ALLIANCE TO SAVE ENERGY
Creating an Energy-Efficient World

Fact Sheet

Energy Efficiency and the Smart Grid

Integrating communications technologies into the electricity grid to improve performance and reduce energy use

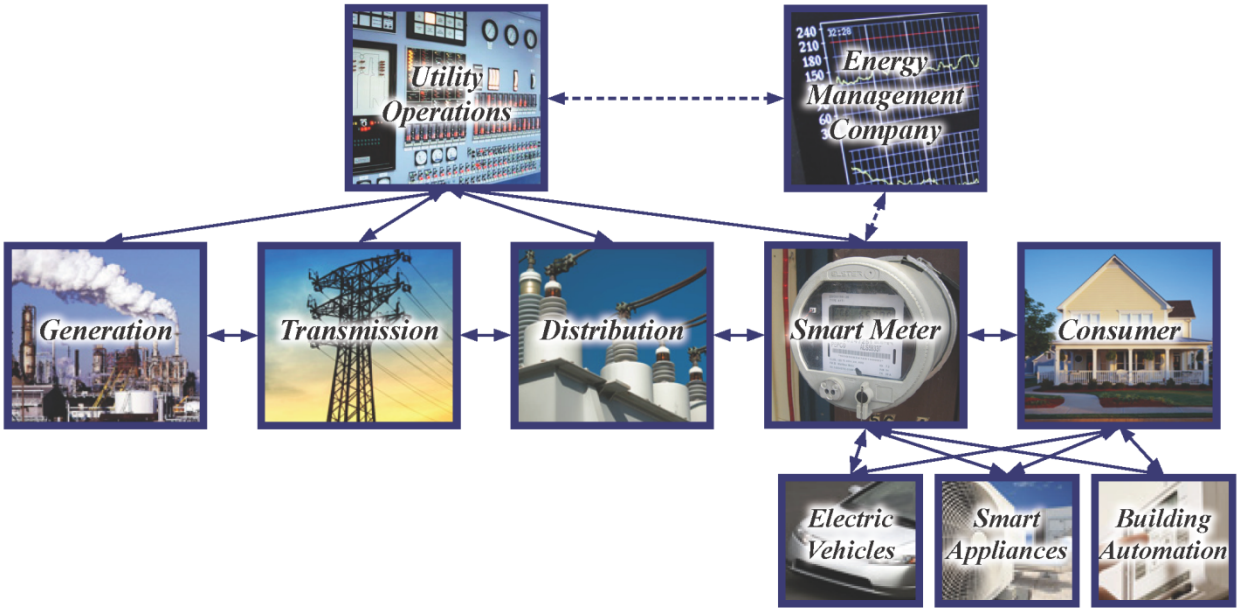
What is a Smart Grid?

The smart grid is a system of interconnected technologies that enable two-way communications between different parts of the electric power system, from generation through to the appliances that consume electricity.[1] It includes sensors along the transmission and distribution system to allow grid operators to know the condition of the grid in any given location. It includes smart meters (also called "advanced metering infrastructure," or AMI) in homes and businesses that can automatically measure and report electricity usage throughout the day. It also includes appliances that can respond to signals from grid operators or their owners in response to events on the grid. This system of communication allows grid operators to have a greater awareness of the condition of the electrical grid at any given location, compared with current, largely analog, systems. It also allows consumers the opportunity to have a better understanding of their own energy use – potentially down to individual appliances' consumption.

Energy Efficiency and Smart Grids

Smart grid and AMI systems can help grid operators run the electrical grid more efficiently and help consumers better understand their own energy use, also allowing them to identify energy saving opportunities. They could also open up opportunities for energy management companies, hired by consumers, to use data from consumers' smart meters to identify opportunities for energy savings or to measure the success of energy savings measures after they are undertaken. For utilities, to better understand the status of the electrical grid at a second-by-second level allows the grid to be operated at much tighter tolerances, resulting in greater efficiencies and reliability.

Elements of a Smart Grid



Demand Response

Smart grid technologies also have the capacity to allow for reductions in electricity use targeted at times when demand is highest. Called *demand response*, these peak reductions can reduce the strain placed on the electrical grid and reduce the need for high-cost generation resources. For example, during demand response events, a business could curtail its operations to reduce its energy use. Certain equipment activities could be postponed or curtailed – for example, ice production for cooling needs could be shifted to off-peak periods. Consumers participating in demand response activities are compensated for the service. While demand response programs currently exist in many areas without smart grid systems, having a smart grid and appliances that can respond to signals from a utility can allow for greater process automation. Consumers do not have to take an action each time a utility calls for demand response activities; the utility can simply send a signal to smart-capable appliances that take action based on pre-programmed consumer preferences. Demand response and the shifting of peak loads can reduce overall energy use (*e.g.* dimming lights slightly at one time does not encourage people to set them even brighter at other times) but it does not necessarily do so (*e.g.* turning down an air conditioner may mean it runs harder before or after a demand response event).

Challenges to Efficiency and Smart Grid Systems

The technological feasibility of the benefits made possible by the smart grid does not guarantee that these benefits will be realized. Utilities implementing smart grid and smart meter programs must design them to work within their infrastructure. Where the utilities cannot identify a business case for doing so, they might make only a portion of the smart grid's features available to their consumers. Technical challenges still exist as well; for example, utilities must manage vast amounts of new data to measure consumer energy use at short intervals and make it available in a useful and timely fashion. Without concerted effort to generate consumer value in smart grid technologies, smart meters may simply become a means to reduce meter reading costs.

Action in Congress

The Electric Consumer Right to Know Act (e-KNOW Act, S. 1029) was proposed in the 112th Congress by Senators Udall (D-Co.) and Brown (R-Mass.). It would require that utilities provide energy use data to consumers – particularly data generated by smart meters. Similar legislation was proposed during the 111th Congress by Representative Markey (H.R. 4860) and by Senator Udall (S. 3487).

E-KNOW would also allow customers to give third parties access to their consumption data. This would allow third-party energy management services to process and reinterpret data from smart meters and to program smart appliances for consumers. Such services could simplify smart meters' use, create the potential for greater energy savings, and allow for an aggregation of savings for load management.

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[1] Though less often a topic of public discussion, and less common than electrical smart meters, smart meters for gas and water also exist.