INCIT-EV

Large demonstratIoN of user Centric urban and long-range charging solutions to booST an engaging deployment of Electric Vehicles in Europe

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NEWSLETTER

Ultrech June INCIT-EV steering committee

For the first time since the launch of the INCI-EV project, the steering committee met face-to-face. All the work package leaders were happy to finally find themselves facing each other. This steering committee was organised at the facility of We Drive Solar in Ultrech (Netherlands).

It was an opportunity to give a complete update on the 30 months progress of the Project. Despite the two years of pandemic and some changes in the partners, the project is practically in line with its initial agenda. The tasks of the partners who left the project were taken over by the partners involved in these tasks. The project is now managed by CIRCE and all partners thank Miguel for his leadership in ensuring this important work.

Regarding the progress of the project: The User Studies are carried out, the Business analyses of the ecosystem UCs are completed, the ICT Infrastructure and DSS are available which will make it possible to fully exploit the demonstrators. The demonstrators are in the engineering and implementation phase but, the deadlines remain critical on certain tasks and mainly the realization of demonstrators that implement innovative solutions of charging system. For these realizations the supply of power electronic components has fallen behind schedule and may impact some demonstrators. In total, 25 new deliverables are expected in 2022.

This steering committee was also an opportunity to discover the achievements of We Drive Solar which are resolutely turned towards smart charging and more particularly V2G in urban areas.

Robin Berg CEO We Drive Solar introduced us to the compact V2G charging station that is now deployed. It is smart terminal coupled with the grid and solar panels (if the building is equipped) allows access to the many features of V2G in homes and businesses. With this unique Vehicle-to-Grid technology, We Drive Solar can use vehicles to store sustainable energy on a large scale, moving in this year from 25 to 150 IONIQ 5 units. “Together with Hyundai, we will make Utrecht the first city and region in the world with a bi-directional energy ecosystem” say Robin.

Finally, we also discovered the already operational achievements of the UC1b demonstrator - Community Bi-Directional of We Drive Solar and MRAe on e-car sharing using V2G public charge stations.

Today 2 V2G charging points and 3 shared e-cars of which a tesla model 3 are in operation in Town of Odijk, near city of Utrecht. It is planned to extend to 5 charging stations and 5 e-cars. With this demonstrator We Drive Solar hopes to monitoring technical and non-technical aspects of this demonstrator.

At the end of this busy day the steering committee met for a networking dinner.

Report on user centric EV charging infrastructure

The INCIT-EV project aims to demonstrate an innovative set of charging infrastructures, technologies and associated business models focused on improving the electric vehicle user experience beyond the early adopters, thus fostering the market share of electric vehicles in the EU.

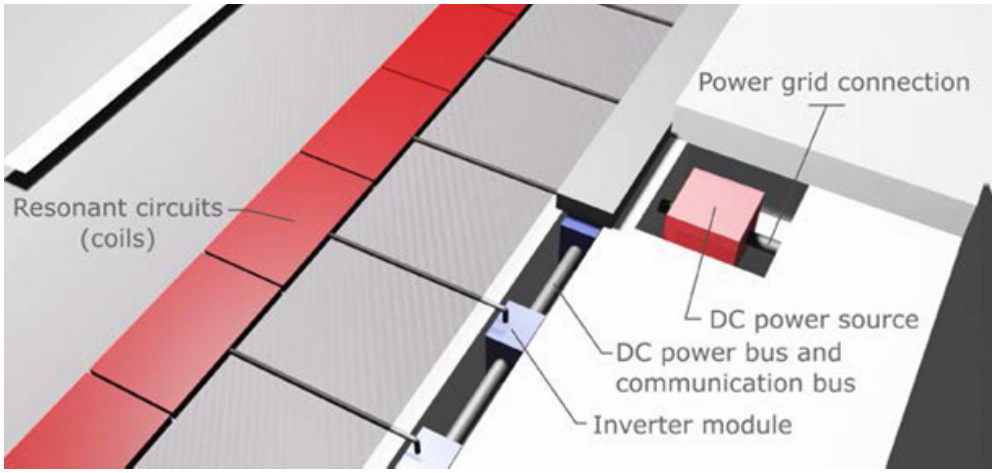
Within the tasks of the H2020 INCIT-EV project WP3 is involved, related to the user-centric electric vehicle charging infrastructure. WP3 has the objective of designing and modeling the innovative charging equipment needed to carry out the rest of the project activities. Thus, the main developments of this are four: **low and medium power DC-DC bidirectional chargers, superfast conductive charging systems improvements, Opportunity Wireless Power Transfer (OWPT) with stops and Static en-route charging, and Dynamic Wireless Power Transfer (DWPT) with urban and extra-urban charging**.

As a result of the analysis of the tasks corresponding to each of these developments, the following conclusions are presented regarding the design of the system:

CIRCE V2G Charger

The final design of the **low cost chargers** designed by CIRCE are composed of medium power AC/DC and DC/DC converters (12.5 to 25 kW) that can be paralleled to obtain any power rating. SiC components and methodologies allow the size and weight of the final equipment to be reduced by increasing the power density. These power electronics designs allow bi-directional capabilities, enabling **V2G** and **ancillary services** such as voltage control, frequency regulation or phase balancing.

The superfast charging system will ultimately be composed of these low and medium power charger electronics modules, allowing the system to achieve **200 kW** in the Estonian demonstrator.



VEDECOM Wireless Charging Lane for urban areas

In regard to the **inductive wireless charge**, the same 30 kW secondary inductor (coil in the vehicle designed by VEDECOM) is used in all the use cases allowing interoperability for all the wireless technologies. The Zaragoza static charging system of 50 kW with liquid cooling (CIRCE and TRIA) has been designed to be installed below the road surface for opportunity charging scenarios. For dynamic charging (VEDECOM and CIRCE) two different solutions have been designed for urban (<60 km/h in Paris) and highway speeds (<130 km/h in Versailles) capable of charging up to 120 kW simultaneously per charge segment (10 to 30 meters).

For the urban environment, multiple but small inductors are proposed, with a limited electromagnetic field allowing the presence of pedestrians in the vicinity of the charging lane. For the intercity environment, smaller but larger **low-cost inductors** are proposed, allowing multiple coils to be charged from a single primary coil on the ground. Both systems can achieve 90 kW of charging in a single vehicle.

An on-board charger is included in the vehicles to control the charging current of the on-board batteries. In addition, a lane keeping assistant has been proposed to keep the vehicle aligned during charging.

Although a large part of the work has been carried out, in order to finally define the specifications and obtain the final design of the system, it is required to continue working on the following on the actual charging performance and to study the magnetic field to ensure EMC and a safe electromagnetic field for the users. The final design of the charging technologies and prototypes will be realized in WP7 and WP8 during the third year of the project.

Dynamic wireless charging lane in Paris (UC2)

COMPLETE SOLUTION

The UC2 experimentation will quantify the efficiency of dynamic wireless power transfer in a street at Paris, where vehicles drive at low speed (up to 30 km/h) or are stopped when the traffic light is red. The main guidelines of this installation are:

- One lane (one side of a road) is equipped
- The installation consists of 30 coils (each 102 cm long) embedded inside the base coat of the road, powered by 30 inverters located inside a technical channel, embedded under the pavement (sidewalk), themselves being powered and controlled by a power supply unit
- The whole system is powered on only when experiments are conducted and under supervision of the demo partners.
- Only the coils located under the adapted vehicles are powered on. It occurs only after the adapted vehicles are identified by the road communication and control system.

The demonstration will take place at rue Thomas Mann (Paris), on one side of the road, along Jardin des Grands Moulins.

VEHICLES

Three different vehicles will be adapted to be charged on the wireless charging lane: a Renault Zoe, a Stellantis DS3 and a Renault Master. The following subsystems will be integrated in the vehicles:

1. Coil: A coil of 30kW nominal power will be attached to Zoe and DS3 vehicles, while three coils of 90kW total power will be installed in the Master vehicle.

2. Power converters: The AC/DC stage converters are responsible for the delivery of the power received by the coil to the vehicle battery.

3. Cooling system: a dedicated cooling system for the converters was developed, avoiding the use of the standard cooling system of the vehicle.

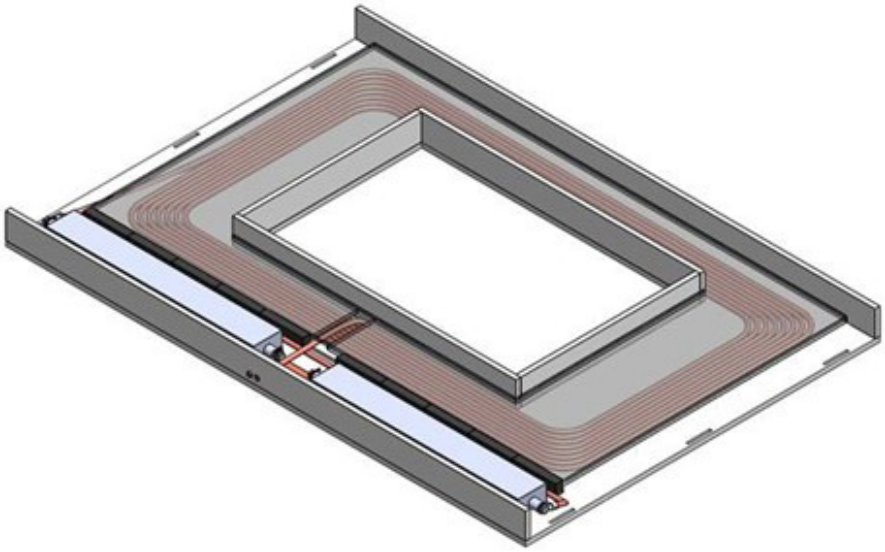
4. Lane keeping assistant: This system is composed of two cameras and a lane keeping assistant interface to help the driver to find the best positioning for the charging lane.

5. Communication system: A ISO15118 based protocol will be implemented and used to identify the vehicles to be charged.

The same vehicles will be used in the other inductive demonstrators of INCIT-EV project.

INNOVATION

In this project, several versions of coils and power electronics were used. These different versions have made it possible to mature all the inductive charging technology. Also, extensive studies have been carried out on the integration of these coils. Thus, and in urban areas, they made it possible to assess the impact of this type of system on the roadway in terms of mechanical and thermal resistance.



VEDECOM Coil

On the other hand, this project also makes it possible to integrate these innovative solutions into life-size vehicles where we have been able to equip three different vehicles from two different car manufacturers. The efficiency of the Dynamic Wireless Power Transfer has been assessed in laboratory and has to be evaluated in real conditions.

CONCLUSION

The following elements have been addressed:

- The choice of an appropriate pavement structure, and a method of installation of the charging coils in the pavement structure

- The design of the coils, embedded inside the asphalt pavement

- The design of the inverters, that drive the coils and its cooling

The whole system will be installed by end of 2022, and the charging efficiency will be measured in the following months, in various weather and temperature conditions

READ MORE ABOUT INCIT-EV PROJECT

https://www.incit-ev.eu

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EUROPEAN COMMISSION