

# FEV Signature Solutions

## Range Extended Electric Vehicle Battery Development

### Cost-efficient decarbonization for your vehicle applications

#### FEV offers

- ▶ Comprehensive 360° battery development with one trusted partner – from concept definition to SOP
- ▶ FEV's modular platform enables high component commonality across REEV, PHEV, and BEV battery systems for maximum cost efficiency
- ▶ Cell selection & concept development based on FEV's battery cell database with more than 1500 cells to find the best concept for each individual use case
- ▶ Expertise in battery platform strategy consultation and powertrain optimization



### Why FEV

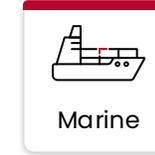
- ▶ Proven expertise across all key domains for REEV development: system architecture, electric motors, power electronics, battery cell & system, combustion engines, controls
- ▶ 20 years of experience in battery systems for automotive applications with over 200 successfully completed battery development projects
- ▶ In-house prototype build center enabling rapid development loops & extensive cell and pack testing capabilities ensuring data-driven, reliable development
- ▶ Close-to-customer operations supported by a global engineering network and long-standing relationships with leading OEs, Tier-1s, and component manufacturers
- ▶ Strong collaboration with FEV Consulting enabling value-driven development and cost-optimized engineering

# FEV is experienced in HV batteries since 2008 and has carried out 200+ major battery development projects



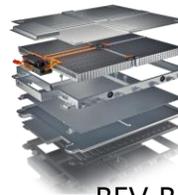
## APPLICATION TYPE

- ▶ DIFFERENT REQUIREMENTS
- ▶ DIFFERENT USE CASES
- ▶ DIFFERENT PT CONFIGURATIONS



## POWERTRAIN / STORAGE TYPE

- ▶ STUDIES/ CONCEPTS
- ▶ PROTOTYPES
- ▶ SERIES DEVELOPMENTS



**140+**

BEV BATTERIES



**50+**

PHEV BATTERIES



**30+**

HEV BATTERIES



**10+**

48V BATTERIES



**5+**

ESS BATTERIES

## CELL FORMAT & CHEMISTRY

- ▶ NMC/ NCA
- ▶ LFP
- ▶ LTO
- ▶ SOLID-STATE



**130+**

PRISMATIC



**70+**

POUCH



**30+**

CYLINDRICAL

## MARKET REGION

- ▶ OEM
- ▶ SUPPLIER
- ▶ START-UPS



**140+**

EUROPE



**20+**

CHINA



**30+**

NORTH AMERICA



**40+**

REST OF WORLD

# Your global engineering partner ...We are connecting the battery industry



## OEM



## BMS SUPPLIER



## CELL SUPPLIER



## PACK MANUFACTURER



# 360° REEV battery development

FROM CONCEPT DEVELOPMENT TO MANUFACTURING

## Specification

Electric drive range:  
>200 km

Power/energy ratio:  
3:1 to 5:1

Battery size:  
30 – 60 kWh

Voltage:  
400 – 800 V

Cycle lifetime:  
2,000 – 4,000



## Battery Concept Development

- Find right battery concept for REEV use case
- Cell & component scouting
- Definition of requirements & safety targets

## Design, Simulation

- CAD design from concept to D-sample
- Electrical, thermal & mechanical simulation
- Unified component design across variants to reduce cost

## Prototype Development & Built-Up

- Parts screening & selection
- Small-series built-up of modules & packs including cooling system, E/E-components, BMS, & wiring-harness

## Testing, Validation & Homologation

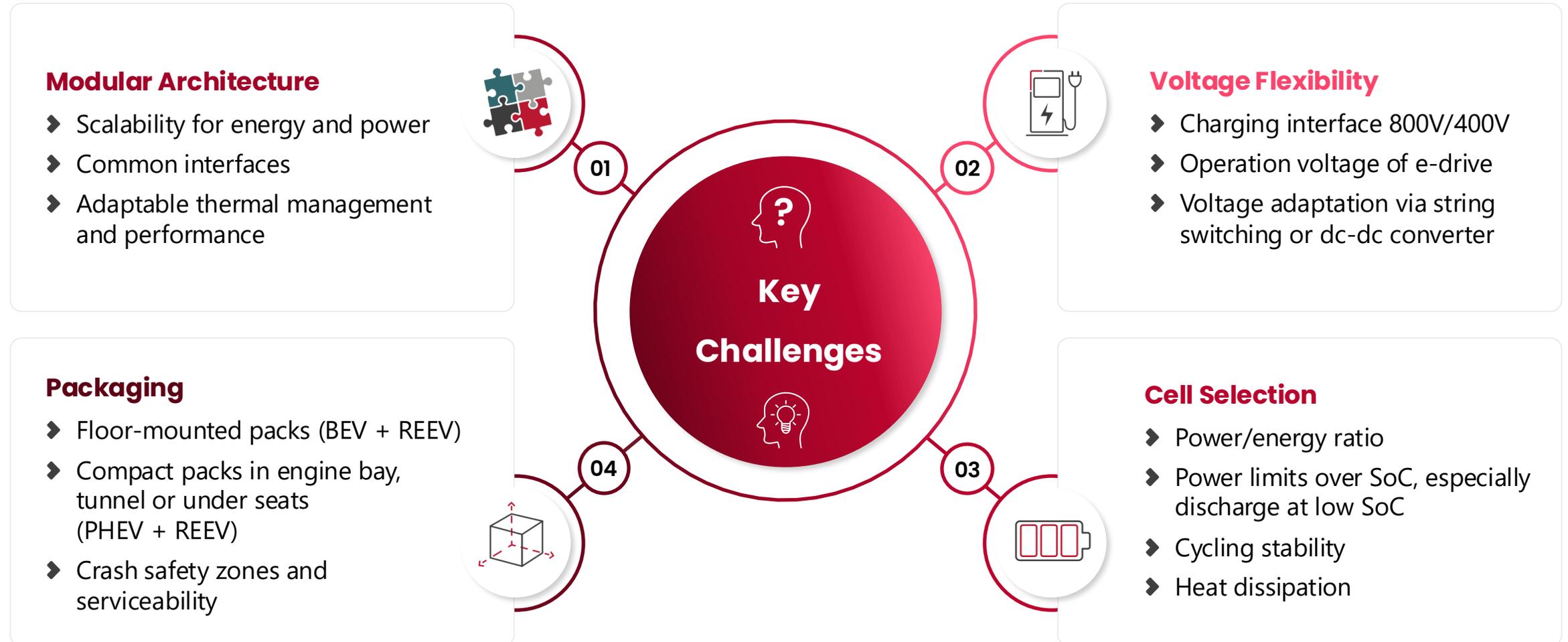
- Creation of DVP & homologation according to regulations
- Testing in FEV's cell lab & eDLP battery test center (electrical, mechanical, abuse)

## Manufacturing Support

- Supplier management
- Teardown analysis & component benchmarking
- Quality control

# We address your key challenges

## FEV'S SCALABLE BATTERY PLATFORM STRATEGY



# FEV supports your REEV development for every use case

01



## BEV base battery

- **CELL:** Unchanged or chemistry update (reduced capacity, higher P/E ratio), cell format retained
- **APPROACH:** Integration concept unchanged
- **BUILD SPACE:** Installation space reduced

02



## PHEV base battery

- **CELL:** Chemistry update, cell format retained or adapted to new design
- **APPROACH:** Integration concept unchanged (C2M2P) or switch to C2P approach
- **BUILD SPACE:** Installation space unchanged or expanded

03



## Dedicated REEV development

- **CONCEPT:** Identification of optimal concept with FEV's battery concept development solution "BATT.code"
- **CELL:** Cell selection based on FEV's cell database containing >1500 cells
- **360° DEVELOPMENT APPROACH:** Concept development, benchmarking, design, prototyping, testing in FEV's cell lab & eDLP pack testing facility, manufacturing & industrialization support



**Maximizing design commonality and leveraging component carry-over to minimize development time and costs**

# Get in touch with us for further information



[www.fev.com/en/  
signature-solutions](http://www.fev.com/en/signature-solutions)