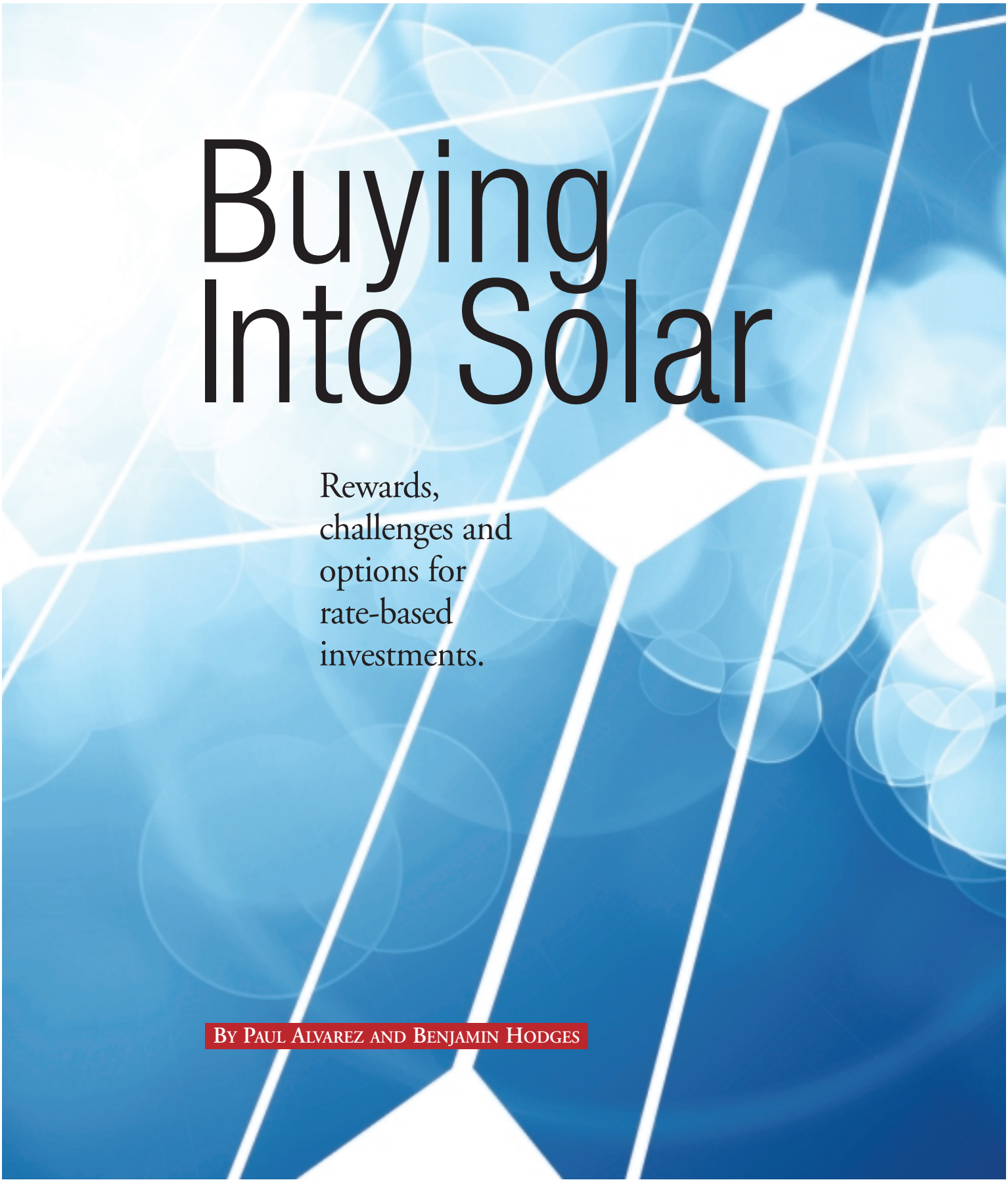

Buying Into Solar

Rewards, challenges and options for rate-based investments.

By Paul Alvarez and Benjamin Hodges

The debate in Washington on climate change is heating up, and a national renewable energy standard is part of it. Although far from being law, proposed federal climate legislation is already impacting the business decisions being made by U.S. utilities.

Many investor-owned utilities have been operating under state-mandated renewable energy standards for some time. Many of these standards include solar or customer-sited generation mandates, and investor-owned utilities (IOUs) are acting aggressively to comply. But other than a few notable exceptions, compliance with solar and customer-sited mandates generally is being accomplished through independent customer investment and power-purchase agreements with independent power producers (IPPs), rather than regulated utility investment in renewable generation.

Investments in solar generation offer a variety of potential rewards, challenges, and options for utilities. Solar generation, and particularly customer-sited photovoltaic (PV) solar, might play an interesting and influential role in future IOU resource portfolios and business models.

Rewards of Regulated Solar

Any solar or customer-sited energy standards that might become law present utilities with a build-or-buy decision. Build solar generation and the regulated utility creates an opportunity to earn a return on investment; buy solar energy from an IPP and the regulated utility foregoes the direct return opportunities. About one-third of state renewable energy standards incorporate a solar or customer-sited generation requirement. A few other states and most versions of pending federal legislation simply provide a bonus multiplier for solar, making a kilowatt hour of solar worth 2 or 3 kWh for compliance purposes.

While the opportunity for profit would seem to offer sufficient incentive for utilities to invest in solar generation, there certainly are other incentives. Investment in distributed PV solar systems, in particular, yields both public relations benefits and growth in organizational capabilities that might be valuable in the future.

"Some utilities are beginning to get the message that solar generation represents a whole new set of market niches in which they can participate," says Mike Taylor, director of research and education at the Solar Electric Power Association (SEPA). "Solar generation will be a small but significant system resource within the timeframe of utilities' current or next resource planning period." While the extent and speed of solar penetration will vary by geography, few doubt that solar generation will one day become a significant portfolio resource and compete with traditional generation market options. The question becomes, "How should utilities participate in the developing solar generation market?"

One could hypothesize that utilities investing in solar generation today might help build the organizational capabilities and experience needed to succeed in future electric markets. Regulated renewable generation investment in general, and solar generation investment in particular, not only presents IOUs with opportunities for investment returns, but also might mitigate market risks and allow growth in organizational capabilities that may one day prove valuable.

Despite these potential rewards, few IOUs are making regulated investments in solar generation. The economics for regulated utility investment in solar generation apparently improved significantly when President George W. Bush signed the *Emergency Economic Stabilization Act* in October 2008, removing the specific exclusion of utilities from generating investment tax credits (ITC) for solar investments. Now that the exclusion has been lifted, the ITC offers current-period reductions in tax liabilities to IOUs that can lower investment costs, a benefit that heretofore was available only to IPP investors in solar generation.

Yet the playing field between IOUs and IPPs still isn't level as a result of this change in the tax code. This is due in part to normalization accounting that applies to ratemaking rules in the tax code related to ITC (*see "Normalization Requirements"*).

This important aspect of the tax code requires IOUs to share ITC tax benefits with customers over time to preserve IOU's investment incentives. If an IOU were to share ITC tax benefits with customers immediately, the investment incentive that the U.S. Congress intended IOUs to have would be lost. Congress repeatedly has confirmed that the goal of the ITC is to stimulate investment by the utility industry and not solely to lower utility bills.

While normalization accounting does indeed preserve a portion of an IOU's ITC investment incentives, these IRS rules

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don't apply to independent power producers (IPPs). IPPs with the tax capacity have flexibility in how they incorporate ITC tax impacts into their bid prices per kilowatt hour when competing with IOUs on generation resource opportunities. Though complicated to calculate, the outcome is easy to understand: Entities that must use normalization accounting (regulated utilities) have less flexibility in how they pass through the benefits of the ITC (likely over a longer period of time) than entities that don't (IPPs). As a result, IPPs have more flexibility in how they choose to incorporate ITC tax benefits when calculating bid prices for solar energy. IPP solar energy bid prices might be lower in terms of utility customer rate impact than regulated investment in solar generation, on a head-to-head bid basis—assuming the IPP has tax capacity and chooses to pass through a greater portion of the ITC benefit more quickly than a regulated utility is allowed to. While this potentially puts IOU-owned solar generation at a competitive disadvantage on an everything-else-equal bid-price basis, regulated investment offers many qualitative advantages over IPP ownership of solar generation.

PSE&G makes loans to customers to finance PV solar systems and classifies the loans as regulatory assets.

Of course there are other challenges related to utility investment in solar generation beyond normalization accounting. One of the largest is simply the demand for capital. Utilities have many transmission and distribution system responsibilities that result from their obligations to serve that require capital, including smart-grid and smart-metering investments. Regulatory uncertainty also looms large.

Qualitative Societal Benefits

There are also other benefits to regulated utility ownership of solar generation that IPP ownership doesn't offer. Though they can be difficult to quantify, they are nonetheless real benefits to ratepayers specifically, and to society in general. There are traditional arguments for regulated ownership that apply even to fossil-fueled generation; arguments for regulated ownership related specifically to renewable generation; and arguments for regulated ownership related specifically to distributed generation like PV solar. Many utilities are using these arguments successfully to obtain regulatory approval for the opportunity to build these investments.

The traditional arguments that IPP contracts must be re-contracted at expiration or replaced while regulated generation assets continue to generate power after they've been paid off, is as true for solar generation as it is for any other type of generation. While such solar assets as PV panels and concentrating solar power (CSP) plants are expected to last 25 years or longer, typically they're depreciated over a 20-year life. After 20 years such assets are fully depreciated and, with no book value, produce power at virtually no cost to ratepayers, except for operations and maintenance expenses. Once a 20-year contract with an IPP to purchase solar power expires, it must be renewed or replaced and ratepayers must re-up to pay for those ongoing costs.

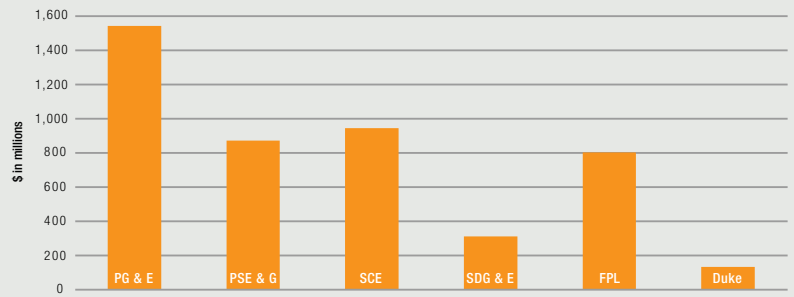
Another traditional argument for regulated ownership is related to the balance-sheet impacts of utilities' power-purchase agreements (PPAs) with IPPs. PPAs represent long-term obligations that a utility must meet. As the proportion of these liabilities to owned assets grows, a utility's balance sheet can become relatively weaker as judged by bond rating agencies such as Standard and Poor's. As bond ratings drop, utilities' borrowing costs (interest rates) rise; and these increased costs are passed on to ratepayers in the form of higher rates. Too many PPAs, for solar or traditional energy, can increase electric rates.

There also are arguments for regulated ownership specific to renewable generation. One of the principal arguments is operational flexibility. "When we own distributed solar systems, we decide where to put them," says Jonathan Marshall, spokesperson for Pacific Gas and Electric. "Brownfield development, substations, transmission constrained areas—these choices help us keep costs down for customers." Utilities typically have little or no control over the location of customer- and IPP-owned generating assets. Customer-sited generation presents an additional challenge in that utilities rarely have access to detailed production, voltage, and power quality data.

Also, regardless of personal opinions on climate change, legislators in many states have deemed clean electric generation a social benefit. A case can be made that utility investment in

Fig. 1 Regulated Solar Investments

Several public utility commissions have approved utility applications for regulated ownership of solar generation based in part on qualitative benefits. Figure 1 presents the total value of the largest such regulated investments either approved or in approval processes.



Source: Author's research.

renewable generation facilitates the achievement of the social benefit. Utilities' access to capital, technical expertise, and program management capabilities can increase the rate and scope of renewable energy generation installation above what it might have been without such capabilities. Thus, utility investment can help ensure that challenging renewable energy standards are met.

There also are benefits to regulated utilities' regulated status. It's hard to tell where renewable technologies will lead; decisions might one day need to be made regarding renewable generating assets (*e.g.,* upgrades, relocations, *etc.)*. By enabling a portion of a solar resource portfolio to be owned by a utility, a regulatory agency preserves its control of options and oversight. This might be in the ratepayers' interests in the long run.

Finally, central solar plants (PV or CSP) generally require new transmission to get power to loads, in contrast to distributed solar generation, which doesn't require new transmission. To the extent utility investment facilitates growth in distributed solar generation, the amount of transmission that must otherwise be built can be reduced, lowering costs for ratepayers and speeding the proliferation of solar generation.

Successful Examples

A growing number of projects are establishing a track record for utilities investing in solar generating facilities (*see Figure 1*).

A few utilities are augmenting existing fossil-fueled plants with CSP. One of the largest of these projects is Florida Power and Light's Martin Next Generation Solar Energy Center, which pairs CSP with a gas-fired combined-cycle plant. Xcel Energy is investing in a similar project in Colorado with a coal-fired plant.

Dedicated central plants might be responsible for the greatest regulated utility investments in solar in the next few years. While such PV systems as FPL's 25-MW plant have been the norm for regulated utility investment, CSP plants are poised to gain ground quickly. While none of the central CSP plants proposed or under construction will be built with regulated investments, this situation likely will change. CSP with thermal storage offers higher capacity factors, a better match between production and utility demand curves, and a lower price per kilowatt hour than PV solar.

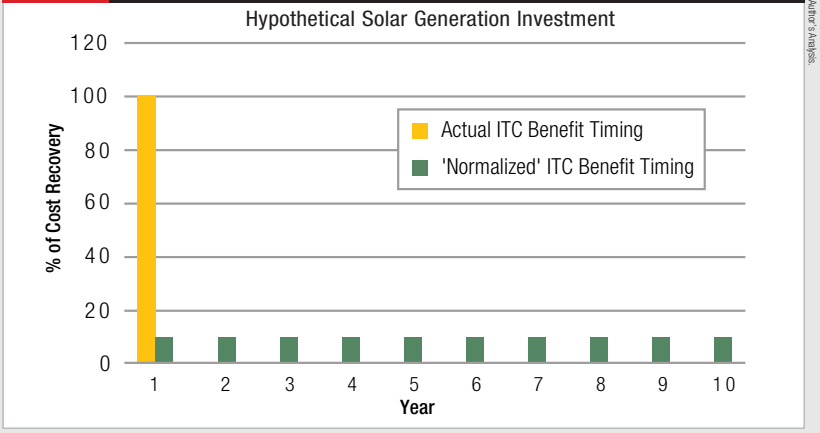
Most regulated utilities argue that their solar investments are part of a plan to meet their respective states' renewable energy standards. But FPL's approach to regulatory approval of its solar generation investments was unique, as Florida hasn't yet passed renewable energy standard legislation. In 2006, the Florida legislature passed, and Governor Crist signed, the *Florida Renewable Energy Technologies and Energy Efficiency Act.*

Normalization Requirements

Normalization requirements for investment tax credits (ITC) were established by the IRS in 1971 as a way to preserve utilities' ITC tax benefits and provide an incentive for IOU capital investment. Normalization rules require utilities to amortize the ITC tax benefits over the life of the associated asset in the ratemaking process. All solar generation investors—regulated utilities and IPPs alike—are allowed to receive the tax credit in the first year of an asset's operation. The net present value associated with the timing difference between when the utility actually receives the credit and when the ITC is passed fully through to utility customers under the normalization rules, represents the utilities' tax-related investment incentive.

As any finance professional knows, $100 in hand today is worth more than annual payments of $10 a year over 10 years. The same effect applies when calculating electric rates. An IPP that isn't subject to the normalization requirements isn't bound by tax code and can pass along to its contracts all, or almost all, of the $100 ITC benefit early in a solar generation project's power-purchase agreement (PPA) bid. This allows IPPs, if they so choose, to offer a lower kilowatt-hour offer price in a PPA bid to a utility when the IPP incorporates the impact of a large, early cash payment—*i.e.*, the ITC benefit. A regulated utility, however, must comply with the normalization rules and amortize the ITC benefit over the life of the associated asset when calculating rates. Rates calculated under the normalized rules can't incorporate the impact of a large, early cash payment, but instead incorporate smaller cash benefits recognized over many years. This is why IPPs have more flexibility in pricing for solar energy than do regulated utilities that are subject to the normalization requirements. – ***PA & BH***

Fig. 2 Timing of ITC Tax Benefits



Source: Author's Analysis

Source: SCE

Southern California Edison's solar panel installation on a 600,000 square-feet warehouse uses 33,700 thin-film solar panels from First Solar. SCE expects the panels to produce enough power for 1,300 Inland Empire homes.

Among other things, the law as subsequently amended encouraged utilities to invest in renewable generation by providing a tax credit equal to 0.5 cents for every kilowatt hour delivered plus 50 percent of the difference between the cost of renewable energy and the cost of benchmark energy.

In addition to progress on central solar plants, regulated utility investments in distributed PV solar are gaining public attention because those systems are highly visible and, some would argue, inspirational. Five utilities—Duke Energy, Pacific Gas & Electric, Public Service Electric & Gas (PSE&G), San Diego Gas & Electric, and Southern California Edison(SCE)—are making or proposing to make regulated investments in large distributed PV solar programs. The programs employ a variety of sites and cost-recovery mechanisms, and the public relations benefits are substantial. Utility investment also offers system-specific research benefits.

"We can't track what we need to know about PV solar systems when they're on the customer's side of the meter," says Mark Nelson, director, generation planning and strategy, with Southern California Edison. "Utility ownership permits SCE to evaluate the efficiency and economics of PV solar systems with a degree of precision not currently available to us."

Most utility-owned distributed PV solar systems are large—500 kW and up—and located on large flat spaces such as brownfield development sites, warehouse rooftops, and vacant utility or public property. Duke Energy's program is unique in that it envisions a large number of smaller sites on commercial as well as public properties. "In the long term, distributed generation (such as customer-sited PV solar) will gain a certain amount of market traction," says Owen Smith, Duke's managing director of renewable energy. "We need to test these systems and their impacts and understand the competencies we'll need to manage increased penetration in a cost-effective and reliable manner."

The regulatory approaches utilized by utilities in California and North Carolina have been very similar. Both states have renewable energy standards, and utilities in both states have argued for direct investment in solar generation. After some pushback from the solar development industry and investigations of the normalization accounting issue, both the California Public Utilities Commission and the North Carolina Utilities Commission ultimately agreed that a certain amount of regulated utility investment in solar was appropriate.

In New Jersey, PSE&G faces a challenging renewable energy standard. Not only is the solar component of the standard one of the most aggressive in the United States, New Jersey's average solar availability will require a system in Newark 25 percent larger than a system in San Diego to produce the same amount of energy in a year, according to NREL's "PV Watts" solar calculator. But the variety and innovation demonstrated by the company's programs are helping PSE&G respond to the challenge.

The company's initial solar loan program is unique in that it makes loans to customers to finance PV solar system installation and classifies the loans as regulatory assets. The company has an opportunity to earn a regulated rate of return on the loans, and its customers are able to repay the loans with valuable solar renewable energy credits generated by the financed PV systems. Customer loans that can be rate-based offer utilities an opportunity to earn a return on investment while avoiding some of the ratepayer impact challenges presented by the ITC and associated normalization accounting.

With planning and creativity, utility investment in solar generation can be a profitable step.

In early August 2009, PSE&G received regulatory approval to invest $515 million for its 80-MW "Solar 4 All" program. The program features 40 MW of PV panels installed on utility poles in the company's 2,600-square mile service territory, as well as 40 MW of more tradi-

tional PV solar applications—larger system installations on flat sites and brownfield development sites.

The unique pole-mounted approach was "created by necessity," says Al Matos, PSE&G's vice president for renewables and energy solutions. "Land is generally expensive and limited in our service territory, but we have 800,000 utility poles. Why not use them?" Throughout its service territory, the company plans to mount 200,000 200-watt PV panels, each with an efficient DC-to-AC smart micro-inverter and wireless Zigbee communications device for performance monitoring.

"The pole-mounted PV smart units will be a clear and highly visible demonstration of PSE&G's commitment to provide universal access to renewable energy and energy efficiency to all of PSE&G's customers," Matos says.

PSE&G's regulatory approach was relatively unique as it is the only regulated transmission and distribution company operating in a restructured electricity market to pursue large investments in solar generation. The New Jersey legislature, through Act PL2007, chapter 340, clarified aspects of New Jersey's participation in the Regional Greenhouse Gas Initiative. As part of this clarification, the legislature ordered the New Jersey Board of Public Utilities to allow public utilities like PSE&G to invest in, and own, renewable generation.

Solar Strategies

Besides regulated investment, utilities can employ other strategies in an attempt to benefit from increased market penetration of solar generation. For example, the smart-grid and smart-metering investments that utilities must make to accommodate large amounts of distributed PV solar will be enormous and will offer opportunities to earn a return. The transmission required to carry power from central solar plants also will present investment opportunities. The delivery of value-added services to customers who own their own generation—for example, to help them take advantage of time-of-use rates or to sell the power they generate on the spot market—offers potential profits as well.

"We can't track what we need to know about PV solar systems when they're on the customer's side of the meter."

— Mark Nelson, Southern California Edison

And finally, there are legislative approaches to be considered. While the utility exclusion from the ITC is now a thing of the past, normalization requirements still put utilities at a competitive disadvantage. Certain utilities might wish to coordinate an effort to modify normalization accounting rules.

The benefits of the ITC are spurring support for regulated investment by several utilities and their respective commissions. Utilities interested in solar-generation investment needn't wait for renewable energy standards to act, nor must they abandon all of the solar resources in their portfolio to IPPs. With a little planning, regulatory and legislative education and creativity, and perhaps further federal tax rule improvements, IOUs can benefit ratepayers, shareholders, and society by making regulated investments in solar generation. Utility investment in solar generation can represent a solid and potentially profitable step in a sustainable direction. F