GRID STAKEHOLDERS ARE DEMANDING MICROGRIDS

But what do the real experts think? Utility Dive surveyed 250+ utility executives to find out.

- Do utilities view microgrids as a business opportunity? (spoiler alert - yes)
- What role should regulations play in microgrid development?
- Do utilities want to partner on microgrids or run the show themselves?
In addition, Utility Dive surveyed 56 U.S. independent power producer (IPP) executives. Their viewpoint provides contrast to the traditional utility perspective as these non-utility owners and developers of generation sometimes compete with utilities and appear well positioned to capitalize on the emerging microgrid market.

Microgrids: The very word seems to explain itself. These mini-versions of the larger electrical grid are designed to offer reliable power in an era when the central grid finds itself besieged by severe storms, cyber-attacks and aging infrastructure.

But the exact definition of a microgrid remains the subject of much debate. For the purposes of this survey and report, a microgrid is a group of interconnected loads and distributed energy that acts as a single controllable entity. The microgrid can connect and disconnect from the larger grid at will.

A microgrid disconnects or ‘islands’ when the central grid fails, protecting the power flow to nearby buildings. The microgrid also can sell services to the central grid through such features as demand response and frequency regulation. The central grid gains support and the microgrid earns revenue.

Given its benefits, the microgrid seems important to the modern electric system. But will microgrids be widely deployed in the U.S.? Much depends on the nation’s electric utilities and how amenable they are to the technology.

To better understand how utilities view microgrids, Siemens commissioned Utility Dive to survey 209 U.S. electric utility executives. Because each electric utility and their service territory is different, we asked those surveyed to provide information on the type of utility they work for and the region they operate in.

Survey Demographics by Region

- **Northeast**: 26%
- **Midwest**: 19%
- **Southeast**: 17%
- **Southwest**: 17%
- **Northwest**: 11%
- **Mid-Atlantic**: 5%
- **Non-contiguous States** (Hawaii, Alaska): 5%
Microgrids have been operating in the U.S. for decades, many of them on college or business campuses that use combined heat and power (CHP) and district energy.

Today, however, their customer base is broadening: military bases, hospitals, municipalities, data centers, and business parks are all developing microgrids.

The microgrid market is growing because of concern about the reliability of the U.S. grid, particularly as storms become more severe. In addition, conventional grid equipment is aging, and microgrids are seen as a part of grid modernization -- part of a new distributed network that employs smart grid technologies. And finally, microgrids are a green choice, since they often incorporate renewable energy or highly efficient technologies.

Still, this is an emerging market, in an early stage. Today, microgrids can be found scattered in 45% of utility service territories. A far smaller percentage of utilities -- 16% in total and 28% of those with microgrids in their service territories -- actually own microgrids themselves. That is a very high percentage: Utility Dive suspects that utilities that own microgrids today are piloting the technology to better understand its capabilities and functionality versus the central grid. It should also be noted that a total 72% of microgrids in utility service territories today are not utility owned, according to the results of the survey.

**Q** Are there currently microgrids operating in your utility service territory?

Yes: 45%

No: 55%

**Q** If yes, who owns the microgrid?

Utility: 28%

Non-utility entity: 72%
Microgrids tend to be owned by private or government entities. Few utilities own them, but that may be about to change. An overwhelming 97% of utilities surveyed see microgrids as a business opportunity for them over the next decade.

More than half of utilities surveyed see themselves in the microgrid market even earlier – within five years. This defies the perception of utilities as often slow to innovate and resistant to disruptive change. It indicates that microgrid development will ramp up quickly in the near term, given that utilities are the dominant players in the electric power industry.

**Q When will microgrids become a viable business opportunity for utilities?**

- Today: 19%
- 1-5 years: 37%
- 5-10 years: 31%
- Over 10 years: 10%
- Never: 3%

**Q When does your utility plan to develop, own, and/or operate any microgrids?**

- Already developed, own, and/or operate a microgrid: 14%
- 1-5 years: 35%
- 5-10 years: 8%
- Over 10 years: 2%
- None planned: 41%
The role of the independent power producer has grown in US markets over the last two decades. These non-utility owners and developers of generation are especially active in restructured or deregulated portions of the nation. They, too, overwhelmingly see microgrids as a likely business opportunity for utilities over the next decade and see themselves as developers of microgrids – with only 5% of IPPs reporting they do not see microgrids as an opportunity for utilities. The utility-IPP dynamic will be interesting to watch, since IPPs and utilities sometimes find themselves vying for the same market.

Q When do you expect non-utility entities in your service territory to develop microgrids?

- They are already doing so: 33%
- 1-5 years: 27%
- 5-10 years: 17%
- Over 10 years: 8%
- Never: 2%
- Don’t know: 13%
Building microgrids on a large scale is still a fairly new idea in the U.S., and it’s not clear exactly how the business model will evolve. Will microgrids be regulated utility assets or products of the competitive market – or a hybrid of both?

Some policymakers have suggested the best model involves a partnership between utilities and private entities. This could help resolve problems with franchise rules that might obstruct private microgrid development.

Utilities seem to favor the partnership idea. After partnerships, utilities see themselves as the most likely owners/operators of microgrids. This buttresses the idea that utilities see themselves as major players in the microgrid market.

47% of IPPs view partnerships as the best ownership model, although 40% see themselves – not utilities – as the second-best owners. This indicates that while we will see partnerships, we will also see competition for the microgrid market between utilities and IPPs.

Q In the future, who do you think should be the dominant owner/operator of microgrids?

- Partnerships of below parties: 43%
- Utility: 31%
- Non-utility/private company: 16%
- Public (municipality, military, etc): 8%
- University: 2%
There is a lot of industry talk about the “utility death spiral” as customers reduce their dependence on utility service and use distributed energy resources. The fear is that as the number of customers dwindle, those left behind will carry the burden of covering the cost of the wires, poles and plants that utilities must maintain. Then rates go up, making it increasingly more attractive for customers to leave -- hence, the death spiral.

But it’s not clear that microgrids will contribute to this problem. The utilities surveyed were split on whether utilities will see significant load loss from microgrids. This may be because utilities see themselves as microgrid owners.

Many solutions are being discussed to protect utility economics as microgrids and distributed generation grow in presence on the grid.

New York, for example, is looking at establishing utilities as distributed grid operators where the utility would act as the manager of distributed energy assets. The model is analogous to how Independent System Operators and Regional Transmission Organizations now manage wholesale generation on the grid. For utilities, this would create a new business role and revenue source. The utilities surveyed clearly see potential in this model and named it as the best method to protect their revenue.
Microgrids may offer new revenue streams for utilities and create savings for customers, since they bring new efficiencies to the grid. But there are costs to build any new infrastructure, and microgrids could have an adverse impact on customer rates.

The majority of the utilities surveyed, however, said that microgrids will either lower or have no impact on customer rates.

Some in the industry have suggested that those key customers that especially need microgrids – such as data centers which need premium electric service – be charged extra to cover microgrid costs. For example, a data center might agree to locate within a utility’s service territory if the utility builds a microgrid that can serve it. But should the data center pay an extra charge to cover the capital investment, or should it be spread out among all ratepayers? Utilities are against charging targeted, premium rates for such service, although not by a large margin.

**Q** What impact will microgrids have on rates for utility customers?

- Raise rates: 42%
- Lower rates: 33%
- No change: 25%

**Q** Should utilities charge premium rates to customers who choose to be on a microgrid (e.g. data centers)?

- Yes: 47%
- No: 53%
Grid Reliability

While microgrids have been around for a long time, they are expected to interact with the grid in increasingly sophisticated ways: islanding in an emergency, using black start capabilities, and selling demand response and ancillary services to the grid.

Microgrid critics have raised safety concerns, particularly when microgrids disconnect and reconnect, saying the process could disrupt grid reliability -- the opposite of what microgrids are intended to do.

The majority of utilities, however, do not see microgrids as a significant threat to grid reliability, with only 23% of respondents saying the existence of multiple grid-connected microgrids would heighten the risk of central grid failure in a utility service territory.

In particular, utilities largely see microgrid technology as safe for interconnecting with the grid, with 69% of utilities surveyed finding that to be the case. However, utilities said they find current interconnection standards inadequate for safety purposes, with 54% of utilities surveyed finding that to be the case. Interconnection standards are in some cases dated and in need of change.

Alternatively, some microgrid advocates envision a future where pools of microgrids serve the grid similar to a power plant. These would be separate microgrids that can communicate with each other and act in concert when needed. They could provide electricity and services to wholesale power markets as a virtual power plant. In these cases, microgrids would not only serve the hospital, college or water treatment facility within its borders, but also export energy as a pool to the larger grid. This approach has yet to see wide-scale deployment, but these results indicate that utilities do not believe that this kind of virtual power plant would severely impact grid reliability.

Q Does the existence of multiple grid-connected microgrids heighten the risk of central grid failure within a service territory?

- Yes, but not materially: 44%
- Yes, significantly: 24%
- No, not at all: 32%
Utility franchise rights are considered one of the biggest obstructions to microgrid development. In most states, a microgrid runs afoul of utility franchise rights if it attempts to serve multiple buildings that are on different streets. Microgrids cannot run wires across public rights-of-way.

One exception is the state of Connecticut, which revoked the franchise restriction for municipal microgrids.

Elsewhere, utilities could use franchise rules to block microgrid development. But it doesn't sound like they will. 85% of utilities support the idea of changing utility franchise rights so that microgrids can cross public rights-of-way.

If this proves true, and utilities do support franchise rule reforms, it will be a tremendous boon for microgrid developers. Under current rules, they often must get special permission from utilities, or strike a partnership deal with the utility, if the project involves crossing public rights-of-way.

Finally, while utilities want to own microgrids – and plan to get into the business – they say there are not enough financial incentives to spur them into action. They believe regulations should be changed to better incentivize microgrid installation. Regulators and policymakers who want to see more microgrids might heed this concern. Incentives have played a major role in developing other new electricity markets in the U.S., such as renewable energy and smart grids.

Q Under the current regulatory model, is your utility incentivized to develop, own, and/or operate microgrids?

- Yes: 15%
- No: 85%

Q Should your utility regulatory model be changed to better incentivize utilities to develop, own, and/or operate microgrids?

- Yes: 84%
- No: 16%
Utilities appear to support the idea of a system integrator or operator coordinating microgrids and other forms of distributed energy. The system integrator is somewhat analogous to the ISOs/RTOs that manage wholesale power in the U.S. organized markets. System integrators would play a similar role for microgrids and other forms of distributed energy. They would act as central entities that manage markets, tariffs and systems in a geographic region.

No distributed system integrators exist yet; it is purely a conceptual model. Policymakers in New York and other states are discussing the idea.

Controversy exists over who should play the role of system integrator. In this survey, utilities say they should. It remains to be seen how this issue will play out in regulatory arenas as the system integrator will hold a lot of marketplace sway. Some states may feel it is better for a government entity or third party to play the role. Others, however, say utilities have the most expertise so would do the best job as systems integrator.

Q Should microgrids and distributed energy resources be coordinated by a central entity, akin to the way ISOs/RTOs coordinate the bulk power market?

Yes: 75%
No: 25%
Contrary to conventional wisdom, utilities are not the enemy of the microgrid.

In fact, utilities see microgrids as a new business opportunity, with far more economic upside than downside. They want regulatory changes that will spur microgrid development, and they’re willing to make concessions and adopt new business models to make it work.

The microgrid, it turns out, could become a new utility asset in the not-so-distant future: a way to keep the power on during a storm and boost the utility bottom line.

But there are still many questions that need to be answered. If an overwhelming 97% of utilities see microgrids as a business opportunity, what’s holding them back from capitalizing on it now? How can utilities be best incentivized to take part in this emerging and exciting new space? And how will utilities integrate these potentially complex new technologies into their operations?

As the microgrid and electric utility industries look to answer these important questions, Utility Dive will be continuing this conversation in the form of articles and downloadable content in the coming months. We hope you’ll join us.

Stay tuned.