

# Are smart grids the way forward?

Smart grids will definitely spark heated debate. And there is much speculation about when they will be market ready. We asked two experts for their input on this electrifying issue.



**“State-of-the-art metering systems and pricing models present a prime opportunity for us to use energy more efficiently.”**

**Dr. Christof Wittwer**, of the Electrical Energy Systems Department at the Fraunhofer Institute for Solar Energy Systems (ISE) in Freiburg, Germany, holds a degree in engineering.

## Opportunities

### Key technologies in the smart grid

Two developments will play a key role in the future of the energy industry: increased use of wind and solar power, and the rise of cogeneration plants that use waste heat from electricity generation for district heating. To accommodate these new technologies, we will need to radically redesign our power distribution networks – by turning them into smart grids. This will allow utilities to coordinate fluctuating output from renewables with power generated by conventional plants. Plus smart grids will pave the way for Internet-based communications technologies suitable for achieving visibility into the distributed pattern of power generation.

Smart metering systems – intelligent meters connected to a network that enable utilities to offer flexible pricing models – are a good place to start. They have the potential to create the necessary transparency for consumers to modify their energy consumption habits in line with monetary incentives offered by utilities for reducing energy consumption or using electricity during off-peak times. Currently, there are no such incentives. However, the European Union has recognized the need for change. The new EU energy efficiency directive, set to be implemented in 2011, will require utilities to provide transparent and flexible pricing models for consumers.

For utilities in Germany, structural change will mainly be driven by the Renewable Energy Sources Act and the Combined Heat and Power Act. These two laws stipulate that renewables must account for at least 30 percent, and cogeneration at least 25 percent of the energy mix by 2020. The greater percentage they make up, the more important it will be for utilities to be able to align supply with demand, and, crucially, demand with supply. Smart metering systems are a key technology, as they enable power generation companies to incentivize households to adjust their energy consumption patterns, making it easier to manage grid load.

For utilities and customers to be able to reap the benefits of economies of scale, a certain level of standardization for smart metering systems is required. To be price-effective, smart meters must be able to be deployed across multiple technologies and communications networks. A number of initiatives are under way that promise to make the technology more affordable.

It is difficult to predict to what extent consumers will take advantage of the possibility to generate their own power or to reduce their energy consumption. This will largely depend on the legislature. However, state-of-the-art metering systems and pricing models present a prime opportunity for us to use energy more efficiently and to better manage decentralized power sources within the grid.

**Links:** [www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)  
[www.erneuerbare-energien.de/englisch](http://www.erneuerbare-energien.de/englisch)

Photos: Anne Morgenstern, Ralph Sondermann

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Professor Torsten J. Gerpott, 51, holds the chair in Strategic and Telecommunications Management in the Department of Technology and Operations Management at the University of Duisburg-Essen.

## Risks

### Households will have no great demand for smart grids and meters

Expectations for smart grids are high. It is hoped that they will lead to better management of renewable energy sources, such as decentralized solar panels and wind farms. Their output is subject to strong fluctuation: in fact, they only produced 16 percent of Germany's energy in 2009. A further hope is that smart grids will enable the introduction of new forms of energy storage such as electric cars, for example. The new technology is also expected to influence the way people use energy, and to provide real-time statistics on power consumption for households. The first step in fulfilling these expectations is to introduce smart meters. These communicate the energy consumption of an entire household or of individual appliances (washing machines, for example) to the utility and allow users to access the information quickly and easily on their laptops or smartphones.

Although installing smart meters to improve the organization of grids makes a great deal of sense, it is naïve to believe that utilities will be compelled to install these appliances on a large scale as a result of great demand from German citizens. Empirical studies show that, for the majority of people, electricity is not a product that inspires passion or identification. There is also no real motivation to reduce energy costs by sitting in front of the “household energy cockpit” and switching appliances on and off as grid load changes. Whatever popular environmentalist views they may profess to have, consumers are not actually prepared to spend money on smart meters as a rule. The effort required is too great and the savings that can be made are far too low. Simply installing the smart meters themselves will not lead to a noticeable reduction in household energy consumption. Rather, widespread use of energy-efficient household appliances, computers and other consumer electronics will make a much more significant contribution in this regard.

Just as was the case with driving the greater integration of renewable energy sources or the insulation of buildings, it will not be enough to hope that free market forces and an organic consumer demand will lead to widespread installation of smart grids and meters. These innovations will not break into the mass market for a long time unless clear-cut and binding statutory regulations are introduced.

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