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Microgrid policy, if carried out cost-effectively, offers two distinct benefits: democratization of demand, allowing consumers to custom-design their own services; and diversity of suppliers, allowing consumers to choose providers based on their merits. Whether these benefits emerge will depend on how well state legislatures and commissions resolve questions about market structure, customer responsibility and utility compensation. This article identifies the main questions, along with the legal and economic principles necessary to answer those questions.

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I. Market Structure: Who Provides Which Services?

Market structure describes (a) the geographic area in which transactions occur; (b) the products and services being sold in that geographic area; (c) the identities, characteristics and market shares of the sellers and buyers of those products and services in that geographic area; and (d) the entry barriers, if any, between incumbents and new entrants.

For microgrids, initial decisions about market structure rest with each state. The main decision is this: For each existing or potential product or service, should it be provided by a monopoly market or a competitive market?

For services requiring a *monopoly structure*, the state needs to have laws and rules for selecting the monopoly, for describing the monopoly's powers and its obligations, and for the process by which customers compensate the company and hold it accountable for its performance, including the processes for replacing it when someone can do the job better. In these decisions, there is no necessary reason to favor the incumbent utility. Consider Maine, Hawaii, Oregon and Vermont. They have relieved their utilities of much of their energy efficiency roles, in favor of independent companies having no internal conflict between producing and conserving.¹

¹ See *How Efficiency Vermont Works*, EfficiencyVermont.com, http://efficiencyvermont.com/about_us/information_reports/how_we_work.aspx (last visited Jan. 21, 2012) (describing Efficiency Vermont's

As another potential example, Maine has a statute requiring its commission to consider appointing a "smart grid coordinator" that would be independent of the incumbent utilities. The coordinator's franchise would be exclusive.² For services warranting a *more diverse market*, states can start by asking these questions:

- For each candidate product or service, will competition be physically feasible?
- Will it be economically efficient?

responsibility to provide "technical assistance and financial incentives to help Vermont households and businesses reduce their energy costs with energy-efficient equipment and lighting" and "energy-efficient approaches to construction and renovation"); *About Us*, Hawaii Energy.com, <http://www.hawaiienergy.com/4/our-team> (last visited Jan. 21, 2012) (describing Hawaii Energy's ratepayer-funded conservation and efficiency programs); *About Us*, EnergyTrust of Oregon, <http://energytrust.org/about> (last visited Jan. 21, 2012) (describing Energy Trust of Oregon's responsibility to invest in cost-effective energy efficiency and assist with the above-market costs of renewable energy); *About Efficiency Maine*, EfficiencyMaine.com, <http://www.energymaine.com/about> (last visited Jan. 21, 2012) (describing Efficiency Maine's technical assistance, cost-sharing, training, and education programs to reduce the use of electricity and heating fuels through energy-efficiency improvements and the use of cost-effective alternative energy).

² "[T]he commission may authorize no more than one smart grid coordinator within each transmission and distribution utility service territory." Me. Rev. Stat. tit. 35-A § 3143(5) (2009) Sec. 3143(5).

- Will customers benefit, in terms of prices, quality or innovation?
- How will that benefit compare to potential losses in economies of scale and scope?
- Since investors are volunteers, what government policies will induce investors to risk their dollars on these new opportunities?

Asking these questions produces a list of services that could be provided by diverse suppliers, i.e., suppliers other than the incumbent utility. Then a series of additional questions follows, such as: What types of companies should be eligible to sell which services? What standards for quality and safety should those suppliers meet? What actions constitute improper trade practices or consumer abuse, and what penalties should follow?

The problem of entry barriers: The most complicated and contentious question is one that we've experienced in natural gas, telecommunications and electricity generation: When we want a diverse market, one where suppliers compete on the merits, how do we transition from the traditional vertically integrated structure, where the incumbent utility is, to use an analogy, the airport owner, the airplane owner and the air traffic

It is an irony of competition that every competitor wants to be a monopoly. Given that reality, regulators must monitor markets to prevent or catch the behaviors that weaken competition.

controller? While there are many facets to this question,³ the one requiring the most thought is entry barriers: What assets do incumbent utilities control, that new entrants will need, because these assets

are classic “bottleneck facilities”—essential to competition but not economically duplicable by the new entrants? I'll focus here on one: the problem of entry barriers, where the incumbent utility controls assets that the new entrants need to compete. A study of an analogous context, smart grid, revealed three bottlenecks essential to new entrants: the last mile, meter data, and interoperability.⁴ Microgrids will present their own versions of these three features.

The importance of monitoring competition: It is an irony of competition that every competitor wants to be a monopoly. Given that reality, regulators must monitor markets to prevent or catch the behaviors that weaken

³ For a detailed discussion of these facets, see Scott Hempling, *Regulating Public Utility Performance: The Law of Market Structure, Pricing and Jurisdiction*, Chapters 3 and 4 (American Bar Association 2013).

⁴ Johann Kranz and Arnold Picot, *Toward an End-to-End Smart Grid: Overcoming Bottlenecks to Facilitate Competition and Innovation in Smart Grids* (National Regulatory Research Institute 2011), available at <http://www.energycollection.us/Energy-Regulators/Toward-End-End.pdf>.

We need to compensate the entity that provides network service. We are now entering our second century of arguing over what compensation is appropriate.

competition. The problem arises most predictably if we allow the utility to play both a monopoly role and a competitive role, either through a single corporation or through affiliates controlled by a central holding company. In that situation, we must ask not only about the incumbent utility's control of bottlenecks, but also whether the utility has any unearned advantages that will discourage new competitors from entering the market? Those advantages can include access to staff, consultants, or data that were paid for by its traditional monopoly customers and now are competitively useful. If so, the state has to spread these advantages among all competitors if it wants competition on the merits, rather than a bias toward incumbency.

This market structure discussion began with the statement that initial decisions about market structure rest with the state. FERC too, will play a role, because its decisions will on transmission access and pricing, wholesale market design (including compensation available to providers of demand response, ancillary services and other non-transmission alternatives) will affect the attractiveness of market entry. But eligibility to enter microgrid markets rests with the states.

II. Customer Responsibility: Who Pays for the Common Infrastructure?

Under state law, a traditional utility has an obligation to serve, including an obligation to invest in the infrastructure necessary to serve: the generation, transmission, distribution, substations, poles, and wholesale supply contracts that keep the lights on. The utility and its investors expect that its obligation to serve will be matched by its customers' obligation to pay. So when a state allows customers to substitute self-service for utility service, the utility faces two possible disappointments.

The first disappointment is that the utility might not recover the investment it made in the existing infrastructure, i.e., assets built for these customers in the pre-microgrid era. Various called the sunk cost problem or the "stranded investment" problem, it arises if, with respect to assets built or acquired under the obligation to serve, the unrecovered book cost exceeds the market value.

The second disappointment is that the utility might forego future profits from new infrastructure: the new infrastructure it won't be building (or the retired infrastructure it won't be replacing) because these self-supplying customers will be creating their own infrastructure. This foregoing of profit happens to any business whose former customers substitute self-supply for purchases. It happens to bakeries when

people bake their own bread and groceries when people grow their own tomatoes.

In current conversations, some have conflated these two disappointments, using eye-catching phrases like "disruptive challenge,"⁵ "existential threat" and "death spiral." But to conflate is to distort, because sunk cost and future profits differ in their legal and practical treatment. Regulatory decisions have been sensitive to unrecovered sunk cost, because utilities have some expectation of recovering prudent costs incurred to fulfill their public service obligations.⁶ (Indeed some of the self-

⁵ Peter Kind, *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business* (Edison Electric Institute 2013).

⁶ The Fifth Amendment to the U.S. Constitution states, in part: "... [N]or shall private property be taken for public use, without just compensation." Courts have said that an unconstitutional "taking" occurs when the government interferes with "legitimate, investment-backed expectations." *Penn Central Transportation Co. v. City of New York*, 438 U.S. 104, 124 (1978). Some have argued that when a utility makes an obligatory investment in its infrastructure, it has a legitimate, constitutionally protected expectation of recovering its costs. In *Duquesne Light Co. v. Barasch*, 488 U.S. 299, 309 (1989), the Supreme Court expressly held that the Constitution does not require rates that recover all prudent investment. See also *Verizon Communications v. FCC*, 535 U.S. 467, 528 (2002) (noting prior FCC statement that "regulation does not and should not guarantee full recovery of their embedded costs"). But the *Barasch* Court did warn that disallowances that are large enough to endanger the utility's financial "integrity, that leave investors undercompensated for the "risk associated with their investment," or that result from "arbitrarily

suppliers have committed their conflation error, arguing that utilities "should have seen it coming," and thus have no more right to recover past costs than to earn future profits.) But the case law and economic common sense are indifferent to foregone profit, because it is not the usual job of government regulation to maintain a company's profits when its customers have found better alternatives.⁷

switch[ing] back and forth between methodologies in a way which required investors to bear the risk of bad investments at some times while denying them the benefit of good investments at others[,] would raise serious constitutional questions." 488 U.S. at 312, 314.

⁷ See *Market Street Railway Co. v. Railroad Commission of California*, . 324 U.S. 548, 554, 557, 567 (1945). where the Court explained that the Constitution has no sympathy for a company whose services are no longer needed:

[I]f there were no public regulation at all, this appellant would be a particularly ailing unit of a generally sick industry. The problem of reconciling the patrons' needs and the investors' rights in an enterprise that has passed its zenith of opportunity and usefulness, whose investment already is impaired by economic forces, and whose earning possibilities are already invaded by competition from other forms of transportation, is quite a different problem. . . .

The due process clause has been applied to prevent governmental destruction of existing economic values. It has not and cannot be applied to insure values or to restore values that have been lost by the operation of economic forces.

While utilities should have no expectation of profit associated with future infrastructure that the self-suppliers do not need, they are entitled to cost recovery and profit on the infrastructure—existing and future—that the self-suppliers do need. In short, while supporting the individualism implicit in microgrids, we must also protect the commons. In the electric industry, the commons is the central infrastructure: the infrastructure that incumbent utilities built to serve customers, long before we had time-of-day pricing, demand aggregators, and rooftop solar; and the future infrastructure customers will still need even when every neighborhood has its own microgrid. Just as Garrett Hardin feared the permanent loss of pasture due to over-grazing,⁸ so must we prevent the degrading of our electric infrastructure due to under-paying. It will be hard to identify who

⁸ Garrett Hardin, “The Tragedy of the Commons,” *Science* (Dec. 13, 1968):

Picture a pasture open to all.... As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, “What is the utility to me of adding one more animal to my herd?” . . . [T]he rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another. . . . But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

gets benefits from, and provides benefits to, our electric infrastructure, present and future. We need not waste time contesting the principle that beneficiaries must pay.

III. Utility Compensation: Can We Align It With Performance?

In the microgrid era, there likely will remain some company, whether it's today's utility or its replacement, continuing to provide some network service on a monopoly basis. We will need to compensate that entity appropriately. We are now entering our second century of arguing over what compensation is appropriate.

Historically, utility pricing focused on satisfying the “revenue requirement”: that is, allocating to every customer its pro rata sliver of fixed and variable costs. The revenue requirement was central to regulation because the utility's financial strength was central to customer service. That was the historical approach. Today's regulators think about two additional purposes for prices: to induce consumers to consume efficiently, and to cause utilities to perform expertly.

Efficient consumer behavior: Today's regulators are experimenting with rates that reflect costs directly caused by consumption: peak and off-peak pricing (sometimes even hourly pricing). These prices allocate customers a pro rata share of fixed costs according to their contribution to fixed costs, while also tracking operating cost incurred at the time of consumption. As we open opportunities for

those who want to “leave the grid,” we must get prices right for those who stay on the grid. Otherwise, we risk fostering uneconomic bypass, with customers leaving the grid to escape an ill-designed rate rather than to increase societal welfare.⁹

Efficient utility performance: In today's complicated world, utility performance means not only managing operations competently, but also preparing for storms, terrorism, and environmental regulation. To move from revenue requirements to compensation based on performance, regulators must take two steps. First, they must establish standards for performance, focusing not only on keeping electric current flowing at reasonable rates, but also on dimensions like product diversity, innovation, customer education

As we open opportunities for those who want to leave the grid, we must get prices right for those who stay on the grid or risk fostering bypass that is uneconomic.

⁹ See *Regulating Public Utility Performance*, *supra* at p.20 n.17: “Uneconomic bypass occurs when the self-generating customer’s total incremental cost (the one-time cost of building the plant, plus the operating costs) is (a) less than the total rate it pays the utility, making it a positive move for the customer; but (b) greater than the utility’s marginal costs (i.e., the cost of producing one more unit of energy), making it a negative result for society. Uneconomic bypass wastes society’s resources by increasing “the total industry costs of providing a given level of service.” J. Gregory Sidak & Daniel F. Spulber, *Deregulatory Takings and the Regulatory Contract* 78 (1998); see also *id.* at 30–31 (discussing uneconomic bypass).”

and customer empowerment. The regulator then must design rate plans that condition compensation on the utility's performance. This step involves (a) establishing the level of revenues necessary for a prudent utility to produce the necessary performance, and (b) designing the compensation scheme so that the utility's profit depends on its performance. Finally, the regulator must evaluate the utility's performance and assign consequences.

But the typical utility proposal for “performance-based rates” does not follow this logical sequence for basing rates on performance. The typical proposal displays one or more of six defects:

1. *Compensation exceeding performance:*

The typical PBR proposal does not align the utility's compensation with performance because it does not define performance. Instead

it allows supra-normal returns without a showing of supra-normal performance—a result possible only in a monopoly market. In the competitive market, sellers have no choice but to match returns with performance.

2. *Rewards for cost-cutting:* Performance-based rate plans often reward cost-cutting, because the rate stays constant when costs decline. But cost-cutting is not a proxy for performance. There is risk that the utility will favor short-term cost cuts over investments in long-term performance.

3. *Mismatched time horizons:* A PBR plan usually is related to rate case schedules; i.e., the commission and/or consumer

advocate refrains from initiating a new rate case long enough for the utility to earn the higher returns called for by the plan. The time period between these rate cases does not necessary bear a logical connection to the time period required for a particular type of performance. The period of time over which benefits emerge for new meters, renewables purchases, or new technology experiments will not match up with the time periods between rate cases.

4. *Regulatory gamesmanship:* Because the utility knows more about its cost structure than does the commission, there is potential for gamesmanship: jiggering the “incentives” to reward results that would have occurred without the incentives.

5. *Worker-reward gap:* What enhances performance is people: specifically, people who work at jobs, not people who wait for dividends. While shareholder investment is a prerequisite of performance, and deserves the return authorized by law, the actual performance that makes service worth compensating is performance by workers. But performance-based rate plans aim at increasing return on equity, not employee salaries. A plan truly focused on utility

Utility proposals for performance-based rates may not follow a logical sequence for basing rates on actual performance, having a number of potential defects.

performance would reward the employees who make the utility perform. Those employee rewards would, of course, be expenses recoverable from ratepayers; they would not affect shareholder returns.

6. *Test year distortion:* Some PBR plans offer special cost recovery paths for specific types of investments. These riders and surcharges allow cost recovery to occur outside the normal rate case. While they make cost recovery more certain, they can bias the test year revenue requirement, and bias it upwards. A test year revenue requirement is a prediction of what costs will be in the rate year. Some costs, like those embedded in rate base, are fixed in advance. But for other costs, predictions placed in the test year revenue requirement are often wrong.

The theory behind a test year is that the over-estimates balance out the under-estimates, so that the return on equity actually earned resembles the level authorized. A rider or surcharge removes costs from the test year revenue requirement and recovers them separately. Doing so upsets the test year balance, i.e., the likelihood that the mis-predictions will cancel each other out. The bias occurs because the costs in the rider tend to increase rather than decrease—which is precisely when utilities propose them. (The book value of rate-based assets declines each year with book depreciation, but utilities do not propose depreciation riders.) For this reason, riders should be restricted to special

cases: costs that themselves upset the test year balance because they are large and non-routine.

IV. Conclusions

Microgrid policy should align the excitement of individualism with a commitment to the commons. To prepare the groundwork, state policymakers should take these steps:

1. For each potential service enabled by, or required for, microgrids, decide if it should be a monopoly service or a competitive service
2. For each monopoly service, host a competition to find the best provider, establish performance expectations and a means to compensate the company based on its performance, hold the company accountable for its performance and have a procedure for rebidding the job at appropriate time intervals.

3. For competitive services, ensure that competitors have nondiscriminatory access to the bottleneck facilities they need to compete. Also establish minimum standards for reliability, safety and customer relations, and put into place effective means for enforcing those standards.

4. Provide a predictable method for the incumbent utility to recover its past prudent costs, consistent with whatever risk it undertook when incurring those costs.

5. Require the central network provider, whether it is the incumbent utility or someone else, to have a plan for providing future infrastructure needs, and create a path for recovering the associated costs from those who benefit.

6. Revise current retail rate design to align customer behavior with economic efficiency, so that microgrids compete on their merits rather than cause uneconomic bypass. □