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Residential

By Lee Barken

Power to the future

According to the Lawrence Berkeley National Laboratory, buildings are responsible for 39 percent of total energy consumption for heating, cooling, lighting and plug loads in the United States. This far exceeds the energy used by the transportation or industrial/manufacturing sectors.

For developers and construction managers, this critical need presents a great opportunity to modernize our nation's buildings and work towards sustainability.

The utility infrastructure of yesteryear is changing from a one-way grid to a multifunctional engineering marvel, including distributed generation, energy storage and electric vehicles. Construction of the future will be focused on buildings and neighborhoods that are outfitted for microgrids.

Enhanced Reliability

A microgrid is a design strategy that increases community resiliency through independence and enhanced reliability of the electricity distribution network. A microgrid is effectively a small-scale version of the electricity grid itself designed to fail gracefully and recover rapidly with full system functionality. It includes all aspects of generating electricity and then distributing that electricity to customers.

Historically, microgrids were the domain of large campuses such as universities or commercial complexes. However, with advances in technology, microgrids are being explored for neighborhoods, small commercial centers and other logically organized groups of customers. Homeowners associations are often viewed as potential candidates.

One of the largest drivers of microgrid exploration is cost savings. A locally organized group could potentially purchase power in bulk and also make micropayments to local generators of power.

Beyond simple opportunities to "go solar," a microgrid allows electric vehicle-to-grid integration, as well as integration of other technologies such as fuel cells and microturbines. It's the ultimate in the sharing economy when your underutilized energy resources can be harnessed by other community members in a seamless and efficient manner.

Keeping Up

Despite the advances, the advent of the microgrid probably doesn't mean that the traditional electric grid is going away. Rather, a local microgrid may adjust the balance of power that is "imported" from the grid and rely more on local resources rather than power generated remotely and transmitted across inefficient power lines. Another way to look at this relationship is to compare it to the consumer who grows some of his or her own vegetables. It doesn't mean that the grocery store is going to shut down, but you may end up taking fewer trips and spending less on your legacy grocery bill.

In conjunction with a smart grid, a shortage of energy in a microgrid may also be able to signal critical resource optimization, such as providing power only to certain infrastructure needs such as hospitals, cell phone towers and food freezers. That way, instead of the entire grid becoming incapacitated, only low priority items would lose power. If given the choice in your own home, how would you prioritize power needs? What if you could automate a delay in the laundry machine, washer and dryer in order to keep the lights on? This approach certainly increases community resiliency in the event of a natural disaster, terrorist attack or other unanticipated event.

Naturally, the policy mechanisms in each state and local jurisdiction must keep up with the times. Currently, the transmission of power over a public right of way (such as a public road) is a violation of the utility's monopoly rights. If the policies are not in place to embrace technology and allow symbiotic participation with microgrids, the potential of this technology will not be realized.

In the short term, microgrids will thrive in areas of high-density buildings and government/campus applications. In the long run, energy policy will likely dictate the trajectory of this emerging technology. ◆

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