FABRIC

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

www.fabric-project.eu

FABRIC: Dynamic Power Transfer System architecture

DEVELOPMENTS AREA

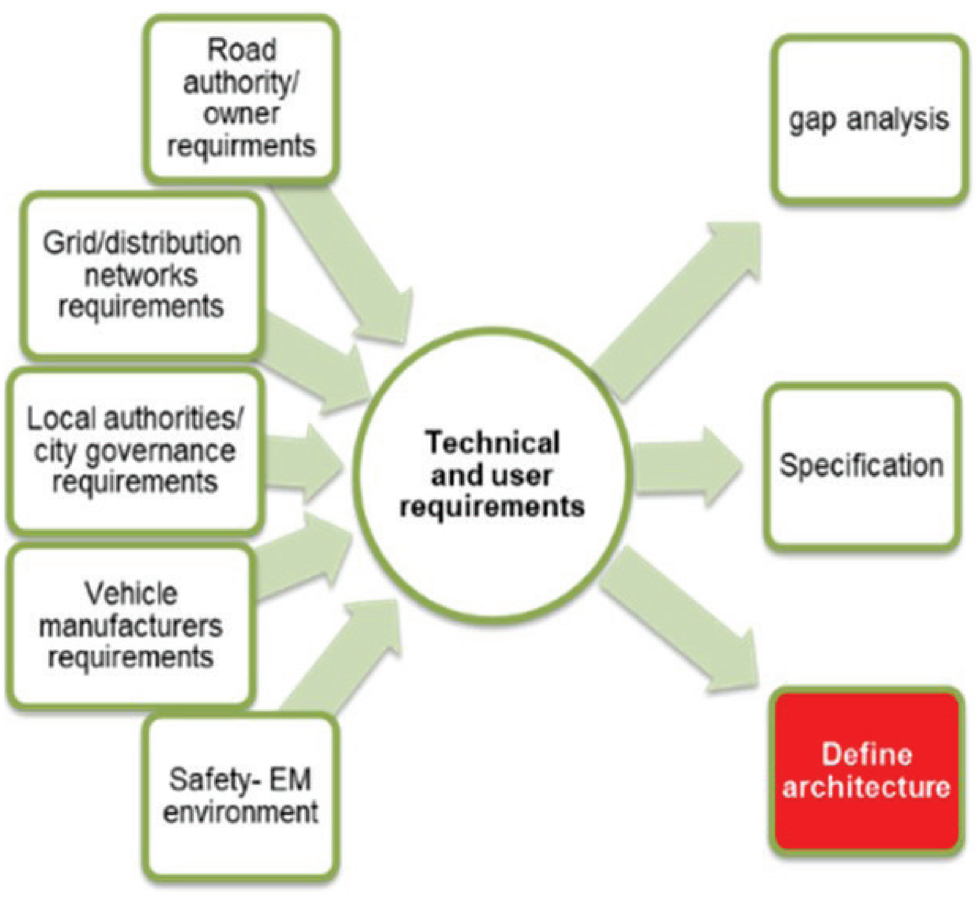
The challenge of realizing a dynamic inductive power transfer systems (IPTs) and it's architecture definition

Overview /introduction

Dynamic charging technology is still in the R&D stage. Nevertheless, dynamic charging aims at mitigating some of the issues that hinder the wider adoption of Evs, easing the path towards large-scale adoption of electro-mobility. Static wireless/inductive charging introduces advantages in terms of safety and ease of charging. The extension to dynamic charging adds the possibility to charge the vehicle battery while driving, enabling both longer range and smaller batteries.

Partners involved

TRL, POLITECNICO DI TORINO, ICCS, circe, AMET, FCA, CRF



Architecture definition: inputs and outputs scheme

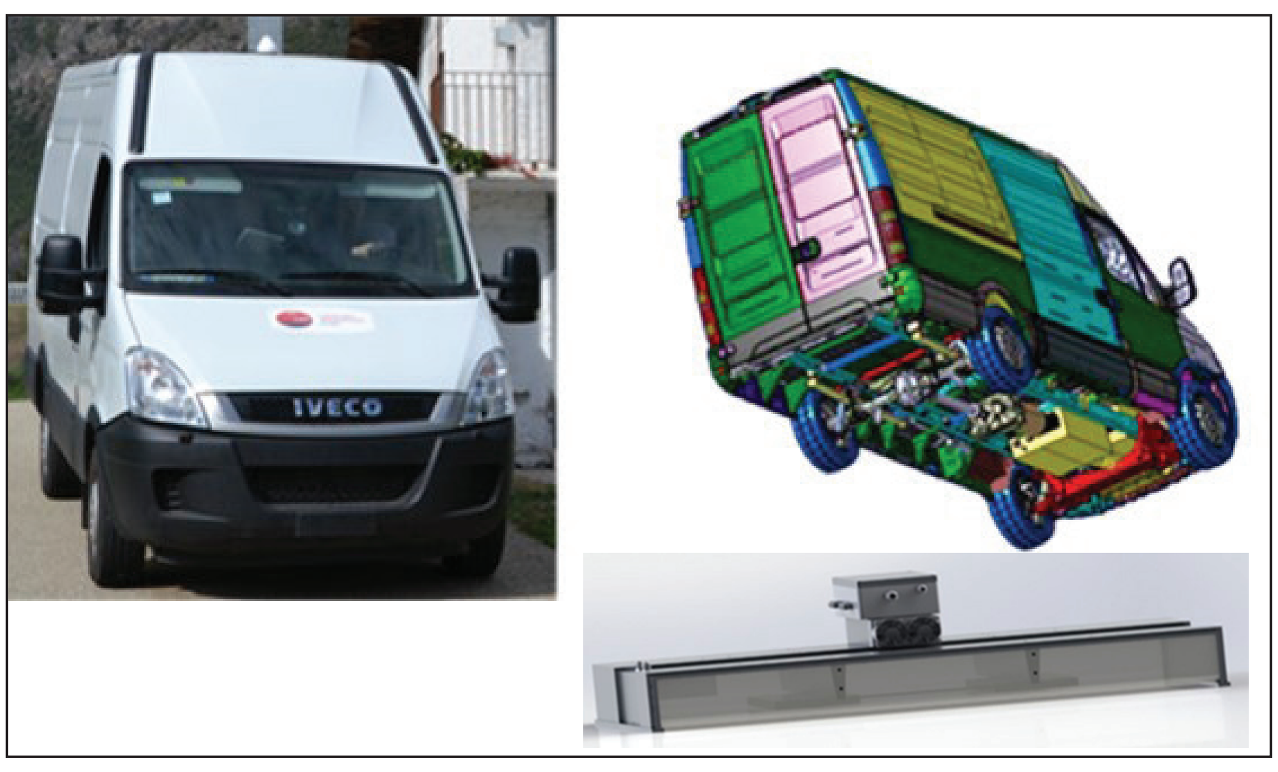
Objectives /methodology

- Develop a on-road charging solution architecture, in terms of energy distribution network, road infrastructure and vehicle interfaces, testing three different on-road charging solutions.
- Undertake structural issues analysis (NVH and passive safety) with Finite Element Method (FEM) in some specific operating conditions, on the vehicle layout of an Iveco Daily Electric, equipped with dynamic IPT charging solution provided by the partner Politecnico di Torino.
- Results' analysis and proposals for improvements, in terms of weight reduction, fastening of suspended solution and materials.

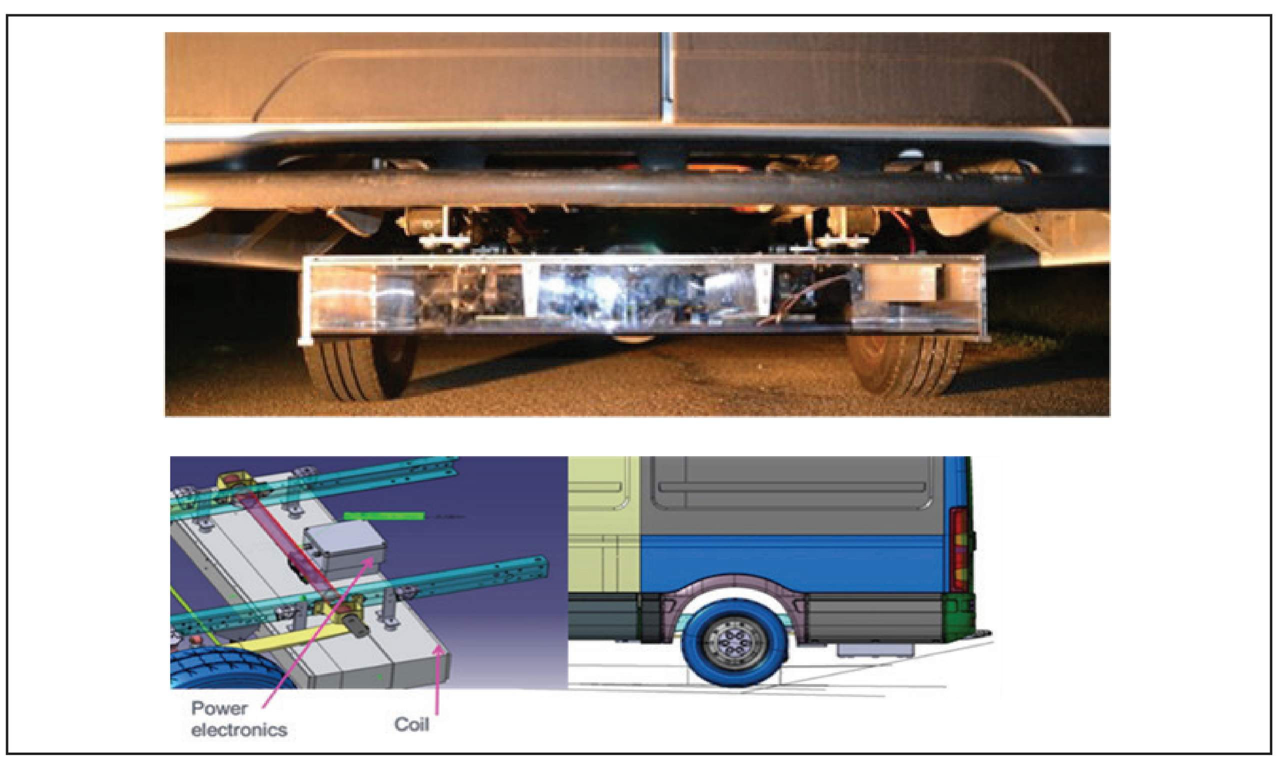
Device positioning and structural performance analysis: results

Receiving structure behavior has been investigated in some specific operating conditions, with linear dynamic and static load cases, reproducing critical event conditions, during the life cycle of the device.
Performance has been evaluated in terms of NVH and passive safety by means of FEM analysis:

- linear dynamic and static load cases, reproducing critical conditions: gravity, vertical bump, front/side impact;
- maximum value of stress: σmax = 512.7 MPa ➔ in case of side impact: 25 g in y direction plus gravity 1g in –z direction ➔ risk of failure for the bracket connecting the receiving system to the vehicle under body.



Test vehicle and on-board receiving structure



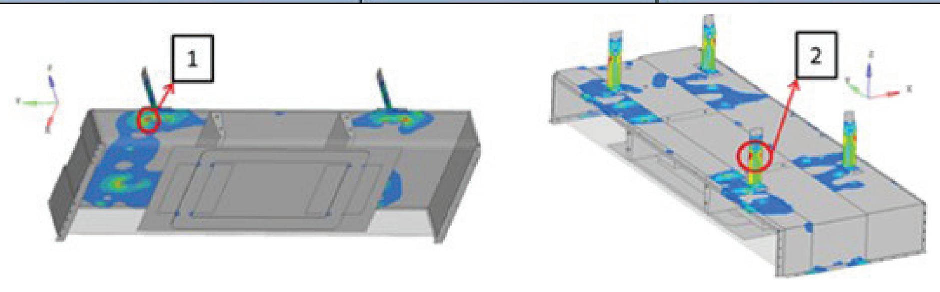
Receiving structure – under body positioning

Results and work around for improvements

The performed evaluations lead to the conclusion that there were no structural problems on the system in normal vehicle operation conditions. In order to improve the structural behavior of the object, the following improvements are proposed:

- Mounting position of the receiving structure can be moved in x direction;
- Thickness and stiffness of metal/polymeric sheet parts (mainly the box containing magnetic coils) can be varied, in order to reduce weight and stiffness of the system;
- Thickness, stiffness, length and shape of brackets between receiving system and vehicle can be optimized.

LOAD CASE	σmax (MPa)	Components (position)
Gravity:	8.73	Box cover (1)
Bump (3g in z direction):	26.2	Box cover (1)
25g in x direction plus 1g in -z direction:	160.3	Attachment bracket (2)
25g in y 1g -z direction:	512.7	Attachment bracket (2)



Structural Performance Analysis: stress results

Final Event & Demonstration | 21-22 June 2018 Italy

Contact
Daniela Parena, AMET, Italy
Email: daniela.parena@amet.it

Coordinator
Angelos Amditis, ICCS, Greece
Email: a.amditis@iccs.gr

Project facts
Duration: 48 M
DG / Unit: Research and Innovation
Budget: 9 M€
Funding: 6.5 M€

This project has received funding from the European Union's FP7 for research, technological development & demonstration under GA no 605405

Consortium

ICCS, FCA, CRF, ERTICO ITS EUROPE, TRL, KTH, VOLVO, SCANIA, VEDECOM, POLITECNICO DI TORINO, saetgroup, DITEN, TECNOSITAF S.p.A., QiEurope, circe, enide, iren energia, AMET, MECT, fka, saner, TNO, cea, HITACHI Inspire the Next, TU

Supported by: eucar, ERTICO ITS EUROPE

FABRIC