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Connected Electric Vehicle Optimized for Life, Value, Efficiency and Range

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### **CEVOLVER – Deliverable Report**

5.5 - User manual for the added functionality for  
testing purposes

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## 1 Publishable summary

CEVOLVER focuses on a leap forward in user's confidence, functionalities and energy efficiency of future battery electric vehicle while ensuring their affordability by a user-centric development approach.

Work Package 5 - WP5 (System and component testing and demonstration using Fiat A class electric vehicles) focuses on optimal predictive control of mostly existing pre-optimized vehicle hardware with the additional benefit from the innovation of cloud-based user-centric predictive optimization algorithms.

D5.5 (User manual for the added functionality for testing purposes for handover to test in WP6) main aim is the description of the vehicle modifications and the actions to perform the tests on the two vehicle validators realized in WP5:

- Vehicle Validator 1: realized starting from the Fiat 500e (North America) with in addition the OPTEMUS project heat pump system (CRU - Compact Refrigeration Unit)
- Vehicle Validator 2: realized starting from the new Fiat 500e with DC fast charge functionality

The two validators use the same cloud-vehicle bidirectional communication hardware and software architecture. A description of the vehicle side final communication architecture is reported in Chapter 4 highlighting its specificities for Validator 1 and Validator 2 to take care of the vehicles differences and investigate the cloud based functions developed in CEVOLVER. In particular:

- Vehicle Validator 1: the integrated energy and thermal management (cabin comfort and e-powertrain components thermal management)
- Vehicle Validator 2: the HV Battery thermal preconditioning before the DC fast charge (preheating or precooling depending on the conditions) in order to minimize the complete charging time considering the expected vehicle range and its battery life target (optimized charging)

Moreover, also the CEVOLVER enhanced eco-driving and eco-routing functions will be evaluated though these validator vehicles.

The integration of these functions in the vehicle units is described in Chapter 5: for Vehicle Validator 1 the cabin climate and e-PWT thermal management functions, for Vehicle Validator 2 the smart fast charging function.

In Chapter 6 the vehicle user's guideline for validators set-up and data logging are reported and organized in three parts: communication chain, log system and vehicle set ups.

In the last part of this Deliverable Report (Chapter 7), there is a complete description of the implementation of the two validation use cases defined to evaluate the effectiveness of the developed functions:

- the around 15 km x 2 home to job and back daily trip (Validator 1)
- the 350 km x 2 trip for the visit to relatives (Validator 2)

In this Chapter also preliminary tests of the baselines vehicles (Validator 1 on a chassis dyno bench and Validator 2 on open road) are reported and, in the case of the Validator 2, compared with the results predicted using the detailed vehicle model developed by CRF in CEVOLVER to identify the best thermal preconditioning strategies.