ENOLVER **Connected Electric Vehicle** Optimised for Life, Value, Efficiency and Range





# INTEGRATED ENERGY & THERMAL MANAGEMENT



# VALIDATOR **North America 500BEV**

## Curb weight 1355 kg

#### eMotor

- Peak Power 83 kW
- Peak Torque 220 Nm
- Speed (max) 16000 rpm

## Battery

- Voltage 354 V
- Energy 24 kWh
- EPA Range 160 km
- Liquid cooling and heating



## CRU (Compact Refrigeration Unit)

**Indirect heat pump** filled with **R290** (propane): cool and heat power are driven to the users by

### means of coolant loop and a large set of valves (EU founded project OPTEMUS)

Features developed inside CEVOLVER:

- **MPC** (Model Predictive Control) devoted to the powertrain and cabin thermal management (RWTH)
- enhanced eco-driving (IFPEN)
- enhanced eco-charging (IFPEN)
- cloud connectivity (IPFEN/CRF)

Control integration and testing performed by CRF



Energy Savings from Thermal Management Functionalities home - job - home (15 + 15 km)

$$TT_{thenergy consumption gain}$$
Hot case (35°C)  
=  $\frac{E_{th,bsl} - E_{th,eco}}{E_{th,bsl}} \times 100$ Cold case (-10°C)

Hot case (35°C) 
$$TT_{thenergyconsumptiongain} = 2.5\%$$
  
Cold case (-10°C)  $TT_{thenergyconsumptiongain} = 1.3\%$ 

The numbers come from the average of all the test performed with different initial battery SOC (10% / 90%).



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