BY TED CUSHMAN

Solar at the Crossroads

This winter has brought some big news for the solar power industry in the United States. In December, a budget deal in Congress renewed solar tax credits for another five years, which also renewed the optimism of companies who install photovoltaic (PV) panels on roofs. But state policy is a whole other playing field—and in state after state, regulators are making decisions that could make or break the market for solar panels on homes.

At the state level, the big political football is the rate utility companies are required to pay residential customers for the surplus power that flows into the electric grid any time solar panels produce more juice than the house is using at that moment. Also in play is the "net metering" regime that determines how production is weighed against consumption (if production is accounted for month by month, homeowners may get nothing for surplus power they feed into the grid during summer months; if the rule is "annual net metering," homeowners can trade off their June and July production against their December and January consumption).

States typically apply a cap to the total quantity of rooftop output that utilities have to net-meter in their service areas, and as one utility after another reaches that limit, regulators often reassess the costs and benefits of the jurisdiction's whole net-metering program. When it comes to net-metering policies (and the real dollars they represent), the controversy is hot and the future is murky.

Photos by Ted Cushman

Phil Coupe, of Revision Energy, in Portland, Maine, scopes out sun paths on a roof. Maine's Public Utilities Commission is reviewing policies for reimbursing homeowners for surplus power produced on their roofs.

POWERFUL PLAYERS

Here's the background: As solar panels have gotten cheaper, companies large and small have started to make money installing solar arrays on single-family roofs. But as the solar industry takes off, it's facing a backlash from utility companies who see solar as a threat to business as usual. Profits for solar-power players—just like profits for conventional generation companies and utility grid operators—depend heavily on rules set by government, and the political, technical, and economic issues involved aren't simple. But big utilities have been playing the political game—and counting the money—for a hundred years. And as solar providers muscle into that game, conventional power producers and power transmission companies aren't about to step away from the table.

And the power companies do have a case. Most solar-equipped houses, the utilities point out, aren't really self-sufficient. Even if they produce more power than they consume in a year, they still need a utility connection at night and on cloudy days. But net-metering rules in many states require utilities to buy excess power from rooftop panels at retail rates, even if the utility could get its juice cheaper from a conventional source. Utilities reason that solar-equipped customers aren't paying a fair share for all the power plants, transformers, and transmission lines that bring power to their homes

when the sun's not shining. And they say that the costs solar owners don't shoulder show up in the power bills of customers who don't have solar on the roof—an argument that allows big power companies to position themselves as Robin Hood heroes, defending poor customers who can't afford solar panels against exploitation by better-off homeowners who can.

Washington Post reporter Joby Warrick has seen this battle coming for years. In a 2014 report, Warrick wrote: "Three years ago, the nation's top utility executives gathered at a Colorado resort to hear warnings about a grave new threat to operators of America's electric grid: not superstorms or cyberattacks, but rooftop solar panels. If demand for residential solar continued to soar, traditional utilities could soon face serious problems, from 'declining retail sales' and a 'loss of customers' to 'potential obsolescence,' according to a presentation prepared for the group. 'Industry must prepare an action plan to address the challenges,' it said."

That action plan is in top gear now, at the federal level and in states around the country. The utility industry's first tactic—fighting solar incentives and subsidies in state legislatures—fizzled, according to Warrick's report: It turned out that support for solar panels on houses was strong among conservative and liberal voters alike. So utilities took their battle to more favorable ground: They started pushing their case in state utility commissions, lobbying for new monthly fees on solar-equipped houses. In that arena, outcomes have been mixed. But the battle rages on—especially in "sunshine states" like California, Nevada, Arizona, and Florida, where solar power has the potential to displace a lot of conventional generation. Let's take a closer look.

Utility workers maintain a power pole in Boston, Mass., in 2014. Power companies say homeowners with rooftop solar panels aren't paying their full share of the operating cost of the power transmission grid, even though they often draw power from the system.

NEVADA

Utility companies scored a big win in December and January in Nevada, a state with plenty of sunshine—and a state where major companies have been betting big on solar. Nevada, don't forget, is the state where Elon Musk, the founder of electric-car company Tesla Motors as well as of solar-electric-giant Solar City, decided to build his "Gigafactory" to manufacture batteries for the Tesla (and, now, for the home electric storage batteries called PowerWall).

Nevada politicians offered Tesla more than a billion dollars in tax incentives to build the $5 billion battery plant in their state, hoping to reap many times that amount in the form of jobs and economic activity. But this month, the Nevada Public Utility Commission (PUC) delivered a disincentive to Musk's other brainchild, Solar City, voting to increase the monthly service charge paid by homeowners with rooftop solar panels, and to reduce the rate the utility pays for extra power the panels supply to the grid (the rate homeowners earn is now slated to decline from full retail price to the wholesale price over four years). The new fees and rates won't just apply to future buyers of rooftop panels, but are retroactive on homeowners who relied on the existing arrangement when they purchased their PV systems.

In reaction, Solar City announced it was ending rooftop PV sales in Nevada (as did competitors Vivint and SunRun) and laying off more than 500 workers in the state. Solar-equipped homeowners filed a class action lawsuit against NV Energy, the state's power utility, over the fee increase. The state's consumer protection advocate petitioned the PUC to stay its decision and hear an appeal; the commission refused.

CALIFORNIA

Regulators in Sacramento heard the same arguments that regulators in Nevada did, but in December, they arrived at a different conclusion. California's power utilities had asked to stop paying the retail price for power supplied by rooftop panels, instead offering to pay homeowners the wholesale rate. But California regulators decided to keep the existing net-metering arrangement in place. Some fees are set to increase for California owners, however: They'll now pay a one-time interconnection fee of about $150 (which conventional power consumers also pay), and they'll have to pay a two- to three-cent surcharge per kilowatt-hour (kWh) on

Technicians for Revision Energy install PV panels for a grid-tied system on a Portland, Maine, roof in 2014. A panel array this size might supply all the power a house needs on a net annual basis, but still requires a grid connection to balance surplus summer production against nighttime and winter power needs.

the power they draw from the grid (the money is earmarked for low-income-assistance and renewable-energy programs). Previously, solar owners paid the surcharge only on the net power they used (which could be nothing); now they'll pay it on any power they take in, even if their excess production balances their intake and their net bill would otherwise be zero.

ARIZONA

The Salt River Project (SRP), an Arizona power cooperative owned by landowners in its service area, decided in 2014 to apply demand charges averaging about $50 a month on residential customers with rooftop solar panels. Solar City has sued SRP on antitrust grounds, saying the utility applied the fees to discourage competition from power sources it doesn't control. In December, a federal judge ruled that the case could go forward.

Meanwhile, the Arizona Corporation Commission, which regulates the state's utilities, is considering allowing similar charges by other Arizona power companies. SunRun has filed bias charges against two commission members, arguing that the officials' objectivity is in doubt because of "dark money" campaign funding believed to have come from the power companies they regulate. But commission members say they want to get past the politics, and they are reportedly talking to Solar City executives in search of a compromise on net-metering rates and monthly grid-connection charges.

FLORIDA

This may come as a surprise to some, but the so-called "Sunshine State" is thirteenth in the nation in terms of the per capita power it draws from the sun. The reason? Advocates of solar say it's because power utilities have a lock on the state's legislature. "Big energy's campaign cash keeps solar down in Florida," was the headline on April 5, 2015, in the *Miami Herald*; reporter Eric Barton, of the Center for Investigative Reporting, wrote: "Lawmakers and lobbyists say that anyone who has attempted to expand the rooftop solar industry has been ostracized. The reason, some lawmakers say, is that Florida's largest utilities have invested heavily in state political campaigns to fend off competition."

Companies like Solar City aren't allowed to lease rooftop panels to homeowners in Florida (residents have to work directly with their utility company), and Solar City doesn't operate there. Proponents of solar power, frustrated in the state capitol, are collecting signatures for a ballot initiative to amend Florida's constitution to, in essence, allow Solar City's business model there. Not to be outdone, a utility-backed group is trying to get a measure on the ballot to keep things the way they are.

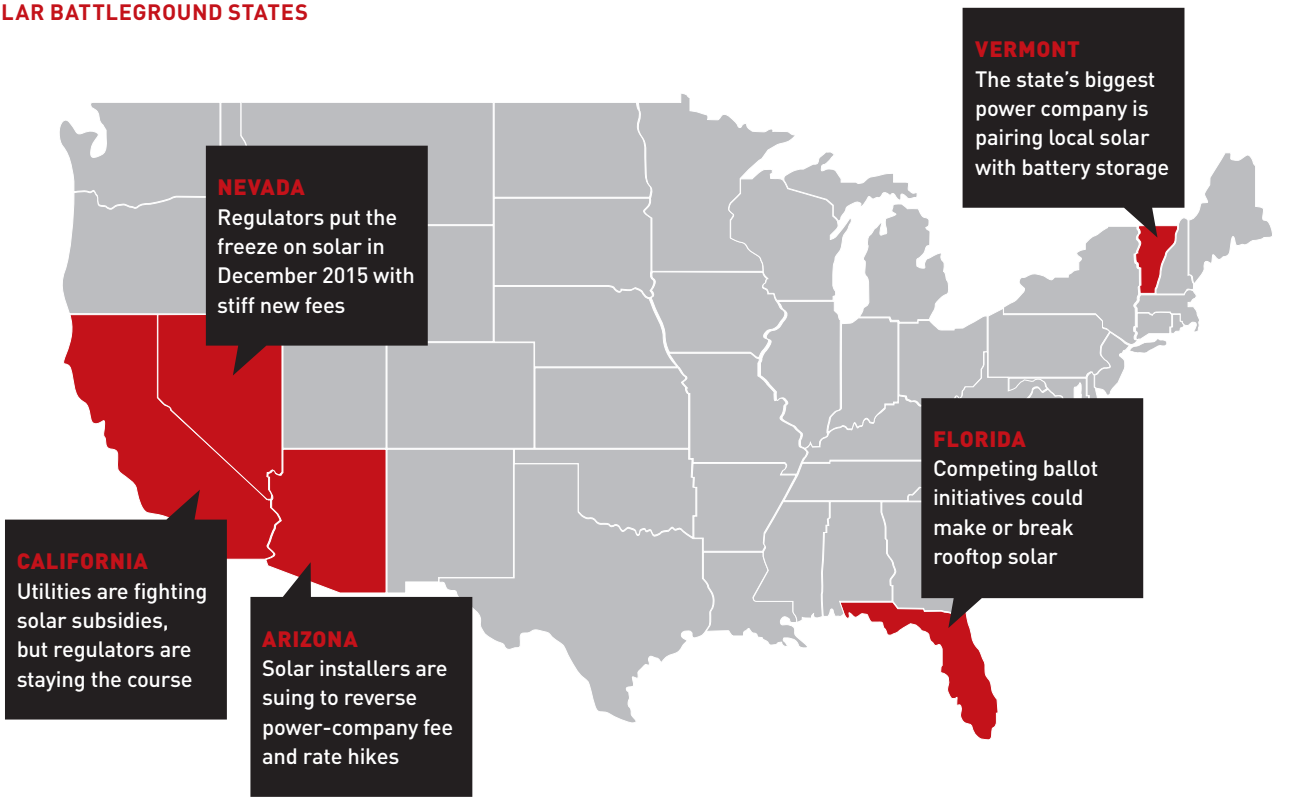
NEW YORK ... MAINE ... AND VERMONT?

The Sun Belt states aren't the only places where the solar action is hot. New York has net metering, and regulators voted in October to lift the cap on the total generating capacity permitted in the net-metering program, after one state utility hit its existing limit at 62 megawatts of rooftop generating capacity.

In Maine, utility Central Maine Power petitioned the state's Public Utilities Commission (PUC) to review the state's net-metering arrangements—as provided for in existing regulations—because the utility has reached the threshold for that move: One percent of CMP's capacity is now in the form of rooftop solar. Maine legislators directed the state's Public Utilities Commission (PUC) to hold hearings and devise an alternative to net metering for the future. Maine's Public Advocate office has suggested creating a "Solar Standard Buyer" (SSB) to consolidate the solar energy market statewide.

Vermont's biggest utility, Green Mountain Power (GMP), hit its net-metering cap in 2015 when alternative production (including both solar and wind) topped 15% of the company's capacity. GMP stands out among the nation's utility companies for its strong stance in favor of distributed generation and renewable power sources. GMP has asked Vermont's Public Service Board to extend the

SOLAR BATTLEGROUND STATES



net-metering program, and in the interim, is continuing to accept net-metering applications for systems of 15kW and less.

SOLAR ON A ROLL

Utility resistance to solar's expansion could hamper the developing small-scale solar industry in many markets. But globally, solar appears stronger than ever. The extension of federal tax credits gives the industry a strong tailwind for the next few years. But the technology's advancing capability and declining cost are independent factors that indicate a bright future. Worldwide investment in clean energy topped $329 billion dollars in 2015, according to a special report from *Bloomberg New Energy Finance*. That's up sharply from just a year earlier, and it comes in spite of plunging prices for oil and natural gas.

If the solar industry can succeed in the face of tough price competition from fossil fuels, it seems likely that it can also hold up against challenges in the regulatory arena—especially since some utilities, such as Green Mountain Power, have decided that embracing renewables is a better path than trying to beat them. Even the Arizona Public Service Co.—the utility that has locked horns with Solar City and SunRun over net metering in the state—is exploring ways to integrate solar into its electricity production portfolio. In January, the Arizona Corporation Commission authorized the utility to develop a pilot program looking at ways to use battery storage to shift the supply curve for solar power—storing surplus solar energy in batteries for use later in the day or the week, when demand for power peaks. That strategy could solve the utility's power management problem with solar and convert solar panels from an enemy into a friend.

Vermont's GMP, however, is way ahead of the Arizona utility. In December, GMP became the first utility in the nation to offer Tesla's PowerWall home battery system to individual ratepayers. GMP President and CEO Mary Powell called the proposal "a game changer that will help fully leverage solar to the benefit of all." GMP has already started installing the first of 500 PowerWall units in homes.

And it could be battery storage that resolves the battle among big power producers, grid operators, and residential-scale solar providers. The power grid's big problem is how to connect the variable demand for power with power sources that are hard to ramp up and down. Introducing the highly variable supply of rooftop solar into the equation has made that problem more complicated for everyone. But if enough battery storage can be deployed onto the grid, batteries could smooth the curve back out again—solving with a technical fix what political and legal systems couldn't solve.

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