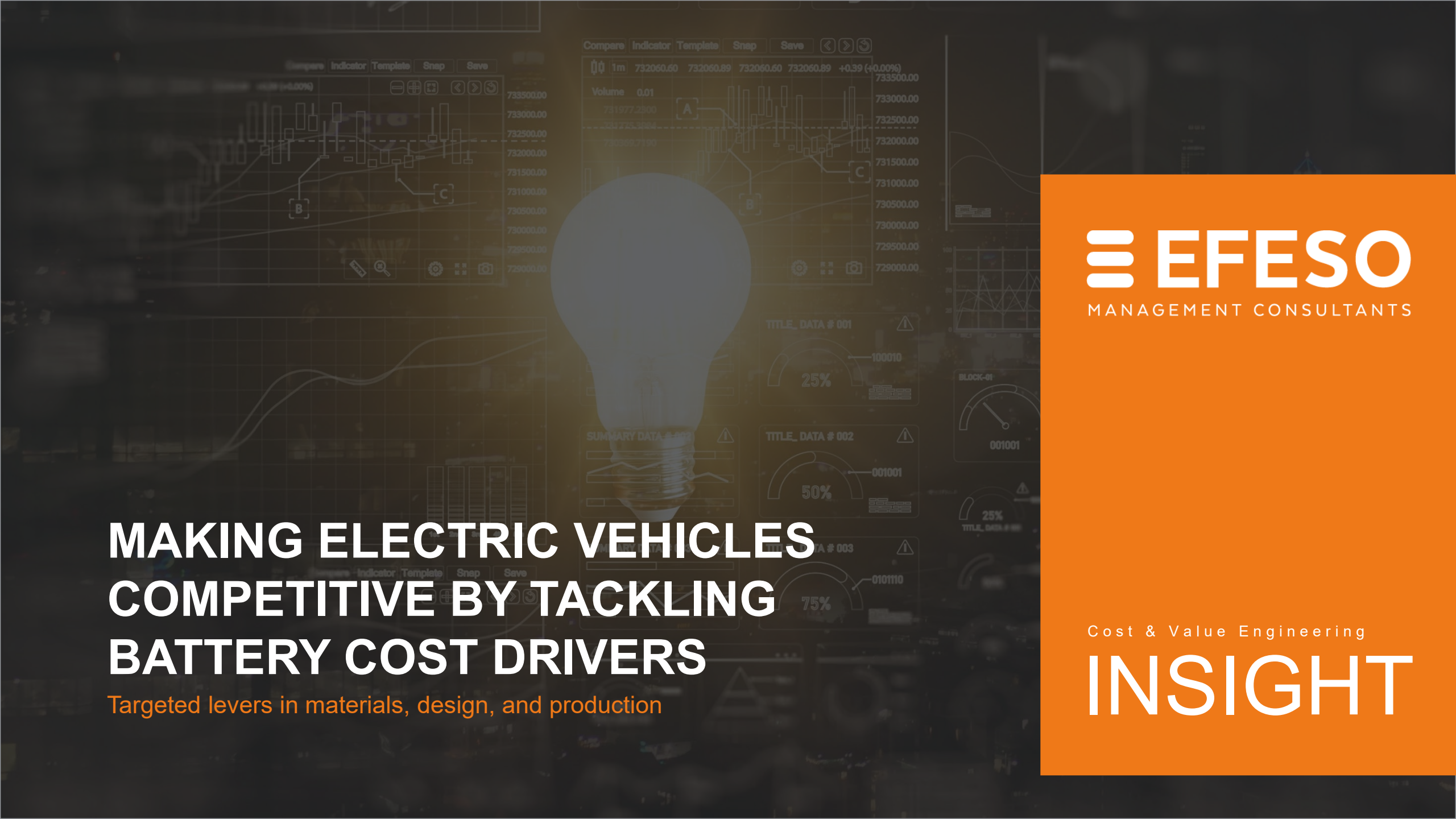


MAKING ELECTRIC VEHICLES COMPETITIVE BY TACKLING BATTERY COST DRIVERS

Targeted levers in materials, design, and production

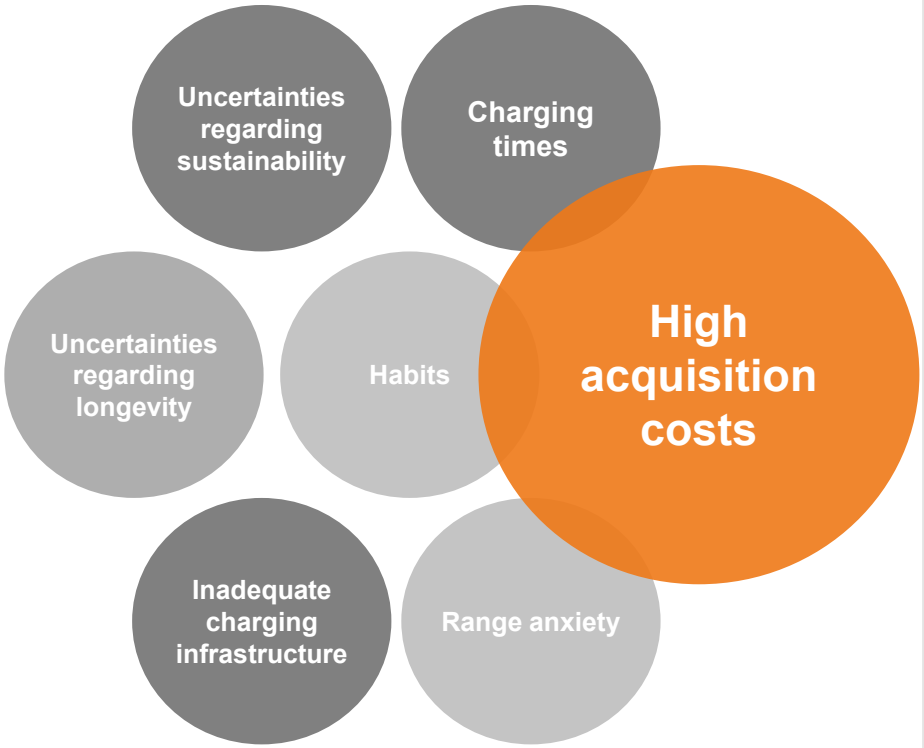
EFESO
MANAGEMENT CONSULTANTS

Cost & Value Engineering

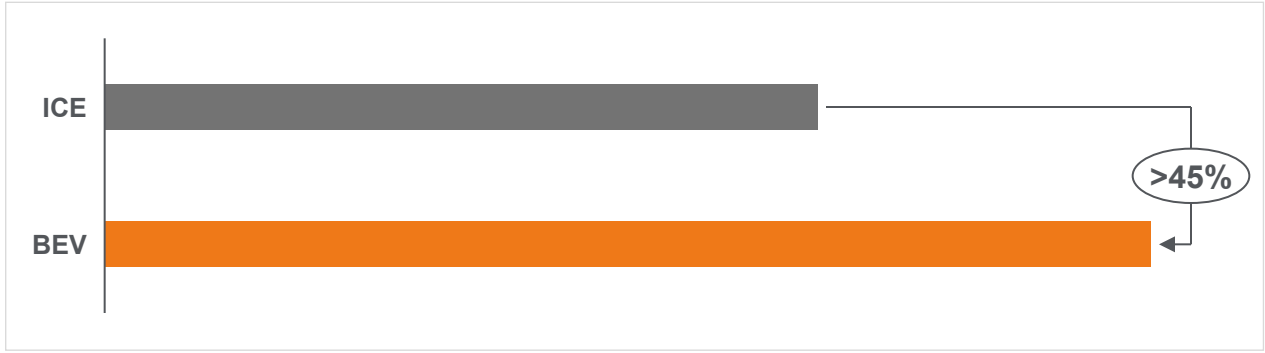
INSIGHT

In Europe, a variety of factors continue to hinder the adoption of e-mobility. Above all, high acquisition costs remain the most critical barrier, discouraging many potential customer

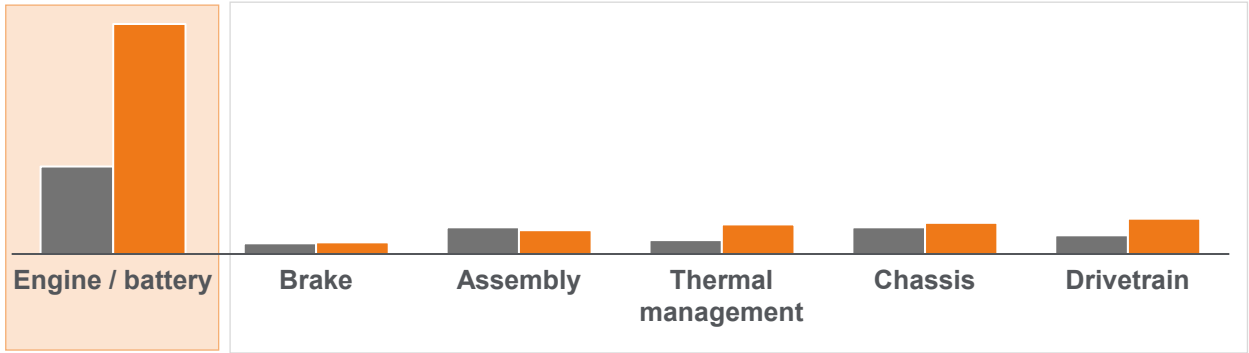
Reasons



Production costs* (based on a mid-size car)



Cost comparison of the main functions

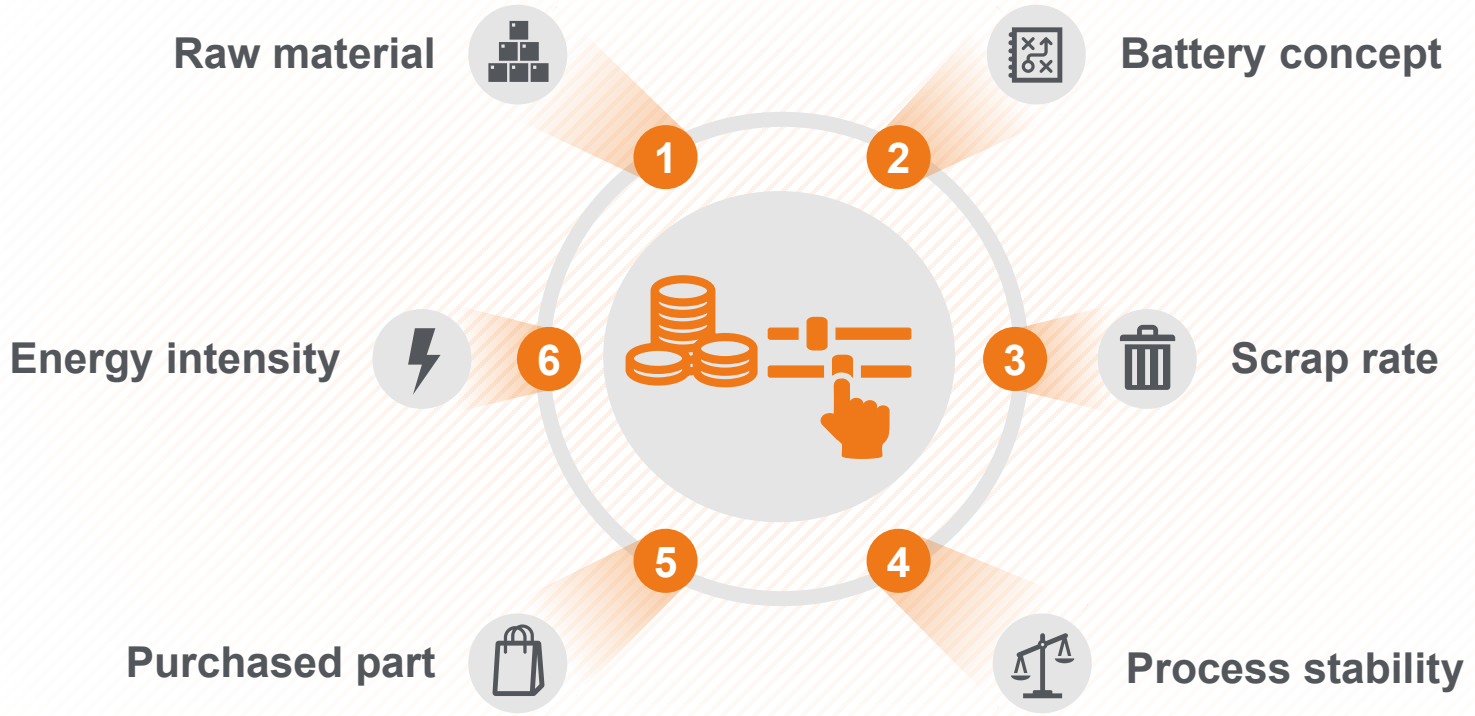


Production costs of a BEV are still considerably higher than those of a ICE. Main cost driver are the battery costs.

Source: EFESO
*Material cost + Manufacturing cost; ICE = Internal Combustion Engine; BEV = Battery Electrical Vehicle

There are still some challenges to be overcome in battery production, the material used and battery design

Core cost drivers in European battery production



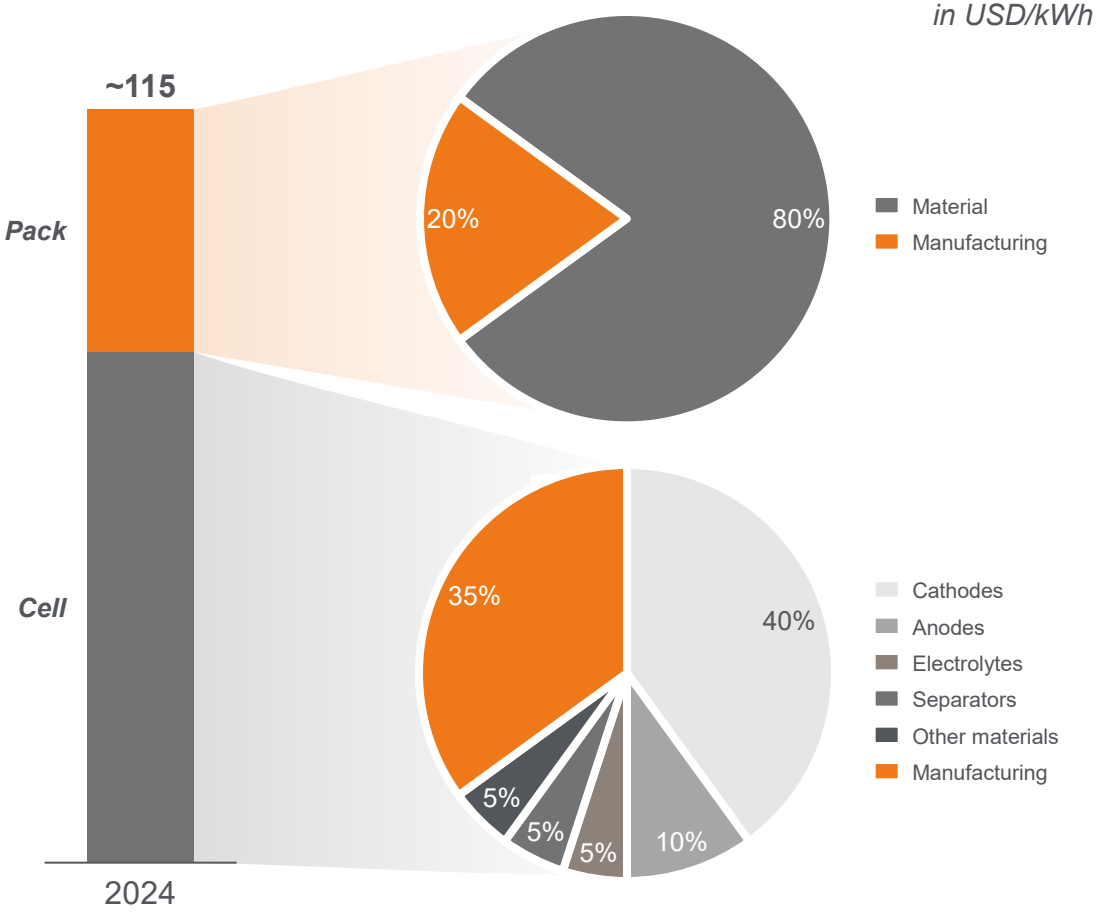
Details

1. *Battery packs require costly raw materials like lithium, nickel, and cobalt*
2. *Often, complex battery designs with many components and interfaces are used*
3. *Scrap rates in battery cell production remain high*
4. *Ramp-up phases often suffer from low OEE and unstable processes*
5. *Sourcing components with the right quality at competitive cost remains challenging*
6. *Steps like coating, formation, or aging require high energy input*

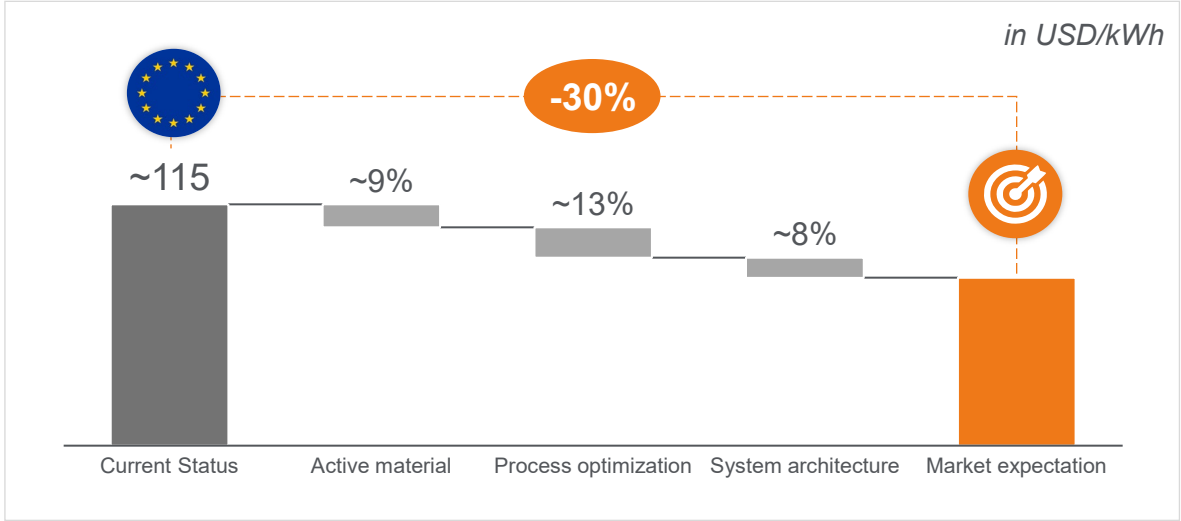
Source: EFESO

How can we systematically reduce battery costs to enable competitive BEV production?

Cost splitting of battery costs



Cost reduction targets: battery pack



Use of more cost-effective materials
e.g., alternative cell chemistry and improved electrode components

Enhanced production efficiency
through streamlined manufacturing processes and reduced scrap

Improved battery design concepts
such as simplified structures and innovative integration approaches

Source: EFESO, Bloomberg, Fraunhofer Institute

Cost Value Engineering supports all relevant cost drivers regarding production costs and enables the identification of cost potentials through systematic approach and transparency

Focus optimization levers

Material costs
- Raw materials
- Purchased components
- Material overhead

Production costs
- Process steps
- Process parameters
- Technology
- Production overhead

Product development
- Design
- Function
- Benchmark

Cost Value Engineering support

- *Cost structure analysis*
- *Function analysis*
- *Design to X approach*
- *Overhead cost analysis*
- *Benchmark*
- *Process optimization*
- *…*

Target & benefit

Identify potentials

Reduction of production costs

Source: EFESO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