Why Microgrids? Why Now?

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You're already managing a big facility. Why add responsibility for operating a miniature power grid, too? First, let's agree on what a microgrid is and isn't.

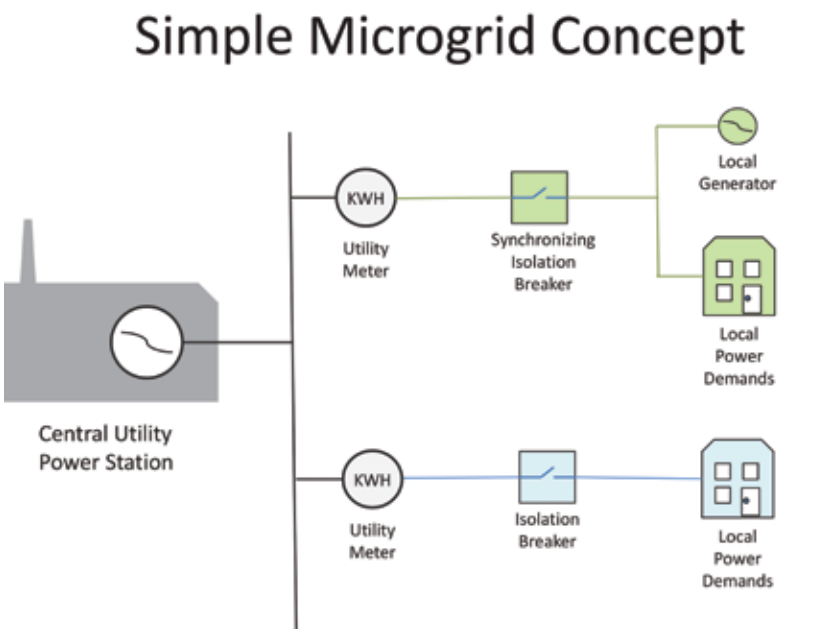
WHAT MICROGRIDS ARE

Microgrids operate as subsets of the larger regional electric power grid. They include at least some power distribution cables between the utility interconnection point and the buildings or other loads being served.

Microgrids include some form of controllable power generation on the customer side of the utility's meter, too. When the utility grid is in service, a microgrid can operate its generator synchronized to the utility grid. When the utility grid fails, the same microgrid can operate autonomously.

Microgrids typically have a single interconnection point with the utility grid and a contract governing such things as technical requirements for safe interconnection, capacity limits for exporting and importing power, maintenance responsibilities, communication protocols, applicable tariffs, and billing terms.

Microgrids are common on university campuses, military bases, at hospitals, and airports, and in large industrial facilities. Some municipalities, resorts, and planned communities include microgrids. It is the microgrid's key capabilities, not the form of ownership (private, cooperative, government, or utility) that define it.



WHAT MICROGRIDS ARE NOT

What wouldn't meet the definition of a microgrid? A diesel generator that is only permitted for emergency use, can't synchronize with the utility grid, and supports only life-safety and emergency loads is not a microgrid. Since it can't synchronize with the utility grid and doesn't support even a pared-down version of normal operations, it's lacking important microgrid features.

Similarly, a solar photovoltaic (PV) array that does not include batteries with advanced inverters or some additional form of controllable power generation cannot be considered a microgrid. It lacks the ability to match power production to real-time demand and cannot operate autonomously.

MAINTAINING MISSION-CRITICAL LOADS

Microgrids are designed to maintain an organization's mission-critical loads in service when the utility fails. Many can support all loads, or all but nonessential and deferrable loads.

Microgrids can save money. A microgrid's onsite power generation is often part of a cogeneration and district energy system. Combined heat and power (CHP) systems are often twice as efficient as central utility stations that are not designed to take advantage of the heat that is a byproduct of power generation. When thermal energy (heating and/or cooling) is needed along with electricity, it can be significantly less expensive to generate them together rather than separately. Microgrids with CHP reduce air emissions, too. The same fuel efficiency that reduces the cost of heat and power also reduces net emissions.

Microgrids benefit not just the owner but the surrounding community in multiple ways. Industrial and commercial customers paying real-time power rates can benefit from nearby microgrids even if they don't have a system themselves. Microgrids that are "economically dispatched" increase power output when they can generate power less expensively than buying it from the utility grid. They decrease power output when their "marginal cost to generate" is higher than purchased utility power. This obviously results in savings to the owner. But it effectively reduces neighboring costs by displacing more expensive power across the grid.

Real-time power is most expensive at times of greatest demand, when the grid is most stressed or there is "congestion" in the local power distribution zone. By generating power and minimizing their demands on the grid during peak times, microgrids can help reduce the requirement for additional utility generation, transmission, and distribution assets—costs that are passed on to the ratepayers.

During regional emergencies, microgrids can become islands of refuge. If utility service is interrupted by a large storm, the presence of even one microgrid in a community can make an important difference. During Hurricane Sandy, several central-Atlantic microgrid operators opened their facilities to first responders and community members to allow them a place to meet, dry off, and charge telephones and radios.

A NEW REVENUE STREAM

Microgrids offer the opportunity for new revenue streams. Some more advanced microgrid operators sell ancillary services to the independent system operator (regional power grid operator). Ancillary services may be such things as additional power generating capacity, black-start capability, power-factor correction, or frequency and voltage support. Selling these services takes a higher degree of contractual sophistication and controls, but does not always require huge additional investments in equipment.

Like any other large project, establishing a microgrid in an existing facility can be technically complex and requires managing a daunting level of administrative details. But facility owners who saved money while reducing emissions and kept the lights on through just one large storm while the rest of the town was dark consider microgrids among their most important assets.

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