



ASPEN OPINION | SOLAR STORAGE

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Christina Tom takes a closer look at the growth of solar power in California which has been spurred by regulatory change, technological advance and finance incentives. Solar generation and also solar storage have made significant progress in recent years, opening up new underwriting challenges for insurance carriers.

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Sunshine State

Solar energy still represents a very small percentage of world energy - estimated at approximately 1%¹. The growth potential, however, is considerable given the emphasis on renewables and, within this market, the limited supply constraints of solar. Unlike hydro-electric, which is inhibited by availability of suitable sites, and wind, where objections to turbines have been an issue, solar has no such restrictions.

The sunshine state of California, perhaps unsurprisingly, continues to be the leading solar market in the U.S. with 15,049MW of installed solar energy- enough to power 3.8 million homes and an estimated market share of 44% in 2015². Its lead in the solar stakes is not only attributable to hours of sunlight, but also to a large population, high utility electricity prices and a long list of state, local and utility incentive schemes. Indeed, solar installation investment in the state totaled US \$7.3 billion in 2015 and over the next five years, California is expected to install 20,487MW of solar electric capacity – more than a two-fold increase of solar installations in the last five years³.

Government Incentives

A number of initiatives have been instrumental in transforming solar energy from the choice of the benevolent few to one of the most popular options. First, the solar Investment Tax Credit (ITC) was introduced in 2006 that provides a 30% tax credit for residential and commercial solar systems. The residential ITC allows the homeowner to apply the credit to his/her personal income taxes on outright purchase and home installation of a solar system. A business that installs, develops and/or finances the project can also claim the credit. It has been one of the most important federal mechanisms to incentivize the deployment of both roof-top and utility scale solar energy in the U.S. with an estimated 76% per annum compound growth in solar installations since inception⁴. The ITC has been extended - most recently, late in 2015 - and the current iteration of tax credits runs until 2023 on a sliding scale to 0% and 10% respectively, for residential and

commercial projects. ITC has also encouraged growth of the solar storage market as the 30% tax credit has recently been clarified as available to solar generation projects that include storage.

In addition to federal policy, California has prospered under a Net Energy Metering system (NEM) that is one of the most favorable in the U.S. This enables residential and commercial customers who generate their own electricity from solar power to feed unused electricity back into the grid. If the home is net-metered, the electricity meter will run backwards to provide a credit against what electricity is consumed at night or other periods where the home's electricity use exceeds the system's output. Customers are only billed for their "net" energy use. On average, only 20%-40% of a solar energy system's output ever goes into the grid. Exported solar electricity serves nearby customers' loads.

California's NEM was reappraised in 2015 by the California Public Utility Commission (CPUC) who decided to preserve the system while making some changes. These included time of use (TOU) rates for new customers when demand is highest. TOU rates - which already apply to commercial and industrial customers - will be phased in for all residential users by 2019. While there is uncertainty about exactly what the charges will be - and thus how this will impact the returns on household solar investment projects - it is likely to promote electricity storage via home battery systems. Homeowners, by pairing solar panels with batteries, could store electricity generated in the middle of the day and maximize its value by selling it back to the grid during early-evening peak hours when demand and prices are highest.

In addition to changes in NEM, the amended Self Generation Incentive Program (SGIP) has provided boost for storage. The program, introduced in 2001, provides incentives for energy storage and behind-the-meter generation. Under the new rules, 75% of the SGIP budget will be allocated to energy storage with the remaining 25% for generation.

¹ BP Statistical Review of World Energy 2016, BP p.l.c (21 November 2016)

² SEIA, California Solar (21 November 2016)

³ SEIA, California Solar (21 November 2016)

⁴ SEIA, Solar Investment Tax (21 November 2016)



The Future is Bright

In the last decade, solar installations have grown by 60% per annum while the cost has fallen by more than 70%⁵. U.S. solar installations currently total one million and are forecast to reach two million by 2018⁶. Storage is linked with this anticipated growth in solar installations. The energy storage market is forecast to exceed the 2GW mark in 2021 and valued at almost US\$3 billion⁷. Growth is expected across all segments - residential, non-residential and utility but the Behind-the-Meter (BTM) sector is forecast to account for a larger share of deployment, rising from 15% in 2015 to almost 50% by 2021⁸.

A BTM system is a renewable energy generating facility that produces power intended for on-site use in a home, office building, or other commercial facility. The sector, like the solar installation market, has benefitted from technological advances and legislation. In California, the CPUC approved a target requiring the state's three largest investor-owned utilities, aggregators, and other energy service providers to procure 1.3GW of energy storage by 2020⁹. The BTM sector is set to benefit as, for example, Southern California Edison has completed long-term procurement contracts for more than 100MW of (BTM) storage to be deployed over the next five years from companies including Stem, Advanced Microgrid Solutions, Ice Energy and SunPower. Looking further ahead, California is also starting to open grid programs and markets to aggregated distributed storage assets¹⁰.

Prevention and Protection

Insurers have been increasingly keen to participate in the growing solar energy market. Top line growth looks assured but there are challenges to be met; not least the distinction between the commercial and residential market.

Loss control can be addressed more keenly for commercial clients with stipulations such as installation of adequate fire protection and heating ventilation and air conditioning systems, 24/7 surveillance linked to security control centers, secure fencing and bollards protecting the equipment, fire inspections conducted by the local fire department, and clear fire separation.

Such measures are more difficult to incorporate in residential homes where fire protection systems are more generally absent. The rapid growth of renewable energy within the residential market creates aggregation issues, which is concerning from a wildfire, flood, earthquake, windstorm and hailstorm perspective. Adequate modeling of a portfolio for natural catastrophes in highly aggregated territories forms a valuable part of the underwriting process.

Underwriters should be mindful that solar storage is still relatively new and insurance is not just about protection but also prevention. The insurance industry will continue to be presented with exciting new risks and opportunities as the solar industry grows and expands with the incorporation of the latest advances in technology.

⁵ SEIA, *Solar Industry Data* (21 November 2016)

⁶ Ibid

⁷ GTM Research/ESA, *U.S. Energy Storage Monitor: Q2 2016 Executive summary*, p.20 and p.21

⁸ Ibid

⁹ NREL, *Issue Brief: A survey of State policies to support utility-scale and distributed- energy storage* (21 November 2016)

¹⁰ GTM, *California added 11MW of BTM Batteries in Q3*, Jeff St. John, 4 December 2015 (21 November 2016)