

## Battery Energy Storage Testing for Safe Electrification of Transport (BESTEST)



By 2020 it is projected that 7 % of all new European passenger and light commercial vehicles will be electric, increasing to a massive 31 % by 2030. BESTEST's role is to accelerate the electrification of transport by contributing to the development of harmonised testing methodologies and global standards and regulations specifically related to EV batteries

Our state of the art laboratories are equipped with thermal, electrical, mechanical and analytical experimental facilities to scrutinise battery safety and performance under a range of simulated environmental conditions.

BESTEST research is guided by and performed in collaboration with European industry representatives and with trusted international partners including the US Department of Energy's National Laboratories as part of the Interoperability Centres. Together we provide leveraged scientific support to harmonised, fit for purpose battery testing methods to assess battery performance and assist battery technology innovation.

Our aim is to ensure cleaner and safer electric vehicles for Europe's citizens and a competitive environment for European battery industries.

## Joint Research Centre

The European Commission's in-house science service

# The European Interoperability Centre for Electric Vehicles and Smart Grids

### Electromobility at the JRC

The JRC has embarked on a programme for testing and pre-normative research regarding the electrification of road vehicles, may these be fully electric or plug-in hybrids. The new VeLA laboratories permit to evaluate experimentally the electric vehicles functionality, their energy efficiency, range, electromagnetic compatibility and, for hybrid vehicles, exhaust emissions. Work undertaken, in close collaboration with the U.S. Argonne National Laboratory, contributes to the global harmonization of test procedures for electromobility.

### Interoperability

Interoperability aims at ensuring the interwork and the data exchanges between the e mobility and the smart grid systems. Interoperability will thus not only facilitate reliable communication and functionality of any plug-in vehicle with recharging devices – it will rather pave the way for seamless integration of e-mobility into tomorrow's smart grid infrastructure. It will enable automatic billing, EV-roaming and energy management for e mobility electricity demand in the smart grids' whole architecture, which in turn manages evermore green electricity to be used. This joint effort involves industry and will provide a platform for transatlantic cooperation - focused on harmonising standards, technology validation and testing methods to facilitate e-mobility through interoperability.

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The European Interoperability Centre for Electric Vehicles and Smart Grids combines four new, state-of-the-art laboratories, which bring together knowledge and test facilities in the areas of efficiency, hybrid exhaust emissions, electromagnetic compatibility, smart grids and battery testing. The European centre will establish a transatlantic bridge with its partner facility at the U.S. Department of Energy's Argonne National Laboratory.

### VeLA 8: the Electric and Hybrid Vehicles Testing Facility

VeLA 8 consists of a two-axis roller bench within a climatic chamber, capable of testing electric vehicles and their supply equipment from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  under controlled humidity, and applying a whole series of analytic scientific instruments. It is also able to perform tests under load on hybrid electric vehicles with different fuels such as gasoline, diesel, LPG, natural gas and even hydrogen. A state-of-the-art measuring system provides a complete analysis of the remaining exhaust gas emissions from hybrids.

The possibility to run these tests at most different temperatures gives valuable information about the performance of electric vehicles and hybrids in winter and summer conditions and on the impact of e.g., their heating, ventilation and air conditioning.



## VeLA 9: "E-Mobility Electromagnetic Testing Facility"



VeLA 9 is a chamber designed for electromagnetic compatibility testing of light-duty vehicles and light commercial trucks. This chamber is clad with absorber material, that suppresses any kind of electromagnetic echo inside.

Reception antennas and receivers analyse the electromagnetic emissions generated by electric and hybrid cars during their full range of acceleration, driving and recuperative braking, and also during the battery re-charging phase, as well as their wireless communication with smart grids.

VeLA 9 and its powerful amplifiers, along with radiating antennas inside the chamber, is also capable of testing the immunity of the electric vehicles against external electric or magnetic fields, from meter-wave to radar pulses. As electric vehicles and all supply devices of the future electro-mobility are "connected", the avoidance of interferences is essential.

## Smart Grids Interoperability laboratories

Our Smart Grids Interoperability laboratories, deployed in the JRC Ispra and Petten sites, support the development of EU policies, by testing of the interoperability of devices and systems according to the applicable standards and with reference to relevant architecture and use cases.

Our facilities are equipped with power components, Information and Communication Technologies and advanced power system real-time simulators. The experimental set-ups are being used to perform interoperability and integration studies of smart grid devices and systems connected to complex power transmission and distribution grids. The tests include renewables, electric vehicles, smart houses and storage systems.

The Smart Grid laboratory features the following elements and functionalities:

- Modelling of static and dynamic simulation modules representative of the European power networks;
- Emulation and reproduction of ICT, communications and networking systems applied to power grids;
- Real-time simulation of power grids and hardware in the loop component testing (combined software/hardware);
- Visualisation of data and scenarios (including Geographical Information Systems – GIS);
- Interconnection of other facilities, within JRC and/or external

