



CONCERT-Japan

Efficient Energy Storage and Distribution

" Modular Megawatt-range Wireless EV Charging Infrastructure Providing Smart Grid Services "

MoMeWEC

INTERIM REPORT

Electric vehicles are rapidly populating Norwegian roads and their number is expected to increase dramatically in the near future both in the rest of Europe and in Japan, with unquestioned beneficial effects on both energy efficiency and air pollution.

However, as new vehicles come equipped with ever bigger on-board batteries, the issue of developing suitable charging infrastructures must be addressed. In particular, simultaneous quick charging of many batteries poses serious challenges to the existing electric grid, calling for new methods that can mitigate such effects without needing major redesigning or expensive upgrades to the existing electrical distribution system.

MoMeWEC aims at developing a new way of building very large scale parking infrastructures, where hundreds of vehicles can possibly be charged simultaneously with minimized impact on the grid and with reduced cost and footprint of the installation. A combination of modern wireless charging technology with the latest advances in modular electric power converter design is proposed in MoMeWEC and will be investigated throughout the project. Analytical calculations, numerical simulations and lab-scale testing will be used to show the feasibility of the proposed approach, as well as the expected savings it will bring.

The first half year of the project has been devoted to establishing research links between the institutions involved in the project (Sintef Energi, The University of Tokyo, Nagaoka University of Technology, RWTH Aachen), coming from three different countries.

During the first year of activity, promising scientific results have been produced. MoMeWEC main concept, consisting of the proposed innovative charging solution has been presented at a major IEEE Conference (ICPE ECCE Asia 2019, Busan, Korea), resulting in a peer-reviewed publication with joint authorship of Japanese and Norwegian researchers. The concept has also been presented in an international gathering of experts in Tokyo, Japan, during the 2019 JST-NSF- RCN Workshop on Distributed Energy Management Systems.

Several other scientific papers are in preparation, based on different aspects of the technology developed in MoMeWEC. One article related to the wireless power transfer aspects has already been accepted for publication in the IEEE Electrification Magazine.

A reduced-scale model of the MoMeWEC concept is being built at Sintef with the help of visiting students from Japan and Germany. The demonstrator, including the modular charger and the emulated EV loads, is almost completed and will be ready for use in January 2020. Experimental data gathered using the model will form the basis for publications in renowned scientific journals.

The project has already seen significant researchers' mobility, both of senior and junior personnel, with a good mix of short, medium and long term stays in all participating countries. The goal of having annual Workshops with participation of all partners is also being pursued with success.

Main activity for the second part of 2019 has been the development of real-time simulation models for the concepts, together with practical realization of a small-scale demonstrator that will be usable in the beginning of 2020 and will form the basis for further joint publications in renowned scientific journals.

The yearly project Workshop with participation of all partners will be held in Tokyo in March 2020.