



# WintEVE

Winter operability for Electric Vehicles

## *Arctic Testing Facilities and Services*

The weather conditions in Northern Finland are ideal for testing both vehicles and vehicle related services. In the winter, the ground is covered with snow for six months and the temperature can drop down to below -30 °C. In addition, businesses in the region have developed commercial methods for how to prepare for arctic conditions and how arctic conditions impact vehicles and different components. Due to these competitive factors every winter many car manufacturers choose to test their vehicles and vehicle components in Northern Finland.

In the WintEVE consortium we develop demonstration and testing environment for electric vehicles using Finnish technology and winter testing know-how in different environments, for example in urban and sparsely populated areas. We examine the operability of the charging systems for electric vehicles in arctic conditions and examine the needs for new services for electric vehicles. Among other things, we examine the impact of weather conditions, route selection and driver decisions on the electric vehicle and the operability and usability of the charging system.

## *The different areas of WintEVE are:*

- Developing and implementing an arctic testing environment.
- Building a real time data transfer system for the testing environment.
- Map and commercialise new services for the electric car industry.
- Testing of electric car technology and techniques in arctic conditions.
- Coordination and information sharing.



*WintEVE is one of five consortia in the Tekes EVE – Electric Vehicle Systems Programme. The project is coordinated by Centria Research and Development in Ylivieska. Also participating in the project are many private corporations, the University of Oulu and Kajaani University of Applied Sciences.*

# WintEVE

## EVE Programme by Tekes

### The Impact of Weather Conditions and Route Selection

The most important information for the driver of an electric vehicle is the driving range of the vehicle and how and where you can charge the vehicle. Elevation changes, the weather conditions along the route, the driving style and speed impact the energy consumption of the vehicle. By acknowledging these factors and by selecting the correct route you can improve the safety of the electric vehicle.

For example, in cold weather the capacity of the battery decreases, this also shortens the driving range. Furthermore, charging in cold weather may require special conditions and the power from normal charging stations may not be enough. With current battery technology the temperature needs to be at least about 10 °C for efficient charging, at the latitude of Oulu the average daily temperature is lower than 10 °C for nine months of the year.

The combined effect of these factors is examined in the WintEVE project. We use Finnish technology and testing know-how to conform current testing environment to the needs of electric vehicles. We test the operability of the electric vehicle, the suitability of the infrastructure network and the components of the electric vehicle in arctic conditions.

### Services

The needs of the clients have to be determined for service stations to be able to improve their services. Currently the charging of the battery takes about 30 minutes, during which time the driver have time to enjoy other services, but do the services meet the needs of the client? To answer this question we set out to find out the needs of the drivers of electric vehicles to make services more client-focused in the future. For example, determining the location of charging stations, how to book them and how to pay for the charging can create new business opportunities.

### Safety

Guidance and instructions for the driver creates new network and mobile services. Furthermore, the steering systems for the vehicle are more and more computerised (for instance, the guidance system for the batteries) which makes it crucial that you can trust the information.

With more and more information technology being used, safety also becomes an issue. Therefore, we are also examining the interaction of different systems and how to minimise problems from external factors and vulnerabilities.

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