MAC Solar Index

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SOLAR SECTOR UPDATE

The MAC Global Solar Energy Index (SUNIDX) is licensed as the tracking index for the Guggenheim Solar ETF* (NYSE ARCA: TAN)
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MAC Global Solar Energy Index (SUNIDX)

SOLAR INDEX PERFORMANCE

The MAC Solar Index, the tracking index for the Guggenheim Solar ETF (NYSE ARCA: TAN), sold off sharply early this year and has since remained weak. The index is currently down -34% year-to-date. The MAC index in 2015 closed -15% lower after the -2% decline seen in 2014 and the +127% gain seen in 2013.

Solar stocks have recently seen weakness due to (1) the general risk-off equity trading mode with the upcoming Brexit vote and the ongoing concerns about the Chinese and global economies, (2) concern that a temporary drop-off in Chinese solar installs in the second half of 2016 could lead to supply overhang and downward pressure on solar pricing, (3) uncertainty about whether the EPA's Clean Power Plan will ultimately survive the presidential election and its court challenge, (4) uncertainty for the U.S. residential solar market amidst a shift to loans from leases and cutbacks in net metering in some states, (5) investor uncertainty about the solar sector after SunEdison filed for Chapter 11 in April, and (6) ongoing trade disputes that have resulted in tariffs and various market dislocations.

Recent bullish factors for solar stocks include (1) the strong overall world demand for solar with the sector set to grow by 10%-20% this year, (2) the strong prospects for U.S. solar in coming years after Congress in December 2015 approved a 5-year extension of the U.S. solar investment tax credit (ITC), (3) strong demand for solar power as countries seek to meet their carbon-reduction targets under December's Paris COP21 global climate agreement, (4) the sharp 89% rally in crude oil and 70% rally in natural gas prices from the recent lows, and (5) low valuation levels that indicate that solar stocks are very conservatively priced.

Solar stocks are currently trading at very low valuation levels compared with the broad market. The median forward P/E of companies in the MAC Solar Index is currently 9.4, which is well below the forward P/E of 17.7 for the companies in the S&P 500 index. The median price-to-book ratio of 0.98 for the companies in the MAC Solar Index is well below the 2.79 ratio for the S&P 500. The median price-to-sales ratio of 1.19 for the MAC Solar Index is well below the 1.86 ratio for the S&P 500.

Global solar growth slows

Despite the recent weakness in solar stock prices, the global solar industry itself continues to show strength. Global solar has grown at a very strong +25% compounded annual rate over the last five years. Meanwhile the long-term demand outlook for solar remains very strong since solar will account for 35% (3.439 GW) of all electricity capacity additions and a massive $3.7 trillion of solar spending through 2040, according to Bloomberg New Energy Finance (BNEF). Moreover, BNEF expects all-in project costs for solar to plunge by another 48% by 2040, thus making solar one of the cheapest sources of electricity.

Solar growth is currently expected to show slower growth in 2016 and 2017 but then regain a strong growth rate near 20% in 2018 and beyond. Weaker growth this year is tied in large part to the end of solar booms in Japan and the UK. However, these areas of weakness are outweighed by solar strength in the U.S. and India and emerging strength in Latin America and the Middle East.

China is expected to install up to 20 GW of solar in 2016, which would be up by 25% from 16 GW in 2015. However, developers accelerated most of their 2016 solar installs into the first half of 2016 in order to beat a step-down in China's feed-in-tariff that takes effect on June 30. China installed some 13 GW of solar

in the first half of 2016, which implies a sharp step-down in solar installs to 2-3 GW in Q3 and 3-4 GW in Q4, before growth resumes in 2017. There are market concerns that sharply lower solar Chinese installs in the second half of 2016 could result in a module oversupply situation (at least within China) that could also put downward pressure on solar panel pricing.

Meanwhile in Japan, solar surged after the Fukushima nuclear disaster in 2011 due to a generous government feed-in-tariff (FIT). Japan solar soared by 64% on an annual compounded basis in the five years through 2015. However, Japan is now set to bring nuclear capacity back on line and has cut its solar FIT, leading to expectations for substantially smaller Japanese solar installs over the next few years. GTM is forecasting that Japan's solar installs in 2016 will fall by 12% to 10.2 GW from the peak of 11.644 GW in 2015 and in 2017 will fall by another 14% to 8.8 GW.

Despite the near-term weak spots for solar, there are strong spots that should still lead the industry to a healthy overall growth rate in 2016. U.S. solar is set to surge this year by 94%, according to GTM, due to the huge amount of utility solar that was brought forward into 2016 to take advantage of the previous ITC expiration at the end of this year. Meanwhile, solar in India this year is set to surge by +127%, according to GTM, as the country relies heavily on solar to expand its electricity capacity and modernize its infrastructure.

The solar industry in coming years will depend less on the big countries for growth. By 2020, GTM is forecasting that 21 GW of solar power growth will come from Latin America, 16 GW from the Middle East and Turkey, and 15 GW from Asia (apart from China, India, Japan and Australia).

Solar blows its competitors out of the water with 64% of new U.S. electricity capacity in Q1

The U.S. installed 1.665 GW of solar PV in Q1-2016, which accounted for 64% of new U.S. electricity generation capacity in Q1-2016, more than natural gas, coal, nuclear and wind combined, according to the U.S. Solar Market Insight Q2-2016 (link). Solar in Q1 sharply raised its market share from the 29.4% contribution to new electricity in 2015, which in any case edged out natural gas at 29.0%. The Q1 solar install rate represented a 24% year-on-year growth.

For all of 2016, GTM Research is forecasting that U.S. solar installs will surge by 94% y/y to 14.5 GW, mainly because of a surge in utility PV that will account for about two-thirds of all U.S. solar installs. Utility PV is seeing a big surge in 2016 because many solar projects were hurried into 2016 to take advantage of the Investment Tax Credit (ITC) that was previously scheduled to expire at the end of 2016. Congress in December 2015 extended the ITC by 5 years, but most of the projects that were already in planning will move ahead in 2016, thus causing the 2016 bulge. That also means, however, that utility PV will drop sharply in 2017 from the artificially high level seen in 2016.

The drop in utility PV growth to more normal levels starting in 2017 is expected to cause the overall U.S. solar growth rate to fall by about 17% in 2017 and by about 7% in 2018, according to GTM. However, GTM then expects the U.S. solar install rate to return to a strong annual growth rate averaging about 20% in the 2019-2021 period. Smoothing out the ITC effects results in an expected 6-year compounded annual growth rate of +19% from 7.5 GW of installs 2015 to 21.5 GW of installs in 2021, according to GTM.

Competitive auctions slowly push aside FITs and help push solar pricing to as low as 5-6 cents/kWh

Utility solar PV pricing worldwide has dropped in the past year to an average of 4.5 cents per kWh, according to GTM Research's recent "Global Solar Demand Monitor" (link). GTM reports that solar PV won a whopping 72% of all electricity capacity awarded in 2015, beating wind, hydropower, cogeneration, combined-cycle natural gas, and geothermal. In the U.S., utility scale power purchase agreements fell to 6 cents/kWh in 2015 and could be headed for an average below 5 cents/kWh in 2016 (including the ITC), according to GTM Research.

A new record low for solar pricing was established in May when developers offered electricity prices at 2.99 cents per kWh for 800 MW of solar power projects for the Dubai Electricity & Water Authority. That was even lower than the 5.07 cents per kWh solar pricing that Mexico accepted at a clean energy auction in April for 1.9 GW of power for CFE, Mexico's only utility.

The decline in solar PV pricing has been caused in part by the global move to competitive auctions whereby a government or utility just specifies the need for a certain-size electricity plant and then accepts bids from interested developers. The competitive nature of the auctions means that solar companies have a strong incentive to improve their technology and reduce installation and financing costs as a means to beat their competitors.

Competitive bidding is increasingly replacing the feed-in tariff (FIT) system whereby utilities are required to buy electricity from solar plants at specified fixed prices. The problem with the FIT system is that it is difficult for the government to set the FIT price correctly to achieve the desired amount of solar. There are many examples such as Spain where the government set the FIT price too high, thus causing a massive surge of solar that ended up costing too much in subsidies and leading to a subsequent cancellation of the entire program. Other key European markets also went through a boom-bust cycle by relying mainly on the FIT system. The FIT system has been complicit in causing boom-bust cycles in a number of geographical solar markets, which in turn causes chaos for the solar industry in trying to adjust investment and production to wildly fluctuating demand. The solar industry would be much better served over the long run by a smoother and more predictable demand curve.

For the long-term health of the industry, solar power in any case must become progressively cheaper over time so that it easily beats alternatives on price without subsidies. The competitive auction system aligns itself better with the needs of buyers as well

as with the solar industry over the long-term as it seeks to reduce pricing while maintaining reasonable profit margins.

There has been some concern that competitive auctions might unduly hurt profit margins in the solar industry. Indeed, competitive pricing could force some high-cost producers out of the market unless they can find less competitive niches for their products. However, the competitive pricing system rewards the best solar companies with the best technology and the lowest-cost systems.

The issue of competitive auctions and profitability was recently addressed by Enel Green Power's CEO Francesco Venturini whose company in April won a 992 MW project in Mexico with a bid of an extraordinarily low 3.5 cents per kWh. Mr. Venturini told Bloomberg News in a recent interview, "There is no value in winning without margin attached. I have two investment committees and two boards of directors I need to present my project to and they want to see the money attached to it. So trust me, there is margin."

World renewable energy jobs soar to 8.1 million

Global renewable energy employment increased by 5% in 2015 to 8.1 million jobs, according to the annual review by the International Renewable Energy Agency (IRENA) (link). IRENA expects that renewable energy jobs will triple to 24 million by 2030, making renewable energy a key sector to help drive job growth as well as the world economy in the years ahead.

Solar PV was the largest renewable energy employer in the world in 2015 with an 11% increase in jobs to 2.8 million jobs, according to IRENA. Meanwhile, the number of U.S. solar jobs rose by 22% in 2015 to 209,000, according to the report, which means that there are now more people working in the solar industry than there are in either the U.S. coal or oil/gas extraction industries.

Clean Power Plan oral arguments are delayed until Sep 27

Oral arguments on the case about whether the EPA overstepped its authority with the Clean Power Plan (CPP) were delayed until September 27 from June 2. In addition, the case will now be heard by all the judges (en-banc) on the Court of Appeals for the District of Columbia Circuit Court rather than by the usual three-judge subset of the court. The court did not give a reason why the case will be heard by the entire court, but that will at least skip the step whereby a decision of a three-judge panel can first be appealed to the full en-banc court. Now, the decision of the Court of Appeals of the DC Circuit will go straight to the U.S. Supreme Court on appeal.

The Court of Appeals for the DC Circuit currently has eleven judges but two of those judges have recused themselves from the CPP case, i.e., judge Nina Pillard and Chief Judge Merrick Garland, who is awaiting Senate consideration for his nomination as a Supreme Court justice by President Obama. Of the nine judges who will hear the CPP case, five were appointed by Democratic presidents and four were appointed by Republican presidents, possibly giving the CPP the upper hand with a 5-4 decision if the case is decided along partisan lines.

Based on the current time line, a decision by the Court of Appeals for the DC Circuit could come by winter or early spring 2017. The case would then likely be heard by the U.S. Supreme Court by spring or fall 2017.

However, the fate of the CPP depends heavily on the outcome of the presidential election. If Donald Trump wins the White House in the November election and takes over as President in January, then the Court of Appeals of the DC Circuit and the U.S. Supreme Court might never even issue a decision on the CPP because the Trump administration would presumably retract the EPA's CPP altogether, making a court ruling moot. Mr. Trump has not expressed a formal policy position on the CPP but it seems safe to assume that he would quickly retract the CPP based on his stated views that global warming is a hoax and that the entire EPA as an agency should be eliminated.

On the other hand, if Hillary Clinton or another Democrat wins the White House, then the ultimate fate of the CPP would likely depend on the makeup of the U.S. Supreme Court at the time of a CPP decision. The presumption is that the Supreme Court at present is tied 4-4 on CPP since opponents to the CPP lost their 5-4 advantage on the Court when Antonin Scalia died in February 2016. If Ms. Clinton can get a new Supreme Court justice through the Senate in time for a CPP ruling, then the chances would appear to be good for a 5-4 vote in favor of CPP. On the other hand, if Ms. Clinton wins the White House but cannot get a new justice on to the Supreme Court in time for a CPP ruling, then the Supreme Court could end up deadlocked 4-4 on the CPP. In the case of a Supreme Court deadlock, the decision of the Court of Appeals of the DC Circuit would become the final ruling on the CPP case, illustrating the importance of a Court of Appeals decision.

The CPP is currently in a state of suspended animation since the U.S. Supreme Court on February 9, 2016, granted a stay for the states on complying with the EPA's CPP until the merits of the plan are litigated in court. The Supreme Court's stay means that states, if they wish, can stop the planning process on how they would comply with the CPP. That stay was granted by the Supreme Court by a 5-4 vote when Antonin Scalia was still on the bench.

The CPP is not scheduled to come into full effect until 2022. Before the Supreme Court issued its stay, the states were required to submit their plans by 2018 on how they would comply with the CPP. If the EPA ultimately wins the CPP case, it not clear whether the EPA will give the states additional time to submit their plans since states that oppose CPP have stopped work on their plans. However, states that favor the plan have continued their work on adopting their plan to meet the requirements of the CPP.

The goal of the EPA's CPP is to reduce national greenhouse gas emissions by 32% from 2005 through 2030 and for the U.S. to get 28% of its electricity from renewable energy sources by

2030, more than double the 2014 level of 13%. The CPP is the centerpiece of the Obama administration's plan on how to comply with the Paris COP21 global climate agreement. If the CPP ultimately does come into effect, it would provide a big boost for solar power after the current solar Investment Tax Credit (ITC) drops to 10% in 2022 from 30% at present.

SunEdison files bankruptcy due to debt and corporate hubris but not solar industry conditions

SunEdison (SUNEQ) on April 21 filed for Chapter 11 bankruptcy protection. SunEdison was dropped from the MAC Solar Index about a month earlier on March 22 when DebtWire carried the first report that SunEdison was in discussions for bankruptcy financing.

SunEdison's descent into bankruptcy was caused by the company's overly aggressive expansion plans and its willingness to quickly run its debt up to as high as $16 billion. SunEdison's attempted $2.2 billion acquisition of U.S. residential-solar-installer Vivent (VSLR) finally pushed the company over the edge as investors lost faith in the company's strategic direction and as the company then faced a liquidity crunch. The company also ran into internal financial control problems that resulted in a delay in filing its annual report, which resulted in a breach of some loan covenants.

SunEdison has so far been moving smoothly through the Chapter 11 bankruptcy process and secured a $1.3 billion loan to continue its operations in an effort to eventually move out of bankruptcy and reestablish itself as a going concern. SunEdison at this point does not plan to liquidate although it will be selling off some of its solar and wind projects to raise cash and pay off creditors, which could put some temporary downward pressure on project prices.

SunEdison's two affiliated yieldcos, Terraform Power (TERP) and TerraForm Global (GLBL) have stated that they have sufficient liquidity and that they have no intention of filing bankruptcy. The TerraForm yieldcos are standalone business entities with their own stock listings and boards. The TerraForm yieldcos, however, do face a period of uncertainty because their financial statements have been delayed by SunEdison's delay in filing its financial statements and because there are a host of legal issues that need to be worked through. Nevertheless, the yieldcos have so far been able to successfully navigate SunEdison's bankruptcy.

The process by which a yieldco can fully separate itself from an insolvent sponsor has already been charted by Abengoa YIeld (ABY). Abengoa Yield's original sponsor, the Spanish engineering and construction company Abengoa S.A. (ABG SM), is currently working through preliminary insolvency proceedings in Spain. However, Abengoa Yield has so far successfully established itself as a standalone yieldco business and recently changed its name to Atlantica Yield to reflect its independence.

Yieldco model navigates current difficulties

The SunEdison saga exposed some weaknesses of the yieldco model but did not kill the concept as a whole. The SunEdison saga contained several key lessons: (1) a yieldco needs to have an independent board and management and must deal at arm's length with a sponsor, (2) the yieldco's cost of capital must remain low enough to ensure that it can profitably buy solar projects, and (3) the yieldco must set realistic dividend expectations for investors and cannot overpromise on dividend growth.

A yieldco is just one way in which a renewable energy company can monetize projects that it builds, aside from just selling the project outright when it is completed. In the yieldco model, the sponsor company first builds a solar plant and then sells that plant to the yieldco, retaining an ongoing financial interest through partial ownership and/or incentive distribution rights (IDRs). By getting the project off its balance sheet, the renewable energy developer keeps a leaner balance sheet and can recycle its project capital while still capturing the profits from building projects and retaining some financial incentive rights in the projects.

Meanwhile, the separately-listed yieldco company can become an attractive investment for investors because it typically pays little or no taxes (due to high non-cash expenses from amortizing the project purchase price) and pays a high dividend to investors from its high cash flow. The investor is getting a high-yield investment that is typically very safe because the yieldco's electricity sales revenues are fixed in long-term power purchase agreements that are guaranteed by a highly-rated utility or large corporation. The yieldco structure is essentially just a modified version of the Master Limited Partnership (MLP) structure that has proved to be so successful in the fossil fuel industry. The yieldco name is new, but the concept is only a twist on the long-standing MLP model.

The SunEdison saga has caused most of the large solar companies to freeze their plans for their own yieldcos as they reevaluate the best ways to monetize the value of solar projects. However, the yieldco model is by no means dead. Indeed, 8point3 Energy Partners (CAFD), a yieldco formed by First Solar and SunPower, avoided the key problems seen at SunEdison's yieldcos because it was more cautious on its dividend guidance and the yieldco was set up in the first place with more independence since it had two different sponsors.

Financial analyst Tom Konrad in a recent article entitled "The YieldCo Boom and Bust: The Consequences of Greed and a Return to Normalcy" (link) provides a good overview of recent yieldco developments. He notes that some normalcy has been returning to the yieldco market and that some yieldcos have returned to the market to sell equity. He concludes that the yieldco model "is not broken" but that "investor expectations have changed."

In any case, the lessons of SunEdison will help the rest of the solar industry evolve on being more careful with debt and on choosing the best business models for maximizing value for shareholders.

SOLAR PRICING

Prices for solar cells and modules since mid-2014 have been moving sideways to lower. Specifically, the price of multicrystalline solar cells fell to a new record low of 30 cents per watt in May 2014 and matched that low in early May 2016, but then moved slightly higher to 32 cents by late May, according to Bloomberg New Energy Finance. Solar cell prices in the past 5 years have plunged by a total of -60% from the 81-cent level seen in mid-2011.

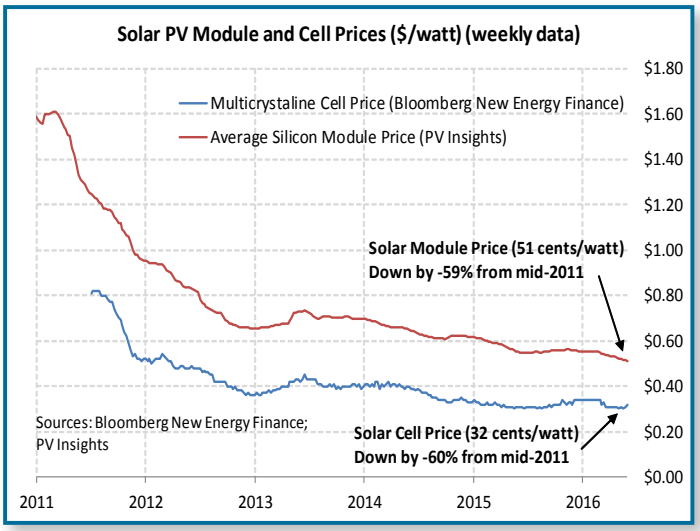
The average price of silicon solar modules has slowly moved lower since late 2015 and fell to a new record low of 51 cents per watt in May 2016, according to data from PV Insights. Solar module prices in the past 5 years have plunged by a total of -59% from the $1.25 level seen in mid-2011.

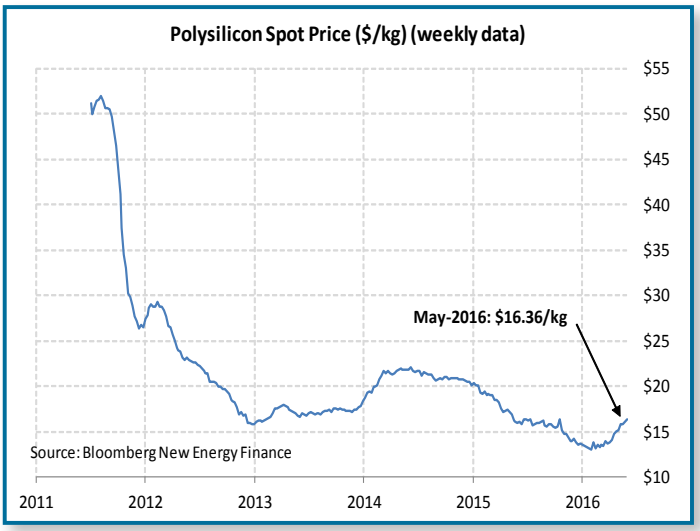
Spot polysilicon prices have been falling since mid-2014 and posted a new record low of $13.08 per kg in early-February 2016, rebounding higher to the latest reading of $16.36 in late May 2016, according to data from Bloomberg New Energy Finance.

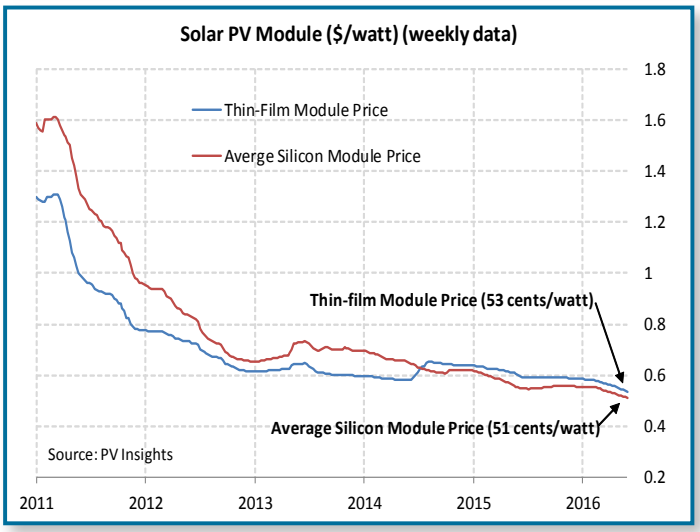
Polysilicon prices in the past 5 years have plunged by a total of -68% from the $51.37 level seen in mid-2011. The decline in polysilicon prices is a key factor in allowing solar cell and solar panel prices to decline since polysilicon is the key raw material for most solar cells.

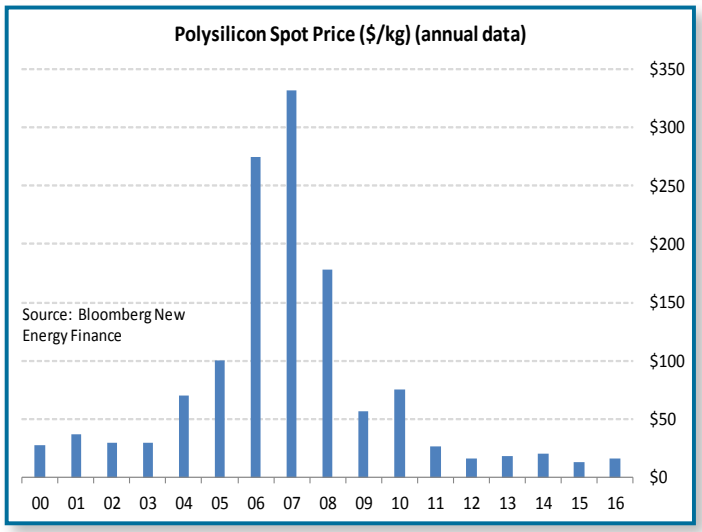
The price of thin-film modules made by First Solar and others fell to a record low of 53.4 cents per watt in June 2016, according to Bloomberg New Energy Finance. Thin-film module prices have fallen by a total of -44% from the mid-2011 level of 95.5 cents.

Solar prices fell sharply in 2011-12 as new Chinese solar firms flooded the market, but prices then stabilized in 2013-14 due to strong demand and the shake-out of smaller and higher-cost producers from the market. Various trade spats have provided some support for solar module prices due to solar tariffs and minimum pricing schemes. Solar prices in general should slowly decline over time due to improved technology, scale manufacturing, and lower production costs.









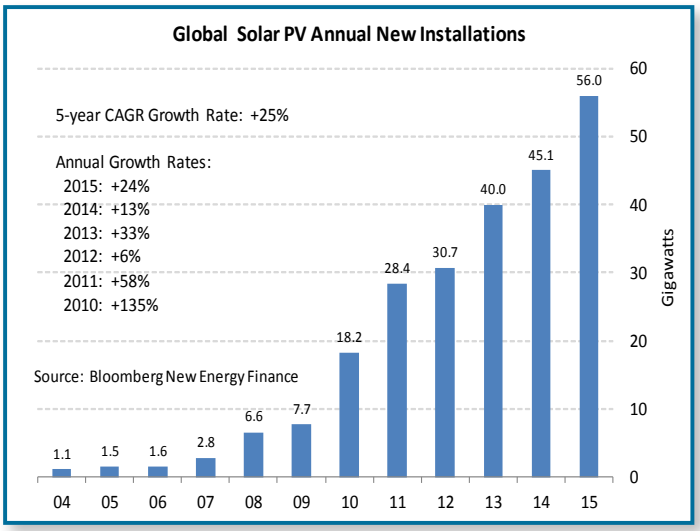
SOLAR PV ANNUAL NEW INSTALLATIONS

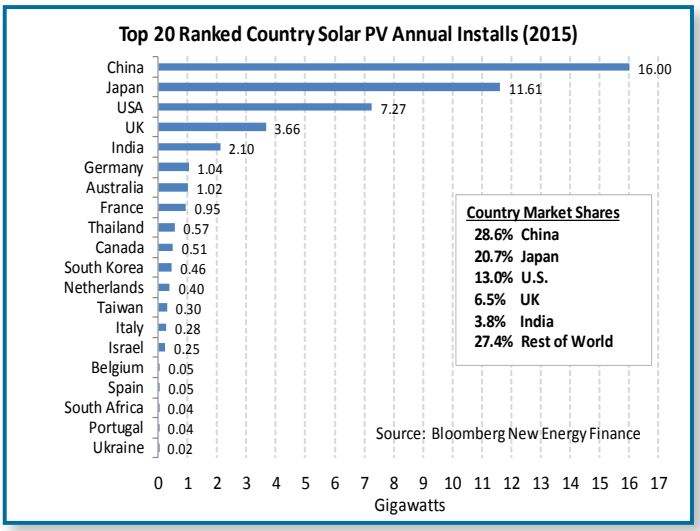
New global solar PV installations in 2015 grew by +24% y/y to a record 56.0 gigawatts (GW), according to Bloomberg New Energy Finance. The 2015 growth rate of +24% followed growth rates of +13% in 2014 and +30% in 2013. Global solar PV installations have grown at a compounded annual rate of +25% over the last 5 years and have risen by eight-fold from 2008.

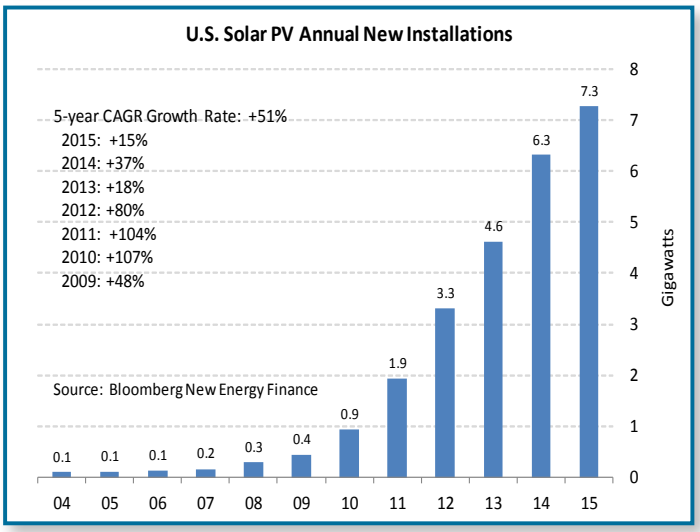
In 2015, China was the top country in the world for new annual PV installs for the third straight year with 16.0 GW of installs, up 23% from the 13 GW of installs seen in 2013 and 2014. Japan remained in second place for the third straight year with 11.6 GW of new installs in 2015, up by +13% from 10.2 GW in 2014. The U.S. stood third in new installs in 2015 for the third straight year at 7.3 GW, up by +15% y/y. The UK was in fourth place for the second straight year with 3.7 GW of new installs in 2015, up +69% from 2.2 GW in 2014.

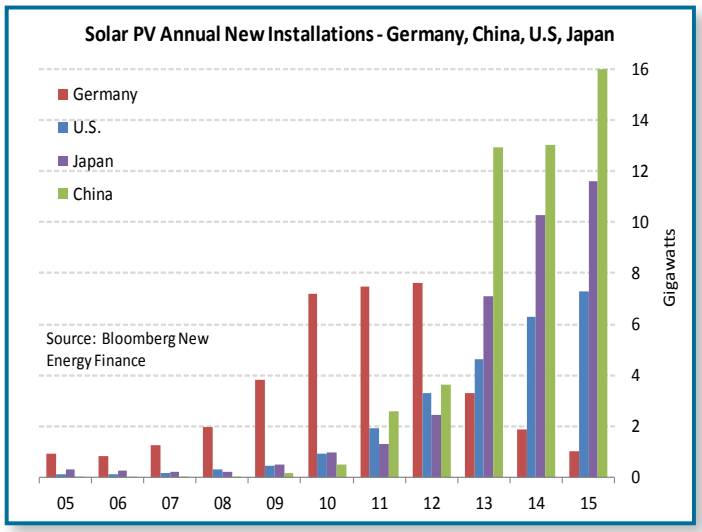
The sharp increase in installs in China, Japan and the U.S. more than offset the declines in continental Europe, which continued to be undercut by reduced subsidy support. German solar installs in 2015 fell by -46% to 1.0 GW and were far below the 2013 peak of 7.6 GW. Italian installs in 2015 fell by -34% to 280 MW, sharply below the 2011 peak of 7.9 GW. French installs in 2015 fell by -10% to 950 MW, about half of the 2011 peak of 1.8 GW.

U.S. solar PV installations in 2015 grew by +15% to a record high of 7.3 GW from 6.3 GW in 2014, according to Bloomberg New Energy Finance. U.S. PV installations over the last 5 years have grown by a compounded annual growth rate of +51%. U.S. PV installations in 2016 will nearly double, according to GTM Research, with about three-quarters of those new installs coming from utility-scale projects. The states with the largest amount of new PV solar installations in 2015 were California (-8% yr/yr to 3.3 GW), North Carolina (+186% to 1.1 GW), Nevada (-12% to 307 MW), Massachusetts (-10% to 286 MW), and New York (+64% to 241 MW), according to the GTM Research.









SOLAR PV CUMULATIVE INSTALLATIONS

The amount of cumulative PV electricity generation capacity across the world grew sharply by +30% y/y to 248 GW in 2015, according to Bloomberg New Energy Finance. In just five years, global cumulative solar PV electricity generation capacity has increased by nearly six-fold from 44 GW in 2010 to 248 GW in 2015, representing a compounded annual growth rate of +42%.

China leapt ahead of Germany in 2015 to take the top spot in the world for cumulative solar capacity at 49 GW, according to Bloomberg New Energy Finance. China at the end of 2015 accounted for 20.0% of world solar PV capacity. In the past five years, China's cumulative solar capacity has soared by 62-fold from only 789 MW in 2010 to the 2015 level of 49 GW, representing a 5-year compounded annual growth rate of 129%.

Germany fell into second place with 38 GW of cumulative solar PV capacity, which was up by only +2.8% from 2014. Germany's cumulative solar electricity capacity in the past 5 years has more than doubled from 17.1 GW in 2010 to 38.4 GW in 2015. Germany at the end of 2015 accounted for 15.5% of the world's total solar PV capacity.

Japan remained in third place for the third straight year. Japan's cumulative solar capacity in 2015 rose by +48% to 37 GW, representing 14.9% of world capacity. Japan's cumulative solar capacity in the past 5 years has risen by nine-fold to 37.0 GW from only 3.9 GW in 2010, representing a 5-year compounded annual growth rate of 57%.

The U.S. remained in fourth place for the third straight year. U.S. solar capacity in 2015 rose by +38% to 27.8 GW, representing 11.2% of world capacity U.S. cumulative solar electricity capacity over the past five years rose by ten-fold to 27.8 GW from 2.6 GW in 2010 and showed a compounded annual growth rate of +61%.