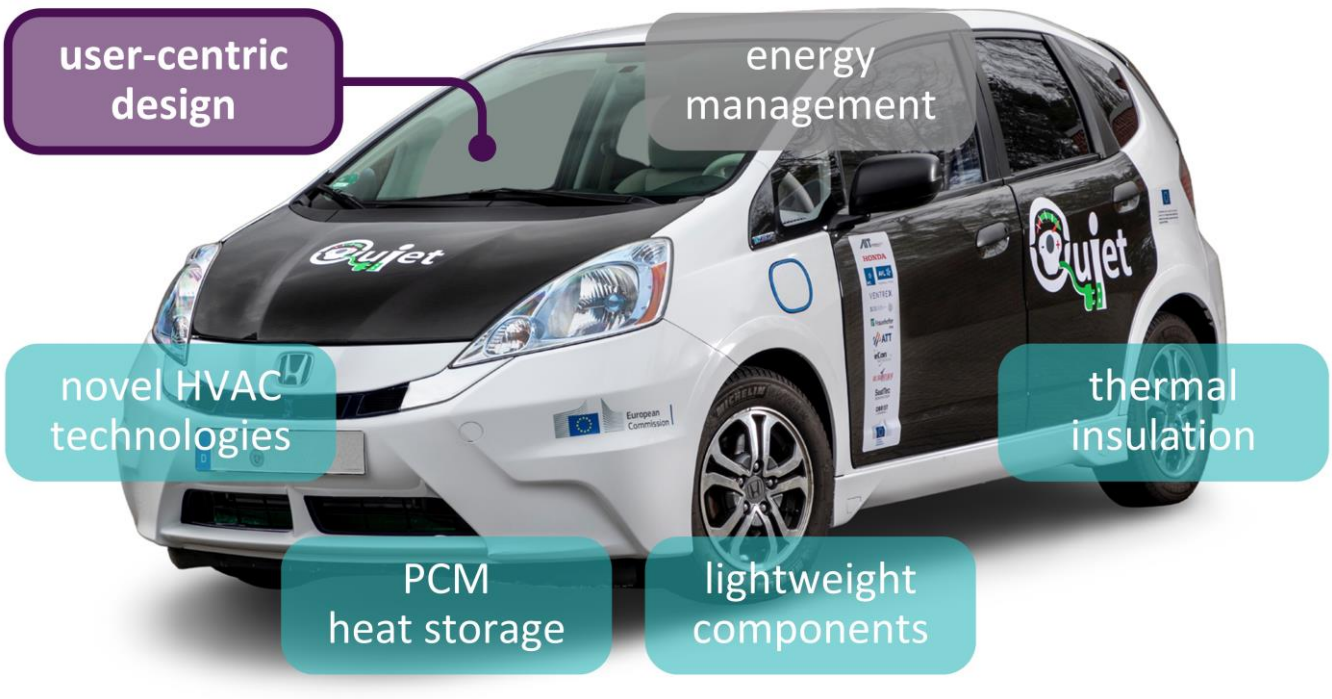
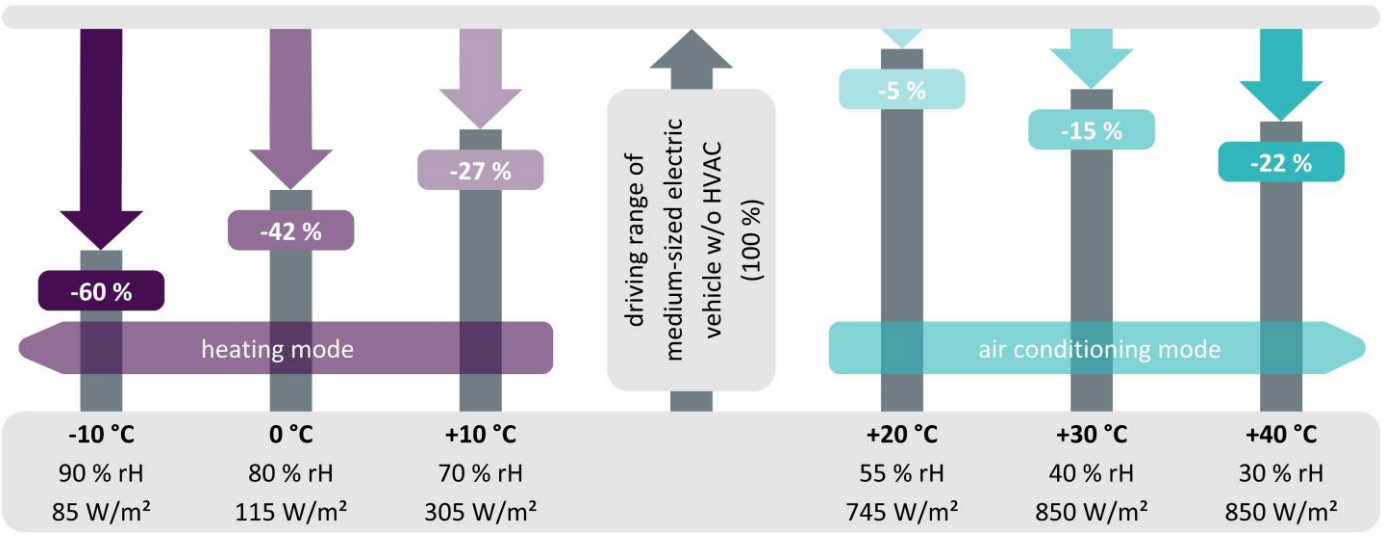


THE QUIET PROJECT

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

MOTIVATION

- Limited driving range of electric vehicles (EV) 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



cf. U.S. Department of Energy, "Vehicle Systems 2015 Annual Report", DOE/EE-1304, January 2016, www.vehicles.energy.gov.

OBJECTIVES

QUIET aims at developing an improved and energy efficient EV 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**)

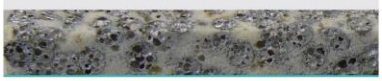
AREA I
expected **energy** reduction through thermal and energy management
10 %

AREA II
expected **weight** reduction of lightweight vehicle components
20 %

AREA II
expected **weight** reduction of lightweight seats
10 %

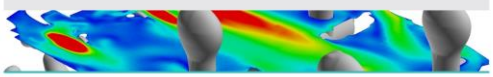
vehicle validation platform
(B-segment HONDA Fit EV)

AREA II
expected **energy** reduction through thermal insulation
20 %



AREA III
expected **energy** reduction through optimised cabin heating
10 %

AREA III
expected **energy** reduction through novel AC with PCM storage
15 %



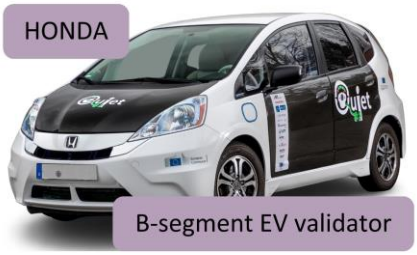
AREA II
expected **weight** reduction of lightweight windows
30 %

RESULTS

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

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

HONDA



B-segment EV validator

HVAC system development

R290 compressor

- For heating up the passenger cabin the **air conditioning system works in heat pump operation combined with a phase change material (PCM) thermal storage system**.

R290 safety valve

R290 expansion valve

infrared heating panels

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.
- The **internal structures of the seats** are redesigned and manufactured from lightweight materials like aluminium and magnesium while reducing the weight by 15 %.
- 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

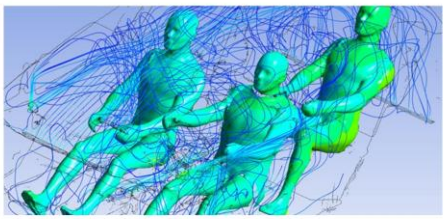
with advanced pore morphology

realised lightweight composite doors

- Development of a **human machine interface (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

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

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. **769826**. The content of this publication is the sole responsibility of the Consortium partners listed herein and does not necessarily represent the view of the European Commission or its services.

PROJECT COORDINATION

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
Center for Low-Emission Transport
Electric Vehicle Technologies
Giefinggasse 2
1210 Vienna, Austria

DI Dr. Dragan Šimić, MBA
Thematic Coordinator
+43 50550-6347
dragan.simic@ait.ac.at

quiet-project.eu