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The 'Value Of Solar' Rate: Designing An Improved Residential Solar Tariff

Net metering is often considered the go-to incentive for residential PV systems, but it has certain limitations for both utilities and users.

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The most commonly adopted rate treatment for residential solar systems connected to the grid is net metering, or, as it is also known, 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 U.S.

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 method has often been described as spinning the meter backward. 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 or, in some cases, the current fuel charge value.

Net metering is a derivative of the Public Utility Regulatory Policies Act 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 excess generation.

Net metering was a major step forward for the residential 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 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 required for the cost or value of the solar generation.

Limitations

Traditional net metering also creates some problems. First, simple netting of energy assigns a retail value to local solar energy (at least up to the point of consumption during the netting period), but that value is not necessarily representative of the true value of solar.

In addition, there does not appear to be a cost-based reason to assign a different value to energy offset by consumption and energy that is excess to consumption during the netting period.

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 could eliminate any utility charges, even though the customer continues to receive service at night and on a stand-by basis, over a network.

Third, the significantly reduced payment for excess generation at the "avoided cost" rate sends a 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 is not enough return to justify the added investment in capacity.

As a result, traditional net metering creates an opportunity cost for all customers. A customer willing to self-invest in a system that could generate valuable excess on-peak or near-peak energy for the network is dissuaded from making that investment by low payments for that energy. Furthermore, the utility still has to generate or procure energy for other customers, almost certainly at a higher-than-average cost.

Net metering raises problems under tiered rate structures. Tiered - or inverted block - rates rise with the level of consumption and are increasingly popular for their energy efficiency price signals. With such rates, however, the more energy a customer uses, the more value that customer receives for solar generation. But the solar that displaces a low-tier, low-price kilowatt-hour is no different than the solar that displaces a high-priced kilowatt-hour.

Finally, traditional net metering couples solar energy value to the level of a customer's energy consumption, even in the absence of tiered or inverted-block rates, with the effect that it discourages energy efficiency and actually encourages on-peak consumption.

Because a unit of energy offset by solar generation is worth so much more to a customer than a unit of excess generation, the approach sends a powerful economic signal to customers that is out of sync with other policy and economic objectives.

Austin Energy's approach

Texas-based utility Austin Energy recently undertook a fundamental redesign of the way net metering was structured, resulting in its new Value of Solar residential solar rate.

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. This figure, which is essentially the price at which the utility is neutral to the solar energy, 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 residential solar rate that is fairer to the solar customer, the utility and other utility customers.

The Value of Solar rate aligns with other policy objectives and decouples solar energy compensation from both consumption and incentives. It is also administratively simple.

Austin Energy had developed and used a Value of Solar calculation methodology to generate a reference or benchmark value against which to evaluate purchased power proposals, calibrate rebate and incentive levels, and evaluate resource plan components several years before applying the calculation to residential rates.

The Value of Solar calculation generates a 30-year levelized value of solar in cents per kilowatt-hour, based on five components: energy, capacity, transmission capacity, transmission and distribution losses, and environmental value.

Energy and capacity value are heavily influenced by natural gas prices and make up the bulk of the value. Environmental value is derived from the price premium for Austin Energy's GreenChoice renewable energy product offering. In the end, the Value of Solar rate today is about three cents higher than the average residential 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. It is the conservative estimate of the cost that the utility would face 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 and system charges as well. Finally, the energy's environmental impacts would have to be "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.

Impacts

Austin Energy's tariff redesign incorporated additional changes. 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, the utility decided that the netting process would be reconfigured.

In order to account for utility fixed and variable cost recovery requirements that remain with solar customers, the billing process charges all customers for total energy consumption (whether offset by solar production or not) at their premises using the applicable existing residential 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 zeroing out helps preserve the status of the net metering calculation as "non-refundable credit" for tax purposes.

The new Value of Solar rate is expected to have several impacts, starting with a reduction in the simple payback period for customers. Under the new rate, customers have a strong incentive to use energy efficiently, making more on-peak energy available to the utility.

Annual recalculation ensures that both the customer and the utility are treated fairly as market costs change. The netting methodology ensures that the utility always recovers its costs of serving the customer, and eliminates the argument that other customers subsidize solar.

The Value of Solar rate reduces utility revenues to the extent that the Value of Solar exceeds the retail rate charged to the customer. It is, therefore, fair to include that increment in a power system cost recovery factor. Of course, this adjustment would only apply to the incremental difference, as the utility recovers the majority of revenue impact through the netting process on the bill.

Austin Energy's Value of Solar rate was implemented on Oct. 1, 2012.

Already, the innovation has earned recognition and interest from utilities and solar experts alike.

For instance, the Solar Electric Power Association cited the Value of Solar rate in its decision to recognize Austin Energy as Public Power Utility of the Year in 2012. The Interstate Renewable Energy Council gave one of its annual Innovation Awards to Austin Energy in September 2012.

More can be done with the Value of Solar approach. The rate could be applied in other states and regions and could see expanded use if publicly available data could be used to estimate values. It might also have application with commercial solar rates, and it merits further study in conjunction with other valuation approaches for distributed solar.

At this time, a priority agenda would include full characterization of value elements and methodologies, the validation of the algorithms across multiple regions and service territories, and analysis of impacts in Austin and other places where the idea is adopted.

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