Deutsche Bank
Markets Research

North America
United States
Industrials
Clean Technology

Industry
Solar

Date
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Recommendation Change

2015 Outlook

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Key Changes

Company	Target Price	Rating
YGE.N	5.00 to 3.00(USD)	Buy to Hold

Source: Deutsche Bank

Top picks

SunEdison (SUNE.N),USD18.16	Buy
Vivint Solar (VSLR.N),USD8.16	Buy
SunPower (SPWR.OQ),USD23.85	Buy
SolarCity (SCTY.OQ),USD49.32	Buy

Source: Deutsche Bank

Overall Thoughts
We believe the recent volatility in solar stocks, driven largely by oil price weakness, presents an attractive entry point for investors as we expect 2015 to be a year of stable industry pricing and accelerating volume growth. We expect a balanced supply demand outlook as strong demand from the US and improving demand from China/other emerging solar mkts offsets any potential demand weakness in the UK/Japan. While weak oil prices could remain an overhang, our work suggests very little impact on solar demand fundamentals and expect several company specific positive catalysts in terms of execution of new/existing yieldcos. Our top picks include SUNE, SCTY, VSLR and SPWR.

Q4 earnings season/Q1 seasonality & Fundamentals:
While solar stocks gave up nearly all of the outperformance during Q4'14, mostly due to declining oil prices, we believe Q4 earnings of most companies would generally be inline/ahead of expectations. China demand in 2014 could turn out to be 9-10GW vs expectations of 13GW, but we believe strong demand from markets such as UK/Japan would likely cover up any shortfall in China demand. We also expect companies to talk about incremental progress in the permitting and payment process in China and believe a number of companies could get closer to launching yieldcos of international assets during 1H15 timeframe. While normal seasonality could likely impact China demand in 1H15, we expect UK/Japan to act as primary drivers for strong 1H volumes/margins. Consensus estimates have generally come down and we believe Q1 guidance from most companies would be more or less inline with expectations. We expect other company specific catalysts such as announcements of yieldcos/project sales along with acquisition of new project pipelines to act as important catalysts for solar stocks over the next 3 months. Q1 seasonality typically affects module pricing, but we expect strong demand from higher priced markets such as the UK and Japan to drive pricing and margin improvement in Q1. We also see limited supply growth in the near term and as such expect relatively stable pricing environment.

Oil price impact on demand:
As explained in a few sections of the note, oil represents only about 5% of global electricity production and in some of the important solar markets such as US, China, oil based electricity generation is less than 5% of the total. Moreover, the fuel cost of oil based electricity generation even at $50 oil prices is in the 7-9c/kWh range and as shown in the note, the marginal electricity cost is higher than solar in many regions worldwide. Bottom line is that oil prices do not have a material impact on solar demand.

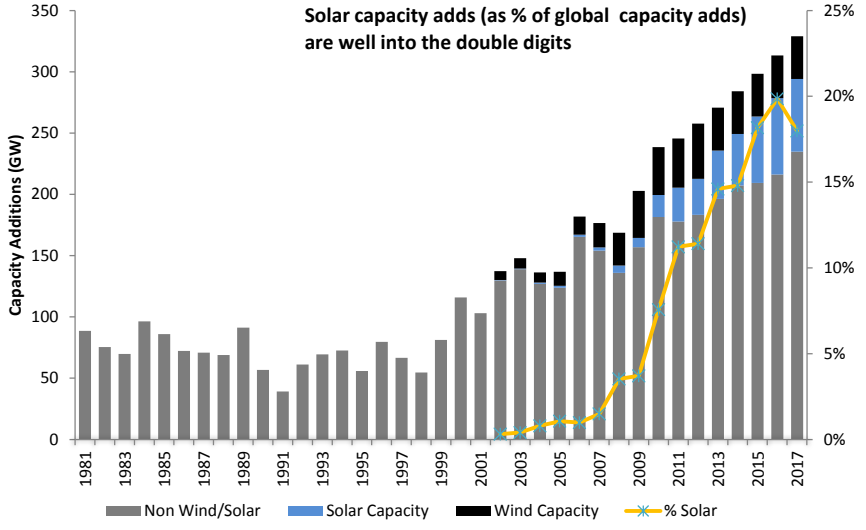
Other important themes:
1) Strong, diverse demand drivers; US rooftop market will be the key highlight and utilities will also start competing in the solar market. Project pipelines and margins will continue to expand. Expect cost reduction to also drive module margins higher, 2) Yieldcos will continue to remain popular source of project capital funding, but companies with first mover advantage will be in a better position to build pipelines/acquire development assets, 3) Policy environment will continue to improve. Given that anti-dumping duties for Chinese modules are expected to be completely removed, we expect companies to see margin expansion.

YGE Downgrade / Sector Valuation/Risks
We are downgrading Yingli Green Energy to a Hold based on ongoing balance sheet concerns and limited positive catalysts/financial flexibility. Please see page 33 for details.
We value most solar companies using a mix of PE multiples and DCF's. Sector Risks include: 1) Grid prices change slower/faster than expected 2) Policy changes in key markets (China/Japan/US) 3) Input price volatility

Key Themes

1) Expect more countries to reach grid parity in 2015: Unsubsidized rooftop solar electricity costs anywhere between $0.13 and $0.23/kWh today, well below retail price of electricity in many markets globally. The economics of solar have improved significantly due to the reduction in solar panel costs, financing costs and balance of system costs. We expect solar system costs to decrease 5-15% annually over the next 3+ years which could result in grid parity within ~50% of the target markets. If global electricity prices were to increase at 3% per year and cost reduction occurred at 5-15% CAGR, solar would achieve grid parity in an additional ~30% of target markets globally. We believe the cumulative incremental TAM for solar is currently around ~140GW/year and could potentially increase to ~260GW/year over the next 5 years as solar achieves grid parity in more markets globally and electric capacity needs increase.

Figure 1: Solar is Increasingly Important to the Global Generation Mix



Source: EIA, GWEC, Deutsche Bank Estimates
Note: 5% growth rate in total capacity additions from 2012+. Wind Installs assumed flat at 5 year average of 39.5GW . Solar Installs are DB ests

2) Solar demand growth should be increasingly more diverse and a greater percentage of demand should be from sustainable markets. While some uncertainty about growth in markets such as Japan and the UK will remain an overhang on solar stocks in 1H15, we expect sector volatility to decrease in 2H15 timeframe as demand from the US, China and other emerging markets takes off.

3) Rooftop solar demand in the US should accelerate, especially as leasing companies expand in more states, get new sources of financing and customer adoption increases ahead of the 2016 expiration of the ITC.

4) 2015 will be a transformative year for the US utilities - we expect some utilities to enter the residential solar market and compete directly with Solarcity and Vivint whereas other utilities would most likely continue to lobby against the growth of distributed solar market.

5) We expect a relatively stable supply demand outlook in 2015 timeframe as most companies are planning only limited supply growth. Q1 seasonality typically affects module pricing, but we expect strong demand from higher priced markets such as the UK and Japan to drive pricing and margin improvement in Q1. We also see limited supply growth in the near term and as such expect relatively stable pricing environment.

6) Our constructive view on solar is largely dependent on improving cost curve of the underlying technology. Overall solar system costs have declined at ~15% CAGR over the past 8 years and we expect 40% cost reduction over the next 4-5 years as a solar module costs continue to decline, panel efficiencies gradually improve, balance of system costs decline due to scale and competition, global financing costs decline due to development of new business models and customer acquisition costs decline as a result of increasing customer awareness and more seamless technology adoption enabled by storage solutions.

7) YieldCos will continue to gain popularity among investors and solar companies looking to lower cost of capital. 2015 will be an important year for YieldCos, both in terms of asset and geographic diversification. We expect solar only YieldCos to become more active in wind and other renewable assets; YieldCos with emerging market exposure to go public and more companies to spin off their solar assets into YieldCos;

8) Lower cost of capital will become a key growth enabler for companies with first mover advantage in the YieldCo space and also act as a significant catalyst in lowering the cost of solar power in emerging markets such as India.

9) Project development pipelines of most companies would increase at a much faster pace, both due to organic and inorganic growth. We expect developers with an off taker in the form of a YieldCo to take on increasingly riskier projects. because the demand for fully developed projects is expected to remain relatively high, we expect more development capital to flow into the sector.

10) Project margins will continue to increase in 2015 before reaching peak levels in 2016 timeframe. Low financing costs and strong demand from YieldCos will continue to drive prices of downstream projects higher. While regional mix may have some impact on project margins, we do not anticipate significant variations in different regions and expect margins closer to 20% levels in the near term.

11) 2015 earnings for most solar companies would become increasingly more volatile. As companies decide to hold more projects in balance sheet, we expect a near term negative impact both on income statement and balance sheet (in terms of increasing working capital requirements). We also expect earnings to be somewhat lumpy as timing of project completions and sales would be harder to predict.

12) Policy focus will remain front and center in many markets. Within the US, the extension of ITC (set to expire in 2016), extending the MLP status to renewables, net metering 2.0 in California, grid integration in Hawaii and grid access charges in several states would be some of the policy items impacting solar supply chain. Additionally, trade case development in China, US and other global markets would be an important theme to watch in 2015. Adverse

trade policies certainly pose the risk of slowing down growth in important solar markets, especially in light of the recent gas price weakness. That said, we believe a positive resolution of these trade disputes is likely and would set the stage for stronger growth in 2016.

13) Q4 earnings season/Q1 seasonality: While solar stocks gave up nearly all of the outperformance during Q4'14, mostly due to declining oil prices, we believe Q4 earnings of most companies would generally be inline/ahead of expectations. China demand in 2014 could turn out to be 9-10GW vs expectations of 13GW, but we believe strong demand from markets such as UK/Japan would likely cover up any shortfall in China demand. We also expect companies to talk about incremental progress in the permitting and payment process in China and believe a number of companies could get closer to launching yieldcos of international assets during 1H15 timeframe. While normal seasonality could likely impact China demand in 1H15, we expect UK/Japan to act as primary drivers for strong 1H volumes/margins. Consensus estimates have generally come down and we believe Q1 guidance from most companies would be more or less in line with expectations. We expect other company specific catalysts such as announcements of yieldcos/project sales along with acquisition of new project pipelines to act as important catalysts for solar stocks over the next 3 months.

14) Oil price impact on demand: As explained in a few sections of the note, oil represents only about 5% of global electricity production and in some of the important solar markets such as US, China, oil based electricity generation is less than 5% of the total. Moreover, the cost of oil based electricity generation even at $50 oil prices is the 7-9c/kWh range and as shown in the note, the marginal cost is higher than solar in many regions worldwide. Bottom line is that oil prices do not have a material impact on solar demand.

15) How to Make Hay While the Sun Shines? The solar sector has been generally under owned by institutional investors and expect greater institutional ownership to drive near term positive momentum for the sector. We expect a number of new business models focused on the downstream part of the value chain to emerge and expect innovative private companies to drive cost improvement/solar adoption. Both of these set of companies stand to generate significant shareholder value, in our view. We believe companies involved in financing/downstream part of the value chain stand to generate the most significant shareholder value in the near term. We expect these companies to be in a unique position to take advantage of the financing arbitrage offered by inefficient private markets and publicly trade "yield" vehicles. Solar is achieving grid parity in a number of new markets globally and we expect companies involved in project development/financing to benefit the most from the significant volume growth over the next few years. As storage costs start to improve we expect companies with cost competitive storage solutions to create the most shareholder value.

Key Picks

In the case of SPWR, weak 2015 outlook was the primary catalyst for share price reaction post analyst day, but the decision to hold back projects for a possible yieldco was the main reason for weak outlook. While capacity constraints could limit earnings upside through 2016, EBITDA and CAFD guide provided during the analyst day suggest that the shares could nearly double from current levels. We expect further clarity around yieldco plans during Q1 to act as the next catalyst for shares. For SCTY, we continue to see upside to 2016 volume targets and believe at current valuations, shares are discounting almost no value for the development business post 2016 timeframe. Finally, VSLR has guided to 100% yoy shipments growth in 2015 and '16 timeframe. Upside to these targets could act as a significant positive catalyst for shares. Seasonality will play a role in Q1 volumes, but expect strong growth from Q2. The company also has industry leading customer acquisition costs. We believe an increasing conversion of Vivint inc customers into solar customers along with greater penetration in commercial markets would result in further reduction of customer acquisition costs.

Figure 2: Target Price and Downside Scenario

Stock	Target Price	Closing Price (1/7/14)	Downside Scenario
SUNE	$40	$18.16	$17.0
SCTY	$90	$49.33	$29.5
VSLR	$20	$8.16	$6.5
SPWR	$43	$23.85	$22.0
TSL	$15	$8.59	$8.3

Source: Deutsche Bank, Thomson Reuters

SUNE

For SUNE, we are keeping our $40PT unchanged and we see limited downside to SUNE shares. Even if we assume the development business is worth next to nothing, the value from TERP and the IDR's provide value as shown below.

Figure 3: SUNE Bear Case Range

	PT Value	Downside Value
Devco	$20.5	$3
TERP Value to SUNE	$8.1	$7.1
IDR Value	$9.3	$5.1
SEMI	$1.8	$1.8
Total	$39.6	**$17.1**

Source: Deutsche Bank

SUNE Valuation/Risks

We value SUNE via SoTP utilizing multiple DCF's. We apply a 10% discount rate for the first ten years, while our TGR is 1.5% with a 15% discount rate. We value the Semiconductor business, the project development business, ownership in Terraform, and incentive distribution rights from the yieldco business separately to arrive at our SoTP Risks: 1) Pipeline/Backlog is not replenished 2) existing projects underperform expectations 3) input price volatility 4)negative changes to govt incentives 5) Acquisitions economics are less favorable than expected 6) Capital markets deals do not close.

SPWR

Our downside scenario assumes the multiple assigned to SPWR's 2016 earnings is cut in half (from 20 to 10x) and the target yield on their potential yieldco is 10%, rather than 6%.

Figure 4: SPWR Scenario

	PT Value	Downside Value
2016 EPS	$1.96	$1.96
Multiple	20X	10x
Value to SPWR	$39.2	$19.6
Yieldco Target cashflow	$75	$75
Target Yield	6%	10%
Value to SPWR	$7.9	$4.7
Total ($/Share)	$42.8	$22.1

*Discounted back at 10%

Source: Deutsche Bank

SPWR Valuation/Risks

Our price target based on 20x 2016E EPS of $1.96 plus $1.25B in target yieldco equity value (6% yield on $75M CAFD). This is discounted back 10% to arrive at our PT of $43. Downside risks include: Regulatory/execution issues for installations, ability to fill pipeline, financing costs/access, capacity expansion timing, cost reduction abilities, competitor panel pricing, pace of lease monetization/expansion

VSLR/SCTY

For our downside risk to SCTY/VSLR shares, we assume the businesses stop completely in 2016 (using our yearly build up, which is unchanged).

Figure 5: SCTY/VSLR Scenario

Downside Value ($/Share)						
	Inception-2012	2013	2014	2015	2016	Total
VSLR	$0.11	$0.49	$1.04	$1.71	$3.16	**$6.5**
SCTY	$2.30	$3.21	$5.33	$8.56	$10.09	**$29.5**
*VSLR uses an 18% discount rate, SCTY uses a 12% discount rate						
Current PT Value						
DCF Value Including through 2020 + Terminal Value						
VSLR	**$20**					
SCTY	**$90**					

Source: Deutsche Bank

VSLR Valuation/Risks:

We use a sum of the parts valuation with an 18% discount rate to value current and future leasing business cash flows and arrive at our $20 PT. We apply a higher discount than SCTY due to smaller platform and younger business. Risks include: 1) Adverse regulatory shifts on the state or federal level which could impact net metering, or other solar incentives 2) Changes in input prices 3) Headline risk from increased scrutiny of large utilities and lawmakers; 4) Inability to acquire project financing at attractive rates. 5) Competitive dynamics from new entrants or large incumbents 6) Widespread Customer defaults or bookings cancellations

SCTY Valuation/Risks:

We use a sum of the parts valuation with a 12% discount rate to value current/future leasing business cash flows and arrive at our $90 base case. Downside risks include changes to net metering, panel/labor prices, inability to attract financing, and headline risk from utilities/govt agencies.

TSL

In order to evaluate the downside valuation case for Trina, we looked at a sum of the parts / net asset value valuation where the company sells all of its manufacturing capacity, downstream solar projects, and satisfies debt obligations. Under the scenario below, we see valuation support at $8.3/sh.

Figure 6: TSL Liquidation Value

Manufacturing Business	MW	Value per watt	Value ($M)
Ingot to Module	1700	$0.40	$680
Cell to Module	1300	$0.20	$260
Module Only	800	$0.05	$40
Enterprise Value			$980
Projects			
2014 Projects (MW)	353		
Liquidation Value ($/W)	$1.00		
Enterprise Value			$353
Net Debt ($M)			
Cash	$ 318.8		
Restricted Cash	$ 97.7		
S/T Debt	$ 783.9		
L/T Debt	$ 276.1		
Net Debt			($643.5)
Total Equity Value			$690
$/Share			$8.3

Source: Deutsche Bank

TSL Valuation/Risks

Our $15 PT is based on 11x 2016 EPS discounted back by 15%,. Downside risks incl.: Ability to execute on co.'s downstream strategy. Polysilicon & other input price volatility. Degree of success in cost reduction efforts. Future capex funding requirements. Negative changes to Chinese govt incentives. Shifts in global solar demand.

Oil Concerns Unfounded

Correlation between oil price and solar stock performance has increased significantly since oil broke below $100/barrel. This has not been the case in the recent past and we believe oil largely does not affect electricity prices and therefore should not affect solar installations. In this section, we highlight the following points:

1) Late 2014 negative price action in solar stocks is strongly correlated with the decline in the price of oil.

2) Actual oil fired generation to produce electricity is very expensive, even with low oil prices.

3) Solar installations are not competing with oil fired generation in most instances

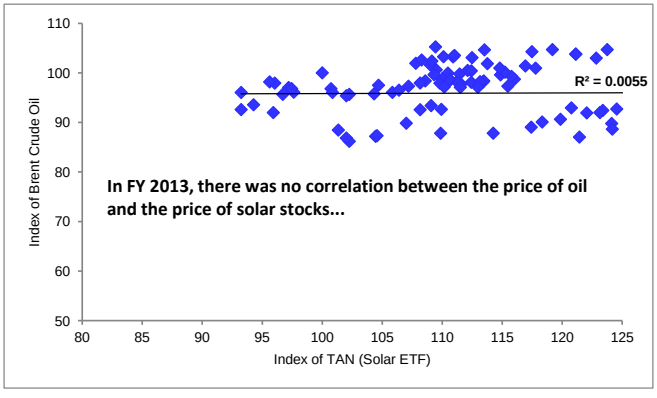
4) Unsubsidized solar competes with the price of electricity, which is unrelated to oil prices.

5) Companies with exposure to distributed generation are best positioned to capitalize on long term fundamentals.

Correlations with Oil Have Increased Sharply

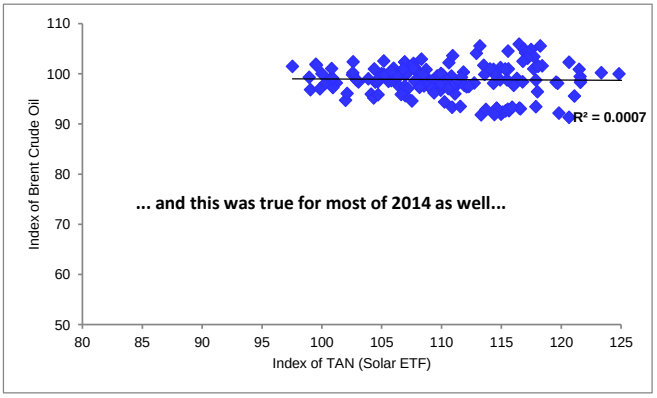
Using the Guggenheim Solar ETF (TAN) as a proxy for solar stocks generally, we examined the correlation between solar stocks and oil price over the last 2 years. We believe investors began irrationally selling solar stocks around the time oil broke $100/barrel. As shown below, solar stock prices have had no significant correlation with oil prices – until 4Q '14. Brent crude first (recently) closed below $100/barrel on September 8, 2014.

Figure 7: 2013: Oil is Not Correlated With Solar Stocks



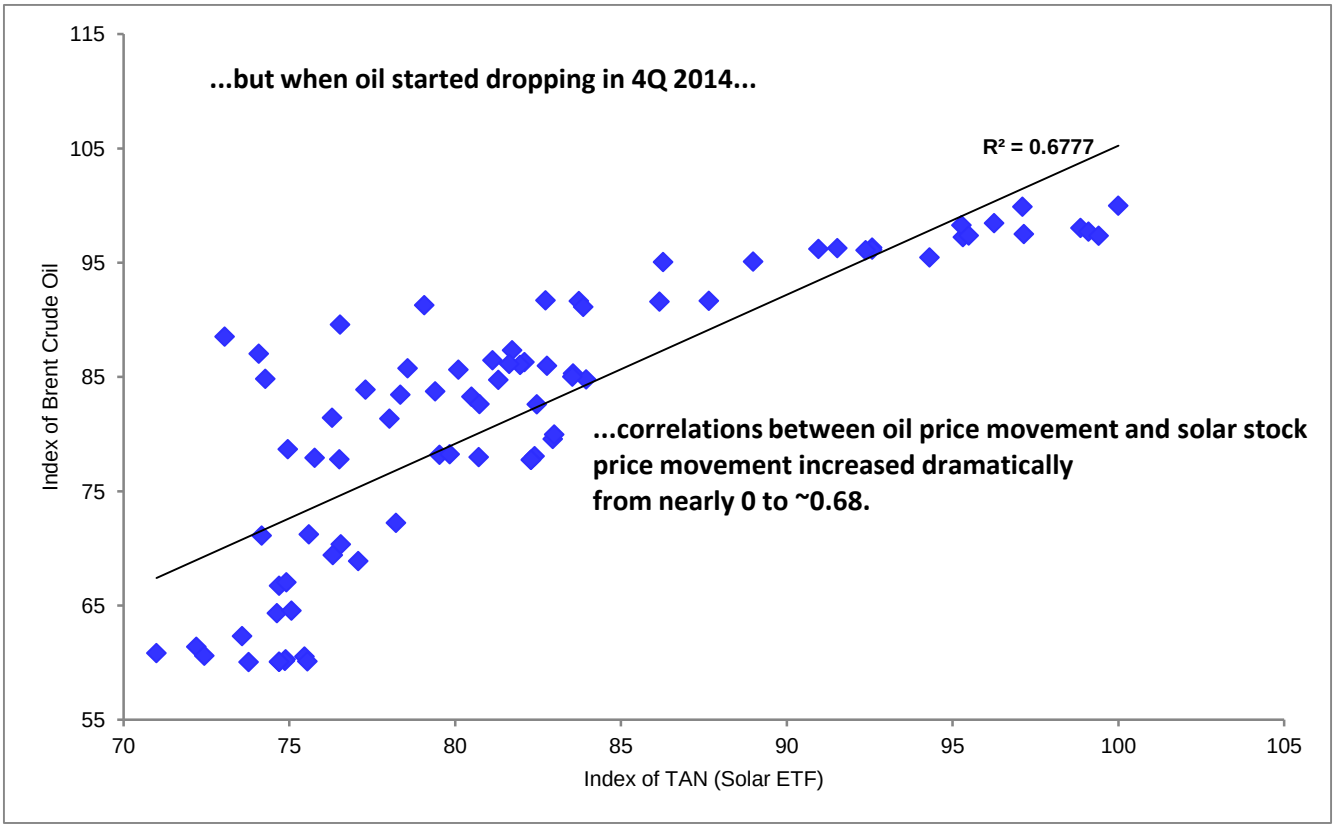
Source: Deutsche Bank, Thomson Reuters
Note: TAN and Brent Crude prices are indexed to 100 on Jan 1, 2013
Note: Daily data runs from Jan 1, 2013 to Dec 31, 2013

Figure 8: 1Q-3Q 2014: Still No Correlation



Source: Deutsche Bank, Thomson Reuters
Note: TAN and Brent Crude prices are indexed to 100 on Jan 1, 2014
Note: Daily data runs from Jan 1, 2014 to Sept 7, 2014

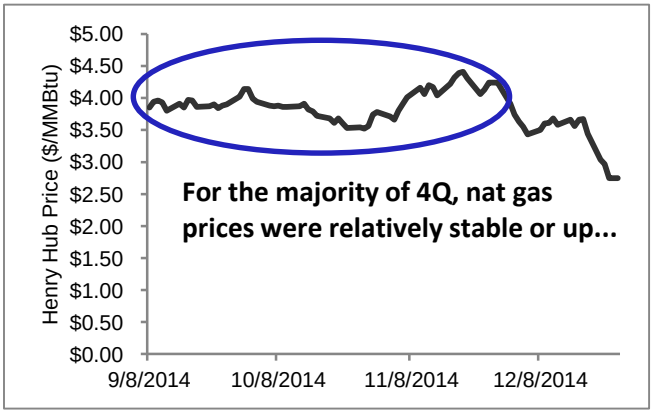
Figure 9: 4Q '14: Solar Stocks Are Suddenly Positively Correlated With Oil Price Movements



Source: Source: Deutsche Bank, Thomson Reuters
Note: TAN and Brent Crude prices are indexed to 100 on Jan 1, 2014
Note: Daily data runs from Sept 8, 2014 to Dec 26, 2014

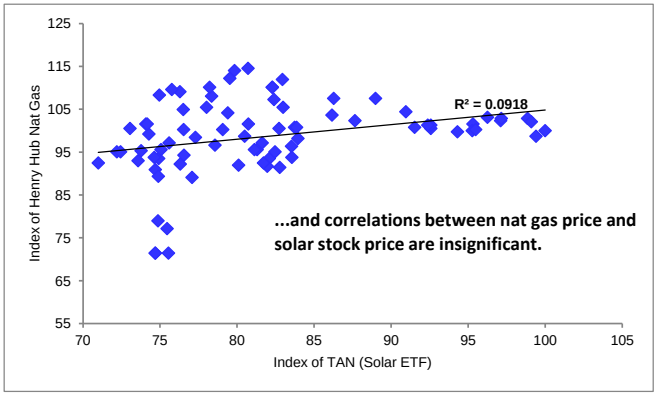
On Sept 8, 2014, the S&P 500 closed just above 2,000 (At 2001.54). In the same timeframe as shown in the graph above, the S&P increased over 4% in value (to 2088.77 on Dec 26). Therefore, the decline in solar stocks cannot likely be attributed to market weakness. We also examined natural gas prices during the same time period shown above to determine if the weakness in solar stocks could be related.

Figure 10: Nat Gas: Generally Stable in 4Q



Source: Deutsche Bank, Thomson Reuters
Note: Daily data runs from Sept 8, 2014 to Dec 26, 2014

Figure 11: Nat Gas and Solar Stocks: Uncorrelated



Source: Deutsche Bank, Thomson Reuters
Note: Daily data runs from Sept 8, 2014 to Dec 26, 2014

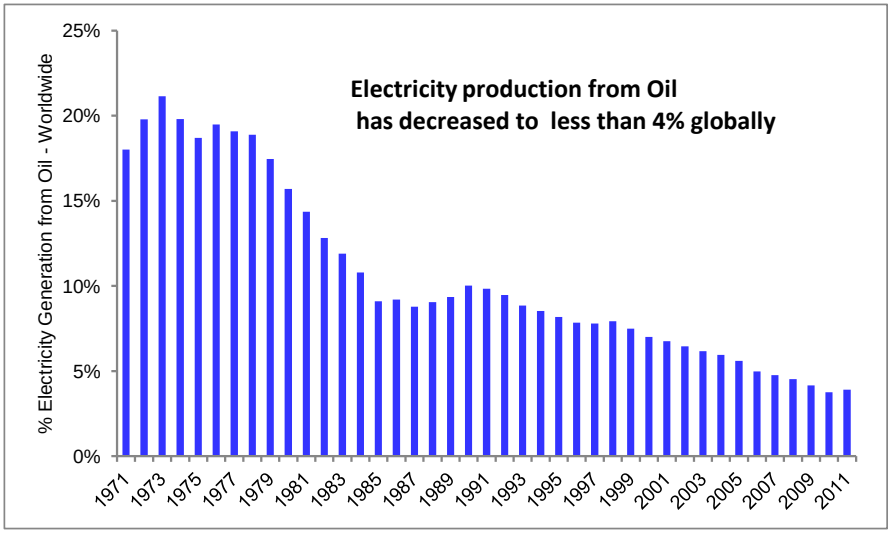
Based on our analysis and conversations with traders/investors, we continue to believe that much of the late 2014 weakness in solar stocks is related to declines in the oil price. This is not based on concerns rooted in fundamentals, in our view.

Worldwide Oil Use in Electricity Generation

Most Countries Generate Less than 5% of their Electricity From Oil

In aggregate, the world generates ~3.9% of electricity from oil. However, the US generates only 0.9% of electricity from oil and China generates even less – 0.17%.

Figure 12: Oil Use for Electricity Generation has Declined Substantially



Source: World Bank, 2011 Data

Furthermore, the majority of the countries which generate greater than 5% of their energy generation are not expected to be notable solar markets. The only truly notable solar market where oil accounts for double digit (10%) percent of total generation is Japan. The Japanese solar market is largely influenced by constructive government policy and generates significant portions of total installs in non-utility scale solar (which is the only segment that would compete with oil fired generation).

Figure 13: Countries Generating >5% of Electricity from Oil

Count	Country	% Electricity from Oil	Greater than 500MW Market?	Count	Country	% Electricity from Oil	Greater than 500MW Market?
1	Malta	99%		29	Morocco	26%	
2	Eritrea	99%		30	Sudan	25%	
3	Benin	99%		31	Togo	24%	
4	Cyprus	96%		32	Indonesia	23%	
5	Lebanon	95%		33	Gabon	21%	
6	Jamaica	92%		34	Guatemala	19%	
7	Cambodia	90%		35	Singapore	18%	
8	Senegal	86%		36	Cameroon	18%	
9	Haiti	79%		37	Oman	18%	
10	Yemen, Rep.	78%		38	Mexico	16%	Yes - 2015
11	Jordan	73%		39	Nigeria	16%	
12	Nicaragua	66%		40	Egypt, Arab Rep.	16%	
13	Kuwait	62%		41	Argentina	15%	
14	Honduras	55%		42	Venezuela, RB	14%	
15	Sri Lanka	50%		43	Iraq	13%	
16	Dominican Republic	48%		44	Japan	10%	Yes - Current
17	Libya	44%		45	Greece	10%	
18	Cuba	43%		46	Chile	10%	
19	Panama	41%		47	Costa Rica	9%	
20	Syrian Arab Republic	40%		48	Malaysia	8%	
21	Pakistan	35%		49	Israel	7%	
22	El Salvador	34%		50	Croatia	7%	
23	Kenya	33%		51	Italy	7%	Previously
24	Ecuador	33%		52	Peru	6%	
25	Angola	29%		53	Algeria	5%	
26	Iran, Islamic Rep.	28%		54	Portugal	5%	
27	Uruguay	27%		55	Spain	5%	
28	Saudi Arabia	26%	Yes - 2016				
	World %	3.9%					

Source: Worldbank, 2011 Data

What is the cost?

In order to examine our hypothesis that solar is not related to the price of oil, we ran an analysis to estimate the cost of electricity generated from oil.

Electricity Generation Cost From Oil as a Feedstock

While there are significant differences between all-in oil fired generation costs across the world, we believe that the actual cost of electricity from oil generation is significantly higher than electricity generated from solar in most instances.

According to the EIA, there are ~5.86MBTU in a barrel of oil, and a typical oil-fired electricity generating plant uses ~10,991 BTU to produce a single kilowatt hour of electricity. Therefore, at $50/barrel, the fuel cost alone to produce electricity is over 9 cents/kwh, and every $10 change affects the cost by ~2 cents/kwh.

Figure 14: Fuel Cost ONLY Per kWh generated from Oil

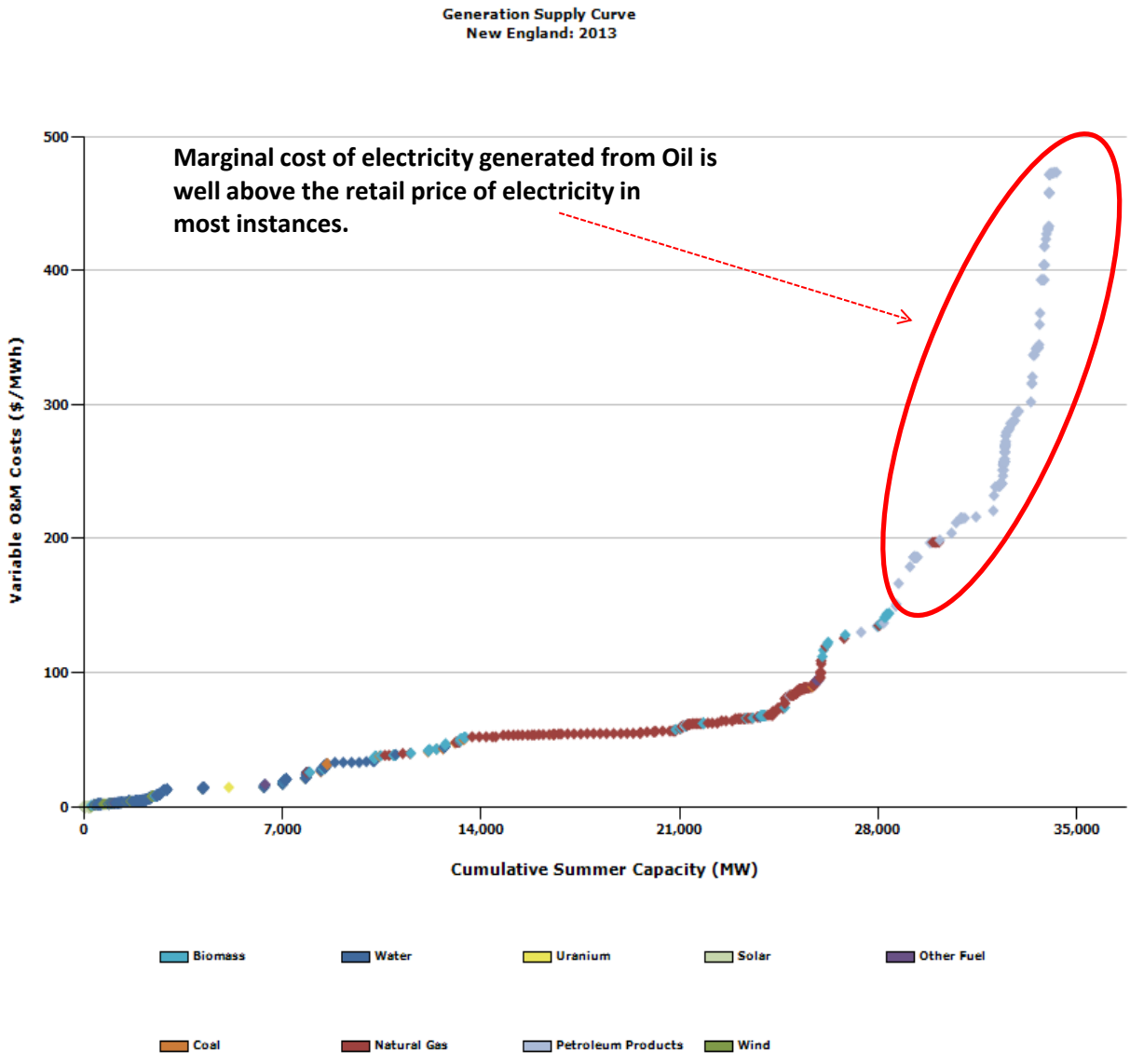
Cost/Barrel	Cost/kWh	Cost/Barrel	Cost/kWh
$30	$0.06	$80	$0.15
$40	$0.08	$90	$0.17
$50	$0.09	$100	$0.19
$60	$0.11	$110	$0.21
$70	$0.13	$120	$0.23

Source: EIA, Deutsche Bank

Actual Dispatch Curve in The US

Furthermore, even the above estimates drastically understates the actual incremental cost of electricity generated from oil. Shown below is the actual estimated supply curve in New England (in the United States) for capacity available during summer 2013.

Figure 15: Variable Cost of Electricity in New England



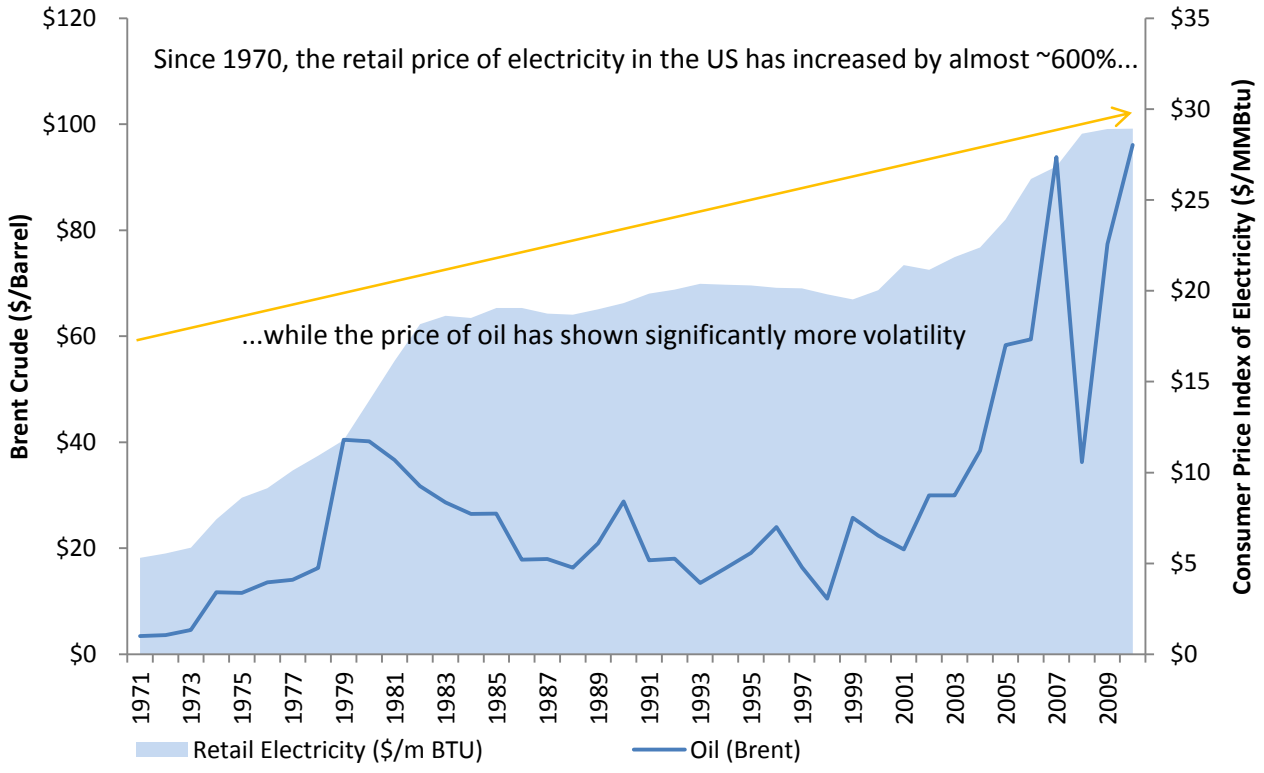
Source: SNL. Added text and emphasis from Deutsche Bank

This regional breakdown will generally hold true for most other regions as well, in our view. Each data point in the chart above is an estimate of the incremental cost of wholesale power. As shown above, oil fired generation cost typically ranges from ~10 cents per kWh to ~50 cents per kWh. With solar PPA's being signed at levels in the mid single digits (cents/kWh), the value proposition versus oil fired generation is compelling.

Long Term Relationship between Oil and Electricity

As shown below, the long term trend in the price of electricity is upwards, while the price of oil is much more volatile. If there were a fundamental basis for oil price changes affecting the price of electricity, the price of electricity should change much more.

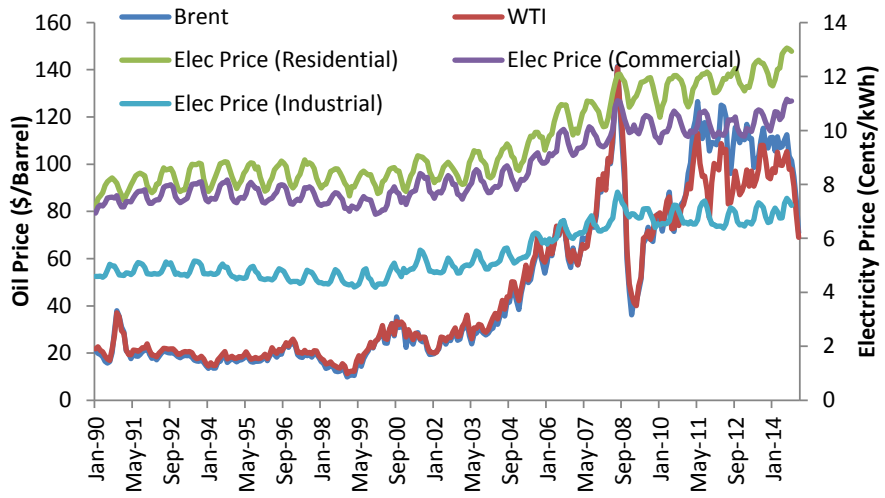
Figure 16: 40 Year Trend of Grid Sourced Electricity vs Oil Price



Source: EIA, Deutsche Bank

We view small scale, rooftop solar as one of the most attractive growth markets for solar installers, which also has clear a read-through for commercial and industrial segments (grid connected electricity prices for commercial and industrial customers is correlated with changes for residential customers).

Figure 17: Electricity Prices Across Consumer Segments Trend Together



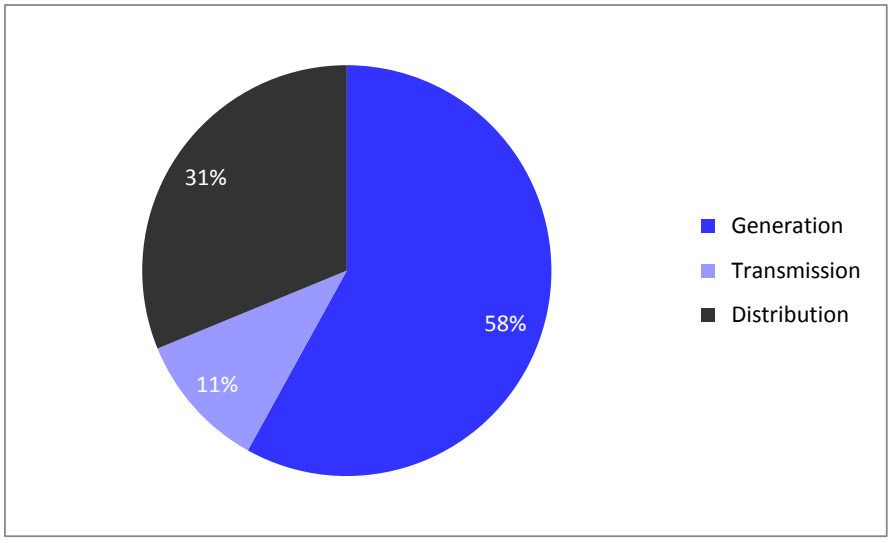
Source: EIA, Deutsche Bank

What Makes an Electricity Bill?

While much of the previous analysis has centered around generation costs from oil and all in electric costs, we note that over 40% of the average electric bill in the US can be attributed to transmission and distribution (T&D) costs. This is because the structure of most mature electric markets allow utilities to recoup costs for large upfront capital expenditures from transmission and distribution. This system has developed over the last century as the modern electric cost-recovery method.

Most investor owned regulated utilities are allowed to generate a regulated return over a multi-year timeframe. This system has facilitated grid build out across the US and other countries (although specific cost recovery mechanisms vary) as utilities are allowed to operate as a natural monopoly and are financially incentivized to build infrastructure (in the form of long term returns on upfront capital investment). Hence, the cost recovery for all necessary infrastructure – including but not limited to electric generation assets – necessitates the inclusion of T&D costs in the consumer's electric bill.

Figure 18: T&D Expense are a Significant Portion of Electric Bills



Source: EIA, Deutsche Bank

Therefore, even if feedstock for electricity generation were to decline substantially, transmission and distribution costs will continue to make up a large portion of an electric consumer's bill.

This System Favors New Solar Business Models

Given that solar companies are not regulated utilities, any installer/leasing business that has exposure to distributed generation (DG) (Residential, Commercial, and Industrial installations) is inherently competing with the grid cost of electricity, which includes all 3 cost components (Generation, Transmission, and Distribution).

However, DG installations do not require significant investments in transmission and distribution. In fact, most rooftop installations do not require any distribution infrastructure to operate behind the grid (behind the grid refers to the concept of using electricity at the generation source – as a factory or residential customer would).

Therefore, companies with significant exposure to DG installations are well positioned to compete with the grid price of electricity over the long term.

Solarcity and Vivint Solar both have little (SCTY) or no (VSLR) utility scale exposure, while companies like Sunedison and Sunpower are also well positioned for long term DG exposure.

Figure 19: Installer Exposure to Segments

	Residential	Commercial & Industrial	Power Plant
FSLR			
DB Est	0%	5%	95%
SPWR			
2015 Guide	30%	13%	57%
SCTY			
DB Est	80%	20%	0%
SUNE			
DB Est	5%	70%	25%
VSLR			
DB Est	100%	0%	0%

Source: Deutsche Bank, Company Reports

Long Term Risk: Evolving Utility Business Models

Based on ongoing disputes in Arizona, California, and Colorado, we see the beginnings of what could indicate a long term shift in how utilities and their regulatory commissions interact with solar. In 2015, we expect several key decisions from utility regulators to continue shaping this debate.

Certain utilities are currently arguing that owners of solar installations are not paying enough to support the grid, because transmission and distribution charges are generally based on metered electricity use. When a solar installation connects to the grid, it generates a portion of the owners electricity use and effectively acts as a reduction in grid demand. In most cases, this leads to a proportional decrease in the dollar charge for grid-sourced electricity (which includes a proportional charge for T&D cost recovery).

Solar companies, individual users, and freedom-of-choice advocates believe this representation does not accurately account for the positive external contributions that solar installations provide. Theoretically, large scale distributed generation adoption should lower peak electricity demand, reduce strain on the grid, provide emissions-free electricity with no fuel cost, and

lower the amount of necessary future investment in the grid on all fronts. In a scenario where 'smart grids' allow distributed solar resources to be dispatched as requested by the grid operator, the benefits from DG installations should increase.

These debates are ongoing and unlikely to be finalized in the short term. On one hand, Arizona has already implemented a 'grid access' charge of $0.70/kw (~$4-5 dollars per month for a typical residential system), which was still considerably lower than the ~$20/month grid charge requested by the utility. On the other hand, key states like California and New York continue to provide a constructive regulatory environment that favors solar.

Long term, we believe the business models for solar and utility companies will necessarily shift as grid penetration rates increase (currently no more than 1-2% in even the high penetration states). Grid access charges could increase, utilities may start to compete more directly with solar installers, and cost recovery mechanisms generally will go through a rigorous analysis in most major solar markets.

Arizona is generally considered one of the most contentious regions for debate in the US, yet solar leasing companies like SCTY have continued to ramp their installation rates despite this.

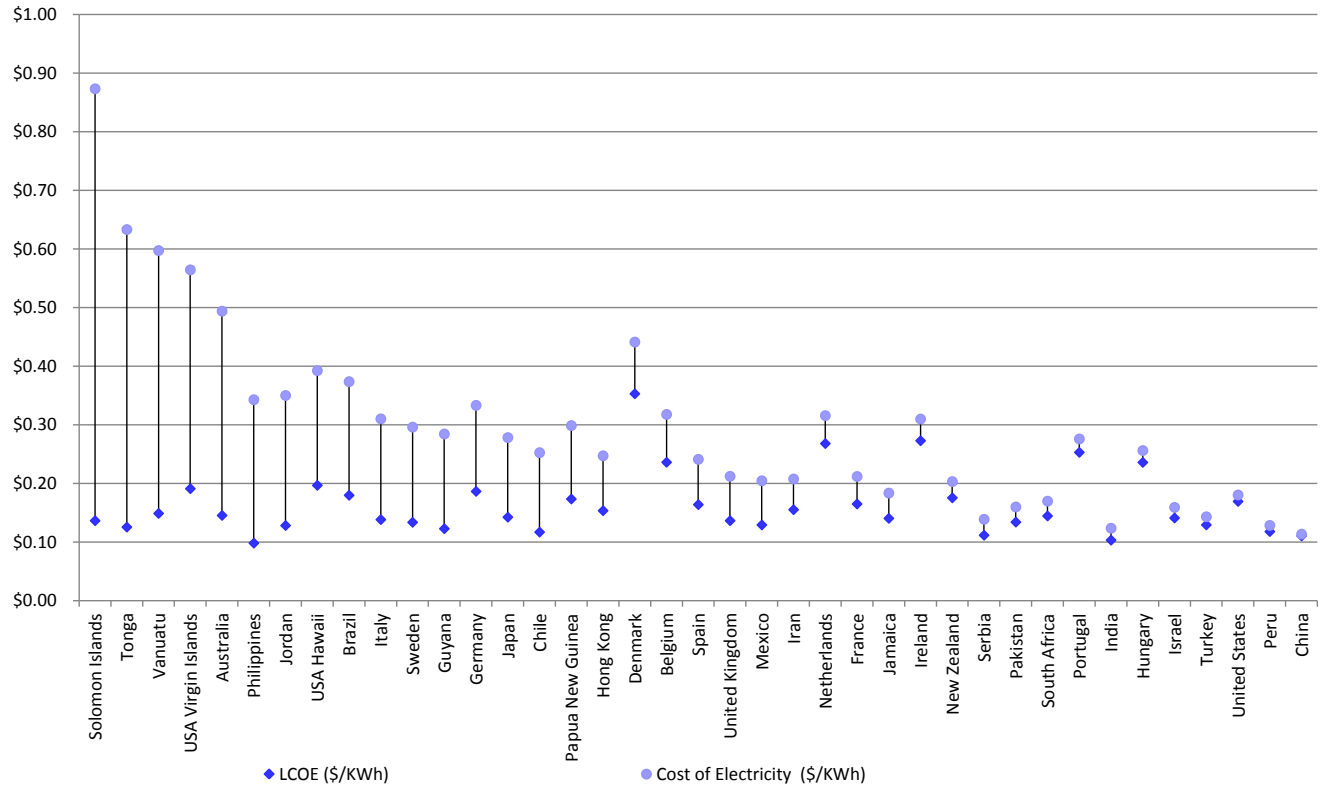
Grid Parity is Here

Over 50% of Countries under Review are Likely at Grid Parity Today

Our analysis indicates that a wide range of countries throughout the world are at grid parity today in high electricity price and/or high sunlight regions. Using our levelized cost of energy (LCOE) model, we estimated typical cost per watt versus estimated electricity prices in the region to determine what countries are likely at grid parity. We have also examined key price drivers in the US market over the next several years and projected cost reductions from ~$2.90/w residential (including customer acquisition and other costs) to $~$1.80/w, which assumes cost reductions of ~10-15% each year. For our exercise, we gathered and estimated data points on average or high/low range residential electricity prices for over 60 countries worldwide. Incorporating a variety of assumptions on cost per watt, sunlight, inverter replacement, O&M cost, and other financial/operational decisions to estimate LCOE.

In the figure below, we provide a high level overview of our estimates and demonstrate that we believe a wide range of countries are at grid parity today.

Figure 20: Countries With Regions of Grid Parity



Source: Deutsche Bank Estimates

Figure 21: Countries With Regions of Grid Parity – Data

Country	Grid Parity	Insolation (kWh/m2/year)	Cost of Electricity Comp ($/kWh)	LCOE	Solar Premium/ Discount	IRR (20 Year System)	IRR (30 Year System)
Australia	Yes	1833	$0.49	$0.15	-$0.35	4781.22%	4781.22%
Belgium	Yes	867	$0.32	$0.24	-$0.08	4.34%	9.38%
Brazil	Yes	1667	$0.37	$0.18	-$0.19	44.53%	44.63%
Chile	Yes	1750	$0.25	$0.12	-$0.14	28.95%	29.40%
Denmark	Yes	813	$0.44	$0.35	-$0.09	15.62%	17.51%
France	Yes	1083	$0.21	$0.16	-$0.05	1.23%	7.58%
Germany	Yes	958	$0.33	$0.19	-$0.15	14.56%	16.55%
Guyana	Yes	1667	$0.28	$0.12	-$0.16	35.27%	35.49%
Hungary	Yes	1042	$0.26	$0.24	-$0.02	3.13%	8.67%
Ireland	Yes	750	$0.31	$0.27	-$0.04	-2.23%	5.90%
Israel	Yes	1917	$0.16	$0.14	-$0.02	8.34%	12.00%
Italy	Yes	1292	$0.31	$0.14	-$0.17	27.48%	27.97%
Japan	Yes	1167	$0.28	$0.14	-$0.14	17.71%	19.11%
Mexico	Yes	1792	$0.20	$0.13	-$0.08	12.45%	15.09%
Netherlands	Yes	917	$0.32	$0.27	-$0.05	6.25%	10.59%
New Zealand	Yes	1167	$0.20	$0.18	-$0.03	-1.43%	6.26%
Papua New Guinea	Yes	1417	$0.30	$0.17	-$0.13	25.63%	26.28%
Peru	Yes	1667	$0.13	$0.12	-$0.01	-	4.46%
Philippines	Yes	1583	$0.34	$0.10	-$0.24	52.81%	52.84%
Portugal	Yes	1458	$0.28	$0.25	-$0.02	22.19%	23.14%
Spain	Yes	1500	$0.24	$0.16	-$0.08	12.05%	14.69%
Solomon Islands	Yes	1417	$0.87	$0.14	-$0.74	16.08%	17.88%
Sweden	Yes	833	$0.30	$0.13	-$0.16	3.82%	9.15%
Tonga	Yes	1583	$0.63	$0.13	-$0.51	-	-
Turkey	Yes	1500	$0.14	$0.13	-$0.01	-	-
United Kingdom	Yes	792	$0.21	$0.14	-$0.08	-	4.52%
USA Virgin Islands	Yes	1667	$0.56	$0.19	-$0.37	2.59%	8.35%
USA Hawaii	Yes	1917	$0.39	$0.20	-$0.20	-	-
Vanuatu	Yes	1417	$0.60	$0.15	-$0.45	-	-
China	Yes vs High Electricity Price	1333	$0.11	$0.11	$0.00	-	-
Hong Kong	Yes vs High Electricity Price	1333	$0.25	$0.15	-$0.09	11.64%	14.38%
India	Yes vs High Electricity Price	1604	$0.12	$0.10	-$0.02	-	-
Iran	Yes vs High Electricity Price	1583	$0.21	$0.16	-$0.05	11.52%	14.29%
Jamaica	Yes vs High Electricity Price	1750	$0.18	$0.14	-$0.04	10.52%	13.55%
Jordan	Yes vs High Electricity Price	1917	$0.35	$0.13	-$0.22	113.17%	113.17%
Pakistan	Yes vs High Electricity Price	1833	$0.16	$0.13	-$0.03	6.75%	10.92%
Serbia	Yes vs High Electricity Price	917	$0.14	$0.11	-$0.03	-	-
South Africa	Yes vs High Electricity Price	1833	$0.17	$0.14	-$0.03	-	-
United States	Yes vs High Electricity Price	1458	$0.18	$0.17	-$0.01	18.03%	19.51%
Total Count	**39**						

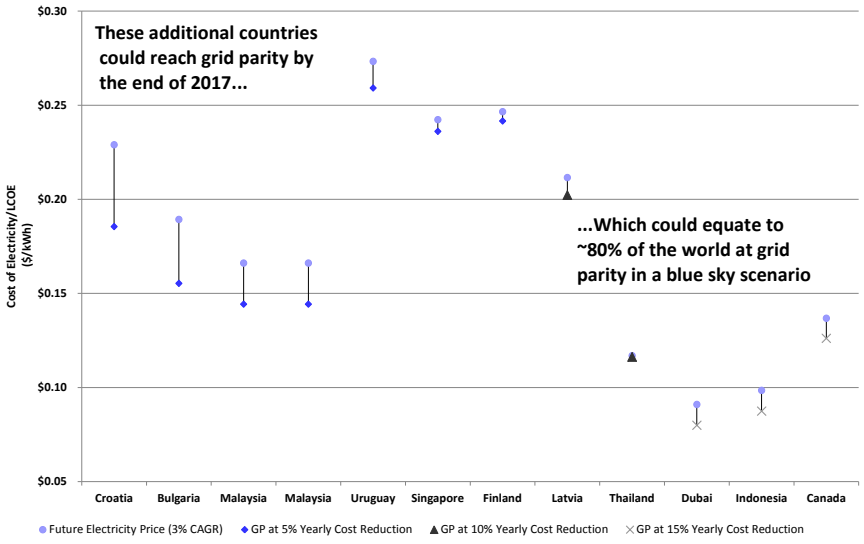
Note: Calculations do not account for any subsidies current or future. Electricity Prices are estimated for residential consumers.

Source: Deutsche Bank Estimates

What does the Future Hold for Grid Parity?

While we believe systems can currently achieve grid parity within some regions of a wide range of countries, what will happen in the future? We conducted a scenario analysis where we assumed yearly average electricity price increases of 3% coupled with 5%, 10%, and 15% yearly overall system cost reduction through 2017. Our findings indicate that under a blue sky scenario, as much as 80% of the target markets could be at grid parity.

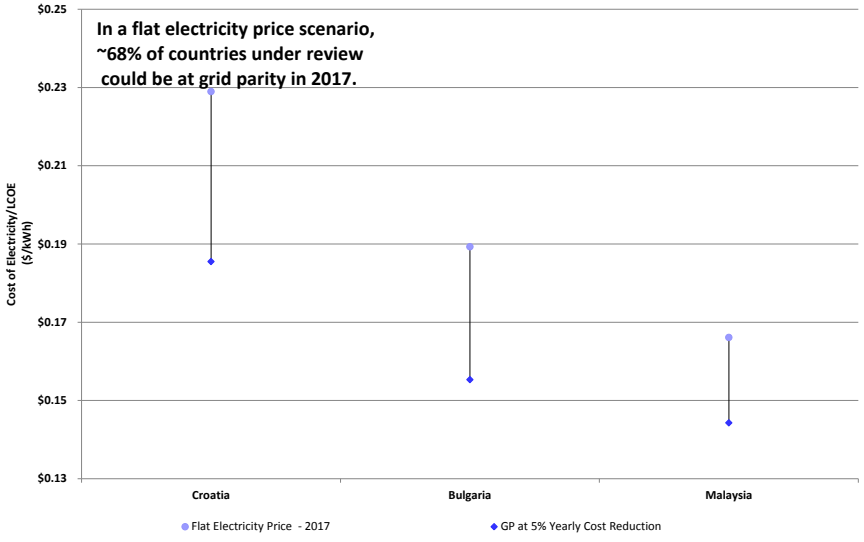
Figure 22: 80% of our target markets could be at Grid Parity by 2017…



Source: Deutsche Bank Estimates

While actual cost reduction may vary between these scenarios, we believe the trend is clear: grid parity without subsidies is already here, increasing parity will occur, and solar penetration rates are set to ramp worldwide.

Figure 23: …or 68% with flat electricity prices



Source: Deutsche Bank Estimates

Where Are We Today: Our Take

One of the most prevalent metrics for direct cost comparison is cost per watt, which we have estimated for various regions throughout the world.

While cost per watt is an appropriate measure to normalize cost comparisons, we note that economies of scale present in different segments/markets will skew cost per watt within regions. While some markets like the US and Japan will have a large portion of residential installations with less economies of scale, Utility scale or large DG markets like India and China will inherently achieve a lower cost per watt. Therefore, we have provided a starting point for analysis coupled with a scenario at different cost points in the previous section.

Module Cost of Production Today

Total module costs of leading Chinese solar companies have decreased from ~$1.31/W in 2011 to ~$0.50/W in 2014 primarily due to reduction in processing costs and polysilicon costs and improvement in conversion efficiencies.

We see total costs coming down 30-40% over the next several years

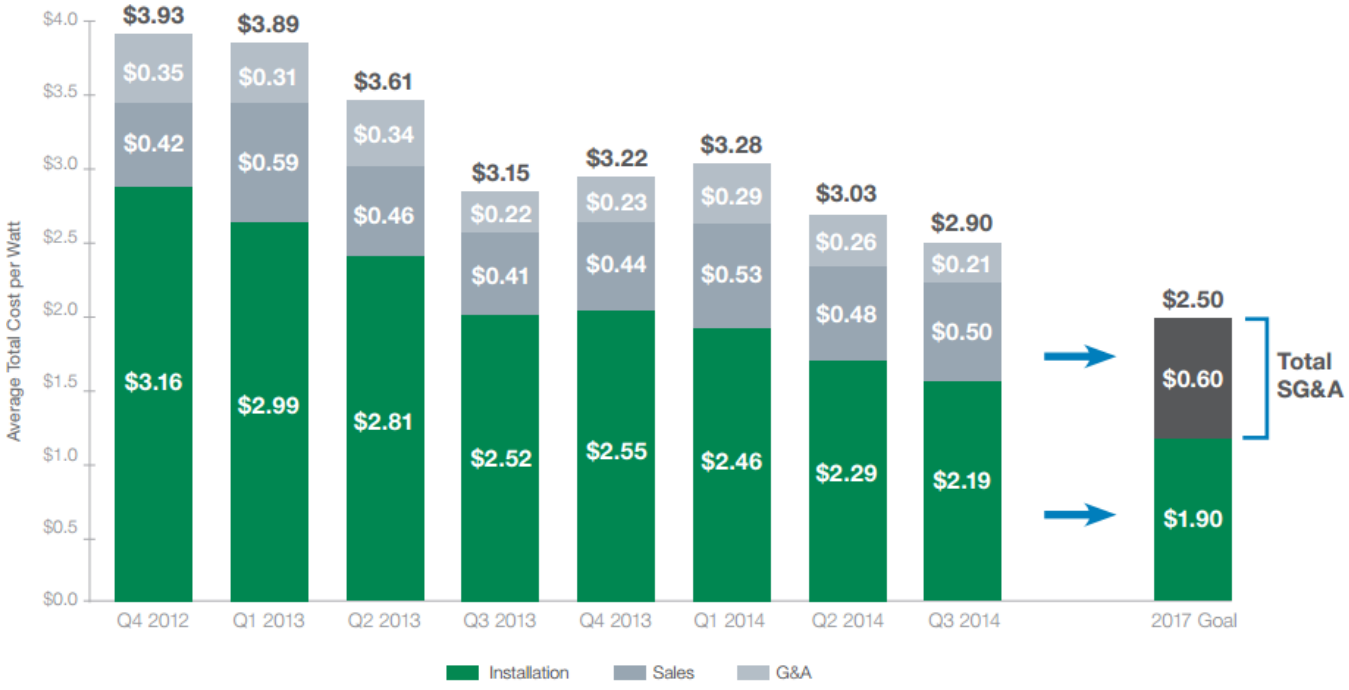
We think it is realistic to expect at least 30-40% reduction in cost per watt in key solar markets, while the greatest cost reductions are likely to come from the residential segments as scale and operating efficiencies improve. There is historical precedent for this in the oldest major solar market in the world – Germany. In fact, costs today are well below costs in the United States and other less mature markets, and total installed costs have declined ~40%+ over the last ~3 years in the country. The exact drivers behind cost declines may vary between countries, but we believe the German example continues to prove that overall system costs have yet to reach a bottom even in comparatively mature markets.

Total Cost Reduction Will Be Multi-Faceted: Mostly Not From Polysilicon

While much of the cost reduction over the last 5-10 years has resulted from polysilicon price reductions, future cost reductions will necessarily come from non panel related balance of system costs. Polysilicon price reductions have accounted for significant portions of cost reductions, and were once the largest single cost component in panels, but this has changed drastically and rapidly over the last decade. In 2014, polysilicon represented no more than 10-11 cents per watt so even if costs are halved, the effect on the total system cost would be incremental – not revolutionary.

However, there are significant other cost drivers that we believe the industry will leverage to drive down LCOE over the next several years. We have outlined our estimates of current and future cost trajectory in the US below, which we expect to mirror other regions' cost roadmaps.

Figure 24: SolarCity 2017 Cost Targets



Source: SolarCity Investor Presentation

Panels: $0.75/w → $0.50/w

Panel prices in the US are already among the highest in the world today, so there would likely be price reductions simply through price arbitrage on a multi-year time horizon. However, we also believe there are fundamental reasons that panel prices worldwide are likely to trend lower over the next several years. While overhangs like trade cases or minimum price agreements could cloud the near term, we believe market inefficiencies will be worked out over the long term and the clearing price will reach $0.50 or lower within the next several years.

Companies like SunEdison have publically targeted $0.40 cent per watt panels by the end of 2016, and many Tier 1 Chinese manufacturers are achieving sub $0.50/w already in 2014. Given that most manufacturers are improving 1-2 cents per quarter, less than ten cents improvement (to reach $0.40) over the next 12 quarters is likely conservative. If panels are sold at a 10 cent gross margin for a total cost of $0.50/w, manufacturers would achieve 20% gross margin – well above recent historic averages. Furthermore, transportation costs and 'soft costs' which inefficiently raise the price of panels should gradually improve as governments work through trade issues

Inverter: $0.25/w → $0.17/w

Inverter prices typically decline 10-15% per year, and we expect this trend to continue into the future. Large solar installers are already achieving ~$0.25/w or lower on large supply deals, and we expect additional savings will be found over the next several years. Component cost reduction, next generation improvements, and incremental production efficiencies will drive savings on the manufacturing side, while new entrants and ongoing price competition

among incumbents will likely keep margins competitive and pass on much of the savings to installers.

Racking/Other Bos: $0.25/w→$0.16/w (Racking) and $0.30/w→$0.17/w (Other)
While racking is often overlooked as a source of cost reduction, we expect ongoing efficiency improvements, streamlining, and potential advances in materials to lead to incremental improvements. As standardization becomes more normalized in the industry, balance of system costs should decline.

Installation: $0.65/w → $0.45/w
Cost reduction on the installation side will come primarily from scale benefits, as we do not expect wage reductions. In fact, solar installation jobs are likely to increase substantially to keep pace with demand, but more experienced installers using better tools and techniques on larger systems are likely to more than offset any wage growth through efficiency gains.

Sales/Customer Acquisition Cost: $0.50/w → $0.20/w
We see substantial room for improvement over the longer term in cost per watt terms as solar gains mainstream acceptance, is recognized as a cost competitive source of electricity, and companies develop new/improved methods to interact with customers.

Already, we are seeing domestic US firms develop automated online systems for customer sourcing, and these systems alone should allow substantial further automation as solar begins to 'sell itself'. Although adoption is still in the early stages in most markets, we think costs could reach the level in the next several years where homeowners begin to recognize inherent value of solar self generation. We believe this will have two effects: 1) customers who prefer to own their own systems and have the ability to do so could finance their solar installation through multiple types of solar loans which are already gaining in popularity and 2) customers who focus on the monthly electricity bill will continue to sign PPA's for solar priced below the retail electricity price curve. Furthermore, the wild card for a third prong of the solar explosion lies in the regulatory environment. If utilities begin to offer competitive solar installations regardless of credit quality (under a third party ownership model), this would open the market to another vast source of potential customers.

All of these factors could converge to drive substantial volume improvements over the next several years. Despite the potential for utility scale choppiness in yearly installs, residential and commercial installations have strong fundamental underpinnings which should continue to drive volume higher as costs reduce, LCOE is more competitive, and customer base expands (which has a compounding effect as neighbors see each other installing solar).

Lastly, the power of all in cost should not be underestimated. A typical residential US-based system costs around ~$25-35K today, but we believe that comparable residential systems could easily dip into the $10-15K range over the next 5 years if market forces driving cost reduction are allowed to progress without substantial policy/exogenous shocks. If interest rates are reasonable and a homeowner takes out a loan, upfront capital investment would be as little as a few thousand dollars.

Other/Soft Costs: $0.20/w → $0.12/w

"Other" costs including soft costs of permitting, incentive collecting, etc account for at least 20 cents/w currently, although 'all in' soft costs from other parts of the cost stack would likely amount to a notably higher number.

We believe that policy rationalization, certainty, and regulatory streamlining could easily cut substantial costs across the solar value chain. Incentive expiration or marginalization (due to insignificant returns) as well as more efficiency and cooperation from utilities and governments should enable further cost improvements.

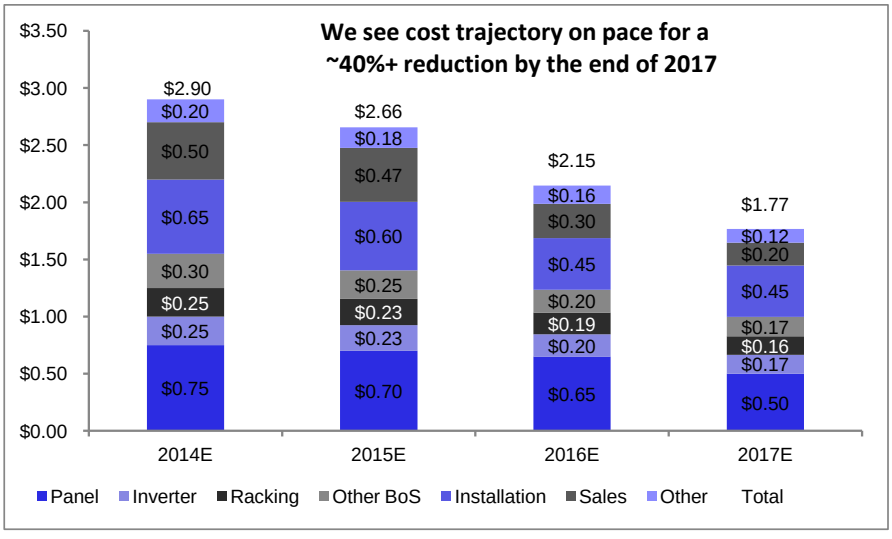
As shown below, soft costs likely account for $0.01-$0.02/kwh in LCOE, or ~10%+.

Figure 25: Cost Per Watt and Total Sun Hours Sensitivity Analysis

Total System Cost ($/W) \ Total Sun Hours (Net of DC-AC Conversion)	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
$1.00	$0.10	$0.09	$0.08	$0.08	$0.07	$0.07	$0.06	$0.06	$0.06	$0.05	$0.05
$1.20	$0.12	$0.10	$0.10	$0.09	$0.08	$0.08	$0.07	$0.07	$0.06	$0.06	$0.06
$1.40	$0.13	$0.12	$0.11	$0.10	$0.09	$0.09	$0.08	$0.08	$0.07	$0.07	$0.07
$1.60	$0.15	$0.13	$0.12	$0.11	$0.10	$0.10	$0.09	$0.09	$0.08	$0.08	$0.07
$1.80	$0.16	$0.15	$0.13	$0.12	$0.11	$0.11	$0.10	$0.09	$0.09	$0.08	$0.08
$2.00	$0.18	$0.16	$0.15	$0.13	$0.13	$0.12	$0.11	$0.10	$0.10	$0.09	$0.09
$2.20	$0.19	$0.17	$0.16	$0.15	$0.14	$0.13	$0.12	$0.11	$0.11	$0.10	$0.10
$2.40	$0.21	$0.19	$0.17	$0.16	$0.15	$0.14	$0.13	$0.12	$0.11	$0.11	$0.10
$2.60	$0.22	$0.20	$0.18	$0.17	$0.16	$0.15	$0.14	$0.13	$0.12	$0.12	$0.11
$2.80	$0.24	$0.21	$0.20	$0.18	$0.17	$0.16	$0.15	$0.14	$0.13	$0.12	$0.12
$3.00	$0.25	$0.23	$0.21	$0.19	$0.18	$0.17	$0.16	$0.15	$0.14	$0.13	$0.13
$3.20	$0.27	$0.24	$0.22	$0.20	$0.19	$0.18	$0.17	$0.16	$0.15	$0.14	$0.13

Source: Deutsche Bank

Figure 26: Cost Reduction Example: USA



Source: Deutsche Bank

Demand Overview

We are updating our country-specific demand estimates and tempering demand expectations from ~49GW in 2014 to ~45GW, while our 2015 ests shift from ~59GW to ~54GW. Several country-specific issues held back the pace of installation expansion in 2014 including: Trade case issues (China, the US, and Europe), regulatory uncertainty (Japan, India), and slower than expected implementation of policies (South America and the Middle East). However, we still see double digit growth in 2014 and accelerating growth in 2015.

Figure 27: Demand Overview

MW	2011	2012	2013	2014E	2015E	2016E	2017E
Asia							
China	2,100	3,400	12,920	10,000	13,000	13,000	13,000
y/y (%)	*110%*	*62%*	*280%*	*-23%*	*30%*	*0%*	*0%*
Japan	1,296	2,086	6,028	8,000	9,000	9,180	7,344
y/y (%)	*31%*	*70%*	*189%*	*33%*	*13%*	*2%*	*-20%*
India	190	980	1004	1,000	2,000	2,600	3,380
y/y (%)	*20%*	*416%*	*2%*	*0%*	*100%*	*30%*	*30%*
Thailand	79	298	447	800	600	500	500
y/y (%)		*277%*	*50%*	*79%*	*-25%*	*-17%*	*0%*
Philippines	0	2	2	250	500	1,000	1,050
y/y (%)			*0%*	*12400%*	*100%*	*100%*	*5%*
Rest of Asia		1,000	2500	3,250	3,750	3,800	4,500
y/y (%)			*150%*	*30%*	*15%*	*1%*	*18%*
Asia Subtotal	*3,665*	*7,764*	*22,899*	*23,050*	*28,350*	*29,080*	*28,724*
% of World		*26%*	*58%*	*55%*	*52%*	*47%*	*49%*
Americas	**2011**	**2012**	**2013**	**2014E**	**2015E**	**2016E**	**2017E**
US	1,600	3,313	4,751	7,000	12,000	16,000	9,600
y/y (%)	*82%*	*67%*	*43%*	*47%*	*71%*	*33%*	*-40%*
Canada	297	268	444	533	586	586	586
y/y (%)	*100%*	*20%*	*-17%*	*20%*	*10%*	*0%*	*0%*
Mexico	7	1	70	120	250	1,500	2,000
y/y (%)		*-86%*	*6900%*	*71%*	*108%*	*500%*	*33%*
Chile	0	6	80	300	1,000	1,000	1,000
y/y (%)			*1233%*	*275%*	*233%*	*0%*	*0%*
Brazil	10	12	50	30	40	500	600
y/y (%)		*20%*	*317%*	*-40%*	*33%*	*1150%*	*20%*
Central America				300	400	500	600
y/y (%)					*33%*	*25%*	*20%*
Rest of Americas		300	1000	1,225	1,860	2,100	2,900
y/y (%)			*233%*	*23%*	*52%*	*13%*	*38%*
Americas Subtotal	*1,914*	*3,900*	*6,395*	*9,508*	*16,136*	*22,186*	*17,286*
% of World		*13%*	*16%*	*23%*	*30%*	*36%*	*29%*

Source: Deutsche Bank

Figure 28: Demand Overview Continued

Europe	2011	2012	2013	2014E	2015E	2016E	2017E
United Kingdom	762	925	1500	3000	2250	1800	1890
y/y (%)	*500%*	*-70%*	*62%*	*100%*	*-25%*	*-20%*	*5%*
Germany	7,485	7,604	3,300	2,145	2,038	2,000	2,060
y/y (%)	*4%*	*2%*	*-57%*	*-35%*	*-5%*	*-2%*	*3%*
Italy	9,443	3,597	1,149	300	400	400	400
y/y (%)	*307%*	*-62%*	*-68%*	*-74%*	*33%*	*0%*	*0%*
Spain	400	332	118	100	100	150	160
y/y (%)		*-17%*	*-64%*	*-15%*	*0%*	*50%*	*7%*
France	1,777	1,115	613	766	920	1,103	1,324
y/y (%)	*109%*	*-60%*	*-45%*	*25%*	*20%*	*20%*	*20%*
Rest of Europe	2,007	3,072	2,497	997	1,227	1,509	1,856
y/y (%)	*205%*	*53%*	*-19%*	*-60%*	*23%*	*23%*	*23%*
Europe Subtotal	*21874*	*16645*	*9177*	*7308*	*6934*	*6962*	*7690*
% of World		*57%*	*23%*	*17%*	*13%*	*11%*	*13%*

Middle East/Africa	2011	2012	2013	2014E	2015E	2016E	2017E
Saudi Arabia	0	0	0	50	300	600	1,500
y/y (%)				*#DIV/0!*	*500%*	*100%*	*150%*
United Arab Emeriates	0	0	20	50	100	150	200
y/y (%)			*#DIV/0!*	*150%*	*100%*	*50%*	*33%*
Jordan	0	2	60	80	150	150	170
y/y (%)			*2900%*	*33%*	*88%*	*0%*	*13%*
South Africa	1	40	100	300	800	1,200	1,000
y/y (%)		*3900%*	*150%*	*200%*	*167%*	*50%*	*-17%*
Rest of Middle East/Africa		12	100	400	600	1,000	1,500
y/y (%)			*733%*	*300%*	*50%*	*67%*	*50%*
Middle East/Africa Subtotal	*1*	*54*	*280*	*880*	*1,950*	*3,100*	*4,370*
% of World		*0%*	*1%*	*2%*	*4%*	*5%*	*7%*

Australia	874	1049	757	1100	850	893	1091
y/y (%)	*124%*	*20%*	*-28%*	*45%*	*-23%*	*5%*	*22%*
Total	**27,557**	**29,412**	**39,508**	**41,846**	**54,220**	**62,221**	**59,161**
y/y (%)	***53%***	***7%***	***34%***	***6%***	***30%***	***15%***	***-5%***

Source: Deutsche Bank

Supply

Polysilicon supply has undergone drastic changes over the past several years as tier 2/3 suppliers have largely gone bankrupt, leaving only a handful of meaningful suppliers in the marketplace. Capacity adds continue to keep prices depressed, and we see enough incremental capacity coming online to maintain a balance over the next few years.

Figure 29: Capacity

Year End Capacity (MT)	2010	2011	2012	2013	2014	2015E	2016E	2017E
INCUMBENT POLY SUPPLIERS								
Hemlock Semiconductor	36,000	44,000	50,000	50,000	50,000	50,000	50,000	50,000
Tokuyama	8,200	8,200	9,200	15,400	29,200	29,200	20,000	20,000
Mitsubishi Materials	3,300	4,350	4,350	4,350	4,350	4,350	4,350	4,350
Sumitomo Titanium	1,400	3,600	3,900	3,900	3,900	3,900	3,900	3,900
Mitsubishi Polysilicon	1,500	2,000	2,200	2,200	2,200	2,200	2,200	2,200
REC	17,000	17,000	17,000	20,000	39,000	39,000	42,000	42,000
Wacker	30,500	42,000	52,000	52,000	59,000	85,000	90,000	90,000
SunEdison (incl. SMP JV)	7,800	9,200	4,200	4,200	4,200	17,700	17,700	42,700
Incumbents - Total	**105,700**	**130,350**	**142,850**	**152,050**	**191,850**	**231,350**	**230,150**	**255,150**
New Entrants NON - CHINA POLY SUPPLY								
OCI	27,000	42,000	42,000	42,000	42,000	52,000	52,000	52,000
M.SETEK	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Nitol Group	3,500	3,500	3,500	5,000	5,000	11,000	11,000	11,000
Others (Russia, New entrants)	1,000	3,000	5,000	5,000	5,000	5,000	5,000	5,000
Non - CHINA Total	**38,500**	**55,500**	**57,500**	**59,000**	**59,000**	**75,000**	**75,000**	**75,000**
New Entrants CHINA POLY SUPPLY								
Asia Silicon	2,000	5,000	5,000	5,000	5,000	11,800	11,800	11,800
Daqo Group	3,300	4,300	5,000	6,150	12,150	12,150	12,150	25,000
Emei Semiconductor	350	350	350	350	350	350	350	350
Luoyang Semiconductor	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300
LDK Solar	11,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000
GCL	25,000	46,000	65,000	65,000	85,000	90,000	90,000	90,000
Wuxi Zhongcai	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Sichuan Xinguang	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
TPSI (Taiwan Polysilicon)	0	3,000	8,000	8,000	8,000	8,000	8,000	8,000
TBEA (China)	0	1,200	10,000	12,000	15,000	15,000	15,000	15,000
Others (China)	5,000	12,000	15,000	35,000	25,000	25,000	25,000	25,000
China - Total	**52,450**	**94,650**	**131,150**	**154,300**	**173,300**	**185,100**	**185,100**	**197,950**
New Entrants - Total	**90,950**	**150,150**	**188,650**	**213,300**	**232,300**	**260,100**	**260,100**	**272,950**
Total (excl. Met Poly)	**196,650**	**280,500**	**331,500**	**365,350**	**424,150**	**491,450**	**490,250**	**528,100**

Source: Deutsche Bank, Company Reports

Figure 30: Supply

Annual Supply (MT)	2010	2011	2012	2013	2014	2015E	2016E	2017E
INCUMBENT POLY SUPPLIERS								
Hemlock Semiconductor	27,900	34,000	36,000	42,500	42,500	42,500	45,000	45,000
Tokuyama	7,300	8,200	4,500	5,000	10,035	16,060	16,974	15,000
Mitsubishi Materials	2,168	3,251	2,000	3,800	4,133	4,133	4,133	4,133
Sumitomo Titanium	1,190	2,125	3,188	3,315	3,315	3,315	3,315	3,315
Mitsubishi Polysilicon	1,275	1,488	1,785	1,870	1,870	1,870	1,870	1,870
REC	10,500	16,672	18,790	19,764	18,600	21,450	27,945	33,600
Wacker	30,500	35,500	38,000	49,000	48,840	57,600	70,000	72,000
SunEdison (incl. SMP JV)	6,102	5,950	5,360	4,200	3,990	7,665	12,390	21,140
Traditional Poly Suppliers - Total	**86,934**	**107,186**	**109,623**	**129,449**	**133,283**	**154,593**	**181,627**	**196,058**
Non-China Poly Supply								
OCI	18,000	35,000	40,000	25,935	37,800	44,650	49,400	49,400
M.SETEK	5,400	7,000	7,000	6,300	6,300	6,300	6,300	6,300
Nitol Group	760	3,500	3,500	2,125	2,500	3,200	4,400	4,400
Others (New entrants)	917	2,000	5,000	5,000	4,750	4,500	4,500	4,500
Non - China Total	**25,077**	**47,500**	**55,500**	**39,360**	**51,350**	**58,650**	**64,600**	**64,600**
China Poly Supply								
Asia Silicon	1,200	2,400	4,500	2,000	1,500	2,520	3,540	3,540
Daqo Group	3,650	4,300	3,568	4,805	6,150	9,720	9,720	13,003
Emei Semiconductor	329	350	350					
Luoyang Semiconductor	1,588	2,475	3,300					
LDK Solar	5,000	10,220	17,000	0	1,020	4,250	5,950	7,650
GCL	17,040	29,414	37,055	50,440	67,500	78,750	81,000	81,000
Wuxi Zhongcai	1,000	1,000	1,000					
Sichuan Xinguang	1,708	1,500	1,500					
TPSI (Taiwan Polysilicon)	0	1,500	1,500					
TBEA (China)	0	600	1,000	6,600	10,125	12,000	13,500	13,500
Others (China)	4,555	8,500	16,230	33,250	21,000	17,500	17,500	17,500
China - Total	**36,070**	**62,259**	**87,003**	**97,095**	**107,295**	**124,740**	**131,210**	**136,193**
Total (excl. Met Poly)	**148,081**	**216,945**	**252,126**	**265,904**	**291,928**	**337,983**	**377,437**	**396,850**

Source: Deutsche Bank, Company Reports

GCL Poly

GCL-Poly high utilization rates in 1H14 were driven by solid demand. The company produced ~32K MT of poly in 1H14 (up ~47% Y/Y), and sold ~7K MT at an ASP of ~$22/kg. The poly production cost in 1H14 declined by ~9% Y/Y. As of June 2014, the company's poly capacity was ~65K MT. The company plans to add ~25K MT of additional capacity through its FBR poly plant, by 2014-15. Capacity expansion could reach ~85K MT exiting 2014 and ~90K MT by 2015. Utilization rates for the company are likely to remain high in the range of ~90% over the next few years, in our view.

Wacker

Wacker also has had notably higher utilization levels recently. Wacker's Polysilicon's sales in 2Q14 increased ~34% Y/Y driven by a significant increase in volumes and better pricing. Wacker has voiced expectations that prices will remain strong driven by solid demand environment. The company is building a new poly plant in the US (20K MT capacity), which is scheduled to be commissioned in 2H15. The company's poly capacity was ~52K MT as of 2013-end. We expect debottlenecking activities and US plant to take poly capacity to 59K MT in 2014, 85K MT in 2015 and 90K MT in 2016. We expect utilization levels to be high in ~80% range over the next few years.

OCI Co.

OCI recently decided to restart a project which will supply ~20KMT (expected to come online in mid-2015), overall, bringing total poly capacity from ~42K

MT to ~52K MT. We expect high utilization levels particularly as OCI is generally not subject to Chinese tariffs

Daqo

Daqo shipped 1.4K MT of poly in 2Q14 (up 3% Y/Y) and expects shipments in 3Q14 to be 1.45-1.50K MT. The company decreased production costs to ~$14/kg and expects further decreases by mid-2015 to ~$12/kg. Poly ASP in 2Q14 increased to $22/kg, and the company expects poly ASP to increase further in 4Q13 and beyond, driven by robust end-market demand. Company anticipates high utilization rates for poly production in 2014 – with poly volume expected to be close to the nameplate capacity of ~6K MT. In 2014, Daqo raised ~$55M through a follow-on public offering, which will be used for the expansion at the company's Xinjiang poly facility. Daqo expects construction to finish by the end of 2014 – taking the poly capacity to ~12K MT. Subsequently, the company plans to increase its poly capacity to 25K MT, which we believe could complete in 2017.

REC Silicon

REC produced ~4.4K MT (~3.7K MT of FBR, ~0.4K MT of Semi-grade, ~0.3K MT of Siemens Solar) and sold ~4.2K MT of poly in 2Q14. REC targets ~5K MT of poly production for 3Q14 (~4.3K MT of FBR) and ~18.6K MT for full year 2014 (~15.7K MT of FBR). The company benefitted from high poly ASP during the quarter (spot price for solar-grade poly up 4% Q/Q to ~$21/kg), driven by strong demand. As such, the company expects poly market to remain balanced during 2H14, and expects flat to modest increase in poly prices through 2H14. In 2014, REC entered into a JV with Shaanxi Non-Ferrous Tian Hong New Energy to build a poly plant with a nameplate capacity of 18K MT. REC's poly capacity currently stands at ~20K MT and the new JV will increase the capacity to ~39K MT by 2014-end. The company also plans to expand capacity at its Moses Lake facility by 3K MT, which would raise poly capacity to 42K MT in the second half of 2016.

Tokuyama

Tokuyama reported a decline in sales of solar-grade poly in June '14 quarter, despite a recovery in the overall global demand, due to a strategic shift. The company is constructing a new poly production facility in Malaysia, which will focus on producing solar-grade poly. The facility has a capacity of ~14K MT and is expected to start operations in Sep-Oct 2014. The company expects capacity utilization to be well over 50% at launch, and then gradually increase, with full production likely from mid-2015. Currently, the company has a poly capacity of ~15K MT (9K in MT in Japan and 9K MT in Malaysia). With the new Malaysian facility, the capacity will increase to ~29K MT by 2014 end.

Supply Demand: Could Be Tight

Although several poly producers are adding capacity in the next 1-2 years, we see supply/demand balance as barely balanced over the medium term, and well within the margin of error. We expect this balance to be maintained over the next several years and do not expect any drastic shifts in poly prices, although there may be gradual price declines as lower cost capacity comes online.

Figure 31: Supply Demand - Balanced

Supply/Demand	2011	2012	2013	2014E	2015E	2016E	2017E
New PV Installation (MW)	27,557	29,412	39,508	42,046	54,220	62,221	59,161
Inventory Requirement (MW)	2,756	2,941	1,975	2,102	2,711	3,111	2,958
Inventory % of Demand	*10%*	*10%*	*5%*	*5%*	*5%*	*5%*	*5%*
Total PV Module Shipments (MW)	**30,313**	**32,353**	**41,484**	**44,149**	**56,931**	**65,332**	**62,119**
Efficiency Loss	*5.0%*	*5.0%*	*4.0%*	*4.0%*	*4.0%*	*3.0%*	*3.0%*
Total PV Cell Shipments (MW)	**31,829**	**33,971**	**43,143**	**45,914**	**59,208**	**67,292**	**63,982**
Thin Film Supply (MW)	2,083	1,945	1,742	2,279	2,663	2,930	3,223
Polysilicon Consumed (ton/MW)	6.5	6.0	5.5	5.4	5.4	5.3	5.3
Total Solar Poly Reqd (MT)	**193,344**	**192,156**	**227,707**	**235,632**	**305,342**	**341,118**	**322,026**
Poly demand from Semis (MT)	**29,657**	**30,218**	**32,839**	**34,152**	**35,518**	**36,939**	**38,417**
Total poly demand (MT)	**223,001**	**222,374**	**260,545**	**269,784**	**340,860**	**378,057**	**360,442**
Poly supply (MT) - excluding scrap/U	**252,126**	**252,126**	**265,904**	**291,928**	**337,983**	**377,437**	**396,850**
Under Supply (Over Supply) (MT)	**(29,125)**	**(29,752)**	**(5,359)**	**(22,144)**	**2,878**	**621**	**(36,408)**
Under Supply (Over Supply) (MW)	**(4,481)**	**(4,959)**	**(974)**	**(4,101)**	**533**	**117**	**(6,869)**
% of demand	*-16%*	*-17%*	*-2%*	*-10%*	*1%*	*0%*	*-12%*

Source: Deutsche Bank

However, 2017 could see a short term oversupply as policy shifts in key markets such as the US and Japan cause demand to stagnate in the near term. We expect the upward demand trend to continue thereafter.

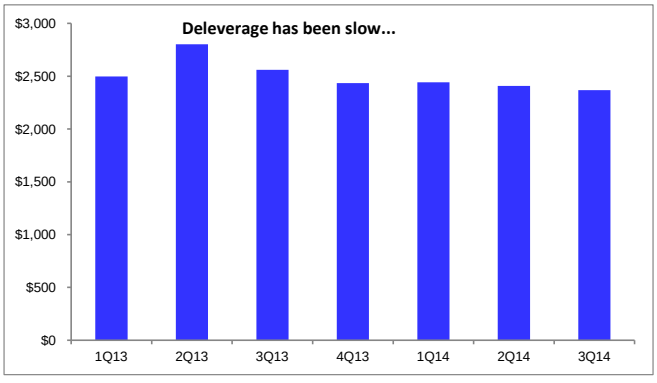
Yingli Green Energy: Downgrading to Hold

Although we continue to believe that Chinese exposure will play out favorably over the long term, Yingli's balance sheet concerns, recent guidance cuts, and ongoing policy uncertainty provide limited upside, in our view. On a relative basis, we prefer downstream installers with more financial flexibility, and within the Chinese companies we prefer Trina Solar. Downgrade Yingli to hold, $3 PT.

Debt and Interest Expense

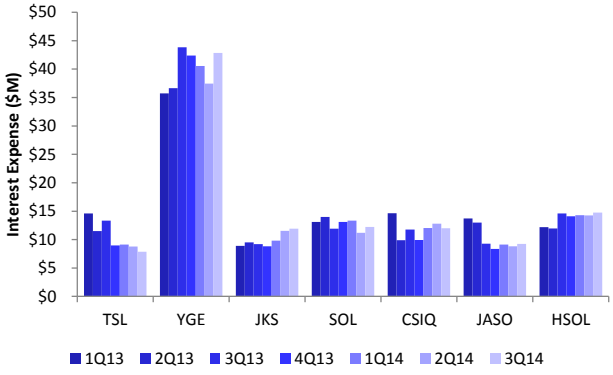
Yingli has one of the highest debt levels of all of the solar companies, as well as some one of the highest absolute interest expense payments. Despite marginal deleveraging over the past few quarters, interest payments appear relatively unimproved. With ~$1.4B of short term debt, Yingli has significant exposure to interest rates and Chinese lender support.

Figure 32: YGE Debt Levels ($M)



Source: Thomson Reuters, Company Reports

Figure 33: Quarterly Interest Expense



Source: Deutsche Bank

Although debt levels have started to moderate slightly, they are still well above any peer. Trina, which has a comparable manufacturing base and may overtake YGE as the top module supplier, has about ~$1B in debt as of Q3 2014, versus ~$2.4B on Yingli's balance sheet.

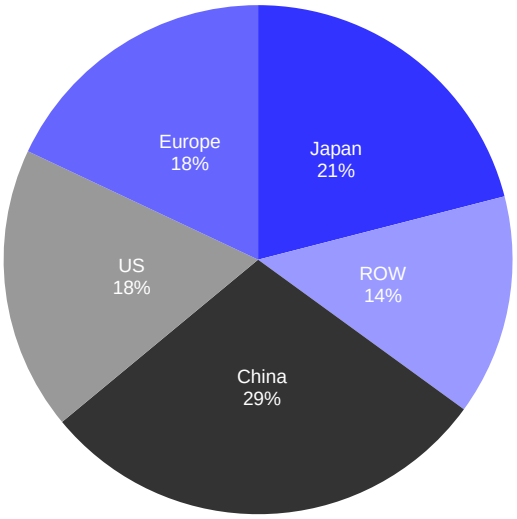
Balance Sheet Concerns Limit Flexibility

Although much of the value creation from solar companies will likely stem from downstream project development, Yingli's tenuous balance sheet leaves the company limited ability to engage in project development and likely sacrifices much of the economics which make downstream development attractive. In April 2014, Yingli established a 1B RMB fund with Sailing Capital to develop projects, which was immediately followed by a secondary offering – over half of which was used for funding the JV. This likely indicates the company's relative lack of flexibility to utilize the balance sheet to build projects, and limits the profitability to do so.

Policy Uncertainty in Key Markets

Although Yingli will likely slowly shift into the downstream segment, we expect the majority of revenues to derive from module sales, which exposes the company to increased policy risk. In 2014, China, Japan, and the US combined are expected to account for ~68% of revenues, and each of these countries has individual policy uncertainties in the near term.

Figure 34: YGE 2014E Revenue Breakdown



Source: Company Reports

While we expect each of these issues to be resolved over time, Yingli's exposure to anti-dumping duties (in the US), shifting policy targets (in China), and interconnection problems (in Japan) give the company a higher risk profile than some, assuming their ability to diversify into downstream project development remains relatively slow.

Adjusting Estimates

We are adjusting our 2015/2016 estimates to account for slower than expected expansion into project development and moderated expectations around opex improvement. We adjust our 2015 Rev/EPS from $2.57B/$0.31 to $2.2B/$0.01 and 2016 ests from $2.65B/$0.63 to $2.3B/$0.35. Our price target is based on 10x 2016 ests discounted back 18% in line with peers, so we have adjusted our price target from $5 to $3.

Upside/Downside Risks:

Upside Risks include: 1) Faster than expected expansion into downstream projects 2) Deleveraging occurs faster than expected or interest payments decrease 3) Panel ASP's increase or stabilize faster than expected 4) Policy risks are resolved faster than expected.

Downside risks include: 1) Slower than expected expansion into downstream project development 2) Balance sheet concerns are not addressed 3) Panel ASPs decline faster than expected 4) Policy risks are exacerbated or worsen.

Figure 35: Yingli Drivers

FYE: December	Fiscal 2013	Fiscal 2014E Q1	Q2	Q3	Q4E	Fiscal 2014E	Fiscal 2015E Q1E	Q2E	Q3E	Q4E	Fiscal 2015E	Q1E	Fiscal Q2E
Annual Capacity (MW)		3000.0	3500.0	3800.0	4000.0		4000.0	4000.0	4000.0	4000.0		4000.0	4000.0
Quarterly Capacity (MW)		750.0	875.0	950.0	1000.0		1000.0	1000.0	1000.0	1000.0		1000.0	1000.0
Available Capacity (MW)		975.0	1225.0	1330.0	1400.0		1400.0	1400.0	1400.0	1400.0		1400.0	1400.0
Revenues	**2191.2**	**432.2**	**549.5**	**551.5**	**554.7**	**2087.9**	**466.2**	**547.3**	**604.3**	**613.9**	**2231.8**	**481.7**	**575.6**
Product Revenue	2066.7	408.9	523.6	518.2	504.3		434.8	515.9	534.9	525.1		443.9	512.2
Projects Revenue	67.5	3.9	9.0	4.2	25.4		6.4	6.4	44.5	68.8		12.8	38.4
Other Revenue	81.2	19.5	16.9	29.1	25.0		25.0	25.0	25.0	20.0		25.0	25.0
COGS	**1965.3**	**364.4**	**463.7**	**436.5**	**465.2**	**1729.8**	**380.2**	**449.7**	**492.6**	**501.2**	**1823.7**	**399.1**	**471.1**
Product COGS	1830.1	340.1	438.9	411.5	418.8		350.0	419.5	431.2	430.1		363.6	419.6
Project COGS	61.8	3.2	8.7	3.5	21.4		5.3	5.3	36.4	56.1		10.5	31.5
Other COGS	82.4	21.2	16.2	21.4	25.0		25.0	25.0	25.0	15.0		25.0	20.0
Gross Profit	**225.9**	**67.8**	**85.8**	**115.0**	**89.5**	**358.1**	**86.0**	**97.6**	**111.8**	**112.7**	**408.0**	**82.6**	**104.6**
Product GM (%)	11.4%	16.8%	16.2%	20.6%	17.0%		19.5%	18.7%	19.4%	18.1%		18.1%	18.1%
Project GM (%)	8.4%	18.1%	3.6%	16.8%	15.7%		17.3%	18.0%	18.1%	18.4%		18.0%	18.0%
Gross Margin (%)	10.3%	15.7%	15.6%	20.9%	16.1%	17.1%	18.4%	17.8%	18.5%	18.4%	18.3%	17.2%	18.2%
Total Modules Used (MW)		630.8	887.9	903.4	905.0	3327.1	780.8	937.9	1003.4	1005.0	3727.1	830.8	987.9
Modules Sold (MW)	3234.3	621.7	810.3	794.4	855.0	3081.4	715.8	857.9	898.4	900.0	3372.1	760.8	877.9
	41%	-33%	41%	2%	0%	-5%	-16%	20%	5%	0%	9%	-15%	15%
Silicon Breakdown													
Spot	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Contract	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Costs ($/W)	**$0.57**	$0.54	$0.52	$0.49	$0.49	**$0.51**	$0.49	$0.49	$0.48	$0.48	**$0.48**	$0.48	$0.48
Spot		$0.12	$0.12	$0.10	$0.10		$0.10	$0.10	$0.10	$0.10		$0.11	$0.11
Contract		$0.00	$0.00	$0.00	$0.00		$0.00	$0.00	$0.00	$0.00		$0.00	$0.00
Silicon cost		$0.12	$0.12	$0.10	$0.10		$0.10	$0.10	$0.10	$0.10		$0.11	$0.11
Processing Costs		$0.42	$0.40	$0.39	$0.39		$0.39	$0.39	$0.38	$0.38		$0.37	$0.37
Check	-9%	*$0.04*	*$0.02*	*$0.03*	*$0.00*	-9%	*$0.04*	*$0.01*	*$0.01*	*$0.00*	-1%	*$0.05*	*$0.00*
Silicon Prices ($/kg)	22.4	22.4	22.4	18.3	18.5	20.4	18.7	18.7	18.9	18.9	18.8	20.7	20.7
Spot	22.4	22.4	22.4	18.3	18.5	20.4	18.7	18.7	18.9	18.9	18.8	20.7	20.7
Premium/Discount to Contract		100%	100%	80%	90%		90%	90%	90%	90%		100%	100%
Contract	22.4	22.4	22.4	22.8	20.5	22.0	20.7	20.7	20.9	20.9	20.8	20.7	20.7
Q/Q(%)		1%	0%	2%	-10%		1%	0%	1%	0%		-1%	0%
		2%	0%	-18%	1%		-17%	0%	1%	0%		11%	0%
Conversion Efficiency		18.0%	18.0%	18.0%	18.0%		19.0%	19.0%	19.0%	19.0%		19.0%	19.0%
Grams/Watt		5.50	5.40	5.40	5.40		5.30	5.30	5.30	5.30		5.30	5.30
ASP ($/Watt)													
PV Modules	$ 0.65	$ 0.65	$ 0.64	$ 0.63	$ 0.59	$ 0.63	$ 0.61	$ 0.60	$ 0.60	$ 0.58	$ 0.60	$ 0.58	$ 0.58
y/y (%)	(16%)	3%	2%	(5%)	(10%)	(4%)	(6%)	(7%)	(7%)	(7%)	1%	(4%)	(4%)
q/q (%)		(1%)	(1%)	(3%)	(6%)		3%	(1%)	(1%)	(2%)		0%	0%
Projects Buisness													
Projects Built & Held on BS		6	72	109	30	217	60	75	100	100	335	60	100
Held MW Sold		0	0	0	0	0	0	0	30	50	80	0	20
Total MW on BS / With JV		6	78	187	217		277	352	422	472		532	612

Source: Deutsche Bank, Company Reports

Figure 36: Yingli Income Statement

FYE: December	Fiscal 2013	Fiscal 2014E Q1	Q2	Q3	Q4E	Fiscal 2014E	Fiscal 2015E Q1E	Q2E	Q3E	Q4E	Fiscal 2015E	Fiscal 2016E Q1E	Q2E	Q3E	Q4E	Fiscal 2016E
Revenue	2,191.2	432.2	549.5	551.5	554.7	2,087.9	466.2	547.3	604.3	613.9	2,231.8	481.7	575.6	627.3	646.4	2,331.0
QoQ		(29%)	27%	0%	1%		(16%)	17%	10%	2%		(22%)	19%	9%	3%	
YoY	21%	0%	(0%)	(8%)	(10%)	(5%)	8%	(0%)	10%	11%	7%	3%	5%	4%	5%	4%
Cost of Goods	1,952.4	364.4	463.7	436.5	465.2	1,729.8	380.2	449.7	492.6	501.2	1,823.7	399.1	471.1	503.1	507.9	1,881.1
Gross Profit	238.7	67.8	85.8	115.0	89.5	358.1	86.0	97.6	111.8	112.7	408.0	82.6	104.6	124.2	138.5	449.9
R&D	47.2	21.2	20.2	17.1	16.0	74.5	15.0	15.0	15.0	15.0	60.0	15.0	15.0	15.0	15.0	60.0
Selling, General & Admin.	295.2	67.3	79.4	65.4	61.0	273.1	51.3	57.5	63.5	61.4	233.6	50.6	57.6	59.6	58.2	225.9
Impairment of Intangible Assets	79.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operating Expenses	421.7	88.5	99.6	82.5	77.0	347.7	66.3	72.5	78.5	76.4	293.6	65.6	72.6	74.6	73.2	285.9
Operating Income	(183.0)	(20.7)	(13.9)	32.5	12.5	10.4	19.7	25.2	33.3	36.3	114.4	17.0	32.0	49.6	65.3	164.0
Non operating (income) expense:																
Interest income (expense)	(153.4)	(40.1)	(36.0)	(41.4)	(38)	(155)	(35)	(35)	(33)	(30)	(133)	(30)	(30)	(30)	(30)	(120.0)
Income (Loss) from an affiliate	11.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forex and other gain (loss)	(5.0)	(2.2)	2.7	(10.5)	(4.0)	(14.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non operating (income) expense	147.5	40.3	33.3	51.9	42.0	167.5	35.0	35.0	33.0	30.0	133.0	30.0	30.0	30.0	30.0	120.0
Income (loss) before taxes	(330.5)	(61.0)	(47.1)	(19.4)	(29.5)	(157.1)	(15.3)	(9.8)	0.3	6.3	(18.6)	(13.0)	2.0	19.6	35.3	44.0
Income Tax Expense (Benefit)	5.1	(3.0)	0.2	3.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income (loss)	(335.5)	(58.0)	(47.3)	(22.5)	(29.5)	(157.4)	(15.3)	(9.8)	0.3	6.3	(18.6)	(13.0)	2.0	19.6	35.3	44.0
Minority Interest	18.0	3.0	1.3	2.5	3.0	9.9	5.0	5.0	5.0	5.0	20.0	5.0	5.0	5.0	5.0	20.0
Accretion of redeemable convertible preferred shares	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net income available to ordinary shareholders	(317.5)	(55.0)	(46.0)	(20.0)	(26.5)	(147.5)	(10.3)	(4.8)	5.3	11.3	1.4	(8.0)	7.0	24.6	40.3	64.0
Basic income (loss) per share	($2.03)	($0.35)	($0.26)	($0.11)	($0.15)	($0.85)	($0.06)	($0.03)	$0.03	$0.06	$0.01	($0.04)	$0.04	$0.14	$0.22	$0.35
Diluted income (loss) per share from Operations (i)	($2.03)	($0.35)	($0.26)	($0.11)	($0.15)	($0.85)	($0.06)	($0.03)	$0.03	$0.06	$0.01	($0.04)	$0.04	$0.14	$0.22	$0.35
Weighted average shares used	156.6	156.7	173.8	181.8	181.8	173.5	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8
Avg Shares - Fully Diluted (M)	156.6	156.7	173.8	181.8	181.8	173.5	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8	181.8
Percent of Sales																
Gross Margin	10.9%	15.7%	15.6%	20.9%	16.1%	17.1%	18.4%	17.8%	18.5%	18.4%	18.3%	17.2%	18.2%	19.8%	21.4%	19.3%
R&D	2.2%	4.9%	3.7%	3.1%	2.9%	3.6%	3.2%	2.7%	2.5%	2.4%	2.7%	3.1%	2.6%	2.4%	2.3%	2.6%
SG&A	13.5%	15.6%	14.5%	11.9%	11.0%	13.1%	11.0%	10.5%	10.5%	10.0%	10.5%	10.5%	10.0%	9.5%	9.0%	9.7%
Operating Income	(8.4%)	-4.8%	-2.5%	5.9%	2.2%	0.5%	4.2%	4.6%	5.5%	5.9%	5.1%	3.5%	5.6%	7.9%	10.1%	7.0%
Net Income	(15.3%)	-13.4%	-8.6%	-4.1%	-5.3%	(7.5%)	-3.3%	-1.8%	0.1%	1.0%	(0.8%)	-2.7%	0.4%	3.1%	5.5%	1.9%
Interest Expense	6.3%	6.6%	6.0%	7.0%	6.3%	6.4%	5.7%	5.6%	5.1%	4.6%	5.1%	4.5%	4.4%	4.3%	4.3%	4.3%
Tax Rate	(1.5%)	4.9%	-0.4%	-15.9%	0.0%	(0.2%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Deutsche Bank, Thomson Reuters

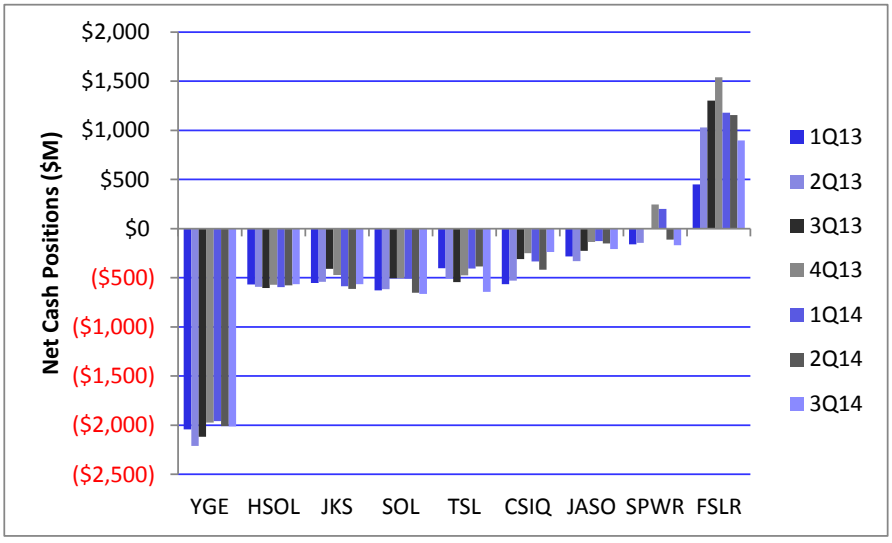
Other Thoughts

Expect Selective Balance Sheet Repair

What happened in 2014?

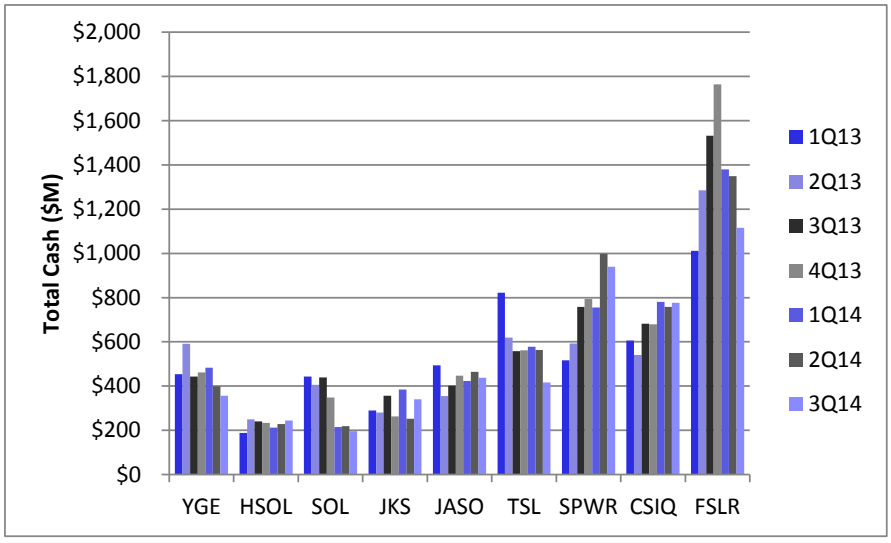
While some solar companies started to de-lever marginally in 2014, several others used cash balances extensively to fuel project deployments, working capital, capacity expansion, or debt repayment. We believe the industry is more confident in longer term outlook and by extension, more comfortable utilizing the balance sheet.

Figure 37: Net Cash Positions



Source: Deutsche Bank, Thomson Reuters, Company Reports

Figure 38: Total Cash Positions

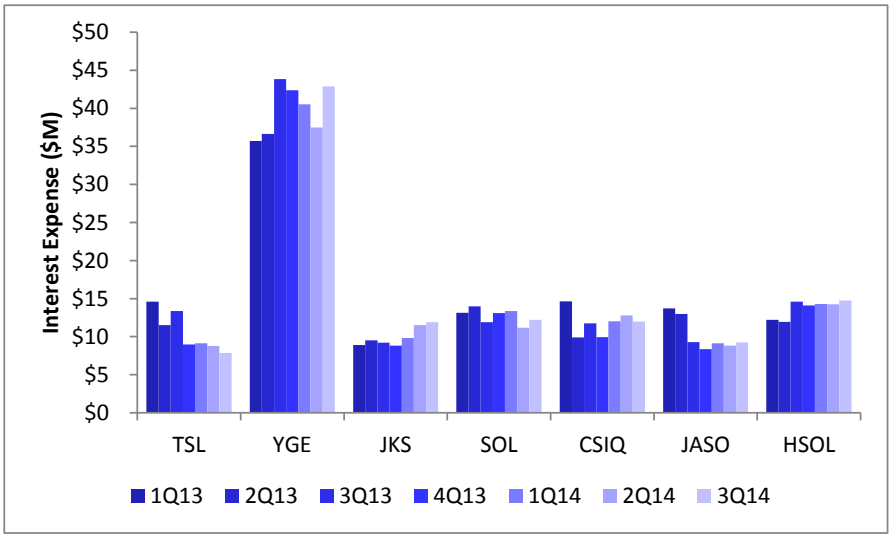


Source: Deutsche Bank, Thomson Reuters, Company Reports

Interest Expense is Largely Not Improved for Asia-Based Companies

Although there have been concerns around balance sheets particularly for the Chinese module manufacturers, we did not see evidence of significant debt paydown, although this is likely related to necessary capital expansion plans announced through the year by most tier 1 manufacturers.

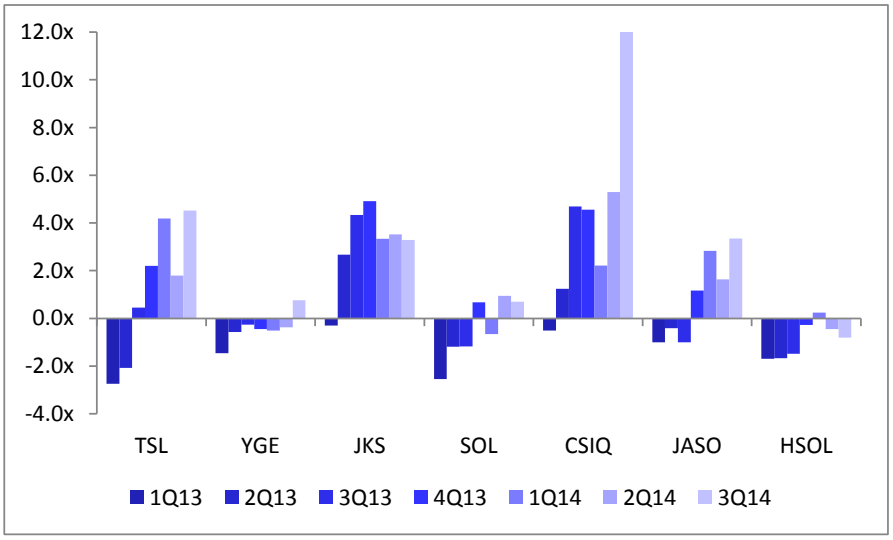
Figure 39: Interest Payments Are Largely Unchanged



Source: Deutsche Bank, Thomson Reuters, Company Reports

However, all of the companies above have shown evidence of improving interest coverage and outlook.

Figure 40: EBIT/Interest Expense



Source: Deutsche Bank, Thomson Reuters, Company Reports

2015: Selective Balance Sheet Repair

2015 will be another year of capital allocation prioritization. Given robust demand environment, we do not see significant delivering from most of the Chinese companies, although shifts in local bank policy could cause repayment on some debt. However, the Chinese government has signaled ongoing financial support for the industry which will likely continue to include ability to roll over debt.

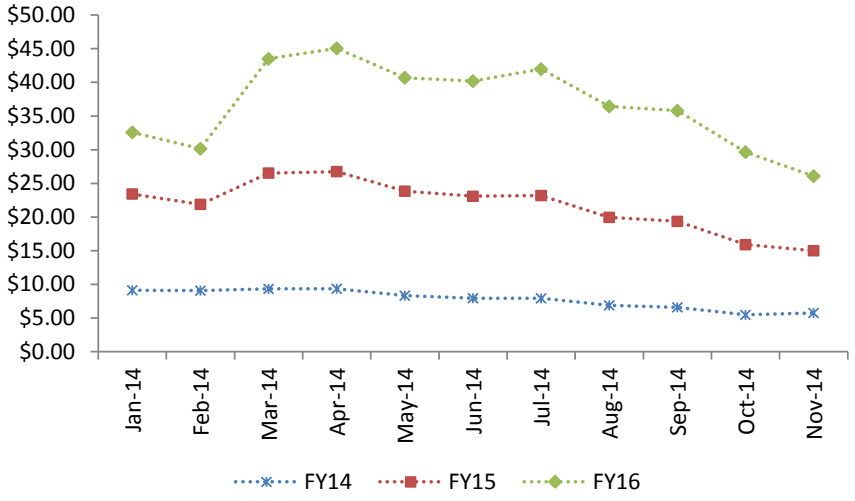
Consensus Revisions

Estimates Have Come Down

Expectations for the solar sector remain strong but more muted, with consensus assuming less operating leverage than previously.

Although profitability outlook has continued to show signs of improvement over the last several quarters, consensus estimates for 2015 and 2016 have come down.

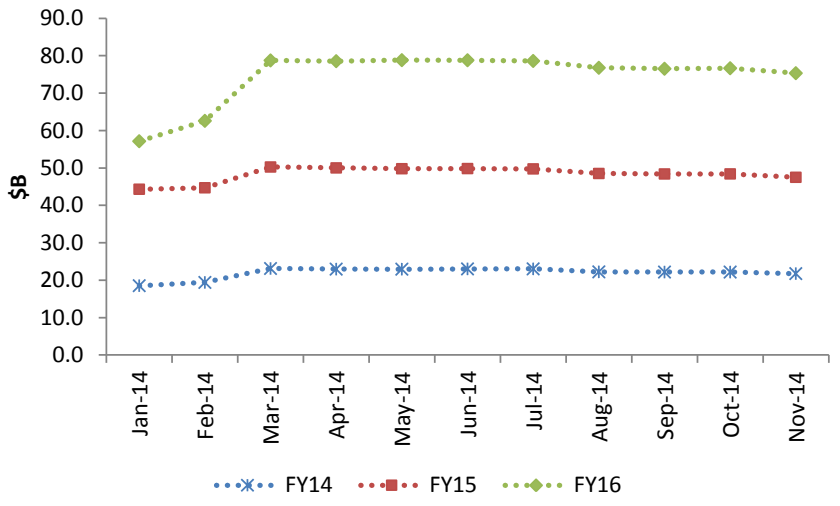
Figure 41: Solar Consensus EPS (SUM)



Source: Deutsche Bank, Thomson Reuters

However, aggregate rev ests have stayed in the same range.

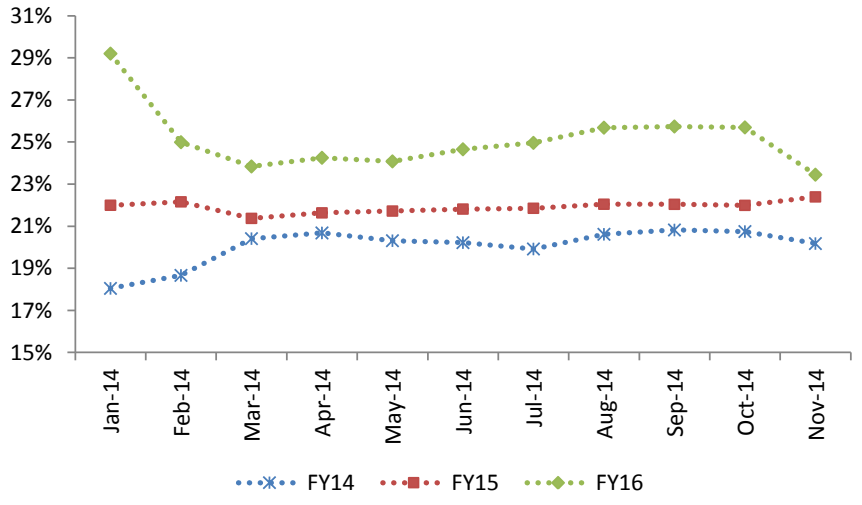
Figure 42: Solar Consensus Rev (SUM)



Source: Deutsche Bank Thomson Reuters

And gross margins estimate forecasts are for modest growth.

Figure 43: Solar Consensus Gross Margin (Average)

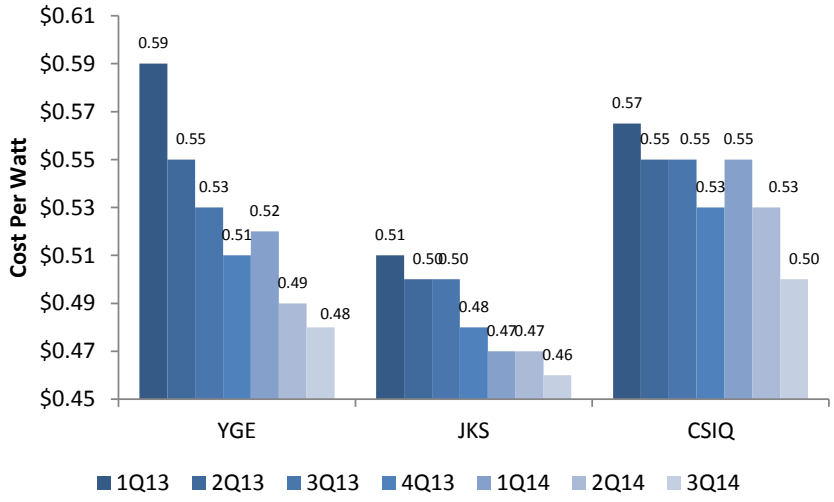


Source: Deutsche Bank

Cost Per Watt

Cost per watt has steadily declined recently with several companies reaching sub 50 cents/w manufacturing costs. We expect 1-2 cents improvement per quarter from all of the major manufacturers, and could see best-in class manufacturing approach 40 cents per watt exiting 2015.

Figure 44: Cost/Watt

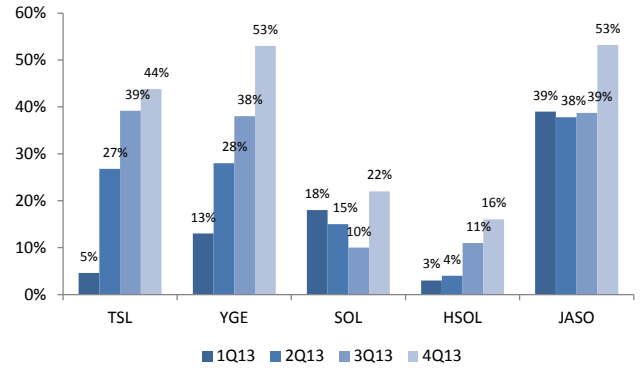


Source: Deutsche Bank, Company Reports

The graph above shows reported or estimated costs for several major manufacturers where available. On an apples-to-apples basis First Solar has likely closed the cost gap with the Chinese module manufacturers, which had a slight advantage in the beginning of the year. FSLR includes additional costs (such as recycling) so comparable costs are likely ~10 cents lower than their reported cost.

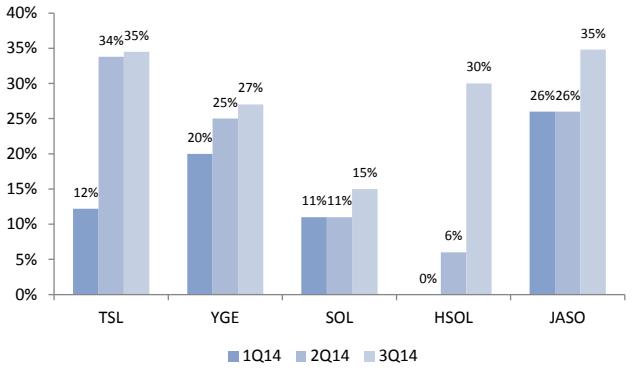
Regional Shipments/Revenue Breakdown

Figure 45: 2013: Rev/Shipments to China



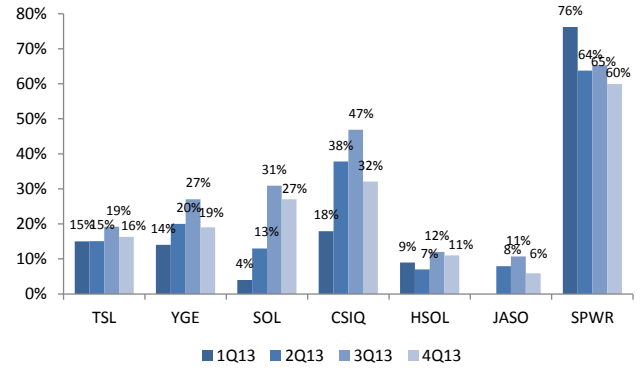
Source: Deutsche Bank, Company Reports

Figure 46: 2014:Rev/Shipments to China



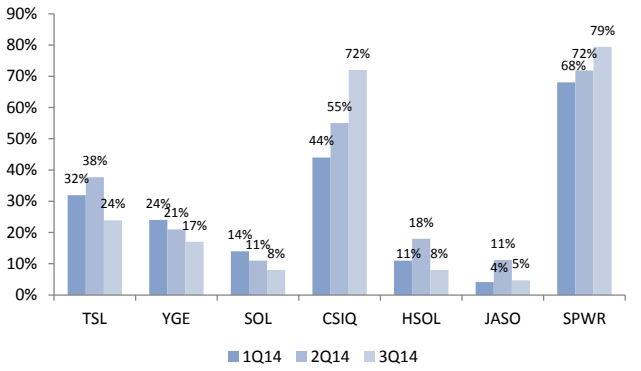
Source: Deutsche Bank, Company Reports

Figure 47: 2013: Rev/Shipments to US/America



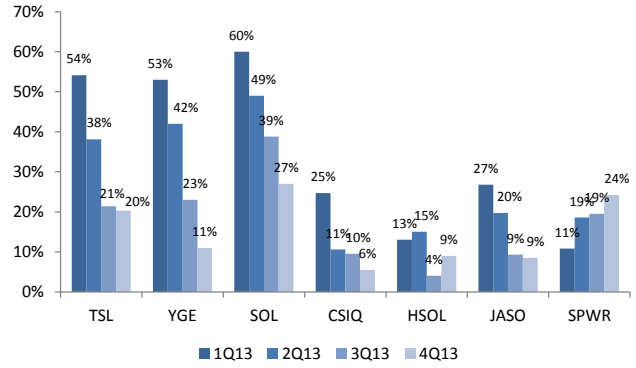
Source: Deutsche Bank, Company Reports
**CSIQ = North America. SPWR/JASO*

Figure 48: 2014: Rev/Shipments to US/America



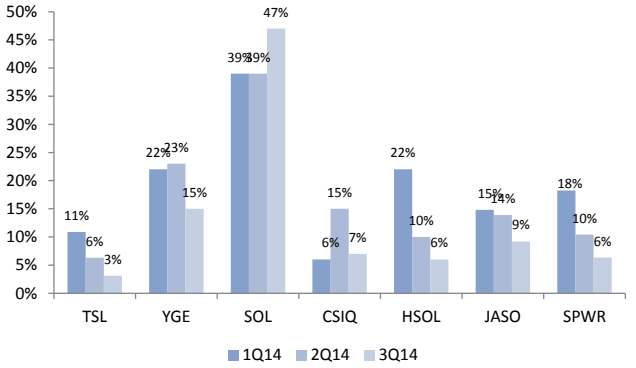
Source: Deutsche Bank, Company Reports
**CSIQ = North America. SPWR/JASO*

Figure 49: 2013: Rev/Shipments to Europe



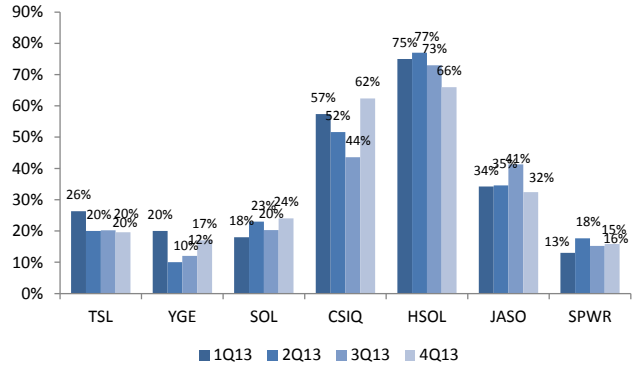
Source: Deutsche Bank, Company Reports
SPWR=EMEA

Figure 50: 2014: Rev/Shipments to Europe



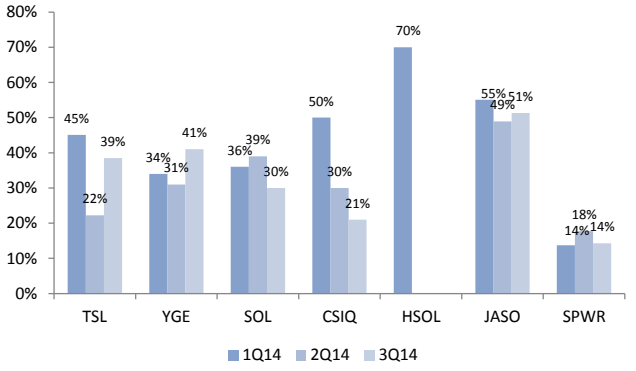
Source: Deutsche Bank, Company Reports
**CSIQ = North America. SPWR/JASO*

Figure 51: 2013: Rev/Shipments to ROW



Source: Deutsche Bank, Company Reports
**CSIQ – ROW includes China.*
***SPWR = APAC*

Figure 52: 2014: Rev/Shipments to ROW



Source: Deutsche Bank, Company Reports
**CSIQ – ROW includes China.*
***SPWR = APAC*

Appendix 1

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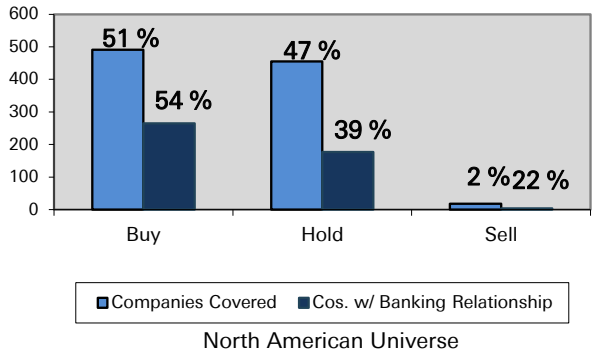

North American Universe

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