

SOLAR SECTOR UPDATE

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

Note: Index performance does not reflect transaction costs, fees or expenses of 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), has moved mildly higher so far this year and is up +4.0% year-to-date.

Recent bullish factors for solar stocks include (1) continued strong overall world demand for solar with particular new strength coming from India, Latin America, the Middle East, and Southeast Asia (see page 4 for the world solar growth outlook), (2) stronger demand for solar power due to the increasingly competitive price of solar versus alternatives as countries seek to meet their carbon-reduction targets under the Paris COP21 global climate agreement, and (3) low valuation levels that indicate that solar stocks are very conservatively priced.

Bearish factors for solar stocks include (1) downward pressure on solar pricing and panel oversupply caused largely by a hangover from the solar install spikes seen in China and the U.S. in 2016, (2) uncertainty about U.S. clean energy policy and global climate change initiatives due to the new Trump administration, (3) uncertainty for the U.S. residential solar market amidst a shift to purchase/loans from leases and cutbacks in net metering in some states, and (4) ongoing solar trade disputes that have resulted in

tariffs and various market dislocations.

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 11.9, which is well below the forward P/E of 18.1 for the S&P 500 index. In addition, the median price-to-book ratio of 1.19 for the companies in the MAC Solar Index is well below the 3.04 ratio for the S&P 500 and the median price-to-sales ratio of 0.98 for the MAC Solar Index is well below the 2.05 ratio for the S&P 500.

Solar industry rolls on despite Trump administration

Solar panel company stocks continue to see general weakness mainly because of concern about panel oversupply and falling solar prices, which have pressured the profit margins of polysilicon, cell, and module producers. However, supply and demand is slowly rebalancing and most observers expect tighter supplies and more supportive pricing as 2017 wears on. Moreover, the decline in solar prices is boosting demand and is creating bullish opportunities for independent solar project developers as well as for the project-development units of the large integrated solar companies.

While the Trump administration has caused some policy anxiety for the solar industry, there has been no Trump effect on the ground thus far. Canadian Solar CEO Shawn Qu said in mid-March, for example, that President Trump's energy policies have not had "any impact into either project development or the project sales process." He said, "People are chasing solar deals like crazy."

There are three main reasons why the Trump administration presents only a temporary obstacle for solar. The first reason is simply economics. Solar power has become dramatically cheaper in recent years and no longer needs the government support that it once needed. Solar in many areas of the world is now able to compete head-to-head with other sources of electricity generation.

For example, solar projects in the Arizona and Nevada deserts can be built for less than 4 cents per kWh versus the higher average lifetime cost for natural gas plants of 5.2 cents and 6.5

cents for coal, according to Bloomberg News. Most utility-scale solar power plants across the world now cost as little as 4-6 cents per kWh on an unsubsidized basis. Many utilities are starting to choose solar mainly because of its low cost, not for policy reasons. The world record low for solar at present is 2.42 cents/kWh at an auction in Abu Dhabi in September.

In the U.S., the unsubsidized levelized cost of utility solar is now 4.6-6.1 cents/kWh, which is roughly equal to the cost of natural gas of 4.8-7.8 cents, according to comprehensive analysis by Lazard's "Levelized Cost of Energy Analysis - Version 10.0."

"I don't think politics are needed to support these [renewable energy] asset classes. They will do just fine because they are economically viable and they make sense," according to Sachin Shah, head of Brookfield Asset Management's renewable energy unit.

The second reason why the Trump administration presents only a temporary obstacle for solar is that the solar industry is a global business in which the U.S. plays a limited role. The U.S. accounted for only 18% of world installs in 2016. That means that even if the Trump administration somehow made the entire U.S. solar market disappear overnight, the global solar industry would see a one-time drop of 18% and would then start to grow again by its usual rate of about 15-20%. Moreover, there is strong government policy support for solar in much of the rest of the world even if the U.S. federal government becomes a policy laggard during any particular 4-year presidential term.

Third, the federal government is certainly not the only game in town when it comes to U.S. solar support. There is strong support for solar from many other quarters such as states, cities, municipalities, corporations, and homeowners.

At the state level, for example, solar will continue to see support from the Renewable Portfolio Standards (RPS), which require utilities to derive certain percentages of their electricity generation from renewable sources. There are RPS mandates in 38 states that require in total that 10.2% of U.S. electricity will have to come from renewable energy by 2020 and 12.9% by 2030, according to Bloomberg New Energy Finance (BNEF). In addition, California and New York, for example, have very aggressive goals to source 50% of their electricity from clean energy by 2030.

Corporations will continue to be big drivers of solar regardless of whether or not the federal government supports solar. Many large U.S. corporations believe in the need to address global warming and have adopted aggressive sustainability goals. Large U.S. corporations such as Apple, Google, Wal-Mart, Amazon.com and many others signed 2.3 GW of power purchase agreements (PPAs) for clean energy in 2015 alone, according to BNEF. U.S. companies will buy another 17.4 GW of clean energy PPAs over the next nine years, according to BNEF.

After President Trump issued his executive order to rescind the Clean Power Plan, GE CEO Jeff Immelt expressed regret, saying that GE supports the Paris climate agreement and that

corporations need to rise above national politics and do what is good for customers and society. He said, "Companies must have their own 'foreign policy' and create technology and solutions that address local needs for our customers and society."

Markets await Trump policy plans

The markets are waiting for more clarity on the Trump administration's renewable energy policy. President Trump has already ordered the EPA to rescind its Clean Power Plan (CPP), which was a plan to force utilities to reduce their carbon emissions. On the more positive side, however, EPA Director Scott Pruitt has said that the EPA will not try to overturn President Obama's 2009 CO2 endangerment finding, which provided the legal basis for the EPA to regulate CO2. On other key issues, the markets are waiting to see if the Trump administration withdraws from the Paris climate agreement and whether there will be any changes to the U.S. solar investment tax credit that is due to last until 2021.

EPA Director Scott Pruitt has taken fire from climate deniers for not overturning former President Obama's CO2 endangerment finding. However, Mr. Pruitt has reportedly concluded that the EPA would lose that legal battle and does not want to waste the time. The CO2 endangerment finding has already been affirmed all the way up to the U.S. Supreme Court. In order to overturn the finding, the EPA would have to provide scientific evidence that global warming is a hoax, evidence which of course does not exist.

The fact that the EPA's CO2 endangerment finding will remain in place is very important for future climate regulation because it means that the EPA remains legally bound to regulate CO2. While the Trump Administration may have no intention of carrying out its legal duty to regulate CO2, the legal requirement will remain in place as the legal foundation for future presidential administrations to regulate CO2.

Regarding the Paris COP21 climate agreement, the Trump administration has said that it will decide before the May 26 G7 summit in Italy whether the U.S. will stay in the Paris agreement. Politico reported that President Trump's advisors will have a showdown meeting on Tuesday, April 18, to hash out a decision. President Trump's advisors are reportedly split on whether the U.S. should stay in the Paris agreement.

Under the Paris COP21 agreement, the U.S. agreed to meet a voluntary goal of reducing carbon emissions by 17% by 2020, by 26-28% by 2025, and an intent to reduce emissions by 80% by 2050. There are 195 nations that have agreed to the Paris climate agreement as the culmination of decades of climate negotiations.

If the Trump administration does decide to withdraw from the Paris agreement, it will not be an immediate process. The agreement is binding for the next three years and the agreement after that requires a 1-year notice to withdraw, meaning that the Trump administration could not fully withdraw from the COP21 agreement until President Trump's 4-year term is essentially over.

However, President Trump could withdraw faster if he takes

the more drastic action of withdrawing altogether from United Nations Framework Convention on Climate Change. That treaty established the overall UN climate process and was unanimously adopted by the Senate in 1992 and signed into law by President H.W. Bush. The U.S. could withdraw from that treaty on one year's notice. That withdrawal would also effectively cancel U.S. participation in the Paris COP21 agreement.

Alternatively, as a kind of back-door exit, Mr. Trump could send the Paris agreement to Congress to be approved as a treaty. That approval would not be likely in the Republican-dominated Senate, shifting the blame to Congress for killing the agreement.

Instead of announcing an official withdrawal from the COP21 agreement, Mr. Trump could stay in the agreement but ignore the U.S. carbon reduction targets or seek to revise the targets. The targets are voluntary in any case and there are no penalties if the targets are not met. There is little chance that the U.S. will meet the targets anyway since Mr. Trump plans to rescind the Clean Power Plan, which was the main vehicle for the U.S. to meet its Paris targets.

Whether the U.S. stays in the Paris agreement or not, it is clear that other countries will need to take over the mantle of climate leadership if the world wants to meet the Paris goal of limiting global warming to 2 degrees Celsius by 2030. Key world leaders have already said they will stick with the Paris agreement regardless of what the Trump administration does and will stick to their voluntary COP21 carbon reduction goals.

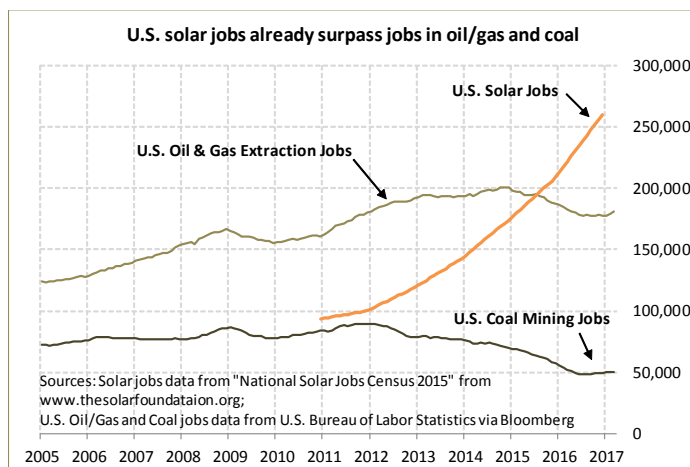
China, for example, has already enshrined its Paris carbon-reduction targets into its domestic Five-Year plan. China's Vice Foreign Minister said after Mr. Trump's election that China plans to continue addressing climate change "whatever the circumstances."

Europe's top climate official, European commissioner Miguel Arias Canete, expressed regret about the Trump administration's intent to rescind the Clean Power Plan, but said, "Despite all the current geopolitical uncertainties, the world can count on Europe to maintain global leadership in the fight against climate change. We will stand by Paris, we will defend Paris, and we will implement Paris."

U.S. solar ITC rolls on

The Trump administration has not mentioned any intent to repeal or curb the already-existing solar investment tax credit (ITC), which provides a 30% tax credit on solar installs. Congress in late 2015 extended the solar federal ITC for 5 years at 30% through 2019 with a step down to 26% in 2020 and 22% in 2021. The ITC in 2022 will expire entirely for direct-owned residential, but will remain at 10% indefinitely for utility PV projects, non-residential, and third-party-owned residential solar installations.

If Republicans do make a move to curb the solar ITC, Senate Democrats could filibuster the attempt. Nevertheless, a repeal of the solar ITC could be wrapped up in a big tax reform package



that bypasses a filibuster through reconciliation. Therefore, there is still a risk of a solar ITC repeal, which would put a big dent in U.S. solar demand over the next few years. Greentech Media estimates that solar installs in the U.S. could be cut in half if Congress were to repeal the solar ITC.

Despite these risks, there are reasons to suspect that Mr. Trump and the Republican Congress will not try to repeal solar ITC legislation. First, a majority of Republicans now believe that climate change is real and favors clean energy. A recent Pew Research poll found that 84% of Trump supporters favor expanding solar panel farms and 77% support expanding wind turbine farms.

Second, Washington already has an up-and-running jobs program with solar since the number of solar jobs has already exceeded the number of jobs in the U.S. oil/gas extraction sector and in the U.S. coal mining sector, as seen in the above chart. Moreover, many of those solar jobs are in Republican-dominated states. It would not make much sense to repeal the solar ITC and cause job layoffs in the solar sector while trying to stimulate new jobs elsewhere with an infrastructure spending program. In fact, solar already constitutes an energy infrastructure program.

U.S. solar jobs have soared by an annual rate of 22% over the last four years to 260,077 jobs at the end of 2016, according to the "National Solar Jobs Census 2016" published by The Solar Foundation ([link](#)). That shows that direct solar jobs now exceed the latest figures of 180,700 direct jobs in the oil/gas extraction industry and 50,300 direct jobs in the coal mining industry, according to figures from the U.S. Bureau of Labor Statistics.

Globally, solar is an even bigger employer with 2.8 million solar jobs worldwide in 2015, up 11% from 2014, according to the "Renewable Energy and Jobs - Annual Review 2016" from the International Renewable Energy Agency (IRENA) ([link](#)). China is way ahead of the U.S. in solar jobs with 1.7 million jobs in 2015 due to larger installation and manufacturing solar operations, according to the IRENA report. Japan also has more solar jobs than the U.S. at 377,100, according to IRENA.

SOLAR PV GROWTH OUTLOOK

Over the last five years, global PV annual solar installs have surged to 75.0 GW in 2016 from only 28.5 GW in 2011, producing a very strong +21% compounded annual growth rate, according to Bloomberg New Energy Finance (BNEF).

The global solar industry in 2016 showed a very strong growth rate of +34% year-on-year to 75.0 GW from 56 GW in 2015 mainly because of a surge of installations in the U.S. and China caused by developers trying to beat respective subsidy deadlines. However, those surges were temporary and the industry is expected to retrench a bit in 2017 before resuming more natural growth rates in 2018 and beyond.

For 2017, BNEF is forecasting world solar installs at 78.6 GW, which would represent a 5% annual growth rate. Other research firms have similar 2017 global solar forecasts with IHS forecasting +5% growth to 79 GW. However, GTM Research is more optimistic, forecasting +13% growth to 85 GW.

Regarding a longer-run solar growth rate, the International Renewable Energy Agency (IRENA) is forecasting 15% annual solar industry growth through 2030 with PV capacity up six-fold at 1,760 GW by 2030. IRENA expects solar PV to account for about 7% of worldwide electricity generation by 2030 versus only 1.2% in 2015.

The long-term demand outlook for solar remains very strong since solar will account for some 35% (3,439 GW) of all electricity capacity additions and a massive \$3.4 trillion of solar spending through 2040 (averaging about \$135 billion per year), according to BNEF. BNEF forecasts that solar PV will account for 15% of world electricity capacity by 2040, up from only about 1.2% today.

Demand for solar should continue to surge in coming years as unsubsidized solar pricing falls farther and increasingly beats other sources of electricity generation. Solar costs have already fallen by some 50% over the past several years. Looking ahead, the International Renewable Energy Agency predicts that the average solar electricity cost will plunge by another -59% by 2025, making solar the cheapest form of power generation in "an increasing number of cases."

China's 2017 solar installs expected to pull back after 2016 spike

China's solar installs in 2016 soared by 58% to 30.0 GW from 19.0 GW in 2015, according to BNEF. Solar surged in 2016 as developers scrambled to meet a June 2016 step-down in the feed-in-tariff. Most of the installs occurred the first half of 2016, leading to a glut of panels in the second half of 2016 that caused solar panel pricing to drop sharply.

Chinese solar installs in 2017 will be 27-31 GW, according to a forecast by BNEF, which would mark little change or even a decline from the 2016 level of 30 GW.

The Chinese government is trying to slow solar growth to more sustainable growth levels to ease recent problems such as (1) electricity oversupply in some northwestern districts that have led to some curtailment of solar electricity usage, and (2) delays by the government in making subsidy payments to developers. The Chinese government in its latest 5-year plan in fact cut its target for installed solar capacity by 2020 to 105 GW from a previous target of 150 GW as it tries to encourage a strong but sustainable solar growth rate.

U.S. faces 2017 slowdown after 2016 utility solar surge

U.S. solar installs in 2016 soared by 90% to 13.7 GW, according to BNEF. U.S. solar has surged by a 48% compounded annual rate over the past five years.

Solar accounted for 39% of all new U.S. electricity generation capacity in 2016, up from 30% in 2015 and 27% in 2014, according to GTM Research. Solar was the largest source of new electricity generation in 2016, easily beating natural gas at 29% and wind at 26%.

The surge in 2016 solar growth was mainly due to a +148% y/y spike in utility PV, which accounted for about 72% of all U.S. solar installs in 2016. Utility PV saw a big spike 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 planned moved ahead in 2016, thus causing the 2016 bulge. GTM estimates that about 4-5 GW of utility projects spilled over into 2017 from the 2016 ITC surge, which will keep utility PV strong in 2017. However, utility PV will then reset in 2018 to a more natural growth rate.

The drop in utility PV growth to more normal levels starting in 2017 is expected to cause overall U.S. solar installs in 2017 to fall by -10% to 13.2 GW, according to GTM Research. However, that is still a very strong install figure since it is +76% higher than the 2015 level. GTM is forecasting that U.S. solar installed capacity will nearly triple over the next 5 years and that annual installs will be 18 GW by 2022.

Solar is progressively becoming more diversified across the country rather than being concentrated in just a few states. A record number of 22 states in 2016 added more than 100 MW of solar PV. California saw the largest number of installs by far at 5.1 GW. Other state solar leaders in 2016 by ranking included Utah, Georgia, Nevada, North Carolina, Texas, Arizona, Massachusetts, Florida, and Colorado.

U.S. solar in the next five years will benefit from the federal investment tax credit (ITC), which stays at 30% in 2017-2019 and then steps down to 26% in 2020 and 22% in 2021. In 2022,

SOLAR PV GROWTH OUTLOOK (CONTINUED)

the ITC will expire entirely for direct-owned residential, but will remain at 10% indefinitely for utility PV projects, non-residential, and third-party-owned residential solar. Projects only need to commence construction by the end of the year in question to qualify for the ITC, as opposed to the previous requirement that the project had to be completed and grid-connected by year-end. The solar ITC extension was approved by Congress in late 2015 as part of a bipartisan energy bargain that involved trading the solar ITC extension in return for dropping the ban on exporting U.S. crude oil.

Japan is coming off its Fukushima solar boom

In Japan, solar surged after the Fukushima nuclear disaster in 2011 due to a generous government feed-in-tariff (FIT). Japan solar installs soared by +64% on an annual compounded basis in the five years through 2015. However, Japan is in the process of bringing 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.

Japan solar installs in 2016 fell by -20% to 9.2 GW from the record high of 11.5 GW seen in 2015, according to BNEF. BNEF is forecasting that Japan solar installs will drop by -37% to 5.8 GW in 2017.

India solar boom in progress

The Indian government is pushing solar very hard as part of its goal of modernizing India's infrastructure and boosting its global business competitiveness. The government has a set goal of installing a cumulative 100 GW of solar by 2022, including 40 GW of rooftop solar. The 100 GW target would be 10 times India's cumulative installed solar capacity of about 10 GW at the end of 2016.

India's solar installs in 2016 more than doubled to 4.4 GW from the low base of 2.1 GW in 2015. India's solar installs in 2017 will roughly double again to 8.9 GW, according to BNEF. That means that India in 2017 should be able to easily take over third place from Japan as the third largest country for solar installs.

European solar growth remains weak on the move away from feed-in-tariffs

European solar growth has slowed substantially in recent years as previous booms ended when subsidies were cut. European governments are now relying more on auctions to buy solar rather than relying solely on feed-in-tariff schemes that are difficult to calibrate.

In 2016, German solar grew slightly by +1% to 1.5 GW, French solar fell by -24% to 675 MW, UK solar fell by -52% to 2.0 GW, and Italian solar grew by +37% to 407 MW.

Rest-of-world is coming on strong

In 2016, the top three countries of China, U.S., and Japan accounted for 70% of world solar installs. However, solar growth in coming years will diversify as a wide range of other countries ramp up installations.

The further geographical diversification of solar will be a very healthy development for the solar industry because it will reduce the industry's exposure to boom-bust events in various countries that have buffeted the solar industry in recent years. The diversification of growth should lead to a more stable and more predictable growth rate that allows the industry to better manage capacity additions and profit margins.

In 2016, solar installs from the "rest of world (ROW)" (countries other than China, U.S., Japan, India, and Europe), totaled 11.1 GW and accounted for about 15% of world installs. However, the ROW category over the next few years is expected to grow dramatically, becoming larger than even China with a total ROW market share of about 40% by 2019 versus only about 23% for China in the same year, according to BNEF.

Specifically, BNEF is forecasting that ROW solar will grow to 17.3 GW in 2017 (+56%), 33.7 GW in 2018 (+95%), and 36.5 GW by 2019 (+8%). Areas coming on strong include Latin America, the Middle East, and Southeast Asia.

SOLAR PV ANNUAL NEW INSTALLATIONS THROUGH 2016

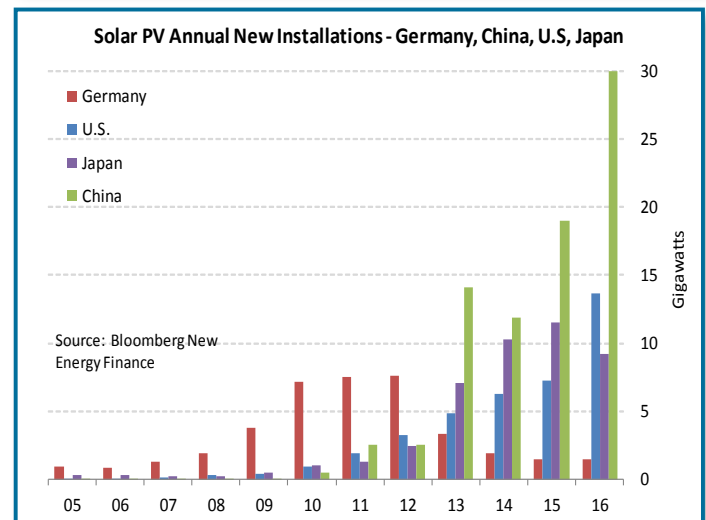
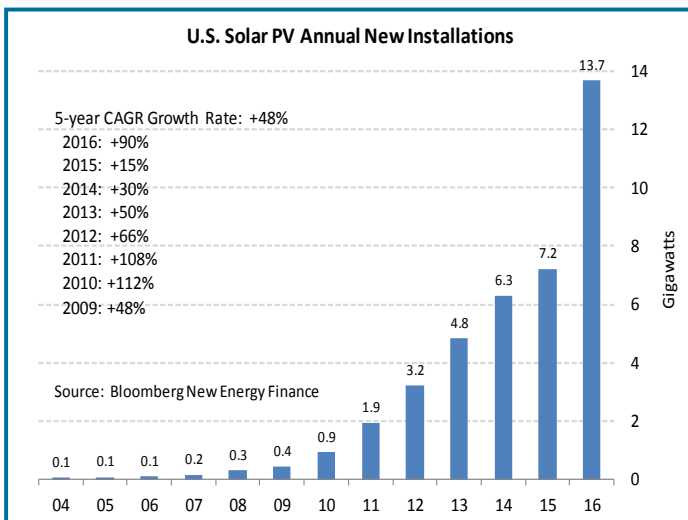
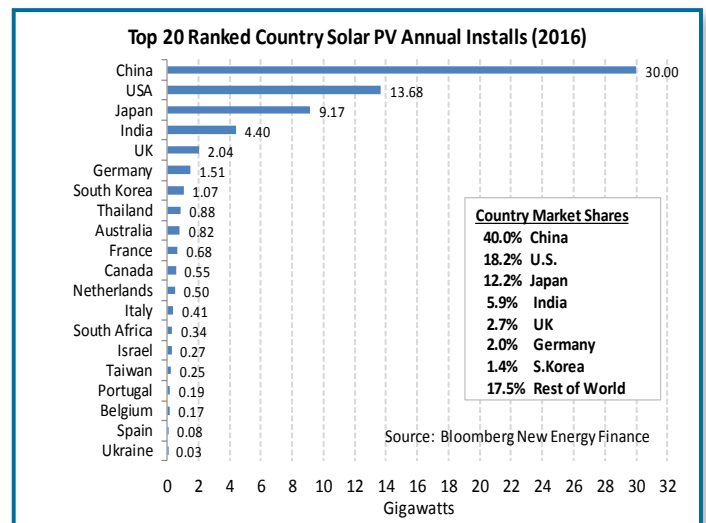
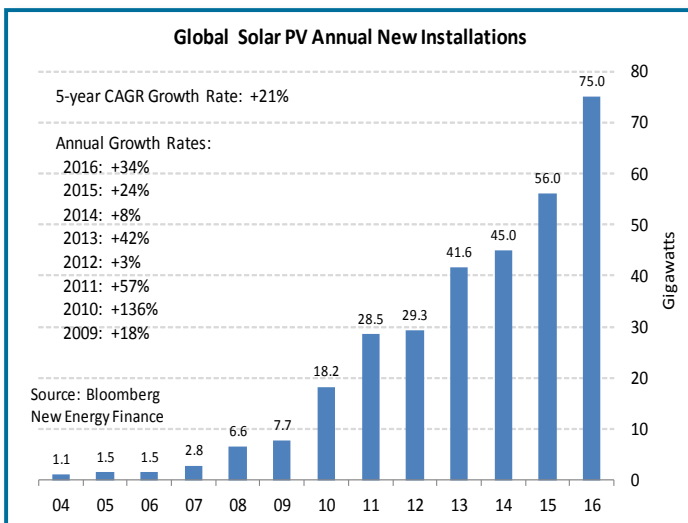
New global solar PV installations in 2016 grew by +34% y/y to a record 75.0 gigawatts (GW), according to Bloomberg New Energy Finance (BNEF). The 2016 growth rate of +34% followed growth rates of +24% in 2015, +8% in 2014 and +42% in 2013. Global solar PV installations have grown at a compounded annual rate of +21% over the last 5 years and have risen by eleven-fold from 2008.

In 2016, China was the top country in the world for annual PV installs for the fourth straight year with 30.0 GW of installs, up by +58% from the 19.0 GW of installs seen in 2015. The U.S. passed up Japan to take second place for new installs in 2016 with a 90% surge to 13.7 GW. Japan fell into third place with solar installs falling by -20% to 9.2 GW. India moved ahead of the UK into fourth place with +113% growth to 4.4 GW.

The sharp increase in installs in China, the U.S. and India more than offset the declines in continental Europe where installs continued to be undercut by low subsidy support. German solar

installs in 2016 rose slightly by +1% to 1.5 GW and remained far below the 2013 peak of 7.6 GW. French installs in 2016 fell by -24% to 675 MW, far below the 2011 peak of 1.8 GW. Italian installs in 2016 rose by +37% to 407 MW but remained far below the 2011 peak of 7.9 GW. UK installs fell by -52% to 2.0 GW as the government curbed feed-in-tariffs.

U.S. solar PV installations in the past five years have surged by a compounded annual rate of +48% and are up by seven-fold from the 1.9 GW level seen in 2011, according to BNEF. The states with the largest amount of new PV solar installations in 2016 were California (+56% to 5.1 GW), Utah (+438% to 1,241 MW), Georgia (+313% to 1,023 MW), Nevada (+229% to 984 MW), North Carolina (-19% to 923 MW), Texas (+216% to 672 MW), Arizona (+155% to 657 MW), Massachusetts (+23% to 406 MW), Florida (+840% to 404 MW), and Colorado (+162% to 382 MW), according to GTM Research.



SOLAR PV CUMULATIVE INSTALLATIONS THROUGH 2016

The amount of cumulative PV electricity generation capacity across the world grew sharply by +30% y/y to 323 GW in 2016, according to Bloomberg New Energy Finance (BNEF). In just five years, global cumulative solar PV electricity generation capacity increased by more than four-fold from 73 GW in 2011 to 323 GW in 2016, representing a compounded annual growth rate of +35%.

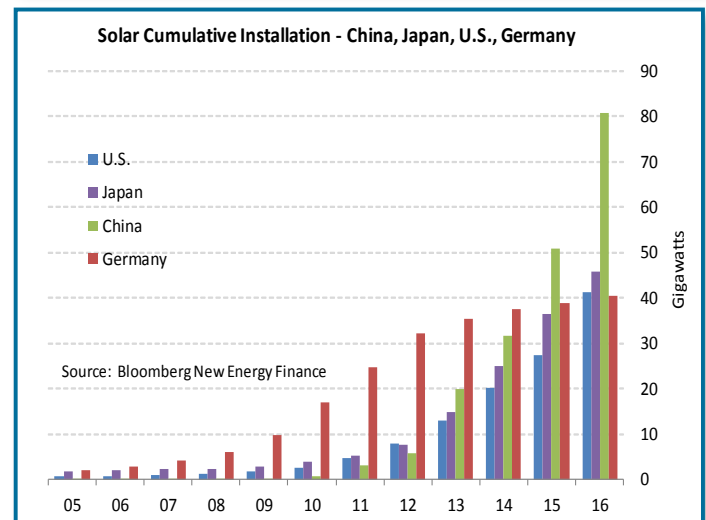
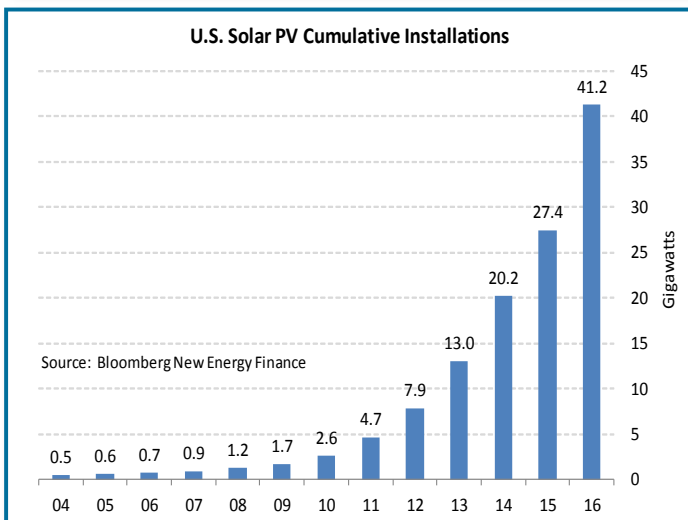
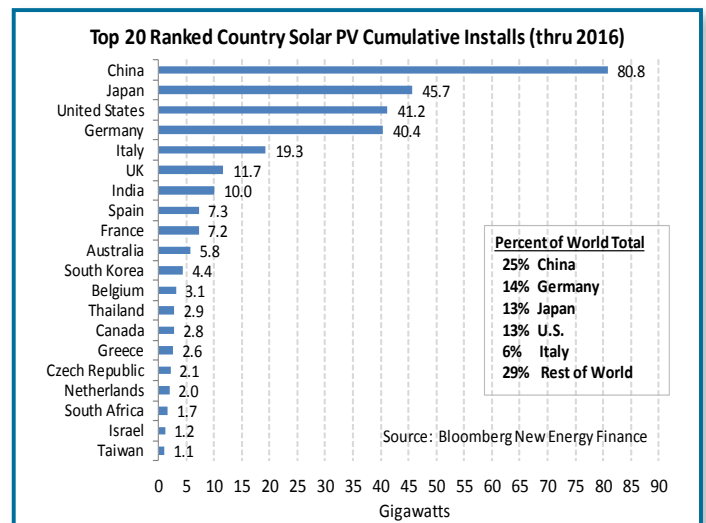
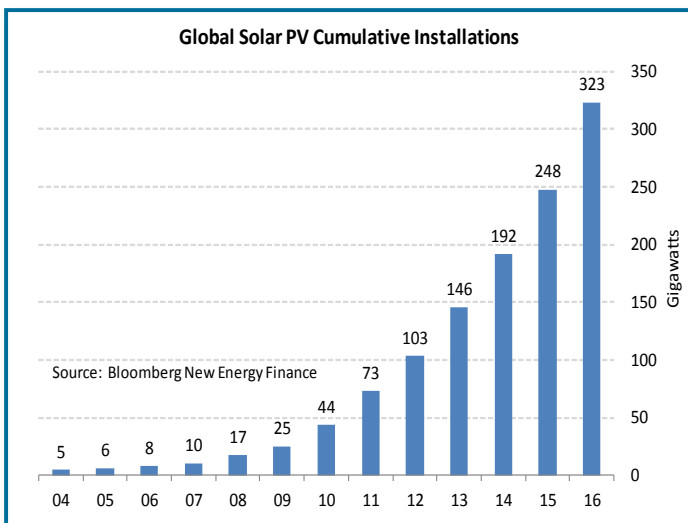
China remained in the world's top spot for cumulative solar capacity at 81 GW, according to BNEF. China at the end of 2016 accounted for 25% of the world's solar PV capacity. In the past five years, China's cumulative installed solar capacity has soared by about 25-fold from 3.2 GW in 2011 to the 2016 level of 81 GW, representing a 5-year compounded annual growth rate of 91%.

Germany in 2016 remained in second place with 40 GW of cumulative solar PV capacity, up by +4% from 2015. Germany's

cumulative solar electricity capacity in the past 5 years has risen 1.6-fold from 24.6 GW in 2011. Germany at the end of 2016 accounted for 14% of the world's total solar PV capacity.

Japan remained in third place for the third straight year. Japan's cumulative solar capacity in 2016 rose by +25% to 46 GW, representing 13% of world capacity. Japan's cumulative solar capacity in the past 5 years has risen by nearly nine-fold to 46 GW from only 5.2 GW in 2011, representing a 5-year compounded annual growth rate of 54%.

The U.S. remained in fourth place for the fourth straight year. U.S. solar capacity in 2016 rose by +50% to 41 GW, representing 13% of world capacity. U.S. cumulative solar electricity capacity over the past five years rose by nearly nine-fold to 41 GW from 4.7 GW in 2011 and showed a compounded annual growth rate of +55%.



SOLAR PRICING

Prices for solar cells and modules have fallen sharply over the past year and have hit record lows. Specifically, the price of multicrystalline solar cells fell to a record low of 21 cents per watt in Sep 2016 and was most recently quoted just slightly above that level at 22 cents, according to Bloomberg New Energy Finance (BNEF). Solar cell prices have fallen by -29% on a year-to-year basis and by a total of -73% in the past six years from the 81-cent level seen in mid-2011.

The average price of silicon solar modules has moved lower since early 2016 and is currently at a record low of 35.2 cents per watt, according to PV Insights. Solar module prices have fallen by -37% on a year-to-year basis and by -63% in the past 6 years from the \$1.25 level seen in mid-2011.

Spot polysilicon prices fell to a new record low of \$12.76 per kg in mid-Oct 2016, but have since rebounded mildly higher to the current level of \$13.70, according to BNEF. Polysilicon prices

are little changed from the year-earlier level but have plunged by -73% in the past 6 years 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 has fallen to a record low of 34.0 cents per watt, according to PV Insights. Thin-film module prices have fallen by -36% on a year-to-year basis and by -73% from the mid-2011 level of 95.5 cents.

Solar prices have fallen sharply over the past year mainly because of panel oversupply after the solar install spikes seen in China and the U.S. in 2016 caused by developers trying to beat respective subsidy reduction deadlines. Solar pricing is also moving lower in line with its long-term downward trend that is the result of lower production costs stemming from technology advances and from scale manufacturing.

