

IAA Commercial Vehicles Battery Technology

September 29th, 2010

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Introduction of SB LiMotive

JV between Samsung SDI and Bosch



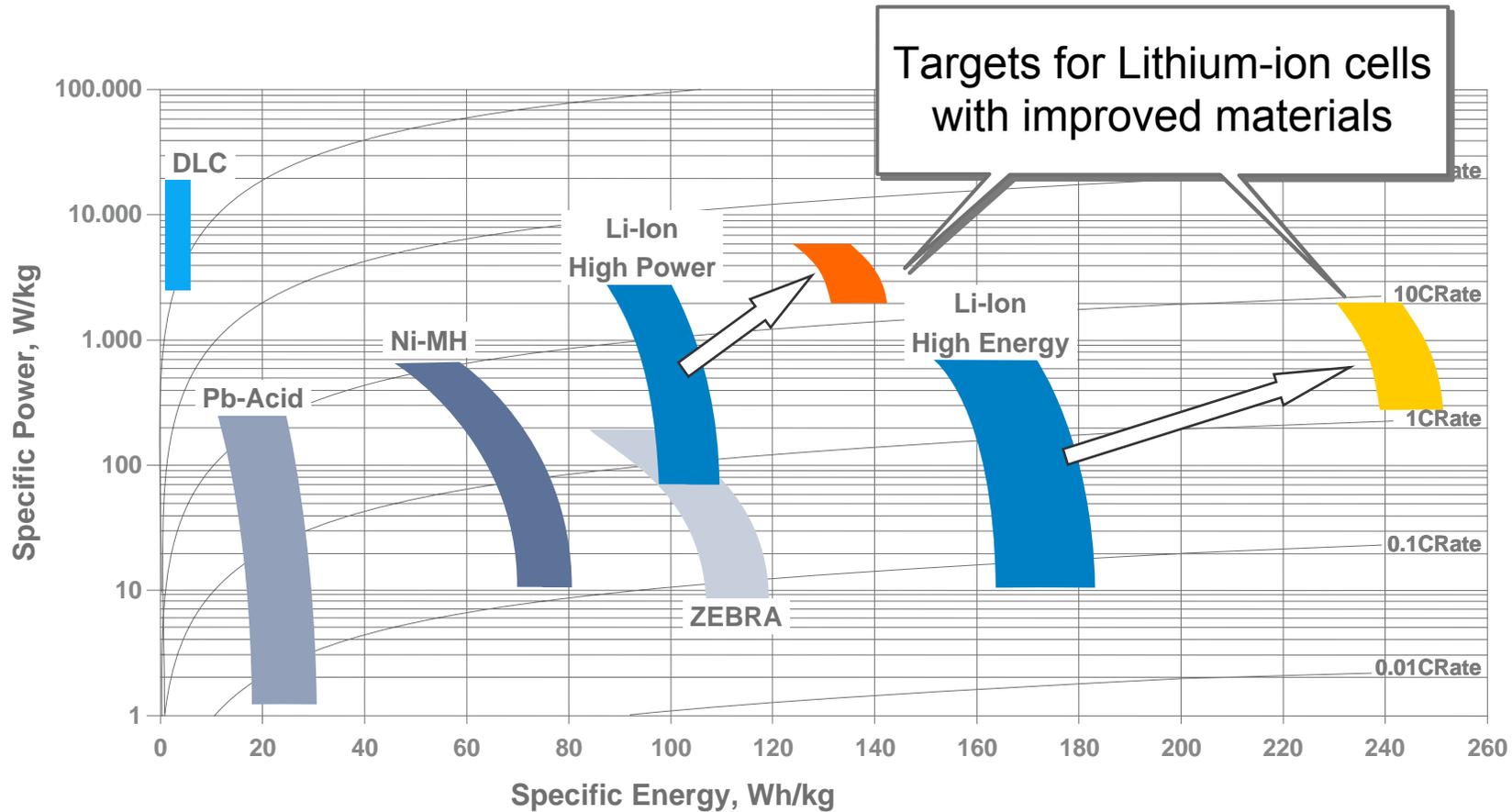
Scope of Business:

Development and manufacturing of Lithium-ion battery cells and battery systems for automotive power-train and 14V applications

- μ HEV
- HEV
- PHEV
- EV
- e-Scooter

Li-Ion Cells

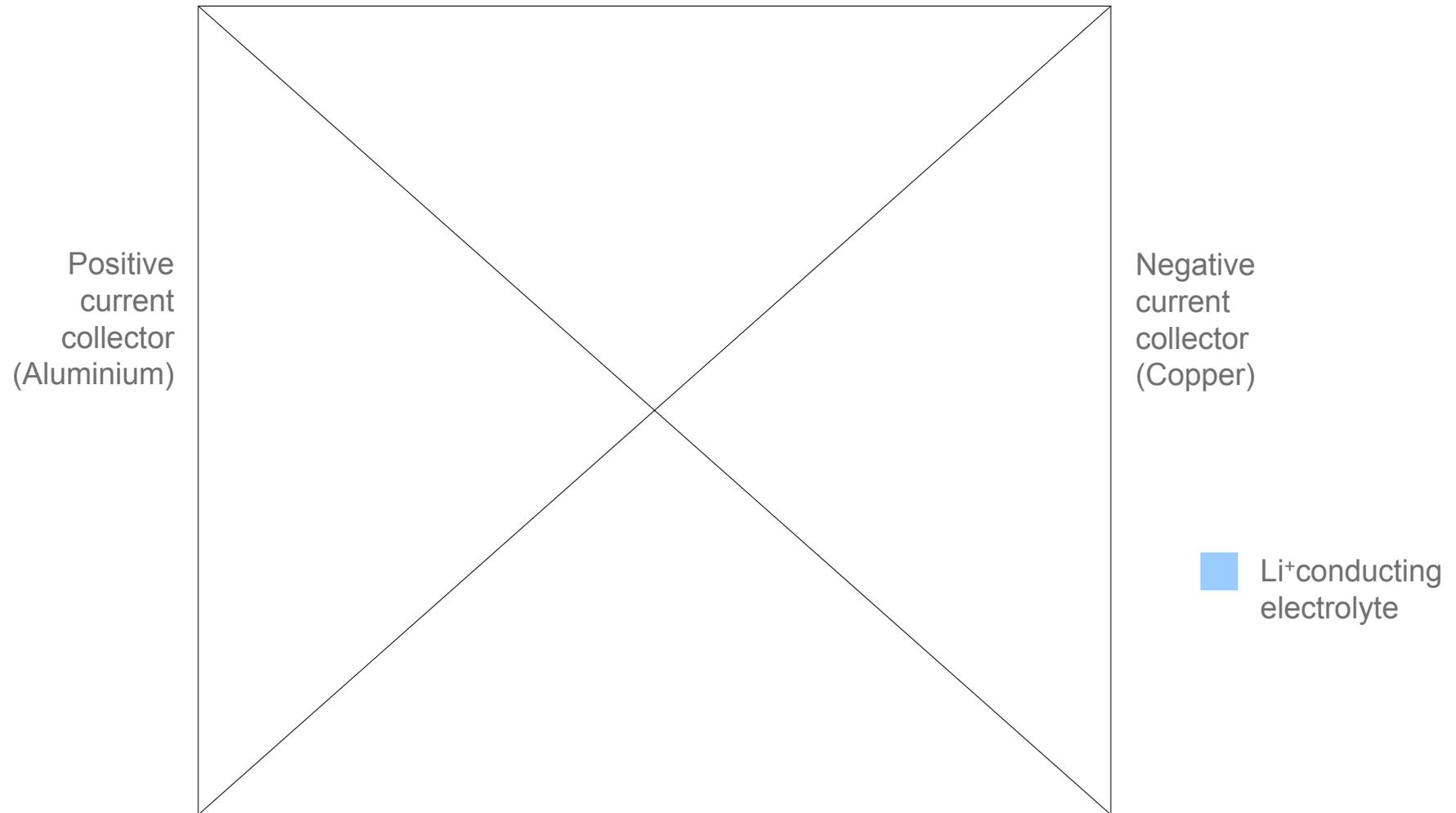
Why Li-Ion in Automotive Batteries?



→ Li-Ion is one of the most promising energy storage technologies

Li-Ion Cells

“Rocking Chair” Principle



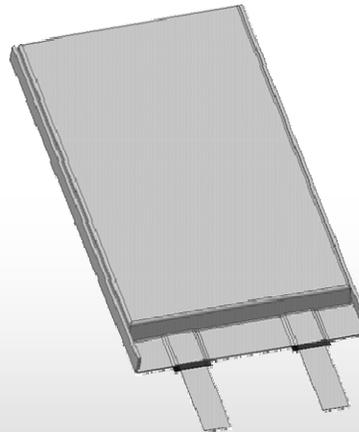
Li-Ion Cells

Housing Types

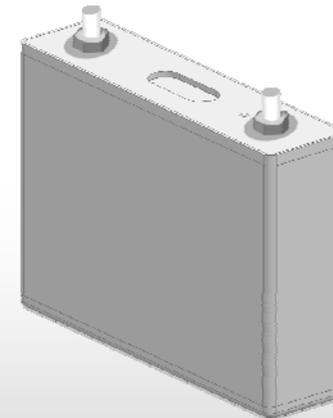
Cylindrical Cell
(Hardcase)



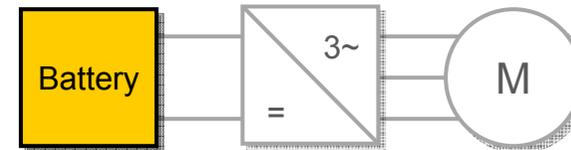
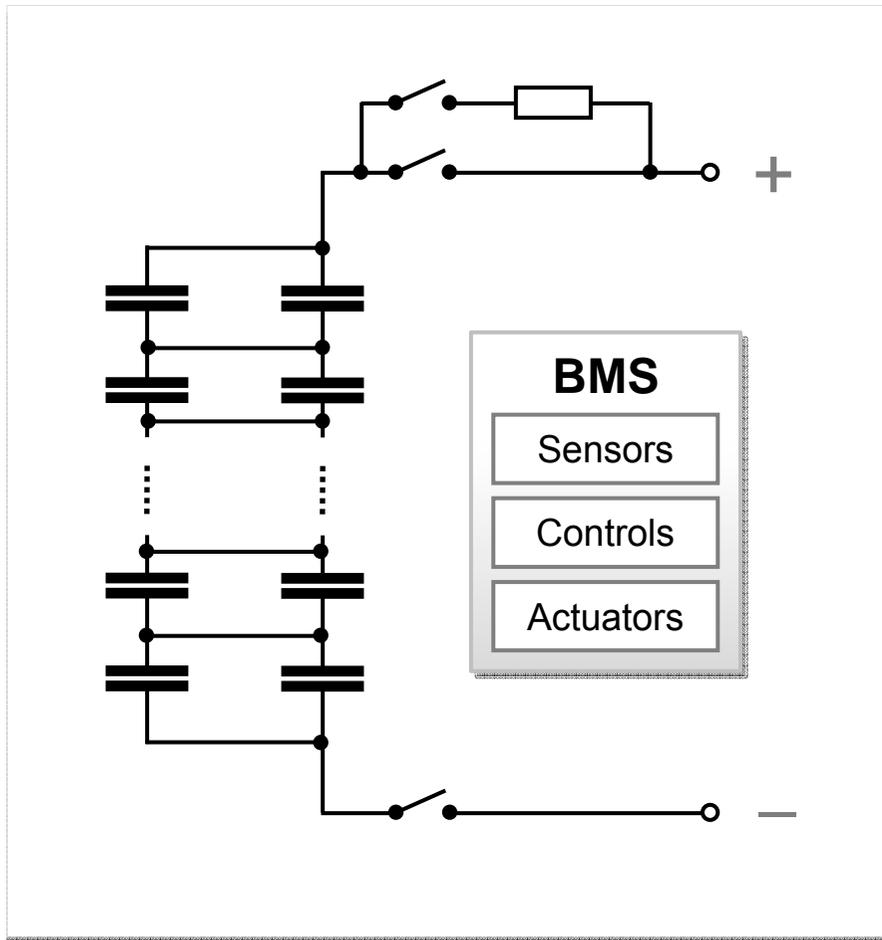
Pouch Cell
(Softpack)



Prismatic Cell
(Hardcase)



Automotive Li-Ion Batteries Architecture



Typical Li-Ion Battery

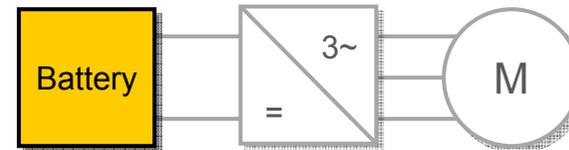
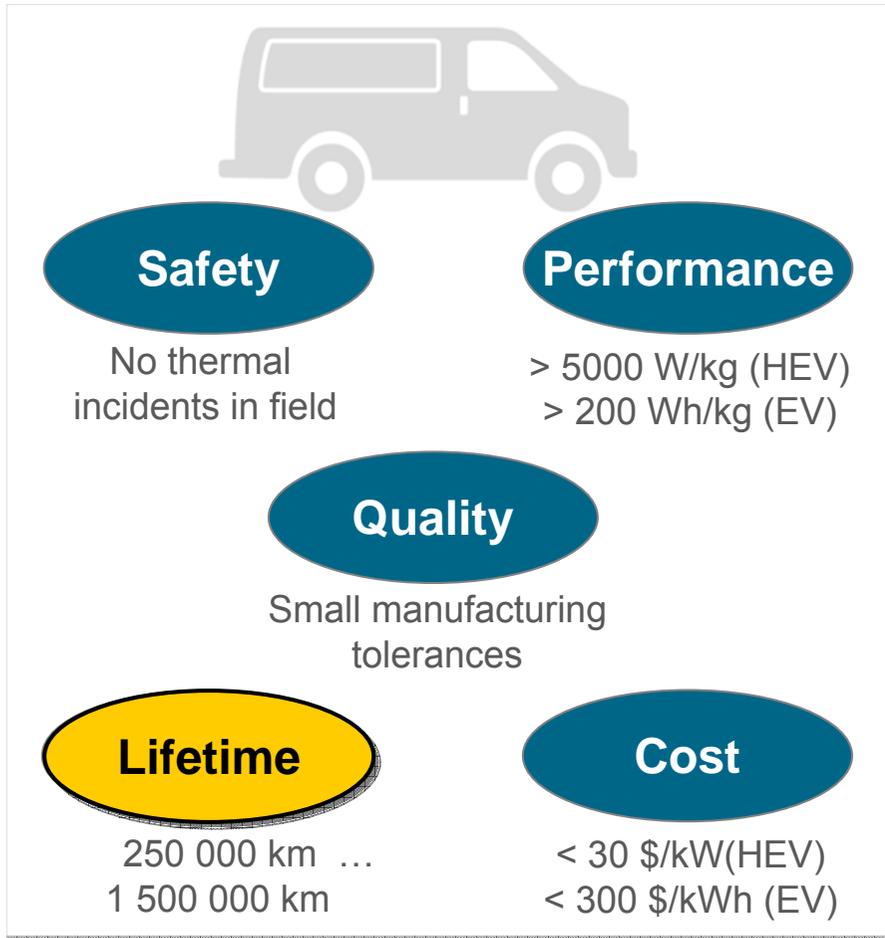
- Cell voltage 2,8V..4,2V
- Cells in series connection
- Cells optional in parallel connection to increase capacity
- Precharge unit and 2 main relays

Battery Management System (BMS)

- Necessary to fulfill requirements regarding safety, lifetime and performance

Automotive Li-Ion Batteries

Key Success Factors



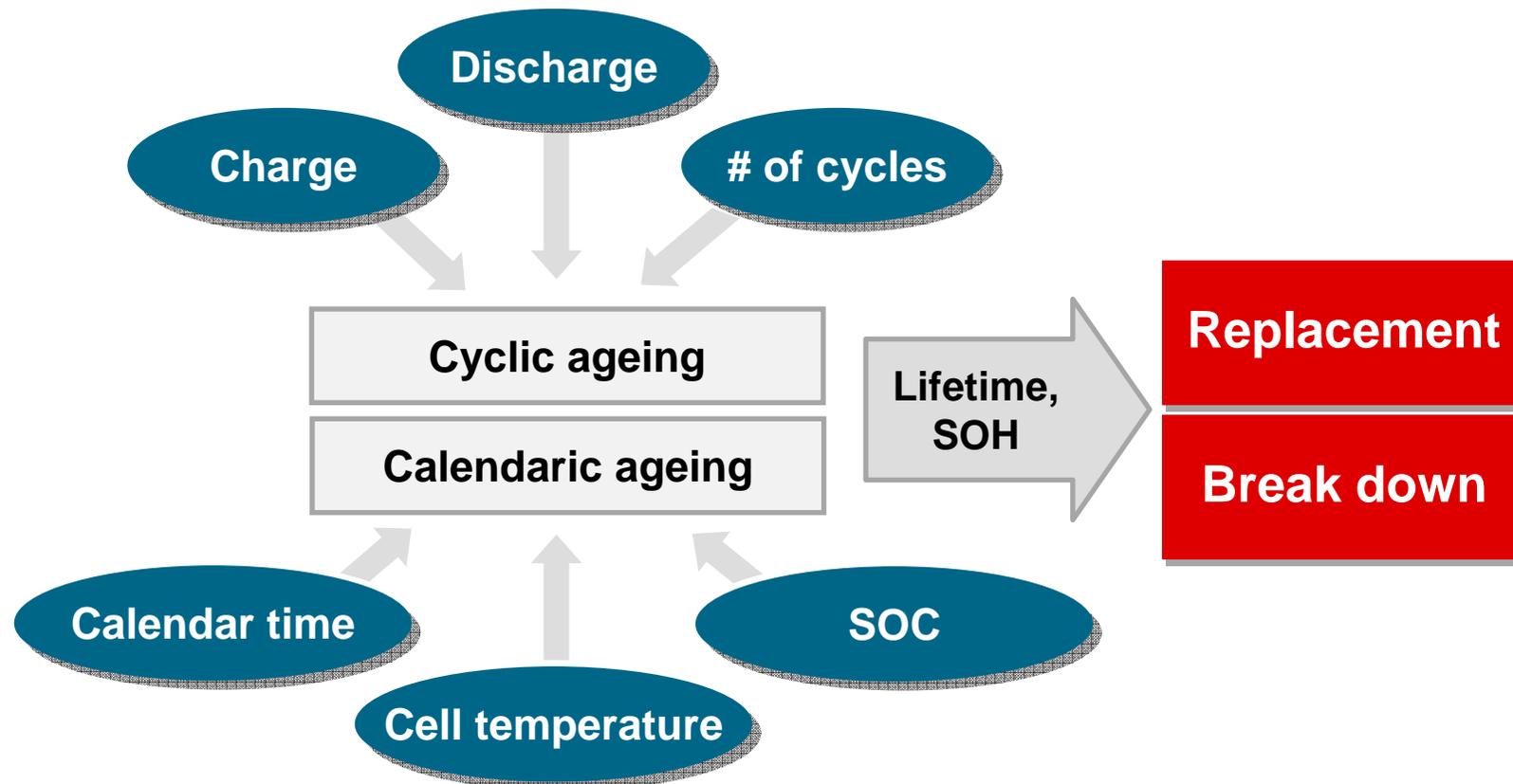
Challenges

- Requirements have to be fulfilled all together
- Implementation of whole value chain including recycling
- Build up of infrastructure

Commercial Vehicles

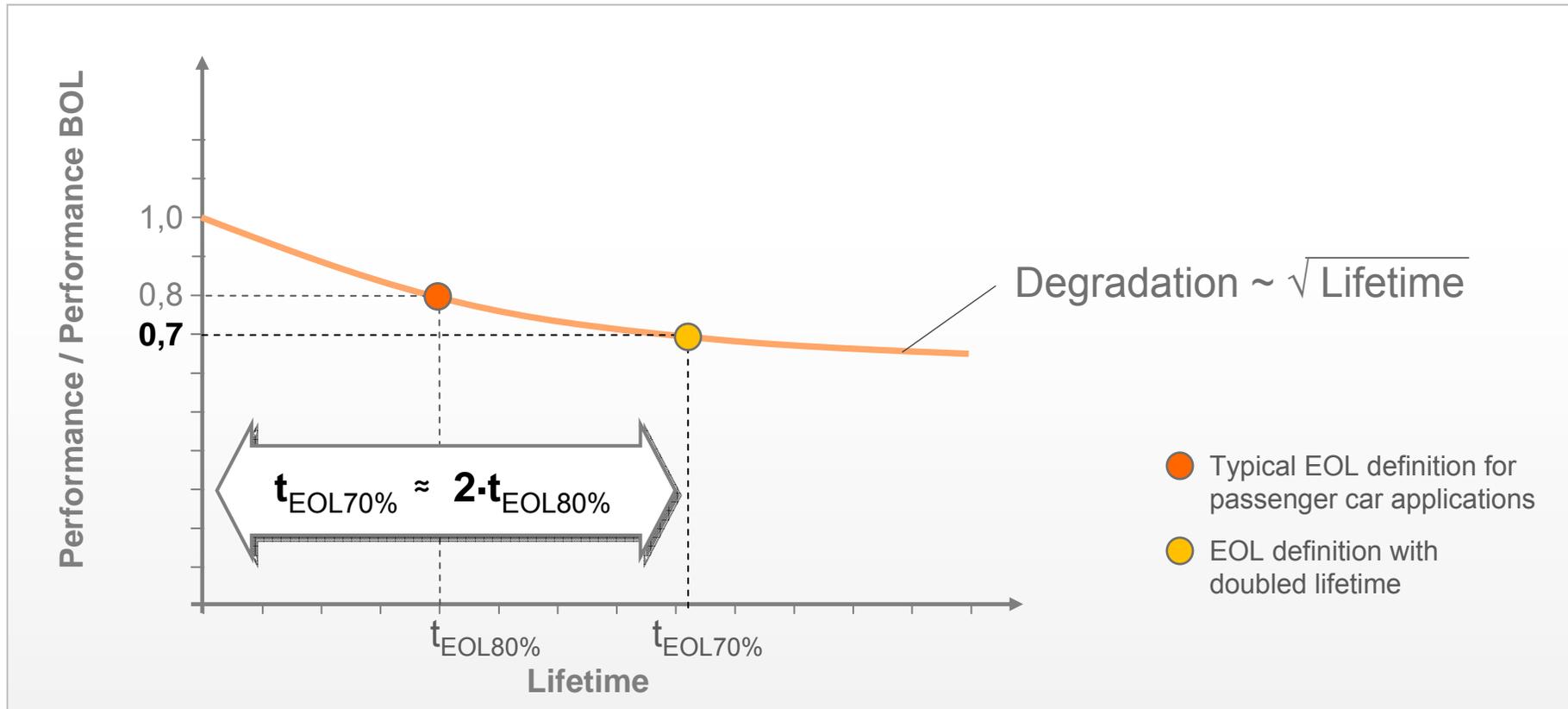
- Requirements regarding lifetime and environmental conditions are more severe than in passenger cars

Automotive Li-Ion Batteries Lifetime

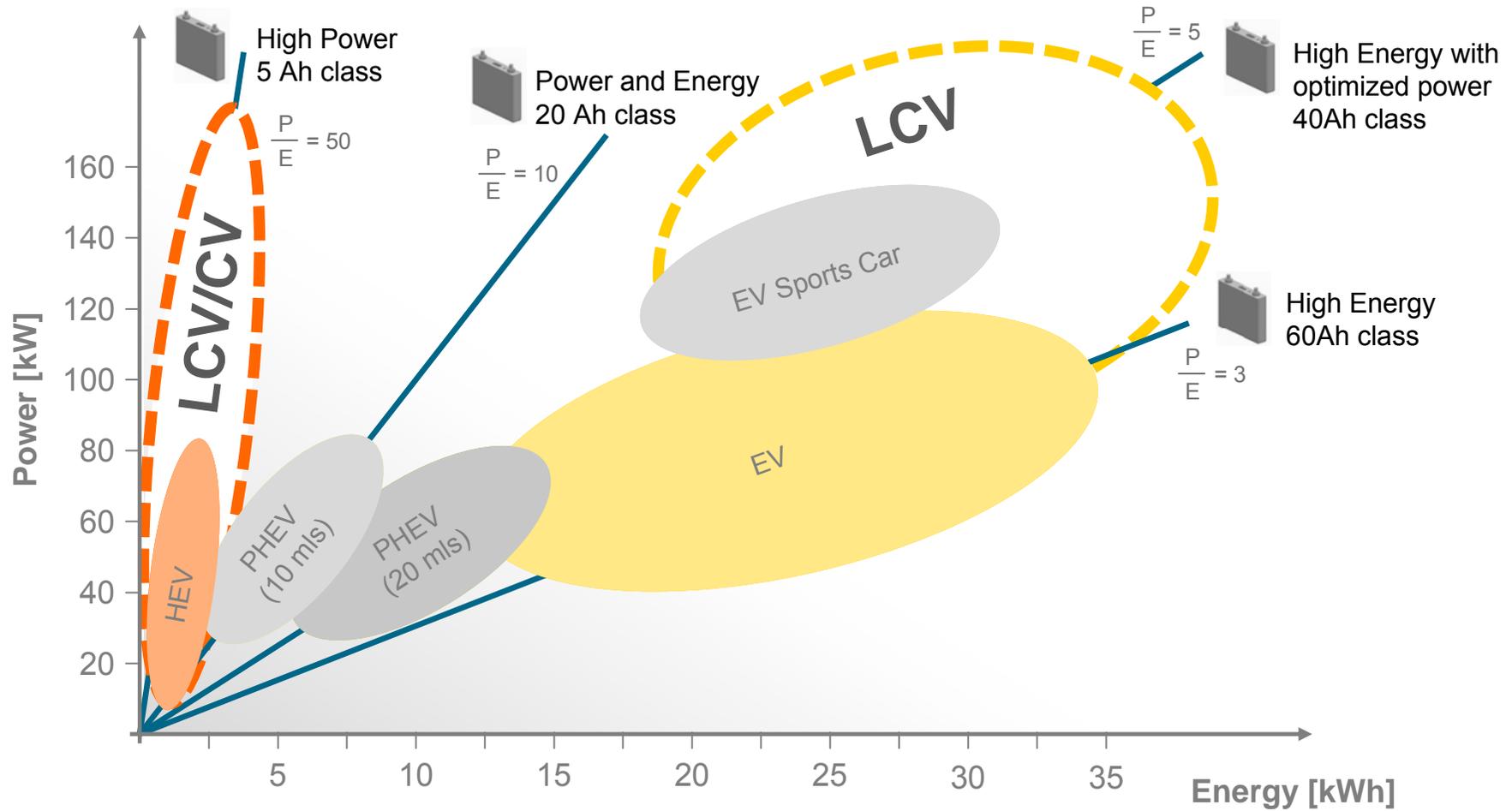


SOC State of Charge, SOH State of Health

Automotive Li-Ion Batteries Lifetime



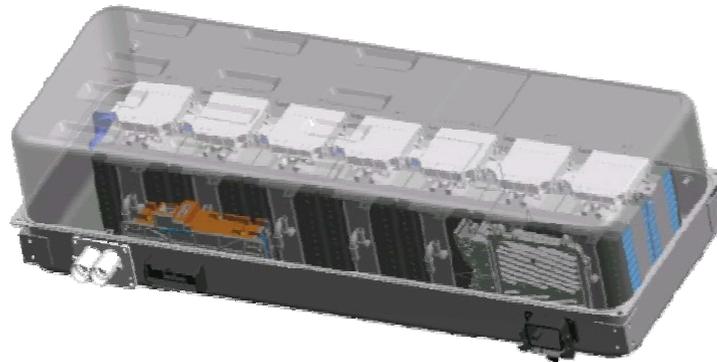
Automotive Li-Ion Batteries Performance, Power to Energy Ratio



Automotive Li-Ion Batteries

HEV Batteries for CV, Examples

Battery Specification	Medium Power	High Power
# of High Power cells	160 (80s2p)	320 (160s2p)
Nominal voltage	300 V	600 V
Maximum voltage	336 V	672 V
Maximum current	±400 A	±400 A
Usable energy content @BOL	1.6 kWh	3.2 kWh
Peak discharge power @BOL, 10s, 50% SOC	110 kW	220 kW
Weight	~85 kg	~150 kg



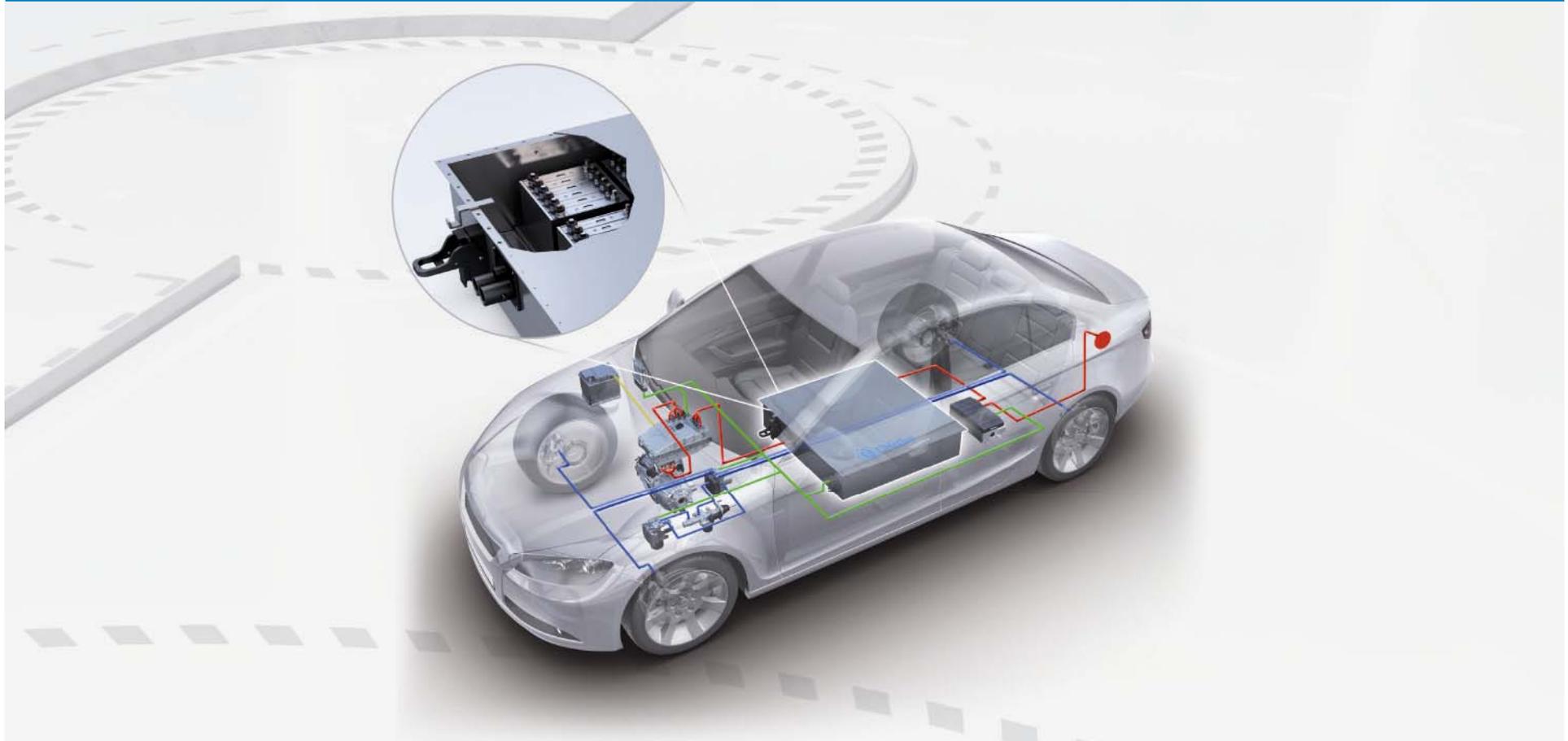
BOL Begin of life
SOC State of charge

Automotive Li-Ion Batteries

Conclusion

- Technology of Li-Ion batteries for passenger cars can be applied for LCV battery system
 - Same chemistry can be used
 - Definition of “end of life” has to be adapted to LCV requirements regarding cycle lifetime and calendar lifetime
 - Carry over of battery management system and housing technology possible

- Introduction of Li-Ion batteries in LCV simultaneous with passenger cars possible



Thank you for your time and attention