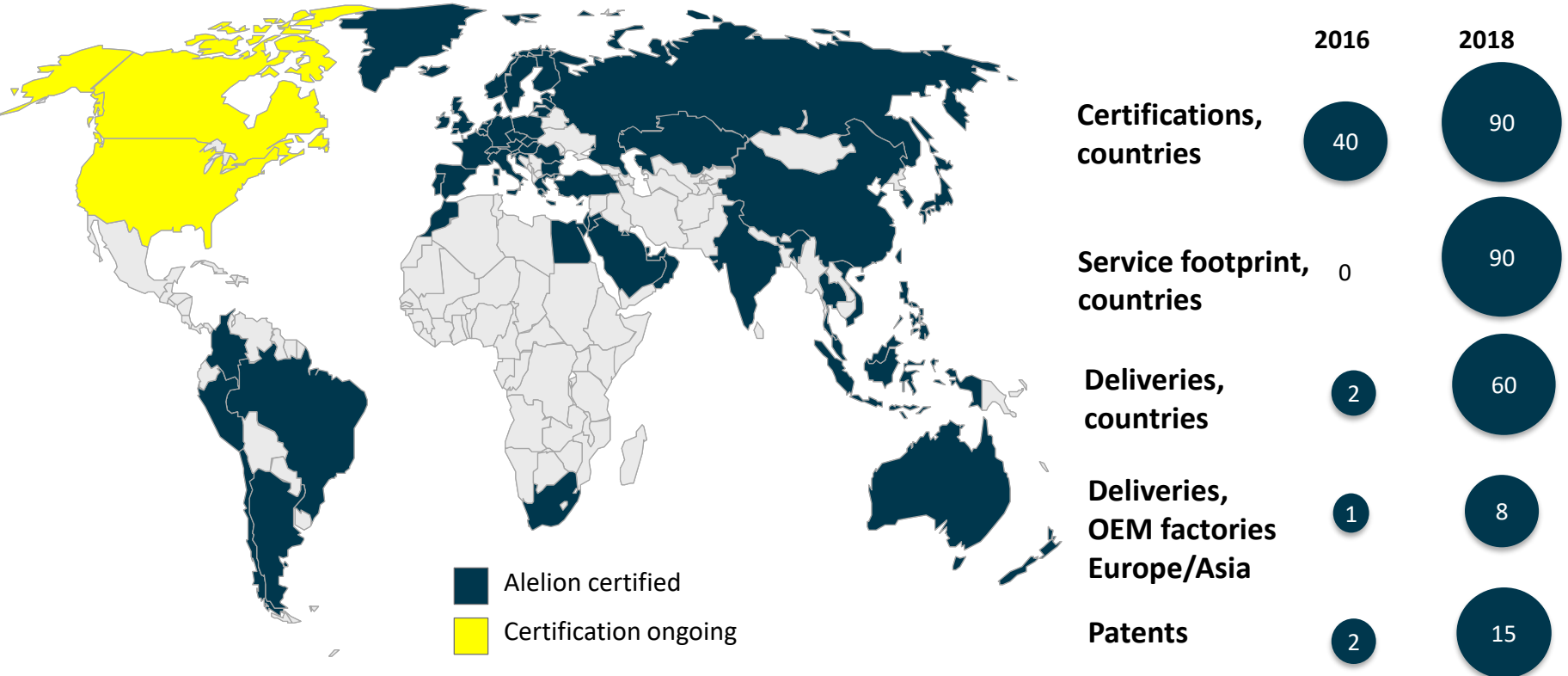
Increased share of renewable energy

Proven provider of customized battery systems and battery management systems



Pictures as examples

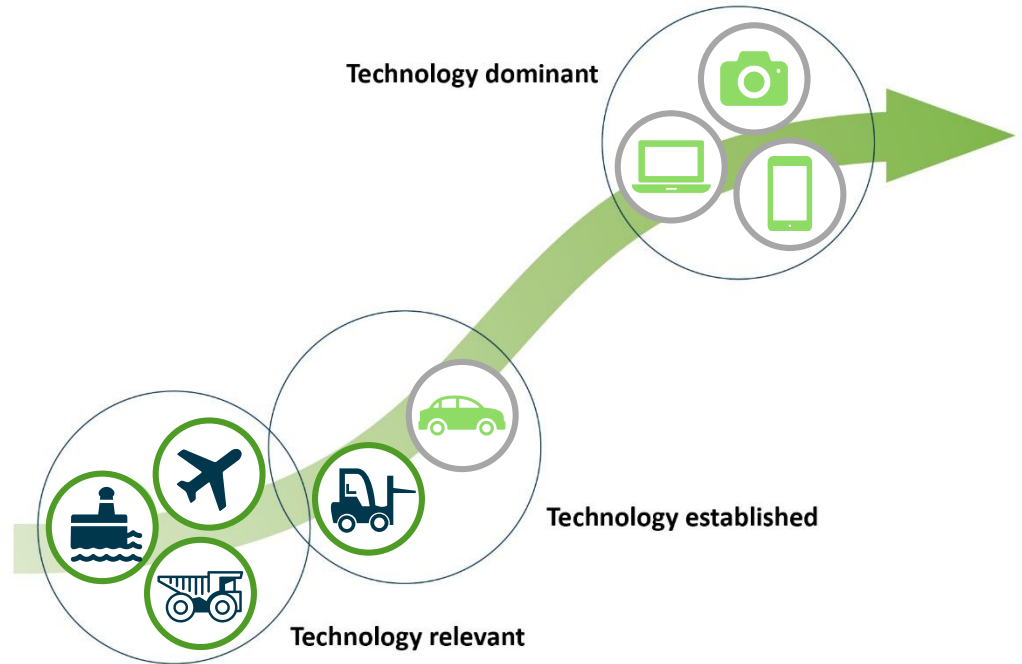
Increased access via global customers in prioritized segments



Replicating the material handling journey to adjacent industries will further boost topline growth

Alelion is transforming additional carefully selected industries

-  Material handling – warehouse logistics trucks
-  Mining vehicles
-  Airport logistic vehicles
-  Port material handling vehicles



Alelion Intelligent Energy Systems creates many benefits for the end user

Energy Management – System solution



Alelion has developed a 3rd generation of its Li-ion battery system, based on a modular design

The 3rd generation battery system enables both cost competitive and flexible design and production

The new 3rd generation battery system ...



**Modular and simple
battery design**



**Automated manu-
facturing process**



... benefits Alelion in several ways



Improved flexibility of production while still achieving strong cost competitiveness



Drastically reduced time required for prototyping phase



Reduced dependency on single suppliers



Substantially lowered cost for product development including prototyping

Lead time and engineering efforts reduced by ~90%

Manufacturing process

Flexibility in cells



Prismatic cells



Flexibility in module layout



Automated module
production



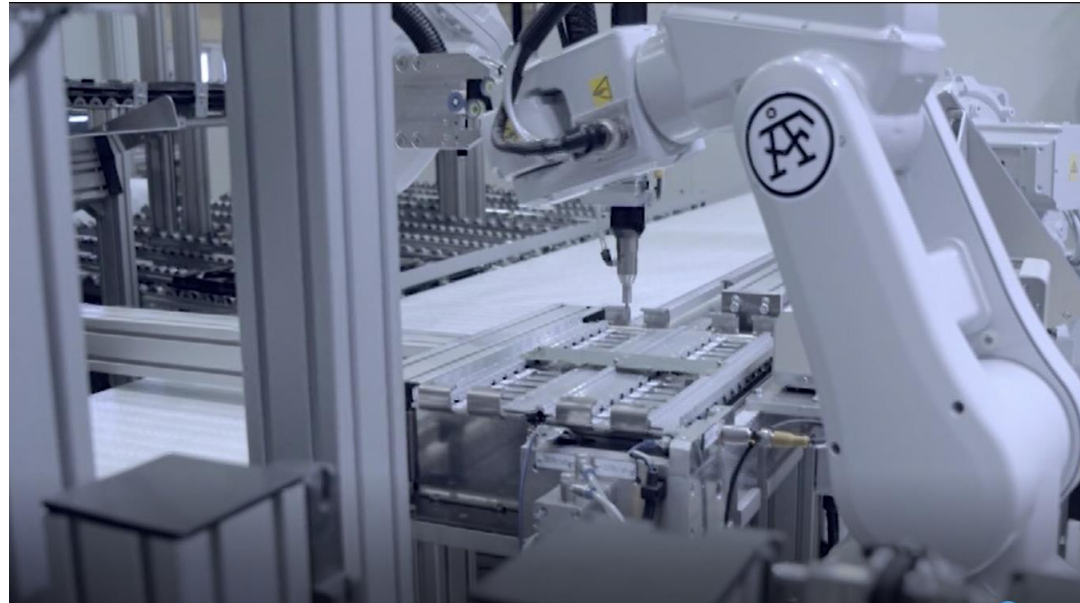
Flexibility in system design



Manual system
assembly

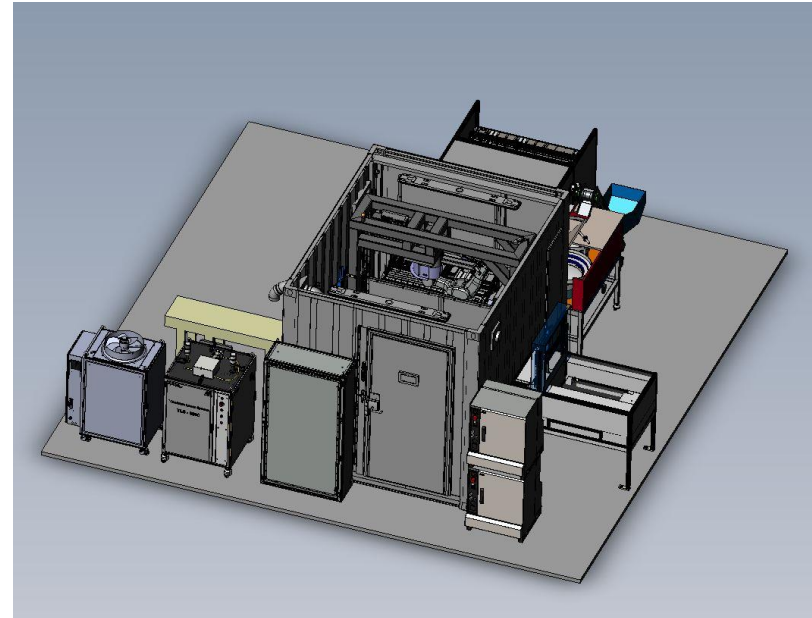
Laser welding – Main drivers

- Clean process (product sensitive to metallic contamination)
- Welding inside the material (no need for pre-defined slits)
- Low heat addition to the cell
- Resetting free between welded materials
- Low variable cost



Laser welding - Concept

- 3 kW fiber laser
- Welding and handling robot (ABB)
- Permanova welding optics
- Fully automatic and flexible fixturing for handling of a range of products (next slide)
- Recipe management via PLC
- Welds aluminium (bus bar) and stainless steel (frame)
- The laser welding station is part of a fully automated line(ÅF)



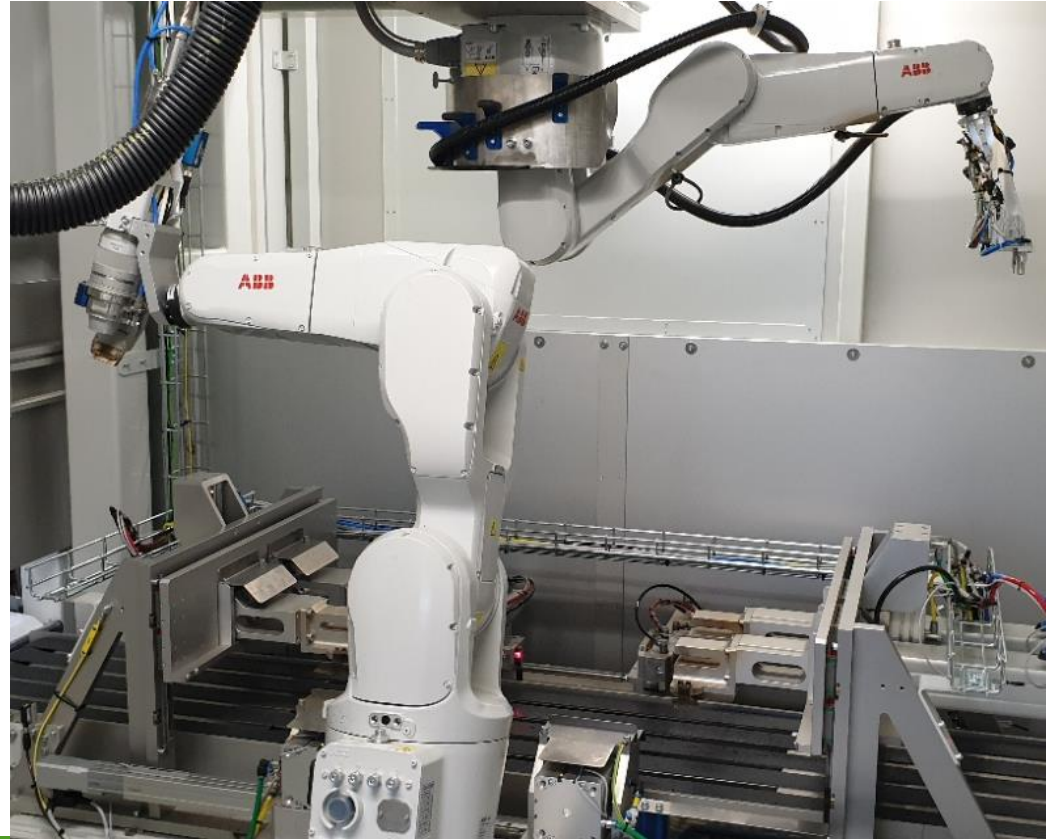
Laser welding - Fixture

- Actuators manage a range of configurations and sizes
- The execution of the weld is part of each recipe
- Recipes use reference point



Laser welding - Process

- Bus bar – area of the weld and heat induction into cell are critical parameters
- Frame – shear strength is critical parameter
- Continupus weld (CW) is used



Laser welding – Aspects to consider

- Initial investment
- Relatively cumbersome to modify

