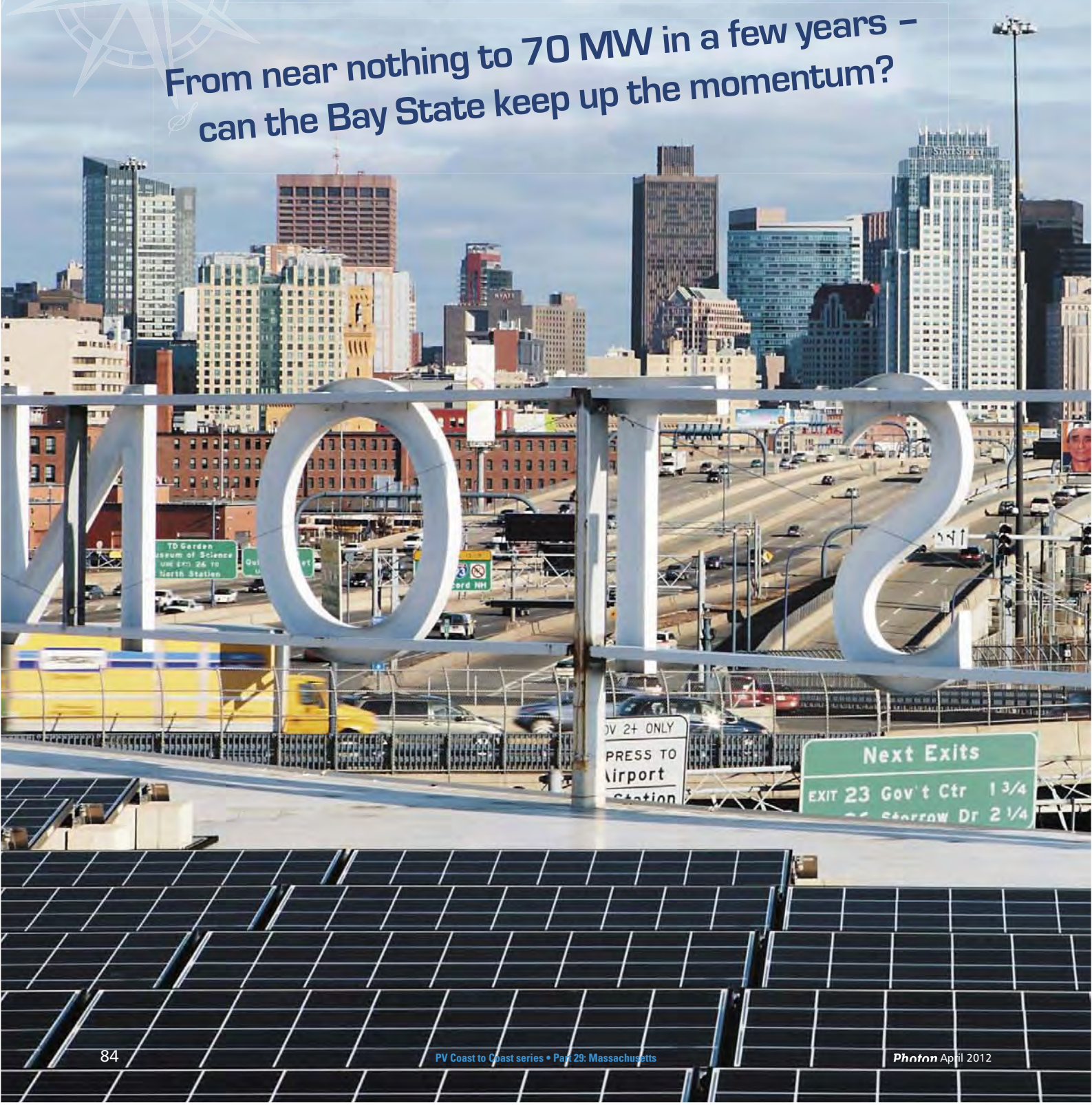
Massachusetts on the move

From near nothing to 70 MW in a few years – can the Bay State keep up the momentum?



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When Governor Deval Patrick came to office in 2007, photovoltaic systems were a mere novelty in Massachusetts, with only about 3.5 MW installed. A few years later, the state has about 70 MW on roofs and on the ground, with hundreds more in the works. With an array of subsidies and a uniquely designed solar renewable energy certificate (SREC) system, there's no doubt that now is a good time for residents to go solar in Massachusetts. But questions around long-term contracts and market growth remain for developers pursuing bigger projects.

Don't take this the wrong way, but Mark Durrenberger may not be the guy to replace Billy Crystal as next year's host of the Oscar awards ceremony. In his chosen field, which is renewable energy, Durrenberger has a stellar reputation, as evidenced earlier this year by him being named small business leader of the year by the Worcester Business Journal, a plaudit that he garnered in large part due to his ethical guidance of the Hudson, Massachusetts-based installation company he founded in 2006. His customers – people like Tom Williams, a salesperson for computer networking behemoth Cisco Systems, who hired Durrenberger to install a nearly 9 kW photovoltaic system on his roof – fall over themselves to praise the professionalism and expertise of Durrenberger and his employees.

But there is this question about his comedic instinct. Not long after launching New England Breeze Solar, his solar

Forward, not backward: Massachusetts has embraced state policies to encourage the installation of solar systems, like this one atop the Boston Food Bank.

Sunny disposition: State Senator Ben Downing believes Massachusetts will soon be talking about GWs of solar, not MWs.

installation company, Durrenberger was in Tennessee getting trained to become one of former US Vice President Al Gore's army of spokespeople about the dangers of climate change and he had the opportunity to meet Gore.

»I walked up to him and said, ›Hello, Mr. President,‹« recalls Durrenberger, who was referring to the fact that in the popular vote, Gore was the victor in the 2000 election. »He didn't smile, but he didn't throw something, either.«

Durrenberger has demonstrated a greater facility for ad libbing in the business world. Soon after launching the company he first called New England Breeze, for example, there was a big problem.

»When I started the business, it was going to be wind focused,« he says. It's a calculation Durrenberger made at the time based in large part on the incentives for small, residential wind systems. But after a couple of years in business, he came to realize that the barriers to installing wind – including zoning, permitting and a whole lot of resistance from neighbors who didn't want to look at spinning wind turbines – made it so difficult that he decided to stop doing them altogether.

While he was running into roadblocks for wind projects, Durrenberger saw an easier path to installing photovoltaic (PV) systems. For one thing, residential PV prices were steadily declining from the $10 per W range, pushed downward largely by the creation of a host of state incentives to spur the development of solar. »People would call me for wind systems,« he says. »More often than not, I would talk them into going solar instead.«

Thus, Durrenberger morphed New England Breeze into New England Breeze Solar. And this one liner was well-timed. In fact, it's hard to imagine a better time for someone to sell – or a homeowner to install – PV systems in Massachusetts. Policy support from the state comes in myriad ways, including rebates for those who live in the service territory of one of the four investor-owned utilities and a handful of municipal utilities, along with a state tax credit and regular income from the sale of SRECs that, unlike in other states, are designed not to fall below a certain level. It's enough to make it so that payback on PV systems, an admittedly blunt metric, can be as little as 2 or 3 years.

From nothing, something

It's hard to spend much time in Massachusetts without coming face to face with seminal moments in American history. No visit to Boston, the state's capital and its largest city, is complete without a stroll along the Freedom Trail, which takes one past the site of the Boston Massacre, the Old North Church, Sam Adams' house and other Revolutionary War-era locations.

The story of solar's growth in Massachusetts, is obviously of a far more recent vintage and one that is pointed towards the future. Just 4 years ago, the entire state had a cumulative installed PV capacity of a measly 3.5 MW. By the end of 2011, there was nearly 70 MW constructed and at least another 40 MW in the development pipeline. The reason for this dramatic surge in installations is easy to identify. »Our solar revolution, if you will, started with Governor Patrick taking office and making a real commitment to renewables and energy efficiency,« says Richard Sullivan, the Massachusetts secretary of energy and environmental affairs, referring to the 2006 election of

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In-state advantage: Projects installed under the state's rebate program get a bonus for using Massachusetts made equipment. Shown here are inverters made by Solectria.

Deval Patrick, the state's first African-American chief executive. »Specifically, with an interest in solar, he challenged the Commonwealth to install 250 MW of solar in Massachusetts by 2017.«

There were a number of reasons why a push for solar made strategic and economic sense for Patrick. Unlike other states, the Bay State has little to tap in the way of fossil fuels. »Massachusetts is at the end of the energy pipeline in terms of fossil fuels,« says Sullivan. »We don't have the natural resources of coal or oil or natural gas and our economy spends $22 billion on energy, and of that $18 billion, or 80 percent, of those dollars go outside the state and in most cases outside the country.«

At the same time, like other northeastern states, Massachusetts also has high electricity prices, at over 14¢ per kWh for average retail rates. In the traditional sense, this is seen as a drag on the economy. But the Patrick administration also viewed it as an opportunity. »It's a doubled-edged sword to have high electricity prices,« says Patrick Cloney, the CEO of the Massachusetts Clean Energy Center, which was established as part of the Green Jobs Act of 2008. »It's troubling to the manufacturing base that has to pay those bills. But it's also a good place for the adoption of new technologies.«

Of course, as important as it is, anyone can set a goal. What really matters, at least from a political perspective, is the ability and willingness to craft and enact policies to get there. Not long after taking office, Patrick, who was a senior official in former President Bill Clinton's Department of Justice and one-time general counsel at both the oil conglomerate Texaco and at Coca-Cola, set the wheels in motion on a number of solar policy fronts.

One thing that Gov. Patrick and his administration were able to do to help give the state's solar industry a quick jolt was to use $8 million from the American Reinvestment and Recovery Act, typically known as the stimulus bill, to help fund solar projects on primarily municipal buildings, like schools and city halls. Called the Commonwealth Solar Stimulus, the injection of cash has helped make possible 77 projects totaling about 5.5 MW around the state.

Massachusetts' officials knew from the start a one-time boost would not create a sustainable market. So in keeping with Gov. Patrick's goal to install 250 MW of solar in Massachusetts by 2017, members of his administration tasked with energy and environmental matters embarked on a two-phase approach to create a long-lasting PV market. At the very start, a fund of about $68 million was created via a combination of money collected from ratepayers paying into a renewable energy trust, along with cash from payments by utilities for not reaching mandates under the state's renewable portfolio standard (RPS). That funding established the Commonwealth Solar rebate program. At the launch of the program in 2008, the Patrick administration had very specific goals for the $68 million: to spur the installation of 27 MW of PV, most of it on residential and small commercial rooftops, over the next 3 to 4 years and simultaneously drive down the price of installed solar.

The goal of reaching 27 MW of new installations was reached earlier than expected, after just 2 years. And the rebates also clearly played a role in the dropping per W price of residential PV installations, which have gone from an average of $8.17 per W to $4.88 per W. Part of that success can be attributed to the design of the rebates. As with the California Solar Initiative rebate program, the incentive per W falls in a step-down manner. So as more MWs have been installed, the Massachusetts incentive has declined. The Commonwealth Solar rebate has gone through nine so-called blocks, with the incentive falling from a base rate of $2 per W (with adders making incentives as high as $6.50 per W) to the current 40¢ per W.

There are other sweeteners to entice families with either moderate home values or incomes to go solar. Depending on the location of a house, those with a value of less than $400,000 (in some places, it's lower than $300,000) qualify for a rebate of 80¢ per W, or double the typical amount. People who are considered of moderate income – defined as making around $75,000 or less as an individual, or less than $95,000 in a dual income household – also qualify for the doubled rebate. The Commonwealth Solar Rebate program, which provides rebates on the first 5 kW of PV systems 10 kW and smaller, is buttressed by a state tax credit that allows most people who install a system at their house to take $1,000 off their tax bill. This is in addition to the federal investment

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Long-term advantage: John Tourtelotte, founder of solar developer Rivermoor Energy is bullish on the state's market, but says it could be helped by more long-term SREC contracts.

tax credit, which provides a benefit of 30 percent off the system price.

It's important to note that the rebates are only available to customers of the four investor-owned utilities and 5 municipal utilities, which serve most of the state's population, because they pay into the pool funding the program through a charge on their bills.

A different kind of SREC market

Even as policymakers were planning to roll out a rebate program to get a solar market running, they were also looking into what would eventually replace it. The thought was that rebates alone, while sufficient to spark interest in PV, were not enough to build a PV market totaling hundreds of MWs. To achieve that, says Dwayne Breger, director of the renewable energy division at the Massachusetts Department of Energy Resources, the state opted for the so-called market based mechanism created through SRECs, a method popular around the northeast, including in New Jersey, which is home to the nation's second largest (trailing only California) PV installation market.

The transition from rebates to an SREC market – likely to be completed in the next year or two – was deliberated carefully. »We did have the advantages of seeing some of the pitfalls of New Jersey and the boom and bust of incentives and oversupply where the market drops off precipitously,« says Breger.

He and his colleagues were right in being concerned about the pitfalls of SREC markets. These markets generally work by mandating that utilities purchase an increasing volume of SRECs, which represent one MWh of solar energy, equal to a percentage of their retail electricity sales. New Jersey and Pennsylvania have seen their solar markets go from booming when SREC prices are sky high because there aren't enough solar plants operating and producing them, to the current situation where there are way more SRECs being generated than necessary for utilities to meet their mandates. The result: SREC prices have cratered, threatening to kill solar development in those states, at least temporarily. In both states, the legislatures are considering bills that would rearrange the number of SRECs utilities need to acquire in order to stabilize the market.

A few things happened in Massachusetts that allowed it to set up a traditional SREC market with some design elements aimed at preventing the boom and bust cycle. First, in 2008 the Massachusetts legislature passed the Green Communities Act, a sprawling and ambitious piece of legislation that gave the state energy resources department the opportunity to change the state's RPS in order to establish a distributed generation carve-out. In response to Gov. Patrick's solar goals, the energy department opted to not only devote the entire renewable carve-out to PV but also boosted the governor's goal from 250 MW to 400 MW as a way to entice more solar developers and companies to make a long-term investment in Massachusetts.

At the same time, in designing the SREC program, the state energy department wanted to incorporate a few safeguards that would provide investors and developers some certainty while also giving ratepayers some protection against consistently high SREC prices. In short, the state has established a floor price for SRECs in hopes that it will give investors

Long-term advantage: John Tourtelotte, founder of solar developer Rivermoor Energy is bullish on the state's market, but says it could be helped by more long-term SREC contracts.

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and developers long-term market certainty. At the same time, Massachusetts utilizes a complex formula to determine market size, one that is meant to keep supply and demand in balance (see article, p. 100).

The jury is still out

It is probably too early to definitively say whether Massachusetts has come up with a way to make an SREC market work without the sorts of stops and starts others have had to endure. In the revisions to the RPS that created the solar carve-out, a minimum standard was established for compliance years 2010 and 2011, which means that the formula has only been used once. As many would expect, the first year that was used as a jumping off point for the use of the formula was one that saw a lot of alternative compliance payments – made by utilities when they don't acquire the number of SRECs required in a given year - and no SRECs deposited in the auction account. It's a development policymakers expected because it takes a bit of time for the PV industry to get projects through the development pipeline.

Some developers in Massachusetts, particularly those of utility and commercial-sized projects, are concerned that the formula is too backward looking and doesn't guarantee a minimum amount of growth from one year to the next. »The demand increases are not automatic,« complains one developer, who pointed out that the formula last year resulted in a market demand increase of just 3 MW, from 69 MW to 72 MW. »The requirement won't go up in 2013 because of the way previous years influence the equation. The equation doesn't respond to market momentum, so in 2013 you could have excess capacity just like in New Jersey or Pennsylvania.« For this particular developer, the way to solve this problem would be to make sure PV demand increases by a minimum of 20 to 30 percent, at least over the next few years. »Still run the equation, but have an override when we're in this period of having the market develop,« says the developer.

Dwayne Breger at the state energy department, has heard these sorts of complaints about the formula, especially about PV demand not rising quickly enough. But he points out that at least so far, the industry is not yet reaching the demand targets set out by the formula. »There's still a lot of room for development to take place before we hit the 2012 target,« says Breger. »If they overbuild and do great work, the minimum standard for 2013 will go substantially higher.«

While there are certainly complaints about the SREC market structure, it also receives enthusiastic praise, particularly from residential integrators, who often serve as SREC brokers for their clients. »It's actually a state that has gotten it right. Clearly they have learned lessons from other states in what they have put together,« says Michelle Waldgeir, a vice president of communications for Astrum Solar, a Maryland-based company that offers PV systems for lease or purchase and expanded into Massachusetts in 2011. In particular, Waldgeir is enthusiastic about the SREC floor price Massachusetts has established, something that's missing in states like Ohio and Pennsylvania, where the company also operates. »They have protected the downside. The controls give you a lot

less risk and more certainty,« she says. And Astrum is not alone in embracing Massachusetts. SolarCity, Sungevity and SunRun have all expanded into the Bay State recently, eager to offer their lease products to homeowners.

Thinking long-term

Although the Massachusetts SREC program is designed in uniquely, there's one challenge in the state that commercial solar developers from places like Ohio, New Jersey and Pennsylvania would recognize: it is hard, if not impossible, to get long-term contracts for SRECs. For the most part, utilities purchasing SRECs these days are doing so either on the spot market or with 1 to 3 three year contracts, not the 10-year contracts solar developers crave.

Long-term contracts are important because they allow banks to feel comfortable enough about the long-term revenue stream a PV system will generate that they will make loans to finance the project. On the flip side, a 1- to 3-year SREC contract is not terribly comforting for a bank considering a 10-year loan, which is really the duration needed to finance a capital intensive solar project. That's the immediate, pressing reason solar developers crave long-term contracts for SRECs.

But there are also ancillary arguments to be made about the wisdom of ensuring the availability of long-term SREC contracts. Right now in Massachusetts, because there is a dearth of SRECs, utilities are paying a premium for them on the spot market or in short-term contracts. This, of course, is a tab that gets passed on to ratepayers when utilities go through their cost recovery process. What that means, then, is that ratepayers are footing the bill for SRECs that run $550 per MWh, or 55¢ per kWh. The argument developers make is that readily available 10-year or more SREC contracts could be made at or around the $285 per SREC floor price, a big savings over what's happening now.

If long-term contracts, as their advocates insist, would both save ratepayers money and spur more solar development, then why aren't they available? There are a few factors in play, including what the utilities say is the lack of regulatory or legislative approval for anything beyond short-term contracts. That is only partially true. According to State Senator Ben Downing, who chairs the joint committee on telecommunications, utilities and energy, the Green Communities Act actually directs utilities to procure 3 percent of their peak load under long-term contracts, though the provision in the law did not specify any carve outs for solar or other energy sources.»For the most part, that has been met through land-based wind contracts and also in National Grid's case from Cape Wind,« he says.

A different kind of SREC

Maintaining a stable market for solar renewable energy certificates (SRECs) has proven difficult for some states. And as might be expected in a state that is home to Harvard University, the mechanism Massachusetts created to ensure stability is very complicated – which is one reason skeptics question how well it will work – but it's key to understanding the photovoltaic (PV) market in the Bay State.

The main concept to grasp in considering the SREC market design is that it is meant to keep a handle on supply and demand in such a way that it stays in balance and avoids the wild SREC price swings that can make a PV market look attractive one day and repugnant the next.

How does it do that? Think of the Massachusetts SREC design as a house, with a ceiling and a floor meant to neatly contain the amount of fluctuation possible in SREC prices. The ceiling is the alternative compliance payment (ACP), basically a penalty, which kicks in when utilities don't acquire the number of SRECs required in a particular compliance year. It's a ceiling for SREC prices because no utility would pay more than the ACP rate for an SREC – it would make no sense.

Currently the tab for each SREC utilities lack during a compliance year is $550, which translates to 55¢ per kWh. At the end of 2011, in an effort to provide some long-term visibility for investors and solar developers, the state energy department set in regulation a schedule for ACP rates over the next decade. After 2013 the ACP steadily declines each year, going from $523 in 2014 down to $365 in 2021.

There's nothing unusual about SREC markets using ACP payments as a quasi market ceiling. What is unusual about the system in Massachusetts is that there also is a floor price, something meant to provide assurance to investors and developers that a flurry of PV project construction won't lead to a situation where SREC prices plummet – as happened recently in Pennsylvania – causing the market to literally seize up. In Massachusetts, the floor price is set at $285 per SREC.

The other lever the state has for boosting PV demand when the number of SRECs being generated is lagging, or to tamp it down if the opposite is true, is a so-called minimum standard formula, which determines how many MWs of projects will qualify to generate SRECs in a particular compliance year. This is literally a formula as one would imagine a Harvard math professor writing it out on a chalkboard in front of a classroom, and it's calculated each summer as a new compliance year is set to begin. The formula spells out a target for the total MWs of SREC-generating projects in the marketplace for the upcoming year.

There's one other factor to understand for the formula to make sense, and that is the establishment of an auction mechanism that kicks in when solar power producers can't sell their SRECs because of an oversupply. The Massachusetts Department of Energy Resources established this auction mechanism to ensure that producers of SRECs would always be able to sell what they generate at the floor price of $285. This is important to know because both ACP payments from utilities and the number of SRECs up for auction are indicators of where a market stands and are key elements of the formula used to establish the next year's market size. Lots of ACP payments means that the market has an undersupply of PV systems churning out SRECs, while lots of SRECs up for auction means that there is an oversupply.

As confusing as this all is, there is method to the madness. Each August, after factoring in whether the market is overflowing or desperate for SRECs, the energy department makes a calculation about the proper market size for the upcoming year.

»If we are in oversupply, the demand goes up to absorb that oversupply,« explains Dwayne Breger, director of the renewable energy division at the state energy department. »Or, if there's a shortage, the minimum standard grows enough the following year so it has time to catch up to the demand.«

All of which sounds great in theory. What remains to be seen is if it works. *cw*

Cape Wind is the hugely controversial and still not built wind project proposed off the coast of Cape Cod. In frank, off the record comments about the proposed Cape Wind project, some in Massachusetts say that it has stunted the growth of other renewables, including PV, by soaking up a big portion of the long-term contracts available. »Cape Wind is to energy policy in Massachusetts as the Big Dig is to transportation policy,« says Downing, a supporter of Cape Wind, referring to the legendary multi-billion dollar project that routed Interstate 93 under the city and was bedeviled by cost overruns and delays. »You can't talk about roads and bridges without talking about the Big Dig and you can't talk about energy policy without Cape Wind.«

Whether Cape Wind is making it impossible for solar developers to get long-term contracts or not, the fact remains that they're not available and won't be unless there are some legislative changes that would reduce their risk to utilities. As it stands now, utilities like National Grid see plenty of risk in long-term contracts. »If you sign a contract for five years on the SREC and you buy it at $300 per SREC, what if the SREC market is at $200 and the regulators say you have to pay $200. Who is going to eat the difference?« asks Fouad Dagher, who oversees solar proj-

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A lot more Harvards would help: The town of Harvard has one of the highest PV per capita ratios in the country, thanks to state incentives.

ects at National Grid. »We would like to see long-term contracts but we can't sign on with customers for a long-term contract without having the assurance that our customers, our shareholders won't be negatively impacted by it.«

That assurance could potentially come in two ways, say developers. One would be by giving legislative certainty that the SREC program will last for at least 10 years, thereby removing the chance that a new governor or new legislature unfavorable to solar could come in and scrap it. By itself, that could eliminate some of the rationale a utility would have for sticking to the spot market for SREC purchases. If utilities have the certainty that the program will not be eliminated, that could reduce the worry that they'll sign a long-term contract that leaves them holding the bag for years' worth of expensive SRECs.

Giving specific legislative direction that utilities can recover the costs of long-term contracts would also probably help. »Massachusetts' utilities and competitive energy market participants are the mandated end buyers of SREC and REC contracts under Massachusetts' RPS,« says John Tourtelotte, founder of Rivermoor Energy, a solar developer. »When Massachusetts utilities and competitive energy suppliers become certain that the SREC program has a clearly defined and guaranteed 10 year life, they will then enter into longer term contracts.«

Regardless, Tourtelotte is optimistic about the future of the market for commercial and utility projects and believes the state has done a great job getting the market moving in the right direction.

That legislative fix, however, does not seem to be imminent. »I don't think there's a consensus on what the right way to proceed is,« says State Senator Downing, who notes there are currently no specific proposals before his committee that would make any of those changes. »I don't know if we need to do long-term contracts on top of what we are doing, or if when we meet our stated goal of 400 MW from the SREC program, do you then shift to long-term contracts? It's an issue we are hearing more and more about.«

Figuring out how to tweak the SREC market is just one of the issues facing the Massachusetts PV market. With more projects in the development pipeline, interconnection issues are adding expense and delays lasting as much as six months, which prompted the Department of Public Utilities to recently convene a stakeholder group to address the matter. And although the goal of 400 MW still seems a way off, what should come next to support the next wave of solar development is already on people's minds. »The intent of the program was not to build the market to 400 MW and then call it quits,« says Breger of the state energy department.

But he can only speculate on what will be next. Perhaps solar will be cheap enough that it can be lumped together with other renewables and take advantage of regular RECs for financing. Or maybe the carve-out needs to be continued under new pricing. For his part, Senator Downing thinks the next stage of solar development in Massachusetts will arrive sooner than most would expect and it's time to start thinking bigger.

»I think we will quickly, and much sooner than the governor would have expected, meet his goal of 400 MW,« says Downing. »I think we will easily get there as we make policy decisions to expedite that and as the cost of solar comes down. I think the market is massive and some day soon we will be talking about GWs and less about MWs.« Chris Warren