

SOLAR INDUSTRY ETF (TAN)

Long Term Outlook: Bullish

Price (9/01/16): \$20.83

52W Price Range: \$19-33

NAV: \$20.89

Expense Ratio: 0.70%

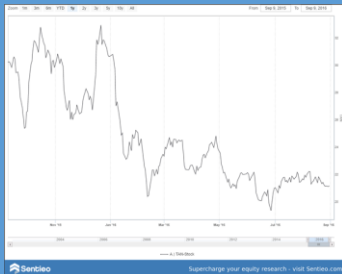
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Renewable Energy



TAN 1 Year Price Chart

Long Term Solar Industry Outlook

Near Term Stress; Long Term Success

- The solar industry has significantly matured over the last decade, from speculation on technologies to sustainable business models.
- A supply glut as well as margin pressures due to rapid growth in emerging markets may cause stress in the solar module manufacturing sub-sector, particularly with Chinese firms, though the negative effects are not likely to be anywhere near as devastating as the previous glut.
- *"Oversupply appears to be business as usual in the solar industry."*
- Balance of systems (BoS) costs will likely be a primary point of cost cutting as module prices reach a floor.
- The solar industry will exhibit some level of interest rate sensitivity going forward.
- There is a massive addressable market available for solar companies with sustainable business models to capture, as the era of alt. energy has only begun.
- I am extremely bullish of the broader solar industry in the long term, though personally I believe that security selection has the ability to outperform this index fund.

The Solar Industry: An Overview

The solar industry has historically been a fast changing, technology driven space where clear industry leaders can be toppled within just a few years. The industry has come a long way in the last decade and has significantly matured, moving from speculative investments on a particular technology into a somewhat more stable sector as the industry consolidates, and factors like operational efficiency or BoS costs are increasingly important.

Solar has become extremely competitive with fossil fuels in most areas, even cheaper without subsidies in some cases. With that being said, the solar industry is still young and immature when compared to the wind industry for example, so it will likely still exhibit a high beta and growth rate. The solar industry is expected to grow at a 13% CAGR over roughly the next decade. Solar currently makes up about 1.10% of total US electric generation capacity, but with 30% of all newly installed capacity in 2015 coming from solar (and similar trends worldwide), the industry still has plenty of room to grow. Overall, I believe that the solar industry in its current form is poised for a decade of continued strong growth at somewhat lower margins than the industry has previously enjoyed.

Utility Scale Solar vs Residential Solar

The solar industry is a diverse space, with investment opportunities at all levels of the supply chain. To give readers a feel for how the industry is divided, I will look at the industry from a more macro level and then move into the specific subsectors within the solar industry (and how they are covered in this ETF).

On a very basic level, there are two primary ways solar is installed, on residential and commercial rooftops or in large utility-scale installations. Residential solar costs more to install per Watt, though these installations save users from paying the much higher retail rate for electricity, so the higher cost is justified to residential solar users. Utilities have been actively fighting net metering (the ability for excess power produced by solar panels to feed into the grid and make a meter run backwards) in many states, which has made the viability of residential solar high variable by state. Generally, utilities are losing this battle though and residential solar is becoming increasingly competitive.

Due to its high upfront cost, most residential users require financing assistance, which solar companies have found creative ways to implement. Some companies lease the panels to the residential user, who “profit” from the difference between the electricity savings and lease cost (often with a buyout provision after ~20 years), while others bundle it with their mortgage.

Asset backed securities, backed by the solar installations themselves and the associated revenue streams, have also been proposed.

This area has historically been a “hot” sector on Wall Street, though the seemingly exponential growth of this sector has recently slowed. One residential solar installer included in this ETF, Sunrun (RUN), noted that after growing installations by 76% in 2015, the company expects to grow only 40% in 2016. This is partially due to the extension of the investment tax credit, which I will discuss later on.

Utility scale solar installations, which consist of multi-MW or multi-GW solar projects for wholesale power sales via PPAs (power purchase agreements) to utilities have been the primary driver for solar growth. Roughly 2/3rds of all solar generation in the US is from utility scale installations, which sell electricity for as low as \$0.03/kWh after incentives, which makes them extremely competitive with fossil fuels.

Utility scale installations are built by developers, or increasingly by solar module manufacturer systems segments (as this is a great way to sell high volumes of a company’s modules). Upon completion, these installations are typically operated by the developer on a PPA or sold to utilities (or other interested parties) for long term operation. Yieldcos are specialized publicly traded companies, oftentimes set up by module manufacturers who want an easy way to sell projects, which exist solely to operate long term renewable energy projects with fixed cash flows and to pay out the cash flows in the form of dividends. The solar industry ETF currently holds multiple yieldcos, with Terraform Global and 8Point3 Energy Partners being two notable examples.

Solar Industry ETF Holdings: Sectors and Sub-Sectors

Outside of the previously discussed solar module manufacturers and yieldcos, there are many other sub-sectors within the solar industry and this ETF in particular. This ETF covers solar capital equipment manufacturers, polysilicon and/or wafer producers (crucial resources used in C-Si solar panels), producers of glass used in solar modules and inverter producers (used in all solar installations to convert DC power to AC power).

Firms operating in the solar industry, across essentially all sub-sectors, traditionally take on large amounts of debt due to the industry’s very high capex requirements. This is because whether it is purchasing capital equipment or a solar project outright, the invoices often run into the hundreds of millions. So with few exceptions, many of the firms operating in the solar industry face a high interest expense. This pressures many manufacturers to constantly operate

at capacity to overcome tight gross margins, which stand just below 20% for most solar module manufacturers.

This ETF has just 23 holdings and does not hold all of the publicly traded entities in each of these sub-sectors. Additionally, many entities in the solar industry (particularly developer or firms involved in the downstream side of the production process) are privately held and therefore not able to be included in this ETF.

The below table shows the holdings from largest to smallest, utilizing data from Guggenheim as of 8/29/2016. Note that the “Type” column was added by me and is not comprehensive, as many companies will do more than I listed below. For example, many solar module manufacturers develop solar projects as well.

Ticker	Name	% Weighting	Type
TSL	TRINA SOLAR LTD-SPON ADR	6.96%	Module Manufacturer
3800	GCL-POLY ENERGY HOLDINGS LTD	6.58%	Wafer and PV materials
968	XINYI SOLAR HOLDINGS LTD	6.48%	PV Glass
SCTY	SOLARCITY CORP	5.78%	Residential Installer
TERP	TERRAFORM POWER INC - A	5.67%	Yieldco
FSLR	FIRST SOLAR INC	5.56%	Module Manufacturer
MBTN	MEYER BURGER TECHNOLOGY AG	4.71%	Production equipment
750	CHINA SINGYES SOLAR TECH	4.65%	Module Manufacturer
ABY	ATLANTICA YIELD PLC	4.48%	Yieldco
CAFD	8POINT3 ENERGY PARTNERS LP	4.37%	Yieldco
1165	SHUNFENG INTERNATIONAL CLEAN	4.37%	Developer/Operator
JASO	JA SOLAR HOLDINGS CO LTD-ADR	4.26%	Module Manufacturer
JKS	JINKOSOLAR HOLDING CO-ADR	4.04%	Module Manufacturer
GLBL	TERRAFORM GLOBAL INC - CL A	3.85%	Yieldco
CSIQ	CANADIAN SOLAR INC	3.81%	Module Manufacturer
DQ	DAQO NEW ENERGY CORP-ADR	3.69%	Polysilicon Production
REC	REC SILICON ASA	3.26%	Polysilicon Production
SPWR	SUNPOWER CORP	3.17%	Module Manufacturer
RUN	SUNRUN INC	3.06%	Residential Installer
S92	SMA SOLAR TECHNOLOGY AG	2.97%	Inverters
VSLR	VIVINT SOLAR INC	2.83%	Residential Installer
SEDG	SOLAREEDGE TECHNOLOGIES INC	2.75%	Inverters
HQCL	HANWHA Q CELLS CO LTD - ADR	2.69%	Module Manufacturer
Total		99.99%	

ETF Holdings Valuation and Relative Performance Information

This solar industry ETF is currently valued at historically low levels due to intense competition and industry maturation. While still risky relative to the broader market, the industry is much less speculative now than it was just a few years ago. Even among the consolidation, investors should note that this ETF is heavily concentrated in small-cap equities.

Valuation

Price/Earnings	7.93
Price/Book	0.99
Price/Sales	0.71
Price/Cash Flow	4.84
Dividend Yield	2.46

As of 07/31/2016

Market Cap Breakdown



Avg. Market Cap \$1.1B

As of 07/31/2016

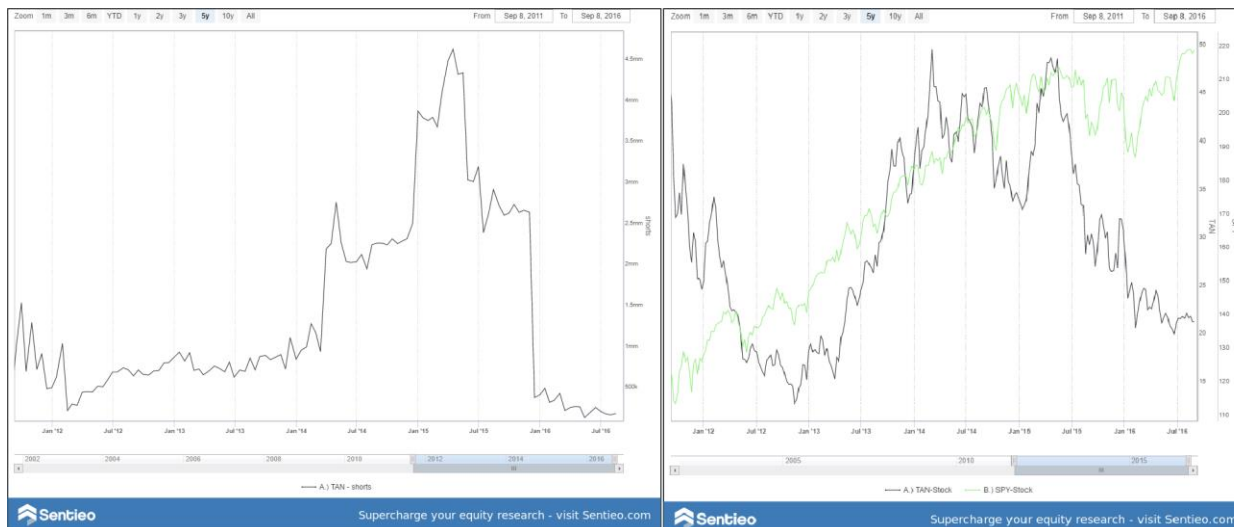
Source: TD Ameritrade

Growth

Long-Term Earnings	14.92
Historical Earnings	--
Sales Growth	-4.61
Cash-Flow Growth	-19.88
Book-Value Growth	-2.42

As of 07/31/2016

Below are two 5 year charts showing some relevant information about the performance of this ETF relative to the broader market as well as shares short. The chart on the left shows how the substantial short interest in the solar sector in 2014 and 2015 has severely diminished to new lows. The increased short interest in those years was perhaps due to the fact that solar stocks were generally extremely highly valued due to the fact that 2015 was a record breaking year for solar by just about every metric and there was considerable solar hype on Wall Street and in the financial media. The solar industry ETF traded at about \$50 during the peak of those times, over twice what it is going for now, on volumes up to 10x higher than today.



Institutional Holders

The solar industry ETF has few large institutional positions, with only \$34M of the \$235M in assets (~15%) held by institutions. The large retail ownership in this ETF combined with the somewhat speculative solar industry are likely major drivers behind its volatility.

INSTITUTION	TYPE	VALUE IN \$MILLIONS	SHARES	% OF OUTSTANDING	% OF CHANGE VS PRIOR PERIOD	% OF CHANGE VS PRIOR PERIOD	% OF CHANGE VS PRIOR PERIOD
GOLDMAN SACHS GROUP INC	Investment Advisor	\$5	270,134	2.45%	0.00%	▲ 55	▲ 0.02%
MIRAE ASSET GLOBAL INVESTMENTS CO., LTD.	Unclassified	\$4	211,322	1.91%	0.11%	▲ 211,322	▲ 100.00%
BANK OF AMERICA CORP /DE/	Investment Advisor	\$3	165,634	1.50%	0.00%	▲ 64,104	▲ 63.14%
ALLIANZ ASSET MANAGEMENT AG	Unclassified	\$2	134,430	1.22%	0.00%	▼ -56,505	▼ -29.59%
SUSQUEHANNA INTERNATIONAL GROUP, LLP	Investment Advisor	\$2	118,313	1.07%	0.00%	▲ 45,896	▲ 63.38%
SUSQUEHANNA INTERNATIONAL GROUP, LLP	Investment Advisor	\$1	84,000	0.76%	0.00%	▲ 34,500	▲ 69.70%
MORGAN STANLEY	Investment Advisor	\$1	72,948	0.66%	0.00%	▲ 15,090	▲ 26.08%
CRIBSTONE CAPITAL MANAGEMENT, LLC	Unclassified	\$1	68,358	0.62%	0.89%	▲ 68,358	▲ 100.00%
WELLS FARGO & COMPANY/MN	Investment Advisor	\$1	59,983	0.54%	0.00%	▼ -9,480	▼ -13.65%
OLD MISSION CAPITAL LLC	Unclassified	\$1	52,363	0.47%	0.08%	▲ 52,363	▲ 100.00%
UBS GROUP AG	Investment Advisor	\$1	49,546	0.45%	0.00%	▼ -6,270	▼ -11.23%
CLS INVESTMENTS, LLC	Investment Advisor	\$1	49,000	0.44%	0.04%	▲ 5,000	▲ 11.36%
LPL FINANCIAL LLC	Unclassified	\$0	41,509	0.38%	0.01%	▼ -17,585	▼ -29.76%
SCOTIA CAPITAL INC.	Investment Advisor	\$0	35,317	0.32%	0.02%	▲ 7,435	▲ 26.67%
PERKINS COIE TRUST CO	Investment Advisor	\$0	22,153	0.20%	0.31%	▲ 3,079	▲ 16.14%

The Solar Industry Going Forward: Expectations

Going forward, the solar industry will likely exhibit different characteristics than it has in the past. Previously, the brutal race to lower solar module costs by trying to get the highest solar cell efficiencies was perhaps among the most watched factors. This put extreme pressure on solar module manufacturers to cut their production cost per Watt.

Now that module production costs are reaching the \$0.30-0.40 per Watt range and production module efficiency gains are slowing for C-Si technology (relative to the past), the amount by which module costs can further decrease is somewhat limited. In the next few years I expect average polycrystalline efficiencies to significantly stagnate, monocrystalline efficiencies will likely strive to match Sunpower into the mid-high 20% range and First Solar's CdTe efficiencies will likely reach ~22%. The real next barrier to lowering the solar LCOE (Levelized Cost of Energy) is lowering the BoS (balance of systems) costs.

BoS costs are essentially all costs of installing a solar installation outside of solar module costs. This includes labor, inverters, racking and related costs. These BoS costs make up about half the cost of utility scale solar installations and over 80% of the cost of residential installations. Considering that the vast majority of this solar ETF's holdings are not in companies involved in producing BoS components, the pressure to reduce costs in this sector should be a net benefit for shareholders.

Due in part to the ITC (Investment Tax Credit) extension in the United States, the rate of solar growth should decline compared to last year. This is due to the fact that there is no longer a rush to complete projects before an imminent ITC expiration. The next rush of US solar installations will likely come in the early 2020s as the "step down" in the ITC begins.

Due to this as well as saturation in European markets, much of the growth in global solar installations will come from emerging markets. India is perhaps the most notable of these, as the country has dedicated itself to installing a massive 100GW of solar by 2022. In such markets, the ASP (average selling price) is lower than that of the United States, which will compress developer (and module manufacturer) margins.

There also may be a looming supply glut in the solar industry due to huge capacity expansions announced in 2017, which are expected to grow global manufacturing capacity by 18% in the face of slower solar growth.

This isn't the first supply glut the solar sector has faced though. During the silicon glut of 2011-2013, the price of silicon dropped substantially, leading to much cheaper solar modules and huge capacity growth. During this period, innumerable firms went bankrupt. While the coming supply glut will likely be nowhere near as brutal due to industry consolidation and improved supply chain characteristics, it is a glut nonetheless. Analysts at New Energy Finance believe it could take up to two years to eliminate this glut. Though as lead solar analyst Jenny Chase astutely noted, "*Oversupply appears to be business as usual in the solar industry.*"

Macro-Sensitivity

The modern, post-2012 glut solar industry hasn't seen a real bear market, so there is little past precedence to go off of. My best estimate is that while utility scale solar will likely not see too drastic of changes as a result of the broader global economy, residential solar may.

Financing for residential solar carries a higher yield due to its higher risk, a risk that many banks may not feel comfortable making after the SolarCity debacle. So while Tesla's investment in SolarCity (the by and far leader of residential solar installation) may not drastically change due

to the broader economy, the rest of the residential solar sector would likely suffer in a bear market. These systems have very high upfront costs, so if installers are unable to secure appropriate financing, residential installations would likely take a notable hit.

On the flip side, a bull market would likely be beneficial for residential solar as well (assuming interest rates don't drastically increase) due to what would likely be increased consumer buying power. I mention interest rate sensitivity because SolarCity's most recent bond issue yielded 6.5%, which is in line with emerging market sovereign debt. Given that, if interest rates returned to a historically reasonable level (however unlikely), the yield the market requires on financing residential solar projects may raise costs significantly as well. This would affect utility scale projects as well, though not as much due to the creditworthiness of entities that deal in utility scale solar projects.

The low interest rate environment also creates a good opportunity for solar project developers and yieldcos as well. This is because these companies can take on inexpensive debt to build solar projects, which yield a varying (but high) amount. This low debt expense allows yieldcos to raise dividend payouts, which would make the "safe" yieldcos an attractive investment vehicle for investors in this low interest rate environment.

Risk Factors

- Margin compression due to more competitive emerging market projects
- A potential looming module supply glut
- Interest rate sensitivity

Disclosure: I am long FSLR.

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