Why We Need Standby Rates for On-Site Generation

Standby rates for on-site generation are a critical tool for the appropriate allocation of costs to those who cause them. Moreover, because the system-benefits provided by on-site generation are highly situation specific, generic prohibitions on standby rates are highly inefficient and are likely to undermine the potential public benefits of distributed generation.

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I. Introduction

A recent article in this journal argued that stand-by rates for on-site (or distributed) generation are not only unnecessary, but contrary to the public interest.[1] Unfortunately, that article reflected a fundamental misunderstanding of distributed generation (DG) and its impact on distribution facilities.

As this article explains, all consumers who are interconnected to the distribution grid and who rely on that grid to import or export energy impose costs on the utility system. Consumers with on-site generation (consumer-generators) are no exception. Without some mechanism to recover those costs from consumer-generators, other consumers on the utility system will be required to absorb the costs, subsidizing consumer-generators.

This article also explains that while certain types of on-site generation can provide some system benefits, such system benefits are highly situation-specific. Because the benefits can only be achieved where the generation is properly planned, designed, located, and operated, proposals to compensate consumer-generators for such benefits through a

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generic exemption from standby charges are not only unfair to other consumers, but are also inefficient. Such proposals would subsidize DG that provides no public value and reduce incentives for consumers to plan, design, locate, and operate their on-site generation in a way that provides value to their communities and other electric consumers.

II. Discussion

A. All interconnected consumers, including consumer-generators impose costs on the system

The electric utility industry is highly capital-intensive. In order to serve their consumers, utilities must have in place a network of transmission and distribution facilities adequate to meet the peak requirements of the consumers on each circuit. Utilities must also own, or acquire by contract, enough generation capacity to meet the peak requirements of their consumers.[2] The costs of that system must be recovered from the utilities' consumers.

Every consumer that contributes, or could contribute, to a utility's peaks imposes costs on the utility. The utility must build its system a little larger, or acquire a little more capacity, in order to ensure that energy is available and can be delivered whenever the consumer needs it.

Those costs do not vanish merely because a consumer installs on-site generation. If the consumer installs intermittent generation such as wind power, for example, the generation may simply not be available during a utility's peaks. The wind is often still during the hottest hours of the day when the consumer will lean most heavily on the utility's system. The utility must have the same capacity in place to serve the consumer-generator as it did before the consumer installed its wind turbine.[3]

A utility's costs do not vanish merely because a consumer installs on-site generation.

Moreover, unless a consumer agrees by contract to operate its generator during the utility's peaks, the consumer is free at any time, and for its own reasons, to take power from its electric utility rather than operate its generator. The utility must stand ready at any time to meet that consumer's demand, just as it would in the absence of on-site generation.

Even a contract is no guarantee that on-site generation will operate at peak. As with any generator, on-site generators will have unscheduled outages. Though the odds may be small for a properly operated and maintained on-site generator, utilities are not permitted to gamble with system reliability. Utilities must plan for the risk that the on-site generator will fail at the worst possible time.

There are only a few circumstances under which a utility need not design its system to meet a consumer's peak demand. The most obvious is where the consumer elects to operate in isolation from the grid. If a consumer is not interconnected to the grid, and cannot draw power from the grid, then the consumer cannot contribute to the utility's peaks and will not be charged for standby service.[4]

B. Standby rates are required to recover the costs incurred to serve consumer-generators

As noted above, utilities' fixed costs are unlikely to change merely because a consumer installs on-site generation. Utilities' ability to recover those fixed costs, however, can change dramatically. As even opponents of standby rates recognize, utilities' traditional rate structures are not well designed to accommodate consumer-owned generation.

While most of a utility's costs are fixed, the electric utility industry has historically recovered its costs largely through volumetric rates. The small fixed charge most retail consumers pay each month is typically sufficient only to cover the cost of metering and billing. Consumers then pay a volumetric, or kWh, charge to cover not only the utility's variable costs (energy and some variable operation and

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maintenance costs), but also the utility's fixed costs for transmission and distribution infrastructure and for generation capacity.

The volumetric charge is set for each rate class at a level intended to recover that class's share of the system's variable and fixed costs given certain presumptions about the volume of energy the class is likely to consume during a particular period.[5] When a consumer installs on-site generation, the assumptions behind the traditional rate design no longer hold. The fixed costs required to serve the consumer remain about the same as for other consumers in the rate class. But, because the consumer takes fewer kWh from the utility, they will pay a smaller share of the system's fixed cost than those other consumers. Those other consumers will then have to make up the difference, subsidizing the consumer-generator.

Theoretically, there are a number of ways to "fix" the rate design to ensure that utilities' costs are covered. A utility could raise the fixed monthly charge paid by all consumers to cover all of the utility's fixed costs, but that answer is typically not politically palatable. Others have instead supported giving utilities a revenue cap. The cap would protect utilities from revenue losses caused by DG, but would lead to increased rates to other consumers and effectively subsidize consumer-generators.[6] The most common approach has been to require consumer-generators to take retail service under a different tariff that includes standby charges.

C. Actuarial mathematics provide little guidance in establishing standby costs for most generators

In his article opposing standby rates, Sean Casten argues that the outage of a single on-site generator has little impact on a utility's costs for three reasons:

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- The utility's costs are spread across multiple customers;
- The requirement to provide backup capacity is a function of the population of generators connected to a utility grid; and,
- The ability of a distributed generator to idle utility capacity (strand investment) is a function of its coincident peak.

While accurate, none of these points supports Mr. Casten's argument.

First, standby rate design already incorporates two of these ideas: that a utility's costs are spread across multiple customers, and that the risk of stranded costs is associated with the consumer's demand at peak. Standby rates are not designed to recover the entire cost of the system from consumer-generators alone. Rather, they are designed to collect from consumer-generators their appropriate share of the system's fixed costs—related to the rate class's contribution to system peak—that they would have paid had they not installed on-site generation. They are cost-based rates, designed to recover the costs of providing electric service to consumer-generators that the standard volumetric rates are unable to recover.

Second, while it is true that the requirement to provide backup capacity is a function of the population of generators connected to the grid, that does not provide much guidance alone. The calculation is more complicated than Mr. Casten suggests.

For example, how much DG is there on a particular system? Were a utility to have 10, 20, or 50 distributed generators on its system, it might be able to reduce the amount of generation capacity it acquires to meet the needs of consumer generators.[7] Similarly, were a utility to serve 10, 20, or 50 distributed generators on an individual transmission or distribution circuit, it might be able to reduce the transmission or distribution capacity it builds on that circuit to serve the consumer generators.[8]

Thus, at high levels of penetration, utilities may be able to set standby charges for each consumer generator at a lower rate that

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takes the presence of the others into account. But there are few utilities today that have that kind of penetration on the entire system, let alone on a particular circuit. If they have any DG at all, most utilities are more likely to have only a few units.[9]

At light penetration levels, utilities cannot simply reduce the standby charge for a generator with an 80 percent capacity factor by that same percent. This is not a game in statistics, but a matter of reliability. The generation and infrastructure capacity must be available on the system in the event that a unit fails at peak or the lights may go out for other consumers.

Unfortunately, even when DG reaches high penetration levels, standby charge calculations will never be able to resemble the simple statistical calculations found in Mr. Casten's article. For example, even if there are a large number of DG units on a system, the utility faces a significant risk that their outages may correspond. If there are a lot of consumers with gas- or wind-powered units on the system, for example, they are all likely to be suffering from light wind at the same time when fuels peak.[10] If there are a lot of gas- or diesel-fueled units on the system, they are likely to all choose to turn off their generators and take power under the utility's regulated retail rate at the same time if fuel prices peak.[11] If a large percentage of distributed generators will fail to operate at the same time, utilities will still have to have electrical and distribution capacity available to serve all of those consumer-generators at the same time. Consumer-generators should pay for that capacity need to serve them.[12]

D. The system and societal benefits of DG are highly situation-specific

Mr. Casten argues that utilities should be prohibited from charging standby rates in order to compensate consumer-generators for a range of system and societal benefits, including more efficient power generation, reduced emissions, and reduced need for investment in transmission or distribution facilities. Unfortunately, Mr. Casten's argument presumes inaccurately that all DG has these benefits. In fact, the benefits of DG are highly situation-specific.[13]

The argument that DG permits utilities to avoid upgrades to their T&D infrastructure is overstated.

It is true that certain DG applications can be extremely efficient. Where a consumer's heat or steam requirements are well matched to the consumer's electricity needs, combined heat and power applications can reach levels of efficiency that no central station generator can meet. But that describes a very small percentage of DG applications. A microturbine operating without thermal recovery is only 26 percent efficient. At low loads, that same microturbine is only 15 percent efficient. The efficiency for commercially available fuel cells is about 32 percent. By contrast, a new combined-cycle gas generating plant has an efficiency of over 50 percent. New pressurized fluid bed coal technologies can exceed 35 percent efficiency.

It is also true that certain DG applications can be very clean. Wind and solar have no air emissions. A gas-fired on-site generator with post-combustion controls has air emissions per MWh of output that are dramatically below those of the average coal boiler, but still higher than those of a modern combined cycle gas generating plant.[14] Most DG, however, is considerably less environmentally friendly than central station generation. The most common form of DG, on-site generators fueled with diesel, produce nearly four times the NO_x, and twice the particulate emissions of the average coal boiler per MWh.[15]

The argument that DG permits utilities to avoid upgrades to their T&D infrastructure is similarly overstated. In certain circumstances, the right generation technology properly operated and appropriately located on the grid can provide benefits to the utility grid. For example, rotating generators operated to replace

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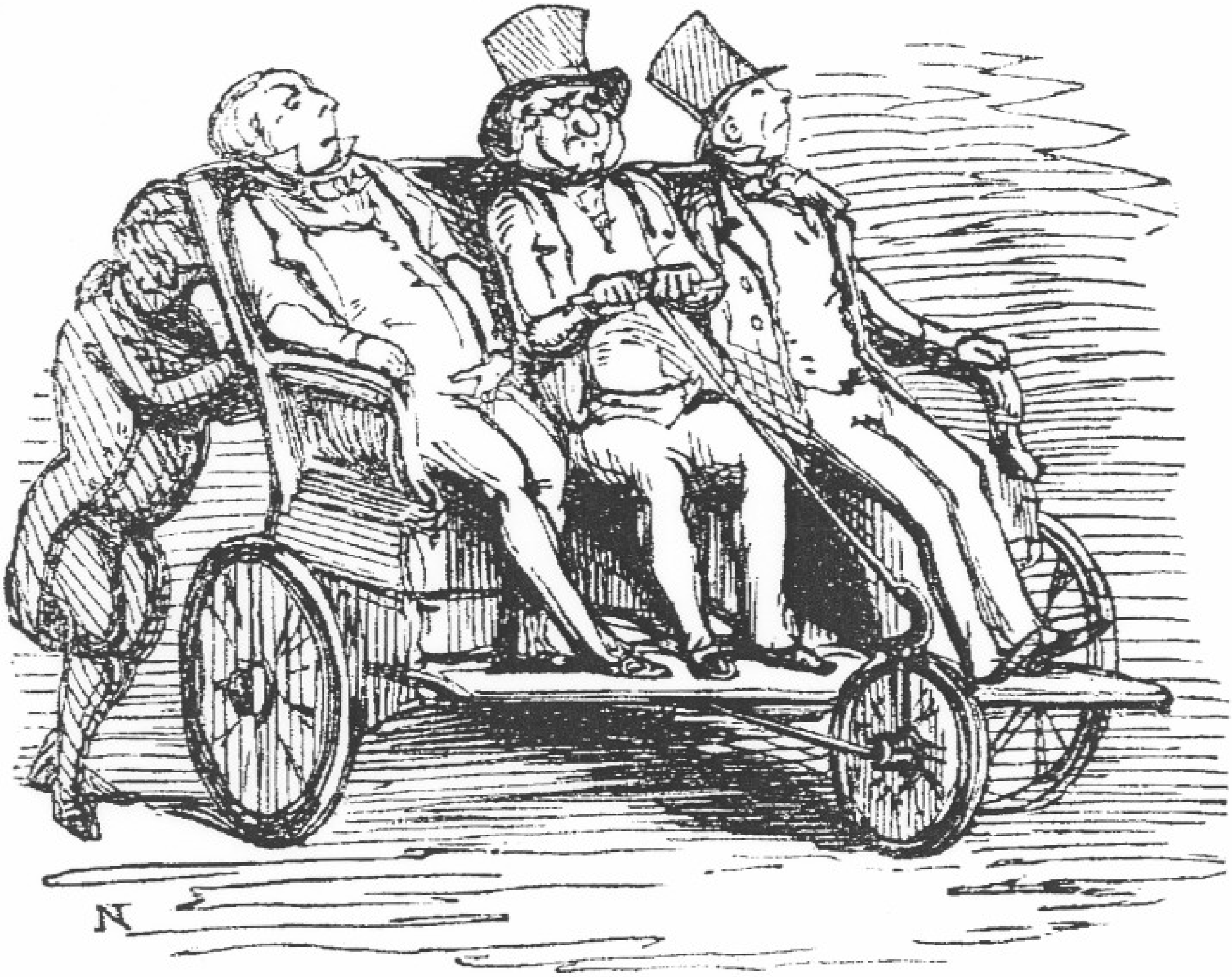
some real power output with reactive power may be able to provide support on a line that suffers from voltage sag. Also a generator that can be relied on to operate during peak demand on an overburdened line may permit a utility to put off upgrades to the circuit.[16]

To provide those benefits, however, generators must be located at exactly the right spot, operated in cooperation with the local utility, and capable of providing power at the times needed. Typically, those benefits cannot be provided reliably by intermittent generators such as wind and solar. Moreover most investment in DG is likely to be made for the primary purpose of meeting the customer generator's needs, and its contribution to the system will be a secondary consideration for the DG developer if it is considered at all. The system cannot rely on DG that will be located and operated solely to meet the commercial needs of a particular consumer. Unless the consumer-generator agrees to provide voltage support, reserves, or peak-shaving services to the



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utility, and can be depended on to do so, there is no reason to believe that their DG will provide these services.

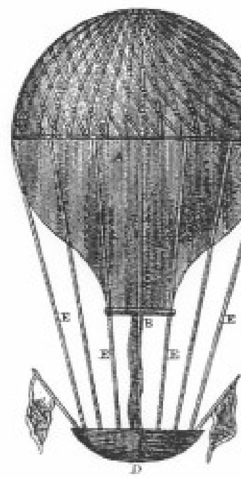
E. Compensation should be matched to actual system and societal benefits

The conditional value of DG to utility systems and society argues against providing generic compensation by relieving consumer-generators of the obligation to pay standby rates. Such generic compensation creates uneconomic incentives for consumers considering installing DG.

On the one hand, generic compensation gives consumers inefficiently high incentives to install DG that does not serve the public interest. By insulating consumers from the costs they impose on the system and the public, such policies encourage consumers to install DG regardless of the total private and public costs. The wide net that is cast by generic compensation will pay DG installations that are inefficient, have high emissions, and/or undermine the reliability of the distribution system.

On the other hand, generic compensation gives consumers no incentive to install DG in a manner that maximizes societal value. Because consumers receive no greater compensation for acting in a socially responsible manner, they are less likely to invest the additional capital required to install equipment to recover and use the waste heat from their generator; install cleaner technologies or tailpipe controls on their generation; or design, locate and operate their DG as necessary to actually produce system benefits.

Rather than adopt inefficient policies that subsidize all DG, regardless of the value that it provides, states should design



policies that tailor compensation to more closely match the value that DG truly provides to the system. If states believe that the efficiency value of CHP is inadequately compensated by the market, they can provide consumers who install CHP with targeted tax credits or cash payments. States can use similar approaches to promote environmentally responsible DG,[17] while at the same time using environmental regulations to restrict those DG technologies with the highest emissions.[18] Rate designs and regulatory approaches can also be developed that provide consumers credits for locating and operating DG in such a manner that it permits utilities to defer system investments or provides other system value.[19]

III. Conclusion

Under the right conditions, DG can provide consumers, communities, and the environment with tremendous benefits. If state regulators and others want to maximize those benefits, however, they should not adopt generic approaches that raise the cost of power to all consumers in order to subsidize DG. Rather, they should focus their attention on the goals they want to achieve and adopt targeted policies that give consumers appropriate incentives to act in the public interest. They should require consumer-generators to pay the costs required to provide them with reliable electric service, including appropriate standby charges, and separately require society to compensate consumer generators for any specific social value that they actually provide.■

Endnotes:

1. Sean Casten, *Are Standby Rates Ever Justified? The Case Against Electric Utility Standby Charges as a Response to On-Site Generation*, ELEC. J., May 2003, at 58–65.

2. The peak on a particular transmission or distribution circuit may not coincide with the peak requirements of the utility as a whole, the peak times designated in the wholesale contract under which the utility receives power, or the peak for a regional market. Thus, this article speaks to a utility's "peaks" because each of these different peaks can be important for cost causation purposes.

3. In fact, if the DG contributes excessive fault current or otherwise burdens the grid, the utility may actually have to upgrade the grid in ways that would not have been necessary absent the DG.

4. This is not to say that a consumer that was previously interconnected to the grid may not have an obligation to pay for system investments that were made on its behalf before it chose to disconnect.

5. Of course, each individual customer's consumption does not exactly match the presumptions. There will be variations within the class. Some will pay marginally more or less than their "share" of the system's fixed costs, but rate classes are designed to limit the range of variation.

6. See, e.g., Frederick Weston, Charging for Distribution Utility Services: Issues in Rate Design, Dec. 2000, found at http://www.raponline.org/Pubs/General/DistRate.pdf ("RAP Issues in Rate Design").

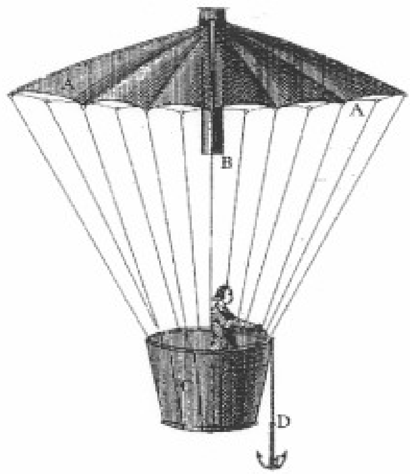
7. Even this statement is too simple. If a utility serves 50 consumers with 3 kW fuel cells and 1 consumer with a 10 MW cogeneration unit, the standby charge for the consumers with fuel cells could be adjusted to take into account the likelihood that only a small percentage will be out of service at any one time. The standby charge for the cogeneration unit will be practically unchanged, as its outage alone would have such a dramatic impact on the system.

8. Because standby charges are required to recover the cost of the distribution system as well as the cost of generation capacity, the utility must look at the total capacity of DG on each circuit in setting backup rates, and not just the total DG capacity on the system. If there are 10 DG units spread equally across 10 distribution circuits on a utility system, the utility may be able to reduce somewhat the generation capacity it needs to have available to serve the consumer-generators on its system. But, because there is only one generator on each circuit, "actuarial mathematics" are irrelevant on the wires side. The utility may not reduce the capacity it maintains on any of the 10 distribution circuits.

9. This statement does not apply to the thousands of DG units used for back up power when the grid is down. They are not relevant here, however, as they are not assessed standby charges.

10. The exception would be for a utility with a multi-state territory whose wind generators are spread across a wide geographic region.

11. Of course, when fuel prices are peaking, that is probably the time



when it will be most expensive for the utility to meet those consumers' demand.

12. Standby charges can be equated to insurance premiums. The cost of insurance goes down as the number of customers and their diversity increases. If there is only one customer in the insurance pool, its premium will have to be high enough to cover all of the insurance company's costs and risks. But numbers are not alone. If a company provides flood insurance to 100 customers, premiums will still be high if all 100 live on the same flood plain. A single event could cause them all to file claims at the same time. In the absence of diversity, numbers are less relevant.

13. There is a secondary question, and that is who should compensate consumer-generators for any societal benefit they may provide. Generic policies that prohibit standby charges require only those electric consumers served by the same utility as the consumer-generator to subsidize those benefits, even though they may be enjoyed by everyone in a state or region. While that may make sense with respect to very large utilities that serve most consumers in a state, it can be highly inequitable and burdensome when applied to small utilities serving only a few thousand consumers. To prevent that inequity, compensation for societal benefits ought to be funded through state, or nationwide, tax-funded programs, and not imposed on other consumers through rate design.

14. See Model Regulations for the Output of Specified Air Emissions from Smaller-Scale Electric Generation Resources, Appendix B Emissions Calculations (Oct. 31, 2002 Review Draft), found at http://www.raponline.org/ProjDocs/DREmsRul/Collfile/ReviewDraftModelEmissionsRule.pdf ("Model Regulations").

15. *Id.*

16. This presumes load growth at a rate that will not rapidly exceed the capacity of the DG. Also, not all circuit loads are growing. In some areas of the country with ample wind and other energy resources, demand is actually shrinking. In such situations, DG accelerates stranded cost problems rather than permitting utilities to reduce transmission or distribution investment.

17. Many states already have targeted programs aimed at supporting renewable energy. For details, see http://www.dsireusa.org/.

18. Texas and California have already adopted rules for this purpose. See Title 30, Texas Administrative Code, Part 1, Chapter 116.601–116.603; Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8, Article 3, Sections 94200–94214. The National Renewable Energy Labs have also funded the development of model state regulations for DG. See Model Regulations, *supra*.

19. See, e.g., RAP Rate Design, *supra*; Dennis R. Eicher and Douglas R. Larson, Developing Rates for Distributed Generation (2001), found at http://www.nreca.org/nreca/leg_reg/dgtoolkit/DGRatesManual.pdf.

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