

Press Release

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Intelligent Energy Management in Smart Grids

Fraunhofer ISE coordinates project for an integrated communication concept

The increasing amount of renewable energies being integrated into our electricity grid requires new management and ICT concepts. In addition to the chances of active participation in the energy markets and reducing electricity costs, a decrease in peak loads is also made possible through the intelligent use of renewable energies. The requirements of a grid management and the necessary communication technology are high. Under the coordination of Fraunhofer ISE, it will now be demonstrated for the first time how all of the features of a so-called Smart Grid can be realized by using an integrated Smart Metering concept.

An innovative energy management and communication system was developed as part of the InnoNet Joint Project "DEMAX" (Decentralized Energy and Grid Management with flexible Electricity Rates) which is sponsored by the German Federal Ministry of the Economy. Based on the system developed, decentralized energy suppliers and loads from the commercial and private sector can participate in the energy market. The main component of the system includes an "Embedded System" of the newest generation that allows an internet based communication. "In order to be able to use the generated energy locally, the supply and demand must be optimally matched. For instance, the energy generated by a photovoltaic system can be used directly for charging the electric vehicle. During peak load in the evening, the co-generation can supply a part of the electricity demand," explains Dr. Christof Wittwer, Head of the Group Operation and System Controls at Fraunhofer ISE.

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The concept functions as follows:

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Distributed grid-connected energy systems in Smart Grids require an efficient integration into a communication network. A conventional internet access is used for transacting the entire communication e.g. for billing, remote monitoring, process visualization, etc. - without incurring any appreciable costs for data transmission. For the connection between the so-called Smart Meters and the system components, the researchers developed a standardized DEMAX gateway. From within a local network, the gateways communicate with the service providers through a central proxy server using secure data connections. The server, for example, can be installed in the transformer station of the low voltage grid. Then, all involved parties, e.g. measurement services providers, electricity suppliers and grid operators, are connected by highly available internet connections.

In the practice, a superordinated virtual power plant operator can take over control of the energy generators and loads, or an indirect request is made by means of a variable pricing rate. "In DEMAX, we realize an automated local optimization of the operation where, in addition to weather and consumption prognoses, an innovative control algorithm also considers flexible pricing rates," describes Christian Sauer, responsible project leader at Fraunhofer ISE. Together with the innovative pricing system of the electricity provider EWS Schönau in Germany, an attractive tariff model is offered to private operators of co-generation systems. The energy management system is an economic, incentive-based operational system for loads and suppliers that also considers the charge condition of the thermal storage.

Here the work of the research partner Steinbeis Innovation Center – Embedded Design and Networking (sizeden) - on innovative wireless communication including standardized components (MBUS RF with Open Metering System, OMS) as well as the concept of flexible electricity tariffs offered by the project partner EWS Schönau are equally shown to advantage.

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With the development of an intelligent control module from the embedded hardware manufacturer SSV Embedded Systems, a link between decentralized cogeneration plant and a virtual power plant is made possible. As a specialist for virtual power plants and at the same time an electricity and stock trader, in.power GmbH contributes its expertise and its software platform in.power energy manager (i.pem) to the project. The project partner GÖRLITZ makes a substantial contribution to the project's success with its know-how in the field of energy data acquisition and management.

At present, the consortium is testing the innovative system technology in a small distribution grid in Bad Bellingen, operated by the EWS Netze GmbH. The project results will be used to develop products and services for the market in cooperation with the industry.

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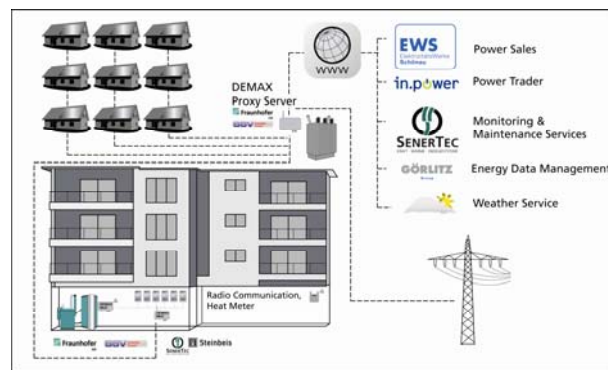
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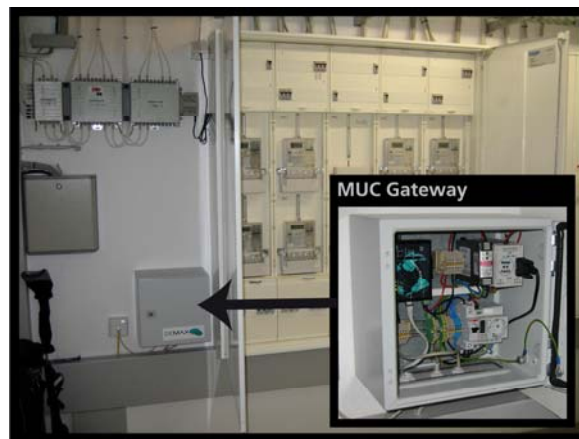
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Schematic of the intelligent grid connections using the DEMAX concept.
Source: Fraunhofer ISE



Multi Utility Communication (MUC) Gateway in a service connection room in the Bamlach housing complex. It is here that the communication takes place between the electricity meters and the service providers.
Source: Fraunhofer ISE

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