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Renewables

When Net Metering Goes Mainstream

For most U.S. electric utilities, small demand-side generation—net-metered generation—has been a long-debated regulatory issue dating back at least 30 years.

From the utility perspective, lost revenues, cross-customer subsidies, grid-integration issues and other precedent-setting disruptions have been discussed, but the practical implications have been less than revolutionary.

From a solar industry perspective, few utilities have 100 or more net-metered photovoltaic (PV) customers. A recent Solar Electric Power Association (SEPA) report, available as a free download, ranked electric utilities by the amount of solar integrated into their portfolios.

Pacific Gas and Electric Co. in California leads with more than 25,000 net-metered PV systems—and nearly half of those are in the United States—but it and a handful of other utilities are exceptions.

PV markets, however, are changing rapidly. Many factors are leading to dramatic price drops in PV panels and installed systems. These include large, global investments in new manufacturing facilities; increased supplies as a result of the new manufacturing; a leveling of global demand because of declining economic conditions; and country-specific subsidization changes.

After a three- to four-year period of PV panel undersupply and corresponding price increases, prices have dropped in the past six months to 2005 levels, and continued drops are anticipated. The Prometheus Institute predicts that PV panel prices will decline from \$3.25 per watt in 2008 to around \$1.50 per watt in 2012—more than a 50 percent reduction in less than four years. Installed costs should drop below \$3.50 per watt during this time for large or aggregated systems. Corresponding growth in annual installed capacity is expected to increase from 350 MW in 2008 to 2,000 MW or more by 2012.

Even if the numbers and dates aren't exact, the trends are clear, and whether these changes occur by 2012 or 2014 is irrelevant. Growth precedents and federal and state policies have been set or are being set such that increasing amounts and numbers of net-metered PV will be installed in certain areas of the country within 10 years—the timeframe of a typical utility's integrated resource planning time horizon.

by Mike Taylor, Solar Electric Power Association

What does this mean for forward-thinking utilities?

First, the PV industry is on similar growth and scale trajectories to that of the wind industry: thousands and later tens of thousands of megawatts per year. The PV business models differ from wind, however, in respects such as:

- **Scalability:** watts to gigawatts,
- **Ownership:** owned by utilities, consumers and developers,
- **Siting flexibility:** roof or ground; urban or rural; utility, customer or developer locations,
- **Side of the meter:** A portion will be net-metered, reducing customer consumption, and
- **Peak demand reduction:** The degree is debatable, but the relationship is positive.

PVs provide a pathway for the democratization and decentralization of electricity production. Utilities might begin to experience business model disruptions similar to those that occurred with cell phones. Although the change will not be immediate (today's cell phone penetration began in the 1980s), the change is beginning.

In the PV industry, residential and business consumers already have three options in some locations. They may:

- Own and operate their own PV systems, reducing (though not generally eliminating) their consumption bills directly,
- Purchase solar electricity from third parties or utilities with long-term, fixed-rate tariffs, dividing their consumption payments between their traditional utility bills and solar contracts,
- Lease their property to third parties or utilities that sell the solar electricity back to the grid.

These three options are available in various forms in some states and have occurred largely during high solar prices. As prices drop, these and other new business models that fill unidentified niches for decentralized power opportunities will emerge.

Solar is not as cheap as wind, coal, natural gas or nuclear (although these sources aren't as cheap as they used to be, either). The broad dismissal based on high solar prices, however, ignores the variety of niches decentralized power can occupy. On the demand side of the meter, solar's competitor isn't coal or natural gas; it is retail rates. Under these new and developing pricing conditions, a residential consumer in Boulder, Colo., could install a PV system with a real, levelized cost of energy around 16 cents per kilowatt hour in the

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near future. We are approaching the realm of grid parity on the customer side of the meter.

As the consumer PV industry moves from an ethics market to an economic one, financing becomes critical. Residential and commercial customers can begin to use three notable and replicable financing models that go beyond traditional bank loans:

- **Solar services companies (and some utilities):** Rather than selling consumers a solar system, they sell them solar electricity. These companies offer consumers long-term, fixed-price performance contracts with no capital cost. With no money down, consumers can purchase solar electricity at a 20-year price that meets or beats their current utility rates or is designed to in the near future. Consumers pay 70 percent of their electricity consumption to traditional utilities and 30 percent to solar utilities.

This business model is common industry practice in commercial installations in some states and is beginning to move into California's residential sector. The model's arrival to any particular state depends on local policy and market conditions—it's not available everywhere.

Solar companies finance the system for consumers. Arizona Public Service recently proposed a utility-style program in which it offers a fixed-rate solar tariff for homes or businesses that host a solar system.

- **Low-interest municipal financing:** The city of Berkeley is popularizing this form of green financing by setting up low-interest municipal bonds, which solar consumers tap and which are managed through home or business property taxes.

Moving? New owners take over the systems and payments. Municipal utilities may offer coordinating synergies among financing, permitting, interconnection and education for consumers.

- **Utility financing:** Public Service Electric and Gas Co. in New Jersey saw a gap in the conventional lending markets for PV. It wasn't actively participating in the market, so the utility developed a financing program for its customers. Homes or businesses with good credit can acquire from the utility a loan, which is paid back with a market reference price on renewable energy credits (RECs). The utility provides consumer liquidity for the solar REC and applies the REC toward meeting its renewable portfolio standard.

Within this framework of facilitating net-metered activities, the discussion turns to the utility's loss of revenues. Aren't these projects working against the basic business principle of selling more to make more (or to cover costs)? Yes, but generally utilities also are regulated monopolies that balance ratepayer, shareholder and social concerns.

Federal and state policies, with public support, have tended toward opening up access for electricity consumers to use distributed generation toward this end. The disincentive of selling less electricity and reducing profits or not covering costs remains, however, and net-

metering limits have been an obstacle to continued and expanded growth. At federal and state levels, decoupling is becoming part of a national discussion to help alleviate these risks to utilities and the solar and energy efficiency industries and advocates.

Decoupling might or might not be the answer, but if you play out advances in demand-side technologies over the next 20 years, a new method for utility accounting or business development might be needed.

On the utility side of the meter, centralized solar farms ranging from 10 to 550 MW also have been announced, using traditional economies of scale to drive down prices.

In addition, utilities have announced distributed power plants ranging from 10 to 500 MW. These are large, aggregated, PV projects that are installed in tens to hundreds of locations, achieving economies between individual projects and centralized farms, but which are sited at the load and without transmission issues.

SEPA is tracking more than 2 GW of new, utility-driven PV projects and 5 GW of concentrated solar power projects slated for installation in the next five years. These projects are competing against average utility wholesale or market costs and new acquisition costs, but more often are competing against other renewable projects.

In comparing costs, we must ask what the market conditions are. Differences in policies, incentives, leadership and solar resource will push individual states and utilities up or down the adoption curve.

The supply-side PV market is in its infancy. Announcements are not operating projects, but they are indicators that the utility-scale solar market is stretching its legs.

All solar markets are state-specific, and, in general, the state policies that encourage solar development don't create burgeoning activity overnight. PV is beginning to reach a scale that matters to utilities in certain states and in the next 10 years will expand in scope

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commensurate with anticipated price drops relative to increases in retail grid rates.

During the next two to three years, it will be interesting to watch the supply-demand dynamics of PV panels play out within new consumer and utility business models. PV represents the closest approximation to the anticipated renewable distributed generation future. ■

On the Net: SEPA report:

<http://solarelectricpower.org/docs/SEPA%20Utility%20Solar%20Integration%20Rankings-2008.Public%20release.pdf>