

SOLAR & STORAGE FINANCE & INVESTMENT **TEXAS**

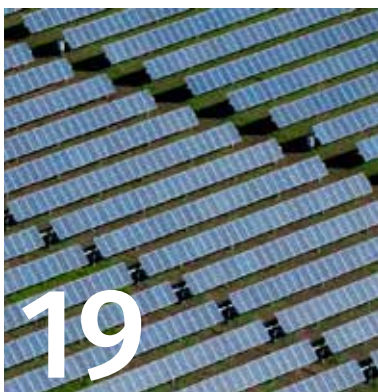
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NEWS ROUND-UP



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28 Jun 2016

Texas to become the fastest-growing utility-scale solar market in the US

Texas is rapidly emerging as a frontrunner for utility-scale solar growth in the US, according to various reports.

US Solar Market Insight, Q2 2016, compiled by GTM Research and the Solar Energy Industries Association (SEIA) explains how the Lone Star state has secured a top 10 ranking nationwide for its 566MW of installed solar capacity. Texas is therefore producing enough solar energy to power 61,000 homes. The report only forecasts developments to go up from here; as the total solar capacity in the state is predicted to more than double this year alone. Over the next five years, Texas is expected to install more than 4,600MW of solar – following closely behind California – which has been the nation's clear headliner for solar developments thus far. Of the 4,600MW forecast to be installed by the end of the decade, 4,000MW will be utility-scale.

"Texas is entering a period of unprecedented solar growth, dominated by a massive uptick in utility-scale solar deployment across the state," said Tom Kimbis, SEIA's interim president. "This strong demand for solar energy is generating thousands of well-paying jobs for Texans, hundreds of millions of dollars in economic benefits, and providing customers with another option for meeting their electricity needs. And the best part – this solar boom is just beginning."

ERCOT solar predictions

The Electric Reliability Council of Texas (ERCOT), the entity that manages the electricity of some 24 million Texans, representing about 90% of the state's electric load, posted a roadmap of the state's electricity activity over the next 15 years.

ERCOT's report extrapolated potential



Source: Flickr/Tom Sales

According to forecasts by GTM Research and the SEIA, Texas is set to deploy 4,000MW of utility-scale solar by 2020.

bulk power purchases from 2017 to 2031 under a range of different scenarios, including low gas prices, high economic growth etc. In all seven separate scenarios, solar power emerged as a clear economic winner within the state.

The ramifications of both this, and the exponential utility-scale solar deployment, cannot be understated, given that in Texas, competition to supply electricity is unfettered. The results concluded by ERCOT indicated that the price of solar has fallen low enough to potentially beat the cost of other new energy plants.

"I think what sets Texas apart is the combination of the open deregulated wholesale market and the ease with which new technologies can connect to the grid," said Warren Lasher of ERCOT in a reported statement.

Right now, solar provides less than 1% of

Texas' total electricity. ERCOT forecasts however that if current trends continue, the 17% of power will come from solar by 2031. Today in the state there are nearly 500 solar companies distributed throughout the value chain, employing more than 7,000 people. In addition, Texas is home to its own advanced cell/module manufacturer Mission Solar.

"This is a model, this is not a crystal ball," said Lasher in a reported statement. "What is striking though, is, that, solar is coming through as a competitive resource in all of the different scenarios. Is it going to be the only thing that gets built in ERCOT going forward? I think that's probably a stretch."

However, what the ERCOT report, and the roadmap by GTM Research and SEIA show is that solar energy has reached a crucial tipping point and is scheduled for an impressive energy future.

28 Sep 2017

PV Talk: Financing solar in the Americas

Solar PV development is soaring globally prompting developers to expand into new regions. Whilst the technology may be the same, regional market fundamentals and transaction structures vary and can complicate entry into a new market.

Rob Eberhardt, Jeremy Hushon and Amala Nath of global law firm Norton Rose Fulbright compare and contrast the different innovations and challenges faced in financing solar PV projects in the United States and in Latin America.

What are some of the innovations in project finance that are helping contribute towards low cost in solar?

Robert Eberhardt (RE): There are a few notable innovations in the US market which are contributing to lower costs and greater liquidity in the finance market.

For several years now, commercial banks and insurance companies have joined to offer permanent hybrid bank/bond debt financing with a tenor that aligns with a solar project's expected useful life and the length of its offtake contract. The commercial bank tranche typically amortizes in full in the first eight or so years after the start of commercial operations. At maturity of the bank debt, principal repayment starts on the long-dated fixed rate note tranche. This structure allows a sponsor to borrow against its entire contracted revenue stream and avoid the risks of refinancing, while also allowing commercial banks to avoid the regulatory charges or other constraints associated with long tenor debt.

Community solar refers to an arrangement that seeks to facilitate utility-scale solar development by harnessing the interest of residential, municipal and commercial and industrial customers in buying clean energy directly from projects in their retail service territories. Under a community solar programme, a group of retail customers typically subscribe directly to



Source: Solarcentury

purchase energy from a specific utility-scale solar project. The project is entitled to the payments made by the customers, and the customers receive a credit against their retail electric bill. The local utility receives the project's output, but often does not sign an offtake contract.

The lack of a traditional utility offtake contract presents challenges for traditional project financing, but some capital providers have extended credit to community solar projects after evaluating the details of the programme, taking views on customer credit quality and the ability to replace customers through new subscriptions, and perhaps financing community solar projects as part of a larger portfolio that includes more traditional projects. Many view community solar as a growth area in the US market.

Jeremy Hushon (JH): In Latin America, development banks are now offering extremely long tenors for solar projects and in some cases; tenors are now approaching the length of long-term power purchase agreements. Whilst the availability of long-tenor debt helps keep solar costs low, this development is having a chilling effect on commercial financing, both by local and international lenders, who are not able to offer such extended tenors.

Amala Nath (AN): At the smaller scale, an

A completed project in Panama.

emerging trend in project finance Latin America is the packaging of small-scale solar schemes to create economies of scale, at least for financing purposes. There are cost savings associated with developing and financing these projects as a series of small-scale portfolios (1-3MW each) with shared common infrastructure and shared, competitively priced EPC and O&M arrangements. The profile of the sponsors developing these types of projects varies somewhat from the traditional large-scale project development companies. For instance, on our projects in El Salvador, the sponsor is a New York-based private equity fund, which through two of its funds organised in Delaware, owns all of the borrowers and the project contractors (some of which are located in other neighbouring Central American countries).

Another aspect contributing to lower costs on solar (and other renewable) financings in the region is the use by sponsors of affiliated companies to undertake all of the development, management, construction and maintenance work, which allows them to keep cash-flows in-house rather than dealing with third-party contractors. However, a potential concern for development finance institutions and other lenders with these sorts of

arrangements has been ensuring that the fees (and particularly any success or management fees) being paid to such affiliated entities are reasonable and on arms-length terms.

What financing structures do you tend to encounter?

RE: A typical financing structure used for greenfield utility-scale solar projects in the US includes the three sources of funds. First, a construction loan provided by commercial banks. Second, an equity investment from a financial institution, insurance company or other US taxpayer made primarily in exchange for a fixed return based on a combination of cash distributions and federal tax incentives (including the federal investment tax credit). Third, funds from the sponsor or third-party equity investors, which can be funded in part through debt borrowed at a holding company level, including from some or all of the commercial banks that provide the construction loan.

The construction loan often can be used to fund the bulk of construction costs. It is repaid in full at the start of commercial operations with the other sources of funds. Once this happens, there is little opportunity to raise debt at the project level until the equity investors receive their fixed rate of return.

JH: We see a variety of structures in Latin America but generally speaking, projects

are less highly leveraged than in the US. Many transactions use traditional project finance structures where debt is lent into a special purpose vehicle which owns the project assets and sponsors contribute equity to that ring-fenced vehicle via share capital and shareholder loans. However, there is also an emerging market for green project bonds which we are seeing in countries such as Brazil and Mexico.

Are there any important sources of funds investing in solar?

RE: Pension funds continue to be an important source of long-term equity capital for US utility-scale solar projects. The long-term contracted revenue streams from US electric utilities associated with many US solar projects, with limited commodity exposure, have proven a good match for the time horizons and risk tolerances of many of these funds. Investments can be made through private equity funds, or increasingly, on a direct basis. Some pension funds have sought higher returns or strategic relationships with key sponsors by making development or construction-stage investments.

JH: Development banks are still an important source of debt finance for renewables in Latin America. We expect to see an increase in commercial bank involvement in construction financing as the appetite of institutional investors and the bond markets continue to grow.

What are some of the ongoing factors that keep the cost of capital persistently higher in some regions than others?

RE: In the US, federal tax incentives – in particular the investment tax credit (ITC) – have helped to spur remarkable growth in the deployment of utility-scale solar projects. A large and growing US solar market in turn has helped to further drive down capital costs. However, the reliance on the ITC also has compelled developers lacking US taxable income to use complicated financing structures to monetise the ITC. The complexity and idiosyncrasies of this “tax equity” financing market results in a higher overall cost of capital than one might otherwise expect for US projects.

JH: A major issue in Latin America is the lack of adequate investment transmission systems. In many countries, particularly in Central America, technical experts are concerned that antiquated and insufficient transmission coverage will be severely tested by the variable output of solar (and wind). This risk is certainly having a damping effect on new renewable projects in the region. On the flip side, advancements in solar and storage present a possible solution to the problem. Storage technology may reduce the variability of loads on the transmission systems and also assist in localizing projects to energy needs.

4 Jul 2017

Energy storage investment masterclass: Q&A with Nancy Pfund, DBL Partners



Nancy Pfund of DBL partners.

Nancy Pfund is managing partner at DBL Partners, a venture capital firm which specialises in investing in companies and start-ups that offer both rewarding financial returns, and positive social impacts. There have been some serious clean tech companies in DBL's portfolio. As well as being one of the earliest backers to Tesla and SolarCity, to utility-scale solar tracker company NEXTracker to Off-Grid Electric, which deploys solar in rural Africa; to others in energy storage like Advanced Microgrid Solutions and Primus Power, Pfund is extremely well-placed to offer a quick Q&A 'masterclass' in energy storage investing.

What were some of your key takeaways from 2016 in energy storage?

It was a seminal year for energy storage. Energy storage really moved from dream to reality. The hard work that lots and lots of companies have been doing for several years to get battery storage into prime-time, they flipped the switch and while we don't have widespread energy storage yet, we definitely took the important first steps toward that reality. I think you see it through the very high profile merger of SolarCity and Tesla, which was a statement about energy storage and its role not only in transportation but most importantly in greening the grid and pursuing consumer personalisation and choice, as well as utility use of storage to avoid the need for peaker plants and such. Similarly other chemistries that will be important made some very significant moves into pilots and flow batteries, different chemistries, nickel-zinc, zinc bromide. I'm not the person to ask for all the different battery types but we've seen uptake on the part of utilities, corporate customers and in certain locales, residential when paired with PV. For all of those reasons we saw 2016 as a huge inflection point for energy storage.

We've seen significant growth in the various different use cases for energy storage. It's not just households with PV, or just

utilities doing more to make grids resilient – would you say it's been an "all of the above" kind of year?

I would but with the underlining emphasis that corporations are becoming significant storage customers. As we see the move towards 100% renewables on the part of massive companies like Apple and Google and Microsoft and Amazon, they are now becoming, as they build that renewable infrastructure for their servers and operations, not surprisingly, some of the earliest storage customers. One of our companies Primus Power that has a zinc bromide flow battery has an installation at Microsoft HQ for example which is very significant in terms of signalling that part of the toolkit for corporations to reduce costs by going renewable and achieve their sustainability goals, a big part of that toolkit is the battery or the storage architecture.

A huge part of DBL's raison d'être is positive social impact – if corporations are choosing to do this is that a good marriage of business sense with social benefits?

You don't have to sacrifice financial return to deliver a positive social result and I think storage epitomises that because you're seeing significant companies in their early days being built that will bring returns to investors at the same time that you're addressing a critical need. If we electrify everything - which we're moving towards doing - we need to do it in a way that uses green resources and the nature of those resources will require storage. So it's a virtuous circle. And it's not just the batteries or the storage architecture, it's also the integration. There's some really interesting work being done, like Advanced Microgrid Solutions [is doing] to develop a virtual power plant at a commercial building or office park by integrating storage assets with renewables, with the grid, with software to manage demand and reshape load. Saving the customer money, strengthening the grid reliability by applying locational strategies, putting storage in areas where it's needed - so helping the

utility and the end use customer and the overall grid. So that's really where we're heading and using storage both in front of and behind the meter.

Is energy storage in the US still concentrated in leading regions, such as California, where around 100MW was deployed in six months to deal with the shortfall created by the Aliso Canyon gas leak? And have developments in those leading regions sent shockwaves around the rest of the country?

A lot of energy innovations happen in California first because there's a history here of good policy and utility and innovative new entrants pushing the envelope - and there's a consumer will for it. I can tell you that every battery company, every battery integration effort is being affected by what's going on in California. AMS just announced that they've got a Texas utility to do this [take up energy storage]. Hawaii is of course active in PV and storage. So it's happening and just as with solar where California is head and tails above others in terms of PV installations, you're going to see other states catch up and in some ways storage has less of a headwind because you don't need the elaborate policies that solar needed to get started with. I would signal that Massachusetts has a storage mandate they're working on and it's just a process that we'll see dissemination of across the board. In Hawaii residential PV-plus-storage is cost effective given that they have extremely high utility rates so it's natural they would look at it there too. The numbers will start to work out in California over the next two to three years, so you'll see a steady rise in the customer solution architecture for storage as well, as prices come down. The fact that California is leading, it's the sixth largest economy in the world - so it's not like it's some tiny state that doesn't have anyone living there. Even today, a huge percentage of US solar is in California, so it's a terrific place to start. It's like this is a really good place to hatch the next generation of the clean grid infrastructure.

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3 Jul 2017

Oil major Shell dips into power market

Shell Energy North America (SENA) has agreed to buy power services company MP2 Energy.

MP2 offers supply, on-site generation, demand response and other services, including solar, to commercial and industrial customers. According to Shell, many of these services are offered via proprietary technology and systems that have been developed in-house.

"We are proud to bring MP2 into the Shell Energy North America family," said Glenn Wright, VP, SENA. "MP2 has established itself as a significant player in the large end-user electricity market, and achieved its position by combining optimally designed energy solutions and exceptional customer service," added Wright.

SENA's retail energy business for the C&I sector will be expanded beyond its West Coast limits to incorporate Texas and the Eastern Seaboard. MP2's more advanced services will also be rolled into the SENA offering.

MP2 has collaborated closely with SolarCity in the past with services aimed at both residential and C&I customers. Shell has stated that part of the attraction of the deal is "MP2's top tier network of aggregators, brokers, and consultants".



Image credit: Shell.



Credit: Toyota.

MP2 is providing a flexible five-year PPA to Toyota's Piano, Texas campus.

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5 Jun 2017

Sunrun expands operations into Texas

Sunrun, the largest dedicated residential solar company in the US, announced this week that it is expanding its home solar business to Texas, one of the sunniest and most populous states in the country.

Sunrun also announced a partnership with ENGIE Resources LLC to provide an offer that bundles retail energy — inclusive of a 20-year net metering agreement — with its residential retail energy company, Think Energy.

Sunrun customers in Texas will utilise Think Energy as their retail energy provider, allowing them to get retail energy credits for every kW of excess generation that goes to the grid. They can access that credit when they consume energy from the grid, and purchase energy at a fixed rate when they consume in excess of their solar generation.

This net metering deal stands as the first time that a retail provider and solar company have bundled a 20-year net metering guarantee.

Sunrun will offer Texas homeowners the option to purchase their solar system, lease, or finance it through a third party loan arranged by Sunrun.

Lynn Jurich, chief executive officer of Sunrun, said: "Solar is a win-win for Texas.



Sunrun is now available to homeowners in Houston and surrounding areas.

Texas homeowners benefit from solar costs being at an all-time low giving them greater control over their energy and all Texans win from solar energy's ability to contribute to the grid clean renewable energy when temperatures are at their highest and so is demand for energy.

"We look forward to working with Think Energy by ENGIE to give Texas homeowners a choice to better control their electric bills and demonstrate the value of distributed energy resources in meeting Texas' energy infrastructure needs."

Sunrun is now available to homeowners in Houston and surrounding areas, with plans to expand to other cities in Texas over the coming months.

After expanding into Texas, Sunrun is now available in 19 states.

Sunrun has been under fire recently following allegations around the manipulation of sales data.

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9 Nov 2017

Toshiba, NRG to deliver 2MW battery for Texas wind farm

Toshiba and NRG Energy have completed a new battery energy storage system that will benefit the Electric Reliability Council of Texas (ERCOT) grid.

The Elbow Creek Energy Storage project is a lithium-ion based Toshiba battery system that is able to store and provide up to 2MW of electrical power. The project located near major generator and utility NRG's and NRG Yield's Elbow Creek Wind Farm in Howard County, Texas, was designed to enhance the stability of the local electric grid. Transmission system operator ERCOT is responsible for the provision and maintenance around 90% of Texas residents' electricity network, run as a non-profit corporation and overseen by the state's Public Utilities' Commission (PUC).

The battery system is expected to help solve short-term grid issues by offering high-speed frequency regulation services. The project was manufactured at Toshiba's 1 million sq. ft. manufacturing facility in Houston, Texas and features Toshiba's SCiBTM Rechargeable Battery.

It has been part funded by Texas' environment agency, Texas Commission on Envi-



Toshiba and NRG Energy have completed a new battery energy storage system that will benefit the Electric Reliability Council of Texas (ERCOT) grid.

ronmental Quality (TCEQ) and it is hoped that the project can contribute to the state's efforts to meet decarbonisation targets. TCEQ introduced the Texas Emissions Reduction Plan (TERP) in August 2016, which gives out grants for individuals and businesses seeking to implement technologies that reduce diesel, nitrogen oxide and carbon dioxide, aimed primarily for air quality purposes, rather than explicitly for decarbonisation.

Kyle Kem, president of the social in-

frastructure systems group at Toshiba International Corporation, said: "Toshiba has a legacy of innovation in power transmission and distribution dating back more than 100 years – the Toshiba Battery Energy Storage System is our latest contribution to improving energy efficiency. Now that this installation is online, we look forward to further streamlining the assembly process at our Houston-based manufacturing headquarters."

18 Aug 2017

Array Technologies completes 102MW PV project in Texas

Solar tracking company Array Technologies announced this week that it has commissioned the 102MW(AC) Lamesa Solar Facility in Lamesa, Texas.

Developed by engineering, procurement and construction (EPC) firm Renewable Energy Systems (RES), the installation utilises Array's solar trackers to maximise the project's energy output and meet the electricity needs of approximately 15,000 homes in Texas.

Built over 359 hectares of land in Dawson County, Texas, the installation features Array's DuraTrack HZ v3 product to ensure optimal output from the facility's 410,000 PV panels.

Despite certain challenges due to the weather in the South Plains region of Texas, the project was completed on time due to Array's installation-efficient solar trackers. The installation went online in May 2017.

Array Technologies founder and CEO Ron Corio said: "When considering the size and scope of a PV plant like the Lamesa



Image: Array Technologies

Built over 359 hectares of land in Dawson County, Texas, the installation features Array's DuraTrack HZ v3 product to ensure optimal output from the facility's 410,000 PV panels.

Facility, reliable product selection is crucial to project schedules and operational uptime. The Array team has poured almost 30 years into our tried-and-true solar tracking technologies to offer installers and asset owners an unbeatable combination of performance and reliability. We

are excited to see this project come to life with a globally respected player like RES and look forward to partnering with them again to meet the demands of both today's and tomorrow's solar market."

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28 Jul 2017

Ideal Power supplies power converters to PV-plus-storage projects in California, Texas

Ideal Power, the US company best known for its power conversion systems for energy storage, has announced two recent project orders totalling 1.6MW in northern Texas and in California.

Just over 1MW of the company's 30kW Stabiliti power conversion systems will be integrated into six solar-plus-storage systems at a California municipal school district. The 35 separate Stabiliti units will be installed with PV and battery energy storage at six installations.

The systems will provide services typical to commercial battery storage installations in the US - lowering energy costs and offering energy resilience in the face of outages and other disruptions to stability of power supply.

A significant operating expense for schools, with the US DoE (Department of Energy) quoted as recording US\$6 billion spent on energy at educational facilities each year, energy costs in this case will be cut by helping the schools optimise their time-of-use of electricity and reduce demand charges, the premium charged for power drawn from the grid at peak times.

The systems would also provide critical load support, Ideal Power CEO Dan Brdar said.

"In addition to reducing energy costs, solar-plus-storage systems can provide critical load support to keep government buildings, universities, schools and hospitals up and running in the event of grid outages due to rolling blackouts, brownouts or severe weather events.

"Critical load support is normally accomplished using diesel generators that may harm the environment due to emissions, require regular maintenance and expen-



Ideal Power also has a supply agreement with NEXTracker. Pictured is NEXTracker's FusionPlus integrated PV-plus-storage solution.

sive refueling, and can damage sensitive equipment when bringing the facility back online after a power outage. Stabiliti enables renewable energy as the school's high-quality backup power source, dramatically reducing generator runtime and fuel use."

Stability power converters are available as either a two-port AC-DC system for energy storage, or a "versatile" multi-port AC-DC-DC system to enable the direct integration of PV and energy storage. The units' technology is the next generation of Ideal Power's Power Packet Switching Architecture (PPSA).

Ideal Power is supplier of conversion systems to a number of energy storage providers, especially in the residential and commercial and industrial (C&I) space. It supplies Sharp for its SmartStorage systems, inverter maker KACO and most recently for PV tracker firm provider NEXTracker on an integrated all-in-one solution using flow batteries.

A quick win in Texas: C&I system will pay back in under seven years

Meanwhile, in another project Ideal Power will be supplying Stabiliti power conversion units to help a public sector information technology services provider

to 'grid-proof' its power supply with a low carbon PV-plus-storage solution.

Tyler Technologies in North Texas manages information and data for local government encompassing schools, the legal system, police forces and more. Tyler has contracted solar developer W Energies Solar One to install two 150kW solar PV arrays, each coupled with 300kWh of energy storage at two of the information tech provider's campus buildings.

The customer wanted low cost, environmentally-friendly electricity, Ideal Power said, while also needing to be backed up and resilient in the event of grid power outages and other disruptions. The two PV-plus-storage systems use five Ideal Power Stabiliti multi-port devices each, the version of the converter which enables bi-directional flow of electricity from solar, storage and the microgrid or grid.

"According to our analysis, we believe that our systems combined with Ideal Power's power conversion technologies can offer payback in less than seven years, making it a compelling solution for renewable electricity that can withstand power outages," W Energies Solar One director of operations Matthew Rater said.

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11 Jul 2017

Toyota completes Texas' largest commercial rooftop PV array at new headquarters

Toyota Motor North America celebrated the completion of its new North American headquarters in Plano, Texas, with the new building featuring Texas' largest commercial solar array ever developed.

The new headquarters, which required an investment of US\$1 billion to develop and is located across 40 hectares of land, features an 8.79MW array that is comprised of over 20,000 solar panels.

Other features at the headquarters include a rainwater harvesting system and a commitment to utilise only renewable energy — purchasing all electricity not generated by the solar panels from wind generated by Texas farms.

Originally planned as a 7.75MW installation, the PV project added nearly 1MW of installed generation capacity during its construction phase. Around 50 certified workers were responsible for the development of the system, which features solar panels on steel carport structures across the top of four parking garages.

Nam Nguyen, SunPower senior vice president, said: "We're proud to partner



Image: SunPower

The new headquarters, which required an investment of US\$1 billion to develop and is located across 40 hectares of land, features an 8.79MW array that is comprised of over 20,000 solar panels.

with Toyota on this innovative solar project as the company works to achieve its ambitious sustainability goals. The unique long-span carport design will feature SunPower's high reliability solar panels that deliver 30% more electricity than

conventional solar, optimizing Toyota's renewable energy investment."

In April, Southern Company subsidiary Southern Power commissioned a 120MW utility-scale solar facility in Texas.

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2 Jun 2017

Texas publicly-owned utility goes big on energy storage

Austin Energy, a publicly-owned electric utility in Texas, is delivering megawatt-scale storage systems as part of the US Department of Energy's Sustainable and Holistic Integration of Energy Storage and Solar PV (SHINES) project.

The programme's goal is to reduce the cost of electricity from combined solar and storage projects to below US\$0.14/kWh.

By being proactive on energy storage under this DOE-funded initiative, Austin Energy will offer its commercial customers options to reduce energy costs while simultaneously providing a reliable energy storage resource for the grid.

"Integrating energy storage with solar is becoming essential as we achieve the City of Austin's goal of 55% renewable energy by 2025," said Jackie Sargent, Austin Energy general manager. "The Austin SHINES program is more than a technical pilot; it's phase one of a larger rollout to maximize the value of distributed energy resources for our customers and the utility. Ultimately, it's about testing innovative technologies that could have long-term benefits."

Stem

The first project under the initiative is by intelligent energy storage provider Stem Inc., who is developing an aggregated fleet of customer-sited storage systems. The project will integrate both solar and energy storage to increase grid performance and reliability. Stem's software-driven storage can enable businesses to reduce energy costs by reducing their peak demand. Where a business has on-site solar PV systems, Stem's software and analytics tools will automatically manage those customers' use of grid-supplied electricity against their solar production.



The Younicos Y Cube to be featured in East Austin.

Source: Younicos

"Austin is a hub of sustainability and we are thrilled to be working with Austin Energy on this project," said John Carrington, CEO of Stem. "We think all of Texas will be watching to see how aggregated energy storage can cost-effectively deliver multiple values to customers, utilities, and grid operators alike."

Younicos

Younicos is also partnering with Austin Energy under the programme to deliver a 1.75MW/3.2MWh system, located in East Austin for both residential and commercial buildings. This will use the company's Y.Cube system and will be managed by Younicos' Y.Q software platform. The seven Y.Cubes and Y.Converters represent the company's largest Y.Cube deployment in the US to date. The Y.Cube systems will provide storage capabilities as part of a Distributed Energy Resource Manage-

ment System (DERMS) that will maintain grid reliability while also enabling energy loads to be delivered at the lowest possible cost with high penetration levels of distributed PV generation. Much like Stem's project, Younicos's systems will optimise battery performance in combination with solar.

"We are keeping Austin weird – and energized," said Stephen L. Prince, CEO of Younicos. "The SHINES project is the perfect showcase for an alternative, distributed energy system with resources like energy storage providing resiliency and security. Our Y.Cube is ideal for this application – offering the best in battery storage, intelligent control, system performance and safety in a compact form factor. We're very pleased to partner with Austin Energy and Doosan GridTech on this innovative project."

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24 Apr 2017

50MW Engie plant powers 10.5% of Houston's energy needs

French renewable energy firm Engie has commissioned its 50MW solar PV plant in Houston.

The SolaireHolman plant is now online and capable of providing up to 10.5% of the electricity needs of Texas' largest city; solidifying Houston's status as the largest municipal purchaser of renewable energy in the US.

Located on 146 hectares in Alpine, Texas, the plant was developed by Engie subsidiaries Solairedirect North America and Engie North America. Comprised of 203,840 PV modules, the plant is one of the largest solar installations in the entire state.

The project will provide electricity for Houston locations such as the Hermann Park Zoo, the Bob Lanier Public Works Building, wastewater treatment plants, and several Bush Intercontinental Airport terminals.

"I want to thank ENGIE and all those who worked on this project for this fabulous Earth Day present," said Houston mayor Sylvester Turner. "As the energy capital of the world, it is important that Houston lead by example and show that investing in solar and renewable energy is a critical tool cities must use to prepare for the future. As the nation's largest municipal purchaser of green power, we are living



Source: duergo

The 260 acre, 50MW plant is one of the largest solar installations in the entire state of Texas.

proof that large, industrial cities like Houston can have a robust economy but also help fight climate change."

"We're very proud to serve the City of Houston, a national innovator and substantial customer by any measure," said Marc-Alain Behar, managing director for Solairedirect North America. "One of the most gratifying parts of our work

at ENGIE is aligning with customers to provide the best value we can. Through SolaireHolman, the City of Houston will strengthen its energy portfolio with clean, low-cost solar power for the benefit of all the people who live and work in this vibrant community. What an excellent way to mark Earth Day 2017."

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6 Sep 2017

ROUNDUP: E.On's Texas Waves underway, Eos appoints Apple battery man, Delta launches home kit

Second and third US projects underway for E.On

5 September 2017: The US arm of European utility E.On has begun construction on its second and third North American utility-scale energy storage projects in Texas.

Following the successful grid connection of Iron Horse, a 10MW lithium-ion battery system connected to a 2MW PV plant in Tucson, Arizona, work has now begun on Texas Waves, a pair of energy storage projects for E.On wind farms in West Texas.

Located at Pyron and Inadale wind farms, each project is of 9.9MW capacity with a "short duration" of energy storage, E.On said. They will be providing ancillary, grid-balancing services to the ERCOT (Electricity Reliability Council of Texas), the independent transmission system operator serving some 24 million customers in the state.

Primoris Renewable Energy, the clean energy arm of a Denver-headquartered engineering and construction firm will deliver engineering, procurement and construction (EPC) services, while software and integration specialist Greensmith – which also worked on Iron Horse – will provide energy storage software and services. The projects' construction and Greensmith's involvement were announced back in March.

Mark Frigo, E.On VP for energy storage said the Texas Waves projects would build on lessons learned from Iron Horse's construction. The 9.9MW projects are scheduled to go online by the end of this year.



E.On's Iron Horse energy storage project in Arizona, which was completed in April.

Apple battery director among new hires at Eos Energy Storage

5 September 2017: Eos Energy Storage, the US company making novel zinc hybrid cathode batteries at grid-scale, has made four top-level appointments, including the hire of a former Apple executive director for battery operations.

The company, which recently claimed its proprietary battery and energy storage system technology could reduce the cost of dispatchable solar-plus-storage for utilities to US\$0.10 per kilowatt hour, has

appointed a new CFO, VP of manufacturing, director of system engineering and integration and director of field operations.

Superconductor industry veteran of 30 years' standing Dave Henry steps in as CFO, former ABB and Parke-Hannifin energy storage engineer Daniel Friberg is director of system engineering and integration and the new director of field operations is Keith Powers, who has been involved in developing 1.5GW of PV for companies including Iberdrola ▶

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Eos' 'Energy Stack' grid-scale solution using the company's proprietary zinc cathode battery technology.

Renewables. Joining the three is Richard Hanna, VP of manufacturing, who after a long stint working with EVs was recently tech brand Apple's executive director for battery operations.

"I was immediately drawn to the technology on account of its simplistic design and manufacturability. The Znyth battery is completely different from the lithium batteries I'm used to. There are no clean rooms required and no complex deposition processes; we can manufacture these batteries in a machine shop like environment and are now working to increase volume, yield, and throughput through automation while expanding localized production lines in target international

markets," Hanna said. Jim Hughes, former First Solar CEO who is now Eos Energy Storage chairman, said the "combined knowledge and expertise" of the new hires would help Eos "expand production and deploy MWh-scale storage on the grid—all with an unwavering focus on quality and continuous cost reduction."

Delta launches integrated residential product for US market

5 September 2017: Power management company Delta has launched an 'All-in-one' energy storage solution for US homeowners ahead of the SPI trade show next week, alongside a new hybrid solar inverter.

The 'All-in-one' features a 7kW Delta E7U model hybrid inverter, battery cabinet with a 6kWh lithium-ion battery system, smart monitor and control system and a power meter. PV systems must be bought separately. Delta claims the product can "fulfill real-time energy demand and energy storage requirements of a home".

Delta said the E7U inverter has a charging efficiency of 97%, uses three Maximum Power Point Tracking (MPPT) algorithms and delivers DC power straight to the battery from the PV system, without additional power conversion required. Both inverter and battery cabinet can be safely installed outdoors.

The power meter comes with a 7" touch-screen interface, which controls system operation modes and monitors energy flows. If paired with Delta's solar Data Cloud, users can follow their system's workings via computer, smartphone or other remote device.

Meanwhile the company's E-series hybrid solar inverters have integrated power conditioners which can drive backup power applications and send power directly to the home, grid or battery storage system. E-series inverters are ready for both DC and AC-coupling, for high and low-voltage batteries and also support cloud based data collection. Delta's E6, E8 and E10 hybrid inverters are available in maximum output power levels of 6,000 VA, 8,000 VA and 10,000 VA respectively.

6 Dec 2017

World's 'largest' module buyer slams Section 201 petitioners

US utility firm NextEra Energy has questioned the motives of the two Section 201 petitioners, Suniva and SolarWorld, and warned the foreign-owned US-based manufacturers could not hope to meet domestic demand.

The company's senior VP for development, Michael O'Sullivan, was among those providing testimony for the US Trade Representative (USTR) in the final phase of the 201 trade case. The USTR is appointed by the President making Wednesday's hearing significant. President Trump will make the final decision on what action to take in the case before the end of January after the ITC made its own recommendations last month.

"Quite simply, the tariff levels proposed in the ITC's Recommendations are too high to support utility-scale projects, the overwhelming driver of solar demand in the United States in recent years," NextEra stated in a document to accompany its testimony.

"These projects will support thousands of skilled US construction jobs. More generally, solar employment has been growing rapidly and represents one of the fastest-growing sources of skilled, high-wage, blue-collar, US construction jobs, including a significant percentage of veterans of the Iraq and Afghanistan wars. These veterans and their families do not deserve to have their jobs and livelihoods threatened to benefit two small, foreign-owned companies and their hedge fund and foreign owners and creditors who are out for a financial windfall," it continued.

The crux of the argument lies in the impact that very high tariffs could have on project economics. NextEra has said it will invest US\$15 billion in renewable energy by 2020.

Suniva's executive vice president chal-



U.S. Trade Representative (USTR) Robert Lighthizer.

lenged this assertion in his own testimony.

"Claims that an increase in the cost of importing modules is going to kill demand have been sensationalized and historically proven to be wrong," he said in reference to the two previous anti-dumping cases in the US. "However, what is really at stake for our opponents is not demand, but rather the market distortion that is the fruit of the poisoned tree of Chinese subsidies and IP theft."

Suniva has also circulated a list of investments made by foreign companies as it sought to question the Solar Energy Industries Association (SEIA) claim to represent the US industry after the trade body issued what it called an "America First" solar plan.

NextEra stated that regardless of the impact on demand, US companies certainly could not provide the required supply.

As evidence, it pointed out the absence of details on how the companies would serve the market once tariffs are in place. Suniva's hands are somewhat tied by its ongoing Chapter 11 bankruptcy case and small scale capacity.

"These two companies have failed to understand and thus have failed to adapt to the needs of the utility-scale solar industry," said NextEra. "That Petitioners have not submitted an adjustment plan only underscores their lack of any real interest in investing the large amounts of additional capital required to manufacture on a sufficient scale to supply the utility-scale solar market. The lack of any adjustment plan by SolarWorld and Suniva at this important juncture in a Section 201 proceeding must be viewed with a high degree of skepticism, since the entire purpose of the statute is to promote a positive adjustment to imports."

Source: Flickr/USDA.

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5 Dec 2017

SEIA reveals its 'America First' solar plan

The Solar Energy Industries Association (SEIA) has revealed a plan which includes six recommendations for Donald Trump to elevate the growth of the solar industry.

The plan leads with rejecting the president's potential tariffs via the Section 201 case. It also claims that increased cost would cause the loss of tens of thousands of American jobs and cause price rises for electricity consumers and businesses.

Abigail Ross Hopper, SEIA's president and CEO, said: "Tariffs would jeopardize our economy, our national security and our workers."

"Our plan is meant to help the President address the issues in this case, put America First, and say yes to strong economic and manufacturing growth. Rather than throw a highly successful US industry in reverse for no good reason, this plan will create more jobs and investment in America," she added.

The plan is part of a blueprint released to keep "the US solar industry soaring" with economic growth, jobs, manufacturing and national security by supporting the military, American workers and veterans.



Source: Flickr/Gage Skidmore

Suniva spokesperson Mark Paustenbach said: "Opponents of American solar manufacturing hoped no one would notice they used a new slogan to pitch the same weak remedies they offered before, none of which will help reinvigorate an industry decimated by years of cheating by China. Even millions spent on lobbying and professional spin can't hide that fact."

According to GTM Research and SEIA's

latest report; suggested tariffs would mean new solar installations are expected to triple by 2022. The industry would be flung into reverse, creating a loss of billions of dollars in investment.

President Trump can accept or reject the ITC's recommendations, or come up with a different policy. He has until 26 Jan 2018 to make his decision.

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17 Oct 2017

Section 201 tariff could halve utility-scale deployment in US: GTM

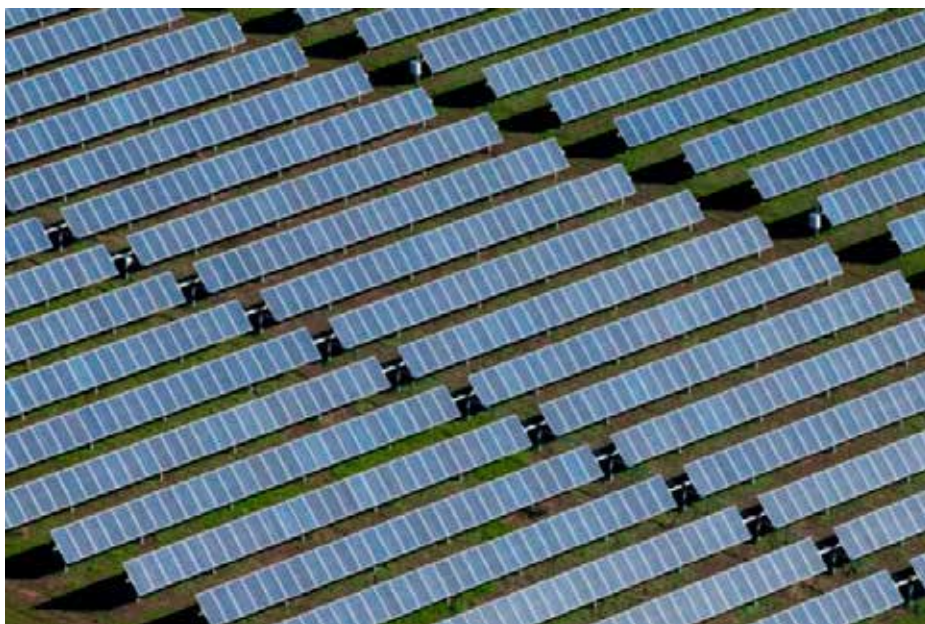
A US\$0.40/W tariff resulting from the Section 201 case would halve utility-scale deployment in the US between 2018-2022, according to GTM Research.

The company also noted however, that the utility-scale sector could ride-out the impacts of a US\$0.10/W tariff with a drop of 9% expected.

The International Trade Commission (ITC) will vote on recommended remedies, including potential tariffs on 31 October before President Trump makes his final determination in January next year.

GTM's report attempts to assess the impact on the industry in the event of tariffs.

"First, we estimate that there will be nearly 5GW of solar capacity that is not subject to tariffs, either because it is not subject to the scope of the petition (i.e. thin film) or because both the cells and modules are manufactured in the US, Korea, Singapore, Canada or Australia, all of which may be exempt. In addition, over 2GW of modules have already been procured for 2018 projects, which will temporarily dampen the tariffs' impact on demand."



Source: SunEdison.

GTM Research noted that the utility-scale sector could ride-out the impacts of a US\$0.10/W tariff with a drop of 9% expected.

Singapore, Canada and Australia are currently exempted from any 201 tariffs however the petitioners, SolarWorld Americas and Suniva, are pressing the ITC to close any "loopholes" that would enable products partly manufactured in other countries to be finished in these nations.

GTM, which is openly against the 201 case, also warns that states with emerging residential markets could struggle to overcome the impact of increased module prices.

14 Oct 2017

Why 2018 could be a breakthrough year for 'Made-in-India' module exports

Things can change very quickly in the solar industry, and no more so than when new trade-related cases are introduced or existing ones are amended in scope. Often companies – and in particular module suppliers relying on export revenues – suddenly find themselves with a golden opportunity that was previously not in their strategies, or have barriers unlocked that remove competitors based in other countries.

This article explains why 'Made-in-India' solar PV module manufacturers could end up seeing immediate opportunities to export to the lucrative US and European end-markets, if certain trade cases come out in their favour; and if downstream EPCs/developers and investors are convinced that the quality and reliability of the modules on offer are at the level they demand to mitigate against potential on-site underperformance and maximize investment returns.

The article will also explain how a dedicated session at the forthcoming PV ModuleTech 2017 event in Kuala Lumpur, Malaysia, on 7-8 November 2017, will seek to reveal the leading Indian module manufacturers that are expected to be among the key beneficiaries should the trade cases move in the favour of India, and what needs to be done to gain global supply acceptance.

A quick review of Made-in-India module manufacturing

Of all the major countries where cell and module manufacturing is active today in GW-level volumes, India has by far the longest history, with the country being one of the first to embrace solar as a technology more than 30 years ago.

The collaboration between Tata and BP-Solar in Bangalore was at its time groundbreaking in the PV industry, and benefited



India-based solar equipment manufacturer Renewsys India, part of international conglomerate Enpee Group, has launched production of 5-busbar (BB) solar PV cells at a Hyderabad facility in the Indian state of Telangana in 2017.

in the day from BP-Solar having an R&D obsession that was matched only by the fervour seen in Japan from the likes of Sharp, Sanyo and Kyocera.

Furthermore, prior to the solar industry having its first growth-spurt phases in Japan (before the current Fukushima-incident driven boom-phase) and Europe (Spain, Germany, Italy), other Indian government-controlled conglomerates had set up somewhat skunkworks-based cell and module production lines, some of which still exist today albeit it in a rather dormant state.

However, it was during the European-driven solar industry growth phase of the mid-2000's that saw the biggest advancement within India from a fab manufacturing standpoint, with the construction of state-of-the-art facilities using imported process equipment from the leading tool makers in Europe and especially Germany.

The focus was largely on pure-play cell manufacturing at the time, and by the time the factories were operational, manufacturers were confronted by the GW

juggernaut of cell and module capacity that had been built up almost overnight across China and Taiwan.

Taiwan chose the pure-play cell route, as opposed to the 'anything c-Si' route that was China, and for the next few years, no-one anywhere could compete with cell production quality, cost and volumes that were coming out of Taiwan to a (then) tariff-free solar world.

This ushered in a phase of inactivity within India that was to last until recent years during which the domestic end-market reached multi-GW level as one of the leading global demand countries serving as a long-term growth target for most of the leading international module suppliers.

Modules have come into India in droves from China, and ASPs have been firmly at the bottom of global tables during this period; two factors that make relying upon the domestic market both challenging from a profitability standpoint and frustrating in light of the end-market status and growth metrics. ►

In this time, only a couple of Indian module manufacturers have succeeded in having any meaningful levels of overseas shipments, and the sheer volume of deployment in the country has also propelled the existence of new module producers that are sufficiently connected with downstream project deployment.

This year, Adani hit the global manufacturing headlines, with its GW-scale cell/module fab in Mundra; 2018 will however be the year that the industry sees how much Adani has succeeded in both its ambitious ramp-up plans and its ability to have strong overseas module shipment levels.

The wildcard trade-based upside to Indian export prospects in 2018

If the Section 201 case in the US does come to fruition, and results in a geographic shakeup in terms of the countries that are able to import into the US and be excluded from any tariff or minimum price requirements, then things could get interesting for Indian module suppliers that have global presence.

Add to this the prospect of both cells and modules being produced in India (that remains one of the very few countries still to have meaningful capacities for both cells and modules), and things could get even more exciting for Made-in-India brands.

In Europe, a new MIP has now come into force, and the full implications are certainly still being understood, with more than one interpretation of what this means for product shipping from coun-

tries in Southeast Asia, including Malaysia and Thailand.

Given that much of the supply to Europe had been diverted to these Southeast Asia countries following the implementation of the original MIP ruling, this clearly leaves a gap that would certainly see Indian module exports (assuming they have the correct source of cells) being in greater demand.

While there are many questions yet to be flushed out, there is every chance that 2018 could become a year that Indian module suppliers need to become much more export-savvy, and seek out the potential upside opportunity that may unfold very quickly.

Made-in-India quality and bankability: is the global downstream segment aware?

Scrutiny on module supply for utility-scale solar outside India is much more rigorous than in the domestic market currently, and for Indian module manufacturers to gain traction globally from 2018 onwards, the global downstream stakeholders will certainly be hard at work doing factory audits, due-diligence reporting, and bankability analysis to ascertain which companies and module technologies meet all the demands from banks and investors bringing in the site-related finances.

These fundamental issues have driven us to incorporate a dedicated session at the forthcoming PV ModuleTech 2017 conference in Malaysia on 7-8 November:

- Made-in-India modules for global Industry deployment: understanding the key suppliers, technologies and product availability.

India's Ministry of New & Renewable Energy National Solar Mission Division currently states that there are almost 120 module manufacturers within India. Of these, only 20 have operational capacity that could in theory deliver supply levels overseas that could be considered viable for large-scale deployment.

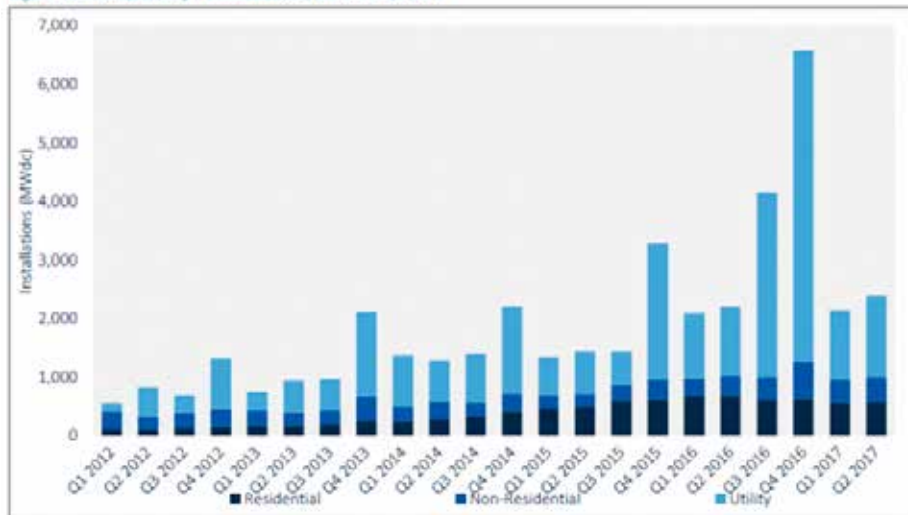
Within this group of 20, less than half are in a position - or have the desire - to commit fully to being viable module suppliers outside India.

However, it only needs half a dozen or so module suppliers in the 300MW to 1GW bracket to emerge as a credible subset of Indian module suppliers for exporting to the US and European markets, and potentially we have 3-4GW of modules that would be more than sufficient to meet any potential shortfall in supply to key markets such as the US in 2018. But who are these Indian module manufacturers? What supply levels could they allocate to overseas markets? What type of technologies are they incorporating into their module portfolios? How are these module suppliers gaining third-party certification? Which (international) independent engineering firms have experience in dealing with these company's product offerings?

11 Sep 2017

US has record Q2 with 2.4GW of solar deployment

Figure 1.1 U.S. Quarterly PV Installations, Q1 2012-Q2 2017



Source: SEIA/GTM Research

The US deployed 2,387MW of solar PV in Q2 2017, marking 8% year-on-year growth and its largest ever second quarter, according to the latest reports from GTM Research and the Solar Energy Industries Association (SEIA).

The Q2 report and market insight study for Q3, found that the US will add 12.4GW of new capacity this year, slightly down from GTM's previous forecast of 12.6GW. While the market is still expected to triple in cumulative capacity over the next five years, the looming Section 201 case brought by manufacturers Suniva and SolarWorld is expected to drastically reduce forecasts if successful.

In any case, US solar is expected to fall year-on-year in 2017 and 2018, ahead of a rebound in 2019, when multiple states start to build at scale and more than half become >100MW per year markets. The near-term fall would be partly due to an inability to recreate the massive record additions of 2016.

The report stated: "The near term will see relatively constrained growth compared to what we've seen previously in both the

utility and distributed generation sectors. DG continues to face an ever-changing policy and customer-acquisition landscape, while the utility sector continues to reset as it builds out the post-ITC extension pipeline and restarts the origination process. Amidst all of this, the ongoing Section 201 proceeding concerning imported modules casts uncertainty across all solar PV segments."

In terms of states, Minnesota and Mississippi were surprise entrants to the top 10 for additions in Q2, joining PV stalwarts such as Arizona, Nevada and North Carolina. Meanwhile, Texas added 378MW - its strongest quarter ever.

Utility-scale still the 'Bedrock'

The US installed 1,387MW of utility-scale PV during the quarter, making it the seventh quarter in a row where more than 1GW was added. Meanwhile, the contracted pipeline currently stands at 23GW. Overall the US is forecast to deploy more than 8GW of utility-scale this year, despite build-out falling on an annual basis.

Growth has been driven by voluntary procurement, PURPA, off-site corporate procurement, and California-based community choice aggregators. These drivers now account for more than 75% of the current pipeline.

Right now 3.6GW of large-scale projects are in construction, and H2 2017 is expected to see over 5.6 GW of deployment.

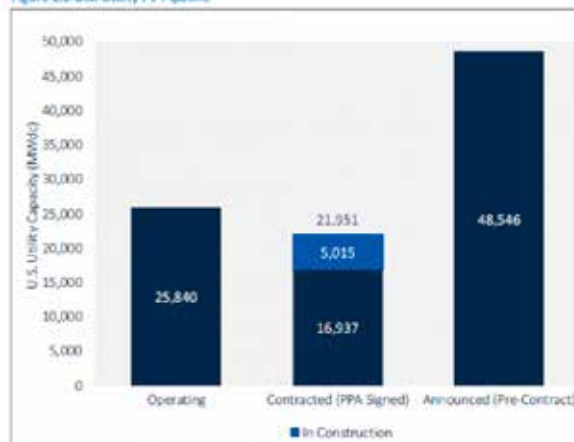
Residential to fall y-o-y for first time

A total of 563MW of residential PV was installed in Q2, up 1% from Q1 2017, but down 17% from Q2 2016. Now residential solar is expected to fall year-over-year for the first time ever. This is partly due to customer acquisition challenges and a slowdown in operations from major PV providers as they prioritize profitability over growth.

Non-residential

The non-residential market saw 437MW of installations, growing 31% year-over-year, driven mainly by favourable time-of-use rates in California, expiring incentives in Massachusetts, and a record-breaking quarter in New York, where several net metering projects were brought online.

Figure 2.2 U.S. Utility PV Pipeline



Source: GTM Research, U.S. Utility PV Market Tracker

Credit: GTM and SEIA

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29 Aug 2017

Energy storage could have significant impact on US businesses' energy costs 'in nearly every state'

More than a quarter of US commercial and industrial (C&I) electricity users could potentially use energy storage to lower premium rates they are charged during periods of high demand, the National Renewable Energy Laboratory (NREL) has found.

NREL has just undertaken what it described as the most exhaustive effort to date to evaluate utility rates across the US, surveying over 10,000 separate utility tariffs that are available to around two-thirds of American C&I users.

In the States, those C&I users of power are commonly levied what are known as demand charges onto their bills. While private homes will pay only for the kilowatt-hours of energy consumed, demand charges mean that businesses are monitored for the amount of power drawn from the grid at specific times and during short time frames.

A charge relative to this rise in demand is then payable by the C&I customer. A 'typical' utility plan might calculate its charges from measuring the highest average electricity usage during a 15-minute window, in other words tracking the rate of consumption of kilowatts and charging accordingly.

Anecdotally, it is often said that these demand charges can form around 50% of a business' electricity costs. NREL cites that generally, demand charges make up anywhere from 30% to 70% of total billed amounts. So far, demand charge reduction has been a strong rationale and economic driver for activity from companies including Stem, Sonnen and Green Charge which all install medium-sized energy storage systems for C&I customers in the US.

NREL found that in fact, while there are 18 million or so commercial and industrial customers of electric utilities in the US, more than a quarter of those – 5 million customers – are seeing demand charges on their company bills higher than US\$15 per kW, making energy storage seem an attractive option.

Variations are state-by-state - and within states

While New York and California got a lot of headlines for getting in early on the action for C&I energy storage providers, NREL found that outside of these two 'first-mover' states, an economic case for energy storage built around demand charge reduction exists in huge swathes of the US: in the Midwest, the Mid-Atlantic and Southeast regions.

High demand charges apparently are levied by utilities scattered across the US. For example, there are several states where demand charges are more than US\$20 a kW, such as Georgia, Iowa and New Mexico – all dotted around in different parts of the country, the south, the mid-west and southwest respectively.

In addition to these regional or state-by-state variations, there can also be big discrepancies within states. NREL found that average maximum demand charges in New York were around US\$10 per kWh, but some businesses in the state's Long Island district are laden with demand charges closer to US\$50 per kWh. Differences in the charges could reflect a utility's billing policy and rate design – but also in the case of Long Island, the area requires higher levels of investment and maintenance money spent on electricity infrastructure – so circumstances could be quite specific to single projects or utility service areas.

While solar on its own can help lower demand charges, it becomes a lot more effective with energy storage, with no variability in the power generated or stored and running through the system, energy storage can do it more reliably and steadily, NREL said. When solar and energy storage are integrated effectively, "[the two] technologies can often complement each other and increase demand charge savings through an effective demand-management strategy".

The NREL report puts forward the numbers of C&I customers in each state where demand charges have gone beyond the US\$15 per kWh threshold, but was careful to point out that the 5 million estimated companies in this category have rate plans with high demand charges available to them – they have not necessarily subscribed to such plans.

The first-movers California and New York have the most eligible customers, with 1,420,000 and 648,000 potential payers of high demand charges respectively. Georgia, Colorado and Michigan then all have between 200,000 and 240,000 potential customers, then Massachusetts, Texas, Connecticut, Minnesota and Ohio all have between 120,000 and 190,000 potential payers of demand charges in excess of US\$15 per kWh.

The high charges are not restricted to states with generally high electricity prices – in fact NREL found that C&I opportunities for energy storage exist in "nearly every state". Even for customers with demand charges lower than that, falling energy storage system costs will continue to open up market opportunities, NREL said.

6 Jun 2017

GTM: US energy storage deployments up 944% since last year

Q1 2017 US energy storage deployments in megawatt-hours (2013-2017).
Image: GTM Research / Energy Storage Association US Energy Storage Monitor.

Energy storage in the US has just enjoyed its greatest quarter for megawatt-hours deployed, up almost 1000% from the equivalent period last year, installing 233.7MWh.

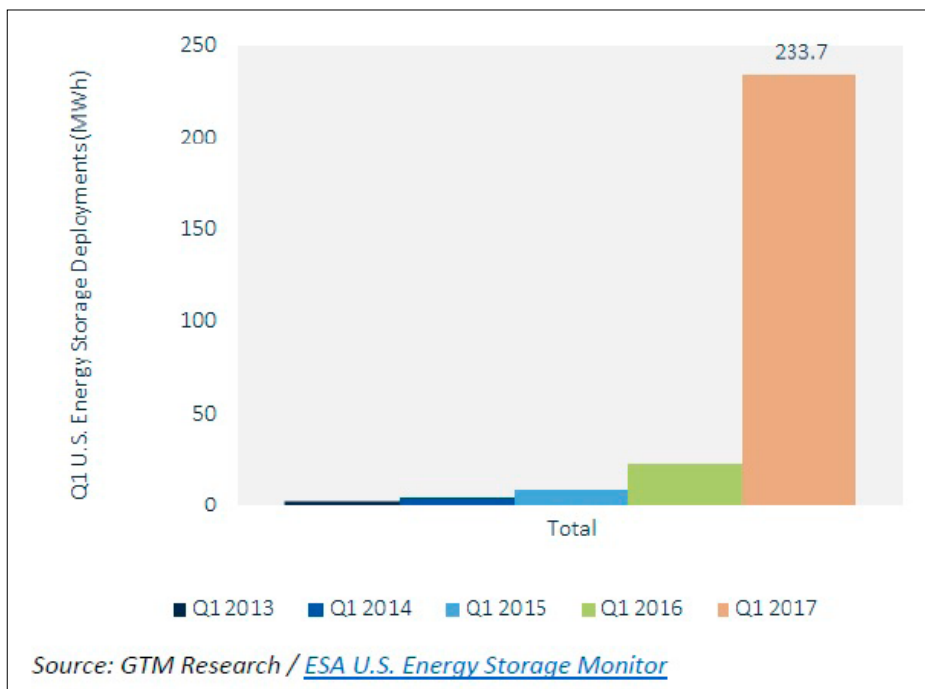
This was among the findings of GTM Research's US Energy Storage Monitor, the market analysis firm's quarterly report, which said that Q1 2017 saw a leap of 944% in deployment over Q1 2016, when just 22.4MWh was deployed. It also slightly edged out the final quarter of last year, which was described by GTM analyst Ravi Manghani as itself an "inflection point" for US energy storage, with 230MWh brought online.

As with that quarter, Manghani explained that "much of" the growth in megawatt-hours this time around can be attributed to a growing trend for longer duration energy storage projects in the utility-scale sector, as well as ongoing efforts in California to deploy capacity to mitigate for the Aliso Canyon gas leak.

Industry 'shouldn't get too comfortable'

Manghani said it was likely the Aliso Canyon projects could skew the picture a little this year, and there was a strong possibility the first quarter of the year could turn out to be its strongest. He said the industry "shouldn't get too comfortable" with this strong showing early in the year, adding that "there aren't too many 10+MWh projects in the 2017 pipeline".

Measured in megawatts, Q1 2017 followed a previously seen trend of a smaller first quarter in each year to follow the fourth of the previous. In the first quarter,



71MW of energy storage was deployed, which was a decrease of 50% from Q4 2016 (140.8MW), but a significant 276% year-on-year increase from Q1 2016, when just 18.9MW was installed. The vast majority of demand appears to be for in front-of-meter applications such as grid services and pairing with large-scale renewables, comprising 91% of all deployments in the quarter. Meanwhile, behind-the-meter, or customer-sited energy storage declined 21% in megawatt-hour terms from Q4 2016 and 22% in megawatts from Q1 2017.

Manghani explained this reduction as attributable to California's pausing of its SGIP (Self-Generation Incentive Programme) scheme, which has since reopened (with all funding for the year already allocated) which lead to a drop in the non-residential market. This was evident in the residential market falling only by 5% quarter-over-quarter, compared to a 26% drop in non-residential installations.

California takes crown again, so does lithium

Lithium-ion batteries comprised 96.5% of the total market for both utility-scale and residential deployments, with GTM expecting that dominance to continue "over the next few years". The second-placed technology was flow batteries, with just 3% of market share, mostly coming from one California project, with lead-acid batteries in third place, accounting for a 0.7% share of the market.

Among states, it was unsurprising to see California in top spot, with second place closely contested by five other states: Hawaii, Massachusetts, New York, Texas and Arizona. The US Energy Storage Monitor also sweeps the states to report on policy and market developments behind- and in front-of the meter across the country.

Key policy initiatives enacted recently include Nevada's SB 204 bill for regulators to consider energy storage targets in front of the meter along with SB



Image: RES.

Front-of-meter batteries are outpacing behind-the-meter.

145 which would establish an incentive programme for behind-the-meter energy storage. Washington Utilities and Transportation Commission, the state's regulator, directed utilities to consider energy storage within their integrated resource plans (IRPs). Massachusetts is expected to set energy storage targets soon, while Maryland's state legislature instructs the state's Power Plant Research

Programme to investigate market reforms and potential incentives to help along the deployment of energy storage.

Long term, GTM expects energy storage markets in the US to total 2.6GW in 2022, representing a near 12-fold increase from 2016's 221MW. Behind-the-meter will grow in importance, constituting as much as 53% of the total market by 2022.

By that year the total market could be worth US\$3.2 billion. Residential storage sales only represented about 4% of energy storage revenues during 2016, but Manghani and his team expect a 650% increase during this year from last year's figures. Non-residential sales will continue to make far more money, however, growing by US\$128 million this year.

This report was created with articles from the
following Solar Media journalists

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Finlay Colville
John Parnell
Tom Kenning

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