

CeBIT 2010: Intelligent energy management for the home

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Using his mobile phone as a display and control mechanism, the resident can control the energy consumption of his appliances. (© Fraunhofer FIT)

(PhysOrg.com) -- In order to save energy, consumers need to be able to obtain up-to-date information at any time about the energy consumption of their appliances, and be able to control them while away from home. At CeBIT 2010, Fraunhofer scientists unveil two applications that help consumers manage their power use.

"Smart meters" - intelligent devices to measure consumption - make it possible to read and control [power consumption](#), even of private households, while away from the property. This is because the increasing use of solar and wind resources will be changing the [electricity](#) supply matrix in the very near future.

Today's battery technology is unable to sufficiently buffer the fluctuations in the [energy](#) supply. This is why customers should be able to consume power as precisely as possible, once it becomes available. Price incentives represent one possibility for creating this precise alignment of supply and demand: When supply is up, the price drops, and vice versa. An intelligent control system will soon be assisting end-consumers with this by keeping a steady eye on electricity prices.

Professor Frank Bomarius, deputy director of the Fraunhofer Institute for Experimental Software Engineering IESE in Kaiserslautern, and his team are currently developing software that shadows the electricity meter and that ensures energy consumption is adjusted accordingly. "Data on the anticipated price trend over the next few minutes or hours come from the outside - which means from the power supplier - or utility company," says the computer scientist. These must be adapted to the needs and preferences of the consumer. "Our system makes sure that there is optimal control over household appliances based on these conditions." This entails more than simply shutting off the air conditioner or laundry machine for the interim, should electricity prices go up. Instead, a much more intelligent approach would be, for instance, using the refrigerator or freezer for [energy storage](#). "If the utility company reports that electricity is getting scarce and will become more expensive in the next two hours, then these appliances can begin to pre-cool their contents right away, so that afterwards, they won't need any power for an extended period of time." The same principle applies correspondingly to water and heating systems.

The system can be controlled via PC, where the consumer simply enters his preferences: setting the temperature for cooling or heating, setting a maximum price that he's willing to pay per kilowatt hour, and setting a limit on maximum consumption. The software uses this input to assess when and which devices in the household are switched on and off. The computer is directly connected to the laundry machine or heater through

electrical conduits or wirelessly. And in actual use, the intelligent energy management system will run on the same computer that also controls other household functions: lighting and heating; window shades; locking systems; and arranging help for residents at home who require assistance.

The system is slated for real-life testing in a few residences in Kaiserslautern in 2010. Of course, it is also suited for use in large residential complexes, public buildings or commercial premises. Typically at such properties, a centralized building system is already installed, and energy management rests on its shoulders. Researchers for the Kaiserslautern project and the local utility company are still negotiating exactly how the system will communicate with the supplier. "We want to keep the interface within a narrow margin," says Bomarius. "There is no reason why my power supplier should know or influence when I use my heating or cooling, watch television or do the cooking."

Mobile phone as control center

Researchers at the Fraunhofer Institute for Applied Information Technology FIT in Sankt Augustin are offering an alternative helpful support: They have created an application that displays the energy consumption of individual appliances within the home. This means that consumers can figure out what device guzzles energy, and get a feeling for which appliances consume how much energy - and that will clearly help them save money. The application is based on the "Hydra" middleware developed by the institute, which was upgraded with a specialized energy protocol. "Using his mobile phone as a display and control mechanism, the resident can control the [energy consumption](#) of his appliances," says Dr. Markus Eisenhauer, who developed the system. "For instance, he can display consumption per room, turn appliances on or off, or dim the lights." And that's not all: The cell phone's camera image can be used as a "magic lens." Just point the camera to a certain appliance, and, as if waving a magic wand, the appliance's exact wattage

is displayed in real-time.

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