

Battery Pack Design and Thermal Management

Centre for Mechatronics and Hybrid Technology (CMHT)

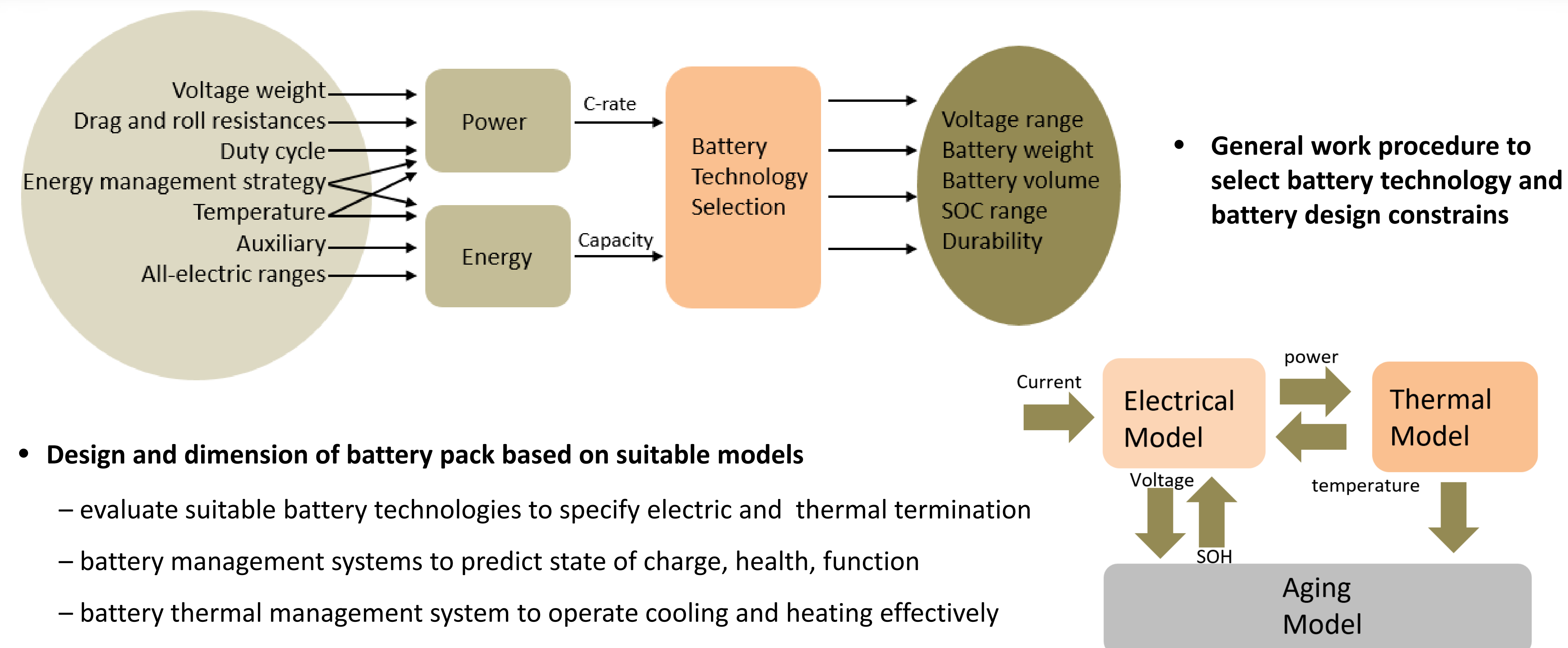
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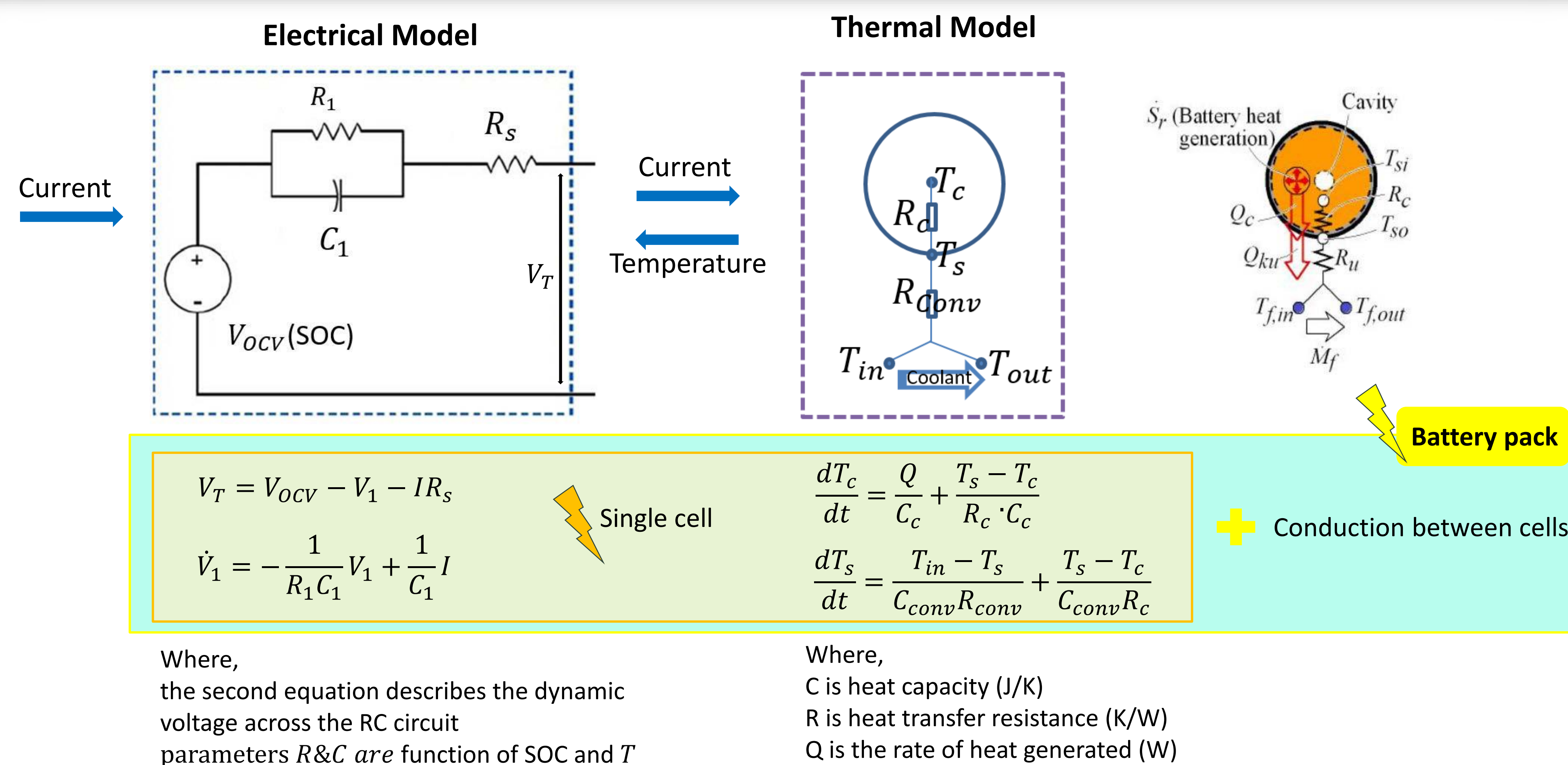
EECOMOBILITY (ORF) &

HEVPD&D CREATE

Constrains and Objectives



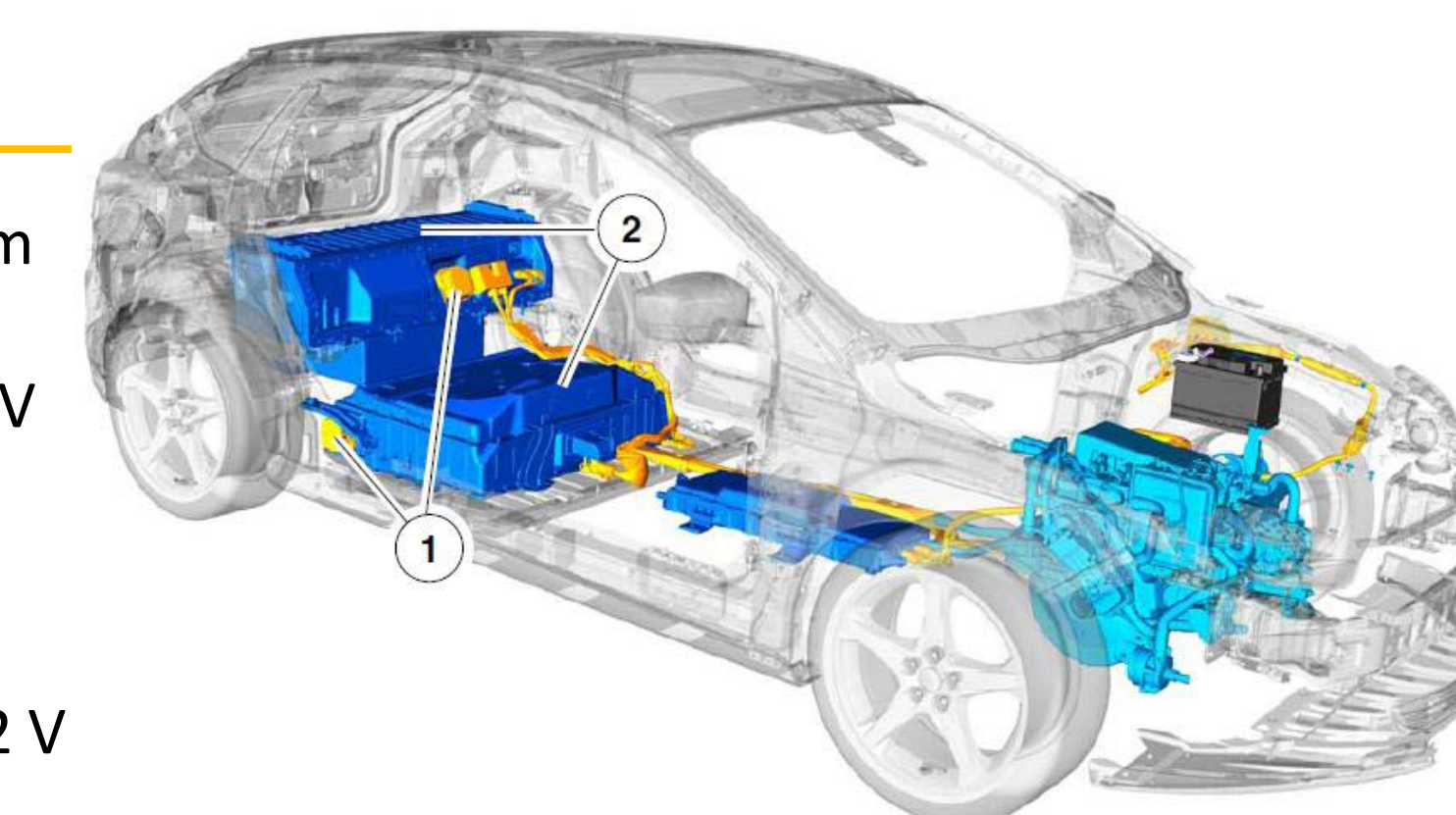
Electro-Thermal Model



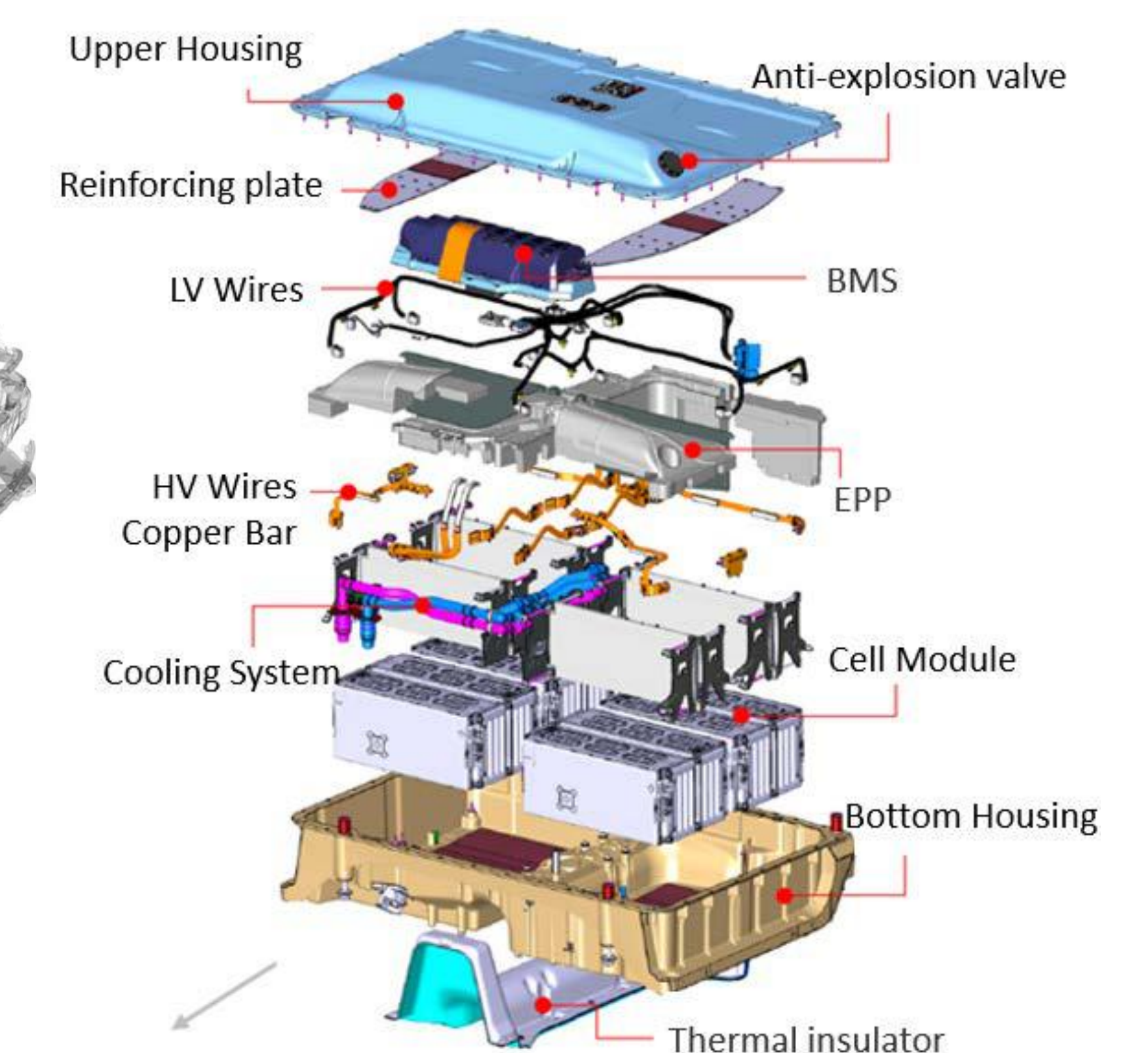
Main Battery Pack

Battery Parameters

Battery Manufacturer: LG Chem
 Type: Lithium-Ion (LMO)
 Cell Voltage Max/Min: 4.2/3.0 V
 Pack Configuration.: 86S 5P
 Number of Cells: 430
 Nominal Cell Voltage: 3.7 V
 Nominal System Voltage: 318.2 V
 Rated Pack Capacity: 75 Ah
 Rated Pack Energy: 23 kWh
 Weight of Pack: 303 Kg
 Cooling: Active – Liquid Cooling
 Pack Location: Two Sections: (1) Behind Rear Seats (2) Under Rear Seats

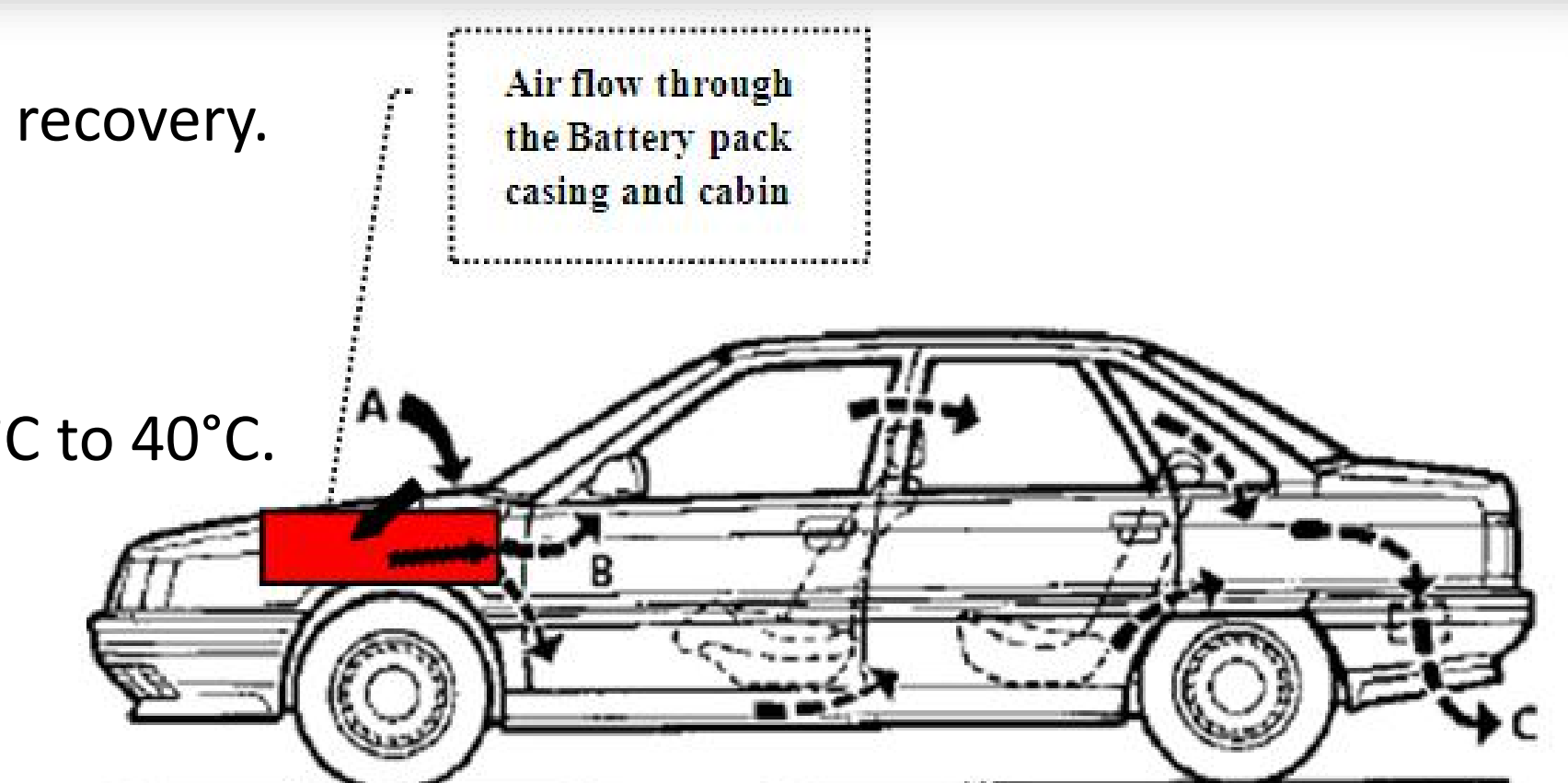


Explosive View of a VW Pack

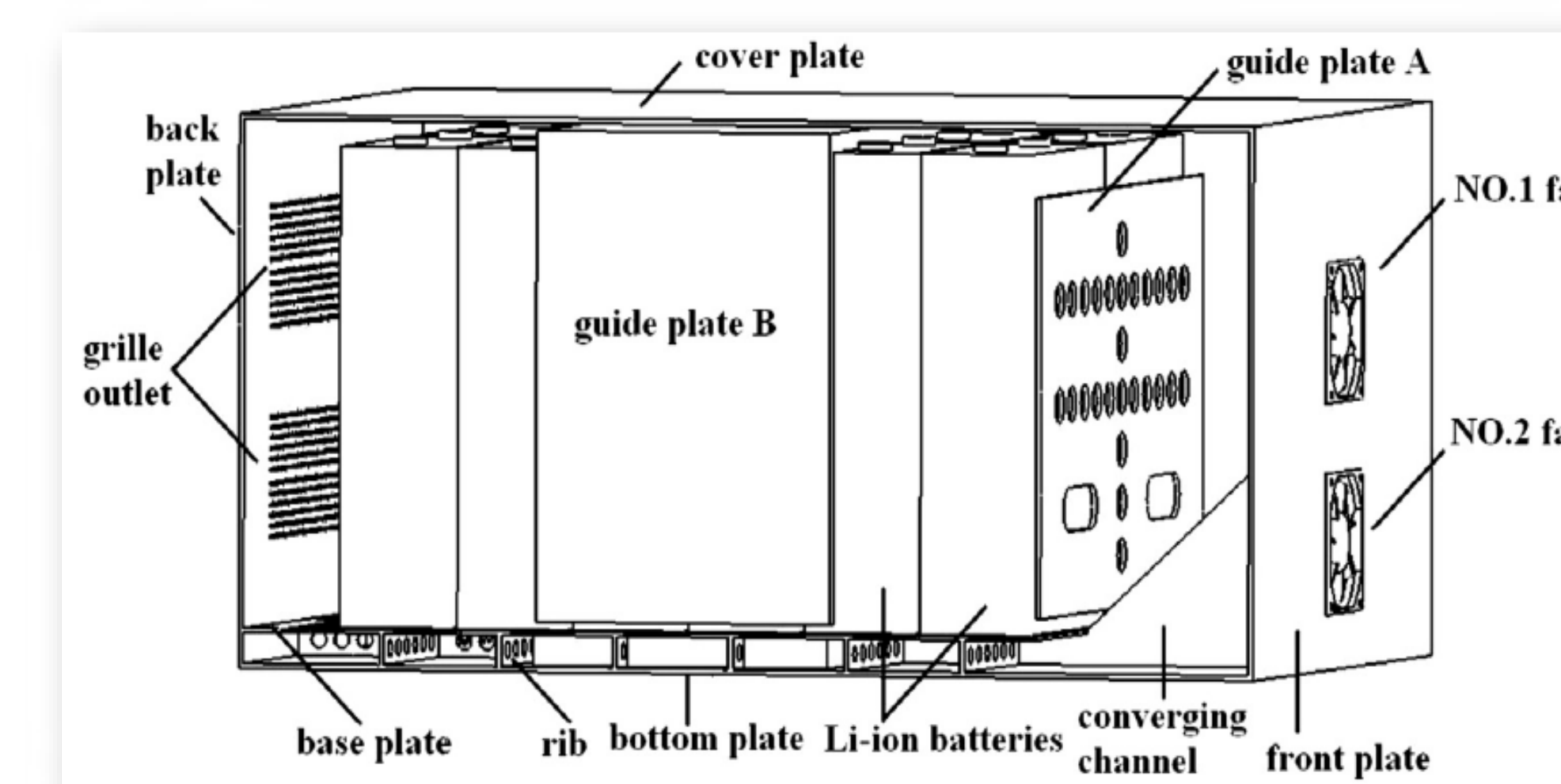


Secondary Battery Pack

- **Air cooling** of a battery creates a high potential for energy savings and heat recovery.
- Locate the pack **in the front of a vehicle** for improving heat transfer.
- The heat can be a source to warm up the cabin in cold weather conditions.
- The operation of most Li-ion cells should be limited to a temperature of 20°C to 40°C.
- Temperature differences between cells should maintain below 5°C.



› Battery designed with **ribs** can increase the heat transfer rate.



Cell provided by NRC
 Type: Lithium-Silicon
 Nominal Cell Voltage: 4.0V
 Nominal Module Voltage: 48 V
 Module Configuration.: 5 Parallel Strings of 12 Cells in Series
 Pack Configuration: 7 Modules in Series
 Number of Cells: 420
 Nominal Pack Voltage: 336V
 Rated Pack Capacity: 75 Ah
 Rated Pack Energy: 25kWh
 Weight of Pack: ?
 Pack Location: In front of the vehicle ?
 Cooling: Air Cooling