ACEEE Policy Brief
American Council for an Energy-Efficient Economy

Smart Grid

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CONGRESS SHOULD

- Include distributed resources, such as CHP and locally generated solar and wind energy, as part of any plans for a national smart grid.
- Support regulatory models that allow both customers and utilities to benefit from the smart grid.
- Support research on the potential benefits of a national smart grid and ways to maximize those benefits.
- When discussing smart grid legislation, support technologies that have been thoroughly tested and evaluated. We especially encourage research on the effects of smart grid technologies on customer behavior and energy use.

THE ISSUE

"Smart grid" is an umbrella term describing an electrical transmission and distribution system that employs a full array of advanced electronic metering, communications, and control technologies. The grid would provide detailed feedback to customers and system operators on energy use and allow precise control of the energy flow in the grid. Smart grid proponents claim significant energy savings benefits; experience and results to date are promising, but research and evaluation supporting these claims are still limited. We recommend that smart grid design be based on behavioral research as well as technological advances and that utilities match their technologies to the needs and opportunities of their customers.

SUMMARY

Customer awareness of energy use is crucial to achieving the energy efficiency potential of a “smart grid.” A well-designed smart grid will make energy use more visible to residential, commercial, and industrial customers through improved metering, billing, and rate design. It will offer customers new opportunities to monitor, control, and manage their energy use. The advanced metering, communications, and control technology of a smart grid would allow system operators to optimize the delivery of electricity to their customers both accurately and efficiently. This technology gives customers and utilities detailed feedback that can be used for tracking and managing energy use.

Advocates of smart grid offer compelling arguments in favor of updating our national electricity systems. U.S. transmission and distribution systems have not evolved to match the development of computer technology and are becoming antiquated. As concern grows about the cost of blackouts, the risks of climate change, and the importance of secure and reliable energy resources, a smart grid system is an increasingly attractive option.[1]

If properly designed, the deployment of a smart grid could provide new tools for energy efficiency. A key issue is whether smart grid technologies and protocols are designed to reduce total energy use (i.e., energy efficiency), or just to affect the *timing* of energy use (i.e., load management). So far, most smart grid applications have been oriented toward load management objectives.

Ideally, utilities and customers would optimize their own energy use for greater overall energy savings, leading to financial and environmental benefits. Advanced metering, improved controls, and innovative rate structures could empower customers to manage their own energy use more effectively than with

[1] *Ibid.*

conventional technology. Some pilot programs are exploring these opportunities. Researching customer behavior and choosing technologies that suit customer needs are essential steps in designing an energy-efficient smart grid.

Transitioning to a smart grid requires money. However, the alternative—using a system that is less stable, less flexible, and less efficient—is not sustainable. Also, creating a smart grid would provide "green jobs" by supporting the integration of renewable energy technologies, the use of plug-in vehicles, and the integration of "local" resources such as energy storage and distributed generation.[2] KEMA estimates that building a smart grid would create 278,600 jobs while the grid is being developed and 139,700 jobs during the first five years that the grid is in place.[3] Utilities could also monitor the smart grid at multiple levels for improved reliability and security.

Like the technology it's made from, the concept of a "smart grid" is flexible. Its design depends upon the goals of the stakeholders who agree to build it. We encourage further research into smart grid development and its potential benefits to the nation. These benefits would include: enabling customers to better manage their electricity use, helping to avoid costly blackouts, improving the security and reliability of our electricity, facilitating renewable energy development, and reducing the need for new power plant construction. We especially encourage thorough testing and evaluation of customers' response to the implementation of various smart grid components and services. Although smart grid proponents often mention the grid's potential energy savings, building a strong foundation for their claims will require more research.

While the smart grid is often seen as a technological advance, its ultimate impact will also depend on how customers respond to it. Smart grid technology will not necessarily save energy unless utilities base their rate design, education, and programs on that objective, and use research and evaluation to document and improve its impact on energy use. If utilities empower customers to make smart choices about their electricity consumption and to take advantage of renewable energy sources, creating a smart grid may also change how we use and generate electricity.

FOR MORE INFORMATION

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ACEEE CONTACT

Marty Kushler
mgkushler@aceee.org

Dan York
dyork@aceee.org

[2] *Ibid*.
[3] KEMA, *The U.S. Smart Grid Revolution: KEMA's Perspectives for Job Creation,* http://www.kema.com/services/consulting/utility-future/job-report.aspx (accessed August 25, 2009).