

## Press Release

Vienna, 19 February 2024

### ELECTROMOBILITY: MAXIMUM RANGE THROUGH EFFICIENT THERMAL MANAGEMENT

AIT leads European research project MINDED: Innovative heating panels and optimised user:indoor comfort as the key to increased energy efficiency

Vienna (AIT): The challenges in the field of electromobility, particularly with regard to the range of electric vehicles, are complex. In addition to battery capacity and the efficiency of the drivetrain, external conditions also play a decisive role. Extreme temperatures, be it heat or cold, have a significant impact on range, as air conditioning and heating consume additional energy. This aspect is not only technically relevant, but also has a direct impact on the acceptance of electric vehicles by consumers. In contrast to conventional vehicles with combustion engines, which utilise the waste heat from the engine, electric cars have to draw the energy for heating directly from the battery, which can lead to significant losses in range.

#### **MINDED: High-level consortium meets for kick-off in Vienna**

In this context, a high-calibre European consortium led by the AIT Austrian Institute of Technology initiated the MINDED research project - with the aim of making a significant contribution to increasing the range of electric vehicles through innovative and efficient heat management.

The kick-off for MINDED (long title of the project: Thermal and energy Management for INcreased Driving range of an Electric minibus including improved user-centric Design and thermal comfort) took place at the AIT headquarters in Vienna-Giefinggasse at the end of January. As part of the project, the consortium, which consists of a total of eleven European partners from research and industry, aims to develop an innovative battery-electric IVECO eDaily minibus. This should have a 20 per cent improved range at 0°C lifting temperature. This is achieved by integrating extremely efficient infrared heating panels in the vehicle, which are controlled by an optimised thermal and energy operating strategy.

#### **Optimised thermal management and use of AI to increase efficiency**

Electric vehicles currently on the market generally use conventional PTC heaters to generate heat in the passenger compartment. These heating elements are made of ceramic material and are based on so-called "positive temperature coefficient technology" (PTC). The PTC material is characterised by the property of increasing its resistance as the temperature rises. However, this is accompanied by a significant energy requirement, which is drawn directly from the traction battery and therefore reduces the range.

To meet this challenge, MINDED relies on the use of innovative infrared heating panels. The radiant heat, which is perceived as extremely pleasant, leads to a reduction in the overall heat requirement and therefore harbours considerable potential for energy savings. The skilful placement of these panels enables the room temperature to be reduced by up to 5°C - without compromising comfort. There is also a particular focus on the development of a new type of air conditioning system with heat pump mode (based on an oil-free compressor), which aims to realise an increase in efficiency at any time of year.

The project is also researching new methods for predicting driver decisions with the help of artificial intelligence in order to further optimise energy management. In this context, an innovative human-machine interface (HMI) is being developed to guarantee excellent usability and user-friendliness. Optimising the insulation of the vehicle interior is also an important focus of the project.

### **Validation on the roller test bench and using Digital Twin**

To validate the results, the IVECO eDaily minibus is measured on an air-conditioned roller test bench to demonstrate the performance of the heating panels at 0°C. The simulation of the entire vehicle digital twin model takes into account the drivetrain, the heating and air conditioning systems as well as AI-based predictions of driving behaviour. This enables a comprehensive evaluation of the thermal and energy-related operating strategy.

The AIT takes on the following tasks as part of the project:

- Overall project management: 11 partners, total funding amount approx. 5 million euros
- Digital Twin models: A comprehensive simulation system is being developed in collaboration with partners to enable simulative design and development of the operating strategy.
- Implementation of a new thermal management system: An efficient heating system will be implemented by integrating infrared heating panels into the minibus. In addition, a user-centred human-machine interface is being developed that enables drivers and passengers to set target temperatures and receive feedback on their comfort status.
- Thermal management system: The focus is on developing an energy-efficient and comfort-optimised operating strategy for the infrared heating system.

AIT expert Thomas Bäuml, project manager of MINDED, emphasises: "Our aim is not only to increase energy efficiency, but also to optimise comfort for drivers and passengers. By integrating infrared heating panels and developing intelligent user interfaces, we are creating an innovative solution in the field of thermal management for electric vehicles. In this way, we want to make a decisive contribution to increasing the acceptance of electrically powered vehicles and thus ultimately contribute to environmentally friendly mobility in line with the European Green Deal."

### **Project consortium**

- [AIT Austrian Institute of Technology GmbH](#) (Coordination)
- [IVECO S.p.A](#)
- [Rimac Technology](#)

- [TU Darmstadt](#)
- [University of Zagreb](#)
- [TU Vienna](#)
- [IDIADA Automotive Technology S.A.](#)
- [Villinger GmbH](#)
- [Garrett Motion Czech Republic s.r.o.](#)
- [Lead Tech SRL](#)
- [TU Vienna Automotive Test Centre GmbH](#)



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