Smart Home: Tomorrow's Energy-efficient Household

Test Laboratory of the MeRegioMobil Initiative Integrates Electric Vehicles as Energy Storage Devices – Opening of the Lab on the KIT Premises

The KIT Smart Home integrates electric vehicles in the intelligent control of the household. (Photo: Andreas Drollinger)

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The smart home of the MeRegioMobil research initiative on the premises of Karlsruhe Institute of Technology (KIT) is now ready for occupancy. The prefabricated house covering an area of about 80 square meters is a prototype of an energy-efficient household of the future. Electric vehicles are integrated in the intelligent control of this household as electricity storage devices and consumers. The smart home is equipped with the typical elements such as a generator, consumer, and energy storage and will now be tested by its inhabitants.

Journalists are cordially invited to the opening on Friday, November 5, 2010, 10.00 – 12.00 hrs (KIT Campus South, Engelbert-Arnold-Straße 5, building 11.10, room 105, kleiner Hörsaal) and to join the subsequent tour of the smart home (KIT Campus South, Leonhard-Sohncke-Weg, building 30.37). (Please register on the form enclosed.)

MeRegioMobil is a joint project of industry and science. Under the

management of EnBW, the cooperation partners are KIT, Opel, Daimler, Bosch, SAP, Stadtwerke Karlsruhe (Karlsruhe Public Utility Company), and the Fraunhofer Institute for Systems and Innovation Research ISI. The project funded by the Federal Ministry of Economics and Technology (BMWi) is aimed at integrating innovative electric vehicles as mobile electricity storage devices in tomorrow's energy system.

The smart home is equipped with typical consumers and decentralized generators. Electricity is generated by a photovoltaic system and a micro co-generation unit. Consumers are typical household appliances, such as a washing machine, a dishwasher or refrigerator. Both conventional, commercially available appliances as well as smart and, hence, controllable electric appliances are used.

Via a charging station, electric vehicles are integrated as storage devices and consumers. The battery of the vehicle can be used to store surplus (renewable) electric energy at times of low load and feed it back into the grid at times of high load. In this way, load peaks are balanced and regenerative energies from fluctuating sources can be integrated much better into the energy system. The inhabitants of the smart home will live in the house for several months and use and evaluate the components developed.

Program for the Opening of the Smart Home:

10:00 hrs Welcome Address
Professor Eberhard Umbach, President of KIT
Engelbert-Arnold-Straße 5, building 11.10, room 105 (kleiner Hörsaal)

10:10 hrs The MeRegioMobil Project, Research Objective and Practical Applications
Lars Walch, EnBW, project head
Engelbert-Arnold-Straße 5, building 11.10, room 105 (kleiner Hörsaal)

10:30 hrs The Smart Home
Professor Hartmut Schmeck, Spokesman of the Project at KIT
Engelbert-Arnold-Straße 5, building 11.10, room 105 (kleiner Hörsaal)

10:50 hrs Tour of the Smart Home for Journalists
Leonhard-Sohncke-Weg, building 30.37

12:00 hrs Snacks

The Roles of the Partners of MeRegioMobil:

EnBW

As the head of the project consortium, EnBW, together with the project partners, studies how electric vehicles can be connected to a house energy management system (smart home) via intelligent charging stations. This includes the setup and operation of a public charging and accounting infrastructure that is run as an open platform with various energy suppliers and vehicle manufacturers.

Robert Bosch GmbH

In the MeRegioMobil project, Bosch focuses on the prototype development of the intelligent charging station as well as on concept research for the reference model “Information and Communication Technologies for Electromobility”.

Daimler AG

As a project partner, Daimler AG will make available various electric vehicles for the project. It is aimed at equipping the vehicles with a technology for the smart charging of the battery and for feeding the electricity back into the grid in a controlled manner. In this way, electric vehicles can be integrated in existing and future energy systems.

Fraunhofer Institute for Systems and Innovation Research ISI

The Fraunhofer Institute for Systems and Innovation Research ISI analyzes short-term and long-term developments of innovation processes and social impacts of new technologies and services. ISI expertise consists in broad scientific competence and an interdisciplinary, systemic approach. Under the MeRegioMobil project, Fraunhofer ISI contributes its profound experience in energy management, operation management strategies, energy demand, and load and charging management.

Karlsruhe Institute of Technology (KIT)

KIT builds a demonstration laboratory to test the integration of electric vehicles capable of feeding electricity back into the grid and decentralized energy generation systems in practice. In addition, KIT focuses on the development of novel energy-related services, control concepts, business models, incentive systems, and software architectures as well as on the further development of the legal framework. Eleven chairs from three KIT departments are involved in MeRegioMobil.

Opel

Within the framework of MeRegioMobil, Opel studies novel smart charging technologies for application in future series products. The test vehicles - electrically driven Merivas - are equipped with a bidirectional battery and control electronics for quick charging with 230 V household current and 400 V 3-phase current. Demonstration of this two-way charging technology is aimed at finding out how the energy stored in a high-performance car battery can be used reasonably at home. Particular attention is paid to electricity from regenerative sources.

SAP

SAP Research focuses on conceptual studies relating to the market and services platform for MeRegioMobil. It is concentrated on the integration of infrastructure services and the support of market-oriented business processes that will be required due to the integration of electric vehicles in the electricity grid in case of an enhanced use of regenerative energy sources. SAP also concentrates on safety aspects and in particular on concepts to ensure data protection in communication between vehicle and charging station and among the market participants.

Stadtwerke Karlsruhe

Within the framework of the MeRegioMobil project, the Stadtwerke Karlsruhe (Karlsruhe Utility Company) contributes to smart charging management from the special point of view of a utility company. Particular attention is paid to the implementation of the charging infrastructure for electric vehicles as well as on the decentralized generation of regenerative energies.

MeRegioMobil is a joint research project of the consortium partners EnBW Energie Baden-Württemberg AG (consortium head), Adam

Opel GmbH, Daimler AG, Fraunhofer Institute for Systems and Innovation Research (ISI), Karlsruhe Institute of Technology (KIT), Robert Bosch GmbH, SAP AG, and the Karlsruhe Utility Company. Based on modern information and communication technologies, this model project is aimed at developing key technologies and services for the integration of electric vehicles in existing and future energy and transportation grids and testing them in Baden-Württemberg. In this way, MeRegioMobil complements the research concept of the "Minimum Emission Region" (MeRegio project) that optimizes CO_2 emissions of a whole region by the smart connection of e.g. photovoltaic systems (decentralized generation), cooling devices (consumer), and the battery of an electric vehicle (storage). MeRegioMobil is part of the funding program "Information and Communication Technologies for Electromobility" of the Federal Ministry of Economics and Technology and the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety.

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Karlsruhe Institute of Technology (KIT) is a public corporation and state institution of Baden-Württemberg, Germany. It fulfills

the mission of a university and the mission of a national research center of the Helmholtz Association. KIT focuses on a knowledge triangle that links the tasks of research, teaching, and innovation.

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