



The Smart Home

How will the Smart Grid affect your home? It won't look very different, but behind the scenes a lot will be happening. Even right now, in many cities across the nation, new equipment, appliances, and software are available that use emerging Smart Grid technologies to save energy, seek out the lowest rates, and contribute to the smooth and efficient functioning of our electric grid.

A key element that allows all of the emerging Smart Grid technologies to function together is the interactive relationship between the grid operators, utilities, and you. Computerized controls in your home and appliances can be set up to respond to signals from your energy provider to minimize their energy use at times when the power grid is under stress from high demand, or even to shift some of their power use to times when power is available at a lower cost.

Smart Meters and Home Energy Management Systems

Smart meters provide the Smart Grid interface between you and your energy provider. Installed in place of your old, mechanical meter, these meters operate digitally, and allow for automated and complex transfers of information between your home and your energy provider. For instance, smart meters will deliver signals from your energy provider that can help you cut your energy costs. Smart meters also provide utilities with greater information about how much electricity is being used throughout their service areas.

This energy information coming to and from your home through your smart meter can be run through a home energy management System (EMS), which will allow you to view it in an easy-to-understand format on your computer or hand-held device. A home EMS allows you to track your energy use in detail to better save energy. For instance, you can see the energy impact of various appliances and electronic products simply by monitoring your EMS while switching the devices on and off.

An EMS also allows you to monitor real-time information and price signals from your utility and create settings to automatically use power when prices are lowest. You can also choose settings that allow specific appliances and equipment to turn off automatically when a large demand threatens to cause an outage—avoiding peak demand rates, helping to balance the energy load in your area, and preventing blackouts. Your utility may provide financial incentives for doing so.

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Smart Appliances

In your smart home, many of your appliances will be networked together, allowing you to access and operate them through your EMS. An EMS provides the ability to turn on your heater or air conditioner from work when you're about to go home or keep track of the energy use of specific appliances or equipment—like tracking the energy use of your pool pump, or seeing how much energy you saved with your new Energy Star dishwasher.

Smart appliances will also be able to respond to signals from your energy provider to avoid using energy during times of peak demand. This is more complicated than a simple on and off switch. For instance, a smart air conditioner might extend its cycle time slightly to reduce its load on the grid; while not noticeable to you, millions of air conditioners acting the same way could significantly reduce the load on the power grid. Likewise, a smart refrigerator could defer its defrost cycle until off-peak hours, or a smart dishwasher might defer running until off-peak hours.

Of course, these smart appliances will include consumer controls to override the automated controls when needed. If you need to run your dishwasher right away, regardless of the cost of power, you'll be able to do so.

One unique type of smart "appliance" is the plug-in electric vehicle, or PEV. See the PEV Section for information on how PEVs will interact with the Smart Grid.

Home Power Generation

As consumers move toward home energy generation systems, the interactive capacity of the Smart Grid will become more and more important. Rooftop solar electric systems and small wind turbines are now widely available, and people in rural areas may even consider installing a small hydropower System on a nearby stream. Companies are also starting to roll out home fuel cell systems, which produce heat and power from natural gas.

The Smart Grid, with its System of controls and smart meters, will help to effectively connect all these mini-power generating systems to the grid, to provide data about their operation to utilities and owners, and to know what surplus energy is feeding back into the grid versus being used on site. A potential feature of the Smart Grid will be to allow your community to use your solar array—and your neighbor's—to keep the lights on even when there is no power coming from a utility. Called "islanding," it will allow a home to grab power from "distributed resources," such as local rooftop solar, small hydropower, and wind projects, until utility workers can bring the grid back online.





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