eTRUCK – Electric truck innovation platform operating in daily use in Finland

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The eTRUCK project collects experiences from 16 ton elecric delivery truck technologies and their real-life operation capabilities in northern circumstances in Finland. The eTRUCK has been operating since autumn 2015 in harsh climate conditions from commercial bases at Tampere region driven so far some 62 000 km.

The eTRUCK has been equipped with present-day monitoring and communication instrumentation enabling to remote follow-up of its operations like: location, operation phase, speed, electric parameters, energy consumption and charging. The task in the project is to enable more accurate estimations and planning of electric truck operations. At a later stage the results accumulated from the eTRUCK experiences will be analyzed from energy consumption, emission and economical perspective.

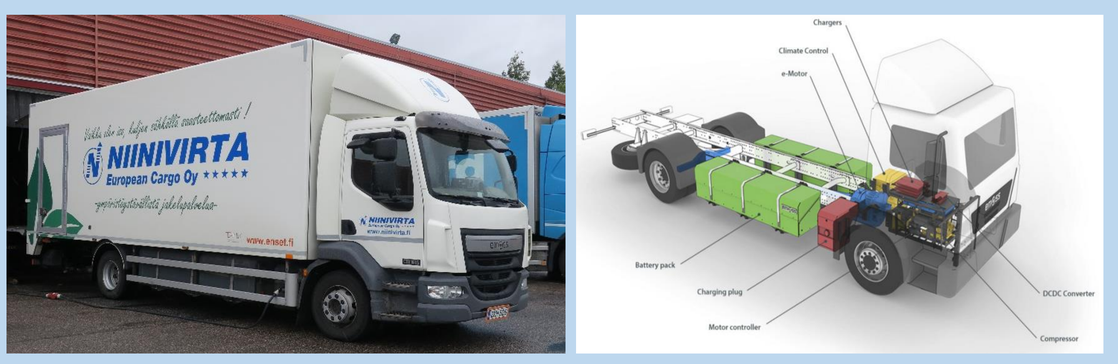

Figure 1: eTRUCK 16 ton electric truck in its present form connected to grid at terminal.

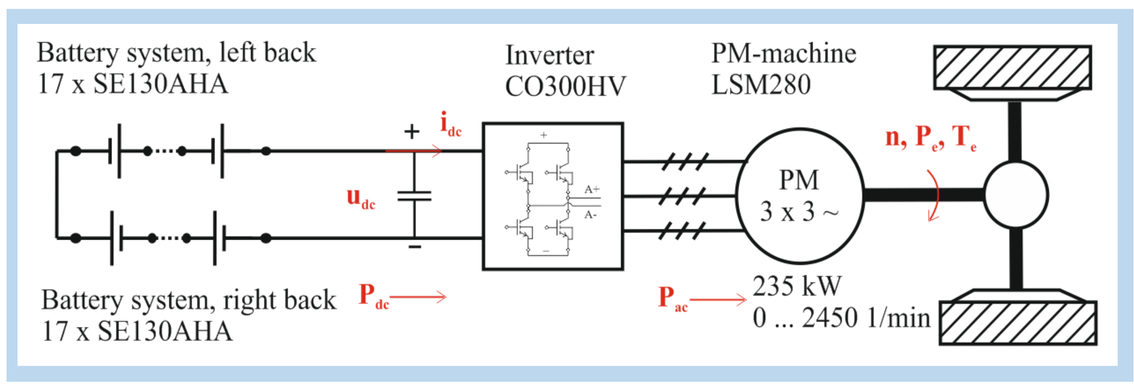

Figure 2: Main circuit diagram of the eTRUCK power system.

Table 1: eTRUCK technical parameters

Weight (kg)	16 000
Payload (kg)	8 000
Energy storage pack (LiFePo4, kWh)	160
Number of two parallel units in series	192
Range (NEDC, 80 % payload, km)	210
Top speed (km/h)	80
Electric motor type	PM
Power, cont. (kW)	235
Power, max (kW)	250
Torque, cont., (Nm)	1600
Torque, max., (Nm)	3400
Operation range, (1/min)	0 - 2450
Maximum eff., (%)	94,5

Equipment used in monitoring is based on IoT-TICKET platform which is a complete *Internet of Things (IoT)* service covering data acquisition, reporting, dashboard and analytics provided by Wapice Ltd.

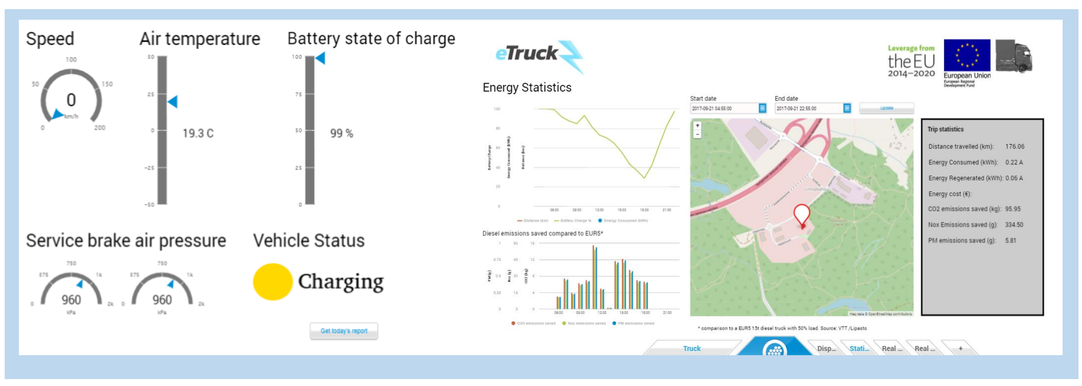

Figure 3: IoT Ticket monitoring interface.

In typical routing at morning hours eTRUCK deliveries material to and loads from some 3 – 5 clients and drives some 30 – 50 km. After that it returns to the terminal for reloading material for afternoon deliveries. The second route is somewhat longer, some 60 – 90 km and consists of 5 – 7 stops. Final stage is to return to the terminal for unloading and reloading material for the next day. While staying in the terminal eTRUCK is recharged for the next drive duty. Longest daily drive duties have been some 240 km.

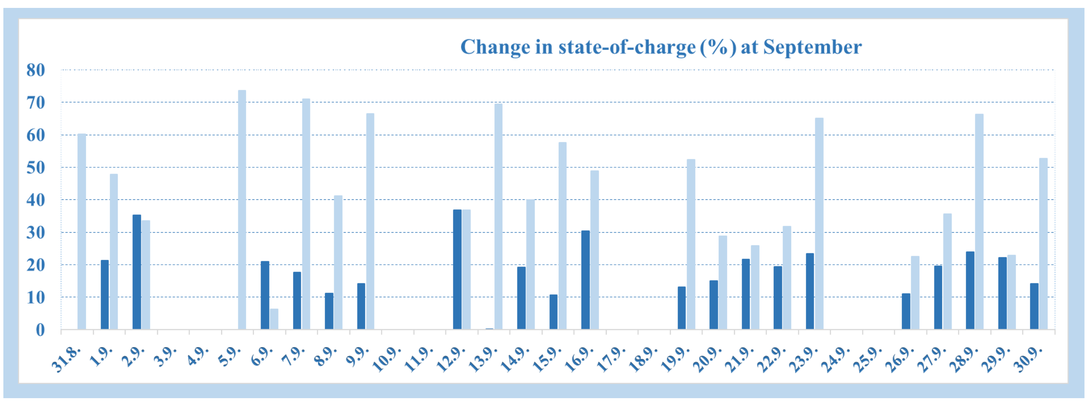

Figure 4: Change in state-of-charge caused by charging at terminal. Light blue at the evening, dark blue during the day time.

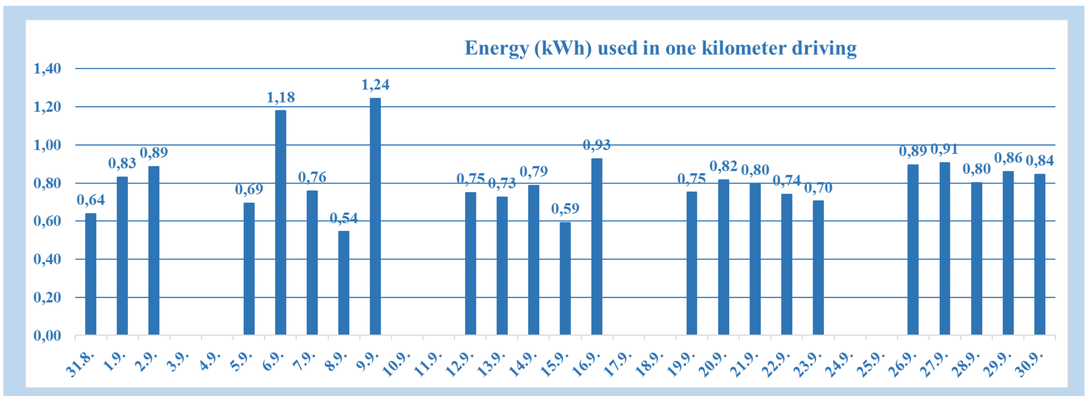

Figure 5: Energy consumption kWh/km at September being typically 0,7 – 0,8 kWh/km.

The data collected will be compared to those produced with computational tools in order to have accurate enough match between measured real-life data and calculations. In future the computational tools will support route and operation planning, charging and driving cycle optimization for electrical delivery trucks in demanding operational and environmental conditions. So far eTRUCK has saved some 34 ton of CO2 and 118 kg of NOx emissions compared to diesel one.

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