

ECO-CHARGING/DRIVING & SMART FAST CHARGING

VALIDATOR

New Fiat 500BEV High Range

Curb weight 1290 kg

eMotor

- Peak Power 87 kW
- Peak Torque 220 Nm
- Speed (max) 18000 rpm

Battery

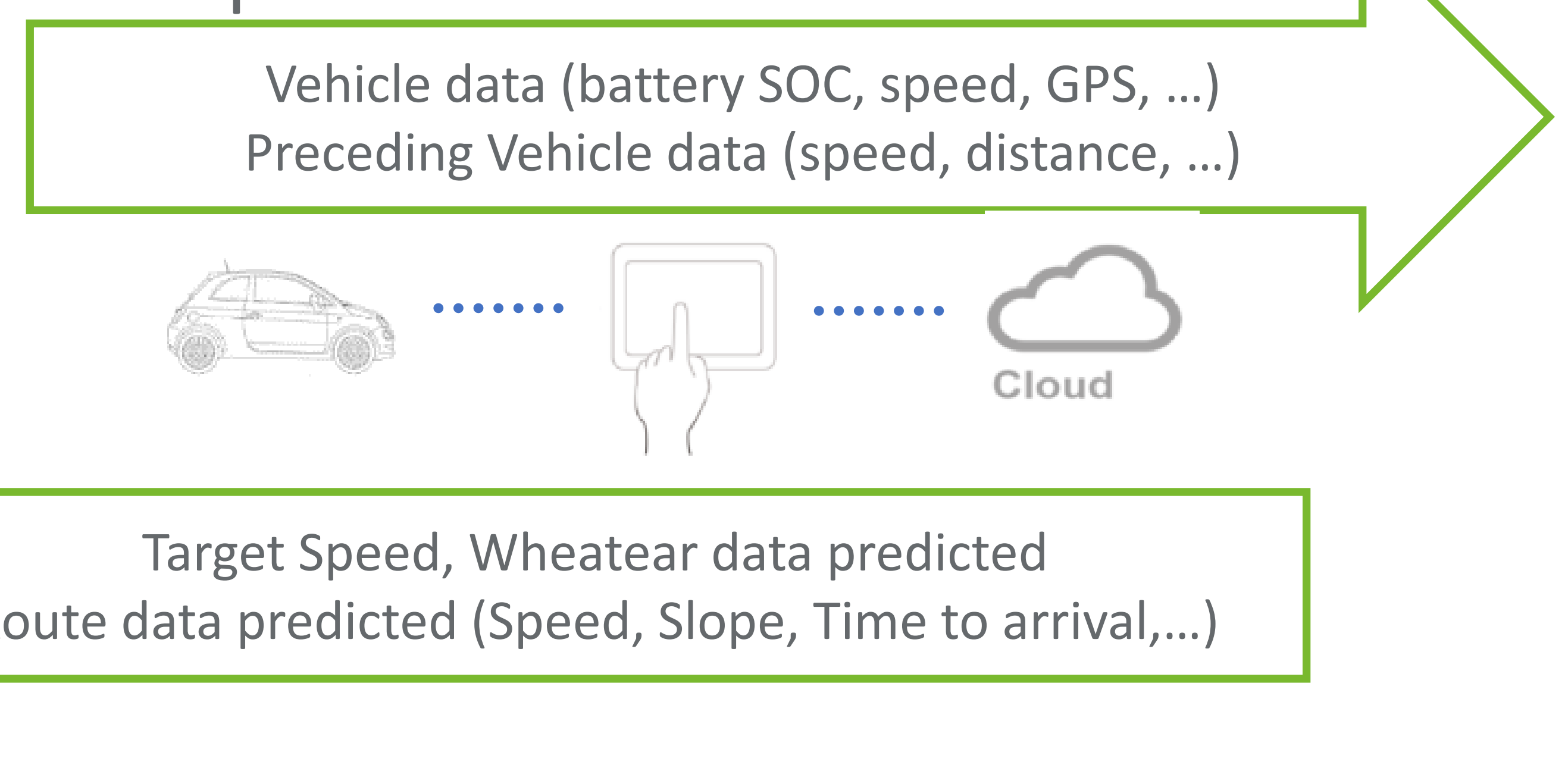
- Voltage 350.4 V
- Energy 42 kWh
- Range 321 km
- Liquid cooling and heating



Features developed by the project:

- enhanced eco-driving (IFPEN)
- enhanced eco-charging (IFPEN)
- Battery thermal preconditioning (VUB/CRF)

Control integration and testing performed by CRF



Main Results

Energy and Time Savings from **eco x-Functionalities**
private visit to relatives (350+350 km)

How to compare the control
and
quantify the improvement?

$$\eta_{E_{batt}} = \frac{E_{batt,bsl} - E_{batt,eco}}{E_{batt,bsl}} \times 100$$

$$\eta_t = \frac{t_{tot,eco} - t_{tot,bsl}}{t_{tot,bsl}} \times 100$$

$$TT_{RelChargeTimeGain} = \frac{\Delta t_{bsl} - \Delta t_{smartfastcharge}}{\Delta t_{bsl}} \times 100$$

(the measurement are recoded on RDE fashion cycle)

Legend:

- E_{batt} → energy charged
- t_{tot} → total trip time (driving + charging)
- bsl → base line / without any control indication to the user
- Δt → fast charging time (interval between plugging and unplugging the battery from the charging station)

eco-charging

$$\eta_{E_{batt}} = 7.6\% \quad \eta_t = -9.7\%$$

Charging Time - 47%

eco-driving

$$\eta_{E_{batt}} = 11.6\% \quad \eta_t = 3.7\%$$

smart fast charge

$$TT_{RelChargeTimeGain}(10^\circ C) = 13.7\%$$

$$TT_{RelChargeTimeGain}(0^\circ C) = 29.2\%$$

The numbers come from the average of all the test performed in different ambient conditions (-10°C / 35°C) and with different initial battery SOC (10% / 90%).

