

A nice problem to have

Market update | The US solar market finds itself with the bizarre, but welcome, problem of having to “manage” a boom. Danielle Ola examines the impact of the ITC extension, alternative drivers of US solar and debunks the supply crunch myth



Getty/Andrew Kravchenko

More solar panels have been mounted on the roofs of American homes this year than ever before. The US recently celebrated 1 million solar installations, well and truly confirming the technology as a mainstream and affordable resource, and banishing the idea that solar was something exclusive to the wealthy or the eco-warrior. Nascent no more, the US solar industry is incrementally emerging as a consolidated market with leaders surfacing.

A global decline in PV prices, manufacturing overcapacity, strong consumer demand and financial incentives have culminated to drive a booming US solar market. The extension of the investment tax credit (ITC) in December provided the industry with long-anticipated economic stability – even if the price of that is a curtailment of short-term installations now that the pre-deadline rush is over.

In the first quarter of this year alone, the US installed 1,665MW of solar PV to reach 29.3GW of total installed capacity. This was a 24% increase over Q1 2015 and the largest non-Q4 in the entire history

of US solar. With more than 1 million individual solar installations nationwide, the industry is on track to grow 94% in 2016, according to data by the Solar Energy Industries Association (SEIA) and GTM Research.

The future for US solar is looking increasingly less reliant on politics, more diverse in terms of drivers and geographies, and backed by an increasingly persuasive economic argument.

ITC extension

The five-year extension of the 30% ITC is one of the key drivers and most critical federal policy mechanisms to support US solar deployment to date. “The ITC is an important economic benefit to the industry, and makes solar possible for many more customers than would otherwise be possible,” says Thomas Plagemann, executive vice president and head of capital markets at Vivint Solar. The extension was critical in maintaining economics across our current markets while we continue to focus on reducing cost per watt and extend the reach of those markets. Not

only does it provide the ability to continue to efficiently finance our self-owned systems through our tax equity partnerships, but it also provides an important economic benefit to homeowners.”

In the residential and commercial segments, the ITC has driven installation growth by more than 1,600% since its initial implementation in 2006, according to the SEIA, at a compound annual growth rate of over 76%.

“Hopefully over the next few years we can move into a post-ITC world,” says Kevin Prince, senior director, business development at NRG Energy. Whilst it is undeniable that a lot of the procurement in the commercial sector is driven by the ITC extension, which not only gives consumers the certainty to pursue projects but also the opportunity to realise immediate savings on their energy bill and hit sustainability targets, it was never intended a sustainable driver in the first place. And whilst the extension certainly prolonged the lead-time on a number of projects that were stampeding to a close prior to an end-2016 expiration, once that pressure was off, the market settled back into regular deal cycles. Therefore, the tax credit extension turned out not to be the main event and bumper 2016 deployment will be a little more measured.

Solar deployment in the US has settled down to a pattern of steady growth since the extension of the ITC

“The ITC extension was critical in maintaining economics across our current markets while we continue to focus on reducing cost per watt and extend the reach of those markets”

The ITC extension may have provided an initial boost for project developers, but second quarter results of the biggest solar companies reveal a delay as the tax credit was only extended at the end of the year when developers had already decided to hold back on some projects. GTM

Research had originally forecast 16GW of installations for 2016, but the readjusted figure was evident in Q1 with 2GW of planned projects dropped.

Instead, other happenings among the solar super-majors are dictating the direction of travel of the market: SunEdison went bankrupt; Tesla bought SolarCity in a move considered the pinnacle of vertical integration; and SunPower laid off 1,200 employees. What is really moving the market is not the ITC, but the fight for quality, according to Alan Russo, senior vice president of sales and marketing at REC Solar. "Customers are starting to think about counterparty quality in a way they never did before. That's the main event: the ITC has sort of passed as a talking point for our customers and our network."

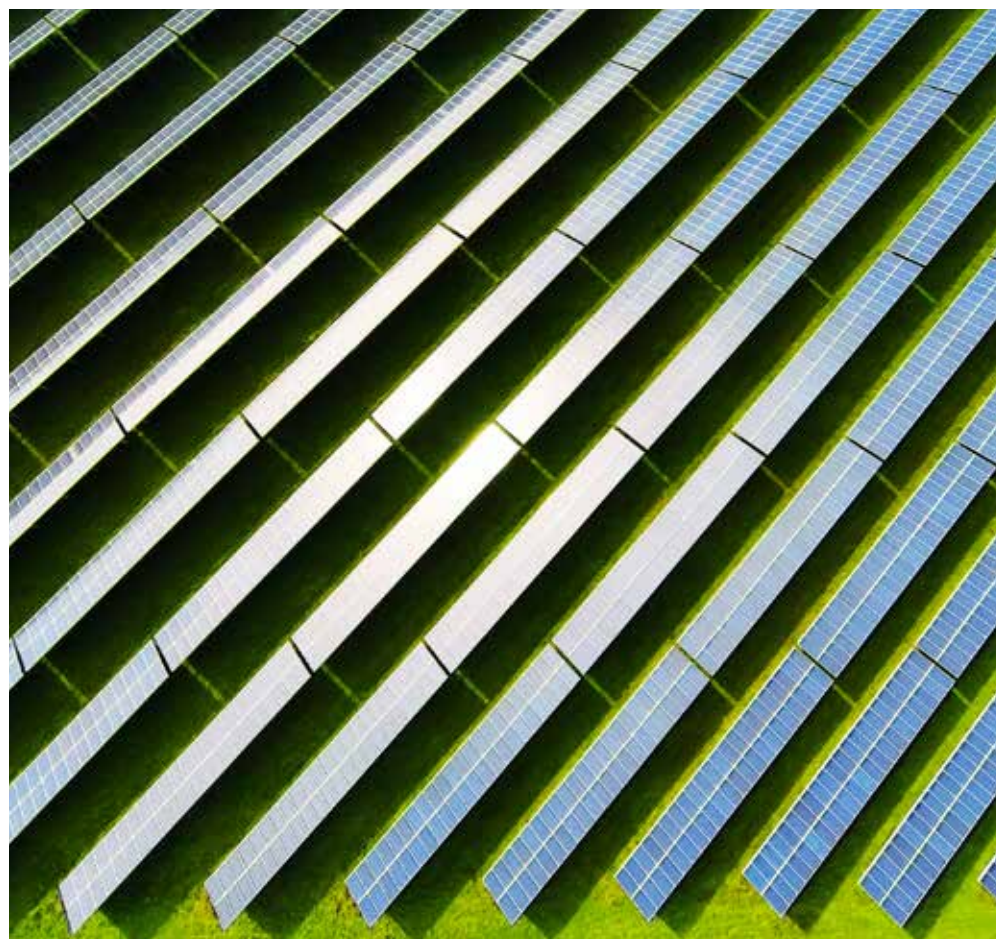
State incentives and regulatory frameworks

Solar deployment has also been spurred by solar renewable energy credits (SREC), particularly in the north-east. These incentives, which too will ratchet down over time, are instrumental in getting projects online, but are slowly being phased out. "It is very market specific, but we see that if a project generates savings today, customers are willing to purchase those, regardless of the runway of the ITC," adds NRG's senior director of business development, John Woody.

Furthermore, state renewable portfolio standards (RPS) are a key driver of solar procurement, requiring utility companies to source a certain amount of generation from solar, wind and other renewables. In Hawaii, for example, there is the ambitious goal of 100% renewables by 2045. Vermont has set itself the goal of 75% renewables by 2032. California also has a strong RPS, at 50% by 2030, closely followed by Maine's pledge at 40% by 2017.

An RPS can drive utility prices up in places like California where the burden on the utility is deemed to be a driver of future utility rate escalation, according to REC Solar's Russo. This utility rate escalation in turn makes onsite generation economic models look better because of the spread between what electricity can be generated onsite versus what is paid today and in the future. If the RPS drives the perception that utility rates are going to be higher, that creates an environment for onsite generation of all sorts.

"In terms of the utility side, I do think the RPS in states is definitely driving procurement but we are also seeing



Credit: Getty Images

Utility-scale solar deployment is increasingly happening outside of state renewable portfolio standards

utilities that are not subject to RPS provisions procuring renewables given the cost. You see some procuring solar and that is partly due to customer demand and customer requirements effectively," explains Woody. "Despite some regulations around RPS goals we do see a lot of utility renewable procurement outside of those regulatory frameworks."

In addition to RPS, states across the nation have been adopting Integrated Resource Plans (IRPs) that follow a simple mantra: less coal and more renewables. Georgia, a particularly low-cost market, initiated a 20-year IRP this year to add renewable energy, predominantly solar to the state. Georgia Power recently added 525MW of renewables under its latest IRP programme.

Signal not a driver

Separate to any state incentives or utility rebates, demand for solar power is a driver unto itself as consumers and energy providers are realising the worth in a clean and increasingly cheap source of energy. "We are seeing customer demand increasing pretty rapidly – customers are definitely driving energy and technology trends, most frequently in the renewable space. Most of those customers have

significant renewable energy goals and they are demanding change," says NRG's Prince.

"In our business today, especially on the utility-side, I would say we are not really an incentive-driven business, we are more of a market-driven business. Where market fundamentals are good is where the electricity market properly values what solar provides to the electricity grid," explains Brian O'Hara, senior vice president of strategy and government affairs at EPC Strata Solar. "Incentives like RPS in the states that we are operating in now are as much a signal to the market as they are an actual market driver; the RPS is not fundamentally what is driving the growth of solar, it is really the economics. Since we are in the south-east, many of those states don't have a RPS and yet we still have a fairly robust solar market there."

In addition to that, the cost to install solar has dropped more than 70% over the last 10 years. "We continue to see really significant drops in component pricing and I think what that is doing is continuing to drive down the levelised cost of solar and open market potential up," says O'Hara, who also adds that a further driver propelling solar as a whole is increasing recognition by utilities that

solar is an integral part of their portfolio. In future, when solar is fully amortised, it will be even more attractive in its ability to produce power at low operational costs in the absence of fuel cost inputs.

Supply and demand

Over the last 10 years US manufacturing has been on the relative decrease with strong competition from Asian module and inverter manufacturers. Despite the ITC extension causing a hangover in the first and earlier part of the second quarter, particularly in the utility space, US manufacturing is facing a bigger problem: China. With vendors such as Trina Solar and JA Solar forecasting more shipments to the US in Q2, there is more pressure for US panel manufacturers to sell at lower prices.

The punitive tariffs on Chinese firms have meant there is a trend for factories being added in Malaysia, Thailand and Vietnam over the last 18 months, so supply is not a problem. In fact, the 14.5GW of installations GTM and SEIA forecast for 2016 should confidently be met despite the duties squeezing out some Chinese supply

A substantial amount of that 14.5GW

has potential to come from US manufacturers, with the rest having to be imported. Hanwha Q CELLS, which manufactures in South Korea and Malaysia, has a shipment contract for 1.5GW for 2016 and imported 500MW into the US last year. In addition, Trina Solar, Jinko Solar and REC Group all manufacture in Singapore, and around 60% of their sales last year came from the US. With all of that said, that 14.5GW should easily be supplied, even in spite of the tariffs.

"I think there's a tremendous amount of talk of overcapacity in the media. When it gets down to actual buying behaviour though we still see a real urgency from people to buy," says Matt Card, executive vice president of commercial operations at US module firm, Suniva. "There may be overcapacity in the more commoditised multi products, and a tremendous amount of supply and demand there, but in higher powered, higher quality mono products demand is still the driver more than an oversupply situation."

SunEdison founder and clean-tech investor Jigar Shah echoes this sentiment: "I think what you're finding is that the solar industry just simply can't help itself. And so even though there is supposed

to be a pull-in of manufacturing capacity, people are so desperate to build more capacity that it just seems like manufacturers cannot produce a shortage of product, even if their life depended on it. Everyone keeps predicting a shortage of product and then you look at the market and you realise there is no shortage of product."

There is in fact a general increase in demand for high-efficiency modules, which allow the number of modules needed to power a system to be cut to generate the same kilowatt hours, which reduces upfront costs and even requires fewer or smaller inverters. This is particularly attractive in the US where there are significantly higher irradiation levels than generally found in the northern hemisphere, for example.

"We are seeing an increased premium being placed on power density. Part of the reason for that is that people are understanding that the more power you can generate off a rooftop, the better off your application is going to be," explains Card. "But also, quite frankly, most of our more developed regions, the really easy to develop pieces of land are becoming fewer and far between; the perfectly

**KEHUA
TECH**

Central-Distributed PV Solution

SPI Stand No. W607

+3%↑

Higher
Efficiency

-10%↓

Cost
Reduction

**48
MPPT**

Increase
Productivity



Complex
Environment



No
Resonance

XIAMEN KEHUA HENGSHENG CO., LTD.
www.kehua.com

square, no trees, all flat, sitting right next door to a substation land is all gone. And so now you are getting land where more compromises have to be made. As land becomes less optimal, the need for power density goes up because the cost of developing the land is more expensive. We've seen great uptake of high-power products in that micro-utility space and certainly the commercial and industrial space."

Due to net metering rates or space constraints, it is becoming increasingly important to maximise the amount of energy that can be produced in any square foot of land. A maturing market is a good thing for high-power, high-efficiency providers because such markets understand it is not just a question of price per watt but it is a question of the value ratio between price and power – and high-power certainly drives that value ratio up.

"It is a market that is driven by real economics that exist regardless of administration"

An unquantifiable spanner in the works for US manufacturers and developers is uncertainty over the presidential election. Some industry experts take the opinion that financial markets are hugely sensitive to any unknowns, and if they do not know something, they sit back and wait until certainty is restored. Suniva's Card however does not feel that this will have a significantly detrimental effect on the market: "The market has great momentum in the US and it seems to have matured to the point that this is not just a decision of a market that is driven by political view point. It is a market that is driven by real economics that exist regardless of administration. So that's a great sign for the US; it has moved passed the case of being totally driven by political or subsidised considerations – more to the notion that the economics simply work."

But with 76 of the 115 companies in the NYSE's Bloomberg Global Solar Energy Index down, and the index itself at a negative 26.57% return in the past year, investors will most likely be taking a seat, for now. ■

Swing states



Credit: Getty/FernandoAH

The US solar industry is changing. The drivers, the scale, the cost, they are all in flux. With all these conditions changed, it is to be expected that the geographic distribution of solar would also be altered. State-led renewable portfolio standards gave way to the federal tax credit as the main driver of solar; now pure economics is becoming an increasing influence and further diluting geographic discrepancies.

2015	2016-2020(e)
California	California
North Carolina	Texas
Nevada	North Carolina
Massachusetts	New York
Arizona	Arizona

Top five states by deployment. Source: GTM Research/SEIA

California has historically been way out ahead of all other US states in the solar deployment stakes. In 2015, Arizona deployed 258MW of solar. That was enough to earn it a place in the top five, according to data from GTM Research and the SEIA. During the next five years Arizona will retain its fifth spot compared to other states during the same period. To do so, it will install 2.5GW, or an average of 500MW per year. This is a pattern replicated across the country. Healthy but unspectacular markets will increase in size. Some with tiny demand now will grow rapidly – Connecticut, for example, had around 230MW installed as of 2015 but will pass the 1.3GW mark at the end of 2020, according to GTM's data. Texas is the only state that will experience transformative growth. Around 4.5GW of additions in the next five years, averaging out at 900MW a year, is a major increase on the 212MW installed in 2015. It is the state that everyone has been waiting to pop, but there are rich pickings available elsewhere too.

Florida

While the fate of Florida's rooftop market looks set to go to the polls, utility-scale solar is now beginning to make its mark. In the last year the state's major power providers, Florida Light & Power and Duke Energy have started work on a total of 725MW of solar farms. More than 2GW has been forecast to be added in the next five years as the Sunshine State's energy mix finally starts to live up to the name.

Minnesota

Minnesota will also add more than 1GW in the next five years and is likely to do much of this via its well-established community solar programme (see p.32 for more on community solar). The state has spent the last three years refining a system with the utilities to enable those without access to a roof or the necessary cash for an install to invest in a portion of a larger centralised system in return for reduced bills. Xcel, the largest utility on the state could install 200MW this year and more than that in 2017.

Oregon

With 73% of its power from hydro, solar deployment hasn't been a huge priority for Oregon, even with so much PV manufacturing encamped there. That said, its renewable portfolio standard is not washed out as its requirements specify that targets must be met from new-build renewable generation. There is competition from established wind, expanding geothermal and well-stocked biomass generation, but solar is still expected to top 1.5GW by the end of 2020. Just 30MW was installed in 2015.

New York

Governor Andrew Cuomo has spearheaded a series of solar-friendly schemes including NY Sun Initiative with a 50% renewables mandate the latest positive indicator for solar. Silevo/SolarCity and 1366 Technologies will add a significant manufacturing presence to the state on top of the expected burst of deployment. It currently has around 716MW of installed solar but the GTM/SEIA forecast expects close to 3GW of new solar capacity during the next five years.

South Carolina

While all eyes are on North Carolina, there is significant opportunity in neighbouring South Carolina. The state didn't introduce its renewable portfolio standard until 2014. As such, it currently has 17MW of solar installed. But it should prove to be a fertile hunting ground for developers as it looks to meet a modest 2% renewable generate capacity target by 2021. GTM/SEIA forecast 765MW in the next five years. The RPS however, does not include projects over 10MW.

By John Parnell