ARTICLE REPRINT

Reprinted with permission from
MICROGRID KNOWLEDGE © October 22, 2018

S&C ELECTRIC COMPANY
Excellence Through Innovation

ADVANCEMENTS TAKING MICROGRIDS TO A WHOLE NEW LEVEL

By Chris Evanich

Chris Evanich, Manager of Microgrids, S&C Electric Company

S&C Electric Company's Chris Evanich explores how recent advancements in the industry are fueling progress, and covers the benefits and advantages of advanced microgrids.

The term microgrid has become pretty much mainstream; even the president of the United States has used the term. And a lot of people now accept the U.S. Department of Energy's definition, which describes microgrids as having distributed generation sources, including renewable energy sources, able to control distributed loads and thus be able to island off the main power grid.

Still, we continue to see a lot of other folks say, 'I have a microgrid,' even though they simply have a backup generator that provides electricity when their utility has a power outage. So, for some folks, the definition of a microgrid is still kind of a grey area.

In my mind, I believe the definition of microgrids has changed, or microgrids have become so mainstream that the definition has evolved. Today, there's a big difference between the microgrid supported by a generator and the ones companies can construct to keep the power flowing without interruption.

To clarify what microgrids are from a utility's perspective—or for that matter from the point of view of a utility's customers—we should consider ones that are basic versus those that are more advanced. When we see the way generation technology has evolved, what we really see is that we've grown from basic microgrids to advanced microgrids with multiple generation sources and multiple loads on the utility grid.

Today's advanced microgrids also provide a lot more options for utility customers. Particularly important is that they support multiple use cases. Sure, a utility customer could use a basic microgrid to island off the grid, but advanced microgrids also can integrate renewable energy sources, and that's a pretty big deal. Through the Ameren microgrid in central Illinois, for example, we've identified 16 use cases for advanced microgrids. In Ameren's case, it's not just with one load; it's with 200 customers on the system. And there's not just one generation source; there's multiple ones, including energy storage and natural gas, along with such renewable energy sources as wind and solar, all able to support the customer loads when needed.

Advanced microgrids allow customers to have better power quality and to optimize power flow on the overall system. For example, a utility customer's load can decrease or increase, and it can have multiple generation sources, which similarly can increase or decrease. Besides enabling the customer to adjust power to address these changes for better power continuity and reliability, the customer also can get the most economic value based on time of day and other factors. Should I use solar? Should I use natural gas? Should I get my power from the grid? Now, the customer is able doing some pretty sophisticated things in terms of decided when to use a particular source, whereas traditional basic systems are just on and running.

Contingency planning also plays an important role, and it further illustrates the difference between basic and advanced microgrids. Contingencies cover what happens if a customer's generation source doesn't start or it doesn't shut off? What if solar is gone for three days? What if there was a cyberattack on a part of the system? The advanced microgrid enables the transition between generation sources seamlessly. This functionality is difficult to accomplish with basic systems, but with advanced systems, the customer can design it to work that way, where it supports a seamless transfer when intentionally islanding and when returning back to the grid. In doing so, the customer can plan for these contingencies and preserve its overall mission to maintain power throughout the corporate campus or other large industrial site.

The third important aspect of advanced microgrids is the increased resiliency they provide. If a customer with basic microgrid has one back-up generation source and it stops working, it's out of luck. With an advanced microgrid, not only is the customer relying on that generator, but it now has multiple generators, and they're distributed throughout the site. If there's flooding in one area, for example, not all assets

are knocked out. Having multiple generators helps build resiliency in the grid because they're distributed throughout the campus.

The same thing with controls as well. It's not just one controller turning a backup generator on and off, as with basic systems; it's multiple controls talking together to build a more resilient system.

Advanced microgrids provide important advantages over traditional, more basic microgrids. Through their support for multiple use case, improved contingency planning, and enhanced resiliency, advanced microgrids can do a lot more that utility customers can take advantage of to ensure they keep the lights on.