AUSTRIAN INSTITUTE OF TECHNOLOGY
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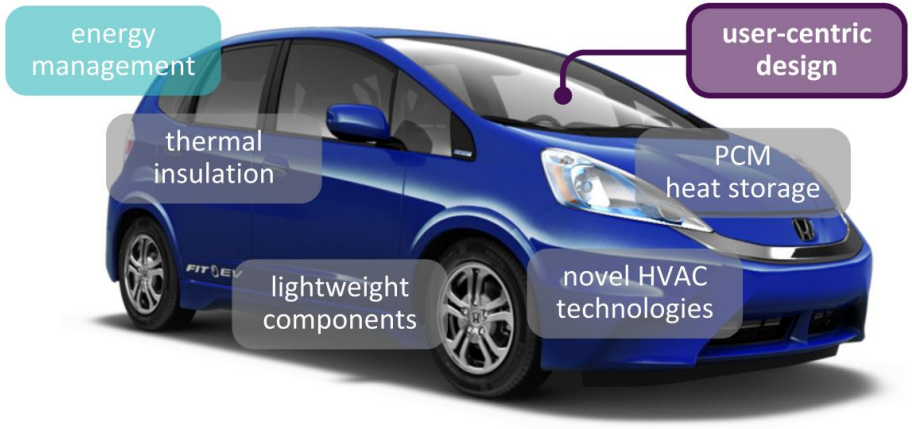
THE QUIET PROJECT

QUalifying and **I**mplementing a user- centric designed and **E**fficien**T** electric vehicle

Dragan SIMIC

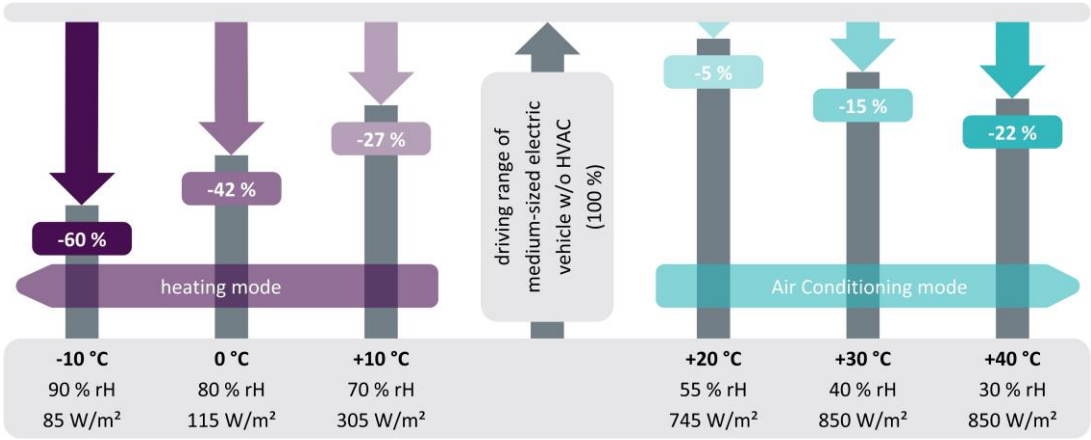


GENERAL INFORMATION

- Topic: Electric vehicle user-centric design for optimised energy efficiency
- Topic identifier: **GV-05-2017**
- Type of action: **RIA** Research and Innovation Action
- Grant agreement number: **769826**
- Project total cost and total EU contribution: **6,998,955.00** EUR

MOTIVATION

- Limited driving range of e-vehicles compared to conventional fuel vehicles
- High energy consumption of auxiliary components and modules
  - **Heating** and **Air Conditioning** systems
  - 60 % reduction of driving range in cold weather conditions
- Reduction of global CO_2 emissions
- Increase of passenger comfort



OBJECTIVES

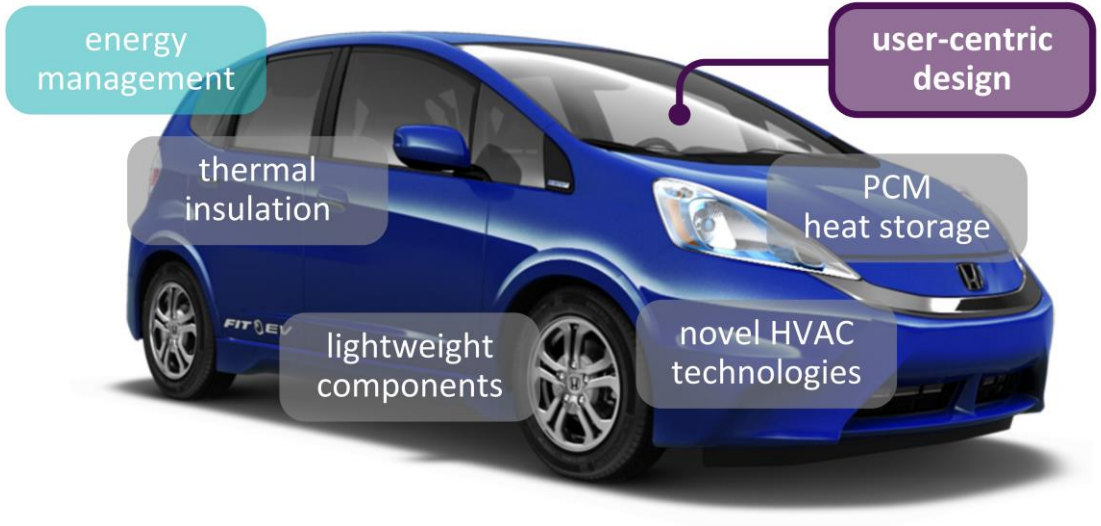
QUIET aims at developing an improved and energy efficient electric vehicle with a **driving range increased by 25 %** under real-world driving conditions.

This is achieved by exploiting the synergies of a technology portfolio in the AREAS of:

- user-centric design with enhanced passenger comfort and safety (**AREA I**)
- lightweight materials with enhanced thermal insulation properties (**AREA II**)
- and optimised vehicle energy management (**AREA III**)

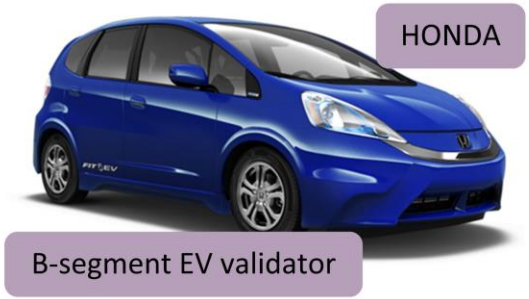
RESULTS

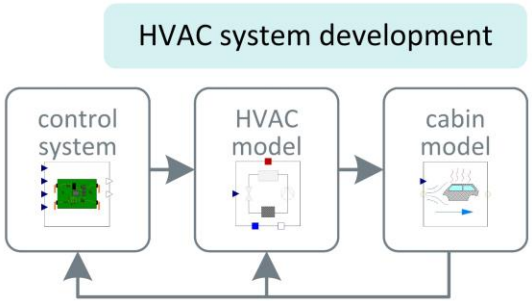
The developed technologies are integrated and qualified in a **Honda B-segment electric vehicle** (EV) validator. QUIET provides a series of breakthrough technologies that enable lowering the energy consumption for heating and cooling while reducing the weight of the entire electric vehicle validation platform, resulting in an electric **driving range increased by 25 %**.

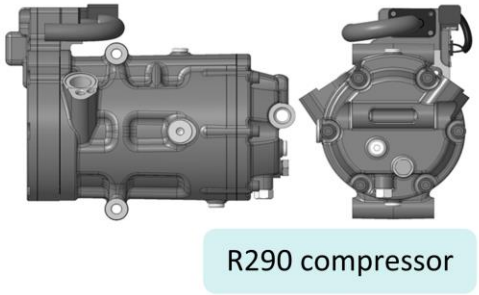


RESULTS

- Implementation of an **innovative air conditioning system based on the refrigerant R290** (propane), that has a significantly lower global warming potential compared to the standard refrigerant R134a.

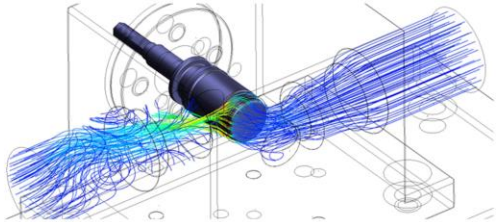






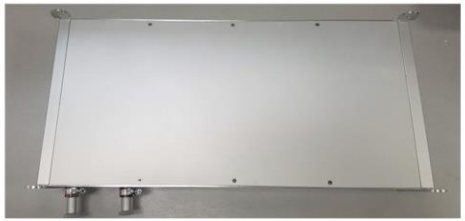
RESULTS

- The heating of the vehicle is done by the **air conditioning system working in heat pump operation mode combined with a Phase Change Material (PCM) thermal storage system**.
- **Infrared heating panels** in the near field of the passengers enhance thermal comfort and reduce heat-up times by 15 %, and therefore the energy consumption.



R290 safety valve

1 kg active PCM



PCM thermal storage system

RESULTS

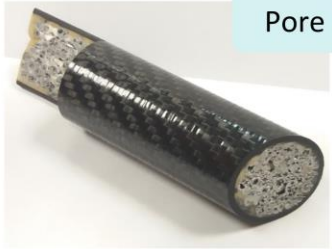
- The **internal structures of the seats** are redesigned and manufactured from lightweight materials like aluminium or magnesium.
- Vehicle doors are manufactured by using a combination of glass- or carbon-fibre composite materials with a novel aluminium-hybrid foam. **The weight of the doors is reduced by 20 % while optimising the noise and vibration properties**.

lightweight seats

> 15 % weight reduction

door crash beam

with Advanced Pore Morphology



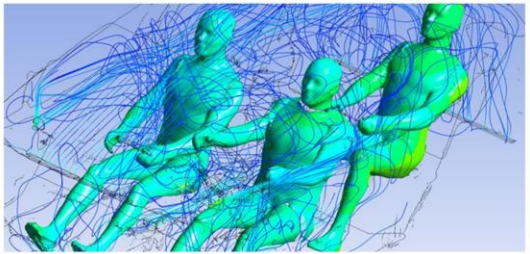
realised lightweight composite doors

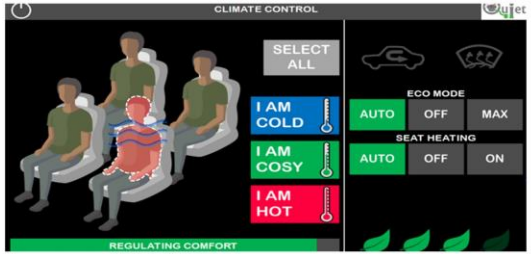
RESULTS

- Development of a **Human Machine Interfaces (HMI)** which is specialised on EVs and which allows the user to interact with the **user-centric designed thermal and energy management**.

interior of the vehicle validator

vehicle cabin flow simulation





user-centric designed HMI

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THANK YOU!

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