INteractive CHarging

Informe

Información del proyecto

INCH

Identificador del acuerdo de subvención: 699111

Sitio web del proyecto

DOI
10.3030/699111

Proyecto cerrado

Fecha de la firma de la CE
18 Septiembre 2015

Fecha de inicio
1 Octubre 2015

Fecha de finalización
30 Septiembre 2017

Financiado con arreglo a
SOCIETAL CHALLENGES - Secure, clean and efficient energy

Coste total
€ 1 266 812,50

Aportación de la UE
€ 886 768,75

Coordinado por
ETREL SVETOVANJE IN DRUGE STORITVE DOO
Slovenia

Periodic Reporting for period 2 - INCH (INteractive CHarging)

Período documentado: 2016-10-01 hasta 2017-09-30

Resumen del contexto y de los objetivos generales del proyecto

When it charges its battery, electric vehicle (EV) is usually by far the largest consumer in the household or even in a small business or residential building. Uncontrolled charging without

consideration of external conditions may have negative consequences on the safety of building's network operation, and on implementation and operation costs of charging system. In addition, EV charging, especially in areas with a high share of EVs, may cause operational problems in the public electrical grid. With increased number of EVs this problem will escalate and the control of EV charging according to the needs and requirements of public grid operators will become inevitable.
The overall objective of the INCH project is to alleviate the stated problems and enable charging of an increasing number of EVs in a smart, safe, and sustainable manner. The specific objective of the INCH project is to introduce a new price-performance optimised low-voltage AC charger for charging of EVs at homes, offices, and car parks.

Conclusions:
The EV charging system developed within the INCH project represents a product that combines simple user interaction with complex control algorithms, local power management with operation of power grid and energy market, and quality materials and modern design with accessible price. The encouraging public response to new charging system indicates that the product's properties address exactly the issues that prevented the potential EV users from buying an EV and charging it at home.
INCH charging system enables interaction between operation of power grids and EV charging. It exploits the demand response capability of EV charging to elevate the role of EV charging from an uncontrollable load to an active component of smart grids. In this manner, the INCH charging system addresses one of the main concerns related to the upcoming increase of EVs, namely the ability of power system to distribute the increased amount of energy to final users in a safe and reliable way.

Trabajo realizado desde el comienzo del proyecto hasta el final del período abarcado por el informe y los principales resultados hasta la fecha

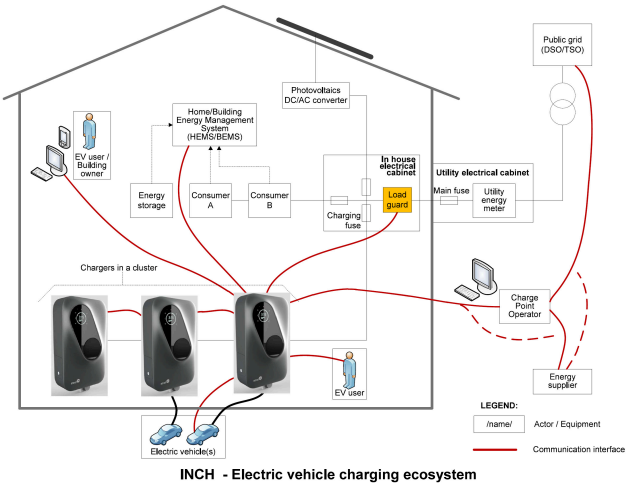
During the first year of the project the activities were focused on development of the technical solution that enables achievement of project's goals. A detailed system architecture was defined which contains actors and components involved directly in charging, local actors and components, and external actors that communicate with the charging system.
Due to its modular structure a new charger's motherboard allows to equip the chargers with different components and modules adapted to the requirements of each individual user. The modularity also enables adapting the charger's communication physical interfaces (Ethernet, Wi-Fi, PLC, or GSM) to the communication system already implemented on site. The newly developed charger's casing enables easy installation and maintenance, bringing additional savings to the end customer.
The implemented power management algorithms use information from the EV, from EV users, from the Load guard device that monitors the building's internal network, and from previous charging sessions. The algorithms control the charging process to achieve different goals: prevention of overload of internal network, charging cost optimisation by shifting the charging load to the periods of low energy delivery tariffs, maximisation of consumption of locally produced energy, and distribution of total charging load to several chargers installed at the same location by strict consideration of individual users' charging needs. In addition, the charging system is capable to communicate with grid and energy market actors in order to adapt the charging load to their needs.

The charger's physical user interface enables the user to enter the necessary information needed for management of charging load. It enables implementation of functionalities required for public charging, such as provision of information about charging price and support for different identification methods. The charger's web interface allows the user to supervise the operation of the system and to monitor the efficiency of power management algorithms.
The activities of the project's second year were focused on testing the developed charging system. The lab tests enabled the developed product to be successfully implemented on the field and tested in different real-world environments. The continuous analysis of system operation under different conditions and above all the users' feedback resulted in many ideas for improvement of functionalities that were successfully implemented already during the project.
In parallel with testing activities, comprehensive communication and commercialisation activities were conducted in order to enable smooth transition of the product from development stage to market entrance. Different media and communication approaches were used to inform the interested community, the beneficiaries of the solution (EV users, grid operators, energy market actors), and current and potential dealers of Etrel's products about the new charging system and its functionalities. The commercialisation activities were focused on designing the processes that will help in later establishment of network of dealers and other business partners that Etrel will cooperate with in sales, installation, maintenance, and customer support.

Avances que van más allá del estado de la técnica e impacto potencial esperado (incluida la repercusión socioeconómica y las implicaciones sociales más amplias del proyecto hasta la fecha)

The INCH charging system goes far beyond achieving its primary goal: charging of EV's battery. It brings the user experience of charging an EV at home to a new level by alleviating the deficiencies of charging that can strongly discourage end users from buying an EV. In addition, the INCH charging system is an enabler for implementation of complex charging configurations which connect one or more chargers into a charging cluster and further with other local and remote actors. In this way, the results of the INCH project present an enabling technology for integration of EV charging into smart grids and for provision of new services within electromobility.
The improvements achieved by the project are reflected in increased safety in operation of grid user's internal network and reduced total costs related to charging. Power management options help avoid additional costs for upgrade of connection of building's network to the public grid. Flexible communication options allow to use existing local communication networks already operating at user's premises. Charging cost optimisation algorithms shift the delivery of energy for charging to periods with lower energy delivery tariffs and higher production from local energy sources. Communication of charging system with grid and energy market actors enables incorporation of EV charging into demand response schemes that improve the operation conditions of public grid and contribute to energy balancing. Connection with actors in broader electromobility ecosystem allows implementation of possible business cases related to provision of services, which result in additional benefits for the grid user.
The overall impact of the INCH project will be reflected in wider acceptance of electromobility by removing some deficiencies of presently implemented charging systems and by offering the users a

cost-effective installation and use of charging system. Together with incorporation of EV charging into smart grid systems, the INCH project will allow to increase the number and use of EVs by charging them in a smart manner, which is the only way to optimise energy use in transport and reduce related greenhouse gas emissions.



INCH - Electric vehicle charging ecosystem

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