Threat From Behind the Meter

The case for utilities to compete directly with distributed resources.

By John Slocum

The electric utility industry is undergoing a transformation. This transformation arises from technology, economic and policy trends that are spurring growth in self-generation and other non-regulated energy service options for consumers, such as distributed renewable generation, combined heat and power and microgrid facilities.

It inverts the traditional model – with a focus on capital-intensive investment – to one based on the primacy of the utility customer, who increasingly enjoys a wide range of competitive products and services to help manage energy use, and even supply some or all of its energy requirements from behind the utility meter. In this new model, electricity delivered by the local utility is but one energy supply option.

At the same time, utilities and merchant generators face rising capital requirements for new or replacement generation capacity, environmental compliance, transmission expansion, replacement and upgrading of aging infrastructure, and cybersecurity compliance measures to maintain power supply reliability and grid integrity. Rate increases to recover the rising cost of grid-supplied power, in turn, could trigger even stronger customer demand for and enhance the competitiveness of behind-the-meter, non-utility energy service options.

Emerging competitive service options on the customer side of the meter and rising costs on the utility side of the meter have the potential in some locations to fuel an unstable cycle of utility rate hikes and load loss. In those areas, it could become economically efficient to generate electricity on the customer side of the utility meter rather than the standard model of remote wholesale generation with delivery via the transmission and distribution grid through the utility meter. Where this occurs, the resulting political and regulatory pressure to resist full and timely recovery of grid-supplied power will threaten the long-term financial sustainability of electric utilities.[1] The financial pressures will inevitably lead to a reassessment of long-established electric utility business and regulatory frameworks.

Various factors are driving industry transformation, and people in the financial and regulatory communities bring many different perspectives on the situation. In this context, stakeholders can consider multiple possible responses. These include: i) selective deployment of ratemaking measures designed to mitigate risks associated with the expansion of behind-the-meter energy products and services; and ii) consideration of alternative utility business and regulatory structures that can better position utilities to compete with these competitive services.

Technology, Economy, and Policy

Competitive behind-the-meter energy and its implications for the electric utility industry are drawing increased attention.

Left unaddressed, expanded customer options plus rising utility costs could fuel a cycle of utility rate hikes and load loss.

Recent notable observers include the CEO of Duke Energy, a large electric utility holding company;[2] the CEO of NRG Energy, a large merchant generator and retail energy service provider;[3] and the Edison Electric Institute (EEI), which released a report earlier this year exploring the financial and strategic implications of this development for the industry.[4] These and other commentators point to a convergence of factors that are driving down the cost and expanding the availability of behind-the-meter energy while simultaneously increasing the cost of grid-supplied power.

A diverse array of energy technologies, some commercially available today and others still emerging, have enabled the availability and expansion of behind-the-meter energy services. While not exhaustive, the list includes:

- Expanded distributed generation (DG) applications,

1. This analysis addresses the implications of behind-the-meter energy on regulated utilities, but industry transformation similarly affects wholesale merchant generators and other unregulated companies that are linked to the traditional utility regulatory model.

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2. "If the cost of solar panels keeps coming down, installation costs come down, and if they combine solar with battery technology and a power management system, then we have someone just using us for backup." *See:* "Are Traditional Utilities Becoming Obsolete?" ecsgrid.com, March 27, 2013.
3. "The increasing competitiveness of distributed energy poses a 'mortal threat' to the electric utility industry and utilities are starting to take notice." "This is not just a threat to electric utilities, though, he said. It is actually a threat to the structure of any business that depends on selling into the wholesale grid – including the wind and other renewable industries that cannot sell behind, or without, the meter." See: "NRG CEO: Distributed generation a 'mortal threat' to utilities," *SNL Energy*, March 22, 2013.
4. "Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business," prepared by Peter Kind, Energy Infrastructure Advocates for the Edison Electric Institute; January 2013.

ranging from rooftop solar and microturbine bolt-on applications, to new design solutions such as microgrid and net zero energy facilities.

■ Improved electricity storage (including, potentially, electric vehicles), designed to support distributed resources and enhance the reliability of non-grid supplied energy.

■ Advanced metering infrastructure (AMI), allowing customers to better understand and control their energy usage and allowing competitive retail energy service providers to develop and market customized behind-the-meter products.

A variety of economic and commercial factors are also playing a key role, both by enhancing the competitiveness of emerging behind-the-meter energy services and increasing the cost of traditional grid-supplied electricity. Factors favoring the development of new behind-the-meter energy options include:

■ Lower installed costs of DG, particularly solar, and also energy control equipment. For example, over the past five years the industry has witnessed a drop in PV module prices of as much as 80 percent and total installed costs to consumers have fallen by 25 to 35 percent.[5] Industry studies suggest that PV solar is now price competitive in approximately 16 percent of the U.S. retail electricity market.[6]

■ Natural gas commodity price trends (lower and less volatile) favoring small-scale, gas-fired applications such as microturbines, fuel cells, combined heat and power (CHP) and microgrids. NRG Energy views current natural gas pricing as a key enabler of behind-the-meter solutions and envisions a future where residential customers utilize on-site gas generation to backup on-site solar and other distributed renewables, thereby allowing customers to cut ties to the distribution system.[7]

■ Favorable economic conditions are promoting the rapid entry of behind-the-meter energy equipment suppliers and service companies. Examples abound, including NRG Solar's residential solar pergola with integrated energy storage, and SolarCity's partnerships with Home Depot and Honda to help market rooftop solar installations and solar leasing products. Creative commercial initiatives of this type broaden consumer awareness of and demand for behind-the-meter energy services.

At the same time, a host of economic factors are exerting upward pressure on the cost of traditional grid-supplied power. At the wholesale generation level, regulated utilities and merchant generators alike confront rising costs of maintaining existing plants and building new capacity. Owners of existing facilities are investing capital to comply with new environmental regulations, and those looking to add new capacity are encountering continued escalation in installed capacity costs. Recent examples include American Electric Power's estimate of $4 to $5 billion in environmental capital investments for 2012 through 2020 to comply with EPA rules[8] and Southern Company's announcement of a $540 million cost increase to complete the Plant Ratcliffe integrated gasification combined-cycle project.[9]

At the transmission and distribution level, many utilities have entered a multi-year capital spending cycle to extend transmission to interconnect new renewable energy supplies; replace and harden aging infrastructure to enhance service reliability; and deploy smart grid and cybersecurity technologies.[10] EEI expects planned transmission investment by shareholder-owned utilities to exceed $15 billion in 2013, a multi-year high, and to remain near that level through 2015,[11] while an industry planning group recently forecast spending to replace, upgrade, and expand the transmission grid in the Eastern Interconnect alone to range as high as $98.5 billion through 2030.[12] At the local distribution level, the Associated Press reports that since 2002 annual utility spending per customer on distribution equipment and maintenance has increased at approximately twice the rate of inflation.[13]

Social media leaves regulators whipsawed between demands for faster outage restoration versus resistance to rate increases.

Public and corporate policy initiatives are also playing an important role in driving industry transformation, both by favoring the entry and expansion of behind-the-meter energy services and imposing significant new costs on grid-supplied power. These policies have been well

5. "Global Trends in Clean Energy Investment," Michael Liebreich, *Bloomberg New Energy Finance*, April 17, 2013, p. 8; and *Tracking the Sun V An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2011*, by Galen Barbose, Naïm Darghouth, Ryan Wiser, Lawrence Berkeley National Laboratory; November 2012, p. 38.
6. *Op. Cit.*, *Disruptive Challenges* report, p. 4.
7. "The individual homeowner should be able to tie a machine to their natural gas line and tie that with solar on the roof and suddenly they can say to the transmission-distribution company, 'Disconnect that line,'" David Crane, NRG CEO, as quoted in: "NRG Skirts Utilities Taking Solar Panels to U.S. Rooftop," *Bloomberg*, March 25, 2013.
8. See: "Industry in Transition," *Public Utilities Fortnightly*, June 2013.
9. See: "UPDATE: Southern's Fanning outlines implications of Kemper IGCC cost overruns," SNL Energy, April 24, 2013.
10. In a 2011 research report the Electric Power Research Institute (EPRI) estimates the average increase in monthly electricity bills required to finance smart grid transmission and distribution investments alone will be in the range of 8 to 13 percent per year for residential and commercial customers when amortized over a 10-year period: *Estimating the Costs and Benefits of the Smart Grid*, EPRI, March 2011, Table 1-3.
11. *Actual and Planned Transmission Investment By Shareholder-Owned Utilities (2006-2015)*, EEI, July 2012.
12. See: "Planning group completes Eastern Interconnection-wide transmission analysis," *SNL Energy*, April 29, 2013.
13. See: "Report finds electric grid reliability down as costs go up," *SNL Energy*, March 8, 2013.

documented in this publication and elsewhere, and include:

- State renewable portfolio standards (RPS) mandating a prescribed supply share for designated renewable energy resources, including behind-the-meter distributed renewable energy.
- Feed-in and net metering tariffs requiring utilities to buy designated distributed renewable energy at parity with retail rates rather than the wholesale cost of power.
- State laws that authorize capital cost recovery mechanisms to support utility investment in high cost new regulated generation capacity.
- Growing political and regulatory pressure for utilities to invest in grid infrastructure hardening and service restoration programs (in response to lower customer tolerance for power outages and several recent high-profile utility storm events).

Corporate sustainability goals that spur customer demand for renewable energy supply solutions, including behind-the-meter energy services. For example, in April Verizon Communications announced a $100 million investment in solar and fuel cells at 19 of its facilities to enhance reliability and help achieve its corporate commitment to cut its carbon footprint in half. Verizon reportedly expects these facilities to generate as much as 30 percent of electricity needed at the sites.[14] Wal-Mart reportedly has set a goal of operating solely on renewable power.[15]

Pressure Points and Financial Risk

The various factors driving behind-the-meter-energy also create conflicting pressure points for utility regulators.

Under the existing industry structure, utilities retain an obligation to provide access to the grid for all consumers, whether the customer relies fully on power delivered by the utility or uses the utility solely for backup service. Given this universal service mandate, regulators traditionally have supported utility grid-related investments to ensure service reliability and efficient operations. Heightened customer sensitivity to service outages and expectations for rapid service restoration only intensify the pressure on regulators to support utility reliability investments. At the same time, however, regulators are increasingly wary of the higher costs associated with new utility infrastructure investments. Regulatory wariness stems from a desire to keep customer rates as low as reasonably possible, but also from a growing uneasiness with the ability of self-generation customers to avoid paying what is deemed to be a fair share of the common fixed costs of a utility system. MIT's *The Future of the Electric Grid* summarizes this policy dilemma:

"If only some customers reduce their net energy purchases through self-generation or efficiency investments, distribution system costs will be shifted onto those who do not. This raises questions of both horizontal inequity (treating otherwise similar consumers differently) and vertical inequity (penalizing lower-income consumers, who could be disproportionately represented among those less able to finance investments to reduce net electricity consumption). Requiring middle- or lower-income customers to subsidize wealthier households' investments in energy reduction, as traditional rate structures do, would seem difficult to rationalize on equity or political grounds."[16]

Social media is intensifying these conflicting pressure points as regulators find themselves whipsawed between public demand for higher reliability levels and faster outage restoration on the one hand and resistance to utility rate increases on the other. Importantly, until very recently regulators haven't had to weigh the implications of behind-the-meter energy as a competitive threat to traditional utility service.

The current electric utility industry environment is also sending conflicting messages to the financial community. While utility capital investment and rate base growth traditionally are seen as drivers of future earnings growth, investors are becoming sensitized to the transformation underway in the electric utility industry and are beginning to view the industry as an increasingly risky investment environment. EEI's *Disruptive Challenges* report cited earlier in this article sounds the alarm about the threat posed by behind-the-meter energy services to the traditional utility investment-growth model:

Industry studies suggest PV solar is now price competitive in about a sixth of the U.S. retail electric market.

"But, even if cross-subsidies are removed from rate structures, customers are not precluded from leaving the system entirely if a more cost-competitive alternative is available (*e.g.,* a scenario where efficient energy storage combined with distributed generation could create the ultimate risk to grid viability). While tariff restructuring can be used to mitigate lost revenues, the longer-term threat of fully exiting from the grid (or customers solely using the electric grid for backup purposes) raises the potential for irreparable damages to revenues and growth prospects. This suggests that an old-line industry with 30-year cost recovery of investment is vulnerable to cost-recovery threats from disruptive forces."[17]

Moody's similarly cautions that as utility rates rise into a range of 5 percent to 7 percent of consumer disposable income,

14. *See:* "Verizon to spend $100 million in solar and fuel cells," *The Daily Energy Report*, May 1, 2013.
15. *See:* "Wal-Mart, Google push for greater use of, access to renewable," *SNL Energy*, May 7, 2013.
16. *The Future of the Electric Grid*, MIT Energy Initiative, Dec. 5, 2011, p. 183.
17. *Op. cit, Disruptive Challenges* report, p. 3.

utilities can expect to encounter strong political and regulatory risk that threatens full recovery of costs.[18] And a recent *Electricity Journal* article contains this message:

"The message for growth-oriented utilities, whose traditional business model has been predicated on building infrastructure and recovering the costs through customer tariffs, is that the historic approach may no longer be sustainable."[19]

With behind-the-meter energy services becoming a viable economic option for a variety of customers, investors are coming to view recovery of utility long-lived capital investments as an increasingly risky proposition. Like regulators, utility executives and investors are being forced to reassess fundamental assumptions about industry structure, business strategy and investment risk.

Left unaddressed, this development leads to an unstable cycle of utility rate hikes and load loss and threatens the long-term financial sustainability of the traditional utility business model. Stakeholders thus are challenged respond to the behind-the-meter energy services threat while it's still emerging.

Ratemaking Responses

Utilities and regulators might reasonably turn to familiar ratemaking tools to mitigate the financial risks associated with the rapid growth of behind-the-meter energy services. Several recent articles address this topic, including one recently published in these pages.[20] Commonly discussed ratemaking measures include:

- Decoupling and fixed charge ratemaking mechanisms designed to break the link between sales and recovery of fixed utility investments.
- Interconnection agreements, universal access charges, and backup or standby rates designed to ensure that all grid-connected customers (*i.e.*, including those using the utility solely for backup service) pay a fair share of the costs associated with transmission and distribution investments, including those associated with maintaining grid reliability.
- Accelerated depreciation and securitization of prudent utility investments designed to support a transition to an unbundled industry structure.

Such ratemaking solutions can be effective tools. Nevertheless, such measures could be viewed as punitive by the very same customers the utility is seeking to retain. For that reason, policymakers should think more broadly about the nature of the risk confronting the traditional utility regulatory model and consider appropriate strategic responses.

Taking on the Competition

Because public policies are an important driver of behind-the-meter energy, realigning policies with emerging competitive market conditions provides one strategic response. In several jurisdictions policy makers are reassessing policies that support behind-the-meter energy in a variety of ways, including resetting or capping feed-in tariffs, adjusting net metering rules, and modifying generator interconnection agreements. CPS Energy's proposal to replace a solar net metering tariff with a feed-in tariff priced at the utility's marginal wholesale generation cost is one current example of this type of response.

Policy makers also are considering actions directed at moderating the upward pressure on wholesale generation, transmission, and distribution costs and the resultant increase in the delivered cost of grid-supplied electricity. Regulators, legislators, and ratepayer groups voice increasing concern with environmental mandates affecting wholesale generators, expansion of RPS mandates, smart grid deployment budgets, incentive rates for new transmission facilities, and rate mechanisms allowing pre-operational recovery of investments in new high-cost generation facilities (*e.g.*, nuclear and clean coal). Examples include legislative efforts in North Carolina and elsewhere to eliminate or reduce utility RPS requirements and similar legislative efforts in Florida directed at that state's law allowing utility recovery of investment costs in new nuclear power plants.

The Orlando Utilities Commission provides an example of direct utility investment in behind-the-meter energy.

In restructured states, ratemaking and policy responses might be sufficient for wires-only utilities to manage the risks associated with behind-the-meter energy. However, for utilities owning wholesale generation assets,[21] industry transformation poses significantly greater investment recovery risk. For them, ratemaking and policy measures might slow or delay the expansion of competitive behind-the-meter energy, but such measures are unlikely to suffice. Hence, long-term success in managing this transformation might demand rethinking the traditional definition of regulated utility service.

18. See: *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know*, Ceres, April 2012, pp. 18-19.
19. "Why the Time Has Come to Rethink the Utility Business Model," by Fereidoon P. Sioshansi, *The Electricity Journal*, Vol. 25, Issue 7, August-September 2012.
20. *See:* "The Law of Unintended Consequences," Robert E. Curry Jr., *Public Utilities Fortnightly*, March 2013.
21. Again, the risks and responses discussed here also apply to wholesale merchant generators and other unregulated companies linked to the traditional utility regulatory model.

Utilities have an impressive set of attributes that position them well to compete in the behind-the-meter energy marketplace, including expertise in local energy markets; distribution grid design and operations; renewable energy integration; energy facility financing, permitting, and contracting; and utility regulation. Thus, another strategic response might be for regulators to allow utilities to leverage their expertise to compete directly on a regulated basis for behind-the-meter energy services in their franchise service areas (*e.g.*, authorize rate base investments in CHP, microgrids, distributed renewable energy, storage and other nontraditional energy investments). The primary objective is to compete to retain existing load, but there might well be derivative grid reliability benefits associated with utility ownership and control of new technologies.

For example, a utility investment in a microgrid project rather than replacement or upgrade of existing distribution facilities could be a superior solution for both customer and utility. A variation of this approach involves utilities partnering with third parties to market new behind-the-meter energy services, (*e.g.*, a utility enters into a commercial arrangement where a third party develops a CHP or microgrid project and the utility enters into long-term lease or operating agreement for the project). Utilities have technical expertise and access to capital that they can bring to bear to the benefit of a joint venture or partnering enterprise. The utility's role in the enterprise could encompass equipment ownership, installation, financing, operation, or maintenance depending on the preferences of the partners and the specific market targeted.

The Orlando Utilities Commission (OUC) provides an example of direct utility investment in behind-the-meter energy. OUC is partnering with a private developer who will own, finance, build, and maintain a community solar garden project in OUC's service area. The developer will sell the energy output to OUC under a long-term power purchase agreement, and OUC is offering its customers the option to invest in the project by means of subscription units that grant the holder the right to buy 1,000 Watts of power from the solar garden for a fixed price/kWh.[22]

As a municipally owned utility, OUC might enjoy greater commercial flexibility than an investor-owned utility that must comply with state regulations prescribing its ability to enter competitive generation markets and negotiate customer service terms. But some investor-owned utilities have successfully developed regulatory models that allow them to respond flexibly to behind-the-meter energy competition. For example, Alabama Power has regulatory authorization to develop CHP facilities for individual customers if they can be shown to provide benefits to all of the utility's customers. Under this model, Alabama Power owns and operates more than 500 MW of on-site customer CHP with the non-steam portion of the facilities allowed in its rate base.[23]

Acting Through Unregulated Affiliates

For most investor-owned utilities, competing directly for behind-the-meter energy on a regulated basis will require a detailed review and overhaul of tariff and ratemaking mechanisms to ensure regulators that utility costs will be recovered efficiently and fairly. An alternate strategic approach can steer clear of all that.

Twenty or more years ago the industry faced a similar set of technology, economic and policy drivers that were transforming wholesale generation markets. In response, many states redefined the role of regulated utilities in competitive power markets and directed utilities to exit the competitive wholesale generation business. Some jurisdictions also allowed utilities to participate in competitive wholesale markets via unregulated affiliates. This model might work for the current situation. Utilities that seek to compete for behind-the-meter energy service might elect to do so through unregulated affiliates, either newly formed entities devoted to behind-the-meter energy markets or existing merchant energy businesses.

Utility investment in a microgrid rather than distribution facilities could be a superior solution for both customer and utility.

Under this model, policy makers could prohibit cross-subsidization of unregulated businesses through familiar regulatory protections such as ring fencing and prohibitions on information or employee sharing with unregulated affiliates. With such protections in place, unregulated affiliates may develop, own, control and operate non-traditional behind-the-meter energy supply projects and services, and they also might elect to participate in competitive wholesale markets. Meanwhile, ring-fenced regulated utilities would retain the obligation to ensure access to the transmission and distribution system for all energy service providers on a non-discriminatory basis. An additional benefit is that by separating the increasingly risky wholesale and retail competitive energy services businesses from the traditional regulated utility operations, investors gain greater certainty of utility capital *(Cont. on page 57)*

22. *See:* "OUC customers can buy solar-generated electricity, lock in price for 25 years," *EnergyBiz*, March 18, 2013.

23. *See:* "Guide to the Successful Implementation of State Combined Heat and Power Policies," *State & Local Energy Efficiency Action Network*, March 2013, pp. 46-47.

investment cost recovery. The resultant enhanced credit profile could lower a utility's cost of capital and ultimately reduce the cost of regulated utility investments.

Energy firms that own both regulated utilities and unregulated merchant businesses appear to be recognizing the benefits of structural separation for mitigating the risk posed by behind-the-meter energy. Several are making investments and developing competitive behind-the-meter energy services through unregulated business units (*e.g.*, Dominion) and others appear to be targeting behind-the-meter energy business as a strategic focus (*e.g.*, Edison International).[24] These and other examples suggest that structural separation of regulated utilities from competitive merchant energy service businesses could again provide a useful strategy for addressing the emerging threat to the sustainability of the traditional utility and regulatory model.

And that's fortunate, because there's no time to waste.

24. See: "Dominion proceeds with construction at Conn. fuel cell facility;" *SNL Energy*; May 6, 2013; and "Edison International sees bright future despite murky crystal ball on San Onofre;" *SNL Energy*; Feb. 27, 2013.