



PROJECT PARTNERS

VIRTUAL VEHICLE Research Center	Austria
ESI Group	France
Fraunhofer	Germany
IFPEN	France
Centro Ricerche Fiat	Italy
Continental	Germany
Mondragon University	Spain
Magneti Marelli	Italy
University of Salerno	Italy
Bax & Willems	Spain
Scuola Superiore Sant'Anna	Italy
DENSO Thermal Systems SpA	Italy
DENSO AUTOMOTIVE Deutschland GmbH	Germany
RWTH Aachen	Germany
ESI Software Germany	Germany

PROJECT BUDGET

6,39 Mio EUR

PROJECT DURATION

June 2015 – February 2019

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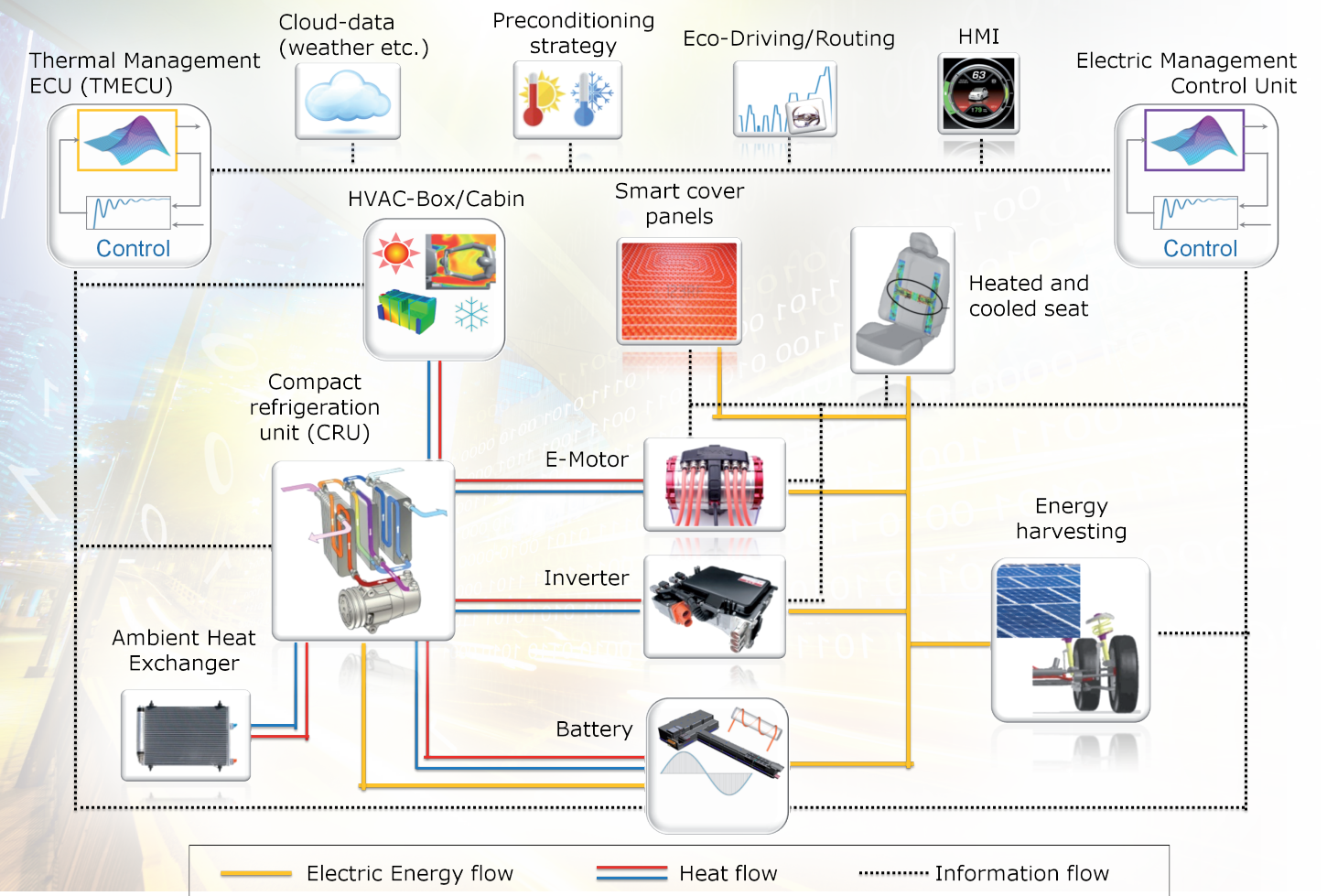


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MOTIVATION

Mass-produced electric vehicles (EVs) have existed in the market since the 1990's, but their widespread adoption has yet to take place.

The limited driving range of EVs, which represents one of the main barriers to their large-scale adoption by the market, can highly vary due to the influence of weather conditions. Recent studies report that EV range is reduced by as much as 33% in extreme heat and 60% in extreme cold, a quite aggressive variation for a conventional driver accustomed to the performance of ICE vehicles.

Despite the fact that the wide majority of urban daily trips are within the range of most existing EVs on the market, the growing deployment of charging infrastructures, use of range extenders, and other OEM innovative business models, EV "range anxiety" persists.

PROJECT CONCEPT

OPTEMUS is a collaborative research project involving top experts in their corresponding fields at EU level covering the entire automotive value chain: one major OEM, three major TIER1 suppliers, leading companies in simulation, SMEs and academia and R&D institutes. Together in OPTEMUS, they directly address the major barrier towards mass-adoption of EVs through the holistic combination of new technological developments that allow reducing energy consumption and increasing energy harvesting during vehicle usage.

The technologies developed will be virtually tested and implemented in a Fiat 500e, a state-of-the-art on the market A segment electric vehicle with an official autonomy range of 140 km. 2 different use cases have been designed, representing both extreme hot and cold scenarios:

- Use case 1 (extreme hot): +35°C and 40% rH
- Use case 2 (extreme cold): -10°C and 90% rH

APPROACH

The OPTEMUS concept is based on a synergic combination of several innovative technologies, which when integrated together will constitute the most advanced systematic thermal energy management system in EVs. The technological developments in OPTEMUS have been grouped under the following classification:

- Core technologies to the vehicle operation: thermal management control unit (TMECU), battery thermal management, compact refrigeration unit (CRU) and suspension shock absorbers
- Technologies providing additional impact: heated and cooled seat, smart cover panels and photovoltaic panels
- Intelligent control systems: Electric management, eco-driving and eco-routing strategies, predictive preconditioning (including HMI and user/event-triggered)

EXPECTED IMPACT

The set of OPTEMUS technologies will demonstrate the following energy reductions:

- Use case 1: 60 % reduced energy consumption for passenger comfort and 33 % reduced energy for component cooling incl. the battery (with ensured life enhancement) and gained energy from harvesting architectures
- Use case 2: 78 % reduced energy consumption for passenger comfort and 33 % reduced energy for component cooling incl. the battery (with ensured life enhancement) and gained energy from harvesting architectures

This will allow guaranteeing an estimated driving range of 150 km in all conditions.