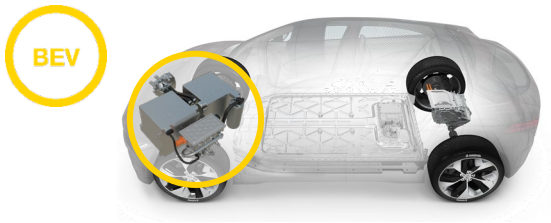

Magna ThermalCore

Cross-Domain Product – ThermalCore
Advanced Vehicle Thermal Management System



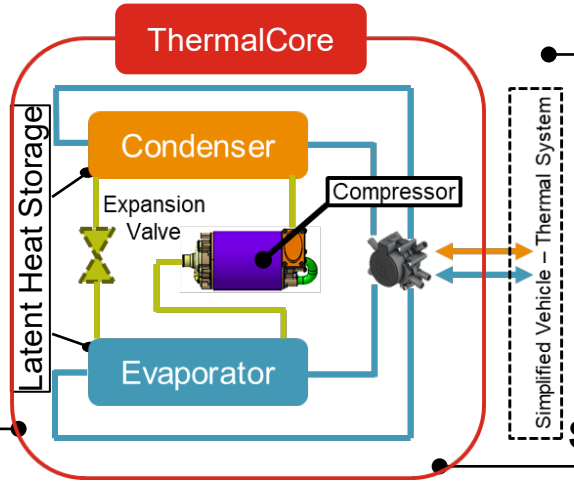
ThermalCore is a simplified architecture for the complete Vehicle Thermal Management (VTM) System of electric vehicles. It reduces complexity and cost of the system while performing equal or better compared to current state-of-the-art solutions.

Heat storage

- Works as a buffer to keep thermal system in highly efficient operating points
- Allows storage and utilization of waste heat

Distribution Valve

- Disc valve for highly integrated coolant flow management
- Fast switch times and very low coolant pressure drop



Compressor

- Highly efficient compressor with reduced lubrication requirements
- Low maintenance, low noise level

Simplified VTM Architecture

- Only two external heat exchangers needed in complete system, no refrigerant lines outside Thermal Core
- Highly integrated valve solution

Pre-Development | Released for Acquisition | Serial Development | Serial Production

MAGNA

Merits on system level

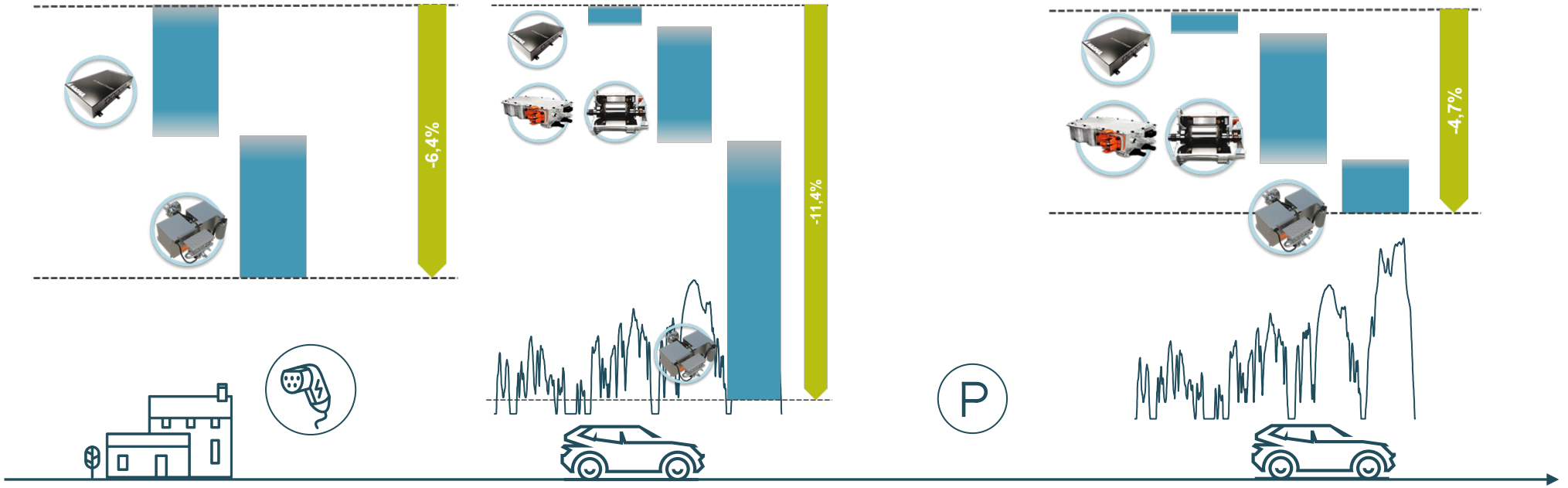
Simplicity and Cost Reduction
Package reduction by ~10% vs. best-in-class benchmark, Fewer components and no external refrigerant lines reduce system costs and allow utilization of new refrigerants

Efficiency
Highly efficient heat and cold generation based on new compressor technologies and thermal storage allows excellent performance and efficiency on system level (energy savings of HVAC system up to 20%, target)

Scalability
Choosing different sizes of thermal storages allows scaling to different electric vehicle (EV) segments

Superior real-world efficiency over full range of relevant temperatures and use cases (vs. WLTP) with extended functionality

ThermalCore
Advanced Vehicle Thermal Management System



Phase I
AC charging at home with pre-conditioning

Phase II
Driving to POI starting with pre-conditioned vehicle

Phase III
Vehicle parked and is not plugged

Phase IV
Driving back home without pre-conditioning

				Total Driving	Total
OBC + DCDC	-3,4%	-0,6%		-0,5%	-0,5%	-1,7%
Drivetrain		-3,4%		-3,0%	-3,2%	-1,8%
ThermalCore	-3,1%	**-7,5%**		-1,2%	**-4,2%**	-3,7%
Total	**-6,4%**	**-11,4%**		**-4,7%**	**-7,9%**	**-7,3%**