The Value of Solar Tariff: Net Metering 2.0

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Introduction

Increasing numbers of customers are installing solar photovoltaic systems on their homes and businesses. As module and system costs decline, customer demand grows, and more businesses organize around the solar opportunity, it is time to revisit the tariff structure under which these systems integrate with and operate on the electric grid. This article details a novel approach to a distributed solar tariff, called the “Value of Solar” tariff (“VOST”), that addresses important utility and customer issues, and offers some significant improvements over traditional net metering approaches.

There is a saying in the venture capital world to the effect that, “It is not enough to design a better mousetrap. You really, really must want to kill mice.” Sound execution inspired by a clear vision of an end result is essential for business success. So, too, in the quest to increase markets for distributed solar generation—you really, really must want to get more solar installed.

Elements of an "Ideal" Distributed Solar Tariff [1]

In thinking about distributed solar tariff design, it is useful to pretend for a moment that we have not had traditional net metering in the United States for almost thirty years, nor feed-in tariffs or other schemes. Instead, a good place to start might be with clean slate, asking what features would accompany an "ideal" distributed solar tariff.

First, and foremost, a distributed solar tariff should be fair to the utility and to non-solar customers. The tariff should ensure that the utility has the opportunity to collect its cost of service to the solar customer, including a reasonable opportunity to earn a rate of return. And other customers should not be unfairly required to pay costs created by the solar customer, nor be unfairly subsidized by solar customers.

Second, the ideal solar tariff should fairly compensate the solar customer, through a credit, for the value that their solar generation brings to the utility system.

Third, the tariff should recover costs and give compensation credit for value independently from an incentive designed to overcome market failures. Incentives are a legitimate public policy tool, widely used in the electricity and other industries, to encourage certain kinds of market behavior. One justification

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[1] This paper addresses a tariff design for “distributed” solar electric or photovoltaic systems. Distributed solar systems are embedded in the distribution grid, on or near the customer’s home or other building, and are typically connected at the electric distribution feeder level, generating electricity primarily for consumption at the customer premises.

for solar incentives is that they help overcome certain market failures such as lack of information and practical experience with the relatively new technology among homeowners, lenders, and others. Another justification for solar incentives is that existing tariffs under-compensate for the value of distributed solar. So adequate compensation for distributed solar energy should relieve pressure on incentive systems. And these incentives will be less necessary as the distributed solar market matures. For efficiency of administration and to communicate clear signals to the market, incentive levels and compensation levels should not be conflated.

Fourth, an ideal distributed solar tariff would operate as a complement to other electricity policy goals, including, especially, a goal of more efficient use of energy. Other goals that a solar tariff should complement include payment or credit for performance, rather than just investment; encouragement of long-term performance of solar systems; reduction of long-term risks or generational cost shifting; and strong alignment with market signals.

Finally, an ideal distributed solar tariff should be intuitively sound and administratively simple to implement and manage. Analytical inputs should be rationally related to the character of solar systems and the quantity and character of energy output associated with the technology. Inputs should also be simply calculated from information the utility already routinely produces.

Traditional Net Metering Benefits and Problems

The most commonly adopted rate treatment for distributed solar systems connected to the grid in the U.S. is net metering, sometimes called net energy metering. The first net metering tariff was adopted in 1983, and the approach is part of utility policy in over 40 states in the United States.

The structure of the net metering approach is simple--customers are allowed to “net” their production of solar energy against their household energy consumption. This has often been described as “spinning the meter backwards”—a nod to the phenomena that local generation can actually cause mechanical meters to spin backwards when generation exceeds consumption. In the event that the customer produces excess energy during the netting period, most net metering systems provide a credit related to the utility’s avoided cost, the applicable retail rate, or in some cases, the current fuel charge value. Those involved in utility regulation recognize net metering as a derivative of the United States’ PURPA regime for utility rate treatment of energy from cogenerators and other “qualified facilities.”

In practice, net metering systems in the various states also include other components, such as limits on the total capacity allowed under the tariff, size limits on individual systems, differences in the netting periods, and variations in the calculation of payments for net excess generation.

Net metering was a major step forward for the distributed solar markets because the policy behind it recognizes that energy generated at the point of consumption by the customer is worth at least as much as a unit of energy delivered by the utility to that customer. And that energy is worth more than the traditionally calculated avoided cost of generating the next marginal unit of energy at a remote power plant.

Net metering offers the additional benefit of administrative simplicity. A single meter, capable of sensing energy flow in both directions can be used. No separate calculation is used for the cost or value of the solar generation.

Traditional net metering also creates some problems. First, simple netting of energy assigns a retail value to local solar energy, but that value is not necessarily representative of the true value of solar.

There is no “cost of service” calculation underlying this assigned value. Second, the approach makes no provision for ensuring that the utility recovers the full cost of serving the solar customer. A solar customer willing to invest in a very large system or dramatically reduce their consumption could, in theory, eliminate any utility charges, even though they continue to receive service at night and on an as-needed basis, over a electric distribution network.

Third, the significantly reduced payment for excess generation at the “avoided cost” rate in many jurisdictions sends a very clear signal to customers that they should size their solar system roughly equivalent to their baseline energy demand. This is because the relatively low payment for excess generation isn't enough return to justify the added investment in capacity to generate that excess energy. As a result, traditional net metering creates an opportunity cost to all customers—a customer willing to invest in a system that could generate valuable excess on-peak or near-peak energy for the system is dissuaded from making that investment by lower payments or credits for that energy. And the utility still has to generate or procure that energy for other customers, almost certainly at a higher-than-average cost.

Finally, traditional net metering couples solar energy value to the level of a customer's energy consumption, with the effect that it discourages energy efficiency and actually encourages on-peak consumption. Since a unit of energy offset by solar generation is worth more to a customer than a unit of excess generation in many jurisdictions, the approach sends a powerful economic signal to customers that is out of sync with other policy and economic objectives.

The Austin Energy "Value of Solar" Tariff

When I served as vice president of Distributed Energy Services at Austin Energy, I took the initiative to fundamentally redesign the way net metering was structured, working with my staff to create a new "Value of Solar" distributed solar rate, applicable to residential customers. The tariff design has two basic components. First, the tariff relies on an annually-updated value of solar calculation designed to reveal the value to the utility of a unit of generated solar energy. Like an avoided cost methodology, this is essentially the “indifference price” at which the utility is neutral to the solar energy, and is conservatively calculated. Second, the tariff reconfigures the netting process to ensure that the utility recovers its full cost of serving the solar customer before any credit for solar generation is applied. These two steps result in a distributed solar rate that is more fair to the solar customer, the utility, and other utility customers. The Value of Solar Tariff is administratively simple, aligns with other policy objectives, and decouples solar energy compensation from both consumption and incentives.

Austin Energy had adopted a value of solar calculation methodology several years before applying the calculation to distributed rates. Previously, the calculation had been used to generate a reference or

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[3] Traditional avoided cost calculations assign a single value to all forms of non-utility generation. The avoided cost is defined as the incremental cost to an electric utility of electric energy or capacity which, but for the purchase from the QF, such utility would generate itself or purchase from another source (see 18 C.F.R. § 292.101(b)(6). The U.S. Federal Energy Regulatory Commission has clarified that a regulatory authority may establish technology-specific avoided cost values under certain conditions. See California Public Utilities Commission, Order Granting Clarification and Dismissing Rehearing, 133 FERC ¶ 61,059 at pp. 26, 31 (2010).

[4] Some net metering schemes limit a customer’s ability to offset some charges.

[5] A comparison table of U.S. net metering schemes is available at http://bit.ly/1fkhHAL

benchmark value against which to evaluate purchased power proposals, calibrate rebate and incentive levels, and evaluate resource plan components. As used by Austin Energy, the Value of Solar calculation generates a long term levelized value of solar in cents per kilowatt/hour, based on five components.

These value components are energy, capacity, transmission capacity, transmission and distribution losses, and environmental value. Energy and capacity value are heavily influenced by natural gas prices (the marginal generating fuel in Texas) and these values make up the bulk of the value. Environmental value is derived from the price premium for Austin Energy's highly successful GreenChoice® renewable energy product offering—a market-based, willingness to pay indicator. Prior to adapting the calculation as a foundation for the distributed solar rate, Austin Energy also added a value derived from nodal market prices, matching 15-minute nodal price data with the average daily output levels of solar energy. In the end, the value of solar today is about three U.S. cents higher than the average distributed energy rate.

The goal of the calculation process is to estimate the total value of a unit of solar energy generated in the distribution grid, at or very near the point of consumption. Put another way, it is the conservative estimate of the cost that the utility would face in seeking to fill an order for a unit of energy with the same character as that generated from a local solar facility. That is, the utility would have to buy some energy, which would include some capacity value. The energy would have to be transmitted, with losses, over a delivery system, and pay transmission costs as well. Finally, the energy's environmental impacts would have to be offset or "greened" with some kind of renewable energy credit or certificate.

The calculation is conservative for several reasons. It does not include so-called externality values related to local economic benefits, local environmental benefits or other valuable attributes of distributed solar. The levelized value is recalculated annually, so as to reflect current utility costs and prevent overpayments when system prices fall.

The concept behind applying the value of solar calculation to a distributed rate stemmed from recognition of the limitations of traditional net metering, discussed above. The calculation confirms the common sense perception that locally generated clean energy, produced at or very near the point of use has "above average" value.

Once the Austin Energy team decided that the value of solar rate was an appropriate foundation for a distributed solar rate, the question that remained was how to incorporate it in a tariff. This rate design stage was the point at which the "ideal" characteristics for a solar rate came into play. First, it was determined that the value would be recalculated and reset on an annual basis, in conjunction with the annual fuel factor or charge calculation. Second, Austin Energy decided that the netting process would be reconfigured, even while it remained on the customer-side of the service relationship. In order to account for utility fixed and variable cost recovery requirements that remain with solar customers, the billing process charges every customer for total energy consumption (whether offset by solar production or not) at their premises using the applicable existing distributed service rates. Then, a credit is applied for every unit of solar energy produced, at the value of solar rate. Excess credit is carried forward each month until the end of the year, when any remaining balance is erased. While little or no balance is anticipated, the use of a credit, rather than payment and annual zeroing out of excess balances helps preserve the status of the net metering calculation as "non-refundable credit" for tax purposes.

While the impact of the new Value of Solar Tariff has yet to be fully understood and will vary from customer to customer, the design team estimated that the new rate would reduce the payback period for an average distributed solar system to something fewer than ten years. Under the new rate, customers have a strong incentive to use energy efficiently, in order to maximize the economic value they receive, and making more on-peak energy available to the utility. Because the value is recalculated frequently, both the customer and the utility are treated fairly as solar and general system costs change. In the event that the system fails to generate as expected, the netting methodology ensures that the utility always recovers its costs of serving the customer. The calculation and netting approach eliminate the argument that other customers subsidize solar, and the Value of Solar credit ensures that solar customers are not unfairly asked to subsidize the utility or other ratepayers. In the months following adoption of the Value of Solar Tariff, Austin Energy reports continued strong growth in distributed solar installations and the opportunity to reduce capacity-denominated incentive rebates by more than 30%.

Next Steps

The Austin Energy Value of Solar rate was implemented with new rates adopted in June 2012. It has earned recognition and interest from utilities and solar industry experts alike. The Value of Solar Tariff was cited by SEPA in its decision to recognize Austin Energy as "Public Power Utility of the Year" in 2012.

More can be done with the value of solar approach. The rate has been adopted in state law in Minnesota, and is under consideration in several other jurisdictions.[6] With more broadly available public data, the concept could see even wider application. As experience grows, the various approaches should consolidate around common methodologies, even as values differ from location to location.[7] Though Austin implemented the concept with residential customers, it can be applied to commercial solar rates as well. And it merits further study in conjunction with other valuation approaches for distributed solar. Finally, the concept of distributed solar valuation as a foundation for setting an economically efficient compensation rate has potential application for use in setting rates for storage, energy efficiency and demand response, smart grid-enabled services, and other distributed energy resources.

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[6] The regulatory process for developing the Value of Solar methodology in Minnesota is chronicled at http://mn.gov/commerce/energy/topics/resources/energy-legislation-initiatives/value-of-solar-tariff-methodology%20.jsp

[7] The author and Jason Keyes recently published a paper setting forth generic recommendations for regulators relating to distributed solar valuation. See A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Oct. 2013, available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf

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