OVERVIEW

Pave the way for large scale deployment of Electromobility

Electromobility is an essential component in the pursuit of the decarbonisation of road transportation and mobility. FABRIC investigated on-road wireless charging technologies as means to alleviate users' range concerns.

"The project's goal was to provide a pivotal contribution to the evolution of Electromobility in Europe"

KEY OBJECTIVES

- Evaluate the performance of on-road wireless prototypes in real driving conditions;
- Assess the impact on the transport infrastructure and on the electricity network from the wide introduction of such systems;
- Assess the impact on the vehicle supply chain and on the environment;
- Derive recommendations for large-scale deployment.

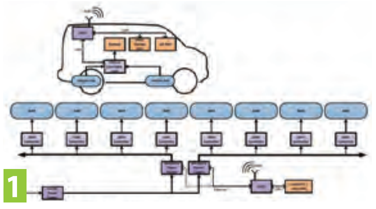
FABRIC PROTOTYPES

FABRIC has developed three prototype wireless charging solutions and support ICT tools which have been demonstrated in its test sites in France and Italy.

- One solution was based on a market available static wireless charging system which was modified to meet the requirements of dynamic on-road charging. Several Base Area Network units were installed in a trench at the French test site and two vehicles were equipped with the corresponding vehicle pad.
- Two more solutions were demonstrated at the Italian test site. A series of 50 multi-windings transmitter coils were installed on a 100 m road segment and 25 simple single turn transmitter coils were installed on a 50 m road segment.

Support applications were developed to optimize driving behavior and system performance, which included:

- an on-board unit to provide information about the charging process to the driver,
- an application to support the driver in keeping a steady position above the primary charging unit on the road, in order to optimize the power transfer, and
- an application to control the energy flow taking into considerationthe energy availability.



1. French Test Site WPT System 2. Italian test site solution prototypes 3. Lane-keeping ICT

FABRIC DEMONSTRATIONS

Numerous test activities have been performed at the two test sites at several vehicle speeds, evaluating the system performance, including various misalignments between primary and secondary coils and under variable weather conditions.

Speed and air gap do not seem to have a significant influence on system efficiency. Still, good alignment is essential to maximise charge performance efficiency.

The prototypes have been successfully demonstrated on several occasions achieving in the French site concurrent charging at 20 kW of two vehicles at 100 km/h.

1. General view of Versailles-Satory test track 2. Inductive test site track in Susa, Italy

FEASIBILITY ANALYSIS

Highlights

Dynamic wireless power transfer appears feasible as eRoads in the medium-term for urban deployment of buses and long-distance freight corridors. Saving battery weight for heavy vehicles could offset the monetary and environmental costs of the infrastructure required. Final cost-benefit assessments as well as feasibility for other scenarios will be dependent on other technological developments in electromobility.

Implementation of eRoad systems is technically feasible in current road design with currently available materials. Selection of the appropriate construction method should be made with considerations for the existing infrastructure, the preferences of the road owner, the contextual use estimations, and the future maintenance and whole life cycle costs.

Careful planning and gradual eRoad deployment is needed. eRoad construction procedures must meet current highway design and construction specifications. Any departures from these standards should clearly demonstrate that the structural integrity and service life of the road remains unaffected.

Travel patterns may change due to eRoads, and this is highly dependent on the regional context. For urban buses and long-distance freight corridors, this is not expected to lead to significant issues.

The expected electricity consumption from a wide introduction of such systems will not pose any significant problems for integration in the electricity grid. Dynamic wireless on-road charging systems are especially advantageous for integration with solar power, as demand is mainly expected during daylight.

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CONSORTIUM

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Feasibility analysis and development of on-road charging solutions for future electric vehicles

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FINAL RESULTS