ON

Just a few years ago, the solar industry could have reasonably expected that Pennsylvania would be one of the last states in the US to go big on PV power. That all changed after legislation and rebates were enacted in the Keystone State. When solar enthusiasts and business people recognized the opportunity, they built capacity here faster than anyone seems to have expected. Now that the solar installations have overshot the Renewable Portfolio Standard, the newly developed industry wonders what's next.

STANDBY

Pennsylvania's solar market flew past its targets; now, the industry waits for signals to proceed

Solar installers with GRASS LLC take a break during this year's heat wave. This is among the last jobs in their queue before they run out of grant-funded projects.

Matt Nightswander / photon-pictures.com

On a hazy Friday afternoon in late July of this year, as the sun broiled the warehouse roof where they were putting on a 31 kW system, a team of installers with GRASS LLC finished a week of toiling through a heat wave that broke records across the east coast. Here in Philadelphia, according to the US National Weather Service, it was the warmest July in recorded history – going back to 1872 – with 21 days of temperatures exceeding 30 °C. But there was no time to delay this installation, given the looming end of another phenomenon in this state: a photovoltaic (PV) installation frenzy over the past 2 years that took Pennsylvania from a speck on the US solar map to one of its biggest markets.

But now prices for the state's solar renewable energy credits (SRECs), which are based on the Renewable Portfolio Standard (RPS), have collapsed due to oversupply. The crew from GRASS will have to finish this project by August, or lose its claim to a $50,000 grant from the state. Without that, the project would not make financial sense.

To onlookers, this mostly coal- and nuclear-powered state was a surprising performer as it added 45 MW of solar last year. With a sympathetic state government and some very generous incentives, the solar industry blossomed from a few installation companies to hundreds of registered installers. Total installed capacity leapt from a few megawatts to more than 100 MW – and more installations are still being completed. But if something doesn't change soon, these installations could be the last of a short-lived PV awakening in Pennsylvania. The combination of solar grant

Hard times in Harrisburg: In difficult fiscal times, more state funding for solar grant programs is unlikely to be passed anytime soon.

programs, net metering and SRECs that once sold at upwards of $300 per MWh added up to provide practically free electricity for PV system owners. Industry participants here agree that the incentive stacking made for much higher-than-needed returns to motivate solar installations. At least some of the incentives, they conclude, could be taken away without destroying the market. Instead, it may all be gone by 2012.

The federal grant program is expiring this year. The state rebates are nearly depleted. And only low-priced SRECs will remain. In August, those credits were trading as low as $45 per MWh in Pennsylvania.

All the right conditions

»You've had almost a perfect storm of state grants and federal tax grants overstimulating the market,« says Gary Lakritz, president of Knollwood Energy LLC, an SREC aggregator working in markets throughout the Northeast. For his company, Lakritz says long-time relationships with SREC buyers have helped cushion the impact of falling prices. It also helps, of course, that the company is trading SRECs in several states. If one market crashes, they'll still have business elsewhere.

At the legislative level, the political climate in Pennsylvania has changed since 2008 – the year when conditions came together for Pennsylvania's solar surge. The state Public Utility Commission implemented the Alternative Energy Portfolio Standards Act of 2004 in that year, using SRECs for enforcement. Electricity providers would have to pay double the average market price in penalties if they didn't reach their portfolio standard. At the time of its implementation, Pennsylvania's solar carve-out was aggressive by US standards. Soon after that, the state implemented the Sunshine Solar Rebate Program, funded by a $100 million state bond issue. State-level stimulus money rolled out with an $80 million carve-out for solar.

This year Tom Corbett, who ran a gubernatorial campaign in 2010 based on fiscal discipline and job creation driven at least partly through the exploitation of natural gas resources, replaced solar energy cheerleader Edward Rendell as the state's chief executive. The new administration is in favor of developing solar but the level of enthusiasm at the state level has stepped down.

For many installers and potential system owners, in fact, the Pennsylvania solar outlook is now pretty bleak. Fiscal constraints make it less and less likely that the anything like the $180 million in total funding that came through the state grants for residential and commercial projects will come out of the budget anytime soon. System prices have fallen but not enough to make the current options financially feasible for most customers. If nothing changes, most expect the market to be nearly dead in Pennsylvania next year.

A patch

At this point, most solar advocates in the state agree that the loss of grants and rebates wouldn't be such a problem if only they hadn't existed in the first place.

The SREC program in Pennsylvania was designed to work on its own to incentivize installations. Utilities are required to purchase credits from PV system owners, or make a compliance payment equal to roughly double the average selling price, theoretically determined by the supply and demand of SRECs. What's more, the utilities can recover the cost of the SRECs from ratepayers. The same is not true for compliance payments.

»I've always expected the price of the RECs to gradually go down,« says state Representative Chris Ross, who has drafted a bill to support the market between 2012 and 2015 by accelerating the RPS requirements to more closely meet supply (see 7/2011, p.40). »That was actually the point of them,« Ross says of the credits, »that they only provide, and should only provide, the subsidy necessary to make the project happen.«

In effect, that's what happened. With grants and rebates available, a high SREC price wasn't needed to motivate people to install.

A worthwhile investment

John and Joanne Ide take pride at the PV system that covers just about all the available space on the rooftop of their house in the quiet town of Hamburg, about 110 km northwest of Philadelphia. »They had to put them on anywhere they could,« John says of the 7.4 kW of modules arranged in four different arrays, at three different orientations – two on the main roof, one on the dormer and one on the rooftop of the lower wing that runs perpendicular to the main part of the house. The Ides sized the system to zero-out their energy use,

text continues on page 94

Matt Nighswander / photon-pictures.com (2)

Jim Kurtz of Reading Electric Renewables says the solar development business may be difficult for the next few years.

THE FIX – FOR NOW

With Pennsylvania's young solar industry confronting the possibility of a serious downturn, state Representative Chris Ross hopes to introduce a bill in the fall that could stabilize the market for the next few years. PHOTON met with Ross to get the latest on the bill.

We also sat down with Patrick Henderson, energy executive under Governor Tom Corbett, to look into whether the legislation will succeed – and if so, what comes next for solar in Pennsylvania.

PHOTON We should probably start with the thing that's on everyone's mind – the bill.

Chris Ross The effort is going to be in the fall, basically to try and get it into committee, move it through committee, through the House and over to the Senate. And it's a bit of a challenging environment, because there was a lot of discussion about the bills that were brought forward in the last session … and this is a much more focused and modest proposal. So we've got to get people clear on what they're voting on now rather than what they were voting on or looking at last time.

PHOTON How positive do you feel about the possibility of it actually going through?

Ross I'm cautiously optimistic. We're right around 70 cosponsors right now, reasonably well split between Republicans and Democrats. Again, until you actually start debating it, you don't know. But I'm definitely more confident and comfortable about the legislation we've got right now than I was feeling last session with some of the other bills that we were trying to get through.

PHOTON Energy Executive Patrick Henderson, whom I talked with this morning, has mentioned that there may be no legal basis for cutting off imports of solar renewable energy credits (SRECs).

Ross Well, I think we've tried pretty carefully to worry about the Interstate Commerce Clause side of this, and we've carefully constructed [the legislation] so that the key for deciding whether you qualify or don't qualify is whether or not you're connected to the distribution grid here in Pennsylvania. I think there is a legitimate reason to have an exception to the Interstate Commerce Clause restrictions, because you are supporting the distribution grid. And having solar power connected to the distribution grid relieves the responsibilities, to some degree, of utilities from having to build more distribution grid lines or substations, because you're providing some relief to the system that way.

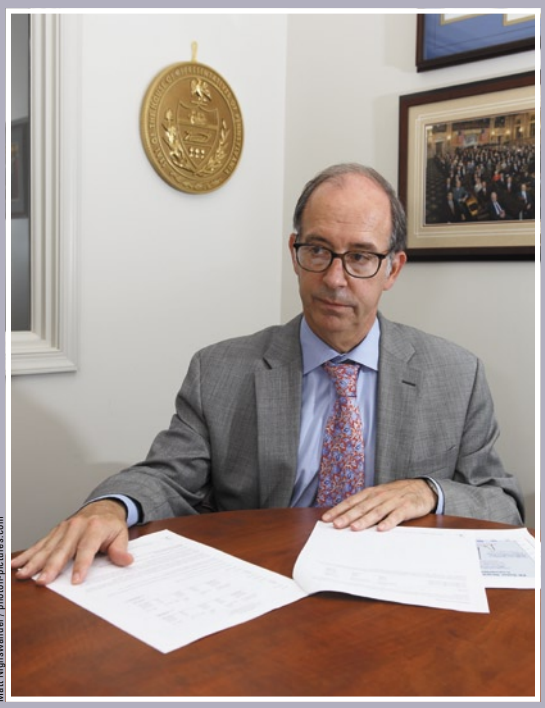
There is also a practical argument. Most other states certainly have total or partial restrictions on out-of-state RECs. Our ratepayers are subsidizing power in other states. And I would have been delighted if they had struck down those other provisions in other states and we had a true PJM-wide marketplace, but why is Pennsylvania the only state that is expected to have open borders and all other states are allowed not to?

PHOTON How many of currently existing installations will that affect?

Ross None. Because it only applies to those that are not registered into the system on Jan. 1, 2012. We certainly wanted to be fair to those that, again, operated under the rules and expected fair play previously. And I consciously also pushed the deadline back so that any facilities that are really being built right now will have time to get up and operational before Jan. 1.

PHOTON This is a short-term fix. Is there a long-term plan?

Ross Well, no. I think if we address the distortion in the marketplace, then we let the market run. Then we go back to the condition where the SRECs are providing the differential between what is needed to get a project up and running and what the marketplace, other than SRECs, is providing already. We're working toward that time when there is going to be no need for government subsidy or intervention at all.



Matt Nightswender / photon-pictures.com

State Representative Chris Ross has been working to build support for a bill to save the SREC market in Pennsylvania.

PHOTON So we're looking at a time in the future when the SRECs just disappear?

Ross Yes, if you get comfortable saying, »I can recover my costs by the sale of electricity over 7 years, 10 years, and I've got a 20-year value« – or 40-year, or 30-year, or whatever the life of that facility is, would you do that deal? If you give me $100 and I'm going to give you $20 a year for the next 20 years, will you do that deal?

PHOTON Long-term future aside, for the interim do you expect that, or do you hope that, the carve-out for solar will be any more aggressive in Pennsylvania?

Ross I think what we're proposing to do right now is doable. I think a totally new

program right now would be a reach too far. What is dominating the conversation in the Legislature, and really within the administration, is the Marcellus Shale at this point. We also have a general philosophy in Pennsylvania to do less government action rather than more government intervention in the marketplace. What's possible in other states on some of these renewables like wind and solar is a little less dominant in Pennsylvania because we are a coal state. We are a natural gas state. If you go over to New Jersey, they really don't have these resources – or Massachusetts, or some of the other New England states. So they're naturally moving more aggressively in some of the renewable areas.

PHOTON Thank you for the interview.

Interview: Melissa Bosworth

Patrick Henderson

Patrick Henderson, who worked on the legislation to create Pennsylvania's renewable portfolio standard, is now state energy executive under Governor Corbett.

PHOTON House Bill 1580 will try to fix the SREC situation for the time being. I'm wondering what the governor's position is on that and what the chances are that it will actually pass?

Patrick Henderson It will be a matter, frankly, of seeing how much interest there is on the legislative side of it, if this is the proper way to address what's happening in the SREC market right now. The governor has some concerns about limiting – and whether we can limit – importation of credits to Pennsylvania.

PHOTON As a general question about renewable energy policy, are there any changes that the industry here might expect to see?

Henderson Well I don't know if it's changes, per se. We don't have a lot of additional dollars to add on to programs such as the Pennsylvania Sunshine Program or the Commonwealth Financing Authority. I think everyone recognizes now that we're in a different time financially in that regard. The governor has stated he is committed to implementing our current AEPS [Alternative Energy Portfolio Standard]. So we want to send a signal of some certainty to the market [indicating] as our AEPS is fully ramped up and implemented that the governor is committed to that.

PHOTON I know that natural gas from the Marcellus Shale promises to be a huge resource here. What will that mean for renewable energy like solar and wind?

Henderson I guess it may be too early to tell. It will probably have a lot of effects across the board on energy. But it will depend on what that natural gas is used for. We see one of the greatest opportunities is to displace foreign oil used for transportation. So if we fully realize that with natural gas, it's not going to have an impact on solar. If we increase generation capacity significantly for electricity from natural gas, it may [have an impact]. I would think that in the shorter term it will have less of an impact on the renewables and more on coal-fired generation that needs to comply with new air standards coming from the EPA [Environmental Protection Agency].

PHOTON There was such an explosion in the solar market here in the last 2 years, and now it has died out. What would you say to people in the industry who are out of work? Should they stay in the solar sector or should they be looking for jobs in a different field right now?

Henderson We absolutely want people in the solar industry. When the stimulus package came down from the federal government, as well as at the state level, and when we passed significant rebates and loans and what not through the Sunshine Program, it wasn't fair, I don't think, to any market – and we saw that on the energy efficiency side as well. It wasn't fair to sort of paint this picture that this many dollars and this level of investment is going to be available for you over the long haul. I think there was probably some error, in hindsight, as far as how quickly dollars were driven out, because it would be a shame if the workers that we have trained and the installers that we have in Pennsylvania, as well as the small businesses that are looking to become medium-sized and large businesses, are not able to sustain what they're doing. So we absolutely want them to continue. They are business owners, they are employees in Pennsylvania, and whether they're installing widgets or installing solar, we want them.

PHOTON Thank you for the interview.

Interview: Melissa Bosworth

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which they estimate is between 9 and 10 MWh per year. They use a lot of electricity in the summer, especially this year with the air conditioner running constantly to battle the record heat. The drought in this area, much of which is reserved by the state as farmland, has been hard on the vegetation. The sunflowers and vegetables in Joanne's backyard garden wilt and sag in the sun.

The electric meter on the house, on the other hand, is running just fine. The meter has a small, visible wheel that spins backwards when the system is feeding electricity into the grid. John still finds it a novelty. »You should have seen him the first day,« Joanne says. »He must have been out there six times: ›It's running backwards! It's running backwards!‹«

John can cite numbers off the top of his head to demonstrate how net metering alone has changed their electrical bills. In July of last year, they received a bill for $180; this year, $19. Like everyone else who invested in solar during the last couple years in this state, they're likely to be seeing lower returns than they originally expected. But the Ides have no regrets.

»I consider this like an investment,« John says of the system. They paid $47,100 for the system, up front. After they get their state rebates and federal tax credits, their net cost will be $23,800. Going forward, they estimate that the system will generate returns between 6 and 12 percent. Whether the returns come in single or double digits will depend on the SREC market. When they signed up, the Ides were expecting to get about $200 per MWh. But even at low SREC prices, they'll come out better than even. Plus, they're confident it will increase the value of their house in a way that other investments – a swimming pool, for example – wouldn't.

Jim Kurtz, president of Reading Electric Renewables LLC, the company that installed the Ides' system, assesses these systems in terms of levelized cost of electricity (LCOE), which seeks to measure costs over the system's life. Using that calculation, Kurtz says that most of the systems his company installed would provide customers with electricity at an average price of about 1¢ to 1.5¢ per kWh. The Ides, who are in Metropolitan Edison's service territory, would otherwise be paying 8.9¢ per kWh in 2011, with prices likely to continue rising. Even without the SRECs, Kurtz says, his clients would still have an LCOE of about 5¢ or 6¢ per kWh. Now, Kurtz says systems could probably make for a reasonable investment only if they cost $3 per W or less to install. »Megawatt projects still look pretty good,« he says. Meanwhile, Kurtz estimates that the commercial rooftop projects his company sells average $4 to $5 per W. Residential systems are about $1 per W more expensive.

In Philadelphia, the water department recently finished the first of what it hopes will be a series of large projects at water department facilities. Kristin Sullivan, director of Philadelphia's So-

Matt Nighswander / photon-pictures.com

Pete Sikorsky recently had a 45 kW system installed in Palmerton.

Longwood Gardens: Economies of scale?

The township of Kennett Square in southern Pennsylvania is home to Longwood Gardens, a nonprofit organization that maintains a collection of botanical gardens on land purchased in 1906 by Pierre du Pont. The site, which covers over 4 km^2 and encompasses 20 indoor and 20 outdoor gardens, serves as an educational center, a concert venue, a tourist destination, and, since June, some great publicity for solar power in Pennsylvania. The park invested in some aggressive sustainability efforts, which include composting, recycling, irrigating with recovered wastewater, and tending to a crew of friendly cats that cruise lazily around the grounds, likely helping with the integrated pest management program by culling mice that come within paw's reach.

Longwood Gardens also has a large-scale goal: trying to get to net zero. The 1.2 MW system completed this year by solar manufacturer and developer Eco-Solargy Inc., in cooperation with installer GroSolar Inc., will provide Longwood with electricity under a power purchase agreement for the next 20 years. This the first of three planned phases, already permitted, which will get the gardens to 3 MW by 2018. Or so the organization hopes.

»It took over 2 years of us just educating ourselves, figuring out how it would work and then the financing of it,« says Paul Redman, director of the gardens, who says it could have been done faster and cheaper had the gardens not been seeking to create best practices in the construction of the project. The array sits on a formerly unused meadow belonging to the gardens, but the group wanted the project to create as little disturbance as possible to the site. Therefore it didn't level the ground, and it left the plants in place. Now the organization has scattered seeds from a variety of shade-resistant plants underneath the rows of modules. »If it works, it will look like they're just floating in a beautiful Pennsylvania meadow,« Redman says. The gardens also insisted on using only US-manufactured modules.

Paul Redman (left) and Mark Winnicki are working to get Longwood Gardens to net zero. The next phases of the project may be difficult to finance.

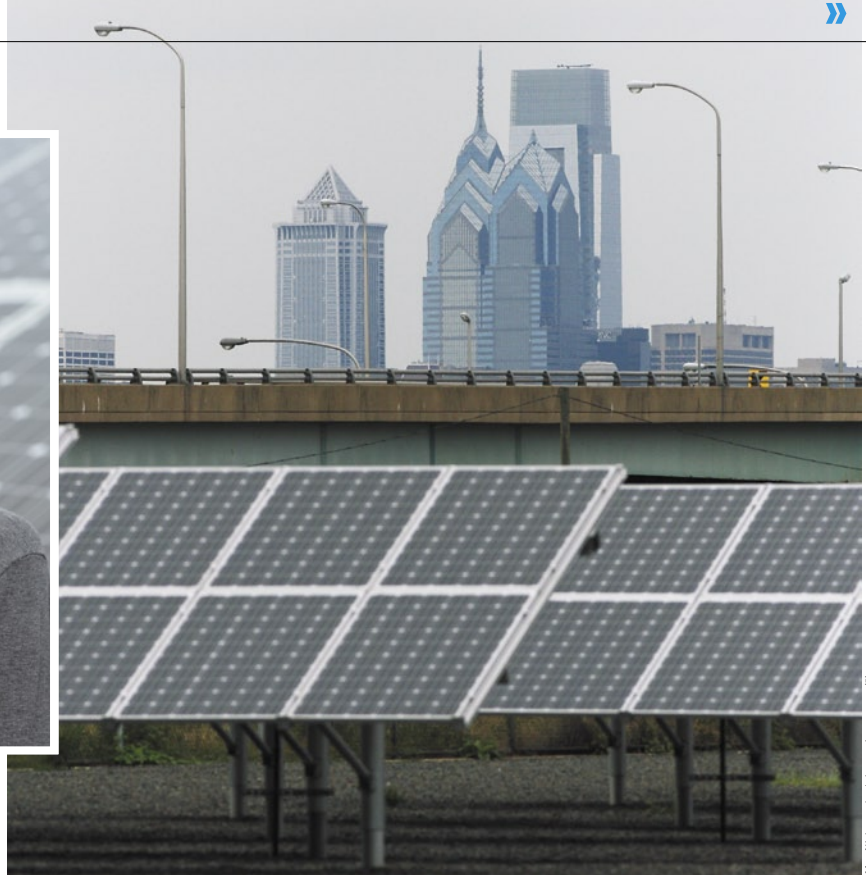
A solar powered flower at Longwood Gardens in Kennett Square township serves as an educational piece for visitors.

Longwood Gardens, a nonprofit botanical park in southern Pennsylvania, is seeking to get to net zero.

There were also factors outside of the specifications particular to this project that slowed down the process. This project was one of the first of its kind in the area and 2 years ago this was a very young market. The gardens also use »virtual net metering,« which means the electricity generated at the site feeds into the grid but the total kilowatts produced are deducted from the amount of electricity consumed to get the net total for Longwood. It took the group a while to work that out with PECO, the Excelon Corp. subsidiary that is the utility there.

In order to help finance this project, Longwood Gardens got two grants: $1.3 million came from $7 million in federal stimulus money earmarked for Pennsylvania solar projects, and another $500,000 came from the Pennsylvania Redevelopment Assistance Capital Program grant program. Theoretically, because the permitting is complete for the rest of the project and the coordinators have gained experience, the next phases should be easier. But now Mark Winnicki, director of facilities at Longwood Gardens, who coordinated the first phase, wonders what measures can be taken to make the next phases cheap enough to move forward. For one, he suggests that requiring American-made modules may no longer be an option. The funding, Redman says, »was kind of a two-edged sword.«

Longwood will not feel the cost of Pennsylvania's solar renewable energy credit (SREC) price collapse with this system because the power purchase agreement is fixed, beginning at 6¢ per kWh with an escalation of 3 percent per year. But the SREC cost collapse is impeding the organization's attempt to move to the next phase. *mb*



Matt Nighswander / photon-pictures.com (5)

Kristin Sullivan, who collaborated with the Solar America Cities program in Philadelphia to get this system built for the water department, is unsure how to make the numbers work for the next planned project.

lar America Cities program, is trying to proceed with the second project in this effort, a 3 MW rooftop plant at another facility. »The SREC market is making it difficult to get the numbers right,« says Sullivan. About 45 solar developers originally showed interest in partnering with the water department on the 3 MW project. The effect of the crashing SREC market was felt when it came time to make an offer: only two companies actually responded to the request for proposal.

At the cost of the land

Pete Sikorsky, who lives just along the edge of the Appalachian Mountains in Palmerton, is a client of Reading Electric Renewables. He recently had a 45 kW system installed on a hillside on the plot of land where he lives and operates his concrete company. The land has been in the family for generations, and he bought it from his uncle a few years ago. It sits just on the edge of Appalachian Trail,

Matt Nighswander / photon-pictures.com

John and Joanne Ide, who recently put a 7.4 kW system on their home in Hamburg, were surprised by the fall in SREC prices.

one of the world's longest hiking routes, running through 14 states from Maine to Georgia. But here, hikers come upon an unsettling section of their journey. The northern slope of Blue Mountain, which faces Sikorsky's property, is a superfund site where 8 km^2 were rendered wasteland by the dumping of zinc, copper, lead and cadmium from a zinc-smelting plant. The pile of cinder debris, itself a high foothill against the side of the mountain, is federal land now. Across the way, standing among his horses in the pasture where they graze just below his new PV system, Sikorsky tells the history of the local zinc-smelting operation, noting that the facility was cited here for access to shipping routes and waterways. The story reminds him of the coal industry's adverse consequences and leads Sikorsky to suggest that in this part of Pennsylvania, owning an electric car might be worse than not because its power will be generated by burning coal.

That may be an exaggeration. But it's not just the carbon emissions that make coal in this part of the state troublesome for its residents. The land in this region has a long history of exploitation. As Sikorsky points out, not far from his home is site of the first commercial anthracite coal mine. Coal reserves cover most of the western half of the state and it continues to be a major part of the economy here.

Today, much of the area exploited for coal mining, along with other broad swaths of the state, is the focus of a controversy over natural gas extraction from the Marcellus Shale, which requires hydraulic fracturing to generate reasonable yield. From the perspective of the current administration in Pennsylvania, the Marcellus Shale is a source of jobs and income for the state, and an important part of the future energy mix. Patrick Henderson, energy executive under Governor Corbett, says Pennsylvania needs any and all available energy sources. Presently, the hope is to use the natural gas primarily to replace foreign oil for transportation. It's too early to judge, Henderson says, what effect an abundance of natural gas could have on the future of renewable resource development in this state.

Representative Ross is also on board with the idea of resource diversification.

A DIRTY PAST

The Three Mile Island nuclear facility near Middletown is a prominent reminder of Pennsylvania's dangerous energy resources; the scars of the coal industry are another.

All told, Pennsylvania's energy economy is full of unseemly resources. Electricity in this state comes primarily from coal and nuclear power. And this is also the site of the most significant nuclear incident in American history. The Three Mile Island nuclear generation facility, near Middletown, is still active – except for the reactor with the core that melted down in 1979. The contaminated water generated by the accident didn't fully evaporate until 1993.

Eric Epstein, chairman of the nuclear watchdog group Three Mile Island Alert, which advocates for the use of safe energy sources, is optimistic that nuclear will eventually be phased out in Pennsylvania simply due to economics. However, he says that the water resources currently going to nuclear facilities are now in high demand for use in natural gas extraction from the Marcellus Shale.

This rock formation underlying most of Pennsylvania has long been known as a source of natural gas, but it has only recently come into consideration as a potentially large and accessible reserve. Because of rising oil prices, it is now financially attractive to tap the natural gas reserves in the Marcellus Shale, which are richest in the northeastern part of the state but require complex and controversial drilling methods to extract. Since the first well was drilled into the shale in 2003, slickwater hydraulic fracturing, or hydrofracking (pumping huge amounts of water and chemicals into wells to facilitate the removal of natural gas), has become commonplace. Critics of the method say it is not well-developed enough to prevent the poisoning of water sources. Reports of adverse health effects and contaminated water are common in drilling areas.

Epstein is among the critics of the natural gas industry there, especially because of the state's experience with the consequences of resource extraction. »We should know better,« Epstein says, adding, »It seems that Pennsylvania never misses an opportunity to build another foot to shoot.« *mb*

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Ron Celentano, president of PASEIA, is working to keep solar on the legislative agenda as the market contracts.

Of course that could have something to do with the low political likelihood of passing anything more than a patch onto the troubled status quo for solar. House Bill 1580 will be very conservative compared to what was under consideration in the last legislative session. In a sense, the market is coming full circle. When the SRECs and grants were originally passed, says Ron Celentano, president of the Pennsylvania Solar Energy Industries Association (PASEIA). »We were trying to get anything, at the time, that was available to us,« he notes, adding, »We did a cart in front of the horse kind of thing, and now we're trying to get the cart back behind the horse for a few years.«

Celentano maintains the perspective that any solar industry here is a victory for those who saw the market grow from nothing. But if House Bill 1580 doesn't pass, it could be a 3-year setback to developing solar power as a major resource in Pennsylvania. The good news is Ross has built a lot of support for the bill, which now has about 70 cosponsors. And perhaps once the market is stable, advocates here can get back to talking about how to foster a larger, more sustainable PV industry.

Melissa Bosworth

Pennsylvania fact sheet

BASICS

Population

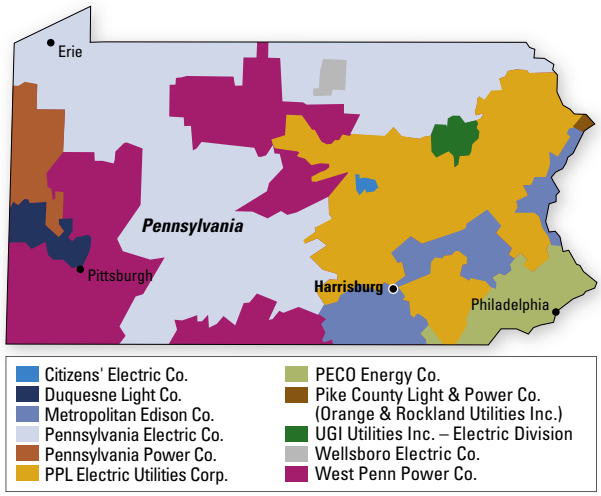
12,702,379

source: US Census (2010)

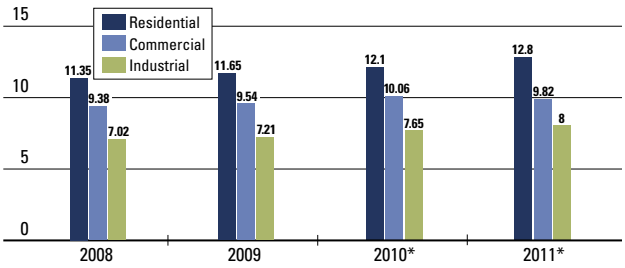
Utility structure

There are 11 jurisdictional electricity distribution companies under eight systems, covering most of Pennsylvania. Together the four companies under First Energy generate nearly 36 percent of electricity sold in the state. Peco Energy Co., part of Exelon, comes in second at about 27 percent of sales, and PPL Electric Utilities Corp. is just a bit smaller with 25 percent. PJM Regional Transmission Organization manages transmission in Pennsylvania and throughout much of the Northeast.

Electric distribution companies



Electricity Prices (¢ per kWh)

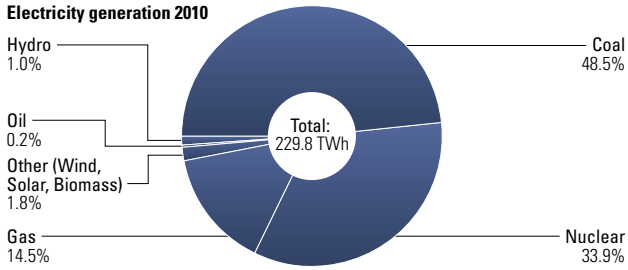


* estimates

source: Energy Information Administration

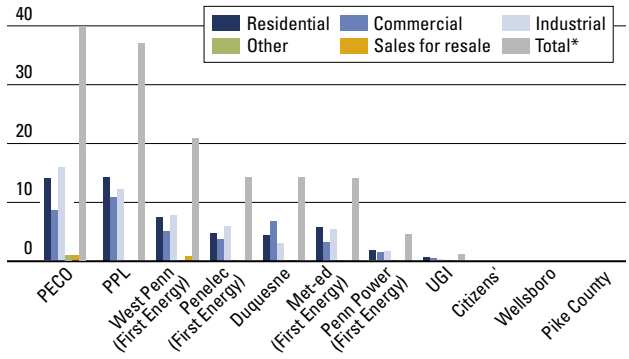
Note: Pennsylvania is currently going through electric deregulation, which means rate caps are being lifted. While Pennsylvanians now have more options in choosing their electricity provider, there is also increased uncertainty about the future of electric rates.

Electricity generation 2010



source: Pennsylvania Public Utility Commissioned (PPUC) based on EIA's Electric Power Monthly

Electricity sales 2010 (TWh)



* numbers do not include losses and company use; final sales number is 144.1 TWh

source: PPUC, Electric Power Outlook 2010-2015

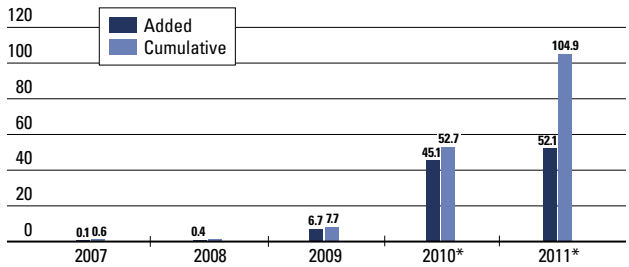
PV system prices in Pennsylvania (median cost)

Solar advocates point out that one of the benefits of the recent boom in installations in Pennsylvania is a significant drop in cost per installed watt. The concern, however, is that a slowing market could mean loss of industry in the state that, combined with uncertainty, could make it more difficult to offer low-cost systems as the Renewable Portfolio Standard (RPS) begins to ramp up again.

Residential:	$5.43 per W
Commercial:	$4.82 per W

source: Sunshine rebate program, applications submitted in July 2011

Installed PV capacity (MW)



* includes 3.2 MW of systems added at some facilities in multiple phases, split between 2010 and 2011

source: PPUC, SREC-qualified generating facilities report from Aug. 17, 2011. The most recent entry dates from July 16.

BASICS (continued)

Cumulative installed PV capacity per capita

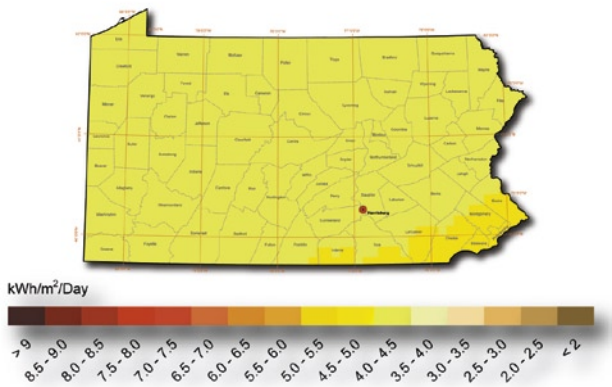
8.3 W per person

Percentage of total electricity consumption from solar

0.08%

Note: As it relates to the state's current RPS, this number is somewhat low because it only includes in-state facilities. At present an additional 27 MW of out-of-state generation facilities qualify to sell Pennsylvania SRECs. That lifts the above number to about 0.1 percent.

Irradiation



source: This map was generated by the National Renewable Energy Laboratory for the US Department of Energy

SUPPORT

Net metering

Annualized net metering at full retail electricity rates, including other fees, was added to the Alternative Energy Portfolio Standards Act of 2004. Residential system owners can net meter up to 50 kW. Nonresidential system owners can net meter up to 3 MW, or 5 MW if the owner makes the system available to the grid during emergencies. System size is not limited by the owner's load. System owners are compensated for net excess generation at the end of the year according to the utility's »price to compare,« which excludes the transmission component of the retail rate. Net-metering years coincide with renewable energy standard compliance years: June 1 to May 31

Rebates and grants

The Sunshine Solar Program

The Pennsylvania Sunshine Solar Program, established under the state's Alternative Energy Investment Act of 2008 and enacted in May 2009, allotted $100 million for solar, including residential and commercial PV systems as well as solar hot water. The PV rebates, funded through state bonds, included funding allocations for 40 MW of residential systems and 144 MW of commercial systems. Each of the programs, which had four steps, is now on its final step. Current rebate levels are:

Residential	75¢ per W (up to $7,500)
Commercial 3 to 10 kW	75¢ per W
Commercial 10 to 100 kW	50¢ per W (up to $52,500)

Rebates remaining as of Aug. 16

	Size of step	Total amount in step	Amount remaining
Residential PV	10 MW	6.630 MW	3.370 MW
Small Business PV	27 MW	14.959 MW	12.040 MW

www.portal.state.pa.us/portal/server.pt/community/grants_loans_tax_credits/10395/PA_Sunshine_Solar_Program/821790

Pennsylvania fact sheet (continued)

SUPPORT (continued)

The Commonwealth Financing Authority
The Department of Community and Economic Development and the Department of Environmental Protection have jointly run a program, available since 2009, with $80 million allotted for solar project grants in the state. Grants cannot exceed $1 million or $2.25 per W, whichever is less. While the program was fully allotted, the Commonwealth Financing Authority decided in July to reopen applications for remaining money that had been awarded but not yet used. By July, $63 million had been awarded to already-completed projects. The application period for the remaining funds opens Sept. 1 and closes Oct. 31.
www.newpa.com/find-and-apply-for-funding/funding-and-program-finder/solar-energy-program

SRECs (or SAECs)
Pennsylvania's solar renewable energy credits (SRECs), also called solar alternative energy credits (SAECs), serve as both a compliance mechanism for utilities and an investment mechanism for system owners. The credits, which are generated in megawatt-hour units, are traded at market rates. Utilities must purchase a certain amount of credits each year to meet the RPS requirements for electricity sourced from solar. If utilities fail to purchase SRECs, they have to make a compliance payment of roughly 200 percent of the average market price. As an additional incentive for utilities, money spent on SRECs is recoverable through ratepayer charges. Compliance payments are not. The following chart shows the upcoming SREC requirements for Pennsylvania's utilities. The percentages are determined by the law; the absolute values will be determined by statewide electricity sales. The numbers below may in fact be somewhat higher than actual demand, as electricity demand in Pennsylvania dipped during the recession and may remain lower than expected.

Reporting year (June 1 to May 31)	PV required	Generation (MWh)	Required PV capacity (MW)*
2009-2010	0.01%	19,525	16
2010-2011	0.02%	33,758	28
2011-2012	0.03%	55,241	46
2012-2013	0.05%	88,605	74
2013-2014	0.08%	149,173	124
2014-2015	0.14%	261,400	218
2015-2016	0.25%	463,906	387
2016-2017	0.29%	556,365	464
2017-2018	0.34%	659,321	549
2018-2019	0.39%	773,151	644
2019-2020	0.44%	898,445	749
2020-2021	0.50%	1,036,024	863

* PPUC numbers, shown here, assume yields of roughly 1,200 kWh per kW annually. PASEIA's estimates of capacity are higher, based on its assumption of 1,150 kWh per kW.

State tax credit
None

Feed-in tariff
None

INDUSTRY

Manufacturing
Silicon
AE Polysilicon Corp.
Ingots & Wafers
Solar Power Industries Inc.
Cells
Solar Power Industries Inc.
Modules
Solar Power Industries Inc.
Inverters
Vacon PLC
Mounting systems
-
Other
Flabeg Corp. (solar glass)

INDUSTRY (continued)

Jobs 2010
PHOTON estimate: 156 integrator jobs*
* with newly installed PV capacity this year on the way to being nearly double that of 2010, integrator jobs could also double

Associations, institutes, and other organizations
PASEIA
The Pennsylvania Solar Energy Industries Association (PASEIA) is the state chapter of the nationwide SEIA. It is part of the Mid-Atlantic SEIA.
www.mseia.org
MAREA
The Mid-Atlantic Renewable Energy Association (MAREA) is a regional advocacy and outreach group, which hosts workshops and monthly meetings. It also puts on the annual Pennsylvania Renewable Energy and Sustainable Living Festival.
www.themarea.org

ADDITIONAL INFORMATION

In order to be eligible for the state rebate program, systems must be installed by a certified Pennsylvania solar installer. A list of those companies can be found at: files.dep.state.pa.us/Energy/Energy%20Independence/EnergyIndPortalFiles/solar/installers/approved_pv_installer_list.pdf.

Solar-related bills under consideration in the Legislature
HB 1580, to be presented this fall by Representative Chris Ross, is meant to save a plummeting market by restoring SREC value. This would be achieved by increasing the short-term targets for PV capacity in the state in order to stabilize the market. It does not raise the long-term Alternative Energy Portfolio Standard (AEPS). Also, the bill hopes to limit imports from out-of-state generating facilities. The changes would be according to the following table. Only the required percentages are certain – the generation requirements and capacity will vary with actual demand. It should also be noted that, according to PASEIA's most recent estimate, PV demand will be about 18 percent lower in reality than in these predictions, due to reduced overall electric demand.

	Current			Proposed by HB 1580		
Reporting year (June 1 to May 31)	PV required	Generation (MWh)	Required PV capacity (MW)	PV required	Generation (MWh)	Required PV capacity (MW)
2009-2010	0.01%	19,525	16	0.01%	19,525	16
2010-2011	0.02%	33,758	28	0.02%	33,758	28
2011-2012	0.03%	55,241	46	0.03%	55,241	46
2012-2013	0.05%	88,605	74	0.15% (new)	260,603 (new)	217 (new)
2013-2014	0.08%	149,173	124	0.17% (new)	301,898 (new)	252 (new)
2014-2015	0.14%	261,400	218	0.204% (new)	370,317 (new)	309 (new)
2015-2016	0.25%	463,906	387	0.25%	463,906	387

State incentives to attract PV manufacturers
No formal incentives

Largest PV system in the state
A 3.6 MW solar farm at the Snyders of Hanover pretzel manufacturing facility in Hanover

Special practices or equipment for PV installations given the local climate
None