

US Electric Utilities & IPPs

Merchant Meets YieldCo: The Solar Renewable Credit (REC) Debate - Call Transcript

Equities

Americas
Electric Utilities

Julien Dumoulin-Smith

Analyst

julien.dumoulin-smith@ubs.com

+1-212-713 9848

Michael Weinstein

Associate Analyst

michael.weinstein@ubs.com

+1-212-713 3182

Paul Zimbardo

Associate Analyst

paul.zimbardo@ubs.com

+1-212-713 1033

SRECs significant revenue generator for developers; underpinning solar growth

Our latest conference call was with Jason Prince at Karbone, to discuss latest trends in the SRECs (solar renewable energy credits) markets; looking at supply/demand fundamentals and price movements in the key Northeast SREC states NJ, MA, MD, and PA. In these markets SRECs can be the largest revenues stream for solar developers, trumping revenues from electricity sales and capacity payments. However there is significant variability in SREC value across states and over time (we discuss state specific factors driving volatility later in this note), which imparts an element of risk to those revenue streams (driving a parallel demand for hedge products). Despite the volatility, SRECs have been a key market based incentive underpinning much of the solar build in these states; Karbone expects SREC demand to double by 2020, needed to incentivize the development of an additional 2.5GW of incremental solar over 2015-2020 in the four main Mid Atlantic SREC states, up to a total of ~5.3GW (assuming flat overall load growth, beyond the ~2.8 Gigawatts today). Bottom line, we see the Northeast as increasingly a key market for continued solar build, with a need to appreciate SREC dynamics to gauge the pace of deployment.

YieldCo's beware: SRECs give initial boost to CF, but adds to merchant volatility

Why are SREC's particularly relevant? SRECs provide substantial upfront cash flow, with values upwards of ~\$200/MWhd depending on the market, which is 'hedgeable' for up to ~7-years in a secondary market. However, after this term, SRECs are subject to market forces. While we're biased to see these prices increase in the medium term through the expiration of the Investment Tax Credit (ITC), particularly in NJ, where the bulk of SRECs are to be found, we see this adding to long-term uncertainty within YieldCo structures. We see this limiting the portion of Northeast-based distributed products (all of which generate SRECs) within the overall YieldCo portfolio. Additionally, with SRECs terming out by 10-15 years of project life (after which they are no longer eligible for SRECs), we see risk to the tenor of the cash flow profile of assets, creating a wide bifurcation in the cash current yields relative to the IRRs. While SRECs have yet to enter the wider debate around YieldCos, we see this as inevitably entering the conversation as the industry transitions to these types of projects through the 2016 ITC expiration towards smaller-sized projects. We think the key will be YieldCo portfolio management, lending itself once more towards larger, diversified portfolios.

Merchant meets solar: SRECs matter as alternative to net metering.

While the wind market has been dealing with hedging merchant risk for some time, solar appears poised to deal with this risk more substantially as markets shift towards DG penetration rather than long-term contracted utility-scale. SRECs matter substantially to the economics, seeing prices as ~\$200/MWh (in NJ) relative to merchant power prices (on-peak is typically \$40-50/MWh) in order to make the economics work for these, effectively an alternative scheme to incentivize solar outside of conventional net metering policies. We emphasize SRECs are crucial to the economics of solar – and an increasingly necessary component to the YieldCo and solar growth equation.

What about Community Solar? Virtual net metering enables a new angle

In an effort to *expand* the opportunity set for eligible home owners wanting solar, MA has allowed for projects to leverage single sites for up to 6MW a piece, with those unable to actually put solar on their roofs directly to effectively buy into smaller projects, still at the metered retail rate applicable to them. As such, renters, those with ineligible roofs, leaf cover, etc will now be able to take advantage of this trend. We suspect this deeply subsidized effort could yet expand to other states keen to push the subject of net metering to accelerate solar deployment. We understand MN has similar policies implemented.

New Jersey: with more than 1.4GW installed solar, w/ market long till ~2016

New Jersey, one of the oldest SERC markets, already has upward of over 1.4GW solar installed; Karbone thinks the success is underpinned by the state's aggressive SERC policy (NJ represents almost half the demand of all the 4 Mid Atlantic SERC markets). Although SRECs markets are currently over supplied into 2016 in NJ (given the success in solar roll out), pricing has still been rising because of legislative changes, the most important of which is an adjustment of the forward RPS Demand Schedule, which has bought demand forward into the 2015-17 period; and also because of grid constraints and extended optionality for SRECs. However, SERC prices having run up since July last year, Karbone highlighted a concern for the long-term stability of this market in relationship to the supply and demand fundamentals in the long run (2019 and beyond).

Maryland: undersupply concerns post '17; siting concerns make mrkt less liquid

Given the small market size (~240MW installed solar), the concern with Maryland is potential undersupply of SERCs; even though prices have been stable largely because the RPS targets have been relatively low too. However, RPS ramps up from now to 2020, which means future solar build needs to be high. However, Karbone highlighted a series of events (potential ITC pullback; reduction in penalty for SERC noncompliance in 2017) that could very well lead to a potential liquidity event where shortages become pronounced in this market. An issues highlighted by Karbone is concerns over siting these projects (which are largely grid connected); and this makes the markets relatively illiquid making it harder to get long-term hedges for SERCs (the latter has a direct impact on project financing).

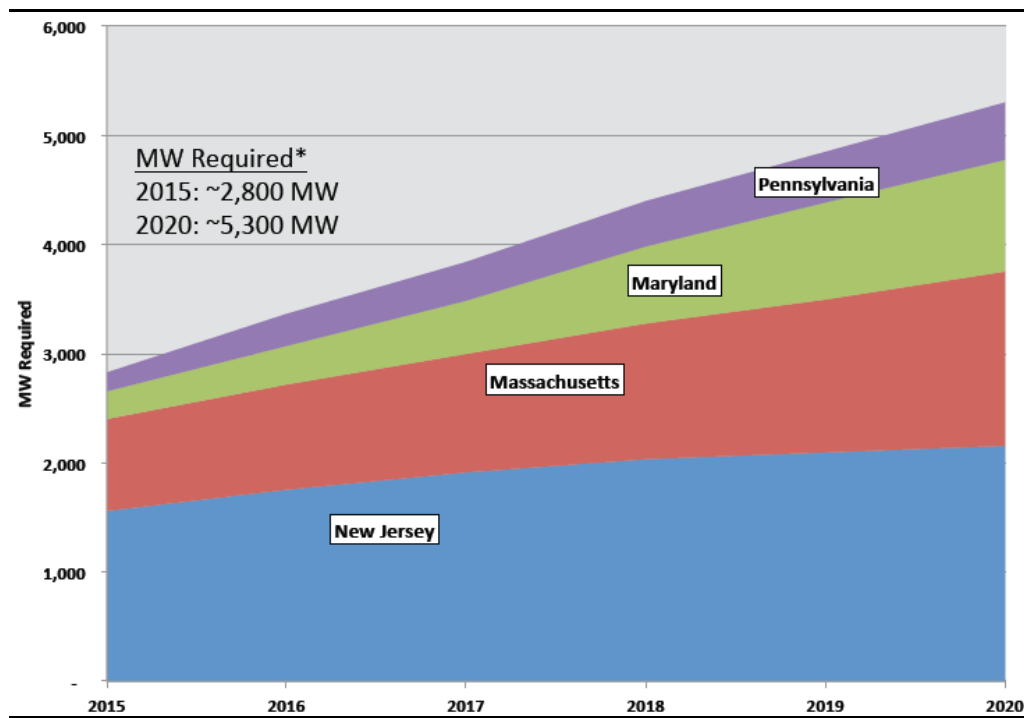
Pennsylvania: low SERC prices may necessitate out of state solar to meet RPS

Pennsylvania SERC market is also relatively small (installed ~210MW); but what makes this market interesting is its criteria for geographic eligibility – other states require the solar facility to be sited geographically within the state – but Pennsylvania allows for siting within the PJM footprint. Given the larger territorial coverage, there has been an abundance in SERC supplies in this market, which has led to weak SERC pricing. Karbone expects present SERC pricing too low to drive significant build in the state, and the state will instead increasingly rely on out-of-state solar resources to meet RPS. The issue to look out for, according to Karbone, is the potential interaction between other PJM SREC markets Ohio and Illinois mostly - that could compete with Pennsylvania for SERC supply depending on arbitrage opportunities between the three states.

Targets by State: How many more SRECs in market?

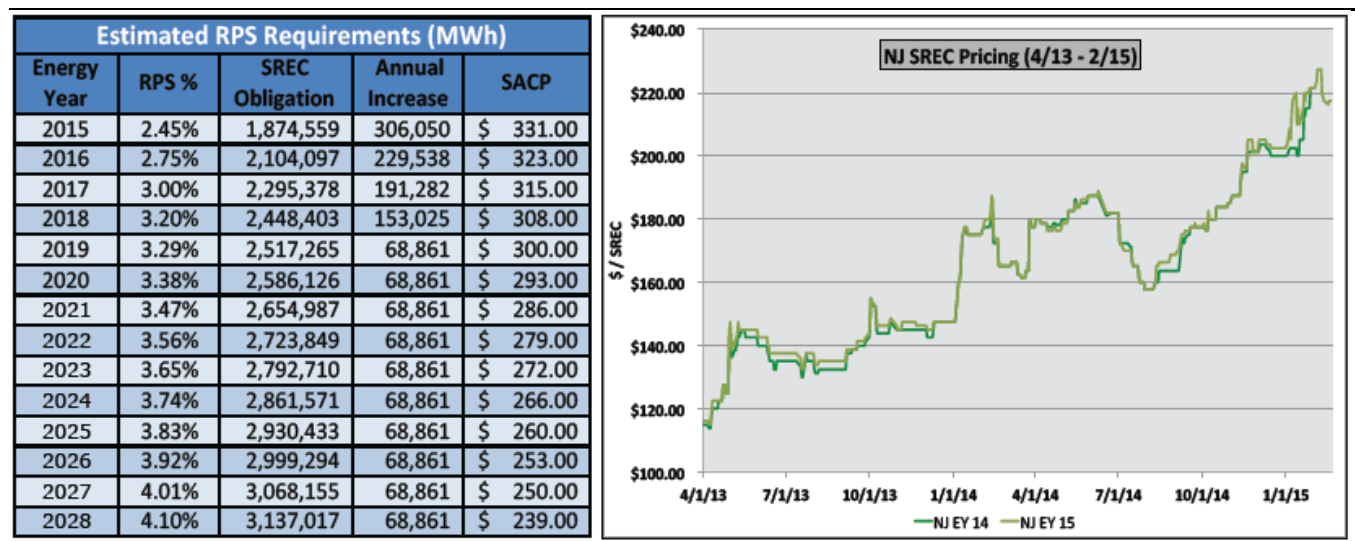
Below we show estimated RPS requirements by state and latest SREC pricing trends in light of those requirements as reported on Karbone's trading desk. Overall, figure 1 below summarizes expectations for SREC demand to almost double to ~5.3GW by 2020 from ~2.8GW in 2015.

Figure 1: RPS SREC Demand Almost Doubles by 2020



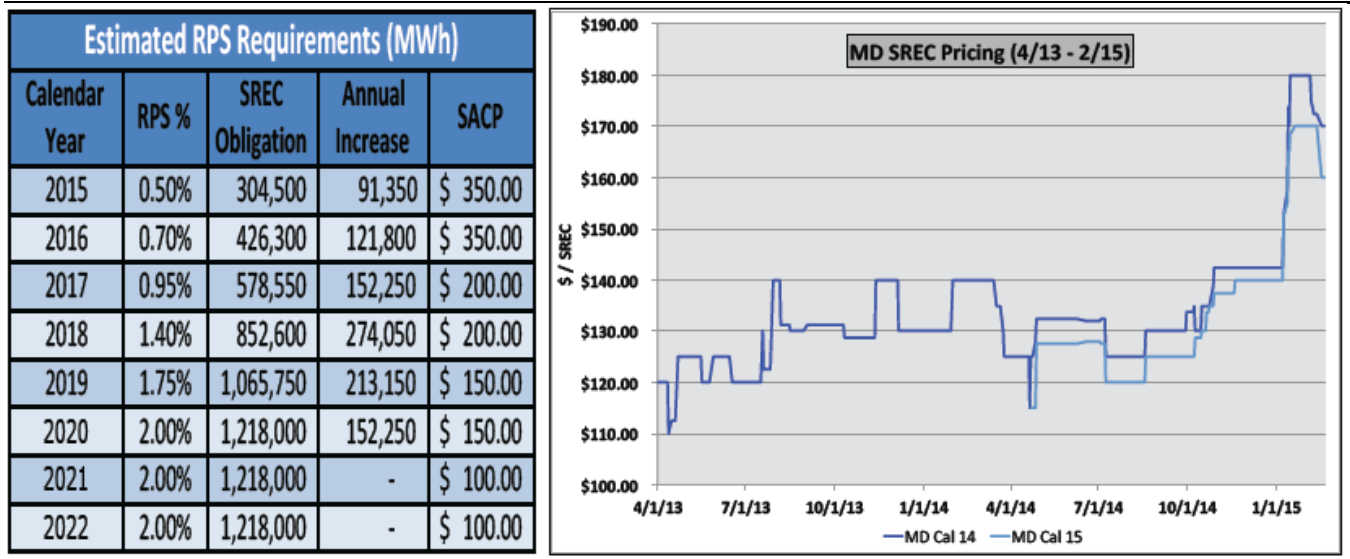
Source: Karbone's presentation made on the UBS Conference Call

Figure 2: New Jersey: RPS requirements and SREC pricing (total state installed capacity >1.4GW)



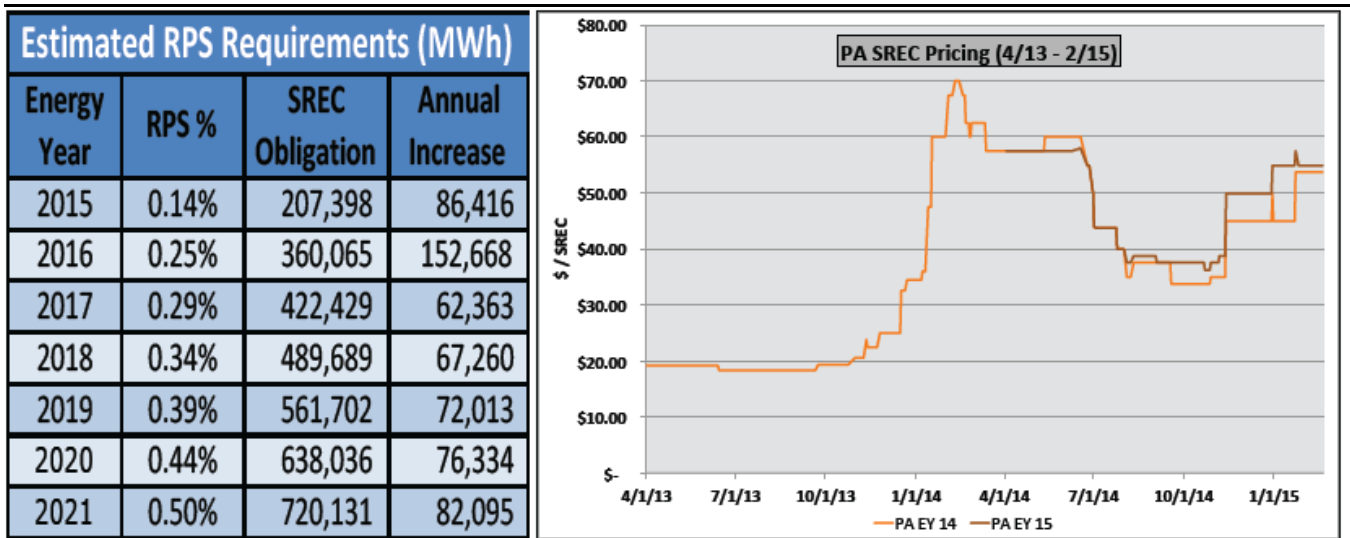
Source: Karbone's presentation made on the UBS Conference Call

Figure 3: Maryland: RPS requirements and SREC pricing (total state installed capacity ~240MW)



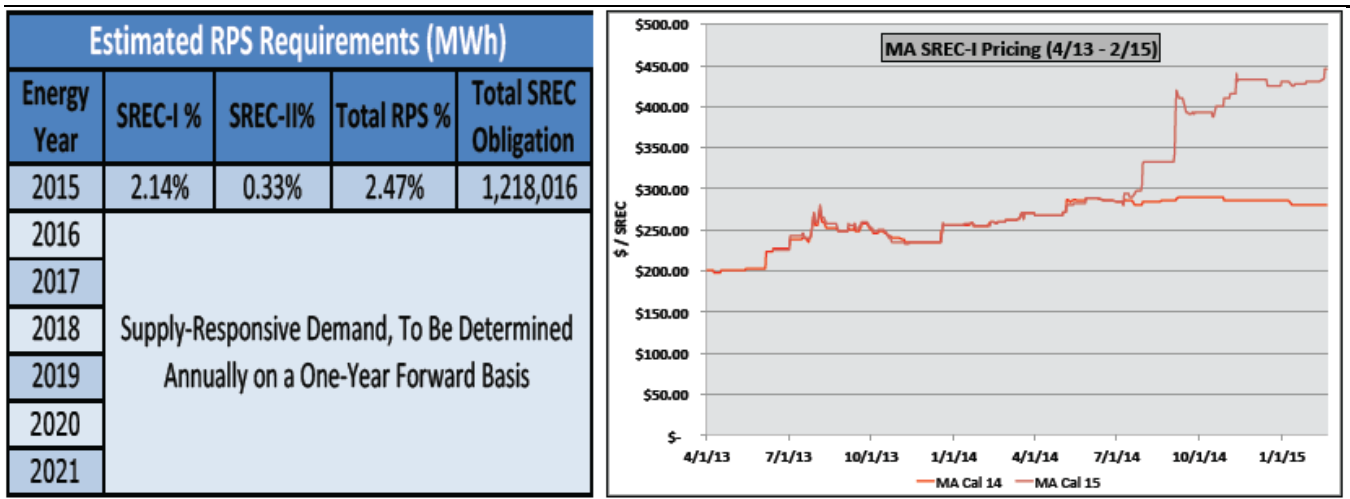
Source: Karbone's presentation made on the UBS Conference Call

Figure 4: Pennsylvania: RPS requirements and SREC pricing (total state installed capacity ~210MW)



Source: Karbone's presentation made on the UBS Conference Call

Figure 5: Massachusetts: RPS requirements and SREC pricing (total state installed capacity ~700MW)



Source: Karbone's presentation made on the UBS Conference Call

Price Caps Matter

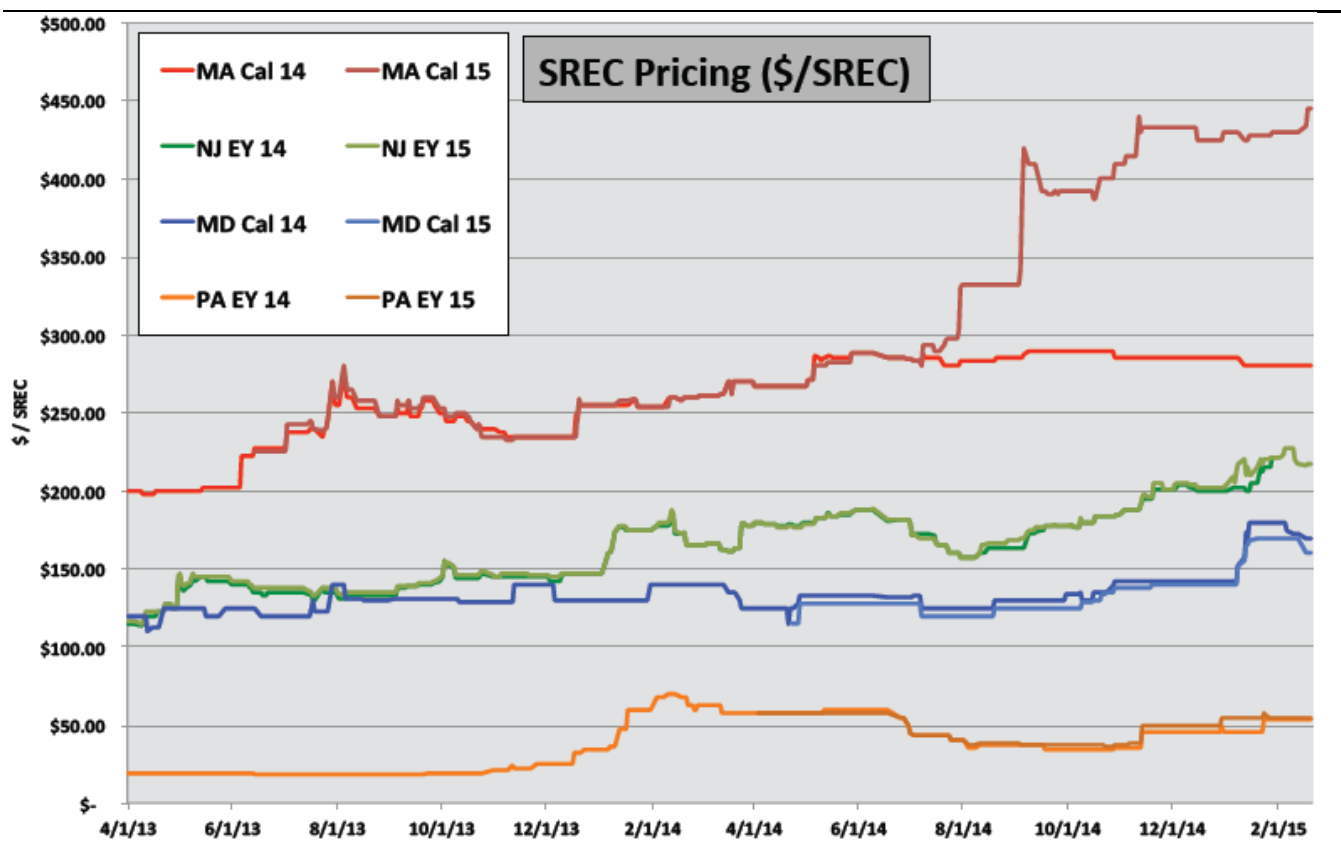
We see SREC prices as effectively priced as a discount to the offer caps by state, reflecting a gauge of how far away from the market's ability to satiate the state's projected targets (reflected by SACP price, or 'alternate' price).

Following legislative reforms to the NJ program, prices pulled back substantially and remain meaningfully below the price cap, reflecting the 'long' position today in the market. We continue to expect these to be absorbed particularly through the high-growth period projected through the medium term.

We suspect SREC prices will need to climb meaningfully to 'offset' the lost value of the ITC in order to backfill the lost value to 'solve' for the necessary build cost to make the economics work to continue to build out solar. We suspect the declining trend of NJ SREC price caps will put a long-term limit to future inflation not far off from today's pricing.

We see the NJ market as likely experiencing a small boom-and eventual bust in pricing. In the long term, prices should be structurally deflationary for SREC prices to reflect the declining cost for new-build of solar installations. The offsetting long-term question is how carbon programs could drive reinvigorated solar RPS requirements; presumably this would be through the same SREC programs, but looking to MA, there is a risk for parallel additional programs. We also flag the ability to import SRECS from out of state

Figure 6: SREC pricing (\$/SREC)



Source: Karbone's presentation made on the UBS Conference Call

Conference Call on Trends in the Solar RECs Market

We present below highlights from our call with Jason Prince from Karbone. They have been edited for clarity. The accompanying slides can be accessed by emailing your UBS representative.

A replay of the call can be accessed using the replay dial in details below:

Replay Information (available until 3/3)

Toll Free: 800 633 8284

Toll: +1 402 977 9140

Passcode: 21759173

Julien Dumoulin Smith: Good afternoon everyone. We are joined today once again by Jason Prince over at Karbone to talk about the Northeast SREC Market. We're going to talk about all the key SREC Markets in the Northeast - New Jersey, Maryland, Pennsylvania and Mass; and go through the nature of these markets and the backgrounds on where all of them stand today. So, with that I will turn it over to Jason to go through some of the background and towards the back half of the hour, we will have time for your questions.

Jason Prince: Great. This is Jason here. Good afternoon everyone. Thank you all very much for joining us today. And also a special thanks to Julien and all of the team over at UBS for having me again. I'm very happy to be here speaking with you all today again.

As Julien mentioned, my name is Jason Prince. I'm the Director of Research at Karbone. And I want to start with just a quick minute on who we are as a firm, to give you a sense of the lens that I'm looking at the market with.

Essentially we're an energy and environmental markets firm. We are made up of three integrated business lines, brokerage, capital advisory and market research. On the brokerage side, most relevant for today's call, we're very active in brokering SREC transactions, but in addition, we also broker all other types of classes and tiers of renewable energy credits and also things like carbon credits.

In addition to just environmental products, a lot of these were also active brokering physical commodities - things like bilateral capacity, also fixed priced power and the likes of that. Moving away from brokerage, on our capital advisory desk, we function like an investment bank. We're doing a lot of buy-side and sell-side advisory, helping to structure the capital stack, also including Tax Equity, Response Equity and debt. We also do buy-side, sell-side advisory in terms of putting capital to projects and matching projects to capital. In addition to that, our market research team, which is the third business line that I lead up, basically tracks all the markets that were active in transactionally.

So what that means, is we spend a lot of time digging into policy to understand the market impacts, do a lot of supply and demand fundamental analysis, modeling out and also projecting prices. We've been very fortunate to have been recognized for our work in the past and today I'm really excited to talk about SRECs, which is really one of our core competencies.

So with that, let's start on Slide 3, looking at the agenda. We'll start off with high level discussion of what SRECs are and why they're used. We'll move onto some analysis on a state by state basis - **four of the most important SREC markets are all focused in the Mid-Atlantic: New Jersey, Pennsylvania, Maryland and Massachusetts.**

And from there, I'll move onto some of the commercial considerations, when thinking about SREC markets. So the focus will be on liquidity and risk. Moving onto Slide 4 here, it really comes down to as a starting point, what's an SREC? Ultimately they are a market-based incentive and they've proven capable of getting a lot of solar built.

So if you look at the graph on this page, you can see just **based on the four SREC states that we're going to**

cover today, compared to the 2015 demand versus the 2020 demand, there's an expectation that these SREC markets are going to need to incentivize the development of an additional 2.5 Gigawatts of solar.

And that's a large number, but the truth of the matter is, as I mentioned, SREC markets have proven themselves very effective at getting solar built and in fact, we've already got about over 2.5 Gigawatts installed across these four markets.

The lion share to date has been installed in New Jersey, but there are going to be important implications looking at it on a forward basis. How have these markets gotten so much solar built and how are they going to get so much more solar built going forward over the next five years?

At the end of the day, the *SREC is a derivative; it's a commodity that comes out of Renewal Portfolio Standards*. So RPS, or Renewable Portfolio Standard is effective a law and it says that, "Certain electricity retailers need to procure a proportion of their electricity supply from eligible Renewable Resources."

And for the sake of all these SREC markets that we're looking at, they have specific caveats that retail suppliers also need to purchase a proportion of their energy from specifically solar electricity.

So at the end of the year an electricity retailer needs to demonstrate compliance with the law, they're basically going to go to their regulatory body and say, "Here are a number of user solar renewable energy credits and since each solar renewable energy credit represents one megawatt hour of electricity generated from a solar resource, they're there by saying that they actually did indeed purchase solar electricity to meet their legal demands under the RPS."

Now everyone can understand this high level framework for an RPS, but what's interesting is that whereas these **retail suppliers need to purchase and have an associated cost with the SREC compliance, the flip side of the coin, is that solar developers and generators actually have an incredible revenue stream.**

And what's really interesting is that they have a captive audience in these markets where buyers need to purchase the credits, so they can sell them, and it ends up being a lot of value that they can get. We're going to dig into how much value that is. But at the end of the day, as I mentioned, SRECs are commodities and so their value fluctuates over time and across markets, based on market conditions.

And this brings us over to Slide 5, where I want to note the importance of SRECs that are priced at the levels shown here (obviously there's a range on the slide), but what's really critical is the fact that if you're a **solar developer you really have three potential revenue streams. You can get your money from selling your electricity, you can get your money from monetizing your capacity attributes, and in addition, in used SREC markets you can get revenue from selling your solar renewable energy credits.**

What's so incredible is that whereas the power and the capacity actually relate to real physical attributes, *the SREC, which is just this environmental derivative, in these four markets that we're looking at, makes up the lion's share of the revenue streams.*

So it's really interesting, when you think about what's actually getting a project built and what the most important incentive is.

If we start with the premise that SRECs are one of the most important revenue streams, it's really important to understand what they are, how to deal with them and how to take advantage of them. So looking at this graph on slide 5, you can see this is historical pricing taken from Karbone's Brokerage Desk, who's active in brokering this stuff, and what you can see is that, across markets you have a lot of variation in price.

So Massachusetts is at the top, and Pennsylvania's at the bottom. There's a significant range of value that distinguishes these two SREC markets. So across markets, there's variability, but in addition, even within a given market over time, there's also a lot of volatility.

So those are the two most important takeaways and I think we're going to address those issues going through each of these states now one by one basis to understand really the nuances to each market that drives volatility within the market and then to understand the difference between the markets that differentiate them from each other.

So with that, we'll go onto Slide 6 and it's New Jersey in focus. And **New Jersey's a great place to start, because it's one of the oldest SREC markets and it's also one of the largest. We're talking over 1.4 Gigawatts of solar, that's already been installed in New Jersey to date.**

And it's funny to think about New Jersey, which doesn't immediately conjure up images of , nice sunshine like maybe a state like California would, but it's amazing to think that it's been so successful in getting solar developed.

And ultimately, I think, what we're going to prove through the discussion today, is **that it's really thanks to its Renewable Standard policy and particular it's really aggressive SREC policy.**

So of the four states we're looking at here going back to Slide 4, that initial demand projection in megawatts and capacity, right now **New Jersey represents almost half of the demand for all of these four markets.** But its schedule will fall off going forward and we're going to address that in relationship to estimated RPS requirements going forward – you can see it in this table on the bottom left.

What I will say though, in regards to the fact that *the market is persistently over supplied, is that it is almost a victim of its own success.* New Jersey has provided such an incentive regime to incur this solar development over the last decade that in fact, the market's so successful that its demand has actually been met and exceeded.

And we're in a regime right now, where if you actually didn't build anymore solar whatsoever going forward, we would still have enough supply that exists in the market from previous generation, that the market would still be supplied through energy year '16. So it really puts into perspective the fact that New Jersey is a long market. And that's the status quo that we're in right now.

What's bizarre in that regard is that when you look at the pricing graph, pricing has been rising and rising consistently for the last little while and in an oversupplied market, intuitively you would think that prices would come off - but as you can see, something is obviously up in New Jersey.

And there are a couple of thoughts that I'm going to put forward to suggest why pricing might well be sustained at these levels. So the biggest thing that I'm going to point to, is the **legislative change that is basically picking New Jersey up from the dumps in the end of 2012, when SREC prices had crashed well below a \$100, and now**

there's some legislation that changed the program and redesigned a number of the perimeters.

And some of those changes I think are particularly important to appreciate in the context of this paradoxical sustained high pricing in the face of persistent oversupply. So some of these things relate to **extended optionality for SRECs**, some of them relate to **constraints on grid supply build**, and then one of the most important ones that I want to spend a minute on talking about right now, is **an adjustment of the forward RPS Demand Schedule.**

So in the table on the bottom left of Slide 6, you can see that the legislation established a forward Demand Schedule in a percentage basis. So this is the RPS. It's the law and it says, "For instance, in 2023, you need to purchase 3.56 % of all your electricity supply from solar resources." Now what's interesting is - SB1925, which was the bill that really changed things in 2012, **pulled forward a bunch of the demand. You can see here in the early years, in '15, '16, and '17 for instance, the annual increase is massive, so every additional year that you go forward in New Jersey, there's a lot more demand that gets added and as a result, that provides the real robust incentives to keep building solar.**

But I want to focus everyone's attention on an interesting nuance where **after the year 2018, starting in 2019, the annual increases start looking very, very flat.** It's really homogenous and if you think about roughly 70,000 annual SRECs incrementally a year that get added to the demand side of the equation, if you use roughly 1200 megawatt hour efficiency per megawatt (which is the 13.7% that the New Jersey Clean Energy Program actually uses) then you're really looking at about 60MW a year that you're going to be able to support.

And that stands in sharp contrast to the last number of years of solar in New Jersey where we've built hundreds of megawatts a year. So what this leaves us with this idea that okay, well pricing is still good. I think people are thinking that the oversupply is going to go away in the next couple of years. But if the oversupply isn't absorbed by the 2019 timeframe, I think there's going to be an issue in regards to the market stagnating, because , 60MW a year is really not that hard to build and I think New Jersey's going to have a hard time throttling its development such that they can keep that up.

So there are real concerns for the long term stability of this market in relationship to the supply and demand fundamentals, as established by this law change.

The last thing that I want to point out in New Jersey, is in relation to the Milestone Reporting. Because the way it works in Jersey, as I just described, is that people are looking at how much supply is going to come online and how that supply is going to interact with the fixed demand schedule which is established by the Renewable Portfolio Standard.

So people really look on a monthly basis when New Jersey releases its one month in arrears installation numbers; and people then try to think of how that number is going to impact supply and demand in the long run.

And one thing that people point to which I think is a very interesting inversion, is when you compare the stuff that's in the pipeline (all of the projects that are expected to be built in New Jersey) with the stuff that's already actually been built (the metal and ground stuff) there's this inversion where in the pipeline, there's a heavy weighting towards grid supply facilities which are those that are feeding the electricity directly into the grid.

So these utilities have to compete a wholesale rates as opposed to behind the meter facilities which under some sort of net metering type arrangement, are really competing with other electricity sources on the retail side of things.

So people look at that Milestone Reporting and they look at all the capacity in the pipeline and the composition of that and how that's really inverted compared to what's installed is vastly weighted towards the behind the meter stuff. So I think that creates this bit of skepticism in regards to what supply is actually going to come online in Jersey in out years, and as a result, that's also helped sustain pricing.

The last point that I want to make, is that the recent run up that we have seen in pricing is certainly tied to the BGS load auction. We've seen the cycle of price appreciation in liquidity usually rallies around the time of the BGS, which is an annual event.

Moving on from New Jersey, which is really one of the most established and largest markets in the SREC space, I'd like to turn to Maryland. And it's an interesting comparison because although Maryland's a much, much smaller market, we're only talking in installed capacity basis at about 240 MW - so it's the opposite concern; whereas New Jersey we were concerned about over supply potentially, in Maryland it's the opposite - there's a little bit of concern for undersupply coming up in the out years.

To date the market has been adequately supplied, solar's gotten built and the RPS targets have not been so aggressive in the last number of years, so that we actually are in a situation where we're doing pretty well and prices have been quite stable.

But what I want to point out to again, is the legislated RPS demand scheduled (you can see on the bottom left hand corner on slide 7 here) the RPS really ramps up quite

aggressively through 'til 2020, where then it flat lines and it remains at 2%.

So what that means ultimately is that **we've got to build a whole lot of solar in Maryland to satisfy all the RPS demand.** And to date build in Maryland has been pretty consistent, but it's also been pretty anemic. We're not seeing build rates anywhere near like we're seeing for instance in the market like New Jersey.

So it's interesting, because post 2017, there could well be some concern. And the reason that that concern is so prominent, has to do with this confluence of factors. For one, if we start at 2016, there's this whole discussion about what's going to happen with the ITC and that's certainly a big variable. But let's just assume for now, that the ITC does go away or at least is reduced at the end of 2016, which I think a lot of people are expecting. Then in 2017 the SACP change happens. SACP is the Penalty Payment that retail suppliers who are unable to purchase enough SRECs to demonstrate their compliance have to pay; essentially the stick or the fine that the MRPS implements to encourage suppliers to purchase SRECs in the first place. But the **SACP drops from \$350 in 2016, to just \$200/MWh in 2017.** And since SACP values are really important for the sake of project financing, and to ensure people of upside potential, it makes a little bit unlikely that we're going to see significant build in the year like 2017, which becomes particularly important, because in 2018, we have this massive ramp up in demand.

So it's a series of events that could very well lead to a potential liquidity event where shortages become pronounced. The 'adequate supply' that has characterized Maryland to date, gets flipped on its head and all of a sudden we end up in a situation where the supply side of the equation is unable to keep up with aggressively ramping up targets on the demand side.

So that's a concern, but on the flip side, you've got to weigh that with if developers are looking at this and they're seeing this opportunity for prices to get up to shortage levels on the SREC side, well then aren't they just going to start building as much as then can? And this is definitely a possibility.

People are looking at Maryland with increasing interest, but initially there's no real capacity limits on each individual directly supply unit. So you can build large facilities in Maryland if you can site them. The situation there I would basically summarize as there being an expectation that there could be future undersupply depending on what gets built, and if we think about what's going to get built, well it could be a lot of these big grid supply projects.

We know Maryland is a much smaller market, so there's more limited universe to counter parties that you could find to be an offtake of your power; similarly it's going to be a little bit more difficult to find long term hedges for your SRECs which are going to be a critical aspect of your project finance. And there's just less liquidity in this market. So I think it's a very, very interesting one to watch in the upcoming years, but we'll really have to wait and see how supply reacts.

So with that, we'll move onto Slide 8, which is the Pennsylvania market. And like Maryland, Pennsylvania is relatively small. So we're only talking about 200 megawatts here. And the thing that's most interesting about Pennsylvania, is its criteria for geographic eligibility.

So when you look at the two markets that we just covered, New Jersey and Maryland and frankly you can rope Massachusetts into this as well, which we're going to cover next. **In each of those markets for the eligibility of an SREC to meet compliance - in Jersey, Maryland or in Massachusetts - you need to have that solar facility sited in state.**

So that's just the bottom line. It needs to be sited in state and then that way you can earn an SREC. **But Pennsylvania's different. It actually defines its geographical eligibility in terms of any facility that's physically located within the PJM footprint.** And obviously that opens up a pretty massive swath of territory where solar facilities could then start flooding Pennsylvania with their SRECs. Evidently, that's what's happened. Pennsylvania's had abundant supply because it can pull from supply in state as well as out of state.

And it's become basically the backstop of liquidity. So when we're talking to people trying to optimize their value, for other solar facilities located in the PJM region, if they don't necessarily have an SREC market - then PA is usually a good play. So a lot of people end up flowing SRECs into Pennsylvania and that's really related to the low price environment that PA SRECs have been in for that last little while.

It's not to say that Pennsylvania's a boring market. First it had been low, there's been some recent appreciation which is great, but in addition, I think that there's going to be some interesting stuff going on in Pennsylvania, as early as next year. And again, what I do is, I just point to the RPS schedule. I think that it's really interesting when they define a forward schedule of up to 15 years in the legislation and its Renewable Portfolio Standard Law, then you've really got to wait and see how is that actually going to play out.

It's really hard to know 15 years in advance how much solar development is going to come online. So in Pennsylvania they set up this forward schedule, where there seems to be a potential liquidity even in 2016, because there's a bit jump in the RPS demand. And it becomes a bit of an issue just because post-2016, there's not going to be that much in-state Pennsylvania supply. With SREC pricing where it's been, they're really not encouraging that much development. I think if you're a solar developer you could look at some of the neighbouring states, whether it be

Maryland or New Jersey, and you find a much better value proposition there.

So **not as much solar's being built in-state in Pennsylvania, so after 2016 Pennsylvania's actually is expecting that they're going to need to increasingly rely on out-of-state solar resources.** So they're going to have to be relying on SRECs from the rest of the PJM region. But the issue here is that there's potentially going to be some interaction between some other PJM SREC markets which include Ohio and Illinois that could actually start competing with Pennsylvania for some supply, certainly depending on where the price equilibrium is and the arbitrage opportunities between the three.

Ohio becomes interesting because they changed their law last year with Senate Bill 310 and it basically eliminated from their SREC market 50% in-state requirement. So now, their entire solar requirement can be met with SRECs from really anywhere. So they can be sourced from other places that otherwise might have flown into Pennsylvania.

Illinois also has some interesting stuff going on. Illinois has broken up their market into Electric Utilities and then you have the ARES, the Alternative Retail Electricity Suppliers - and there's a slightly different RPS requirements for each set. But what's really important to note is that in 2015 the ARES section go from having zero percent solar requirement in 2014, and then all of a sudden in 2015, that jumps to 6%.

So ARES is a significant new source of demand that could potentially be competing with some of these other PJM states for the supply that would have otherwise going into Pennsylvania.

So all this to basically say that in 2016, there's a bit uptick in demand. We also have the ITC through 2016, so maybe we can build enough capacity; and if Ohio pricing continues to

be less than PA, and similarly depending on what goes on with Illinois SACP rates - who knows exactly how it's going to play out. But I do think there's some interesting stuff going on in the near term in Pennsylvania, so it's a market worth paying attention to.

So with that, I'm going to move on to Slide 9. And here we're going to dig into Massachusetts, which really can have an hour call of its own, because there's so much complexity associated with it. For the sake of today, I really want to just use Massachusetts as a comparison to some of these other markets, because it is indeed, still an SREC market. It's still using this market based incentive in SREC to encourage the build out of solar, but it does so in a slightly different way.

And basically if you compare Massachusetts to some of these other SREC markets, it's just much more involved. So whereas, all those other three markets established their RPS schedule, their demand, in percentages - **so you have a forward schedule of percentage targets, Massachusetts actually initially established a capacity cap.** So not a percentage right away, but a capacity, so initially Massachusetts said, "Hey we're going to build 400 megawatts of solar". So what happened the design of the Massachusetts SREC market, being really involved in interventionist, was so appealing to all of these developers, that that original 400 megawatt goal was surpassed - it was in fact, totally blown through.

That initial 400 megawatt goal basically is now embodied in what we call SREC 1 - 400 megawatt stretched all the way to almost 700 megawatts, is what we're looking at now for the SREC 1 program. And to ensure that solar development didn't stagnate beyond this, regulators in Massachusetts said, "Okay SREC 1 is now going to be this initial roughly 700 megawatts, so that's what got built."

But we don't want slower development to stagnate. We want to continue to encourage megawatts getting built in

state. So what they did is they expanded that quantity target to 1600 megawatts: so **1.6 Gigs of solar is what they want to be in state by 2020.**

It's a pretty impressive feat and their development has been really, really robust to date. What's interesting is the fact that **when we look at all these markets, Massachusetts SRECs are significantly the highest priced asset there.**

Massachusetts SRECs are so valuable right now, because in part we're expecting near term shortages. So it's really the only market that we've looked at so far from all these four, that are is expecting shortages and pricing that could approach SACP levels in the next couple of years.

And now as I mentioned, there's two basic programs. There's SREC 1 which was that first 400, which became 700 MWs, and then there's SREC 2, which is going to encompass all of the remaining capacity that gets built through to the 1600 MW goal.

So for SREC 1 the shortages that we're expecting are a result of different factors than the shortages that we're expecting from SREC 2. For SREC 2, finally 2014 is going to be short just because the market really got off to a late start and there was a ton of regulatory uncertainty in the transition period from SREC 1 to SREC 2, so I think that's really what it comes to.

For SREC 1 however, the reason that we're seeing this price in this location (look at the pricing graph on this Slide 9) we have massed class 14s that are remaining pretty flat hugging that 285 auction price magnet, but then you have 15s that jump all the way up and are now trading close to \$450. So what caused that spike? Well what caused it, was this really, really interesting feature of the Massachusetts market that differentiates it from pretty much every other SREC market. And these features again, relate to the fact

that Massachusetts is really involved, so it ends up having a free market, they include design perimeters such as the Solar Credit Clearing House Auction and they established Dynamic in Demand.

So in the table on the bottom left, for every other SREC market, I included the forward RPS requirements, all the way to 2020 or later. Note that for Massachusetts I don't do that, we only have what demand is going to be for 2015. And the reason that I don't include that is because they don't actually know exactly what the percent of demand is going to be in 2016 or going forward.

And the idea is, that the demand is actually calculated responding to changes in supply. So again, to just really underline that point, because I think it's the differentiator for Massachusetts and it's what keeps prices up at the levels that they're at: **basically you have a Solar Credit Clearing House that provides a price magnet and a basic flight of liquidity if the market gets over supplied, it'll basically push the pressure to get prices further down, a way it'll keep prices at a level.**

And also you just have this really neat idea, where demand is dynamic, so if you have a period of oversupply or under supply, it won't be for long, because demand will adjust to it.

We can turn to Slide 10, I just want to highlight a couple quick points in regards to how that auction because I think it's really interesting and I'll talk for like just a brief minute on SREC 2, some of the differentiating features there.

So with the auction, again, in an over supplied market, you'd expect prices to trend down - but Massachusetts provides this auction outlet. So if you're in an over supplied market, instead of competing with each other to sell your credits and making prices come down, what you can do is, you put your credits in this auction.

And what that does is that as soon as you put your credits in the auction, demand increases, so compliance in the next year goes up by that volume. So if you're over by 100 credits in 2014, then 2015 is going to increase its demand by 100 credits so it'll absorb that over supply and it won't persist.

And the idea here is, that it really is trying to keep the market in balance. We don't need to go through too much in detail about the design of the auction, but essentially let's just leave it at the fact, that the auction is incentivized to clear to ensure that the balance is, in fact, maintained.

Now looking at the SREC 2 unique features. It does have the auction, so the auction is the same idea as it was in SREC 1, but what you can see, is that the auction price is in this line chart on the bottom declines. So for the SREC 1 auction price, you can see that it's flat all the way through the program at \$300 versus the SREC 2 auction price which actually declines. And so to be clear, **the price in the auction is what people will have to pay to purchase the credits that get deposited in the auction.**

In addition SREC 2's a little bit different because, it has an SAPC schedule that's further reduced than the SREC 1 SAPC schedule. And in addition, they have SREC factors, so earlier on when I said one SREC represents 1 Megawatt hour of the electricity generated, well for Massachusetts SREC 2 it actually depends on what type of facility you are.

If you're a brown field, for instance, you're not going to earn a full 1 Megawatt hour for one SREC for one hour, but you earn a little bit less. So there's discounted factors depending on your project type. There's also hard cap constraints on the amount of capacity that gets let in of the Managed Growth sector which are large facilities that are basically feeding all their power into the grid. And lastly, there's a new demand formula, which is probably outside of the

scope of today's conversation, but the way that they calculate demand and this supply responsive dynamic way, is slightly different for SREC 2.

I'm happy to get back here for any of the Q&A. But what I'd like to do now, is turn over to Slide 10, and talking about this SREC stuff is really great, but what I'd like to do is understand all the commercial side, well how do SRECs get a project done?

And on the commercial side a lot of work that gets built gets project financed. And accordingly as a result, there are really important **concerns for investors in terms of the volatility that we've witnessed in SREC markets.**

So for the most part investors want as little risk as possible. They'd prefer to have a hedge in place. And when I say a hedge I want to compare the distinction between for instance, a solar generator selling prompt on the spot market, so it's like they're taking all their generations from a given year; and then selling on the market at whatever the going market rate is at that point in time.

So that'd be spot market selling, versus hedging, where you as a solar generator are going to lock in a price for a number of years forward. So you're going to say, "I'll deliver 100 SRECs a year for the next five years, but I want to make it a \$100 per SREC for each of those years", so you have revenue certainty.

And as a result of the revenue certainty that a hedge provides, it's understandably a little bit more desirable for the sake of investors including particularly your tax equity and your debt.

So ideally you get a hedge in place for a number of years and this will lower your weighted average cost of capital because people will think the investment's a little bit less risky. But in terms of how to actually get that hedge in place, it depends on the maturity of the market. So I refer to maturity, both as how old the market is, and also how established and how deep it is - how big it is, and we can see from that initial slide on Slide 4 with the different demand in Megawatts, the New Jersey market right now, I would call it the most mature market.

You can compare it to Pennsylvania where there's just much more liquidity for longer term strips and a much larger universe of buy sell counterparties, because it's been going on for a long time and there's a lot of solar built. And the universe of counterparty is really important and this brings me to this point here in terms of natural versus non-natural. I'm not talking about organic stuff here. I'm talking about the people who are natural buyers we view as those who have compliance obligations.

So, electricity suppliers, they need to purchase these SRECs so we know that they're going to need to buy them on an ongoing basis, but their appetite in terms of liquidity, is going to be different than a non-natural, who could be someone who doesn't necessarily have the compliance obligation, but has an interest in the market.

So a non-natural might have a little bit longer appetite in terms of being able to pay up some additional risk. Naturals are risk adverse - some risk desks will allow you a load service to go out to maybe three years to get a three year hedge.

They find out is a natural compliance hedge for what they know their obligations are going to be. But your competitive retail markets, whether it's people switching from retail supplier to another, and given the fact that you don't necessarily have visibility into what your load is going to be;

and thereby your compliance obligations a number of years out you're got to make sure that you don't expose yourself on buying too much SRECs in the meantime.

So in terms of the tenures, I just want to state New Jersey you can get one to ten years, the one to four years is really the sweet spot for hedges, because you have BGS liquidity really driving that. Maryland one to five is possible. One to three is most liquid, increasingly up to five, because I think more and more people are getting involved.

Pennsylvania's really one to three. It's probably the least mature market that we have here. In Massachusetts , one to ten is possible, one to three is very liquid, but also in fact, five plus is pretty liquid as well, because people have a lot of certain and faith in the auction mechanism and the dynamic demand structure of that market there.

I guess at the end of the day, SRECs really do add complexity because this uncertainty associated with your revenue stream, which as I mentioned, can be your most significant revenue stream. It's hard for that to be so variable when you're trying to get a project built and you're running your numbers through your Proforma.

But at the end of the day, the proof's in the pudding, and I think , we've seen 2.5 Gigawatts get build just across these four markets, so as much as they add a bit of complexity, I think that your **debt equity and your tax equity are all getting more comfortable with SRECs and are getting more and more involved.**

I just want to switch to the last slide quickly, which is our risk slide and I'll just go through some of these points, so we can go over to the Q&A. But on the risk side of things at the end

of the day, SRECs are born out of Renewable Portfolio Standards and the RPS is a law and it's subject to programmatic risk.

You don't want it to go away. It could be repealed but, what it means is that the uncertainty causes that degradation and if you look at the indicative forward SREC pricing, the fact that prices go down typically the further out you go in the curve, just **reflects the fact that there's regulatory uncertainty and people don't really want to wear the risk of what happens if.**

It's just this what if idea. And you see the bid asks spread widening further out, because liquidity really dries up as a result of this uncertainty. But it's important to note that that said, there's a lot of uncertainty, but there's a really great track record as well.

In the entire U.S. there's over 30 of these RPS programs and we only saw just in the last year the first curtailment and it wasn't even significant. *Ohio froze its program for two years, that's really the most significant, anti- RPS repeals that we've seen and that was just freeze for temporary status. West Virginia had the repeal, but I don't really count that as a significant thing, because their program was just on alternative energy portfolio as opposed to renewables.*

So the track record's really good. Ultimately it comes down to politics, but I think that the solar industry is pretty good in a lot of these states, the industry is very well developed, it's a jobs issue, it's an economy issue, so I think it would be very difficult to see solar go away. In the four states that we just went through, I think there's a lot of established political will to increase if not just maintain the SREC markets as they are.

So with that, I think that's really the end of the presentation. I really thank everyone for joining. I look forward to the question and answer.

Julien Dumoulin Smith: Great. Thank you Jason. What are your views about Illinois and that market and particularly in regards to or complimenting everything going on in the nuclear side - what do you think needs to be done from a reform perspective just on the conventional SREC REC market?

Jason Prince: I think there's a really good opportunity for solar to take off in Illinois. There's two sides to it. On the one hand in the bilateral market, that's really where the areas people play and that's where the demand that I mentioned is spiking in 2015.

What needs to be done to answer your specific question, is I think provide some certainty in regards to pricing. Right now there's a pretty wide spread and a bit asked, because no one really knows the way that Illinois' SATP is defined, is really the same as the SAP, there's no distinction there.

And it's a really convoluted calculation, so I think providing some certainty in that regard would really help so people could know what to expect for fair value - but yes, **I think Illinois really could take off as a solar market.**

I think on the utility side, we have this IPA doing a lot of procurements for SRECs, so they provide revenue certainty there. So you have both, you have the bilateral market and you have the longer term contracts as well.

Julien Dumoulin Smith: Interesting, so just broadly speaking, what's driven the price up there?

Jason Prince: On the solar side, I think what we've seen is people really being uncertain what's going to happen.

I think they're going through a lot of revision in terms of the RPS overall and so the way that people are switching back and forth from BEUs to the ARES, makes it difficult to understand what your obligations are going to be in terms of compliance with the RPS.

And so, I think that made it a little difficult for the bilateral market to understand what's going on and maybe it has caused a bit of that price appreciation, and in addition, again, I would just state the fact that the SATP is unknown, so there's a lot of uncertainty regarding how high prices could get.

Julien Dumoulin Smith: Perfect. I've got a big picture question here. "How many megawatts from these SREC markets are we actually going to see annually?"

Jason Prince: Sure. So I will go back to Slide 4 here, and use our forward projections just based on the RPS schedules looking at 2015 compared to 2020.

So by market, you can see that New Jersey is going to be roughly at the maybe 1.6, 1.7 gigawatts by 2020. Massachusetts will be up to 1600 megawatts. Maryland's probably going to be about one and a half gigs and then Pennsylvania maybe 500 or so megawatts.

Julien Dumoulin Smith: Got it. And I was trying to illustrate, it's roughly 2 gigawatt incremental off of 2015 - the next five year run rate; equating to about 400 megawatt a year increments. Is that the right way to think about it?

Jason Prince: Yes. So the weighted projections we're really just backing out from the RPS requirements which are in megawatts hours; we're backing out what the megawatt is based on a 1200 megawatt hour per megawatt efficiency.

And then the other thing I would just note is that I made this graph based on flat state load, because I really wanted to highlight just the importance of the RPS increases in driving accelerating demand - but if you want to think that loads increasing, then that number is going to increase as well in terms of the megawatts that you're going to need added.

Julien Dumoulin Smith: Excellent. When you're looking at pricing trajectories here, what's your view about ITC and that going away? It seems like people have a generally fairly constructive view beyond the ITC for these markets, because of SREC price improvements.

Jason Prince: Yes. It's tough. I think that there's a lot of movement for it. I talk to a lot of people on the Solar Energy Board who are really pushing for it, but you also see a lot of momentum against it. And I think especially when you have outspoken solar advocates who say, "We're happy to stand on our two feet", I'm not sure if it will actually go through.

I think that one thing that's more important even than an extension or a non-extension, I think the conversation is more focused on just *certainty* in one regime or another.

Julien Dumoulin Smith: Jason sorry maybe you misunderstood my question. What does the expiration of the ITC do for the SREC market?

Jason Prince: Oh, okay. Yes, so I mean, ultimately if the ITC goes away, then you're going to need one of your other revenue streams to increase if you want to maintain whatever IRR you're expecting.

So it's like just a straightforward **if the ITC goes away, you're going to need to have your SREC price go up in**

lieu of either your power or your capacity prices going up.

Julien Dumoulin Smith: Right. Do you have any sense of how much they would increase? Like for example, New Jersey there's been a lot of talk about that in that market.

Jason Prince: Yes, so it would be a very big impact on all these markets. They'd be basically proportional, so if you're ITC's going away by 20%, your SRECs going to have to go up to cover that.

Julien Dumoulin Smith: And do you think that'll actually be the case maybe just asked differently?

Jason Prince: **I think that it is unlikely the SREC in itself is going to react to ITC extension or non-extension that significantly.** I think the biggest impact is going to be that the types of development will shift and we'll see a lot more of the resi/part ownership stuff, but probably less of the larger utility scale and even very large commercial stuff, because those guys are really more dependent on the ITC and I don't know if the SREC's really going to go up to SATP levels, just because of it.

Julien Dumoulin Smith: Got it. And then just looking forward here, as you're thinking about the market, and the evolution, which one are you most constructive on in terms of pricing trajectory and least?

Jason Prince: I love Massachusetts because it's just one of the biggest markets out there, but they're really doing everything that they can to ensure a balanced robust market.

So I really like Mass, and we're talking 1.6 Gigs, a pretty sizable amount of solar. It's impressive, but I also think New Jersey is just so interesting because it's got such a long standing history with solar; and the way that the legislative change came about last time around, I'm curious to see there's a lot of discussion about what's going to happen in the future?

So I think those two markets are really, really interesting and also because they're so mature, there's so much going on in terms of really interesting structures.

Going back to the commercial side of things, a lot of cool structures, I think are being engaged in to get solar deals done and people are getting a little more creative, because people are a little bit more familiar with it, whether it be from the lending/investing side, or just from the commercial transactional side.

Julien Dumoulin Smith: And to be clear, your view, is that all these markets ultimately hit their targets right, there's no one who's not going to hit that target as far as you're concerned?

Jason Prince: There's no market set up to fail here, vis-a-vis hitting those megawatt targets. I cited in Maryland they're going to really need to see a lot of build accelerating to hit their targets, but I don't think anything's too big to fail in that regard.

I don't think there's been as much attention focused on Maryland to date, and I think increasingly people are looking to that market. That's the only one that might have an issue hitting its targets, I think the other markets Pennsylvania's definitely going to be okay. Mass will be okay and Jersey is definitely okay.

Julien Dumoulin Smith: Got it. Excellent. And here's a million dollar question for you - these Yield Co structures require a certain amount of visibility and you talked about liquidity out there. The first

question is - are you seeing yield co parties come out there and do deals with you and what's the average tenure of these SREC deals that you're seeing done these days?

Is that getting longer? And then perhaps, the other question is - is there a fundamental expiration to these SRECs as far as assets qualifying for SREC?

Jason Prince: Right. Any investor wants its dearest asset. So to get a dearest asset if we're talking about a solar facility, you need to really get a hedge in place. So what's funny is, you're right, intuitively it makes sense and directionally with yield cos, there's more appetite for these de-risk assets, so there's possibly more appetite for hedges.

But at the end of the day I can't say that we've seen that much of a significant impact on the market in terms of a real paradigm shift; and the reason is because tax equity has required similar types of hedges anyways. I think what we've been seeing in the past is that tax equity investors are also looking for a three to five year hedge. Oftentimes for tax equity, they're trying to match five years to partnership flip structure for example. In which case those types of deals are already very common in the market and in terms of liquidity those are really the tenors of deals that we are seeing get done.

Julien Dumoulin Smith: Has that changed though, just to be clear?

Jason Prince: No, I wouldn't really say it's much as a paradigm shift; but I think that at the end of the day, it was a lot similar types of things that was going on with the tax equity market.

So I think directionally, your intuition is right, but I don't know if we've really seen - it certainly hasn't jumped from like a five year liquidity to all of a sudden now there's ten year liquidity, just because YieldCos are hungry.

Julien Dumoulin Smith: Okay. Great. And then, do SRECs expire? Is there a point at which an asset just doesn't qualify for SREC, just to be clear?

Jason Prince: Yes absolutely. There is and it really does vary by market. So I can give you an example. So Massachusetts when you get a solar facility qualified, you get ten years. Over ten years you will earn SRECs for your electricity generation.

In a market like New Jersey, you get 15 years. So it varies market by market and I would just say it's an important distinction from a revenue stream perspective. But how long does that actual SREC have in its lifetime, like how long do you have to sell that SREC before it expires? That's referred to as shelf life or the eligibility of the functionality – and that also varies market by market.

(Question): Hi. My question is if you looked at the Mass SREC 1 market, Jason what are your thoughts about the SREC 2 market for 2015 and well, the near term, 2015, '16, '17? Thank you.

Jason Prince: I think SREC 2 in 2015 is going to be really, really exciting. What we saw in SREC 2 2014, when I mentioned that the vender supply is really caused by projects just not really getting built. I would draw attention when we're looking at 2015, to the Managed Growth Sector, so we've actually only seen two of these guys get built and demand and growth factor is what basically drove most development in SREC 1.

It's all because people are able to virtually net meter, take advantage of the power prices in addition to the SRECs and really that caused robust development.

So what I would point to is the fact that we've seen a real absence of SREC 2 Managed Growth projects come online. So for instance, the 26 Meg allocations for 2014, was hardly met and what I'm really wondering about is what happened to the 85MW allocation for 2015?

So I think we're seeing for SREC 2 some of the other market sectors churn them true and build per expectations, but I think Managed Growth at the very least had delays; if not some perhaps shortfalls. So I think for 2015, that's really what I would look to is the Managed Growth sector coming through.

(Question): In regards to Maryland and New Jersey you talk about larger projects needed in Maryland to get the quantity you needed. Are the YieldCos and the tax equity trying to determine energy hedges as well, and if so, is there sufficient buy side on the energy to lock in those types of hedges?

Jason Prince: I think that it really is on a case by case basis, with Maryland in regards to the buy side preference for energy hedges as well. It's a little bit more difficult, just because I don't think that there's as many counterparties who are willing to take on a standard, historic PPA, where its 20 years and it's going to be an escalator and you'll take everything the unit produces. Those types of PPAs, I don't think really exist anymore, so it's less easy to get those types of power hedges. But again, if you think about it from the yieldco side, you want a dearest asset, so **if you can get a hedge on the SREC, maybe a hedge on the energy is a little bit less important.**

So I think, one way or the other, it's possible to get those projects built and you just have to find the niche. I think Maryland's really about finding the niche.

Julien Dumoulin Smith: Great. Excellent. Well thank you. With that I think we'll call it a day. So thank you all very much.

END

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