

Press Release

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Decentralized, Flexible and Smart: DEMAX Pilot Project for Energy and Grid Management Successfully Concluded

Presently the expansion of renewable energies is taking place faster than expected. They are increasingly influencing the energy market which is also undergoing a transformation. In particular, the distribution grid, i.e. the grid on the city or local level, accepts the renewable energy and soon reaches its limits. The intelligent networking between decentralized suppliers and loads is realized by Smart Grids in order to compensate for the fluctuations in electricity. A pilot system, developed under the direction of Fraunhofer ISE, shows how modern Smart Metering Systems with flexible tariffs for supply and loads can be used in order to intelligently control the load flow in the networks. The German Federal Ministry of Economics and Technology sponsored the work within the InnoNet joint project "DEMAX" (**D**ecentralized **E**nergy and **G**rid **M**anagement with **F**lexible Energy Rates).

Intelligent Energy Management in Smart Grids

Under the coordination of Fraunhofer ISE, partners from research and industry developed an innovative energy management and communication system with which decentralized suppliers and loads from the commercial and private sectors can participate in the energy market. The communication is carried out through an open, internet-based communications protocol. The main component is an embedded system of the newest generation, allowing internet-based communication through a flexible choice of media.

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In this project, researchers addressed the important issue of how to optimally match the energy supply and demand for both the thermal and the electrical energy. To this end, the combined heat and power plant must be electrically and thermally controlled in the most effective manner in order to also satisfy the needs of the grid. In this project, this was realized with the "SenerTec Dachs" CHP system. Economic incentives such as flexible, or time-of-use, tariffs are determined for the system using an optimizing algorithm.

Implementation of the MUC Standard with the DEMAX gateway

The project partners' answer to the existing challenge is the DEMAX gateway. This gateway was tested in a pilot project in Bad Bellingen, a representative distribution grid of the project partner EWS Schönau Netze GmbH. In the DEMAX gateway, the so-called "MUC Standard" is implemented. This standard was conceived for applications in multi-family houses or apartment buildings. Scientists at Fraunhofer ISE have developed an implementation that fulfills the "MUC Standard" and is accessible to the public (www.openmuc.org). "With the openMUC software platform, we can record relevant billing data from electricity, gas, heating/cooling and water consumption in a modular way. The metering technology for single and multi-family houses can be kept to a minimum, i.e. cost-effective," explains Christian Sauer, responsible project leader at Fraunhofer ISE. The MUC controller is a gateway for all types of meters. Using this set-up, the research partner Steinbeis Innovationszentrum – Embedded Design and Networking (sizedn) tested and optimized its wireless M-Bus technology. In addition, they developed important tools for putting the system into operation, monitoring and cost-effective relaying.

On the basis of these integral communication concepts, the project partner EWS Schönau could offer its customers

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innovative and flexible electricity tariffs with positive results. With the tariffs developed from the field test project, a marked load shift averaging four percent was realized. With expertise in the acquisition and management of energy data, the project partner Görlitz AG assisted in successfully integrating the energy data (EDW3000) into the business process of the relevant agents in the energy market.

Grid integration of CHP plants

In addition to the Smart Metering System, another main component of the DEMAX gateway is a communication module with a Linux-based embedded system developed by experts at the SSV Software Systems GmbH. The new communication module is used for connecting the combined heat and power system to the network: It provides the technical network prerequisites so that the local "SenerTec Dachs" system can be incorporated into the Smart Metering system, leading to optimal operation with consideration to both the thermal storage as well as the virtual power plant. Based on the project results, the company Senertec developed a communication module with an Ethernet interface for the Dachs and the Dachs Stirling. This facilitates the connectivity to control systems for the electricity providers, to the Dachs control system for service technicians and also to the central building control systems. The Ethernet module was introduced into the system in 2011.

In the project, the partner in.power GmbH acts as an independent, direct marketer of decentralized, renewable and environmentally friendly energy. The company joins small and medium-size power plants into large marketable units. The company in.power contributes its expertise in the areas of the energy industry and the IT sector. It holds experience in the practice through its own in.power energy network set up over three years ago. A standardized remote access to the system is carried out, for example, by the appropriate schedule or tariff value.

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The successful Smart Grid pilot project showed that decentralized players can actively participate in the energy market – also under the current conditions – by the use of flexible electricity tariffs. The project results verify that through the use of an intelligent energy and network management, fluctuating and controllable energy suppliers can already be integrated cost-efficiently into our energy system today.

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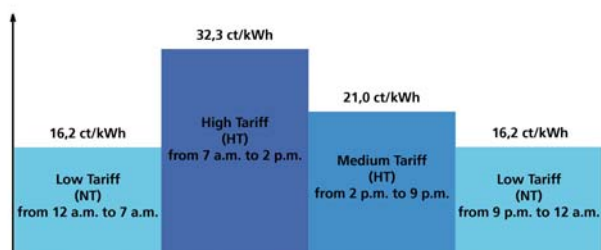
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Your Flexible Electricity
Tariff



Monday - Friday



On Saturdays, Sundays and holidays the medium tariff amounting to 21,0 ct/kWh is valid all day long.

Fig. 1: The graph shows flexible tariffs which were used within the DEMAX project. The result was a considerable load transfer at the participants of the field test. ©Fraunhofer ISE



Fig. 2: The project partners developed a controller with a communication module for CHP plants such as this "SenerTec Dachs" unit which is suitable for the smart integration of CHP into electricity grids. ©Fraunhofer ISE

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