

Smart Microgrids

The Foundation of the Perfect Power System

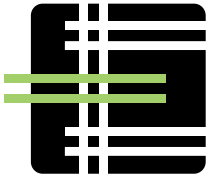
Over the past 50 years, America's electric power system — the grid — has been starved of innovation and technical updates, despite significant increases in consumer demand for electricity. As a result, the current system has become incapable of meeting the growing needs of 21st century consumers. One solution to this problem is to expand the role of smart microgrids that interact with the bulk power grid but can also operate independently of it in case of an outage or other disturbance.

What are smart microgrids?

Smart microgrids are modern, small-scale versions of today's huge centralized electricity system. Like a centralized grid, microgrids can generate, distribute and regulate the flow of electricity to consumers. They also can be networked with one another as well as with the central grid to increase capacity, reliability and efficiency. Unlike a centralized grid, however, microgrids are not necessarily owned or run by a utility company. Microgrids can be built, owned and operated by a community, neighborhood, university, corporation, hospital, individual or any other entity that has legal authority over their power infrastructure (i.e., power lines, generation source, meters, etc.). This local control, which allows for private investment in the system, together with their relatively small size makes microgrids hotbeds for entrepreneurial innovation: They are able to feature the latest smart technology that increases efficiency and reliability and to create islands of sustainable energy within the larger grid. Key benefits of smart microgrids include:

- **Smart microgrids increase reliability.**
Microgrids can be connected to one another and to the larger grid, which allows them to back each other up — and back up the central grid — when power demand and cost are highest. This would lead to fewer rolling blackouts and brownouts during times of peak demand, like hot summer days. Smart technology such as sensors and automated switches enable many of the problems that cause blackouts to be avoided entirely, or at worst, restricted to much smaller areas. The resulting reliability and energy efficiency dollar savings to consumers are typically at least four times the cost of implementing a smart microgrid.
- **Smart microgrids make it easier to efficiently meet growing consumer demand.**
As Americans' dependence on electricity for everything from entertainment to automobile travel increases, there are no signs that the rising demand for power will level off. Microgrids allow local communities, neighborhoods and even individual buildings to increase electricity supply quickly through relatively local small generators, rather than having to wait for power companies to build costly centralized power plants that take much longer to come online. They also can provide real-time price signals and automatically adjust electricity usage to most efficiently meet the power needs of each individual consumer.





Smart Microgrids

- **Smart microgrids make it possible to get the most from clean, renewable energy.**
Because smart microgrids include on-site, backup power sources and energy storage, they have increased flexibility to tap a much wider range of energy sources, including those that present a challenge for the current centralized system such as wind and solar. When the sun shines and the wind blows, microgrids can produce power for themselves and profitably sell the excess to others. When the weather does not cooperate, the microgrid reverts to stored power or power supplied by the central bulk grid, or even another microgrid to which it may be connected.
- **Smart microgrids nurture major technological innovation.**
Microgrids represent the most consumer-friendly and lowest cost bail-out plan for our aging electricity infrastructure. They allow us to “smarten” the grid one piece at a time. Local control over the power infrastructure makes a new business model possible — one in which entrepreneurs and their technologies are invited to participate in an open, competitive market. In addition, because microgrids can be built to optimal scale for its users — whether it is a single building or an entire community — networks of microgrids can be established that provide tailored power service at the best price to each consumer. As a result, for the first time, consumers would have control over the price they pay for electricity, while the electricity producers would have a market-driven incentive — competition — to increase the affordability, efficiency and reliability of our power.