

## 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), fell -2% in 2014, giving back a small part of the +127% surge seen in 2013. So far in 2015, the Index is down -2%. Solar stocks have showed weakness since September due to falling oil and natural gas prices, the Republican victory in the Senate, solar bottlenecks and reduced subsidy support in Japan, and concern about slower economic growth in China. Nevertheless, the fundamentals of the solar industry remain favorable with strong end-user demand, stable polysilicon and solar panel pricing (see charts on p. 3), right-sized industry capacity, and improving profitability among solar manufacturers.

#### Plunge in oil prices hurts solar stocks even though there is little direct connection

The recent plunge in Brent crude oil prices to \$46/barrel has had a negative impact on solar stocks since some market participants worry that the plunge in oil prices will reduce government policy pressure to support alternative energy. However, there is little direct connection between solar and crude oil prices. Petroleum is mostly used as fuel for the transportation sector and has little to do with solar power's role in generating electricity. Petroleum

accounts for less than 1% of U.S. electricity generation and less than 5% of worldwide electricity generation. Solar City's CEO recently noted that oil prices could go to \$50 or \$150 per barrel and it would have almost zero effect on electricity prices.

#### Natural gas prices fall in December but New York bans fracking due to public health concerns

Solar stocks were also hurt by the drop in natural gas prices in December to the \$3 area from the average of about \$3.80 seen during summer and autumn. Lower natural gas prices reduce variable costs for some electric utilities and natural gas presents more direct competition with solar power than oil. However, lower natural gas prices seldom actually reduce utility electricity prices for customers since utilities still have much larger costs for transmission, distribution, grid infrastructure, and operations. In fact, America's greater reliance on natural gas has failed to reduce electricity prices thus far considering that the average price of residential electricity in the U.S. rose to a record seasonal high of 12.9 cents/kWh in the latest reporting month of Sep 2014. While natural gas can be used by utilities to produce base-load electricity, natural gas cannot compete with solar when it comes to the environment or allowing customers to generate electricity on-site. Moreover, the drop in natural gas prices in December was attributed in part to mild early-winter weather across the U.S. and the weather has since turned much colder.

Natural gas is also running into stiffer regulatory headwinds as public awareness grows about the negative environmental effects from fracking involving water usage and pollution, and even earthquakes in some areas, as detailed, for example, in the Oscar®-nominated film "[Gasland](#)." In fact, the state of New York in December joined Vermont in banning oil and gas fracking in the state due to public health and environmental concerns. The public is learning that natural gas is not the panacea that some industry boosters have claimed.

#### Republican control of Congress causes concern about alternative energy support

Solar stocks have also recently been hurt by concern that the Republican's takeover of Congress in the November election will hurt the solar industry, even though the solar industry is a global

industry that is only partially dependent on solar's success in America. The U.S. solar industry in any case does not currently need any help from Congress since the 30% solar investment tax credit is already in place until the end of 2016, then dropping to 10%. President Obama would undoubtedly veto any attempt by Congress to repeal the current solar ITC, which in any case hasn't even been suggested by Republicans. The Solar Energy Industries Association (SEIA) has already launched a campaign to get the 30% ITC extended after 2016 involving educating members of Congress about the benefits of solar. An SEIA official noted that solar fits with key parts of Republican doctrine in that both political parties want to create jobs, stimulate economic development, improve America's energy security, and reduce pollution.

Solar power, in short, is not a Republican-Democrat issue. There are many Republicans who already have solar panels on the roofs of their homes. The benefits of solar energy are recognized across most of the political spectrum and the only real disagreement is about whether the government should provide any subsidy support. Subsidy support in any case is becoming less of an issue every day as solar costs fall and solar becomes more broadly competitive with the grid even without subsidies.

## U.S. solar pricing fell by 3-12% in 2014

U.S. solar pricing dropped by 12-19% in 2013, according to a recently-released report entitled "[PV Pricing Trends: Historical, Recent and Near-term Projections](#)" from the U.S. Department of Energy. The report projected a further drop of 3-12% in 2014. The report said that solar pricing is expected to continue to decline in coming years and reach widespread grid parity in the U.S. without federal or state subsidies within 5 years.

## Final U.S.-Chinese solar trade ruling is expected within the next few weeks

The U.S. Department of Commerce on Dec 16 announced anti-dumping tariffs and countervailing duties on Chinese solar companies when components are sourced from Taiwanese and other non-Chinese companies. The decision came in response to charges that Chinese solar module producers were using Taiwanese solar cells to evade the previous U.S. tariff determinations. The next step will come later in January when the U.S. International Trade Commission will determine whether the U.S. solar manufacturing industry suffered any injury from Chinese solar companies. If so, then a final order is expected by early February.

In the big picture, the U.S. tariffs on Chinese solar companies have boosted the competitiveness of non-Chinese solar producers, impeded the sales and profits of Chinese solar companies, and raised the price of solar for U.S. customers. However, Chinese companies are taking aggressive action to open factories in the U.S. and elsewhere, and enter joint ventures with other companies, in order to avoid the tariffs. In the long-run, the trade spat will have little net effect. In the meantime, U.S. solar installations have soared despite the trade spat and were

up +41% y/y in Q3-2014 at 1.354 GW, according to the SEIA and GTM Research, supporting the group's estimate for total U.S. PV installs of 6.5 GW in 2014 (+37% y/y).

## India's PM Modi launches solar boom

Indian Prime Minister Modi recently announced plans to boost India's installed solar capacity by 33 times to 100 GW by 2022, quintupling the government's previous target of 20 GW. The government also wants global private companies to build large solar factories in India that are capable of churning out solar panels to meet the government's ambitious goals. India in 2013 was the sixth largest country for solar PV installs at 1.2 GW, according to Bloomberg New Energy Finance. India, as of the end of 2013, had only 2.7 GW of installed solar generating capacity, meaning the country has a long way to go to install another 97 GW of solar in just 8 years. The Indian government aims to boost solar's share of India's electricity generation capacity to 10% from the current level of less than 1% as part of its electric modernization program.

Global solar companies are quickly jumping on the new solar opportunities in India. SunEdison (SUNE) on Jan 12, for example, announced an agreement to partner with Indian port owner/electricity provider Adani Enterprises to spend up to \$4 billion to build a massive, fully-integrated solar manufacturing plant in India. SunEdison also announced agreements with two different Indian states to install 5 GW of utility-scale solar farms. First Solar already has a substantial footprint in India and other solar companies such as Canadian Solar, JA Solar, and JinkoSolar have expressed interest in producing and/or selling solar panels in India.

## Germany's largest utility goes after renewables with an entirely new business model

Germany's largest utility E.ON in December announced plans to split into two, spinning off its conventional electricity generation activities into a new entity and switching the focus of the existing company to a dedicated renewable energy business including solar and wind, as well as distribution networks and customer businesses. E.ON's CEO said that the move was being made to "tap the growth potential created by the transformation of the energy world." Meanwhile in the U.S., NextEra Energy acquired Hawaii's main utility company and intends to use Hawaii as a test bed for a transition to a heavy reliance on renewables. Accenture in December published a [report](#) saying that U.S. and European utilities could take a \$130 billion hit from disruptive technologies within 10 years.

## PV+Storage, the holy grail, is set to surge

U.S. sales of combined solar rooftop and battery storage systems will reach \$1 billion within four years (318 MW of capacity), according to a recent report by GTM Research. Meanwhile, PV+Storage worldwide will grow tenfold by 2018, according to IHS. PV+Storage can provide 24-hour electricity, which compensates for solar's inability to produce electricity at night.

## SOLAR PRICING

Prices for solar cells and modules since mid-2014 have been moving mostly sideways. Specifically, the price of multicrystalline solar cells edged to a record low of 33 cents per watt in late December 2014 but then rose to 34 cents in early January, according to data from Bloomberg New Energy Finance. Solar cell prices in the past 3-1/2 years have plunged by a net -58% from the 81-cent level seen in mid-2011.

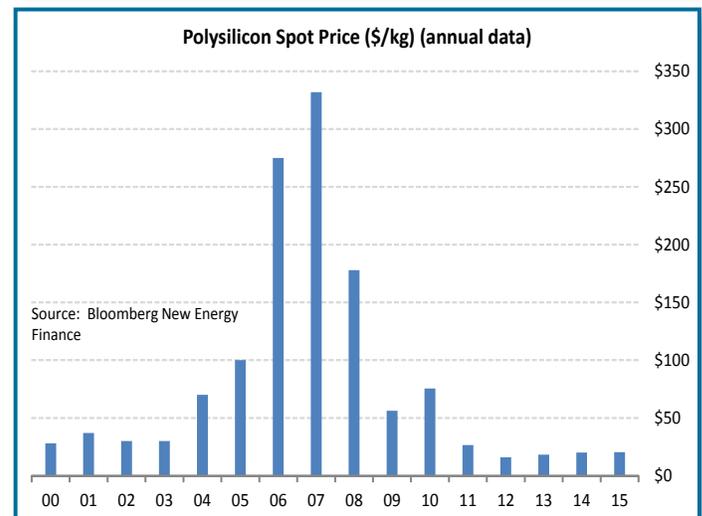
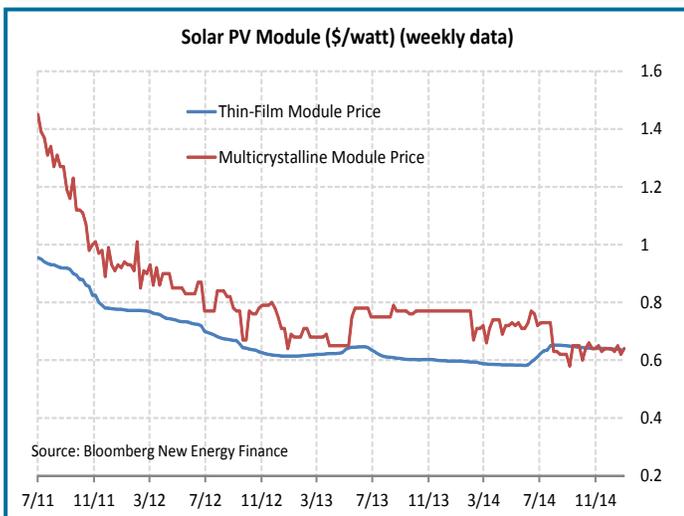
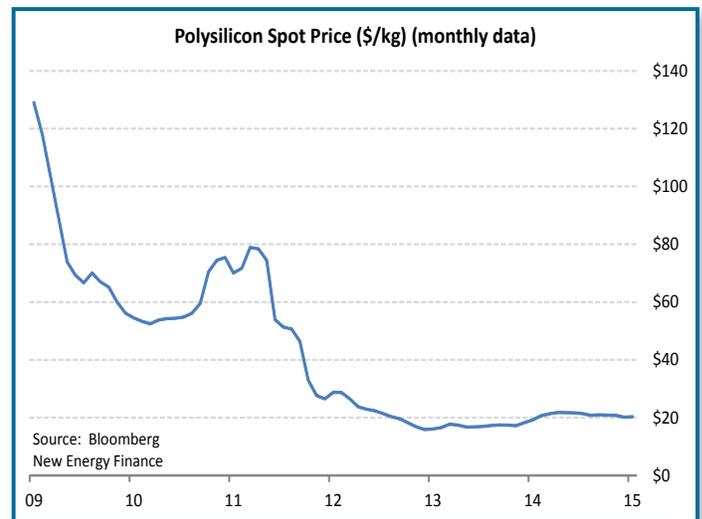
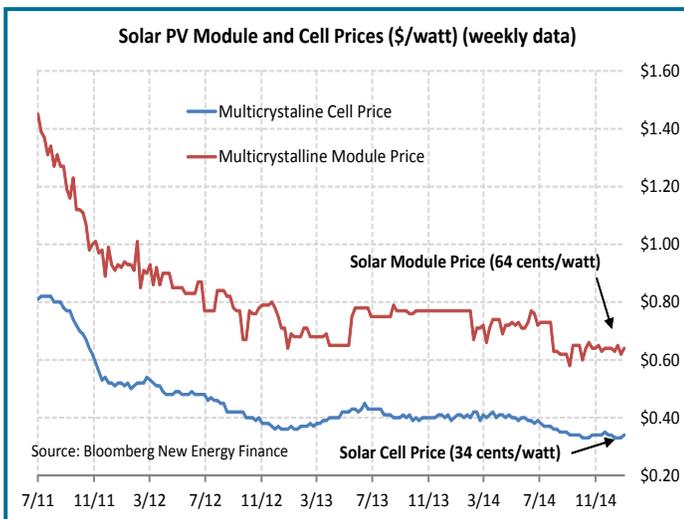
Meanwhile, multicrystalline solar module prices posted a new record low of 58 cents per watt in September 2014 but have since recovered by 10% to 64 cents per watt by early-January, according to data from Bloomberg New Energy Finance. Solar module prices in the past 3-1/2 years have plunged by a net -56% from the \$1.45 level seen in mid-2011.

Spot polysilicon prices have been trading sideways just above \$20 per kilogram and were quoted at \$20.35 in early January, according to data from Bloomberg New Energy Finance.

Polysilicon prices posted a record low of \$15.83 per kilogram in Dec 2012 but have since recovered by 29% to current levels. Polysilicon prices in the past 3-1/2 years have plunged by a net -60% from the \$51.37 level seen in mid-2011.

Solar pricing since 2013 has stabilized mainly because of stronger demand and reduced production capacity after the 2011-12 shakeout forced smaller and higher-cost producers out of the market. In addition, the large players are now calibrating their production more closely to demand. Various trade spats have also provided some support for solar module prices.

The price of thin-film modules made by First Solar and others posted a new record low of 58.2 cents in early June 2014, according to Bloomberg New Energy Finance. Thin-film module prices have since recovered modestly by 9% to 63.7 cents per watt.



## SOLAR PV ANNUAL NEW INSTALLATIONS

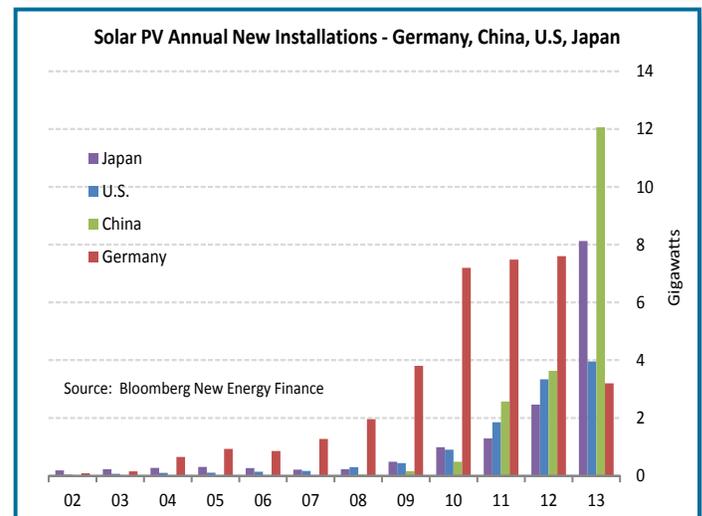
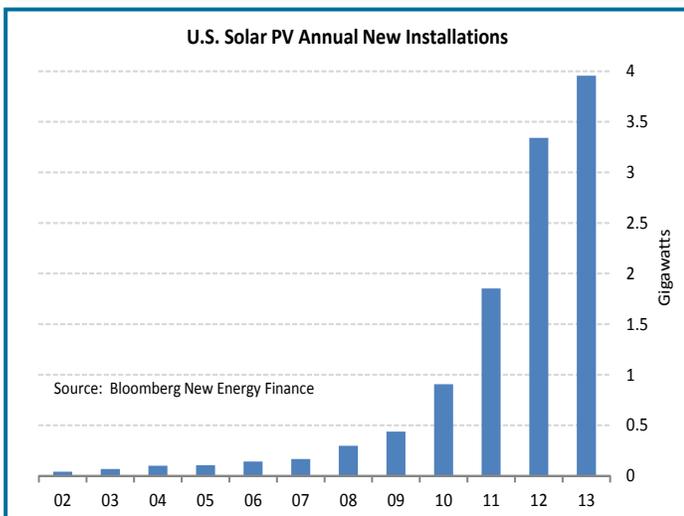
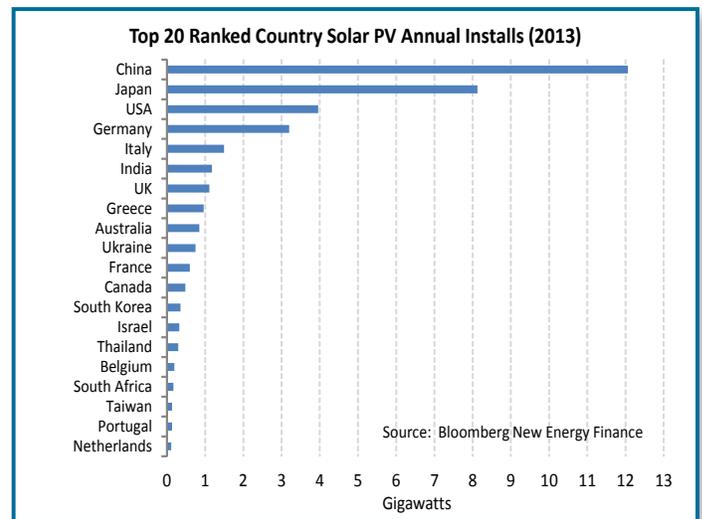
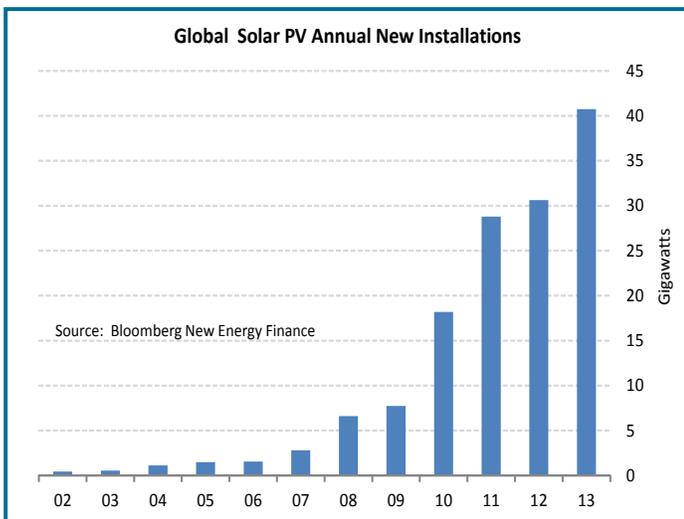
Global new solar PV installations in 2013 grew by +33% y/y to a record 40.7 gigawatts (GW), according to Bloomberg New Energy Finance. That was up from 30.6 GW in 2012 and a sharp improvement from the poor +6% y/y growth rate seen in 2012. Global solar PV installations have grown by a compounded annual rate of +44% over the last 5 years and have risen by six-fold from 2008.

China leapfrogged Germany into the number one world spot for annual PV installs with 12.0 GW of installs in 2013, up by +232% from its 2012 level of 3.6 GW. Japan took second with 8.1 GW of new installs in 2013, up by +230% from 2.5 GW in 2012. The U.S. stood third in new installs at 4.0 GW.

The sharp increase in installs in China, Japan and the U.S. more than offset the declines in Europe caused by reduced subsidy support. German installs in 2013 fell by -58% to 3.2 GW from 7.6

GW in 2012, although that was still large enough to put Germany in fourth place for world installs. Italian installs fell by -58% to 1.5 GW from 3.6 GW in 2012. French installs fell by -44% to 600 MW from 1.1 GW in 2012. The diversification of solar PV installs beyond Europe was a very healthy development for the solar industry.

U.S. solar PV installations in 2013 grew by +18% to a record high of 4.0 GW from 3.3 GW in 2012, according to data from Bloomberg New Energy Finance. U.S. PV installations over the last 5 years have grown by a compounded annual growth rate of +68%. SEIA is forecasting that U.S. PV installs will grow by an annual compounded growth rate of about +30% over the next three years to 9.2 GW by 2016. The states with the largest new PV solar installations in 2013 were California (2,621 MW), Arizona (421 MW), North Carolina (335 MW), Massachusetts (237 MW), and New Jersey (236 MW), according to the SEIA.



## SOLAR PV CUMULATIVE INSTALLATIONS

The amount of cumulative PV electricity generation capacity across the world grew sharply by +40% y/y to 146 gigawatts (GW) by the end of 2013, according to data from Bloomberg New Energy Finance. In just five years, global cumulative solar PV electricity generation capacity has increased by nine-fold from 16.8 GW in 2008 to 146.0 GW in 2013, representing a compounded annual growth rate of +43%.

Germany at the end of 2013 had the world's largest amount of cumulative installed solar electricity generation capacity by far at 35.4 GW, according to Bloomberg New Energy Finance. Germany's cumulative solar electricity capacity in the past 5 years has risen by more than five-fold from 6.1 GW in 2008 to 35.4 GW in 2013.

China moved into second place in 2013 with 19.1 GW of installed PV, representing 13.1% of installed global PV capacity. China's

cumulative solar electricity capacity in the past 5 years has risen by 136-fold from 140 megawatts in 2008 to 19.07 GW in 2013.

Italy was in third place in 2013 with 18.0 GW of installed PV, representing 12.3% of world capacity. Japan was in fourth place in 2013 with 15.6 GW of installed PV, representing 10.7% of installed global PV capacity.

The U.S. was in fifth place in world PV cumulative capacity in 2013 at 12.5 GW representing 8.6% of world capacity. U.S. cumulative solar electricity capacity over the past five years rose by more than nine-fold from 1.37 GW in 2008 to 12.5 GW in 2013 and showed an annual compounded growth rate of +47%.

