

# Launching On The Global Solar Sector

## The Sun Will Shine But Look Further Downstream

- **Global solar coverage expanded via 7 US initiations** — We now cover 17 solar names globally under a unified team approach with research spanning key regions. In this note, in addition to the company launches in the US (see table below), we present new and updated industry level models under joint collaboration in Europe, US and Asia – a team dynamic investors should expect moving forward.
- **Structural shifts and cyclical headwinds warrant sector bias towards the downstream versus upstream segment** — The upstream segment of the solar value chain is going through a permanent structural shift – mainly the commoditization of the panel manufacturing business. Two implications of this: (1) upstream players will find it ever more difficult to differentiate themselves on modules alone - manufacturers will need to offer more services including shifting resources further downstream into development, EPC and O&M services and (2) manufacturers will never see gross margin levels attained prior to the sector bust. Our survey of ~20 electric utilities in the US reinforced these notions. So, while we expect margins to recover as the solar sector works its way out of a cyclical trough, which will take some time to play out, will we ever see gross margin levels witnessed prior to the downturn for the panel manufacturers? We doubt it.
- **Show me the growth!** Global growth will be driven by pure economics and fuel diversity – with some legislatively driven spending overlay. Also, solar spending in historical growth regions is predominately over - new markets are and will open up.
- **North America: Launching coverage w/ 4 non-consensus Buys; 2 Neutrals; 1 Sell.** Buy ratings are SPWR, FSLR, WFR, AEIS; Neutral ratings are TSL, YGE; Sell rating is STP. Our Buys have two common themes: (1) heavy downstream exposure and (2) have/are gaining exposure globally in sustainable growth regions. Given stated headwinds, we remain on the sidelines w/ upstream manufacturers.
- **SPWR added to US high conviction Buy list (Top Picks Live!).** SPWR is the total solar package, including: (1) industry leading efficiency panels, (2) massive distribution channel, (3) 66% ownership by oil giant Total creates floor w/ full upside leverage, (4) big growth expected w/ strategic JV's and acquisitions and, (5) global recognized brand/geographically diverse project pipeline. With this package, SPWR appears strategically best positioned to capture growth at all customer scale levels.
- **Europe and Asia Top Picks** — In Europe our preferred stock remains REC (1H, TP €2.5 +127%) believing that the discount to peers fails to reflect its lowest cost producer status. In Asia we are more positive, with stocks such as GCL benefiting from local demand drivers, signs of polysilicon bottoming and the potential to benefit from possible import tariffs.

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Company	Ticker	Rating		Target Price		Current Year Earnings Estimates	
		Old	New	Old	New	Old	New
Advanced Energy	AEIS	NA	1H	NA	US\$20.00	NA	US\$0.59
First Solar	FSLR	NA	1H	NA	US\$41.00	NA	US\$4.57
SunPower	SPWR	NA	1H	NA	US\$12.00	NA	US\$0.10
Suntech Power	STP	NA	3H	NA	US\$1.50	NA	US\$-2.11
Trina Solar	TSL	NA	2H	NA	US\$6.00	NA	US\$-2.14
MEMC Electronic	WFR	NA	1H	NA	US\$5.40	NA	US\$0.20
Yingli Green	YGE	NA	2H	NA	US\$3.50	NA	US\$-1.70

**See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.**

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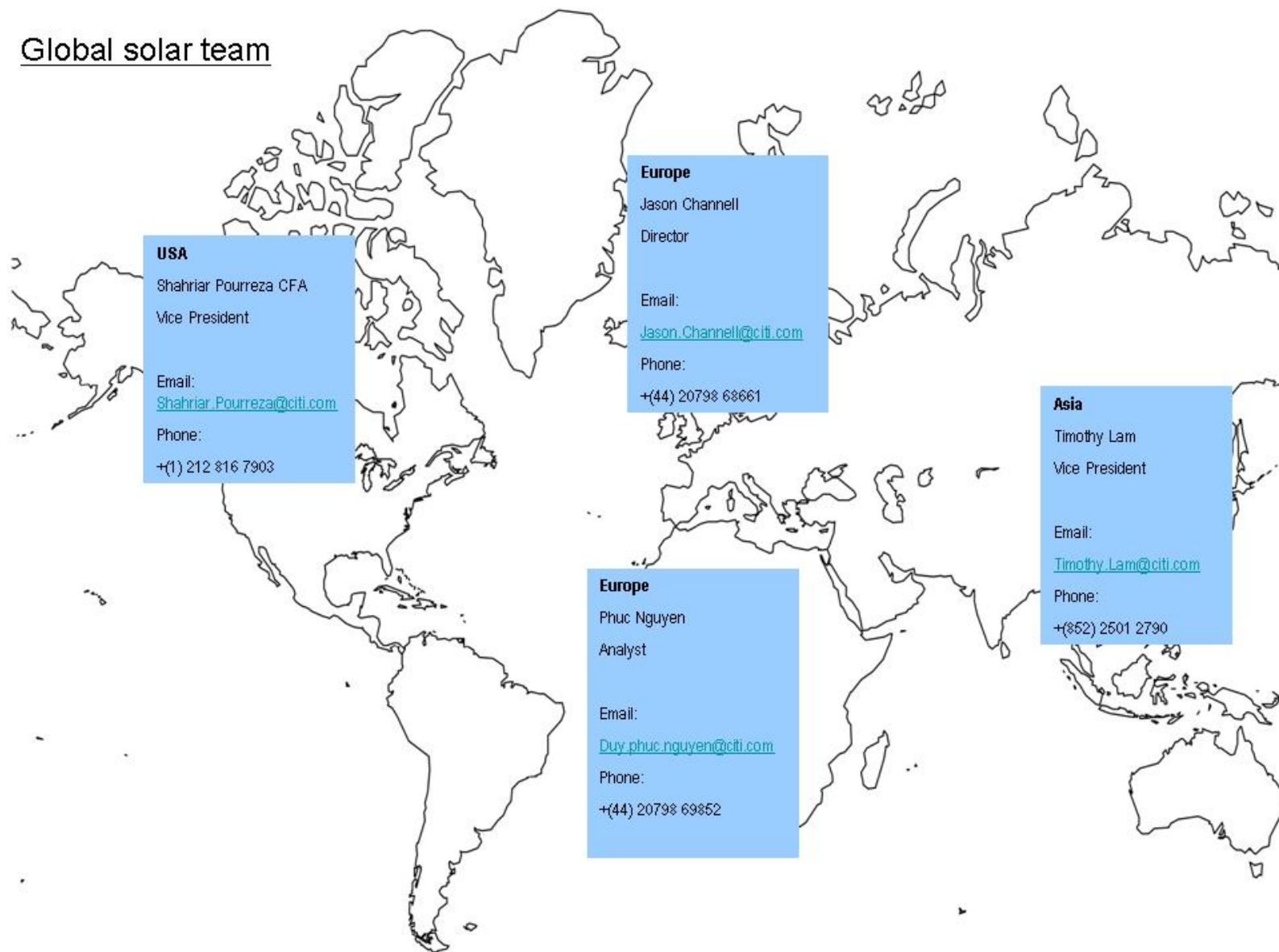
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Figure 1. Introducing the new global solar team...

## Global solar team



Source: Citi Research

Figure 2. Global solar thesis

Company	Analyst	Rating	Risk	Currency	Current Price	Target Price	ETR	Bull case	Bear case
USA									
SunPower	Shahriar Pourreza	Buy	High	USD	7.83	12.00	53%	<b>High Conviction Buy - The Perfect Solar Package</b> (1) Toshiba & Sharp Partnership = huge growth in Japan (2) Massive pipeline yields less investor scrutiny (3) 66% owned by Total - creating a synthetic Put	(1) Higher cost structure than industry (2) Change in reporting segments make modeling very challenging (3) Still has sizeable exposure to Western Europe
MEMC Electronics	Shahriar Pourreza	Buy	High	USD	4.29	5.40	26%	(1) Focusing on key growth regions - minimal exposure to W. Europe (2) Solid growth expected at SunEdison - the value driver of the story (3) Citi Analyst Takao Kanai calling for a Semi Wafer bottom in 2013 (4) Exit out of wafer - exposure to commoditized solar value chain minimal	(1) 28% of portfolio is in emerging markets where growth remains in infancy (2) Project financing dries up - impact SunEdison more given smaller balance sheet (3) Project development business commoditized - larger scale players move in (4) Semi power conversion business remains at trough levels past 2013
First Solar	Shahriar Pourreza	Buy	High	USD	28.33	41.00	45%	(1) Bellwether downstream player (2) Robust pipeline translates into revenue visibility - healthy and growing backlog (3) We expect more announcements in sustainable markets - good start so far (4) Biggest short position in the space - can you say short squeeze?	(1) PPA market very competitive - pricing under pressure (2) Big exposure in CA - needs to diversify away into sustainable markets (3) Panel business will continue to be a drag to consolidated results
Advanced Energy	Shahriar Pourreza	Buy	High	USD	15.64	20.00	28%	(1) Turn key inverter business fits well with our downstream sector call (2) Management displays great execution in short period of time since restructuring (3) With cost costs behind them - well leveraged to grow (4) Satcon bankruptcy will increase AEIS' market share - positive read-through	(1) Semiconductor segment will remain a drag - needs to diversify away (2) Larger, more global inverter players making a bigger push in NA (3) The turnkey inverter segment become commoditized - impacting pricing (4) The strategic move to shift away from semi's takes more time to materialize
Trina Solar	Shahriar Pourreza	Hold	High	USD	5.28	6.00	14%	(1) More defined focus by management to shift further downstream (2) Well diversified and focusing on key growth regions (3) Slightly better balance sheet management vs. pure play Chinese peers (4) Growing perception among investors that fundamentals/pricing maybe bottoming	(1) High exposure to the commoditized solar value chain (2) Shares are up materially over the past month - struggling fundamentals priced in (3) Its not about volumes; its about margins - remain low through our forecast period (4) R&D, tech, cost structure and module ASP similar to closest competitor - YGE
Yingli Green	Shahriar Pourreza	Hold	High	USD	3.05	3.50	15%	(1) Has become the largest panel manufacturer by shipments - overtook STP (2) Growing perception among investors that fundamentals/pricing maybe bottoming (3) China demand could offset slowdown in W. Europe and tighten S/D (4)Made aggressive push into China in Q3 - dilutes Europe exposure	(1) High exposure to the commoditized solar value chain - panel manufacturer (2) Shares are up materially over the past month - struggling fundamentals priced in (3) Its not about volumes; its about margins - which remain low (3) R&D, tech, cost structure and module ASP similar to closest competitor - TSL
Suntech Power	Shahriar Pourreza	Sell	High	USD	1.71	1.50	-12%	(1) As a tier 1 manufacturer, local governments and CDB will keep company afloat (2) As a more established downstream presence versus pure play peers (3) GSF investment has value, will be monetized and provided liquidity (4) Globally recognized brand and distribution channel	(1) Fundamentals don't matter - play on the viability of the company as a going concern (2) Crippling short term debt including big convert coming due in March 2013 (3) CDB loan guarantee to GSF now unsecured - could impact future borrowing costs (4) Hasn't reported earnings since Q1 2012 - pending audit of GSF investigations
Europe									
REC	Jason Channell	Buy	High	NOK	1.10	2.50	127%	1) Lowest cost producer of polysilicon due to FBR technology 2) Strong track record on cost cutting 3) Singapore downstream facilities should be moving to +EBITDA shortly 4) Discount to peers does not reflect lowest cost producer status in poly	(1) Balance sheet retains high levels of debt due in 2014 (2) Limited cash generation and EBITDA mean that there is a risk of covenant breach. (3) Singapore integrated fab may struggle to keep pace with low cost Asian peers (4) US based poly facilities may fall foul of Chinese anti dumping duties
MANZ	Jason Channell	Buy	High	EUR	21.50	31.00	44%	(1) Insulated from solar woes with only 10% of sales in solar in 2013E (2) Exposed to other high growth flat panel display markets (tablets, mobile phones) (3) Battery equipment business for automotive segment offers high growth potential (4) Well positioned with equipment companies owning most of IP in Chain	(1) Order inflow in solar remains very weak, meaning solar division drain on EBITDA (2) Limited EBITDA highlights potential of ongoing cash burn (3) growth in FPD's may slow due to equipment penetration (4) If EBITDA remains weak, limited cash levels could become a concern
Meyer Burger	Jason Channell	Hold	High	CHF	8.34	10.00	20%	(1) Most respected company in equipment space with arguably best technology (2) Controls most of leading IP in equipment space, making it a strategic asset (3) New technologies such as heterojunction and diamond wire give advantage (4) Covers whole of value chain following Roth & Rau acquisition	(1) Limited order book and weak order inflow, with no visibility on 2013 (2) With weak results for 2012, working capital management will be important for cash (3) While cash balances are adequate, weak ongoing orders would begin to tell (4) Overpaying historically for acquisitions means losses likely to continue
Solarworld	Jason Channell	Hold	High	EUR	1.09	1.10	1%	(1) Strong brand, particularly in US (2) Brand and value add sunkits allow premium pricing (3) Large cash balances (not net) provide headroom on balance sheet (4) debt is largely long dated providing some breathing space	(1) High levels of debt, with limited scope to refinance (2) Heavily cost disadvantaged given age and location of production (US, Germany) (3) Heavily loss making, and likely to remain so given cost levels (4) while cash and long dated debt provides headroom, covenants may become issue
SMA Solar	Jason Channell	Sell	High	EUR	18.38	13.50	-27%	(1) World #1 inverter manufacture with 25-30% global market share (2) Very strong balance sheet (significant net cash) ensures survival (3) Technology/performance advantage should continue with strong R&D spend (4) Recent Chinese acquisition allows local access to growth, such as Japan	(1) Premium valuation reflects industry positioning, though results may get worse (2) Late mover on China, while core markets (Germany, Italy) move into decline (3) Continued gradual erosion of global market share likely (4) New markets likely to be more competitive, higher cost, meaning lower margins
Centrotherm	Jason Channell	NA	High	EUR	1.39			N/A	N/A
Asia									
Motech	Timothy Lam	Buy	High	TWD	32.15	42.30	32%	(1) Margin leverage to ASP improvement in cell prices (2) Shareholding by TSMC - remain as "Investment holding" (3) Improvement in utilization rate to 80%+ in 1Q13 (4) Completed disposal of AE Poly	(1) Slower ASP recovery and restriction of exports from Taiwan (2) More fierce pricing competition from cell/module manufacturers (3) Challenges in lowering its operating expenses
Green Energy	Timothy Lam	Buy	High	TWD	25.10	33.00	31%	(1) Margin improvement as a crucial customer for non-China based polysilicon make (2) Improvement in cost structure by focusing on higher-efficiency wafers (3) Improvement in operating efficiencies	(1) Slower reduction in polysilicon supply costs (2) Persistent weak prices in solar wafers, driven by vertically-integrated competition (3) Slower reduction in operating expenses and higher write-down from thin-film fab
GCL Poly	Timothy Lam	Buy	High	HKD	2.11	2.68	27%	(1) May see margin improvement on rise in poly/wafer prices (2) Cost leadership in poly/wafer production (3) New investment in solar projects will drive earnings recovery in 2013	(1) Higher than expected writedown in A/R and inventory (2) Slow revenue generation from solar farm business (3) Higher costs in ramping up its silane-based production capacity

Source: Citi Research

Figure 3. Global solar valuation

Company Name	Currency	Analyst	Rating	Risk	Price 1/2/13	Target price	Upside / Downside	MktCap (\$mm)	P/book			EV/Sales			EV/EBITDA			P/E		
									2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
SOLAR - POLYSILICON																				
Wacker	EUR	Andrew Benson	2		53.0	50.0	-6%	3770	1.1	1.1	1.0	1.0	1.0	1.0	6.2	6.5	5.5	36.4	32.6	17.3
REC	NOK	Jason Channell	1	H	1.1	2.5	127%	426	0.3	0.3	0.3	0.7	0.7	0.6	6.3	7.3	4.4	-1.4	-6.0	-10.4
GCL Poly	HKD	Timothy Lam	1	H	2.1	2.7	27%	4210	1.7	1.6	1.5	2.9	2.5	1.9	49.3	15.4	9.0	-24.4	35.0	10.6
OCI	KRW	Sean Lee, CFA	2	H	168000	200000	19%	3658	1.2	1.1	1.0	1.4	1.3	1.3	5.9	6.4	5.6	17.4	20.7	14.8
SOLAR - EQUIPMENT																				
Centrotherm	EUR	Jason Channell	NA	-	1.4	NA	NA	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manz	EUR	Jason Channell	1	H	21.5	31.0	44%	131	0.5	0.5	0.5	0.6	0.6	0.4	11.5	6.7	4.5	-9.8	50.8	9.7
Meyer Burger	CHF	Jason Channell	2	H	8.3	10.0	20%	438	0.6	0.6	0.6	0.4	0.4	0.3	-9.3	5.2	4.1	-4.7	-19.6	-50.3
SMA Solar	EUR	Jason Channell	3	H	18.4	13.5	-27%	870	0.8	0.8	0.8	0.2	0.3	0.3	1.9	6.1	2.5	7.0	-208.1	13.7
Advanced Energy	USD	Shahriar Pourreza	1	H	15.6	20.0	28%	592	1.6	1.4	1.2	0.9	0.7	0.6	8.0	4.8	3.7	26.4	14.8	9.6
SOLAR - DOWNSTREAM																				
MEMC Electronic	USD	Shahriar Pourreza	1	H	4.3	5.4	26%	991	1.7	1.5	1.2	0.8	0.9	0.7	6.0	5.6	4.4	21.5	17.9	8.4
First Solar	USD	Shahriar Pourreza	1	H	28.3	41.0	45%	2465	0.7	0.6	0.5	0.6	0.4	0.3	2.5	2.1	1.8	6.2	7.1	7.5
SunPower	USD	Shahriar Pourreza	1	H	7.8	12.0	53%	932	0.8	0.8	0.8	0.4	0.3	0.3	7.9	5.0	4.0	78.0	20.3	12.5
SOLAR -MANUFACTURER																				
SolarWorld	EUR	Jason Channell	2	H	1.1	1.1	1%	167	0.4	0.6	1.7	1.0	1.3	1.4	-3.8	-18.9	-14.3	-0.5	-1.0	-1.0
Suntech	USD	Shahriar Pourreza	3	H	1.7	1.5	-12%	310	0.8	2.1	-17.6	1.0	1.2	1.4	-9.6	154.9	25.1	-0.8	-1.3	-1.7
Trina Solar	USD	Shahriar Pourreza	2	H	5.3	6.0	14%	430	0.4	0.5	0.6	0.5	0.7	0.7	-8.7	183.3	15.2	-2.5	-3.4	-6.5
Yingli Green	USD	Shahriar Pourreza	2	H	3.1	3.5	15%	478	1.0	1.7	4.1	1.2	1.5	1.5	-78.6	52.5	21.9	-1.8	-2.2	-2.9
Motech	TWD	Timothy Lam	1		32.2	42.3	32%	475	1.0	1.0	0.9	0.8	0.7	0.5	-12.6	3.8	2.6	-3.1	-394.9	24.1
Green Energy	TWD	Timothy Lam	1	H	25.1	33.0	31%	273	0.8	0.8	0.8	1.6	1.6	1.2	-15.4	7.1	4.5	-2.4	-34.4	16.9

Source: Citi Research

## Executive summary

**With the US solar launch, our global sector coverage now encompasses 17 names...**

We are launching on the global solar sector with a unified team approach in US, Europe and Asia. Our global team coverage has been expanded to 17 solar stocks, most notably via US initiations which include:

- 4 non consensus Buys: SPWR (\$12TP/53%ETR), FSLR (\$41TP/45%ETR), AEIS (\$20TP/28%ETR) and, WFR (\$5.40TP/26%ETR).
- 2 Neutrals: TSL (\$6TP/14%ETR), YGE (\$3.50TP/15%ETR).
- 1 Sell: STP (\$1.50TP/-12%ETR).

**...under unified research coverage in US, Europe and Asia**

**SPWR is our top pick in US**

Additionally, we are adding shares of SPWR to our US high conviction Buy list (Top Picks Live!) and highlighting it as a most preferred and shares of STP as a least preferred relative to our new US solar coverage.

**The downstream segment of the solar value chain will remain profitable**

Two key themes emerge from our ratings in the US: (1) we favor downstream players versus the upstream panel manufacturers. All four non consensus Buy ratings have heavy exposure in the downstream segment of the solar value chain with upstream panel manufacturing being a smaller contributor (if any) to consolidated results. And, (2) all 4 Buy ratings have and are gaining exposure in key sustainable solar growth regions globally.

**Margins will recover for the upstream panel manufacturers but...**

Why the obvious sector bias towards the downstream segment of the solar value chain versus the upstream manufacturers? The answer centers on cyclicalities and the industry's structural shift. While the solar industry is going through a cyclical headwind which will take time to play out – heightened by a massive boom-bust, a structural shift is occurring as well. By structural shift, we are referring to the commoditization of the panel manufacturing industry. We surveyed over 20 electric utilities in the US, one key theme emerged: it has become very difficult to distinguish one panel manufacturer from the other – they all look the same, per respondents. This was not the case in the past.

**...structural shift will lead to lower profitability going forward**

On the cyclical front, the sector will ultimately recover from current trough levels – lifting industry profitability. That said, the permanent structural shift in the solar space will translate into perpetually lower gross margins versus historical standards for pure play upstream manufacturers – the tech sector is a good case study on this (see below).

**Can't differentiate on modules anymore**

So, what does this mean for the pure play panel manufacturers? It will become increasingly more difficult to differentiate products solely from a module perspective – forecasted manufacturing margins will reflect this dynamic. To differentiate, the panel manufacturers will need to offer more services – including shifting resources further downstream into development, EPC and O&M. So while we expect margins to recover as the solar sector works its way out of a cyclical trough, will we ever see the gross margin levels we saw prior to the downturn for the upstream panel manufacturers? We doubt it.

Therefore, we look for more concrete signs of fundamentals improving before changing our stance on the pure play upstream manufacturers. For now, we remain on the sidelines and favor the more downstream players.

Figure 1 is a line and area chart showing the cumulative installed capacity of PV systems in Germany in MW from 2007 to 2017. The Y-axis represents capacity in MW, ranging from 0 to 80,000. The X-axis represents the years from 2007 to 2017. The chart includes a legend with the following categories: Installations (dark blue area), Polysilicon (light blue line), Mono (cyan line), Wafer (MW) (purple line), Cell (MW) (grey line), and Module (MW) (dark blue line). The total capacity increases steadily from approximately 10,000 MW in 2007 to over 70,000 MW in 2017. A significant increase is observed in 2013, where the capacity jumps from around 45,000 MW to nearly 60,000 MW. The 'Installations' category (dark blue area) shows a sharp increase starting in 2013, reaching approximately 58,000 MW by 2017. The 'Module (MW)' category (dark blue line) also shows a sharp increase starting in 2013, reaching approximately 70,000 MW by 2017. The 'Wafer (MW)' category (purple line) shows a steady increase from 2011 to 2016, peaking at around 70,000 MW. The 'Cell (MW)' category (grey line) shows a steady increase from 2011 to 2016, peaking at around 70,000 MW. The 'Mono' category (cyan line) shows a steady increase from 2011 to 2016, peaking at around 70,000 MW. The 'Polysilicon' category (light blue line) shows a steady increase from 2011 to 2016, peaking at around 70,000 MW.

Source: Citi Research

This caution is particularly important given the recent rally. While there are signs of component prices stabilizing, Q4 figures are in our view still likely to be disappointing, and while the volume outlook may be improving, margins for manufacturers are likely to remain constrained due to continuing overcapacity. While there are signs of prices bottoming (not least poly prices) these prices are still very low compared to costs (at or below the cash cost of the marginal producer), and it could still be some time before we see any pickup given continuing overcapacity and excess inventory levels which must still work through. In terms of the global sector, it is important not to confuse what we see as a start of year risk-on rally exacerbated by a short squeeze, (helped by incremental datapoints such as a MidAmerican (Berkshire Hathaway) downstream investment into a solar farm) with a positive shift in manufacturing fundamentals (though some Chinese companies are exposed to more local-market positives).

In the longer term we see every reason to remain positive. The sector will continue to exhibit growth, this being driven by underlying economics and fuel diversity, with legislatively driven spending still present but taking more of a backseat.

Source: Citi Research

Solar has reached socket (residential) parity in many global regions at the residential level with more to come, and utility scale parity expected over the next few years. Besides pure economics, the need for utilities to diversify their fuel mix is crucial to insulating them from volatility and the likely upward movement in gas prices over the longer term, a need that was well documented as we surveyed electric utilities in the US. Indeed some are already choosing to build solar farms instead of gas super-peaking plant based on pure economics. Overall, we continue to view solar and gas as complementary rather than mutually exclusive generation sources.

While historically core markets will provide support, this growth will come from new regions and markets, some already established, others yet to materialise. China will become a larger part of the global market as the government supports demand by setting a sharply higher annual installation target of 10GW. Impressive as this growth is, it may struggle to materially offset the weakness in the previously key European markets of Germany and Italy. Overall we see 2013 demand of 34.6GW representing 6% growth yoy; within this report we examine in detail the breakdown of this demand and regional drivers such as economics, regulation and IRR's.

**Strategic Positioning**

- Quality
- Reliability
- Vendor finance
- Orderbook
- Route to market
- Brand name
- Downstream integration

**Balance Sheet Strength**

- Cash
- Debtor / creditor insurance
- Unused borrowing facilities
- Debt
- Working capital
- Maturity
- Covenants

**Survivability** (Central Intersection)

**Costs**

- Procurement
- Technology
- Age of plant
- Flexibility
- Scale
- Efficiency
- Location

Source: Citi Research

Alongside this demand analysis we examine the supply situation in detail, in particular looking at cost curves and company positioning thereon. This will be a key factor in our view in determining survivability in the current cyclical shakeout; while it is a growth sector, there is a cyclical overlay, and while future cycles should be less extreme, the bottom of this cycle has yet to play out. We expect significant consolidation (tier 2 and 3 players) as industry works off excess capacity and inventory, particularly in the module end of manufacturing which remains relatively immature and highly fragmented. Alongside cost positioning we examine other factors governing survivability such as balance sheet strength and strategic positioning, and identify likely 'winners' in what will remain a tough manufacturing space.

Outside of the US our best picks remain in Europe REC (1H, TP €2.5) based on our belief that its discount to its peers does not reflect its lowest cost producer status in polysilicon. In Asia we are more positive on companies such as GCL (1H, TP \$2.68) given signs of polysilicon bottoming combined with local market demand dynamics, and the potential to benefit from possible import tariffs.



## Chapter 1 – Long term outlook

### Global industry outlook

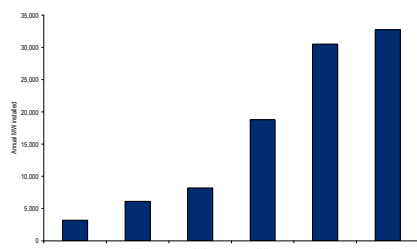
#### Growth, cyclical or both?

Classifying the solar industry is a difficult task, as it displays characteristics of both a hi-tech growth industry, as well as, a traditional cyclical industry. Understanding the interplay between these two dynamics is key to investing in the sector, particularly from a timing perspective.

#### Longer term growth potential

The growth displayed by the solar sector to date has been impressive, with a CAGR in annual installations of ~59% from 2007-2012, as shown in Figure 7. Historically, much of the growth has been attributed to legislative mandates driving solar spending – this is set to change.

Figure 7. Installation growth



Source: Citi Research

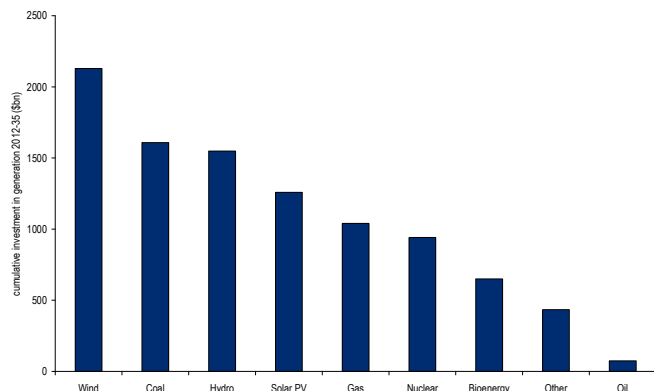
**Growth will be driven by economics and fuel diversity moving forward – with some legislative overlay.** Moreover, this growth looks set to continue for the long term, as solar takes an ever greater share of energy generation, helped by improving economics against fossil fuels, (which conversely are likely to get more expensive over time, assuming that the cheapest reserves have been utilized first) as well as a need for utilities to diversify away from gas and into other generation sources. Key point, many of the US utilities we have surveyed over the past several weeks have highlighted the need to diversify into other generation sources - it is well understood that gas prices won't stay depressed forever. So besides pure economics, from a utility perspective, the need to diversify is crucial to remove the volatility and eventual upward movement in gas prices over the longer term.

**Growth will be driven by economics and fuel diversity moving forward – with some legislative overlay**

The latest projections for solar from the IEA (New Policies Scenario) show solar installing a cumulative 662GW from 2012 to 2035 (a figure that we believe may prove to be highly conservative given that this would imply an average annual installation of 29GW each year until 2035, vs. our 2013 forecast of 34GW). This conservative figure alone would imply that solar represented 11.2% of all new installed generation capacity in that timeframe. More important, this would entail investment of \$1.3tr over the period, or 13% of the total investment in generation capacity of a forecast \$9.7tr.

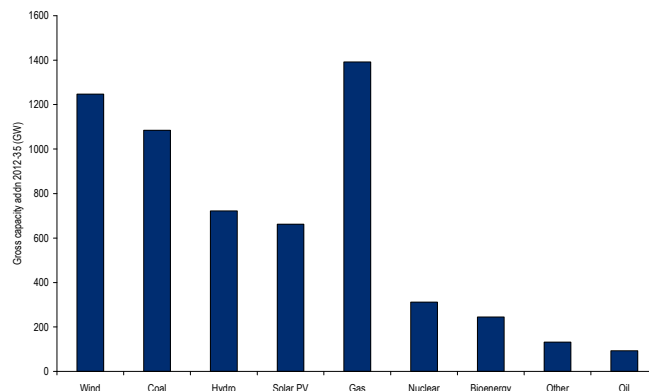


Figure 8. Cumulative global investment in generation capacity 2012-35



Source: World Energy Outlook 2011 © OECD/IEA 2011, page 194

Figure 9. Gross generation capacity additions 2012-35

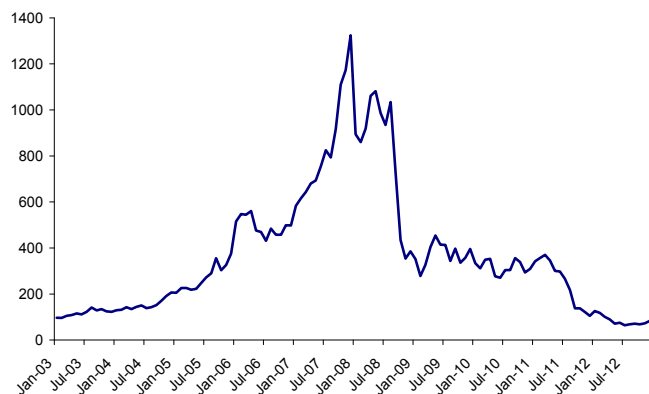


Source: World Energy Outlook 2011 © OECD/IEA 2011, page 187

### Cyclical characteristics

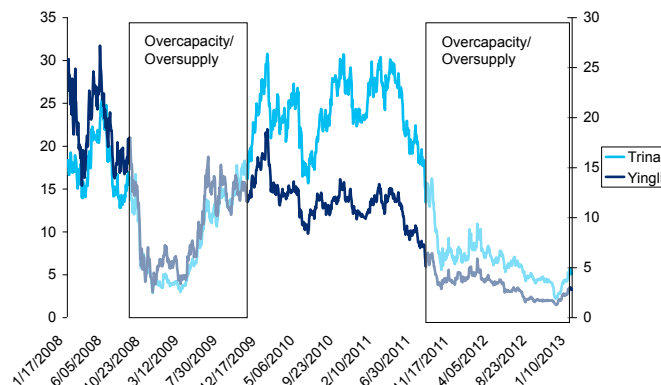
However, alongside these growth characteristics, the solar sector also shows all the hallmarks of a cyclical sector, and an extreme cyclical at that.

Figure 10. Solar index boom-bust



Source: Citi Research

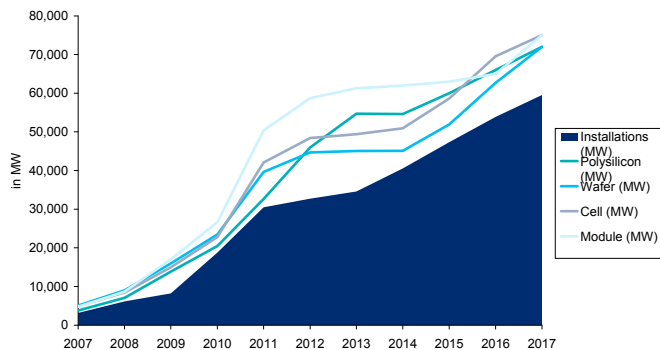
Figure 11. Cyclicalality with Trina and Yingli



Source: Citi Research

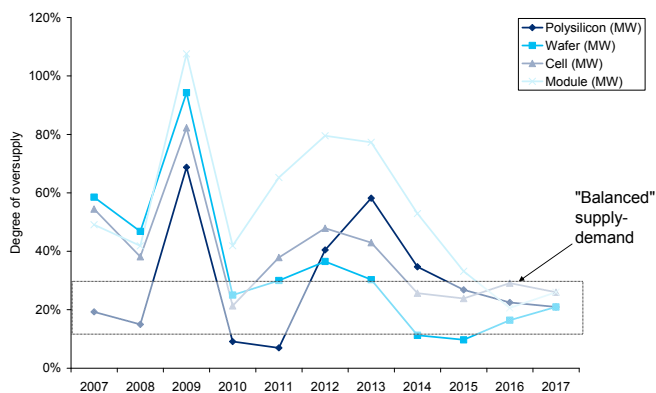
Figure 12 shows the growth in installations against manufacturing capacity. The smaller figures in the early years (see Figure 12) make the relationship harder to see, but suffice to say that an explosion in early demand and a lack manufacturing capacity led to manufacturing returns close to 50% in the early years. This inevitably led to an enormous influx of capital, which then led to a situation of enormous oversupply. This is perhaps demonstrated more clearly in Figure 13, which shows the level of over/undersupply in the key elements of the value chain, shown here in terms of excess capacity.

**Figure 12. While demand has grown inexorably, supply has at times outstripped demand....**



Source: Citi Research

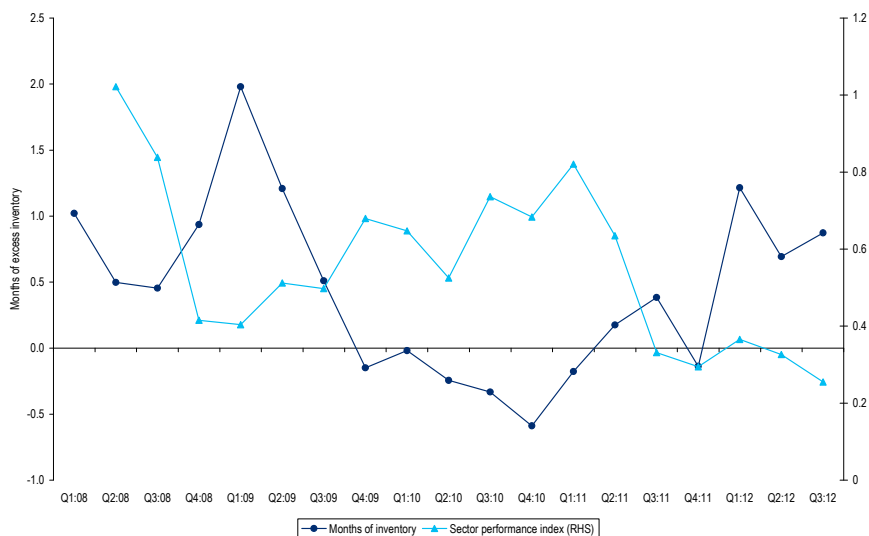
**Figure 13. ...leading to excess capacity across the value chain, resulting in component (and stock) price falls and inventory builds**



Source: Citi Research

These periods of excess capacity have led to significant reductions in component prices, resulting in lower margins and returns, and hence weak stock performance, as highlighted in Figure 14.

**Figure 14. Excess inventory, as a proxy for oversupply (and hence low prices, margins and returns) shows an almost perfect inverse relationship with the sector stock price index**



Source: Citi Research

### So which is it – growth or cyclical?

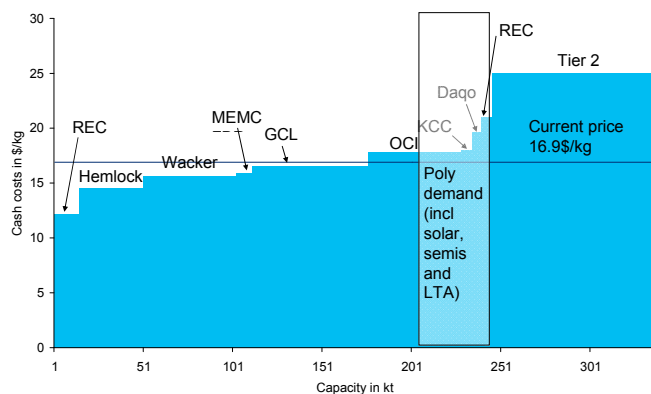
**Solar is a cyclical industry overlaid over a growth track**

As we have seen and as is displayed above, the industry clearly shows growth and cyclical characteristics. So which is it? In our view, the simple answer is both, namely that it is a cyclical industry overlaid over a growth track. However, we believe that as the industry matures, while it will always retain cyclical characteristics, these will gradually reduce (as inevitably will growth rates).

It is important to realize quite how immature elements of the solar industry are. Figure 15 shows the upstream (silicon) part of the manufacturing chain, and demonstrates clearly 'maturity' with 5-6 companies representing the vast bulk of

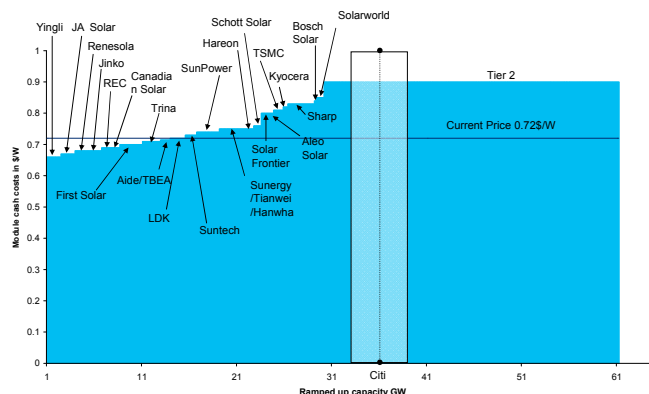
production capacity. However, Figure 16 shows the opposite; the module end of the upstream manufacturing chain is still massively fragmented, and it is this that has been partly to blame for the enormous cyclical volatility which has been seen (i.e. the boom-bust). The attractive returns on offer in the early years led to an enormous number of new entrants (the same was true to polysilicon, much of this capacity being seen at the top right of Figure 15) who competed away returns, and most of whom we believe will ultimately have to exit the industry (Tier 2 and 3 players).

Figure 15. Upstream poly segment shows signs of maturity...



Source: Citi Research

Figure 16. ... while other upstream manufacturing segments are massively fragmented



Source: Citi Research

This process of shakeout should ultimately result in the solar value chain being more mature, dominated by less than a dozen key players. This will see the largest changes in the upstream panel segment with demand of say 35GW per annum, this would imply 7-8 players with an average of 4-5GW each, whereas the bulk of players now have capacity of a few hundred MW each.

This shakeout should also see margins and returns recover, though not to the extreme levels seen in the previous boom phase of the solar cycle – much of this attributed to the structural shifts going on in the sector.

**Structural shift will lead to lower gross margins for manufacturers going forward**

**The structural shift is the commoditization of the panel manufacturing business**

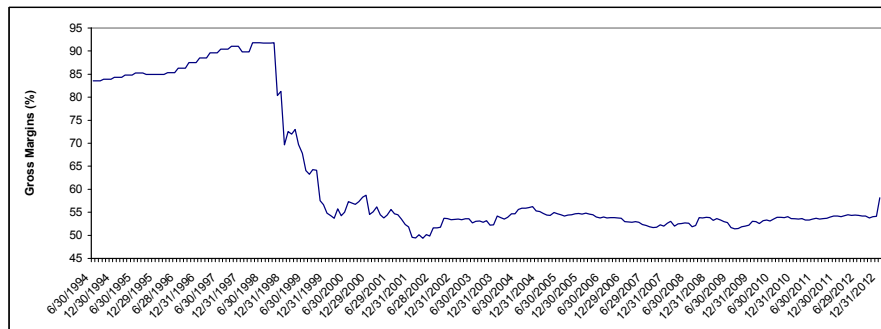
**The structural shifts in the solar space will translate into perpetually lower gross margins versus historical standards for pure play panel manufacturers.**

Two distinct dynamics are playing out in the solar sector: cyclical swings and structural shifts. While the cyclical headwinds will take time to play out (discussed above), typical of a boom-bust cycle, the sector will ultimately recover from current trough levels – lifting the industry's profitability. That said, will we ever see the gross margin levels we saw prior to the downturn for the upstream panel manufacturers – we doubt it. We attribute this to the structural shift occurring in the sector – mainly the commoditization of the panel manufacturing business. We surveyed over 20 electric utilities in the US, one key theme emerged: it has become very difficult to distinguish one panel manufacturer from the other – they all look the same per respondents. This was not the case in the past. What does this mean for the pure play manufacturers? That it will become very difficult to differentiate products solely from a module perspective - forecasted manufacturer margins will reflect this dynamic. This commoditization in the panel business has led to a permanent structural shift in the sector, in our view. To differentiate, the panel manufacturers will need to offer more services – including shifting resources further downstream into development, E&C and O&M.

**The tech sector serves as a good case study**

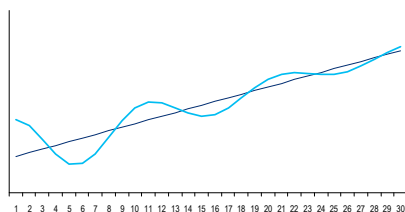
Looking at the tech sector pre and post bubble as a case study, we can clearly see that the structural shift that occurred post tech bubble has translated into a lower gross margin environment – one that never fully recovered following the shift.

**Figure 17. Tech sector index gross margins – pre and post boom-bust**



Source: Citi Research

**Figure 18. Cyclicity expected to dampen as the industry matures**



Source: Citi Research

As these returns and margins recover for the solar sector, we would expect them to continue to display cyclical peaks and troughs, though nothing like recovering to previous peaks as we mention above. This in turn will make the industry (in relative terms) less attractive to new entrants, and hence is likely to lead to less extreme situations of over/undersupply that have been seen so far in the sector's history.

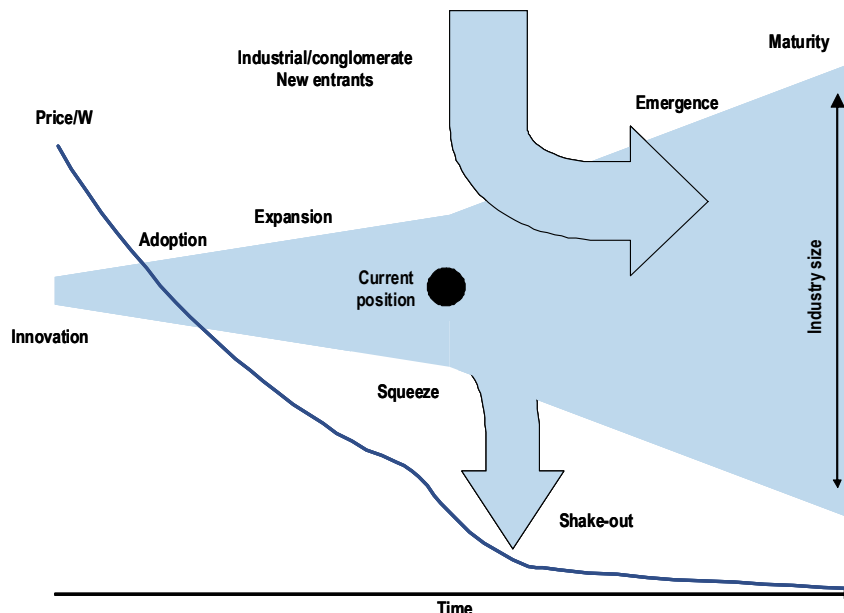
Given these reduced peaks and troughs on margins, we would therefore expect to see the 'amplitude' of the cycles reduce as shown in Figure 18, although this is effectively a capital goods industry, we would always expect the cyclicity to remain.

Currently in the squeeze phase of the evolution of the solar industry

## The solar shakeout – who survives?

Understanding this shakeout process is key to investing in the solar sector. Figure 19 shows a graphic representation of the shakeout process. We have clearly now passed the phases of innovation, early adoption and expansion, and are in our view also approaching the end of the squeeze phase. As companies are gradually forced to exit the industry this should lead to a more consolidated production industry, as discussed previously.

Figure 19. The evolution of the solar industry



Source: Citi Research

Perhaps the bigger question is who will those players be, and even more so will they be existing players, or will they be new entrants?

Greater change to happen in manufacturing

Our own view is that it will be a combination of the two. With the upstream polysilicon industry relative mature already, we would expect to see limited change in that sector, although certain smaller players such as REC with complementary niche technologies may find it harder to survive independently, and their technology may prove attractive to new entrants. However we would expect significantly more change at the other upstream components of the solar manufacturing value chain.

Polysilicon manufacturing relative mature

The other aspect of the shakeout is the issue of new entrants and consolidation. As discussed, the upstream part of the manufacturing chain (polysilicon) is relatively mature, and more importantly this is a highly capital intensive activity (with a 10-15kt facility costing around \$1bn) and a complicated chemical process that requires a high degree of experience and expertise.

Module manufacturing highly fragmented with low barriers to entry

Module manufacturing however (as evidenced by the level of fragmentation) is a relatively easy activity to gain entry to. Indeed most of the companies use the same machines manufactured by the same few equipment providers, and hence have little to differentiate themselves apart from size of facility and location.

**Downstream consolidation likely to be through new build rather than purchase of existing, older facilities**

Given our view that the downstream manufacturing activities are likely to ultimately consolidate to 7-8 players with 4-5GW each, we should consider whether that happens by new facility build, or acquisition of capacity from other players (potentially from distressed sellers). Clearly distressed-sale assets would be 'cheap', but they are also likely to be using equipment which is potentially 3+ years old (and hence higher cost and unable to compete) and also may be in higher cost locations (e.g. Europe/US). Accordingly, while consolidation of existing capacity is likely to happen to an extent, we suspect it is more likely that it will be new production facilities using the latest equipment, and with larger unit facilities to gain extra economies of scale.

**New entrants potentially from consumer electronics or industrials sector likely to build rather than buy**

This question also holds for potential new entrants. While we believe it is likely that several of the largest and lowest cost upstream manufacturers survive, we believe that ultimately we are likely to see large consumer electronic brands dominate the space, potentially alongside large industrial manufacturers. These companies would bring their existing brand strength, customer relationships, route to market, balance sheets, access to cheap capital and purchasing power (to name but a few effects) to the party. If they were to build for example 5GW of capacity using the latest equipment, they would achieve economies of scale and lower costs by a technology advantage of 2-3 years, thereby moving the cost curve down to the next level. While it is possible that they may choose to enter via acquiring a credible downstream manufacturer, this would inevitably entail buying older equipment, potentially in the 'wrong' locations, and without the consolidated economies of scale; clearly it would depend on the discount to replacement cost at which these companies could be acquired, and we would note that most manufacturers are trading at a discount to book value (except some polysilicon manufacturers, and the Chinese downstream manufacturers. (This topic is covered in more detail later in the note)

**We prefer the developer end of the value chain**

This is in part why we prefer the developer end of the value chain (i.e. downstream) given that we do not necessarily view the module manufacturers as take-over candidates, rather as companies that will continue to operate in a very tough, commoditised, and oversupplied segment.

**Who survives and wins?**

**A variety of factors are likely to govern survivability, not least production costs and balance sheet strength**

Perhaps the easiest way to think about who survives is by thinking about who has a reason to survive, especially given the aforementioned commoditization of the space. We identify the following characteristics which we believe will be key to identifying survivors:

- Low production costs – This is clearly one of the key metrics in an oversupplied market that has pushed prices to very low levels. With prices now at or even below (due to inventory dumping) the cash cost of the marginal producer, those companies further along the cost curve will be losing cash were they to continue to operate; clearly these factories are likely to close first. Costs can be determined by a variety of factors, including equipment/technology, location and scale
- Balance sheet metrics – This is potentially the most important factor in assessing survivability. A variety of metrics need to be looked at here, as net debt/EBITDA levels for example alone are not necessarily that informative if the group has sizeable unused borrowing facilities (although covenants clearly have to be taken into account).
- Niche technology/strategic assets – Where a company has a unique technology (for example REC's FBR production facilities) these may not guarantee survival

alone, but may mean that the company is more likely to participate in any consolidation that takes place.

- Strategic assets/positioning – This is linked to niche technology, but could also relate to the location of production facilities, if for example they gave access to a particular market (local content rules) or allowed circumvention of anti-dumping duties. Downstream integration would also feature here giving a company an internal route to market
- High quality – This is less of an issue in a commoditized market, but this is certainly true for the polysilicon end of the production chain. It is perhaps more important from a negative perspective – lower quality producers will find it harder to sell their product in an oversupplied market.
- Brand – Once again this is less important in an oversupplied market, however certain brands do appear to have greater impact in certain markets most notably at a domestic level. Moreover the perception of a company's strength (not least in financial terms) can have a major impact on the bankability of a project using those panels. Brand strength is also important in less commoditized parts of the value chain, for example in inverters where a brand such as SMA is viewed as a clear leader in terms of technology (as evidenced by its leading global market share, which we estimate is still at around 25%). SMA also builds brand loyalty amongst developers and installers via an extensive training programme in a variety of markets which helps to bind installers to the brand.

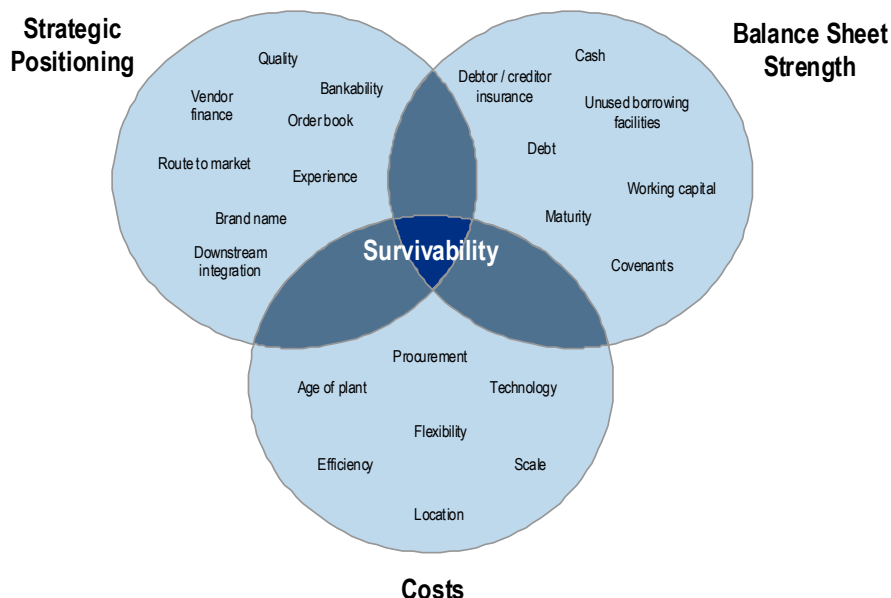
Clearly it is unlikely to be one of these characteristics alone that allows survival/emergence as a winner, but more likely a combination of the above.

### The survivability Venn diagram

Companies ranked on three baskets of criteria

We have chosen to examine the three key elements of those mentioned above, namely costs, financial strength, and a third category of “strategic positioning” which captures many of the other attributes mentioned above.

Figure 20. Factors affecting survivability

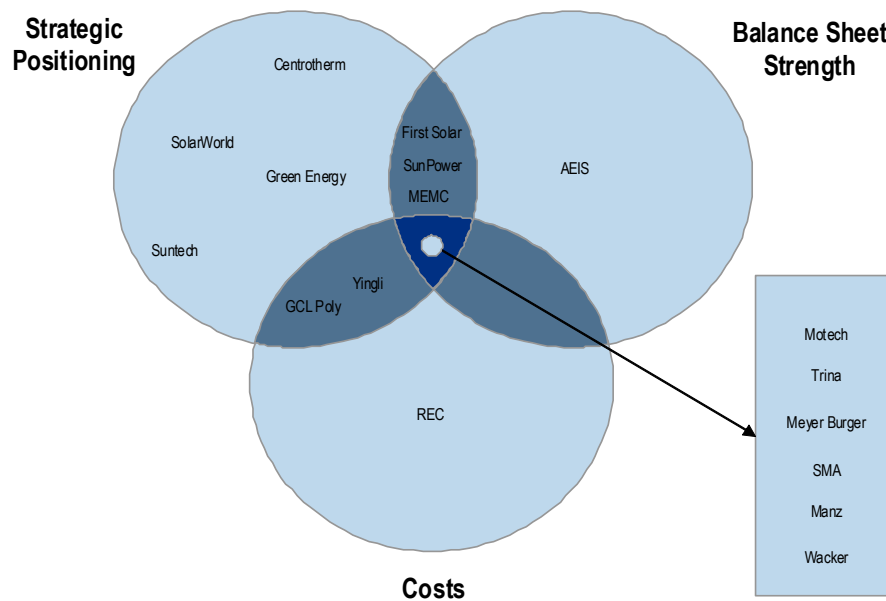


Source: Citi Research

**Companies ranked according to  
performance on metrics**

We have ranked the companies on costs based on their relative position in their particular elements of the value chain. In terms of balance sheet strength we have ranked the companies based on a variety of metric including net debt/equity and net debt/sales. Strategic positioning includes our assessment of the relative merits of the companies based on the criteria shown in Figure 20 above. The resulting Venn diagram is shown in Figure 21.

**Figure 21. Resulting Venn diagram**



Source: Citi Research



## The holy grail of grid and 'socket' parity

While solar has historically relied on subsidies such as feed-in tariffs, tax credits or green certificates to allow it to offer acceptable returns to investors, the rapid decline in panel prices means that parity with conventional forms of generation is within reach, and in many cases already here. This has long been viewed as the 'holy grail' for the solar industry, as parity will allow demand to be driven by standalone economics, with issues such as subsidy/capacity caps no longer providing a 'ceiling' for installations.

**Growth is not limited to growth in power demand, due to substitution effects**

A less obvious, but perhaps more important corollary of this is that this means growth in solar is then not limited to growth in power demand. Domestic and commercial solar are essentially distributed generation which could be installed by a household or company displacing their current supply. Given that this is therefore substitution, it means that growth in solar installations is not limited to power demand growth (i.e. only competing for new centrally sanctioned generation projects) but is driven by cold hard economics of the end user. This is in fact true also for utility scale projects being developed by private companies/investors.

**Distributed generation does not have to include transmission, distribution and retail costs**

For distributed generation, the key benefit is that solar-generated electricity offsets an electricity price which, as well as including the generation cost of the electricity, is inflated by the inclusion of Use of System (UoS) charges for both transmission and distribution (as well as a retail margin). Accordingly, it is far easier for domestic solar to compete (so called 'socket parity') against residential electricity prices.

**Resulting lower utilization rates on conventional plant are an issue for utilities and ultimately consumers**

The main problem with this (for utilities, and ultimately the consumer) is that this substitution leads to lower utilization rates at a conventional generation plant. This would in a perfect economic world lead to the closure of this plant, but the problem of course is that much of this generation capacity needs to remain to cover generation on less sunny days, and night, and through the winter when insolation levels are lower. This issue has already come to light extensively in Germany, where ultimately we believe that the system will move to a capacity payment mechanism to remunerate utilities for low utilization rates on plants that must remain open as backup generation. Ultimately, while solar can reduce costs directly, the consumer will end up paying for these capacity payments.

**Solar generates at times of peak pricing**

The other issue is of course the times when solar generates. It peaks at times of peak demand, reducing demand for power from utilities when power prices are at their highest, thereby reducing profitability at utility generators on a disproportionate basis (though this is of course great news for the economics of solar).

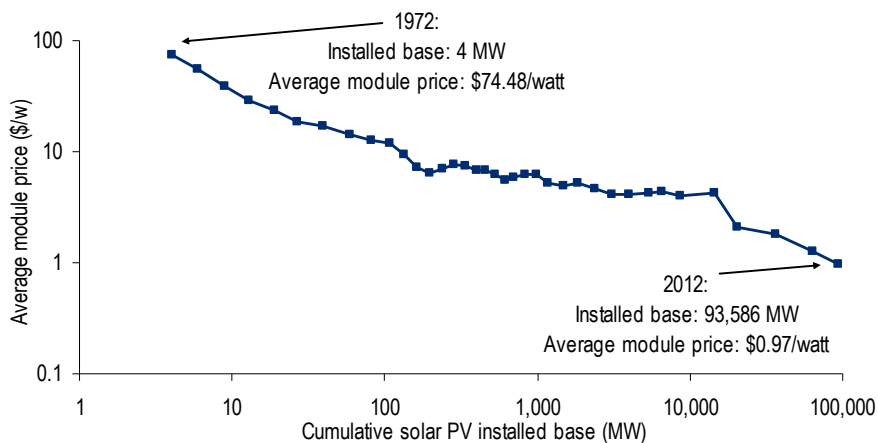
## Forecasting the cost of solar systems

### Module prices

**The cost of solar is inversely proportionately linked to cumulative installed capacity**

We forecast future PV module costs by projecting our estimates for future solar production/installation onto a historically observed 'experience curve' for module prices, which assumes that module prices decline by a constant percentage for every doubling of solar PV production. The historic data of pricing against installations is shown in Figure 22.

Figure 22. Historical average module prices against cumulative installed capacity



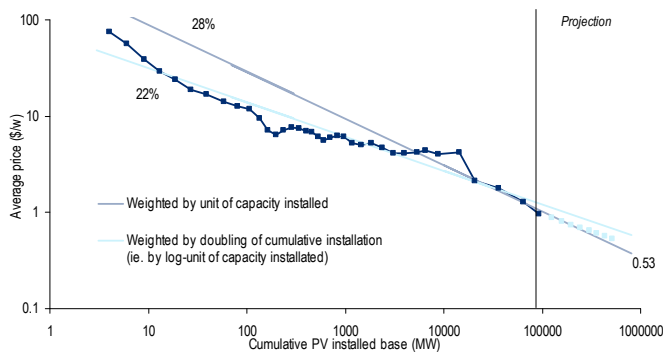
Source: Citi Research

#### Calculating a Moore's law for solar

Figure 22 shows the data of average module prices vs. cumulative installation for each year going back to 1972, with both scales logarithmic to provide a 'straight line' graph as we attempt to effectively calculate a Moore's Law for solar.

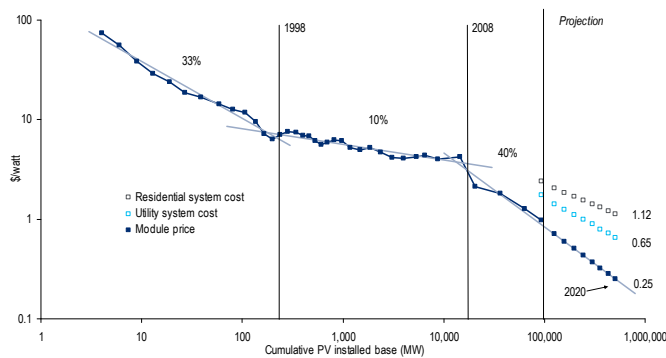
Figure 23 shows what we refer to as the 'single speed' learning rate, the line demonstrating a 22% learning rate, that is for every doubling of installed solar capacity, the average price of a module fell by 22%.

Figure 23. The 'single-speed' scenario, with price forecasts achieved by applying the historical experience curve factor of 22% to the 2012 price



Source: Citi Research

Figure 24. The 'three-speed' scenario, with price forecasts achieved by projecting onto the post-2008 experience curve



Source: Citi Research

#### Three distinct periods of differing learning rates

However, as Figure 24 shows, the historic pricing data can be split into three distinctive periods with differing learning rates.

1. The period up to 1990 shows a learning rate of 33%, but as the x axis shows this only corresponded to a cumulative production of around 200MW, and hence was essentially laboratory based production, calculators, satellites, early panels etc.

2. The middle period from 1990-2008 shows a dramatically reduced learning rate of 10%, but with installations reach just 15GW by the end period. The bulk of installations in this period occurred in later years, and corresponded to the introduction of incentive mechanisms (most notably feed-in tariffs) which drove demand, whilst not (in hindsight) providing enough downwards pressure on costs (i.e. it was all about volume as project IRR's were overly compelling)
3. The period from 2008 onwards shows a dramatically increased learning rate of 40% (effectively playing catch-up from the previous phase). This period corresponds to the reduction in subsidy schemes which increased pressure on costs, and was facilitated by advancements in manufacturing equipment, economies of scale, the squeeze of manufacturing margins to zero (and beyond), but most importantly the move of manufacturing to Asia.

**Costs likely to fall by 30% for every doubling of installed capacity**

Clearly the latter two effects in phase 3 cannot be replicated and hence it is unreasonable to project this learning rate of 40% forwards in our view. Conversely the single phase learning rate of 22% only produces a module price forecast of 0.53\$/W in 2020. Given that spot module prices from Asia are currently around 0.70\$/W, with some companies selling inventory in the 0.50's \$/W, this hardly seems like an aggressive forecast for 7 years into the future.

Accordingly we believe that the reality will be somewhere between the two (22% and 40%) learning rates, with a likely outcome of around 30% over the longer term, interestingly in line with the first phase of the '3-speed' chart).

### Balance of system costs

**Balance of system costs are more difficult to project forward, since they amalgamate diverse costs.**

Balance of system (BoS) costs are difficult to forecast because, as an amalgamation of diverse cost elements, they vary considerably across installations. For one, the BoS cost varies dramatically depending on whether the installation is of a residential-scale (e.g. on the rooftop of a home or small business) or of utility-scale (e.g. constructed by a utility and grid connected).

BoS costs have historically comprised less than 40% of the total installed cost for residential-scale solar, and less than 25% of the total cost for utility-scale solar. However, in recent years declines in BoS costs have not kept up with plummeting module costs, and BoS now typically stands at around ~50% of the cost of residential-scale solar, and ~30% of the cost of utility-scale solar.

These costs can be significantly higher, however; in the US, balance of system costs can comprise up to 75% of a residential-scale solar installation. One reason for this is the comparatively high compliance costs to obtain planning approval.

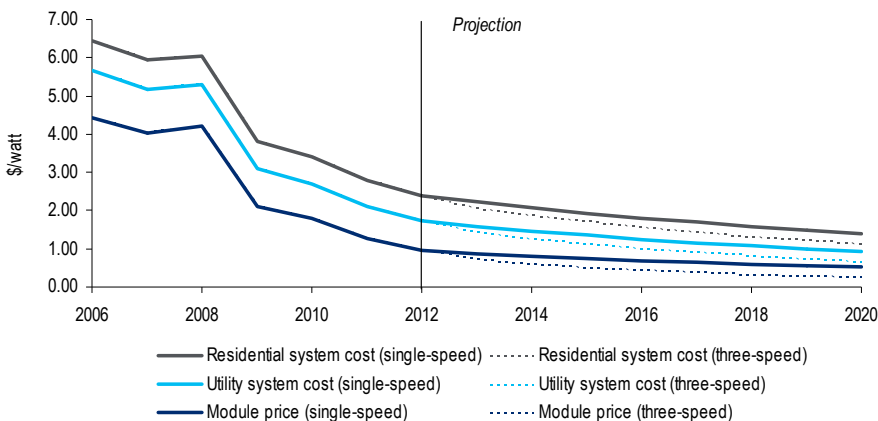
We see ample scope for significant reductions in BoS costs, through streamlining and standardizing the installation process. To forecast these reductions, we apply an annual discount of 6% to residential scale BoS costs, and an annual reduction of 8% to utility-scale BoS costs, which we think are conservative estimates of future reductions.

**Under our two scenarios, we see total system costs dropping ~42–53% by 2020 for a residential-scale installation, and ~47–63% for a utility-scale installation.**

With our projections, by 2020 we see the cost of a solar module at \$0.53/watt in the 'single-speed' scenario, and at \$0.25/watt in the 'three-speed' scenario, compared to \$0.90/watt today. In fact, modules for some Chinese producers are already available for around \$0.75/watt.

For residential-scale installations, we see the corresponding costs at \$1.40/watt and \$1.12/watt, compared to \$2.40/watt today. For utility-scale installations, we see the corresponding costs at \$0.93/watt and \$0.65/watt, compared to \$1.75/watt today.

Figure 25. Forecast for future average solar module price and full systems costs, for the 'single-speed' scenario and the 'three-speed' scenario



Source: Citi Research

## Solar 'socket parity' is already here in several regions

**In many countries – Germany, Spain, Portugal, Australia, and the South-West of the US – residential-scale solar has already reached 'grid-parity' with average residential electricity prices. In other countries grid-parity is not far away; we forecast that grid-parity will be attained by Japan in 2014-2016, South Korea in 2016-2020, and by the UK in 2018-2021.**

Figure 26 and Figure 27 show the timing of residential socket parity for both the single (Figure 26) and 3-speed (Figure 27) learning rates.

**Solar is already at or beyond domestic socket parity in many countries**

The height of the bubbles on the y axis shows the residential electricity price in that country, the position on the insolation x-axis simply showing the number of sunshine hours per year for that country. The size of the bubble simply shows the size of the electricity market in that country. The curves show the cost of solar electricity in a particular year, with the cost of solar (on the y axis) reducing as you move along the curve from left to right on the x-axis as you move to sunnier countries. The curves drop down in later years as the cost of solar system reduces in line with the learning rates calculated earlier.

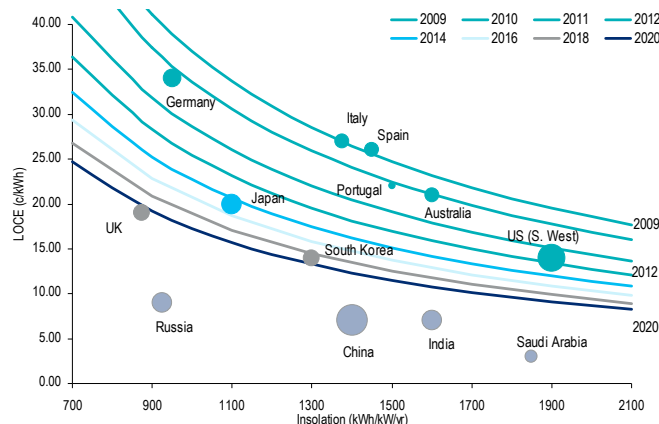
Put simply, if a bubble is above the curve for a particular year, the cost of solar is below residential electricity in that country at that time.

As the charts show, we have already seen residential solar LCOE fall below average residential electricity prices in Spain (2009), Germany, Portugal and Australia (2010-2011) and the South-West US (2012), with Japan set to follow in 2014-2016, South Korea in 2016-2020 and the UK in 2018-2021, depending on the price scenario.

Unable to compete in countries with subsidized residential electricity prices

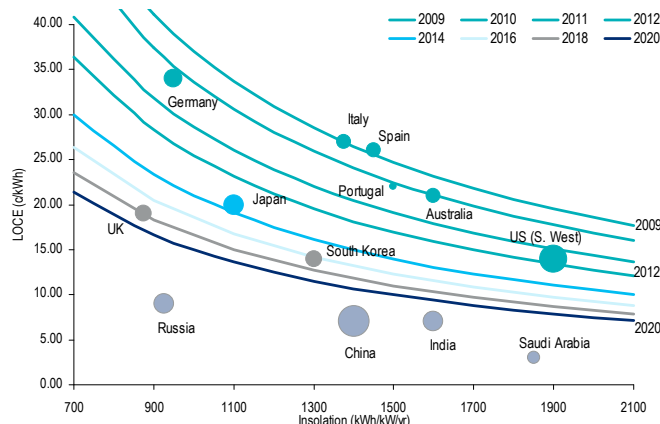
Conversely on this analysis China, India, Russia and Saudi Arabia will not attain grid-parity by 2020, due to their low residential electricity prices (ironically due to subsidized prices).

Figure 26. Solar cost curves by year on a single speed learning rate, vs. residential electricity prices by country



Source: Citi Research

Figure 27. Solar cost curves by year on a 3-speed learning rate, showing the majority of unsubsidized countries at socket-parity by 2020



Source: Citi Research

## Utility scale solar vs. CCGT

Utility scale solar must compete against wholesale prices, though at peak price times

While residential solar has the advantage of competing against higher residential electricity prices, merchant utility scale solar must compete against wholesale power prices, effectively the price of power as it leaves a conventional power station. However, while solar electricity generation is intermittent, what works in its favor is that it generates at times of greatest demand when power prices are at their highest (particularly in hot regions, where air conditioning is a key driver of demand, when of course the solar is generating to the maximum).

To examine this we have reproduced some of the work which is analyzed in much more detail in the “*Shale & Renewables: a symbiotic relationship*” report published in September 2012 (Link: [Shale & Renewables: a symbiotic relationship](#)).

Comparative gas prices and hence CCGT electricity costs vary widely by region

In this analysis we have calculated the cost of electricity from a CCGT at a variety of difference gas prices – the cost will even be higher for a peaking plant. In determining which gas price is right for which region (especially given the shale phenomenon) we have reproduced Figure 28 which gives an idea of gas prices delivered, both including and excluding environmental costs. While gas prices in the US are currently around \$3.4/mmbtu, the base Henry Hub prices used of \$4-6 are those which we estimate to be breakeven prices for gas producers in the US (E&P returns at the much vaunted \$3/mmbtu level have been sub-WACC). A much more detailed derivation and analysis of these prices is contained with the aforementioned shale gas report.

As Figure 28 shows, breakeven gas costs including environmental costs related to fracking (i.e. water treatment, fugitive methane reduction) produce prices between \$4-10/mmbtu for the US, \$9-15 for Europe and \$11-17 for Asia, these ranges for Europe and Asia fitting well with current spot prices.

Figure 28. Natural gas cost scenarios for the US, Europe and Asia (ex. China), in \$/MMBtu

	US			Europe			Asia		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
<b>Extraction</b>									
Base (Henry Hub)	4.00	5.00	6.00	4.00	5.00	6.00	4.00	5.00	6.00
<b>Transport costs</b>									
LNG fuel markup (15%)				0.60	0.75	0.90	0.60	0.75	0.90
Liquifaction				2.25	2.25	2.25	2.25	2.25	2.25
Shipping				1.00	1.25	1.50	3.25	3.50	3.75
Other	0.0	0.25	0.50						
<b>Total (excl. environmental)</b>	<b>4.00</b>	<b>5.25</b>	<b>6.50</b>	<b>7.85</b>	<b>9.25</b>	<b>10.65</b>	<b>10.10</b>	<b>11.50</b>	<b>12.90</b>
<b>Environmental costs</b>									
Carbon price	0.00	0.59	1.18	1.18	1.78	2.37	0.59	1.18	1.78
at carbon price of	\$0		\$20	\$20		\$40	\$10		\$30
Other	0.00	1.00	2.00	0.00	1.00	2.00	0.00	1.00	2.00
<b>Total environmental costs</b>	<b>0.00</b>	<b>1.59</b>	<b>3.18</b>	<b>1.18</b>	<b>2.78</b>	<b>4.37</b>	<b>0.59</b>	<b>2.18</b>	<b>3.78</b>
<b>Total costs (with environmental)</b>	<b>4.00</b>	<b>6.84</b>	<b>9.68</b>	<b>9.03</b>	<b>12.03</b>	<b>15.02</b>	<b>10.69</b>	<b>13.68</b>	<b>16.68</b>

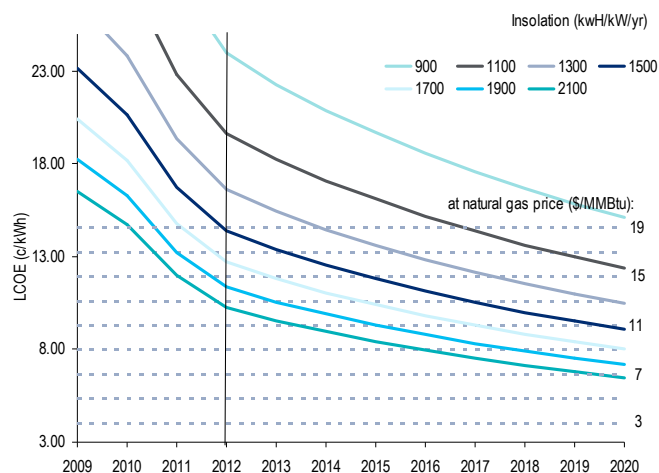
Source: Citi Research

#### Solar costs also vary widely by region

Figure 29 and Figure 30 show the cost of utility scale solar electricity, each curve representing a different insolation level (with around 900 hours representing the UK, and the lowest/2100 hour curve representing the Middle East). These costs reduce over time (x axis) due to the learning rates discussed.

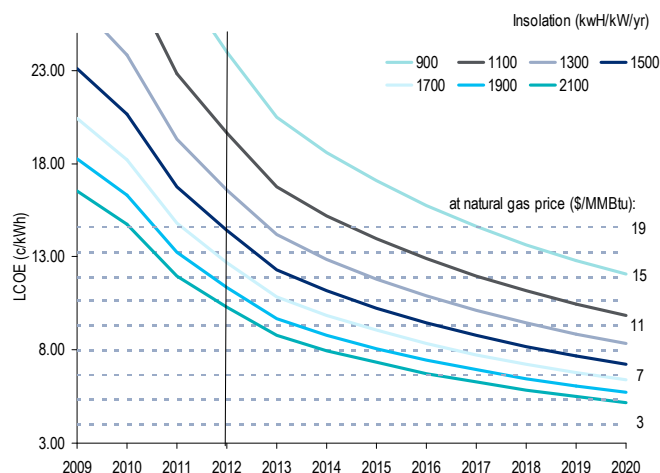
Most important are the dotted horizontal lines, which represent the cost of electricity generated by a CCGT burning gas at the price shown at the right hand end of the line, i.e. the lowest dotted horizontal line is the cost of electricity from a CCGT burning \$3/mmbtu gas.

Figure 29. Utility scale solar costs vs. CCGTs using a single speed learning rate



Source: Citi Research

Figure 30. Utility scale solar costs vs. CCGT's using a 3-speed learning rate



Source: Citi Research

**Utility scale solar cannot compete with \$3 shale gas, but it can in higher priced regions, or if environmental costs are included**

As the charts show, at \$3/mmbtu, utility solar cannot reach parity on a standalone basis vs. a CCGT, as has been observed with the shale boom in the US. However, we would note that as discussed, in our opinion \$3 is not a level reflective of the costs of production. Moreover, if we are to look at the higher gas prices in other

**Economics likely to be more compelling vs. super-peaking gas plants**

regions such as Europe and Asia (particularly Japan at around \$16) solar can be highly competitive.

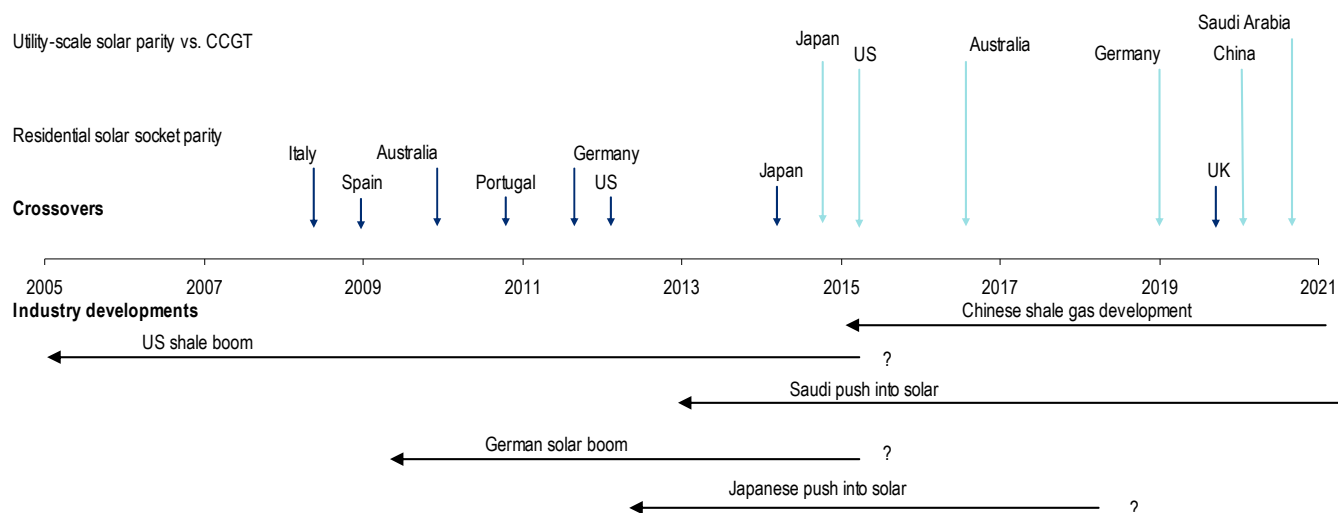
We would also note that this is versus a CCGT; were we to conduct the analysis for a super peaking plant which only operates at peak times (i.e. when solar generates) we believe that the economics of solar would be competitive in sunnier regions such the southern US now. Indeed many utilities are actually building solar plants instead of peakers, believing the economics to be better already (i.e. Georgia Power).

**The parity timeline – where and when?**

**Solar is already at domestic socket parity, with utility scale parity coming from 2015 onwards**

Given the number of variables in the prior analysis, namely countries, electricity prices, sunshine levels, gas prices etc, it can be hard to deduce what becomes competitive where. Accordingly we have placed a parity timeline in Figure 31 which shows when domestic solar reaches(d) parity (the shorted vertical lines) and utility scale solar parity vs. CCGT's (the taller vertical lines).

Figure 31. Parity Timeline



Source: Citi Research

As the chart clearly shows, in many countries we are already at domestic socket parity, while solar becomes competitive vs. CCGT's in an increasing number of countries from 2015 onwards.

**Solar will keep getting cheaper, while fossil fuel prices are likely to increase in the longer term**

Perhaps the last, but most important, point to make is to accentuate how disruptive solar is as a technology given these 30% derived learning rates. The key point is that solar will keep on getting cheaper, and conversely (assuming that lowest hanging fruit has been developed first, and barring black swan events like shale) fossil fuels are likely to get more expensive over time, making the relative economics ever more compelling.

## Chapter 2 – Near term drivers

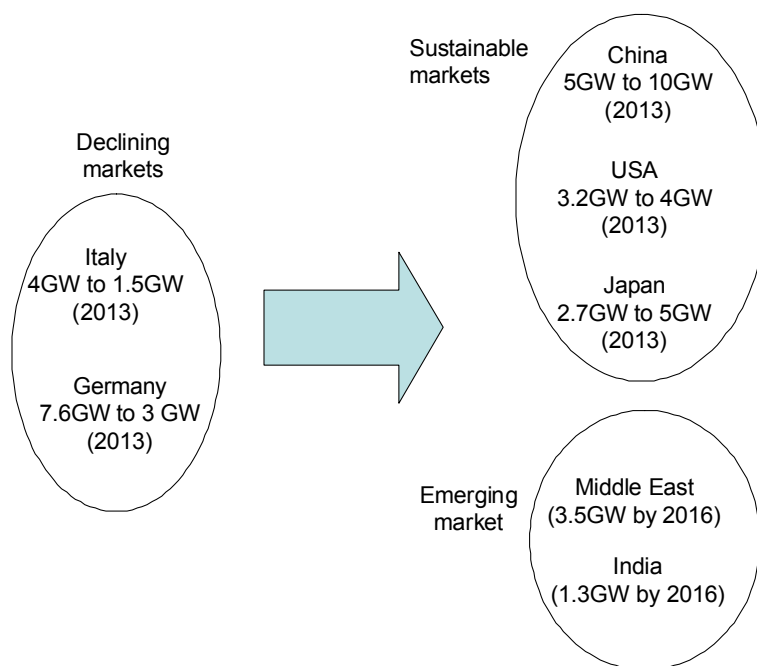
### Demand – Shift from Europe into Asia shows some improvement in visibility

**Structural demand shift from Europe into China, Japan and the USA...**

**...Opportunities abound in emerging markets**

In 2013, global demand is set to stagnate another year (6% YoY growth) until picking up again in 2014 and 2015 with even healthier growth. The reason we expect sluggish growth in 2013 is that traditional growth markets such as Italy, Spain and Germany are committed to limiting annual installations to minimum levels with the goal of avoiding ballooning consumer bills. This decline in annual installations is partially offset by stronger growth in China, Japan and the USA which provide a robust and sustainable demand market moving forward. Emerging solar markets such as India and the Middle East show great promise but growth remains in the infancy stage with huge leverage to the upside. High electricity rates and some of the best solar economics in the world coupled with a need to diversify into other fuel mixes should translate into substantial growth opportunities over the next few years within the emerging markets but we await more defined policies.

Figure 32. Summary of demand market shift



Source: Citi Research



Figure 33. Global solar demand in MW

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy	150	500	650	3,499	7,499	4,000	1,500	1,500	2,000	2,000	2,000	2,000	2,000	2,000
Germany	1,400	1,600	4,500	7,392	7,485	7,600	3,000	3,000	3,000	3,300	3,630	3,993	4,392	4,832
Spain	600	2,500	100	275	372	275	303	333	366	403	725	797	877	994
France	50	100	100	707	1,671	1,022	1,000	1,050	1,103	1,158	1,216	1,276	1,340	1,407
UK	0	0	0	115	784	725	621	653	685	719	755	793	833	874
ROE	242	297	1,344	1,204	1,720	2,050	2,050	2,112	2,175	2,240	2,307	2,377	2,448	2,521
USA	200	350	350	984	1,712	3,200	4,000	5,500	7,000	9,000	9,500	10,000	10,000	10,000
Canada	0	0	50	145	249	400	500	600	700	800	900	1,000	1,050	1,100
Latin America	10	10	10	30	140	100	200	400	500	750	1,000	1,200	1,320	1,320
Japan	300	300	500	900	1,155	2,700	5,000	6,250	8,333	9,167	10,083	11,092	11,646	12,229
China	40	30	200	450	3,240	5,000	10,000	11,500	13,225	14,548	16,002	16,802	17,642	18,525
India	0	0	20	95	300	1,100	1,200	1,400	1,300	2,000	3,000	3,500	3,500	3,500
Australia	20	20	100	387	774	1,115	700	770	847	974	1,120	1,288	1,481	1,704
Korea	50	300	100	148	157	200	200	200	250	300	350	400	450	500
SE Asia	0	0	20	360	420	600	960	1,371	1,577	1,814	2,116	2,267	2,418	2,588
Africa	20	20	20	140	225	550	800	1,000	1,200	1,500	1,875	2,344	2,813	3,281
ROW	100	100	150	1,942	2,606	2,200	2,530	2,910	3,055	3,208	3,368	3,537	3,713	3,899
Total	3,182	6,127	8,214	18,773	30,509	32,837	34,564	40,548	47,316	53,879	59,948	64,666	67,924	71,273
Growth		93%	34%	129%	63%	8%	6%	17%	17%	14%	11%	8%	5%	5%

Source: Citi Research

## Europe – Sunny days are over – more tepid outlook moving forward

### Conto 5 legislation to run out soon...

**Italy** – Italy has been a traditional growth market installing solar capacity at a rate of 7.5GW in 2011 (25% of global market) and 4GW in 2012 (12% of global market). In 2013, we are expecting the remainder of the Conto 5 legislation to add 1-1.3MW of installations and the rest to occur on an unsubsidized basis in sunnier parts of the country to bring total installations up to 1.5GW – see our forecast above.

**Two key reasons why the forward demand outlook is falling:** (1) The Italian government has set an annual spending cap of 6.7€bn to support solar installations. As of the 27<sup>th</sup> September 2012, 6.17€bn of this was allocated to existing installations. This leaves room for an extra ~2GW of new installations. Developers are very cautious to plan ahead for new installations, which stalls the rate of installations (440MW new installations in the past 5 months since August 2012) as one would expect. (2) Italian power prices include very high subsidy costs that are unsustainable – especially in light of a very weak economic backdrop where political sensitivity is high. So, we don't expect the government to commit to an extension of Conto 5 at this juncture. Therefore, looking forward, moderate installation levels are driven mainly by pure economics (combination of utility-scale PPAs, high insolation and relatively high power prices) versus legislatively driven mandates.

### Degression mechanism makes attractive IRRs unsustainable in Germany..

**Germany** – Against expectations, Germany saw 7.6GW of installations in 2012 – this was the key region of growth historically and a main focus of growth opportunities for the solar names under our coverage. Looking forward, growth has completely subsided – many companies are now re-focusing their resources to other growth regions outside of Western Europe. The German government is strongly in favor of curbing installations and will do whatever is necessary to hit the target corridor of 2.5-3.5GW – recent monthly FiT cuts support this notion. Looking

forward, we expect quarterly adjustments in FiT's in order to remain within the government's solar installation target.

**Why the tepid outlook moving forward?** (1) We think that the German government is serious about limiting solar installation levels with Merkel pledging to German citizens that there is going to be no more renewable surcharge additions to electricity bills – this speaks volumes. So, we believe the degression mechanism is credible and an easy way to curb installation levels towards the stated targets. (2) Utility/commercial-scale installations have been drivers for installations in Germany (90 % of total installations). With IRR levels depressed at current feed-in tariff levels we believe that installations will occur in South Germany where high insolation levels improve IRRs. But overall, this represents a much smaller installation base than we had historically. Therefore we think installation rates will drop as a result of this dynamic. (3) Although the segment receiving the best feed-in tariff in Germany, rooftop installation growth (currently 10% of total installations in 2012) will be too small to make up for the shortcomings of larger-scale installations.

## Sustainable markets – key global demand drivers

**We are optimistic that China can deliver growth in the coming years....**

**China** – At the beginning of 2013, China disclosed an increased installation target of 10GW for 2013 – double the 5GW installation of 2012, and which would account for ~30% of global end demand. This is undoubtedly a positive for the industry (especially locally), though we would highlight that the incremental effect versus our previous forecast for China demand of 7GW is more limited in a global context.

**...10GW is great news. However, we caution investors**

On the positive side, the official announcement may trigger inventory re-stocking in the solar supply chain as channel suppliers anticipate China launching an additional incentive scheme for solar power. Along with recent approvals of a new batch of Golden Sun projects, Rmb13bn funding from central government, and potential implementation of anti-dumping measures on polysilicon by February 2013, this could bode well for near-term order outlook for some local companies.

While China has not published clear funding sources for the 10GW installation, based on our checks China may seek applications for another round of Golden Sun projects by the end of 1Q13, and will finalize the feed-in-tariff scheme in 1H13. While the details are still being ironed out, recent NDRC discussions suggest funding support will likely be more targeted for distributed power development projects, with the intent that most power production will be consumed rather than being sold to the national power grids. According to the earlier 12-5 plan, we anticipate that at least 50% of projects to be for rooftop/distributed PV systems, while the remaining projects will be for solar farm projects. New project developments in China would be constructive for Chinese solar project contractors such as China Singyes Solar Technologies (0750.HK), and potentially for domestic polysilicon companies like GCL-Poly (3800.HK).

However, the very fact that China has not yet published clear funding sources for this programme does present risks, the key one being that the 10 GW target may be achieved at a slower rate than anticipated taking into consideration that the Chinese government has been slow in paying subsidies under the prior Golden Sun program. This has built up a backlog of subsidy payments over the past year which could leave developers waiting for past subsidies to be paid before commencing new installations. Clearly if the target were to be missed this would represent a disappointment (later in the year) especially in the context of some of the recent stock moves on the back of this announcement.

In any scenario, the move to a 10GW target is a positive datapoint for the industry regarding China and clearly displays the country's ambitions in the solar space, making it a key sustainable market for solar energy moving forward. Perhaps most important to note though is that while it may be positive for some Chinese solar companies, the incremental 3GW of demand that this represents (assuming the target is achieved) has a limited effect on the more important issue of closing the gap between global demand (we forecast 34.6GW of demand in 2013 including the 10GW) and global industry capacity, which we estimate to still be 50-60GW. While much of this capacity is idle or running at low utilization rates, until this overcapacity is cleared to more acceptable levels we see limited upside in pricing, as will margins for manufacturers. Once again, this Chinese announcement would appear to be more positive for developers than it would necessarily for manufacturers, in line with our general positioning thesis.

**The US will remain a key growth engine for global solar spending for several years**

**US** – Solar spending moving from legislatively mandated growth to pure economics and fuel diversity. The solar landscape in the US is very diverse with each state having its own legislation supporting solar installations or not. The single legislation tying it all together is the federal investment tax credit (ITC) which grants developers a 30% tax credit that they can offset against future revenue. We view the US solar spending growth outlook very much like how we view the dynamic changes going on overseas between traditional growth countries and new sustainable markets – the driver of growth going forward will be sourced by pure economics and the need to diversify fuel sources with a modest overlay of legislatively mandated growth. Case in point, many states in the Southwest have already reached what we call socket parity (solar rates equates to residential retail rates). Additionally, we have begun to see the emergence of utility scale spending in states with no incentive mechanisms issuing RFPs for large scale solar projects (i.e. Georgia Power, who recently issued an RFP for 210MW, has been vocal about stating the need to build solar based on both economics and fuel diversity).

**We why do we view the US as a sustainable growth region early in the spending cycle:** (1) New financing trends are emerging: third party financing/leasing arrangements provide a viable financing solution for households triggering installations in the residential segment – an early growth segment, (2) commercial level spending is still in the early stages – the use of third party financing should propel this segment as well, (3) while utility scale spending will level off in the interim as RPS standards have been met through 2016 generally, the new growth engine will center around the need to diversify fuel mix as well as economics based on grid parity (LCOE of solar equates to a peaking gas plant) – this will continue as system costs and PPA rates continue to fall.

**Nuclear exit provides an opportunity for renewable energy**

**Japan** – Japan's nuclear exit after Fukushima provides upside potential for solar power. The election of a pro-nuclear government (LDP victory in December 2012) did not alter the landscape significantly, as the decision to switch nuclear back on is a technical rather than a political decision. Meanwhile Japan needs to come up with a solution to fill the generation gap. Therefore we are expecting generous subsidies for renewables in the foreseeable future given that the country is relatively pro solar across the board. Installations could reach 5GW in 2013 and grow at a decent rate to cope with incremental domestic electricity demand.

**High panel and equipment prices mean there is huge IRR upside**

**Why are we positive on Japan?** (1) Japan exiting nuclear power means that there is huge gap between electricity demand and supply. This means that the gap has to be filled with additional generation capacity. High gas prices partly due to oil-gas indexation and LNG unavailability currently make renewable energy the best

solution to replace nuclear power. (2) The combination between relatively high panel and balance-of-system prices balanced with generous feed-in tariffs make attractive IRRs possible in Japan. And because panel prices and equipment prices are high at the moment there is a huge potential for very attractive IRRs in Japan when prices drop. We think that prices ultimately will drop when Japan opens up international trade. (3) there is wide support for solar under different nuclear options – solar was the most added source of renewables in 2012 (versus wind, hydro and biomass) which supports our notion. (4) Even with a potential reduction in FiT's in March 2013, the current solar economics within the region translate into very high IRRs – this is not expected to change. And (5) unlike in Germany, FiT rates are secured by a developer prior to the start of a project – an attractive proposition for developers.

## Emerging solar growth markets

### Potential growth region: 1) Middle East 2) India

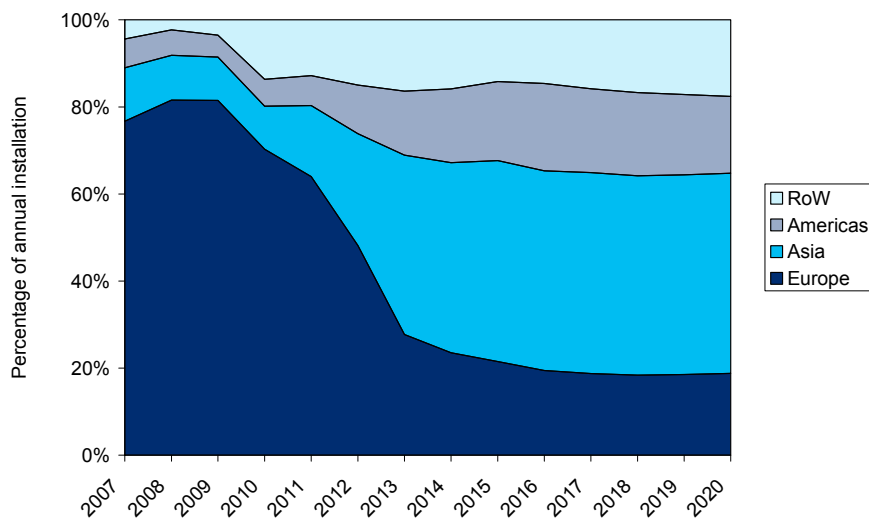
**Middle East** – The Middle East is a scattered growth region with diversified nations having different growth strategies. The primary incentive to deploy solar power for this region is to a) save oil for export (oil exporting countries) instead of burning it for electricity b) avoid importing high-cost oil (oil importing countries). Current growth ambitions are impressive - (1) Dubai announcing 1GW of projects by 2030, (2) Saudi Arabia new target of 17GW of solar by 2030 and (3) Qatar ~1.8GW target over next couple of years. We remain cautiously optimistic as growth is in the infancy stage. That said, the stage is set for a potential booming market with large sums of capital at their disposal. We await more defined policy.

**The bear argument?** – (1) The Middle East and in particular Saudi Arabia put an emphasis on local supply chaining. Developing a domestic supply chain could take years and could ultimately hinder installation rates (2) Ambitious growth targets are presented by states such as Saudi Arabia, Dubai and Qatar but those countries lack the concrete legislation to back up growth targeted rates.

**India** – Currently installations are driven by national and local tenders for PV installations with national targets to install 1.2GW in 2013. Although these tenders have attracted a significant amount of investment in the past (1.1GW in 2012) low visibility in terms of periodicity of future tenders leaves the question open of how committed India is to build up a sustainable domestic solar market. We are awaiting a unified policy towards solar sometime this year. Currently, there are various incentives in place – some successful, some not. States are basically looking to align their incentives with the central government's plan (National Solar Mission Phase 2 is expected to be released by mid year 2013).

**Why are we cautious as we await policy?** – (1) Although local and national PV tenders attract attention, historically the bid ratio always falls short of expectation. The recent Tamil Nadu tender (1GW) received bids worth less than 500MW on pricing and funding concerns. The main reason developers were cautious to bid was because payment guarantees consisted of a government letter (normally an escrow account provides much more security). (2) Tenders are very cyclical and provide too much government discretion over installation rates. (3) Local content requirement will ultimately slow down future installation rates.

Figure 34. Demand shift from Europe into Asia



Source: Citi Research

## The Supply picture

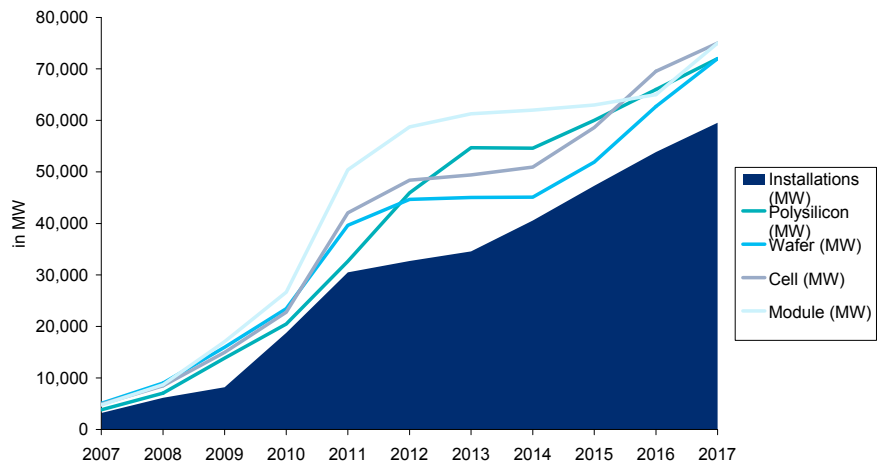
Figure 35. Capacity for polysilicon/wafer/cell/module

Polysilicon (t)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wacker	8,500	11,750	16,588	30,330	40,330	41,580	52,000	52,000			
GCL Poly	393	5,000	13,000	21,000	46,000	65,000	65,000	75,000			
Hemlock	7,864	12,150	21,350	28,350	27,500	27,500	36,000	36,000			
OCI	0	5,000	17,000	27,000	42,000	42,000	52,000	52,000			
Tokuyama	5,800	5,800	8,000	8,200	8,200	8,200	9,200	9,200			
REC	6,000	6,500	11,500	13,500	17,000	21,500	21,500	21,500			
MEMC	5,000	5,800	6,000	7,500	9,000	9,000	9,000	9,000			
M Setek	747	3,075	5,688	6,425	7,000	7,000	7,000	7,000			
Mitsubishi	3,150	3,450	3,450	3,450	3,450	3,450	3,450	3,450			
Other	22,700	30,675	40,000	60,000	65,000	69,000	84,630	70,000			
Semi demand	26,000	24,400	21,800	28,000	29,000	32,300	33,546	34,840	Top down forecast		
Total (t)	34,154	64,800	120,776	177,755	236,480	261,930	306,234	300,310			
Polysilicon (MW)	3,795	7,046	13,862	20,481	32,631	45,953	54,685	54,602	60,000	66,000	72,000
Conversion ratio (g/W)	9.0	9.2	8.7	8.7	7.2	5.7	5.6	5.5			
<b>Wafer (MW)</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
China	2,043	3,849	8,555	13,375	25,131	29,342	31,995	36,238			
Rest of Asia	660	1,358	2,432	3,710	7,730	9,435	9,575	7,755			
US	112	263	496	628	596	479	323	0			
Europe	1,134	1,930	2,615	3,265	3,114	2,133	375	0			
Japan	1,095	1,596	1,860	2,492	3,086	3,278	2,688	667			
RoW	0	0	0	0	0	0	75	450			
Total	5,044	8,996	15,958	23,470	39,657	44,667	45,031	45,110	52,000	63,000	72,000
<b>Cell (MW)</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
China	1,679	2,875	6,361	11,090	25,753	30,465	31,423	32,565			
Rest of Asia	884	1,766	3,758	6,046	10,529	12,450	13,575	15,270			
US	93	204	562	806	835	720	595	370			
Europe	1,235	2,160	2,738	2,911	2,586	2,037	1,130	568			
Japan	987	1,408	1,500	1,900	2,360	2,710	2,613	1,725			
RoW	37	51	54	27	0	0	75	450			
Total	4,915	8,464	14,973	22,780	42,063	48,382	49,411	50,948	58,610	69,543	75,000
<b>Module (MW)</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
China	1,647	2,965	7,075	13,331	30,011	35,729	38,376	39,153			
Rest of Asia	436	1,113	2,909	4,374	7,222	8,911	10,213	12,626			
US	363	678	1,167	1,748	2,310	2,539	3,090	3,150			
Europe	1,572	2,843	4,177	4,920	7,234	7,249	4,950	2,156			
Japan	661	984	1,407	1,807	2,815	3,367	3,557	3,737			
RoW	66	108	315	455	823	943	1,093	1,254			
Total	4,745	8,691	17,050	26,635	50,415	58,738	61,279	62,076	63,000	65,000	75,000

Source: Citi Research

## Poly

Figure 36. Supply show aggressive poly capacity growth

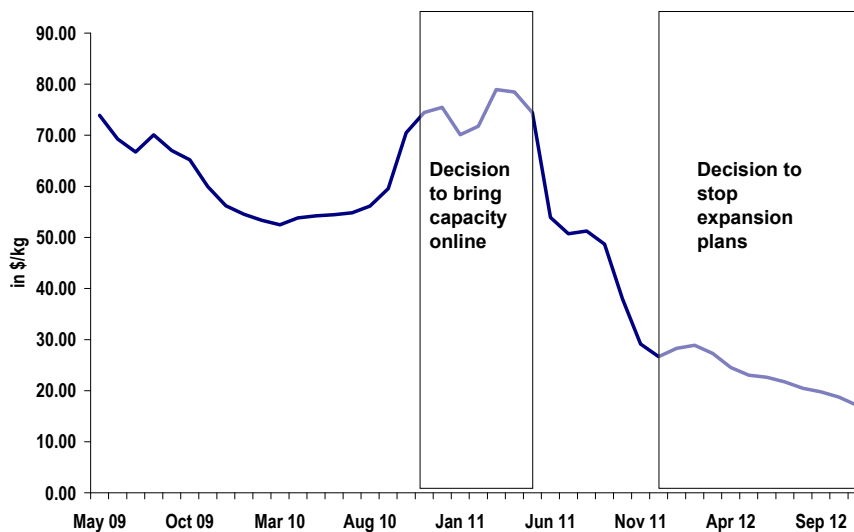


Source: Citi Research

### Supply very inelastic due to long lead time of polysilicon

Due to the long lead time to build a polysilicon production plant (~2 years) polysilicon supply is much more rigid than wafer/cell/module supply. Poly producers made the decision to add on capacity in 2010/11 when poly prices peaked at 80\$/kg and the poly supply was thin on capacity (Figure 36). This capacity addition is coming online now, and that is why we see capacity additions into an already oversupplied market. However, we do not expect much more capacity to come online throughout 2013 as poly prices dropped early 2011 and this must have triggered decisions to stop capacity expansion. Looking forward post 2014 smaller, uncompetitive producers will retire capacity while large producers will marginally expand capacity leaving the supply picture flat until demand picks up again.

Figure 37. Poly prices

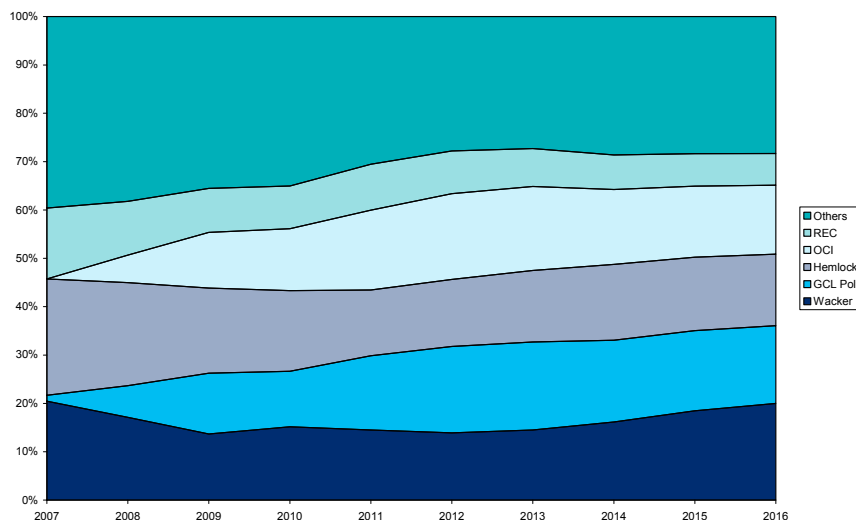


Source: Citi Research

#### Polysilicon market has matured over the years

The polysilicon supply curve looks very mature with top 5 companies taking on a market share of over 60%. We do not expect the high degree of consolidation to change significantly in the future as polysilicon production is a quite sophisticated process where experience and learning curve play a major role. Companies such as Wacker, REC and Hemlock have developed technical capabilities over the years and are likely to stay at the lower end of the cost curve while their Chinese counterparts are likely to produce at higher costs.

Figure 38. Polysilicon consolidation



Source: Citi Research



## Module

### Module market is immature and consolidation is required

Module/Cell/Wafer supply is much more flexible in terms of expansion and contraction of capacity due to the high degree of dispersion of suppliers. The market consists of many smaller manufacturers which have much more flexibility to enter/exit the supply market. In contrast, larger poly players have more stamina in terms of balance sheet to absorb losses during troughs, and hence are willing to keep capacity online during tough times.

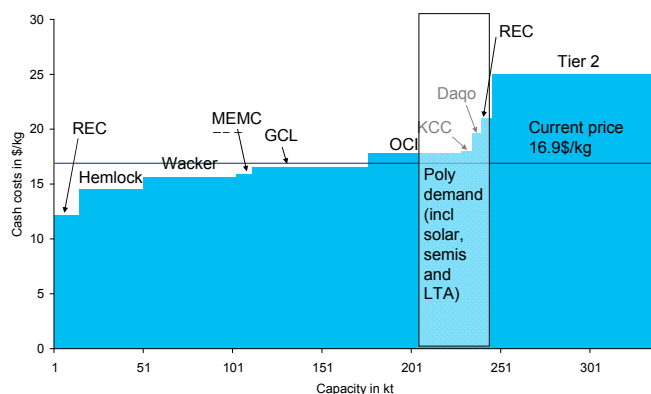
Figure 39. Poly/Module Top 10 companies

	Average Size (MW)	Capacity/Demand
Poly	4,485	142%
Module	1,775	55%

Source: Citi Research

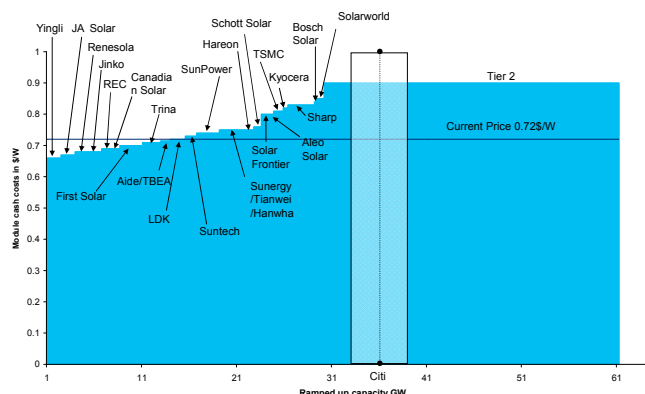
The module market seems very immature with many small players serving global module demand. This immaturity is reflected in a smaller average size and a lower market share for the top 10 module producers in comparison with their polysilicon counterpart (Figure 39). The dispersion of capacity in the module market allows for more flexibility in the supply curve: (1) Smaller players have less balance sheet stamina and (2) make less of a social impact when closing factories and terminating labor contracts. This is especially relevant during times demand/supply imbalance because it gives module supply the capability to better adjust to overcapacity.

Figure 40. Mature poly segment



Source: Citi Research

Figure 41. Immature module segment



Source: Citi Research

As we have seen throughout 2011/12 this adjustment to overcapacity happens in form of capacity closure and industry exits. Most notably in 2012 REC closed down their wafer factory in Heroya (650MW) exiting the wafer segment of the solar chain.

**Figure 42. Major industry exits 2011/2012**

Firm	Value chain	Location	Capacity affected (MW)	Action
China Sunergy	Cell/Module	China, US	220/390	Suspension
Evergreen Solar	Wafer/Cell/Module	US	160	Filed for bankruptcy
First Solar	Module	Germany	560	Suspension
First Solar	Module	Germany	505	Plant closure
Hyundai Heavy Industries	Cell/Module	South Korea	50	Suspension
PV Crystalox	Wafer	UK, Germany	600	Suspension
Q Cells	Cell/Module	Germany, Malaysia	500/150	Files insolvency, plants still operational
REC	Wafer	Norway	650	Plant closure
Schott Solar	Wafer	Germany	250	Plant closure
Solarworld	Wafer/cell/Module	US	250/500/350	Suspension
Solarworld	Module	US	150	Plant closure
Solon	Module	US, Germany, Italy, Austria	80	Filed for insolvency
Solyndra	Module/System	US	80	Filed for bankruptcy
Suntech Power	Cell	China, US	600	Suspension

Source: Citi Research

## Inventory – 10.6 GW total excess inventory in chain

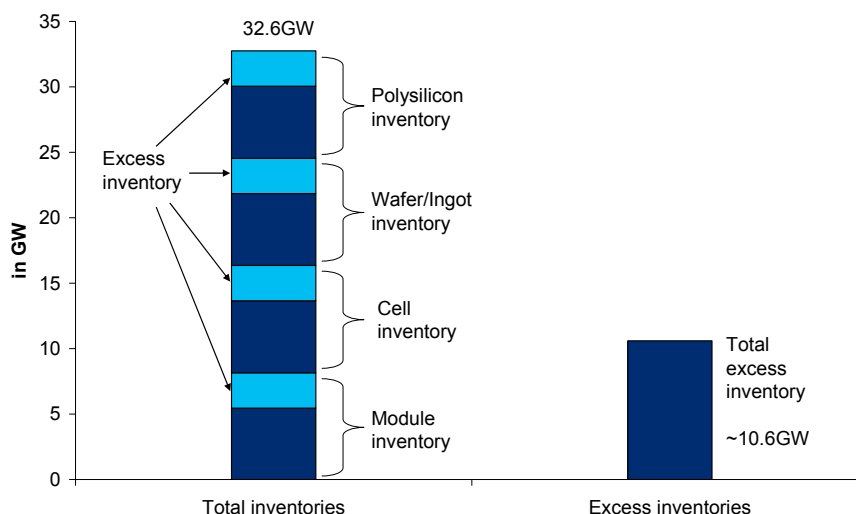
Our analysis reveals that inventory levels across the value chain amount to a total of 32.6GW. This inventory level of 32.6GW is hidden in form of polysilicon, wafers/ingots, cells and modules. When we balance this figure out across the chain we obtain 8.2GW worth of inventory in each segment of the chain (Poly/Wafer/Cell/Module).

Figure 43. Inventory analysis (excerpt from the model)

	Q1:10	Q2:10	Q3:10	Q4:10	Q1:11	Q2:11	Q3:11	Q4:11	Q1:12	Q2:12	Q3:12
Level of demand (GW) (1)	18.8	18.8	18.8	18.8	30.5	30.5	30.5	30.5	33.0	33.0	33.0
Inventories in each segment (GW) (2)	3.1	2.7	2.6	2.2	4.6	5.5	6.1	4.7	8.8	7.7	8.2
Total inventories (3) = (2)*4	12.4	11.0	10.4	8.8	18.5	22.1	24.2	18.9	35.4	30.6	32.6
Natural level of 2 month inventory (GW) (4) = (1)*2/12	3.1	3.1	3.1	3.1	5.1	5.1	5.1	5.1	5.5	5.5	5.5
Months of inventory (months) (5) = (2)*12/(1)	2.0	1.8	1.7	1.4	1.8	2.2	2.4	1.9	3.2	2.8	3.0
Excess inventories per segment (6) = (2)-(4)	0.0	-0.4	-0.5	-0.9	-0.4	0.4	1.0	-0.3	3.3	2.2	2.7
Estimated total inventories (7) = (6)*4	-0.1	-1.5	-2.1	-3.7	-1.8	1.8	3.9	-1.4	13.4	8.6	10.6

Source: Citi Research

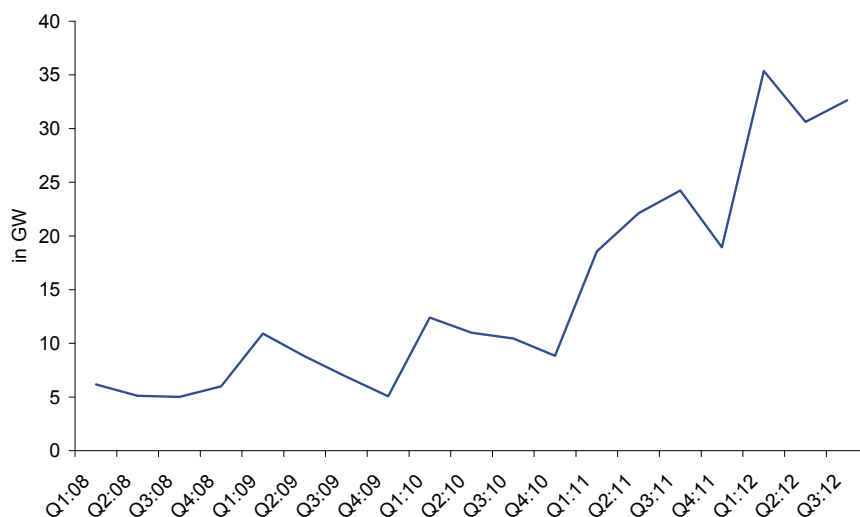
Figure 44. Excess inventory break-down



Source: Citi Research

In Figure 45 we plotted total inventory levels and observe that inventory levels have been rising dramatically since Q4 2010, when the first signs of overcapacity started to show. We advise caution when using total inventory levels as a benchmark to measure oversupply because it leaves out the comparison with an actual MW sales figure (which increased on a year on year basis since 2008). This ultimately leads us to inventory days, which puts inventory levels in a more relative context (Figure 46).

**Figure 45. Inventories have risen but not dramatically more than sales..**

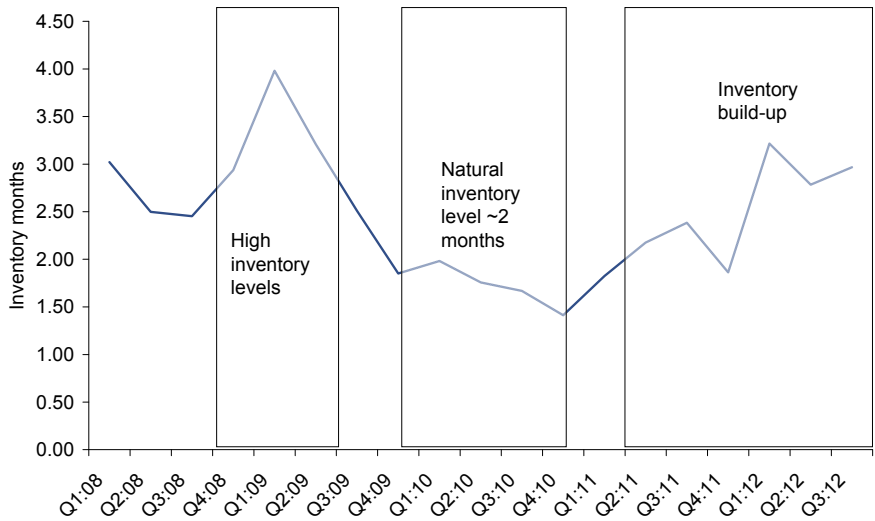


Source: Citi Research

#### 10.6GW of total excess inventories

Considering that inventory levels of 2 months are natural for manufacturers, we saw oversupply towards the beginning of 2009 when inventory months spiked up to 4 months. Then again inventories started rising since Q2 2011 until it reached a level of currently 3 months worth of inventories. This represents 1 month of excess inventory and translates into 2.7GW in each segment or a total oversupply of 10.6 GW in the chain.

Figure 46. Inventories days increasing since Q2 2011



Source: Citi Research

**We expect excess inventory levels to fall in 4Q12, at least for some Asian companies**

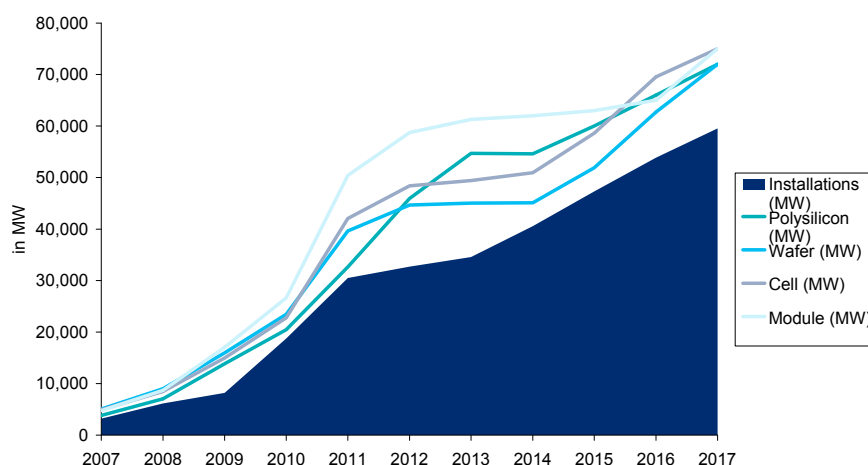
Interestingly, anecdotal evidence from many Asian companies suggests that utilization rates dropped materially in 4Q12, allowing some of this excess inventory to work through. While we do of course not yet have actual figures, this will be an important feature to look for in full year results.

## Supply/Demand balance

Year 2012 was worst in terms of demand/supply imbalance

Supply and demand have been out of balance since 2010 with the current year 2012 being the worst in terms of demand/supply imbalance. As a consequence of this overcapacity, utilization rates dropped drastically and excess inventory started building since the beginning of 2011.

Figure 47. Supply/Demand imbalance



Source: Citi Research

Figure 48. Demand to Capacity figures

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Capacity											
Polysilicon (MW)	3,795	7,046	13,862	20,481	32,631	45,953	54,685	54,602	60,000	66,000	72,000
Wafer (MW)	5,044	8,996	15,958	23,470	39,657	44,667	45,031	45,110	52,000	63,000	72,000
Cell (MW)	4,915	8,464	14,973	22,780	42,063	48,382	49,411	50,948	58,610	69,543	75,000
Module (MW)	4,745	8,691	17,050	26,635	50,415	58,738	61,279	62,076	63,000	65,000	75,000
Demand											
Installations (MW)	3,182	6,127	8,214	18,773	30,509	32,837	34,564	40,548	47,316	53,879	59,948

Source: Citi Research

Framework to estimate how long it takes for fundamentals to normalize incorporates 1) overcapacity and 2) oversupply

The most important question on every investor's mind is: When does the market eliminate this imbalance in order for solar manufacturers to return to positive margins? To answer this question let's look at what needs to happen for supply and demand to balance again: 1) First of all overcapacity has to drop to a reasonable level (we estimate 120-135% of demand is natural) and then 2) oversupply (excess inventory) has to be sold into the market. We can adapt this overcapacity/oversupply framework to estimate how long it would take until supply/demand balances again and prices stabilize.

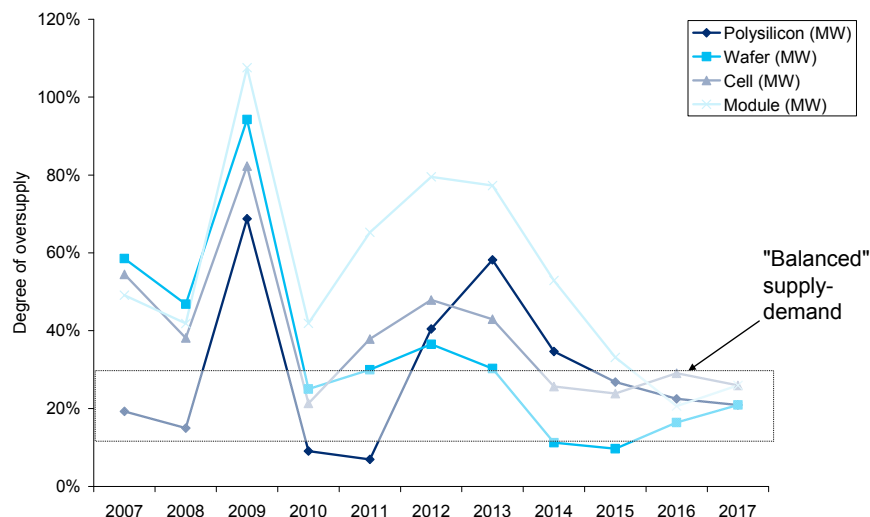
### 1) Overcapacity

Much more overcapacity in 2009 than today

We had a similar situation in 2009 when the market was glutted with oversupply and overcapacity. When we compare the current environment to 2009 and measure the degree of overcapacity (capacity/annual demand) it turns out that 2009 was much

more severe than now. Module overcapacity was at over 100% in 2009 in comparison with 80% now.

Figure 49. Degree of overcapacity



Source: Citi Research

**2009 solution to oversupply/capacity:  
soaring end demand**

The pivotal difference, however, was that in the following year of 2009 end-demand soared up to absorb the entire overcapacity (see 2010 demand in Figure 47). Installations rose from 8GW in 2009 to 19GW in 2010 representing a 130% demand increase. Hence overcapacity was simply eliminated by rising demand in 2009.

**2012 solution to oversupply/capacity:  
industry exits**

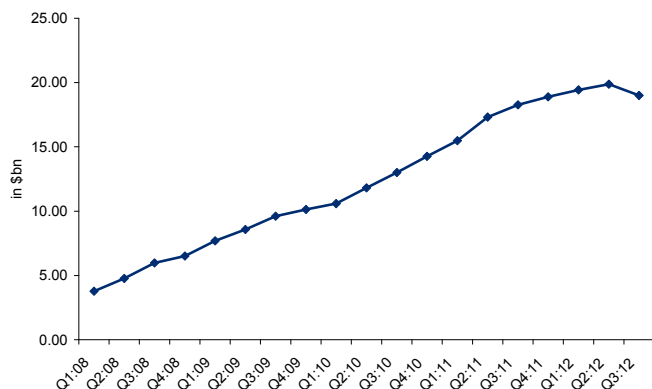
In the current environment we do not expect demand to rise significantly to bring the solar market into balance. Our demand model forecasts a mild increase of 6% in demand for 2013, which is not nearly enough to absorb current overcapacity.

Instead of demand absorbing overcapacity we think that it is more likely that capacity is going to retire. In order to obtain visibility on how long it takes for the market to balance we gauge the rate at which capacity retires and compare this to total overcapacity.

**~4-5GW exits in Q3 2012**

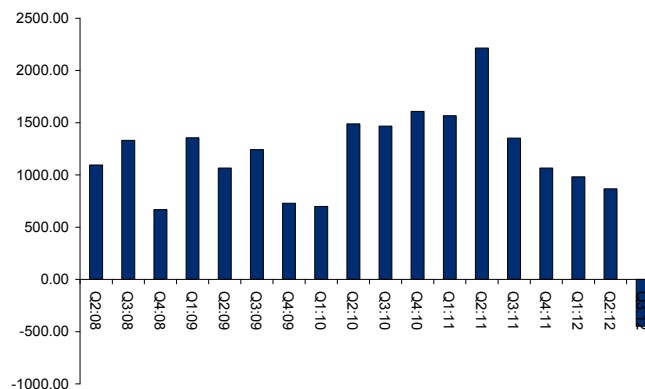
To estimate industry exit rates we measure PPE levels across the industry (Figure 50). We then adjust those PPE figures to depreciation (which represents a decline in PPE on the balance sheet but does not reflect a decline in name plate capacity) and find that Q3 2012 was the first quarter that capacity has exited the industry (on a net basis). Adjusted PPE levels dropped by 450\$mm in Q3 2012 which translates into 1.6GW of exits among the largest 30 manufacturers (Figure 51). Extrapolated to an industry-wide figure we estimate that ~4-5GW of capacity across the chain (Wafer/Cell/Module) exited the industry.

Figure 50. PPE levels



Source: Citi Research

Figure 51. PPE change in \$mm (depreciation stripped out)



Source: Citi Research

## 2) Oversupply

As outlined in the inventory section there is excess inventory worth 1 month of demand in the value chain. This translates to a total oversupply of 10.6GW. Figure 52 shows that we had a similar situation of overcapacity and oversupply in 2009 where excess inventory amounted to 5.4GW. However, comparing 10.6GW in 2012 to 5.4GW in 2009 would not be meaningful as it doesn't take into consideration the demand to absorb oversupply.

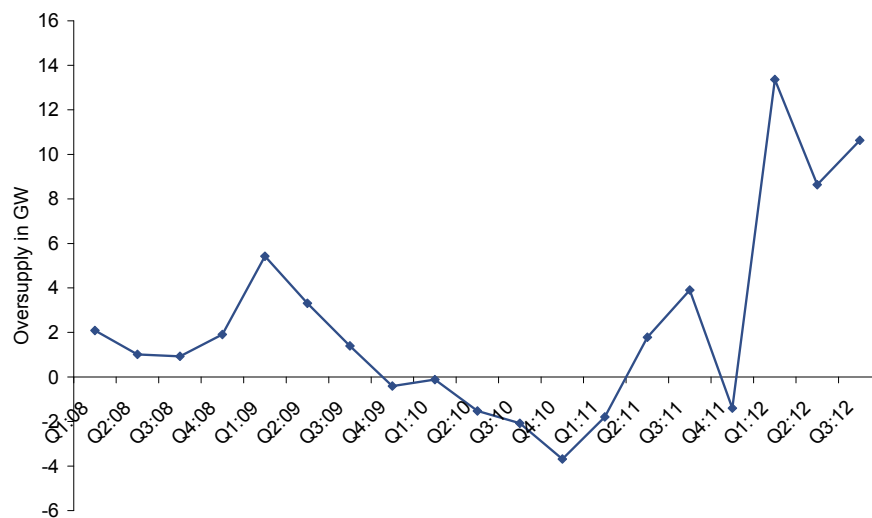
Figure 52. Inventory model (excerpt showing data from Q1 2010)

	Q1:10	Q2:10	Q3:10	Q4:10	Q1:11	Q2:11	Q3:11	Q4:11	Q1:12	Q2:12	Q3:12
Level of demand (GW) (1)	18.8	18.8	18.8	18.8	30.5	30.5	30.5	30.5	33.0	33.0	33.0
Inventories in each segment (GW) (2)	3.1	2.7	2.6	2.2	4.6	5.5	6.1	4.7	8.8	7.7	8.2
Total inventories (3) = (2)*4	12.4	11.0	10.4	8.8	18.5	22.1	24.2	18.9	35.4	30.6	32.6
Natural level of 2 month inventory (GW) (4) = (1)*2/12	3.1	3.1	3.1	3.1	5.1	5.1	5.1	5.1	5.5	5.5	5.5
Months of inventory (months) (5) = (2)*12/(1)	2.0	1.8	1.7	1.4	1.8	2.2	2.4	1.9	3.2	2.8	3.0
Excess inventories per segment (6) = (2)-(4)	0.0	-0.4	-0.5	-0.9	-0.4	0.4	1.0	-0.3	3.3	2.2	2.7
Estimated total inventories (7) = (6)*4	-0.1	-1.5	-2.1	-3.7	-1.8	1.8	3.9	-1.4	13.4	8.6	10.6

Source: Citi Research



Figure 53. Excess inventory/oversupply are rising



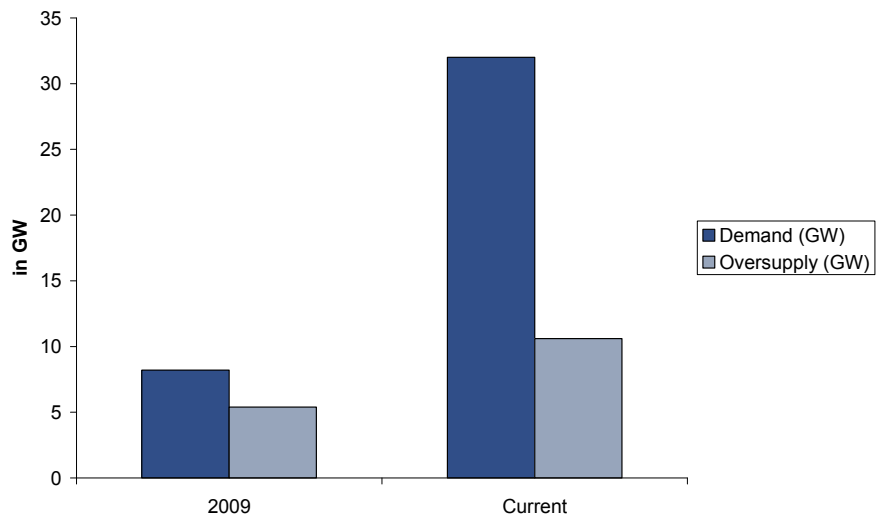
Source: Citi Research

Figure 54, where we compare oversupply to demand reveals that in 2009 the solar market faced 5.4GW of excess supply to 8.2GW of end-demand. Currently we have 10.6GW of oversupply compared to 32GW of end-demand.

**Current oversupply is not a significant issue**

These figures suggest that oversupply is not much of an issue. The major difference in 2009, as outlined previously, was that in the following year demand picked up drastically to absorb overcapacity and with it all of the oversupply. We don't expect that to happen in 2013; rather we expect capacity to exit the value chain.

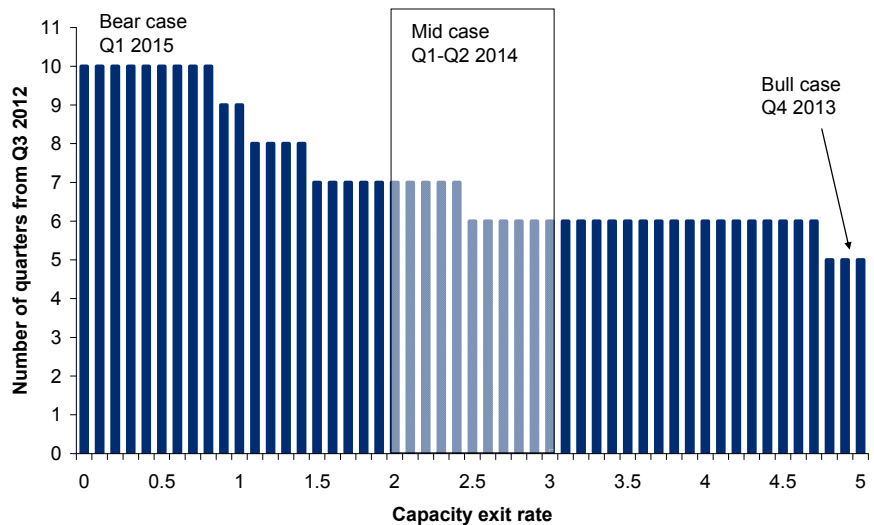
Figure 54. Oversupply to demand



Source: Citi Research

### 3) Conclusion: when do we balance – Q1 to Q2 2014

Figure 55. Bear/Bull case



Source: Citi Research

#### Bull: Q4 2013 Balance

**Bull case** - if capacity exits at a rate of 5GW per quarter as we display above, it will take 4 quarters (from end of Q3 2012) for 21GW of overcapacity to be eliminated from the chain. Adding to this 1 month of oversupply (see inventory section above) we are looking at the end of Q4 2013 for demand/supply to balance.

#### Bear: Q1 2015 Balance

**Bear case** – In the case of minimal industry exits, (up to 0.9GW/quarter, see Figure 55) we would expect demand/supply balance as early as mid-Q1 2015. Rather than significant capacity exiting the industry demand would catch up with supply reaching a level of 50.8GW in 2015.

#### Citi forecasts balance in Q1-Q2 2014...

This is all contingent on how rapidly capacity can exit the industry. We believe that the reality lies somewhere in between and forecast moderate industry exits of 2-3GW per quarter. With this industry exit rate demand/supply balance would be achieved in Q1-Q2 2014. Obviously, the timing is strongly dependent on industry exit rates. We at Citi will monitor the situation and provide updates to investors in order to get the timing of an investment decision right.

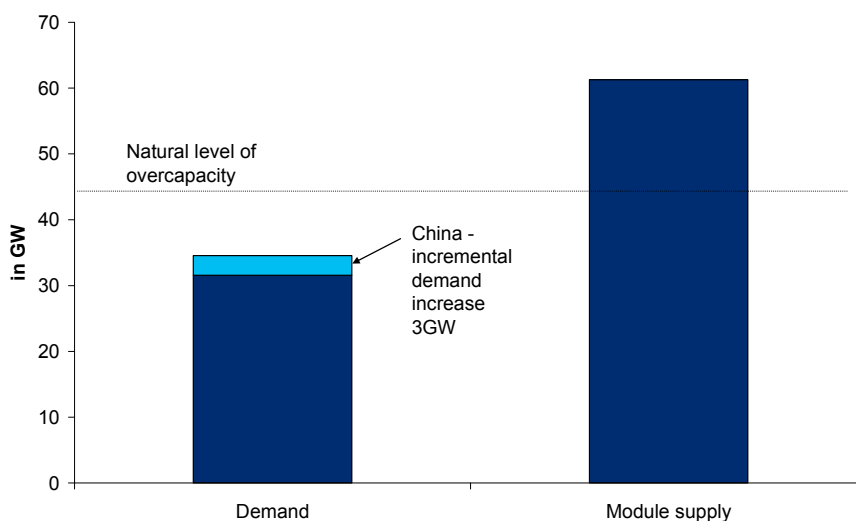
#### 4) Putting 10GW announcement of China into context

#### China 10GW announcement just a ripple in the ocean

The 10GW announcement was positive news for global demand/supply balance but in our view doesn't solve the overcapacity issue the solar market is facing. While stronger demand in China moves demand figures closer to production capacity we have to consider that this incremental increase represents a mere 3GW (previous China forecast 6-8GW vs 10GW currently) of additional demand in 2013. This number is dwarfed by an overcapacity gap of 16GW. In other words we need at least another 5 China effects in order to reach a point where demand starts to balance with supply and fundamentals improve.

#### China 2013 demand forecast shifted from 7GW to 10GW, which represents a 3GW incremental increase in demand..

Figure 56. Incremental effect of China demand forecast moving from 7GW to 10GW is limited in a global context



Source: Citi Research

## Cost curves

Poly – bottom at 17.8\$/kg

Figure 57. Poly cost curve data

Company	Technology	Capacity (kt)	Production (kt)	Cash Cost (\$/kg)	Implied utilisation
REC FBR	FBR	14.90	14.90	12.20	100%
Hemlock	Siemens HC	36.00	34.00	14.50	94%
Wacker (Burghausen, Texas)	Siemens HC	37.00	30.00	15.60	81%
Wacker Nuernchritz	Siemens HC	15.00	12.00	15.60	80%
MEMC FBR	FBR	9.00	3.50	15.90	39%
GCL	Siemens HC	65.00	50.00	16.50	77%
OCI	Siemens HC	52.00	40.00	17.80	77%
KCC	Siemens DC	6.00	5.10	18.00	85%
Daqo Wanzhou	Siemens HC	4.30	4.00	19.60	93%
REC	Silane Siemens	6.60	5.60	21.00	85%
LDK	Siemens DC	17.00	7.50	25.00	44%
Tier 2		75	25	25	33%
Total (kt)		326	232		
Semi poly demand (kt)		32	32		
Solar grade poly (kt)		306	199		
<b>Solar grade poly (GW)</b>		<b>55</b>	<b>36</b>		
Implied utilisation	Tier 1 79%	Tier 2 33%			

Source: Citi Research

In order to gain insights into the cost and supply/demand dynamics of polysilicon we have constructed a poly spot curve. Unlike the conventional poly curve (Figure 59) the spot curve takes into consideration that semiconductor grade polysilicon and that long term agreement (LTA) volumes do not affect the pricing of spot polysilicon.

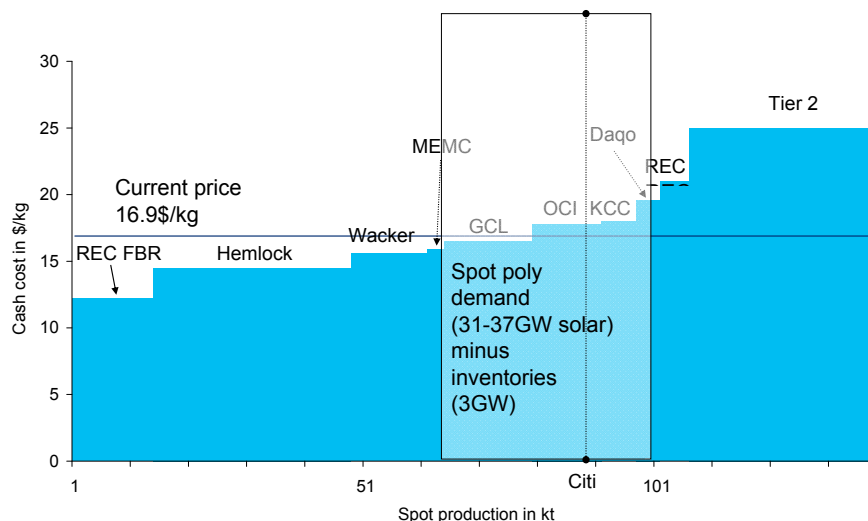
**Figure 58. Spot demand calculation**

	Upper	Lower	Citi
Solar demand (GW)	37	31	35
Thin film demand (GW)	1	1	1
Conversion (t/MW)	5.6	5.6	5.6
Poly demand (kt)	210	175	197
LT contracts (kt)	92	92	92
Spot demand ex inventories (kt)	117	83	104
Inventory level (months)	3	3	3
Natural level (months)	2	2	2
Solar demand (GW) 2013	35	35	35
Oversupply (GW)	3	3	3
Poly oversupply (kt)	17	17	17
Total spot demand	101	66	88

Source: Citi Research

**Polysilicon prices have bottomed at \$15/kg, but will remain in the territory of \$15-\$20/kg for most of 2013**

**Figure 59. Poly capacity cost curve shows degree of overcapacity**



Source: Citi Research

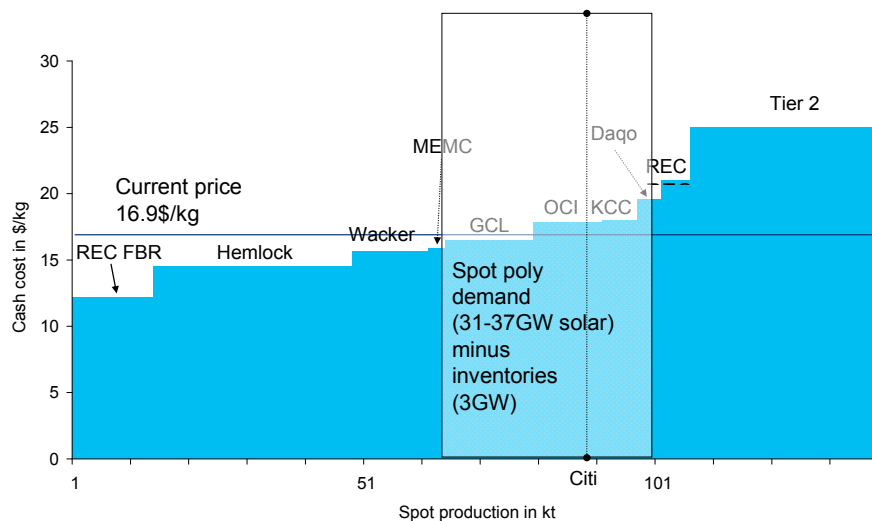
Spot supply consists of global poly production from which we subtract semiconductor grade polysilicon and LTA volumes. Spot demand is made up of global solar demand from which we take out thin film demand, LTA volumes and excess inventories. With the spot supply and demand figures we can make predictions about the bottom of polysilicon spot prices and the marginal supplier.

With our demand forecast of 34.6GW in 2013, we expect spot solar grade poly demand to stand at 88kt. In order for 88kt of solar grade polysilicon to clear on the spot market polysilicon prices can drop to a minimum of \$17.8/USD. With current prices around this level we think that polysilicon prices have bottomed.

Nonetheless, we caution that poly sales below the \$17.8/USD mark are possible in the short-term when poly producers sell their excess poly inventory into the spot market to gain liquidity. However, we don't expect that levels below \$17.8/USD will persist once excess inventory (~3GW or ~17kt) have filtered through the system.

This has severe implications for polysilicon prices. We implicate that polysilicon price have bottomed and will remain in the \$15-\$20/kg for most of 2013. This belief stems from the following two reasons (1) On the upside, overcapacity and oversupply do not allow demand/supply balance until earliest Q3 2013 (see bear/bull case Figure 55). Therefore it would be hard to imagine polysilicon prices to pick up significantly. (2) On the downside, the marginal supplier has cash costs above \$15/kg. Therefore, polysilicon prices cannot drop below this level to trigger sufficient poly production. We conclude that polysilicon prices will trade in the \$15-\$20/kg for most of 2013.

Figure 60. Poly spot production



Source: Citi Research

## Module

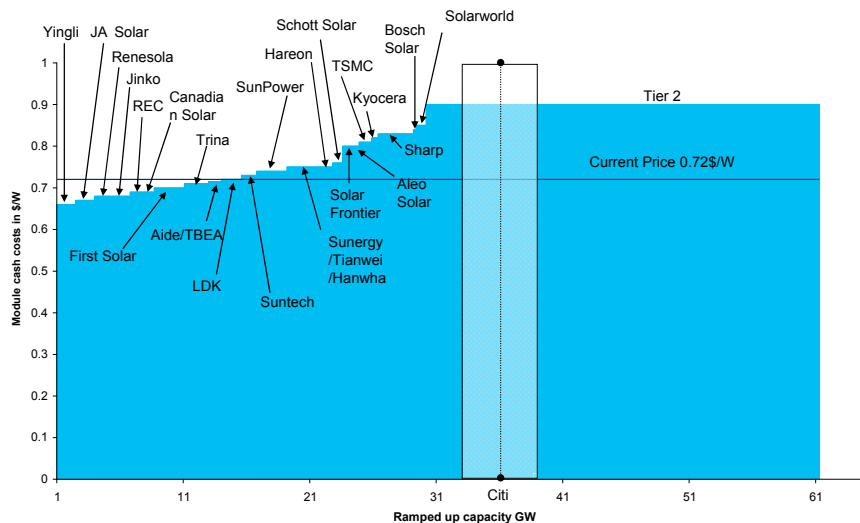
### Near term (2013-2014)

#### Tier 2 capacity at risk when shake out happens

In the near term we think that Tier 2 suppliers are increasingly at risk of exiting the industry. Chinese Tier 1 manufacturers have special status with Chinese government because it is highly supportive of the industry. The Chinese government holds a stake in those companies through government-owned banks, which hold a significant amount of debt of those companies. As many thousands of Chinese workers are employed by the domestic solar industry Chinese officials are more willing to extend loan terms on those companies, providing them a funding and balance sheet advantage to their European counterpart.

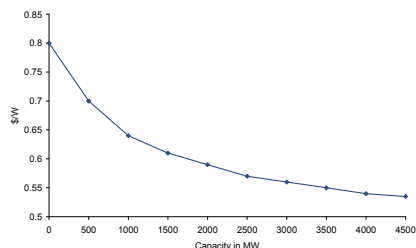
With this in mind, our capacity forecast shows that currently there is ~60GW of module capacity in the market. With 32GW of 2013 demand 16GW has to come out to achieve a natural supply level (130% of demand). This capacity is expected to retire throughout 2013 and will most likely be Tier 2 capacity (Chinese/US/European) with a few higher cost Tier 1 capacities in Europe/US retiring.

Figure 61. Module cost curve



Source: Citi Research

Figure 62. Scale benefits



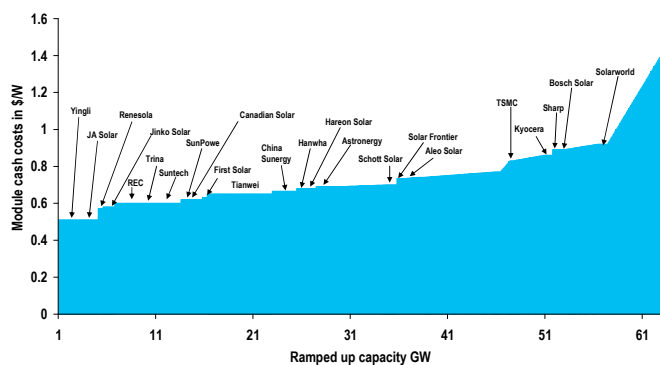
Source: Citi Research

#### Medium term (mid 2014 onwards)

In the medium term we expect demand to pick up and increase to 40GW by 2014. This will provide an incentive to an industry that has already gone through a shake-out to moderately expand capacity. Capacity expansion is most likely to occur with larger best-in class manufacturers in order to push costs downwards. As expansion takes place benefits of scale are exploited up until the point where scale benefits are outweighed by complexity. And as the industry matures we estimate this point to be around 4-5GW where cost benefits of expansion becomes marginal (Figure 62).

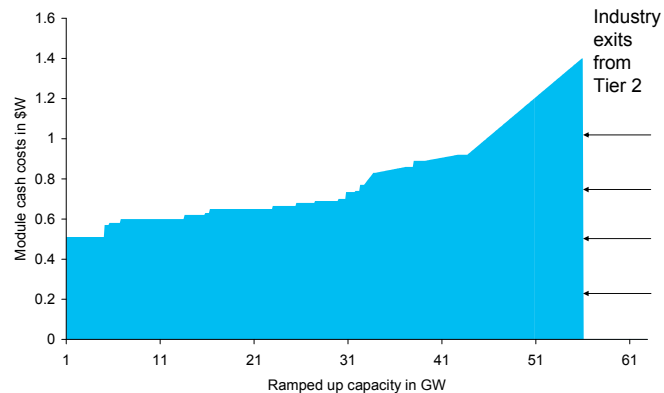
The bottom line, in our view, is that Tier 2 capacity is in acute danger. Currently, those companies are burning cash as module prices are troughing and face exit risks near term due to the vast overcapacity. Even when a few of those companies survive the shake-out they face an expansion threat from industry leaders pushing the cost curve to the right post 2014 (Figure 65).

Figure 63. Current situation in module segment



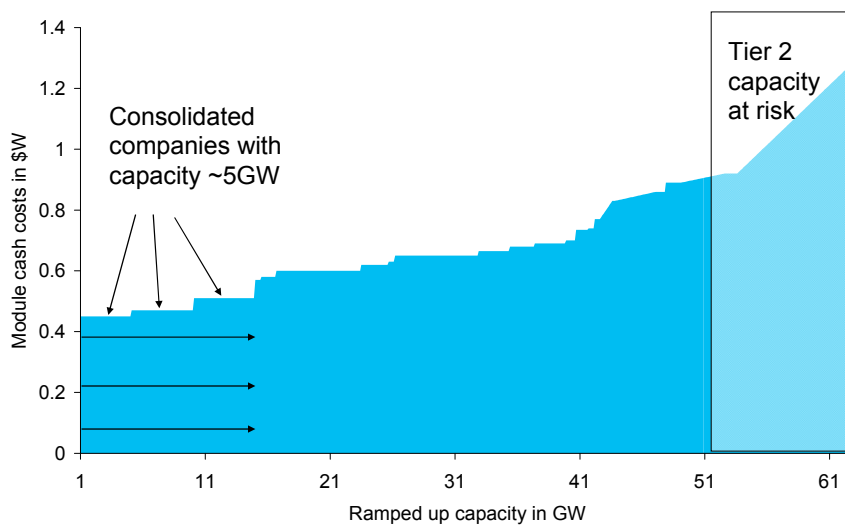
Source: Citi Research

Figure 64. Medium term



Source: Citi Research

Figure 65. Long term

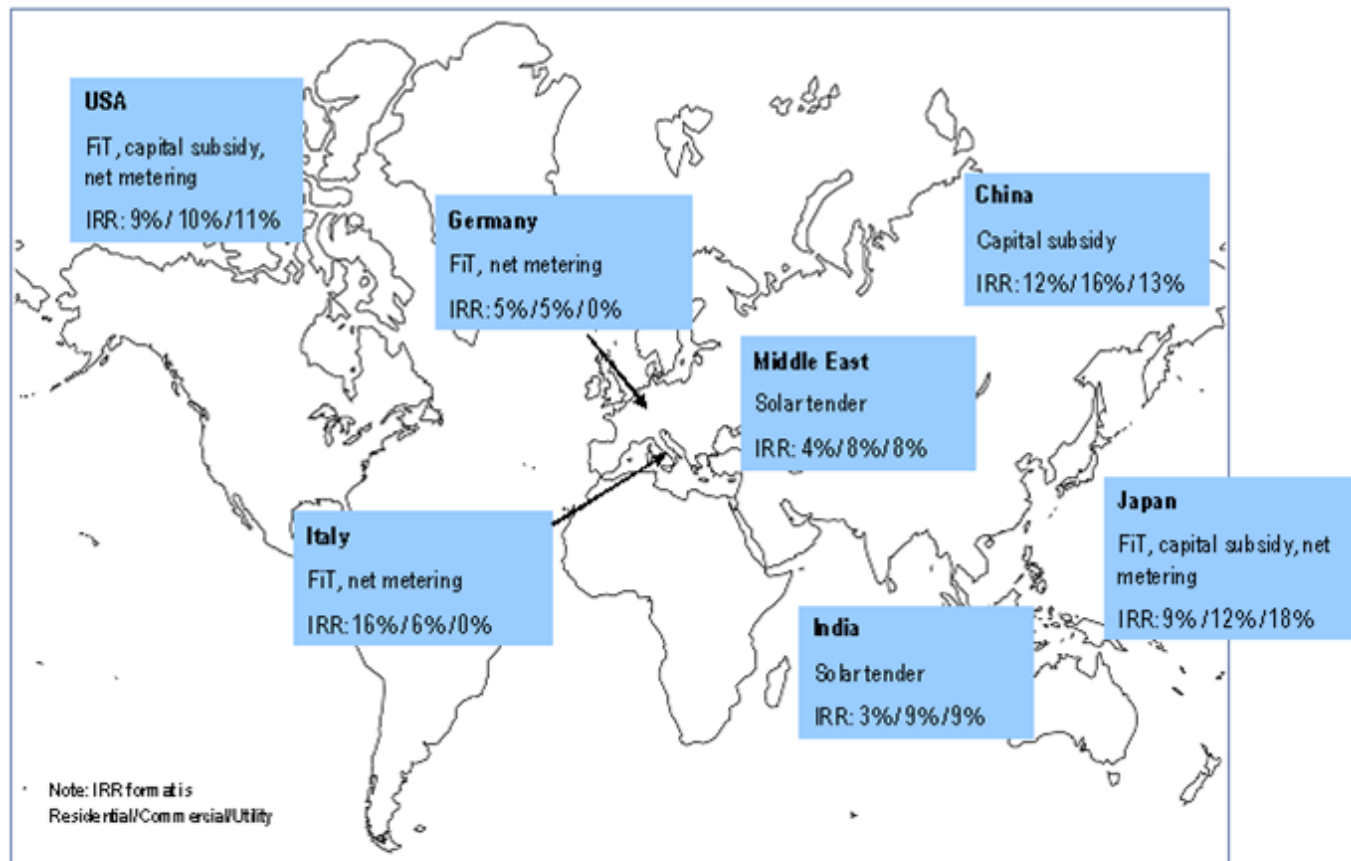


Source: Citi Research



## IRR and regulation

Figure 66. IRR Summary



Source: Citi Research

Figure 67. Segmented IRR

		IRR			Demand		
	Historically important segment	Residential	Commercial	Utility	2012	2013E	Outlook
Germany	Utility	5%	5%	0%	7.6GW	3GW	-
Italy	Commercial	16%	6%	0%	4GW	1.5GW	-
USA	Commercial/Utility	9%	10%	11%	3.2GW	4GW	++
China	Utility	12%	16%	13%	5GW	10GW	+++
Japan	Utility	9%	12%	18%	2.7GW	5GW	+++
India	Utility	3%	9%	9%	1.1GW	1.2GW	+
Middle East	Utility	4%	8%	8%	115MW	149MW	+

Source: Citi Research

## Germany

### FiT

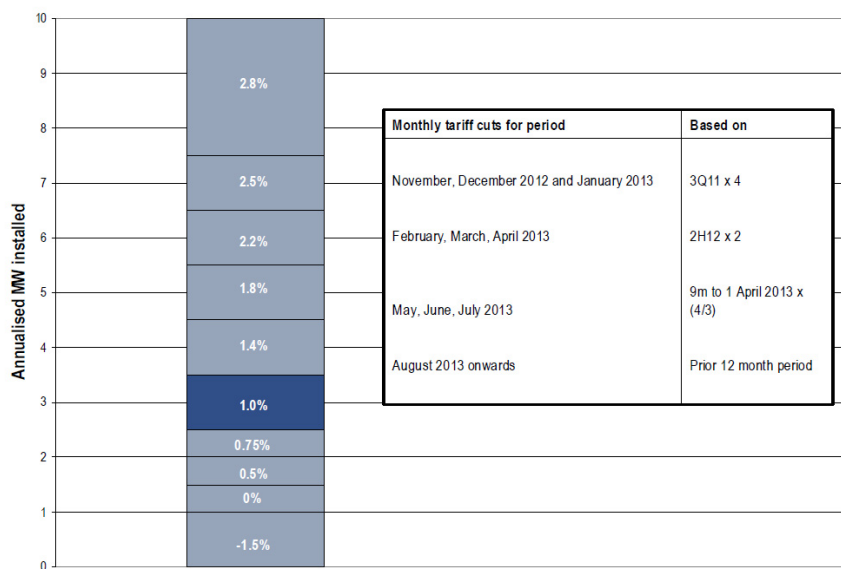
Figure 68. FiT rates in Germany (Nov 12)

in €/kWh	Feed in tariff
<10kW	17.9
10-40kW	16.98
40-1000kW	15.15
1-10MW	12.39
<10MW	12.39

Source: Citi Research

The major driving force for solar installations is the feed in tariff scheme under the EEG legislation. However, FiT rates were cut once more in November 2012 and will be degressed on a quarterly basis depending on installations in the previous quarter (Figure 69).

Figure 69. FiT adjustment mechanism



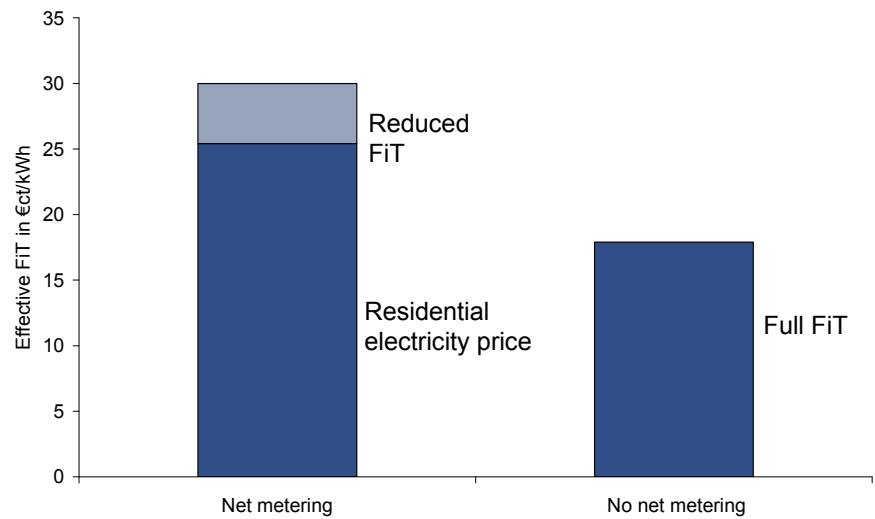
Source: Citi Research and Deutscher Bundestag

### Net metering

**What is net metering** - Net metering provides an opportunity for electricity generators to self-consume solar electricity and benefit from electricity cost avoidance and a reduced feed-in tariff (see next paragraph).

Small to medium size installations of up to 500kW are rewarded with a separate FiT for self consumption. For up to 30% self consumption the regular FiT rate is reduced by 16.38€/kWh and for every kWh above 30% the regular FiT is reduced by 12€/kWh. With high residential electricity prices in Germany of 24.06€/kWh this makes self consumption an attractive alternative to the regular FiT.

Figure 70. Net metering benefits in Germany



Source: Citi Research

**Expectation of end-of-year rush to install on a quarterly basis just before FiT rates are degressed**

**What comes in the future?** – We expect further reductions in feed-in tariff throughout the year as rates are adjusted automatically on a quarterly basis. Tariff cuts will ultimately depress developer's IRRs to desired levels to achieve the government's target corridor of 2.5-3.5GW. Further we expect end-of year rushes to install solar capacity on a quarterly basis.

## Italy

### FiT

Figure 71. Italy FiT (Conto 5)

in €/kWh	Feed in tariff	Self consumption
1-3kW	20.8	12.6
3-20kW	19.6	11.4
20-200kW	17.5	9.3
200-1000kW	14.2	6
1-5MW	12.6	4.4
>5MW	11.9	3.7

Source: Citi Research

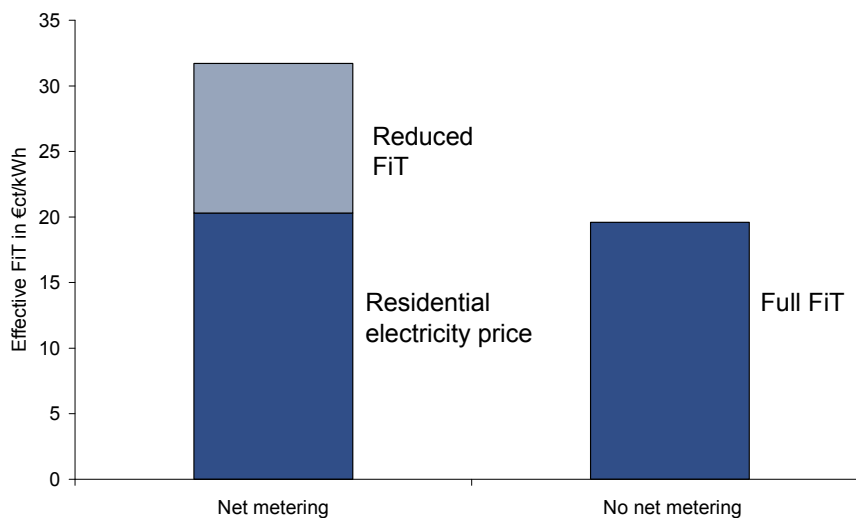
Italy supports solar installations with its Conto 5 programme which includes a feed in tariff (Figure 71). Italy has also set an annual spending cap of 6.7€bn of feed in tariff support. As of the 27<sup>th</sup> September 2012 6.17€bn was reached. The remainder of 530€mm translates into ~2GW of new installations and likely to be taken up at a slow rate so that the cap will be reached at the end of 2013.

### Net metering

**What is net metering** - Net metering provides an opportunity for electricity generators to self-consume solar electricity and benefit from electricity cost avoidance and a reduced feed-in tariff.

Self consumers receive a lower FiT compared to the standard tariff (see Figure 72). As the case in Germany, Italy's residential electricity prices are relatively high (24.85€/kWh) and hence makes self consumption a very attractive alternative.

Figure 72. Net metering benefits in Italy



Source: Citi Research

**No extension of Conto 5 expected...**

**Figure 73. Conto 5 expiry**

Available financing	530	€mm
FiT	196	€/MWh
Sunshine hours	1300	hours/year
Capacity	2080	MW

Source: Citi Research

**What comes in the future?** – As mentioned above there was 530 €mm left in the Conto 5 budget as of 27<sup>th</sup> September 2012 and this converts into 2GW of installations. Due to mainly developers concerns and Italy's approach to split those 2 GW into several registries we expect installations rates to slow immensely compared to 2012 rates (4GW).

We also do not expect to see an extension of any supportive mechanism for solar power after the Conto 5 expiry. The reason for this is because Italian energy prices are already inflated with renewable energy subsidies. To grasp the comparison, residential consumers currently pay a rate of 24.85€ct/kWh and this ranks amongst the highest in Europe. Consequently, we firmly believe that there is large chance the government will stop supporting solar energy post Conto 5.

## USA

The key programme in the USA to support solar installations is the investment tax credit (ITC). On top of the ITC state-specific feed-in tariffs/renewables certificates/net metering help making solar installations make a better value proposition.

### ITC

The ITC is a credit worth 30% of total installation costs that can be offset versus tax expenses. The ITC legislation is set to expire 2016 when the government expects solar energy to be competitive with gas.

### Feed in tariff and net metering in California

#### 1) PPA for utility scale installations

Utility-scale developers can enter a power purchasing agreement that is fixed to pre-determined Market Price Referent (MPR) rates. These MPR rates are adjusted to the time of the day when the electricity is produced (see Figure 74).

**Figure 74. Time of Day factor**

Monthly period	Super peak	Shoulder	Night
June-Sep	2.38	1.12	0.59
Oct-Dec, Jan& Feb	1.1	0.94	0.66
Mar - May	1.22	0.9	0.61

Source: Citi Research

**Figure 75. California MPR rates**

\$ct/kWh	10 Year	15 year	20 Year
2012 MPR	7.689	8.353	8.956
2013 MPR	8.104	8.776	9.376
2014 MPR	8.454	8.776	9.376
2015 MPR	8.804	9.15	9.755

Source: Citi Research

#### 2) Residential FiT/capital subsidy and net metering

Residential installations have a choice between a feed-in tariff and an equivalent capital subsidy under the California Solar Initiative. On top of net metering is available for residential installations

## Japan

Japan has a combination of capital subsidy, feed-in tariff and net metering (residential installations only). Utility-scale installations can benefit from capital subsidies on top feed-in tariffs.

### Capital Subsidy

- Period: April 2012 - March 2013 (details to be announced)
- Grant amount: JPY 30/W for system equal to or less than JPY 550/W  
Extra JPY 5/W will be added if system price is equal to or less than JPY 475/W
- Module efficiency limits: mono c-Si minimum 16.0% / multi c-Si minimum 15.0% / thin film silicon minimum 8.5% / copper indium gallium selenide (CIS) minimum 12.0%
- Maximum eligible system price: JPY 550/W

### FiT

Following rates are applicable for projects that sign power purchase contract from 1 July 2012 to 31 March 2013:

- Solar (10kW+): JPY 40/kWh for 20 years
- Solar (< 10kW): JPY 42/kWh for 10 years (surplus buyback)

### March 2013 in Japan: Expectation of FiT cuts and lower system prices..

**What's next for solar?** – Current feed-in tariff levels of 42JPY/kWh (residential) and 40JPY/kWh (commercial) are too high to be sustainable. We believe that FiT levels will fall in March when the Japanese government will readdress the solar support mechanism. This drop in feed-in tariffs will come with a reduction in system costs as Japan opens up to solar trade with neighbor nations (in particular China) and Chinese competition driving prices downwards. Those two effects combined 1) lower FiT levels and 2) lower system prices will allow for attractive returns to trigger solar installations after the decision in March.

### FiT levels to fall by a maximum of 12%...

At the end of January this year a government-appointed committee has kicked off discussions to set FiT rates for renewable project applications coming into effect April 2013. As per industry checks, feed-in tariff rates for solar are expected to fall by a maximum of 12%. If this case was to materialize we would still see solar projects earn attractive IRRs due to rapidly falling panel/system prices. Therefore, this is rather positive news for solar in Japan.

## China

Under the Golden Sun Program the Chinese government pays a capital subsidy to solar developers, which drives solar demand in China. In 2012, 4.6GW (compare to 5GW total installations in China) were installed under this programme.

China is also considering increasing its 2015 target from 21GW to 40GW. This would require government funding and is most likely to come in form of an expansion of the Golden Sun Program.

### Golden Sun Program

- Upfront project cost subsidy focused on distributed installations of 5.5CNY/W (0.88\$/W)
- To qualify projects must be completed by 2013
- Approved between 2009-12:
  - 2009 - approved 642MW (while 54MW projects were cancelled)
  - 2010 - approved 272MW
  - 2011 - approved 1st batch 442MW and 2nd batch 246MW
  - 2012 - approved 1st batch 1,709MW and 2nd batch 2,890MW

### National Concessionary Bidding

- Winning bids under 1RMB/kWh (2010)
- Fixed at 1RMB/kWh fixed for project approved after 1 July 2011

**Highly likely – expansion in Golden Sun program**

**Potential for 1) national wide FIT and 2) net metering**

**What's China's next move?** - China announced that it targets 10GW of solar installations in 2013. Full details of how the government intends to achieve this level of installations will be disclosed in the following weeks. We believe that on the back of this announcement there is a high possibility that China will expand its China Golden Sun project program by increasing the size of its periodical tenders. In order to provide additional support we think that there is a potential that China is introducing a) a national wide feed-in tariff and b) net metering to reward self consumption of solar generation.



## Middle East

There is large disparity in terms of solar mandates across different countries in the Middle East. The general motive to support renewable generation in the region is to avoid burning expensive oil that could have been sold at a much higher price to the West. And because those oil-producing countries have huge capital at their disposal, there is a big potential for highly supportive legislation in the coming future. This is reinforced by ambitious targets that this region is envisioning: (1) Dubai announcing 1GW of projects by 2030, (2) Saudi Arabia new target of 17GW of solar by 2030 and (3) Qatar ~1.8GW target over next couple of years.

But at the moment the industry is in its infancy and most countries experiment with solar installations via a tendering process. For now there is little visibility in terms of legislation and therefore we await positive signals before we upgrade the region to a sustainable growth market.

**Expect a number of countries to introduce feed-in tariffs by 2015...**

**Next step** – After a few successful rounds of tenders governments such as Saudi Arabia will ultimately introduce a national-wide feed-in tariff to build up investor confidence into the solar market. We believe that by 2015 a number of countries in the Middle East will have introduced viable feed-in tariffs by which time we have much more legislative certainty.

## India

Currently solar installations are supported through the Solar Mission legislation under which developers bid for project costs. This legislation attracts a significant amount of developer interest and has a very decent bid ratio. On top of that, states run their own tenders from time to time, which are significantly less popular among developers. The recent local Tamil Nadu tender (1GW) received bids worth less than 500MW on pricing and funding concerns which shows that there are gaps to fill in current mandates.

**Expect improvements in the national Solar Mission program**

**Nonetheless still low legislative security for solar developers...**

**Next step** – A government draft of the second phase of the national Solar Mission program revealed that the government wants to improve the program by 1) introducing viability gap funding to support a large part of Phase 2 installations and by 2) changing current coal/solar bundling scheme for utility-scale projects. The target with this improvement is to trigger 3.6GW for Phase 2 between April 2013 and March 2017. On top of this, 5.4GW of additional installation can be added under state programs if those programs succeed in filling the legislative gaps. We think there is large potential for a solar uptake in India, however, we remain cautious to the upside as there is no definite legislation with regards to national (Solar Mission Phase 2) and state programs.

## Chapter 3 – North America solar launch overview

Launching US coverage of solar sector...

...with 4 non consensus Buys

Adding shares of SPWR to high conviction buy list – TPL!

We are launching coverage of 7 solar names with 4 Buys: SPWR, FSLR, AEIS and WFR; 2 Neutrals: TSL, YGE; 1 Sell: STP. Additionally, we are adding shares of SPWR to our high conviction Buy list (Top Picks Live!) and highlighting SPWR as our most preferred and shares of STP as our least preferred – relative to our US solar coverage space. See Figure 76.

Below we highlight our ratings and earnings forecast versus consensus.

Figure 76. Citi vs. consensus

SPWR		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$810	\$2,648	\$587	\$780	\$813	\$747	\$2,927	\$3,151	Buy	\$12
	EPS	\$0.09	\$0.10	\$0.08	\$0.10	\$0.14	\$0.07	\$0.39	\$0.63		
Consensus	Rev	\$772	\$2,593	\$543	\$612	\$678	\$740	\$2,590	NA	Neutral	\$6
	EPS	\$0.15	\$0.15	(\$0.09)	\$0.01	\$0.10	\$0.13	\$0.22	\$0.46		

FSLR		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$1,208	\$3,501	\$1,246	\$903	\$933	\$1,090	\$4,172	\$4,408	Buy	\$41
	EPS	\$1.73	\$4.57	\$0.82	\$0.95	\$0.99	\$1.24	\$4.01	\$3.80		
Consensus	Rev	\$1,332	\$3,627	\$840	\$837	\$883	\$939	\$3,570	na	Neutral	\$24
	EPS	\$1.75	\$4.60	\$0.91	\$0.94	\$1.00	\$1.12	\$4.04	\$3.27		

WFR		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$597	\$2,763	\$561	\$684	\$825	\$760	\$2,831	\$3,288	Buy	\$5.4
	EPS	\$0.01	\$0.20	(\$0.06)	\$0.05	\$0.14	\$0.11	\$0.24	\$0.51		
Consensus	Rev	\$667	\$2,779	\$557	\$720	\$786	\$836	\$2,814	NA	Neutral	\$4.2
	EPS	\$0.00	\$0.04	(\$0.06)	\$0.03	\$0.10	\$0.13	\$0.18	\$0.39		

AEIS		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$111	\$450	\$115	\$126	\$139	\$142	\$522	\$597	Buy	\$20
	EPS	\$0.15	\$0.59	\$0.14	\$0.24	\$0.33	\$0.35	\$1.06	\$1.62		
Consensus	Rev	\$112	\$451	\$101	\$113	\$127	\$134	\$482	NA	Neutral	\$15
	EPS	\$0.16	\$0.59	\$0.11	\$0.21	\$0.30	\$0.33	\$0.95	\$1.25		

TSL		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev \$	271	\$1,265	\$416	\$355	\$304	\$310	\$1,385	\$1,686	Neutral	\$6.0
	EPS \$	(0.94)	(\$2.14)	(\$0.57)	(\$0.36)	(\$0.34)	(\$0.28)	(\$1.55)	(\$0.81)		
Consensus	Rev \$	272	\$1,268	\$271	\$309	\$343	\$359	\$1,294	NA	Neutral	\$4.3
	EPS \$	(0.81)	(\$3.39)	(\$0.70)	(\$0.60)	(\$0.48)	(\$0.52)	(\$2.07)	(\$1.30)		

YGE		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev \$	457	\$1,801	\$370	\$472	\$336	\$461	\$1,639	\$1,764	Neutral	\$3.50
	EPS \$	(0.56)	(\$1.70)	(\$0.42)	(\$0.36)	(\$0.31)	(\$0.31)	(\$1.39)	(\$1.03)		
Consensus	Rev \$	358	\$1,706	\$346	\$390	\$426	\$438	\$1,635	NA	Neutral	\$1.78
	EPS \$	(0.54)	(\$2.24)	(\$0.27)	(\$0.39)	(\$0.36)	(\$0.43)	(\$1.45)	(\$0.59)		

STP		Dec FQ4:12E	F2012E	Mar FQ1:13E	Jun FQ2:13E	Sept FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev \$	317	\$1,585	\$417	\$354	\$342	\$443	\$1,556	\$1,552	Sell	\$1.5
	EPS \$	(0.49)	(\$2.11)	(\$0.34)	(\$0.29)	(\$0.31)	(\$0.34)	(\$1.28)	(\$1.02)		
Consensus	Rev \$	406	\$1,728	\$380	\$383	\$414	\$447	\$1,729	NA	Sell	\$1.0
	EPS \$	(0.51)	(\$2.66)	(\$0.40)	(\$0.40)	(\$0.39)	(\$0.37)	(\$1.55)	(\$1.85)		

Note that we rate all of the stocks above High Risk.

Source: Citi Research

Our ratings are geared towards our top-down sector stance of favoring the downstream players

Launching US coverage of AEIS with Non Consensus Buy; \$20 target price

## Summary of US solar stock calls

**Where to invest in Solar?** From a top-down sector standpoint, we favor the downstream players versus the upstream panel manufacturers. The sector is not only going through a cyclical trough but also structural changes – mainly the commoditization of the panel manufacturing business. This translates into a relatively benign margin environment for the pure play panel manufacturers over the intermediate term as excess capacity is worked off. So, we remain on the sidelines with the upstream manufactures until we see more concrete evidence that fundamentals are improving. Our stock ratings reflect this sector call.

**Launching US coverage of Advanced Energy Industries (ticker AEIS) with non consensus Buy; \$20 target price.** *Our new target price equates to a 12 month ETR of 28% supporting our Buy thesis. Following the recently announced restructuring effort, AEIS has become a healthy cash generator well positioned to capitalize on the growth of commercial and utility scale projects in North America – a region remaining early in the growth cycle. Shares of AEIS are a core holding for investors looking to gain exposure into the downstream solar market while avoiding some of the pitfalls that have impacted the upstream segment - i.e. the commoditization of the module business.*

### Key reasons why AEIS shares appear attractive:

- We favor the downstream segment of the solar space; AEIS' turn-key inverter business fits well with our sector thesis.
- Management has displayed great execution over a short period of time following the announced September 2011 restructuring effort.
- With successful cost cutting measures predominately in the rearview mirror, AEIS is well positioned to capitalize on selective growth initiatives at Solar Energy and Thin Films (the non semi equipment power conversion business).
- One of the few names in the solar space generating healthy margins over our forecast period.
- Yes, the Semiconductor sector has been a drag for the Thin Film segment but management has been diversifying away into derivative sectors.
  - That said, the Solar Energy segment remains the key focus of growth for us over the near term.
- Management's conservative strategy of selectively chasing margins versus market share leadership like some competitors has made AEIS the success story today.
- Peer bankruptcy helps support AEIS' market position – not a negative read-through to sector.
- Balance sheet and liquidity remains strong and continually improving.
  - Recently completed \$75mm share buyback program. Announced new \$25mm buyback program.

**Launching US coverage of FSLR with  
Non Consensus Buy; \$41 target price**

**Launching US coverage of First Solar (ticker FSLR) with non consensus Buy; \$41 target price.** *As highlighted in the industry section of our launch report, our sector tilt is favorable towards solar downstream names versus the upstream manufacturers – FSLR is the bellwether in the downstream market. FSLR's balance sheet strength and bankability premium should allow it to continue to capture large scale projects in key growth regions globally – we see a robust pipeline outlook for the next several years. Our new \$41 target price translates into an ETR of 45% - supporting our outlook.*

**Why FSLR shares remain attractive:**

- From a top down sector standpoint, we favor downstream players versus upstream manufacturers – FSLR is the bellwether downstream player in the large scale utility and commercial space.
- The project pipeline remains robust – backlog driving revenue visibility near term.
- Many emerging growth regions early in the solar cycle have climate characteristics optimal for CdTe. These include India, Indonesia, Chile, Australia and the Middle East – regions in which First Solar has begun to gain traction.
- Management has displayed great execution over a short period of time following the announced April 17<sup>th</sup> restructuring effort.
- Strongest balance sheet and cash flow position within the solar space.
- Despite a drop in ASPs for utility scale systems and Thin Film panels, margins remain healthy through our forecast period.
- With a short interest level far exceeding anyone in the solar sector – including the Chinese manufacturers with crippling debt levels – shares remain unloved. This leaves an opportunity, in our view.

**Launching US coverage of WFR with non  
consensus Buy; \$5.40 target price**

**Launching US coverage of MEMC Electronic Materials (ticker WFR) with non consensus Buy; \$5.40 target price.**

*Our favorable outlook on WFR shares is predicated on: (1) solid growth prospects at SunEdison – WFR's tech agonistic project development solar business and (2) demand/pricing improvement in the semi 300mm wafer segment in 2013 as highlighted by Citi Analyst Takao Kanai. That said, the solar segment is the key area of growth for us. With our favorable sector tilt towards downstream players in the solar space (vs. upstream manufacturers), we believe SunEdison is well positioned to capitalize on emerging growth opportunities in the US and oversees sustainable markets. Our new \$5.40 target price per share translates into an ETR of 26% - warranting the Buy rating.*

**Key reasons why WFR shares appear attractive:**

- Our sector tilt is positively biased towards downstream solar players versus upstream manufacturers, WFR's project development arm (SunEdison) fits well with our thesis - SunEdison is the key contributor to growth at WFR going forward.
- With the strategic move to predominately exit out of 3<sup>rd</sup> party solar wafer sales, WFR's exposure to the highly commoditized upstream value chain remains minimal. WFR also doesn't hold solar panels in inventory.

- SunEdison's tech agnostic strategy in regards to modules stands to benefit the most versus the other solar downstream names in this highly commoditized module pricing environment where we expect minimal upside in ASP's (average selling prices).
- With the sale of 98MW of solar projects in Bulgaria and Italy combined, SunEdison's exposure to Western Europe – a source of historical growth opportunities with a very tepid outlook going forward – is minimal.
- Calling for a semi wafer bottom? Semi Wafer industry poised for recovery in 2013 per Citi Analyst Takao Kanai – a positive read-through for WFR's Semiconductor Materials segment.
- Balance Sheet and Cash Flow strong and improving.

Launching US coverage of SunPower (ticker SPWR) with non consensus Buy; \$12 target price...

...Now our high conviction buy

**Launching US coverage of SunPower (ticker SPWR) with non consensus Buy; \$12 target price. Shares added to high conviction Buy list (Top Picks Live!).** *SPWR's industry leading efficiency panels, massive downstream channel, the backing of oil giant Total and, strategic JVs with key industry players make it the perfect package, in our view. With a global recognized brand and distribution channel, SPWR is best positioned to capture growth in the residential and commercial scale market. Recent project wins at the utility scale level have been gravy – we see additional opportunities with their Tracker system. Our \$12 target price per share translates into an ETR of 53% - supporting the Buy rating.*

#### Why SPWR shares are a top pick?

- Overall, it's the total package: (1) industry leading panels, (2) massive distribution channel, (3) 66% owned by oil giant Total, (4) key strategic JV's and acquisitions, (5) global recognized brand and distribution channel.
- Despite some contraction, SPWR has maintained a premium priced product because: (1) industry leading technology and (2) large downstream business that has served as a captive sales channel at the commercial, residential and utility scale level for their market leading efficiency panels.
- SPWR is 66% owned by French oil giant Total. This limits downside while providing full leverage to the upside.
- Strategic partnership with Toshiba and now Sharp has allowed SPWR to access the Japanese market – only major US firm to achieve this milestone.
- The Warren Buffet's halo factor. The ~\$2.5B purchase of 579MW Antelope Valley brought a major jolt to SPWR and the industry. We now see more revenue certainty for the next several years and a recycling of capital for key growth programs including residential leases.
  - Leveraging the Total relationship, we would be not be surprised to hear announcements of future large sale project wins in key global growth regions like the Middle East – a suitable environment for SPWR's T20 and T0 Trackers.
- SPWR project pipeline is very diverse – with over 5GW of projects alone in NA. This leaves SPWR to be less scrutinized than other downstream players (i.e. FSLR) when it comes down to the ability to re-fill the pipeline as installations occur. Pipeline is also geographically well diversified.

Launching US coverage of STP with Sell;  
\$1.50 target price

- No exposure to the highly commoditized components of the solar value chain – does not manufacture poly, ingots and wafers.
- Balance sheet and liquidity position strong and improving.
- Margins remain healthy through our forecast period.

**Launching US coverage of Suntech Power (ticker STP) with Sell; \$1.50 target price.** *With company-specific factors serving as an overhang, we believe STP shares are facing several near term headwinds above and beyond the structural and cyclical changes going on in the solar space. Our \$1.50 target price equates to an ETR of -12% - supporting our negative stance.*

#### Why our negative stance with STP shares?

- While STP has been a market leader in many of the regions it operates in, volumes has never been an issue, it's been about margins – which remain very depressed.
  - Note: Being the largest producer in a highly commoditized solar manufacturing space is a tough proposition, in our view.
- The GSF investigations remain open – closure expected over the next few months.
- A lack of reporting since Q1 2012 poses a challenge when trying to assess the current financial position of the company.
- The company has significant short term debt outstanding which poses liquidity concerns. That said, much of the short term debt centers around local/state owned bank borrowings which we expect to be refinanced – especially in light of the recent pledges by local provisional governments as well as the CDB to provide ample liquidity to tier 1 manufacturers. The main concern is the \$575mm convertible bond due in March 2013 – UBS has been hired to look at strategic options. This remains a key uncertainty.
- STP's business is heavily exposed to Europe (including Germany, Italy and Spain) – a historical growth region now with a very tepid spending outlook (see industry sections above in Chapter 2, beginning on page 32).
- With a slightly better than average panel efficiency/module premium price comes a slightly higher cost structure versus peers – another tough proposition in a highly commoditized market.
- Shares are up significantly over the past month due in large part to the bounce in the solar space. We attribute this to a general beta trade, as well as, renewed investor perception that poor industry fundamentals may have reached a bottom. Some of this is driven by the news coming out of China on solar spending growth (see industry sections below on page 34). While this may be partially true, STP is facing too many company specific headwinds over the near term – the share price move over the past month is overzealous, in our opinion.

Launching US coverage of TSL with  
Neutral; \$6 target price

**Launching US coverage of Trina Solar (Ticker TSL) with Neutral; \$6 target price.** *As one of the higher quality panel manufacturer in China, TSL is greatly leveraged to a recovery as the sector works off excess inventory over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the*

*modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$6 target price yields an ETR of 14% - supporting our stance.*

#### Why we remain on the sidelines?

- Given the structural and cyclical changes going on in the solar space, our sector tilt favors downstream players versus the upstream manufactures. TSL still remains mostly a pure play panel manufacturer with a goal of shifting further downstream – very prelim stage.
- Regional diversification is a strong attribute for TSL. That said, TSL still has heavy exposure to historical growth regions which now have a more tepid outlook for solar spending (i.e. Germany, Italy).
  - The focus on sustainable growth regions like Australia (5% of shipments), China (15% of shipments) and US (20% of shipments) will likely show promise but very prelim.
  - To effectively improve margins, management will need to continue to diversify away from the traditional growth regions and into sustainable markets.
- It's not about volumes, show me the margins.
  - Gaining market share and increasing volumes has never been an issue (Chinese panel manufacturer's account for~ 70% of the market). It's been about margins – which remain fairly depressed over our forecast period.
- From an efficiency, R&D, technology or cost structure standpoint, TSL doesn't have any visible advantages to similar pure play peers including YGE – its closest competitor. Same premise for product services and module ASPs (Average Selling Prices).

Launching US coverage of YGE with  
Neutral; \$3.50 target price

**Launching US coverage of Yingli Green Energy (ticker YGE) with Neutral; \$3.50 target price.** *As a quality Tier 1 pure-play panel manufacturer in China, YGE is highly leveraged to a recovery in the sector as the industry S/D tightens over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$3.50 TP yields an ETR of 15% - supporting our stance.*

#### Why we remain on the sidelines?

- Given the structural and cyclical changes going on in the solar space, our sector tilt favors downstream players versus the upstream manufacturers. YGE still remains a pure play panel manufacturer with no immediate goals of shifting further downstream.
- Less regional diversification yields country-specific risks but trends improving.
  - Negative: Less regional diversification and heavy exposure to Germany - a country once a key growth region with a more tepid solar spending outlook going forward.



- Positive: YGE made a larger push into China in Q3 – a region with a sustainable spending outlook moving forward. This dilutes some of the spending drag you are seeing in Germany and other Western European countries.
- In the end, we would like to see a greater push into other sustainable regions including Middle East, Japan, India and Australia. As of Q3 2012, rest-of-world revenues (excludes Europe, US and China) only comprised of 1% of consolidated results – YGE needs to diversify into more growth regions.
- From an efficiency, R&D, technology or cost structure standpoint, YGE doesn't have any material visible advantages to similar pure play peers including TSL – its closest competitor. Same premise for product services and module ASPs (Average Selling Prices).

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**Figure 77. US solar stock call snapshot – Bull/Bear case**

	Ratings	Ticker	Company	Target	12M ETR	Bull Case	Bear Case
Most Preferred	Buys						
		SPWR	SunPower	\$12.00	53%	<ul style="list-style-type: none"><li>▶ High Conviction Buy - The Perfect Solar Package</li><li>▶ Toshiba &amp; Sharp Partnership = huge growth in Japan</li><li>▶ Massive pipeline yields less investor scrutiny</li><li>▶ 56% owned by Total - creating a synthetic Put</li><li>▶ The Buffet Halo - more projects expected with Total relationships</li><li>▶ Premium priced modules expected through captive sales channel</li><li>▶ Generating very healthy margins</li></ul>	<ul style="list-style-type: none"><li>▶ Higher cost structure than industry</li><li>▶ Change in reporting segments make modeling very challenging</li><li>▶ Still has sizeable exposure to Western Europe</li></ul>
		FSLR	FirstSolar	\$41.00	45%	<ul style="list-style-type: none"><li>▶ Bellwether downstream player</li><li>▶ Robust pipeline translates into revenue visibility - healthy and growing backlog</li><li>▶ We expect more announcements in sustainable markets - good start so far</li><li>▶ Biggest short position in the space - can you say short squeeze?</li><li>▶ Generating very healthy margins</li></ul>	<ul style="list-style-type: none"><li>▶ PPA market very competitive - pricing under pressure</li><li>▶ Big exposure in CA - needs to diversify away into sustainable markets</li><li>▶ Panel business will continue to be a drag to consolidated results</li></ul>
		AEIS	Advanced Energy	\$20.00	28%	<ul style="list-style-type: none"><li>▶ Turn key inverter business fits well with our downstream sector call</li><li>▶ Management displays great execution in short period of time since restructuring</li><li>▶ With cost costs behind them - well leveraged to grow</li><li>▶ Salton bankruptcy will increase AEIS' market share - positive read-through</li><li>▶ Generating very healthy margins</li><li>▶ Focused in North America - minimal exposure to W. Europe</li></ul>	<ul style="list-style-type: none"><li>▶ Semiconductor segment will remain a drag - needs to diversify away</li><li>▶ Larger, more global inverter players making a bigger push in NA</li><li>▶ The turnkey inverter segment becomes commoditized like modules - impacting pricing</li><li>▶ The strategic move to shift away from semi's takes more time to materialize</li></ul>
		WFR	MEMC Electronics	\$5.40	26%	<ul style="list-style-type: none"><li>▶ Focusing on key growth regions early in the cycle - minimal exposure to W. Europe</li><li>▶ Solid growth expected at SunEdison - the value driver of the story</li><li>▶ Citi Analyst Takao Kanai calling for a Semi Wafer bottom in 2013 - growth expected</li><li>▶ With the exit out of 3rd party wafer sales - exposure to commoditized solar value chain minimal</li><li>▶ Tech agnostic project development business a strength in this market</li><li>▶ Generating very healthy margins</li></ul>	<ul style="list-style-type: none"><li>▶ 28% of portfolio is in emerging markets where growth remains in infancy</li><li>▶ Project financing dries up - which could impact SunEdison more given smaller balance sheet</li><li>▶ Project development business becomes more commoditized - larger scale players move in</li><li>▶ Semi power conversion business remains at trough levels past 2013</li></ul>
	Neutrals						
		YGE	Yingli Green Energy	\$3.50	15%	<ul style="list-style-type: none"><li>▶ Has become the largest panel manufacturer by shipments - overtook STP</li><li>▶ Growing perception among investors that fundamentals/pricing maybe bottoming</li><li>▶ China demand could offset slowdown in W. Europe and tighten S/D</li><li>▶ Made aggressive push into China in Q3 - dilutes some of the drag from Germany exposure</li><li>▶ As a tier 1 manufacturer, local governments and CDB will keep company afloat</li></ul>	<ul style="list-style-type: none"><li>▶ High exposure to the commoditized solar value chain - mainly a panel manufacturer in a challenging space</li><li>▶ Shares are up ~70% over past 3 months - performance may already price in bottoming fundamentals</li><li>▶ Its not about volumes; its about margins - which remain low through our forecast period</li><li>▶ R&amp;D, tech, cost structure, product services and module ASP similar to closest competitor - TSL</li><li>▶ Cyclical and structural headwinds can take time to play out</li><li>▶ Less regionally diversified vs. peers - focused historically in Germany</li><li>▶ No defined path of shifting further downstream</li></ul>
		TSL	Trina Solar	\$6.00	14%	<ul style="list-style-type: none"><li>▶ More defined focus by management to shift further downstream</li><li>▶ Well diversified and focusing on key growth regions</li><li>▶ Slightly better balance sheet management vs. pure play Chinese peers</li><li>▶ Growing perception among investors that fundamentals/pricing maybe bottoming</li><li>▶ China demand could offset slowdown in W. Europe and tighten S/D</li><li>▶ As a tier 1 manufacturer, local governments and CDB will keep company afloat</li></ul>	<ul style="list-style-type: none"><li>▶ High exposure to the commoditized solar value chain - mainly a panel manufacturer in a challenging space</li><li>▶ Shares are up ~25% over past 3 months - performance may already price in bottoming fundamentals</li><li>▶ Its not about volumes; its about margins - which remain low through our forecast period</li><li>▶ R&amp;D, tech, cost structure, product services and module ASP similar to closest competitor - YGE</li><li>▶ Cyclical and structural headwinds can take time to play out</li></ul>
	Sell						
		STP	Suntech Power	\$1.50	-12%	<ul style="list-style-type: none"><li>▶ As a tier 1 manufacturer, local governments and CDB will keep company afloat</li><li>▶ As a more established downstream presence versus pure play peers</li><li>▶ GSF investment has value, will be monetized and provided liquidity</li><li>▶ Globally recognized brand and distribution channel</li><li>▶ Has a good share of Japanese market</li><li>▶ Slightly higher efficiency panels with slightly better pricing</li><li>▶ China demand could offset slowdown in W. Europe and tighten S/D</li><li>▶ Growing perception among investors that fundamentals/pricing maybe bottoming</li></ul>	<ul style="list-style-type: none"><li>▶ Fundamentals don't matter - more of a play on the viability of the company as a going concern</li><li>▶ Crumbling short term debt including big convert coming due in March 2013</li><li>▶ CDB loan guarantee to GSF now unsecured - could impact future borrowing costs with new lenders</li><li>▶ Hasn't reported earnings since Q1 2012 - pending an audit of GSF b/c of investigations</li><li>▶ Still has big exposure to Western Europe</li><li>▶ Higher cost structure versus peers</li><li>▶ Shares are up over 100% - pricing in a potential improvement in industry fundamentals</li><li>▶ Shares have too many company specific headwinds to join in with the solar rally</li><li>▶ High exposure to the commoditized solar value chain - mainly a panel manufacturer in a challenging space</li><li>▶ Its not about volumes; its about margins - which remain low through our forecast period</li><li>▶ Cyclical and structural headwinds can take time to play out</li></ul>
Least Preferred							

Source: Citi Research

## How we value the US solar stocks

### **We employ various valuation methodologies to our US coverage space**

**We employ various valuation methodologies to our US coverage space.** Given that our new North America coverage spans across multiple solar value chain components with two names having exposure in non solar sectors, we employ various valuation methodologies. Additionally, given the severe cyclical moves the sector has recently gone through – typical of a boom-bust industry – as well as the structural changes going on currently, employing a historical valuation methodology (i.e. mid cycle, trough, peak multiple) is not appropriate or reflective of the sector's current economics.

**For the pure play panel manufacturers (TSL, YGE and STP), we employ an EV/Sales multiple approach.** The EV/Sales multiple is 1 year forward looking and based on consensus estimates which varies with each panel manufacturer. Applying this multiple to our 2013 sales forecasts yields a projected enterprise value to which we back out net debt (not including restricted cash) and minority interest. We divide this calculated equity value by 2013 share count to arrive at our 12 month forward target price.

It is important to note that our EV/Sales target multiple for each pure play panel manufacturer in China is higher than the average 2013 comp for our globally-diverse solar universe to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese panel manufacturers. Our premium to the group multiple accounts for this lower risk factor.

**For our solar downstream names (SPWR and FSLR), we primarily employ a DCF centered on the project pipeline.** For FSLR, since we can easily distinguish the module business from the EPC/project development business (not the case with SPWR), we employ a sum-of-the-parts: (1) DCF for EPC/project development segment and (2) EV/Sales multiple approach for the module segment. As a secondary measure for valuing FSLR, we incorporate a risk adjusted/probability weighted free cash flow model to the entire business – which supports our primary valuation methodology. For SPWR, since it's more challenging to distinguish the module segment from the downstream segment – especially given the change in reporting structure - we employ a risk adjusted/probabilistic DCF valuation methodology to the entire business which attempts to capture the future value of projects with modules sales being embedded in the captive sales channel.

**For our solar names with other non solar segments (AEIS and WFR), we employ various valuation methodologies – depending on the business mix.** For AEIS, we apply a modest premium to a semi mid cycle P/E multiple to our 2013 EPS forecast. It's important to note, the solar inverter business remains at a very early growth stage and only recently has become a greater contributor to consolidated results for AEIS. As AEIS' business shifts more towards solar energy inverters and less emphasis is placed on traditional cyclical industries (i.e. Semis), we will look to employ more of a traditional sum-of-the-parts valuation methodology. For WFR, we employ a sum-of-the-parts valuation methodology, valuing the Semiconductor Materials (semi wafers) and Solar Energy (SunEdison) segment separately. For the Solar Energy segment (SunEdison), we apply a discounted cash flow analysis to our forecasted project pipeline. For the Semiconductor Materials (semi wafers) segment, we employ a comparable EV/Sales multiple approach.

## The US solar value chain

Figure 78. US solar value chain comparison

Company	Ticker	Upstream Manufacturing				Downstream Services					Other Segments - Non Solar	Key Takeaways
		Polysilicon	Wafer/Ingot	Cell	Module	Systems	Development	EPC	Financing/Leasing	System Inverters		
SunPower	SPWR											Residential leasing in several states. Solar systems business more geared for residential rooftop given that they are higher priced but also higher efficiency. Very large dealer network.
First Solar	FSLR											Thin Film module business becoming much smaller contributor - panels mainly for internal project business. Emphasis on downstream will continue to grow. Business more geared for utility scale projects. May one day become technology agnostic.
Advanced Energy Industries	AEIS											Has a non solar segment that produces wafers for semiconductor sector. Solar inverters primarily for utility scale projects. More contribution from the Solar Inverter segment expected versus the non solar segment (i.e. Power Conversion products for multiple industries including Semiconductor).
MEMC Electronic Materials	WFR											Cut Poly production materially - now Poly production mainly serves Semi Wafers. Wafers are produced for semiconductor industry and internally for solar project consumption at SunEdison - 3rd party Solar Wafer sales largely eliminated - only strategic sales where demand exists. Solar downstream segment through SunEdison will continue to become a more material segment for WFR - main focus is Commercial and Utility segment.
Trina Solar	TSL											Has a systems lease program mainly for residential customers. Has made a strategic pledge to shift more of the business further downstream given the state of the module business.
Yingli Green Energy Holdings	YGE											Has vendor financing in US. Downstream business goals not in the immediate forefront - unlike TSL.
Suntech Power Holdings	STP											Has a lease program for Commercial and Residential customers - expansion early.

Source: Citi Research

## US Solar competitive positioning

Figure 79. Competitive positioning – qualitative assessment

Company	Ticker	Module Pricing	Manufacturing Cost	Gross Margins (Module + Systems)	Channel Strength	Balance Sheet	Bankability	Technology	Near Term Access To Capital	Average Score	Key Takeaways
SunPower	SPWR	1	4	2	1	2	1	1	2	1.8	Margins lifted by downstream business. Key player in the residential market. Good history with panel reliability. Backed by Total Sa (66% owned by Total). Good balance sheet though not as strong as FSLR. JV with Toshiba and Sharp helps with Japan market penetration.
First Solar	FSLR	4	3	1	2	1	1	4	1	2.0	Margins lifted by downstream business. Most successful player in utility scale projects despite having some module reliability issues. Strongest balance sheet in the sector. May become technology agnostic down the road.
Advanced Energy Industries (Solar Energy - Inverters)	AEIS	NA	NA	NA	NA	1	2	1	2	1.5	Does get slightly higher prices on inverters. Strong balance sheet with ample cash. Margins healthy - driven by being selective with client projects versus just chasing market share like some inverter peers. Satcon bankruptcy should help gain market share.
MEMC Electronic Materials (SunEdison)	WFR	NM	NM	1	3	2	1	NA	2	1.8	Becoming mostly a project developer - tech agnostic. Sound balance sheet though not as strong as FSLR. High margins driven by project development at Commercial and utility scale. Minimal debt - mostly project financed debt.
Trina Solar	TSL	4	1	4	3	3	3	3	1	2.8	Margins will remain weak over the intermediate term. Balance sheet strength improving - albeit still weak. Looking to get further in the downstream market - success in strategy remains uncertain. The Chinese government is expected to continue to lend despite massive debt balances but this will not continue into perpetuity.
Yingli Green Energy Holdings	YGE	4	1	4	2	4	3	3	1	2.8	Margins will remain weak over the intermediate term. Balance sheet strength an issue with significant short term debt outstanding. The Chinese government is expected to continue to lend despite massive debt balances but this will not continue into perpetuity.
Suntech Power Holdings	STP	3	2	4	2	5	4	2	2	3.0	Margins will remain weak over the intermediate term. Modules command higher prices but cost structure high as well. Balance sheet and corporate health concerns a major hindrance. Near Term headwinds remain. The Chinese government is expected to continue to lend despite massive debt balances but this will not continue into perpetuity.

Source: Citi Research

Note: Scale 1-5 Positioning Strength (1 = Strongest; 5 = Weakest)

## Stock performance – A quick comment

Stock performance for manufacturers reflects improved visibility in China...

...We look for more concrete evidence before changing our stance with the pure play panel manufacturers

**Are the stocks getting a bit ahead of themselves? Maybe with the pure-play panel manufacturers.** Over past 3 months, we have seen ~25%-100% upward price moves with the pure play panel manufacturers. The downstream players have enjoyed a rally as well but their financial status and fundamental outlook is far superior to the upstream panel manufacturers as we discuss in this note. With the upstream players, we attribute much of the performance to: (1) a risk-on mentality and (2) fresh investor perception surrounding a potential bottoming of fundamentals. Much of this relates to news coming out of China on the Golden Sun program and a 10GW solar installation target for 2013 – double the prior goal. While this certainly improves the outlook for solar, we caution investors not to buy into what we consider an overzealous rally for 3 reasons: (1) China has not disclosed any details on how they will achieve their 10GW target for 2013, (2) Incentives like Golden Sun program in China are not new and despite having these incentives already in place, project installations are occurring much slower than anticipated – for a multitude of reasons and (3) we aren't convinced that improved fundamentals in China will offset the headwinds you are seeing globally. While we agree that visibility has improved modestly, much of the price moves over the past month reflects this notion. We look for more concrete evidence for improving fundamentals before changing our stance with the pure play panel manufacturers.

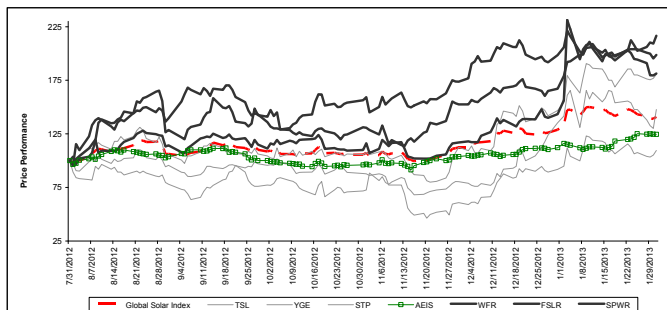
Figure 80. North America launch - stock performance

Ticker	Company name	1 mth	3 mth	6 mth	9 mth	1 yrs	18 mths	2 yrs	3 yrs	5 yrs
<b>Citi US Coverage Universe</b>										
AEIS	Advanced Energy Industries Inc.	11.2	29.8	24.6	28.6	44.3	44.7	-0.6	17.0	42.0
FSLR	First Solar Inc.	-8.7	16.0	81.3	53.2	-33.3	-76.2	-81.8	-75.1	-84.5
WFR	MEMC Electronic Materials Inc.	29.6	65.1	116.7	15.9	-9.0	-43.9	-62.5	-66.9	-94.2
SPWR	SunPower Corp.	38.6	80.7	98.7	38.9	13.7	-60.3	-42.0	-61.8	-88.7
STP	Suntech Power Holdings Co. Ltd. ADS	9.2	106.2	47.8	-33.7	-48.6	-77.2	-80.3	-87.6	-96.9
TSL	Trina Solar Ltd. ADS	19.1	24.6	9.5	-28.8	-35.7	-71.1	-80.2	-76.4	-69.6
YGE	Yingli Green Energy Holding Co. Ltd. ADS	23.0	71.0	80.6	-20.6	-31.7	-60.1	-75.0	-76.9	-85.8
	<b>Best Performer</b>	<b>38.6</b>	<b>106.2</b>	<b>116.7</b>	<b>53.2</b>	<b>44.3</b>	<b>44.7</b>	<b>-0.6</b>	<b>17.0</b>	<b>42.0</b>
	<b>Worst Performer</b>	<b>-8.7</b>	<b>16.0</b>	<b>9.5</b>	<b>-33.7</b>	<b>-48.6</b>	<b>-77.2</b>	<b>-81.8</b>	<b>-87.6</b>	<b>-96.9</b>

Source: Citi Research

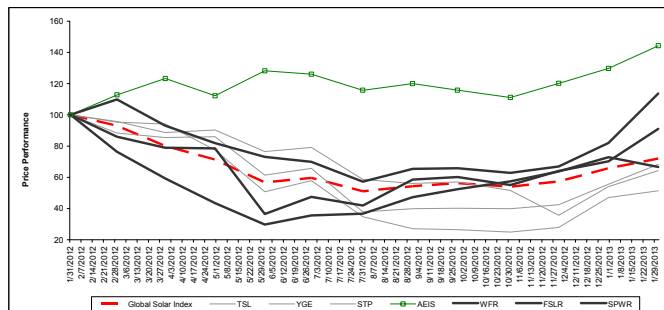
As the below charts display, over a longer time horizon, the solar sector has generated negative returns – whether upstream or downstream – given its boom-bust cycle. Only recently, over the past 6 months, have we begun to see a material divergence in performance between the pure play panel manufacturers and the upstream project developers with, the latter group outperforming. In light of the industry headwinds (cyclical and structural) facing the panel manufacturing business, we expect this trend to continue as investors selectively pick winners in the space which seem to center around the project developers.

Figure 81. 6M price change



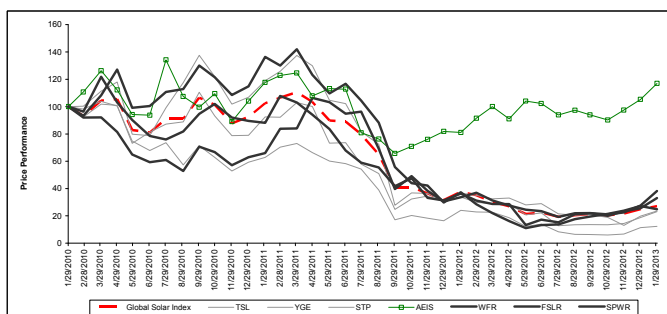
Source: Citi Research

Figure 82. 1 year price change



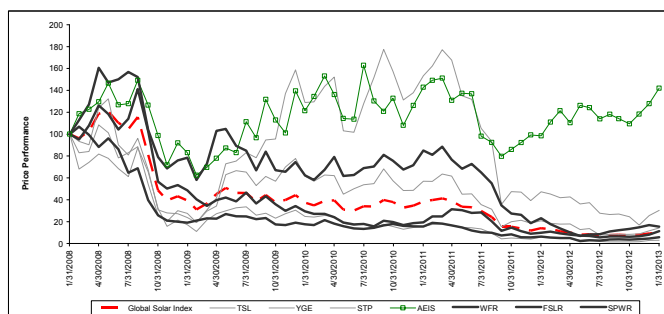
Source: Citi Research

Figure 83. 3 year price change



Source: Citi Research

Figure 84. 5 year price change



Source: Citi Research

## Company Focus

- Company Update
- Initiation of Coverage

**Shahriar (Shar) Pourreza, CFA**

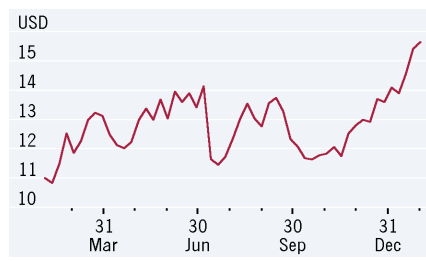
+1-212-816-7903

shahriar.pourreza@citi.com

<b>Buy/High Risk</b>	<b>1H</b>
Price (01 Feb 13)	US\$15.64
Target price	US\$20.00
Expected share price return	27.9%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>27.9%</b>
Market Cap	US\$592M

### Price Performance

(RIC: AEIS.O, BB: AEIS US)



## Advanced Energy Industries Inc (AEIS) The Time Is Right – Launching With Buy

- **Launching US coverage of AEIS with a non consensus Buy (1H)** — We are initiating coverage of Advanced Energy Industries with a Buy/High Risk (1H) rating and an \$20 target price. With our favorable sector tilt towards solar downstream players (versus upstream manufacturers), Advanced Energy's rapid growth in the full service inverter arena within North America fits well with our new sector thesis. Our \$20 target price translates into an ETR of 28% - supporting our Buy rating.
- **Now is the time to own AEIS** — We now view AEIS as a cash generating North American downstream solar play well positioned to capitalize on the rapid growth of the US and Canadian commercial and utility scale solar project arena – the new driver of the story going forward.
- **Not your old semi equipment story** — Management has done an effective job of diversifying away from traditional cyclical industries (i.e. power conversion products for OEM semi equipment sector) and into a broader group of derivative sectors within the Thin Film segment. This is coupled with a material increase in focus towards turn-key solar inverters for commercial and utility scale projects. In fact, we question whether the historical growth driver – power conversion products for the semi equipment industry – fits with the strategic direction going forward especially with the semi industries structural and cyclical headwinds.
- **Management displays great execution on costs in a short period of time; growth up next** — Since taking the helm at Advanced Energy in August 2011, Garry Rogerson's restructuring plan, announced one month later, has successfully taken material costs (~\$0.55/share by 2012) out of the system which are not expected to return with further cost reductions expected through 2014. Today, AEIS management has turned the company into a healthy cash generator well positioned to capitalize on key organic/strategic growth initiatives.
- **Generating healthy margins in challenging space; initiating On 2012-14 EPS** — We forecast very healthy operating margins at AEIS through our 2014 forecast period at an average 12%. Our new 2012/2013/2014 EPS is \$0.59/\$1.06/\$1.62 with above consensus estimates for 2013/2014 - attributed to a more bullish outlook on the turn-key inverter market in North America. While global inverter prices have recently begun to show some downward pressure, AEIS's focus on North America and a wide offering of individualized turn key commercial and utility scale solutions will help mitigate the potential "commoditization" impact we have seen in the solar module business.
- **Satcon bankruptcy increases Advanced Energy's market positioning; not a negative read-through to sector** — The October 17 bankruptcy announcement of pure play inverter manufacturer, Satcon (Ticker SATCQ), should help elevate AEIS's market share position in the US. We do not view this bankruptcy as a negative read-through to the industry given the multitude of company specific factors involved in the bankruptcy event – discussed in note.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
<b>2011A</b>	0.43A	0.31A	0.20A	0.01A	0.95A	0.96A
<b>2012E</b>	<b>0.06A</b>	<b>0.19A</b>	<b>0.20A</b>	<b>0.15E</b>	<b>0.59E</b>	<b>0.60E</b>
Previous	na	na	na	na	na	na
<b>2013E</b>	<b>0.14E</b>	<b>0.24E</b>	<b>0.33E</b>	<b>0.35E</b>	<b>1.06E</b>	<b>0.94E</b>
Previous	na	na	na	na	na	na
<b>2014E</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>1.62E</b>	<b>1.25E</b>
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## The Time Is Right – Launching With Buy

We are launching US coverage of Advanced Energy Industries (ticker AEIS) with a non consensus Buy rating and a \$20 target price. Our new target price equates to a 12 month ETR of 28% - supporting our Buy thesis. Following the recently announced restructuring effort, AEIS has become a healthy cash generator well positioned to capitalize on the growth of commercial and utility scale projects in North America – a region remaining early in the growth cycle. Shares of AEIS are a core holding for investors looking to gain exposure into the downstream solar market while avoiding some of the pitfalls that have impacted the upstream segment - i.e. the commoditization of the module business.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

### Key reasons why AEIS shares appear attractive

- We favor the downstream segment of solar space; AEIS' turn-key inverter business fits well with our sector thesis.
- Management has displayed great execution over a short period of time following the announced September 2011 restructuring effort.
- With successful cost cutting measures predominately in the rearview mirror, AEIS is well positioned to capitalize on selective growth initiatives at Solar Energy and Thin Films non semi business.
- One of the few names in the solar space generating healthy margins over our forecast period.
- Yes, the Semiconductor sector has been a drag for the Thin Film segment but management has been diversifying away into derivative sectors.
  - That said, the Solar Energy segment remains the key focus of growth for us over the near term.
- Management's conservative strategy of selectively chasing margins versus market share leadership like some competitors has made AEIS the success story today.
- Peer bankruptcy helps support AEIS' market position – not a negative read-through to sector.
- Balance sheet and liquidity remains strong and continually improving.
  - Recently completed \$75mm share buyback program. Announced new \$25mm buyback program.
- Our target price of \$20/share equates to an ETR of 28% - supporting the favorable stance.

### Where we can be wrong?

- Larger global players like SMA (S92-DE) and Power-One (Ticker PWER) making a bigger push into the North American Commercial and Utility scale market – which could put pressure on AEIS' margins and pricing power.



- Turn key inverter commercial and utility scale projects become commoditized - similar to the module manufacturing business – putting pressure on system wide ASP's.
- Semiconductor equipment weakness continues past 2013 – placing more margin pressure on Thin Film segment's semiconductor power conversion business.
- The strategic move to diversify away from power conversion products for semiconductors into derivative sectors within the Thin Film segment fails to materialize or add to growth over the intermediate term.

## Background

Solar Energy is the driver of growth  
moving forward

**Advanced Energy Industries operates under two key business segments:**

**Thin Films and Solar Energy.** The latter segment has become a greater contributor to consolidated results recently with the rapid growth of North America inverter sales (See Figure 85 below) – this is the key growth engine for us. Within the Thin Films segment, Advanced Energy remains a leading provider of components and subsystems to a variety of industries utilizing high-technology manufacturing processes. The firm's suite of products in power conversion are critical to the production of semiconductors, flat panel displays, data storage products, solar PV, architectural glass, and other advanced product applications.

Targeting both OEMs and end users, Advanced Energy's operations reach around the globe with regional centers in North America, Asia, and Europe, in addition to its growing manufacturing base in China. Advanced Energy continues to enter new markets vis-à-vis strategic acquisitions and partnerships, as well as through internally developed proprietary, process-focused technologies - all key elements that further strengthen the company's position in process-critical, scalable, highly-patented technologies.

Recently, more focus has been turned to the inverter segment (Solar Energy) which now comprises of greater than 50% of consolidated results (See Figure 85 below). We expect this trend to continue beyond our forecast period with the non solar segment (Thin Films) becoming a smaller contributor to AEIS' results. Key reasons for this are: (1) The rapid growth of the inverter business, (2) a tepid outlook on Semi's and (3) the move into derivative Thin Film sectors to diversify away from semi is in the infancy stage – growth remains uncertain. Founded in 1981, the company is headquartered in Fort Collins, Colorado and has 1,500 employees.

Figure 85. AEIS changing business mix – solar becoming a larger contributor

		Semi	Inverter	Non-Semi Thin Film				Service	Total Rev	Business Mix		
				FPD	Solar	Data Storage	Total					
2010	Q1A	48.6	2.3	4.1	5.0	10.1	19.2	11.5	81.6			
	Q2A	43.9	14.4	5.8	13.2	12.4	31.4	11.4	101.1			
	Q3A	49.4	37.4	11.3	20.4	9.4	41.1	13.2	141.1			
	Q4A	40.2	51.7	7.6	25.8	9.9	43.3	13.4	148.6			
	Total	182.1	105.8	28.8	64.4	41.8	135.0	49.5	472.4	22%	14%	64%
2011	Q1A	46.4	37.6	4.8	24.5	10.7	40.0	13.7	137.7			
	Q2A	43.7	40.8	12.5	17.9	9.7	40.1	13.5	138.1			
	Q3A	29.6	51.7	8.6	14.7	10.5	33.8	13.4	128.5			
	Q4A	26.9	58.1	3.9	4.2	7.5	15.6	11.8	112.4			
	Total	146.6	188.2	29.8	61.3	38.4	129.5	52.4	516.7	36%	12%	52%
2012	Q1A	38.3	45.4	1.3	3.1	5.7	10.1	12.0	105.8			
	Q2A	36.6	50.8	2.2	3.5	9.6	15.3	12.9	115.6			
	Q3A	29.7	60.7	1.9	0.7	10.9	13.5	13.6	117.5			
	Q4E	20.2	65.1	1.9	0.7	10.0	12.6	13.0	110.9			
	Total	124.8	222.0	7.3	8.0	36.2	51.5	51.5	449.8	49%	2%	49%
2013	Q1E	38.3	53.1	1.3	3.1	5.7	10.1	13.8	115.3			
	Q2E	36.6	59.5	2.2	3.5	9.6	15.3	14.8	126.2			
	Q3E	32.7	77.1	2.1	0.7	10.9	13.7	15.6	139.1			
	Q4E	31.0	82.7	2.3	0.7	10.0	13.0	15.0	141.6			
	Total	138.6	272.4	7.9	8.0	36.2	52.1	59.2	522.3	52%	2%	46%
2014	Q1E	42.1	61.1	1.3	3.1	5.7	10.1	13.8	127.1			
	Q2E	40.3	68.4	2.2	3.5	9.6	15.3	14.8	138.8			
	Q3E	37.6	96.4	2.3	0.7	10.9	13.9	15.6	163.5			
	Q4E	35.7	103.3	2.7	0.7	10.0	13.4	15.0	167.4			
	Total	155.7	329.2	8.5	8.0	36.2	52.7	59.2	596.8	55%	1%	43%

Source: Citi Research

**Restructuring effort a success with few cost levers left; Focus now turns to execution and growth.** One month after Gary Rogerson took the CEO post, AEIS announced a large restructuring plan on September 28<sup>th</sup> 2011. The plan was geared with the goal of realigning resources and taking costs permanently out of the system.

Key feature of the plan include:

- Bring R&D closer to the customer.
- Moving manufacturing of solar inverter subcomponents to China with final assembly and testing taking place near the customer.
- Outsourcing parts and sub-assemblies.
- Change in employee compensation – performance based measures.
- Reduction of workforce primarily in Thin Films segment.
- Space consolidation: closing factories and relocating some to different areas.

To date, the impact of the above mentioned initiatives have yielded costs savings in excess of \$30mm/year with anticipated savings reaching \$55mm/year or \$1/share by 2014. Much of the restructuring efforts are now complete with some levers remaining, including: COGs reductions, sub assembly transitions and some re-alignment of engineering resources.

Key takeaway, these cost reductions are not expected to return so the positive net income impacts mentioned above are permanent. With the restructuring effort largely behind them, AEIS is in a very strong position to weather potential industry headwinds as well as have ample capacity to selectively grow the solar inverter

Figure 86. Cost savings plan

ACTION	Est. Annual Impact in \$Millions				
	2011	2012	2013	2014	TOTAL
Organizational restructuring	\$2	\$12	\$12	\$12	\$38
Space consolidation	\$0	\$1	\$2	\$2	\$5
Optimize distribution network	\$0	\$0	\$2	\$2	\$4
Manufacturing consolidation	\$0	\$3	\$10	\$10	\$23
Material sourcing improvement		\$2	\$7	\$17	\$26
Compensation Plan Changes					
- Incentive plans		\$6	\$6	\$6	\$18
- Shareholder dilution		\$6	\$6	\$6	\$18
Total Cost Saving Initiatives	\$2	\$30	\$45	\$55	\$132
Net Income Impact	\$2	\$22	\$32	\$40	\$96
EPS Impact	\$0.05	\$0.55	\$0.81	\$1.00	\$2.41

Source: Company Filings

business as well as adjacent markets within the Thin Film segment - as it diversifies away from the semi industry.

## Solar Energy segment – Key growth driver

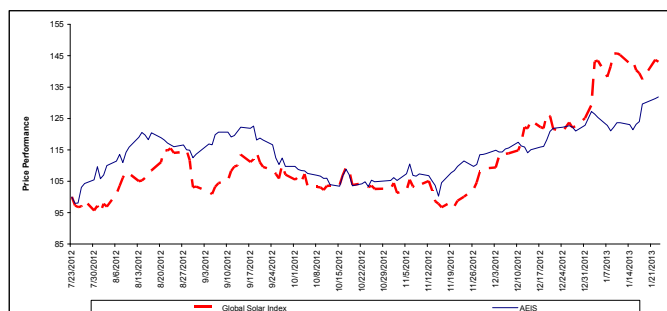
### Contributions at Solar Energy will continue to grow

The solar Energy segment is the main driver of growth through our forecast period. The segment offers a suite of turn key inverter products mainly for the commercial and utility segments in North America. For a deep dive discussion into the US and global PV market including S/D, see industry sections above beginning on page 16. That said, our strong stance towards the US commercial and utility scale markets in NA translates into our bullish outlook for AEIS' Solar Energy segment.

**Segment contributions will continue to grow.** Solar Energy now comprises of over 55% of consolidated results – up from ~20% in 2010. With North America's utility and commercial solar segments in an early growth phase, it is highly probable to see this segment contribute close to 65%-75% to consolidated results – especially if the tepid outlook for the Thin Film segment continues.

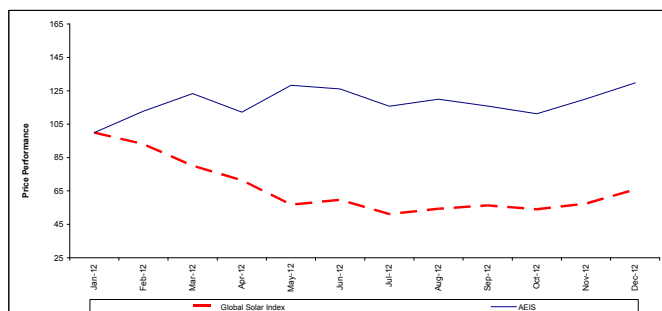
Only recently has AEIS shares begun to trade inline with our diverse solar index as the market begins to turn focus away from semiconductor power conversion products towards the growing Solar Energy segment (see Figure 87 and compare to Figure 88). As contributions from this segment continue to grow – as we anticipate, the Market will increasingly view AEIS as a solar energy play with exposure to a less material non solar segment (power conversion products for the Thin Films segment).

Figure 87. AEIS 6M price return versus solar index – highly correlated



Source: Citi Research

Figure 88. AEIS 12M price return versus solar index - divergent



Source: Citi Research

**Queue of utility scale PPAs materially outweigh project completions in the US – AEIS stands to capitalize.** Industry checks estimate that there are currently over 2,000 MW of utility scale solar projects operating in the US and over 10,000 MW of projects with signed PPA remaining in various stages of the project cycle. Additionally, as we highlight in the industry section above (in the Demand chart), US PV installations could reach 9,000MW by 2016 from the 3,200 MW level we estimate in installations in 2012 – translating into substantial growth opportunities for AEIS' Solar Energy segment. To limit redundancy, please refer to the industry sections above for additional details on PV growth expectations for North America.

### AEIS inverter prices have remained stable for several reasons

**Despite seeing some weakness in spot inverter prices, AEIS' inverters haven't succumbed to pricing pressure.** We attribute this to several reasons: (1) much of the price drop has centered around the residential inverter market with micro inverters – an area AEIS has little exposure (2) Much of the weakness has been driven by pricing pressure in historical growth regions overseas like Europe where the forward growth outlook has mostly subsided (i.e. Italy and Germany) – not a

region of focus for AEIS, (3) AEIS offers turn key products including BoS (Balance-Of-Systems) and O&M services tailored individually to each project – thereby minimizing the negative impact of commoditization, (4) AEIS focuses on the utility and commercial scale customer class – an area of solid growth and (5) industry checks with utilities highlight a bankability premium for AEIS' turn key product offerings.

### Our estimates could be conservative

**Our estimates could be conservative.** We estimate an inverter price, on average for commercial and utility scale customers, of ~\$0.23/watt for 2013-2014 for Solar Energy. We expect shipment to grow from 950MW in 2012 to 1,168MW in 2013 and 1,414MW in 2014 – an average of 21% growth per year from 2012 base as AEIS continues to selectively capitalize on NA commercial and utility scale solar projects. With the recently announced bankruptcy of a major player in the space (Satcon Technologies) coupled with the rapid growth of PV installations in the commercial and utility scale markets, our 21% revenue growth assumption for Solar Energy could prove conservative. For 2013, we maintain 10% operating margins; increasing to 13% in 2014 partly from the execution of the remaining components of the restructuring plan.

See below for a sampled of US projects that have incorporated AEIS's inverters – not all inclusive.

Figure 89. U.S. solar projects incorporating Advanced Energy inverters – not all-inclusive

Project Name	Developer	MWac	State	Status	Construction?	COD	Owner	Power Offtaker	Offtaker Type	Business Model	Module Technology	Module Manufacturer	BOS Type	
Merced Solar	Cenergy Power	6	CA	Pre-Contract	N	2013		Cenergy Power			S-Energy	Fixed		
Absolutely Solar 1 - SCE CREST	Absolutely Solar	1.5	CA	Operating	N	2011		Southern California Edison	IOU	West Hills Construction	PPA	Multi c-si	Trina Solar	Fixed
Absolutely Solar 2 - SCE CREST	Absolutely Solar	1.5	CA	Operating	N	2011		Southern California Edison	IOU	West Hills Construction	PPA	Multi c-si	Trina Solar	Fixed
Paradise Solar Urban Renewal	American Capital Energy	5.2	NJ	Operating	N	2011	Paradise Solar Urban Renewal	Commercial			Multi c-si	Yingli	Fixed	
PSEG Solar 4 All - Yardville Solar Farm	American Capital Energy	3.7	NJ	Operating	N	2011	PSEG	Commercial	American Capital Energy	UOG	Multi c-si	Suntech	Fixed	
Toms River Regional School District Solar	American Clean Energy	4.5	NJ	Operating	N	2012	American Clean Energy	Commercial						
KeyStone Solar Project	Community Energy	5.2	PA	Operating	N	2012	Community Energy	Wholesale						
Buckeye Union High School District	Constellation Energy	4.3	AZ	Operating	N	2012	Buckeye Union High School District	Commercial						
Bellevue Solar Project	EDF Renewable Energy	1.7	OR	Operating	N	2011	EDF Renewable Energy	IOU	EDF Renewable Energy	PPA	CIGS	Nanosolar	Fixed	
Yamhill Solar Project	EDF Renewable Energy	1.2	OR	Operating	N	2011	EDF Renewable Energy	IOU	EDF Renewable Energy	PPA	CIGS	Nanosolar	Fixed	
TVA Project - EETN	Efficient Energy of Tennessee	1	TN	Operating	N	2010	Efficient Energy of Tennessee	Public Utility	Natural Energy Group	PPA	a-Si	Sharp	Fixed	
Arlington Project	ESA Renewables	0.17	GA	Operating	N	2011	ESA Renewables	IOU	ESA Renewables	PPA	Mono c-si	Suniva	Fixed	
Blairstown Project	ESA Renewables	1	GA	Operating	N	2011	ESA Renewables	Public Utility	ESA Renewables	PPA	Mono c-si	Canadian Solar	Fixed	
Brasstown Project	ESA Renewables	1	NC	Operating	N	2011	ESA Renewables	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Culbertson TVA Project	ESA Renewables	1	NC	Operating	N	2011	ESA Renewables	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Fugay-Vannia Project	ESA Renewables	0.5	NC	Operating	N	2012	Holcom	IOU	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Holmes Project	ESA Renewables	1	NC	Operating	N	2011	Duke Energy	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Martin's Creek School Solar	ESA Renewables	1	NC	Operating	N	2011	Duke Energy	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Murphy Farm Project	ESA Renewables	1	NC	Operating	N	2011	Duke Energy	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
New Bern Project	ESA Renewables	1.3	NC	Operating	N	2012	ESA Renewables	IOU	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
Wingate Project	ESA Renewables	1	NC	Operating	N	2011	Duke Energy	Public Utility	ESA Renewables	PPA	Multi c-si	Canadian Solar	Fixed	
NJR Vineyard Solar	NJR Clean Energy Ventures	4.1	NJ	Operating	N	2012	NJR Clean Energy Ventures	Wholesale	American Capital Energy	Wholesale	Multi c-si	Yingli	1-Axis	
Anaral Rock Solar Farm	O2 Energies	4.5	NC	Operating	N	2012	O2 Energies	Progress Energy Carolinas	IOU	National Renewable Energy Corp.	PPA	Multi c-si	REC	Fixed
Falmont Solar Farm	O2 Energies	4.5	NC	Operating	N	2012	O2 Energies	Progress Energy Carolinas	IOU	REC	PPA	Multi c-si	REC	Fixed
Maxton Solar Farm	O2 Energies	4.5	NC	Operating	N	2012	O2 Energies	Progress Energy Carolinas	IOU	REC	PPA	Multi c-si	REC	Fixed
Black Cap Solar Project	Obidian Renewables	2	OR	Operating	N	2012	PacificCorp	Pacific Power	IOU	Swanton Incorporated	UOG	Multi c-si	Suntech	1-Axis
PSEG UOG Program - Stroud Solar Station	Pacific Gas & Electric	20	CA	Operating	N	2011	Pacific Gas & Electric	Pacific Gas & Electric	IOU	Cupertino Electric	UOG	Multi c-si	Suntech	Fixed
PSEG UOG Program - Westside Solar Station	Pacific Gas & Electric	15	CA	Operating	N	2011	Pacific Gas & Electric	Pacific Gas & Electric	IOU	Cupertino Electric	UOG	Multi c-si	Suntech	Fixed
Baldock Solar Highway Project	Portland General Electric	1.5	OR	Operating	N	2012	Bank of America	Portland General Electric	IOU	Aadland Evans Constructors	PPA	a-Si	SolarWorld	Fixed
Portland General Electric UOG project	Portland General Electric	2.1	OR	Operating	N	2010	Portland General Electric	Portland General Electric	IOU	Northwest Solar Solutions	UOG	a-Si	Uni-Solar	RoofTop
Kauai Solar Project	REC Solar	1	HI	Operating	N	2010	Kapala Solar	Kapala Island Utility Cooperative	Coop	REC Solar	PPA	Multi c-si	REC	Fixed
San Francisco Sunset Reservoir Solar Project	Recurrent Energy	4.4	CA	Operating	N	2010	Recurrent Energy	San Francisco Public Utilities Commission	Gov't Agency	PPA	Multi c-si	Suntech	RoofTop	
SMUD FIT Brucelle - Phase I	Recurrent Energy	5	CA	Operating	N	2011	Google	Sacramento Municipal Utility District	Muni	Swanton Incorporated	FIT	Multi c-si	Suntech	1-Axis
SMUD FIT Dillard	Recurrent Energy	9.4	CA	Operating	N	2011	Google	Sacramento Municipal Utility District	Muni	Swanton Incorporated	FIT	Multi c-si	Suntech	1-Axis
SMUD FIT Krammer - Phase I	Recurrent Energy	5	CA	Operating	N	2011	Google	Sacramento Municipal Utility District	Muni	Swanton Incorporated	FIT	Multi c-si	Suntech	1-Axis
SMUD FIT McKenzie	Recurrent Energy	30	CA	Operating	N	2012	Google	Sacramento Municipal Utility District	Muni	Swanton Incorporated	FIT	Multi c-si	Suntech	1-Axis
Mesquite Solar 1 - Phase 1	Sempra Generation	42	AZ	Operating	N	2011	Sempra Generation	Pacific Gas & Electric	IOU	Zachry	PPA	Multi c-si	Suntech	Fixed
Mesquite Solar 1 - Phase 2	Sempra Generation	58	AZ	Operating	N	2012	Sempra Generation	Pacific Gas & Electric	IOU	Zachry	PPA	Multi c-si	Suntech	Fixed
Outback Solar 1	Smart Energy Capital	5	OR	Operating	N	2012	Obidian Renewables	Portland General Electric	IOU	Belectric	PPA	Multi c-si	Suntech	1-Axis
Masonic Home of NJ	Solar Power Partners	1.2	NJ	Operating	N	2011	Solar Power Partners	Masonic Home of New Jersey	Commercial	NJ Solar Power	Retail PPA	Multi c-si	Kyocera	1-Axis
Aerlog Project	SPI Solar	5.2	CA	Operating	N	2010	SMUD, SPI	SMUD, SPI	Muni					
RCCLA Annalia Solar Array 1	Standard Solar	1.3	NM	Operating	N	2012	Washington Gas Energy Services	Kil Carson Rural Electric Cooperative	Coop	PPC Solar	PPA	Multi c-si	Trina Solar	1-Axis
Colorado State University Solar - Phase I	SunEdison	1.74	CO	Operating	N	2009	SunEdison	Colorado State University	Other	AMEC	PPA	Multi c-si	Trina Solar	1-Axis
Colorado State University Solar - Phase II	SunEdison	2.97	CO	Operating	N	2011	SunEdison	Colorado State University	Other	Global Energy Services	PPA	Multi c-si	Trina Solar	Fixed
Greenfield Solar Farm	SunEdison	1.7	MA	Operating	N	2012	SunEdison	Town of Greenfield	Commercial	Sun Edison	Retail PPA	c-si		Fixed
LakeLand Under Regional Airport - Phase I	SunEdison	2.3	FL	Operating	N	2011	SunEdison	LakeLand Electric	IOU	SunEdison	PPA	Multi c-si	Hanwha SolarOne	Fixed
LakeLand Under Regional Airport - Phase II	SunEdison	3.2	FL	Operating	N	2012	SunEdison	LakeLand Electric	IOU	SunEdison	PPA	Multi c-si	Hanwha SolarOne	Fixed
Sunrise NC Alexander	Sunrise Energy Ventures	0.8	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
Sunrise NC Daughter	Sunrise Energy Ventures	0.8	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
Sunrise NC Hindman	Sunrise Energy Ventures	0.8	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
Sunrise NC Martin 1	Sunrise Energy Ventures	0.8	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
Sunrise NC RKAN	Sunrise Energy Ventures	0.5	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
Sunrise NC Shields	Sunrise Energy Ventures	0.5	NC	Operating	N	2012	Sunrise Energy Ventures	Tennessee Valley Authority	Public Utility	PPA	Multi c-si	Suntech		
WNECO Project - Indian Orchard Solar Facility	Western Massachusetts Electric Co.	2	MA	Operating	N	2010	Western Massachusetts Electric Co.	Western Massachusetts Electric Co.	IOU	American Capital Energy	UOG	Multi c-si	Suntech	Fixed
WNECO Project - Silver Lake Solar Facility	Western Massachusetts Electric Co.	1.8	MA	Operating	N	2010	Western Massachusetts Electric Co.	Western Massachusetts Electric Co.	IOU	American Capital Energy	UOG	Multi c-si	Suntech	Fixed
GlaxSmithKline-York	American Capital Energy	2.6	PA	Development	Y	2011	American Capital Energy	GlaxSmithKline	Commercial	American Capital Energy	Retail PPA	Multi c-si	Suntech	Fixed
Sunlight Solar 1	American Capital Energy	16	NY	Development	Y	2013	EW Energy	NY Energy	IOU					
Absolutely Solar 3 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 4 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 5 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 6 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 7 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 8 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Absolutely Solar 9 - SCE CREST	Eco! Energy	1.5	CA	Development	N	2013	Eco! Energy	Southern California Edison	IOU	PPA	Multi c-si	Canadian Solar	1-Axis	
Barceloneta Project	ESA Renewables	20	PR	Development	Y	2013	ESA Renewables	Puerto Rico Electric Power Authority	Public Utility	ESA Renewables	Wholesale	Canadian Solar	Fixed	
Clayville Project	ESA Renewables	20	PA	Development	N	2013	ESA Renewables	PJM	Wholesale	ESA Renewables	Wholesale	Canadian Solar	Fixed	
Plymouth Project	ESA Renewables	20	NC	Development	N	2013	ESA Renewables	PJM	Wholesale	ESA Renewables	Wholesale	Canadian Solar	Fixed	
Anahola HCCO Project	REC Solar	12	HI	Development	Y	2013	REC Solar	Kauai Island Utility Cooperative	Coop			REC		
Mesquite Solar 1 - Phase 3	Sempra Generation	50	AZ	Development	Y	2013	Sempra Generation	Pacific Gas & Electric	IOU	Zachry	PPA	Multi c-si	Suntech	Fixed
Total MW		441.2												

Source: Citi Research, GTM Research

**Satcon bankruptcy will likely increase  
AEIS' market share in NA**

## Quick thoughts on competitor bankruptcy – AEIS will likely benefit

In our view, the October 17<sup>th</sup> bankruptcy announcement of pure play inverter manufacturer, Satcon Technologies (Ticker SATCQ) should be seen as a positive read-through for AEIS' as it serves to strengthen its competitive position - bankability is a key determining factor for large scale solar projects at the commercial and utility level so we see Satcon's market share position being absorbed by the other industry players – AEIS to benefit. Satcon once held the top market share position in the Commercial scale market (see Figure 90 to the left) and a strong position in the utility scale market (top 4 position) – we think this market share position is beginning to dissipate. If you include both commercial and utility scale customers – Satcon held an 18% market share in the NA inverter market (versus 32% and 24% for SMA and Advanced Energy, respectively), per industry checks. Key takeaway, we ultimately believe that Advanced Energy will be one of the key recipients from Satcon's expected market share loss at both the commercial and utility scale level as bankability will increasingly become a question.

Therefore, we do not view this event as a negative read-through to the sector. At a top level view, the announced bankruptcy appears to be attributed to more company specific factors versus broad industry dynamics.

Some distinguishing factors between AEIS and SATCQ:

- SATCQ has significant debt (liabilities exceeding assets) outstanding leading up to the announced bankruptcy. AEIS is flush with cash with minimal debt outstanding. In fact, they just completed a \$75mm stock repo program and announced a new \$25mm offering.
- SATCQ – per industry checks, SATCQ entered into long term supply take or pay contracts which negatively impacted results with the material drop in sales. This led to large inventory balances. Not the case with AEIS.
- SATCQ had some exposure to other regions outside of North America faced where there was increased competition and significant drops in inverter pricing. AEIS' exposure overseas is nil.
- SATCQ won very little new business in 2012 at the utility scale level – was losing out to competitors. AEIS is winning business.
- SATCQ cost structure is much higher than AEIS' who is a much leaner company. For instance, much of AEIS's manufacturing has been shifted to China.
- SATCQ had no other businesses to diversify away the risk it was seeing with the inverter business. AEIS has the Thin Films segment.

**Figure 90. Commercial inverter market share**

Industry Players	Q1-2012	Q2-2012	Q3-2012	Average
Satcon	43.2%	24.1%	33.2%	33.5%
Advanced Energy	30.2%	37.4%	22.6%	30.1%
SMA	11.2%	23.3%	10.3%	14.9%
Solectria	7.7%	6.8%	19.8%	11.5%
Power-One	3.7%	3.1%	2.3%	3.1%
Schneider Electric	1.1%	0.7%	4.8%	2.2%
Fronius	1.1%	2.5%	2.0%	1.9%
Enphase Energy	0.6%	1.1%	4.1%	1.9%
Siemens	0.9%	0.0%	0.0%	0.3%
KACO	0.2%	0.4%	0.2%	0.3%
Other	0.0%	0.7%	0.5%	0.4%

Source: Citi Research, GTM Research

**Thin Films' contributions to consolidated  
results will fall**

## Thin Films segment – Historical growth driver in transition

The Thin Films segment develops and makes very precise power conversion products for the Semi equipment industry and adjacent markets including solar, glass, flat panel display and industrial coating markets. Up to 2008, Thin Films comprised of all of AEIS. In fact, AEIS developed its first inverter by applying the knowledge it attained from Thin Films. The semi equipment and flat panel display markets are two key industries for Thin Films' power conversion devices – both of which are facing headwinds in the intermediate term.

Flat panel and Semi Equipment sector  
has near term headwinds

**Who does Thin Films primarily supply?** AEIS' Thin Film segment is an OEM supplier of power conversion devices for the leading processing machines including Applied Materials Inc (AMAT.O; US\$13.11; 2), Lam Research Corp (LRCX.O; US\$41.97; 2) and Tokyo Electron (8035.T; ¥3,870; 2). So, the Thin Films power conversion business is directly linked to the spending outlook of the semi equipment sector whose outlook, in turn, is highly dependent on the spending outlook of Toshiba (6502.T; ¥403; 1), Samsung Electronics (005930.KS; W1,437,000; 1), TSMC (2330.TW; NT\$103.00; 1) and Intel Corp (INTC.O; US\$21.35; 2).

**Thin Film segment is in transition; structural and cyclical factors warrant a move away from Semi and into adjacent markets.** As a reminder, the Semi power conversion business comprises of ~28% of consolidated revenue in YE 2011. With the structural and cyclical shifts occurring in the Semi equipment space, management recently has made a strategic move to diversify away from Semi power conversion products and into adjacent/derivative sectors where they can apply the knowledge attained in the semi space.

According to Citi's semi cap equipment analyst, Terence Whalen, as the semi cap industry consolidates, the top 3 spenders now comprise of ~70% of the industries spending vs. 20% 15 year ago so the 'cycle' is more a reflection of customer specific lumpiness vs. macro supply demand cycles – a structural shift. Therefore, Samsung, TSMC, Intel are the semi cap cycle. As stated prior, given the structural changes in the semi cap industry, we question whether we will ever reach the cyclical peaks highlighted by management with 23%-25% operating margins and whether the semi power conversion segment within Thin Films fits with future growth initiatives moving forward. An exit out of Semi's is not certain but a potential option. At the very least, we see this segment becoming a material lower contributor to consolidated results moving forward.

**Citi recently lowered its 2013 semi cap equipment spending outlook** (see Terence Whalen's 1/16/2013 note at [Add to Secular Quality KLAC & TER; AAPL Shuffle Makes '13 a Transition Yr, though L/T Supplier Dynamics Remain Constructive](#)). Driving the lower 2013 WFE forecast is a 13% cut to our TSMC forecast and an 11% cut to our Samsung forecast based on input from Citi's global semiconductor analysts Roland Shu, Henry Kim, and Glen Yeung, and coupled with recent news flow.

**Flat Panel Display market facing challenges as well – spending expected to remain flat to slightly down next year per Citi Analyst.** Power conversion products for the Flat Panel Display market comprise of ~6% of consolidated revenue at YE 2011. According to Citi Analyst, Henry Kim, Samsung and LG Display CAPEX for display panel will remain flattish in the coming years – a negative for Thin Films. In fact, some downside in spending outlook for 2013 is possible but there are puts and takes: (1) Reduced CAPEX for traditional a-Si TFT-LCD given the limited growth outlook in conventional TV, notebook and monitor and 2) Increased CAPEX for LTPS TFT-LCD/OLED (Samsung/LG Display for smartphone/tablet) and Oxide OLED (LG Display for TV). Also, the new generation of flat panel displays (high resolution new display technology like LTPS, Oxide and OLED) have been burdened by lower yields which is further pushing out capital investment and thus, the full migration into the next generation technology. These items highlight key challenges facing the flat panel display power conversion business within the Thin Films segment.

AEIS will continue to diversify away from  
semi power conversion business

**So what does all this mean? Time to diversify away – we maintain a tepid view through 2014.** With the key drivers of growth for Thin Films segment facing very evident structural and cyclical headwinds, management has made a more aggressive strategic push into adjacent markets where they can utilize their learning



curve for new power conversion products. While in very early stages, management has made some headway into adjacent markets including glass coating and PV solar as well as new market potentials including gas abatement, precision hard coating and food and beverage packaging. That said, given that the push to diversify away from mainly Semi's is at a very infancy stage, uncertainties remain around growth potential going forward. Therefore, for Thin Films overall, we assume very modest revenue growth through our 2014 forecast year from the estimated revenue level in 2012.

## Rating and valuation

**We are launching US research coverage of Advanced Energy Industries (Ticker AEIS) with a Buy (1H) rating and \$20 target price per share.** An ETR of 28% warrants the new Buy rating. AEIS remains a core holding for investors looking for exposure into the downstream solar market while avoiding some of the pitfalls that have impacted the upstream solar manufacturing segment - i.e. the commoditization of the module business leading to significant pricing pressure. Following the recently announced restructuring effort, AEIS has become a healthy cash generator well positioned to capitalize on the growth opportunities within the commercial and utility scale project market in North America – a region remaining early in the growth cycle (see industry sections above).

Figure 91. AEIS valuation

a	2013 EPS	\$1.06
b	P/E Multiple	14x
c = a * b	<b>Equity Value Ex Cash</b>	<b>\$14.82</b>
d	2013 Cash Balance (\$/MM)	\$193.32
e	2013 Share Count (MM)	39.6
f = d / e	Cash/Share	\$5.00
g = c + f	<b>AEIS TP</b>	<b>\$20</b>

Source: Citi Research

**Our target price for AEIS shares is \$20.** At this juncture, we apply slight premium (to account for the inverter segments above cyclical growth pattern) mid cycle semi multiple of 14.0x (12.0x mid cycle is highlighted by our semi equipment team) to our 2013 EPS estimate of \$1.06. This equates to an equity value of \$14.82/share to which we add ~\$5/share for cash on hand to arrive at our 12 month target price of \$20/share. The solar inverter business remains at a very early growth stage in the cycle and only recently has become a greater contributor to consolidated results for AEIS. As AEIS' business shifts more towards solar energy inverters and less emphasis is placed on traditional cyclical industries, we will look to employ more of a traditional sum-of-the-parts valuation methodology.

## Earnings, cash flow and other key metrics

**Our new 2012/2013/2014 EPS is \$0.59/\$1.06/\$1.62 with above consensus estimates for 2013/2014.** We attribute much of our EPS growth outlook to a more bullish view on the turn-key inverter market in North America. While global inverter prices have recently begun to show some downward pressure, AEIS's focus on North America and a wide offering of individualized turn key commercial and utility scale solutions will help mitigate the potential "commoditization" impact we have seen in the solar module business. A more rapid growth in the Thin Film business versus our tepid outlook will be additive to our EPS outlook assumptions.

Figure 92. AEIS: Citi vs. consensus

AEIS		Dec		Mar		Jun		Sept		Dec		Rating	Target Price
		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E				
Citi Est	Rev	\$111	\$450	\$115	\$126	\$139	\$142	\$522	\$597	Buy	\$20		
	EPS	\$0.15	\$0.59	\$0.14	\$0.24	\$0.33	\$0.35	\$1.06	\$1.62				
Consensus	Rev	\$112	\$451	\$101	\$113	\$127	\$134	\$482	NA	Neutral	\$15		
	EPS	\$0.16	\$0.59	\$0.11	\$0.21	\$0.30	\$0.33	\$0.95	\$1.25				

Source: Citi Research, Factset

We forecast cash balance of \$228mm by YE 2014 – modestly exceeding managements target range of \$180-\$200mm. We do not assume \$25mm in share buybacks as recently authorized. We expect cash on hand to be used more for organic and strategic acquisition opportunities.

Figure 93. AEIS key metrics

FYE: DEC	2011				2012				2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4E	Q1E	Q2E	Q3E	Q4E	Q1	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Return On Equity	19.1%	13.1%	6.2%	(2.7%)	1.1%	9.7%	6.1%	4.0%	5.7%	9.4%	12.6%	12.8%	8.9%	11.5%	16.7%	16.9%
Return on Avg Equity	28.5%	27.2%	22.6%	13.5%	9.1%	8.3%	7.8%	9.5%	10.3%	9.8%	11.2%	13.1%	13.9%	14.3%	15.3%	16.3%
Return On Invested Capital	17.9%	13.0%	9.9%	2.6%	4.6%	11.2%	8.4%	8.0%	6.1%	9.5%	12.4%	12.6%	6.7%	9.1%	14.0%	14.2%
Return On Invested Capital ex cash	27.7%	20.1%	15.5%	4.0%	7.5%	18.9%	15.6%	17.2%	12.6%	19.2%	24.4%	25.2%	14.5%	19.1%	27.3%	28.2%
Return On Assets	14.5%	10.0%	4.8%	(2.1%)	0.8%	7.2%	4.4%	3.0%	4.3%	7.1%	9.6%	9.8%	7.0%	8.9%	13.0%	13.3%
Return On Assets (12 mth)	22.2%	19.7%	16.4%	10.1%	6.9%	6.3%	5.8%	7.2%	7.9%	7.4%	8.3%	10.0%	10.7%	11.0%	11.8%	12.6%
Return On Net Assets	19.8%	13.7%	6.6%	(2.8%)	1.2%	10.3%	6.6%	5.1%	7.1%	11.6%	15.3%	16.0%	12.0%	15.1%	20.9%	21.8%
Return On Net Assets (12 mth)	34.0%	27.1%	22.0%	14.0%	9.6%	8.8%	8.4%	10.8%	12.0%	11.3%	12.9%	16.5%	18.0%	18.3%	18.9%	20.6%
Return On Sales	13.7%	9.8%	5.1%	(2.5%)	1.0%	7.7%	4.9%	3.5%	4.8%	7.5%	9.4%	9.8%	7.8%	9.5%	12.2%	12.7%
Return On Sales (12 mth)	18.4%	17.4%	15.6%	10.2%	7.4%	7.1%	6.9%	8.4%	8.8%	8.1%	9.1%	10.3%	10.9%	11.3%	12.0%	12.7%
<b>Efficiency Ratios</b>																
Sales/Total Assets	1.06	1.02	0.93	0.84	0.83	0.93	0.90	0.87	0.89	0.95	1.02	1.01	0.89	0.94	1.06	1.05
A/R Days Sales Out	80	85	94	107	89	80	79	70	70	70	70	70	70	70	70	70
Inventory Turns	3.34	3.28	3.41	3.65	3.15	3.53	3.27	4.50	4.50	4.50	4.50	4.50	4.30	4.30	4.30	4.30
Days of Inventory	109	111	107	100	116	103	112	81	81	81	81	81	85	85	85	85
Number of Employees																
Revenues Per Employee (000)																
Revenues Per Avg Employee (000)																
<b>Liquidity Ratios</b>																
Current Ratio	3.98	4.13	4.21	4.28	4.73	4.32	4.13	4.89	5.09	5.11	5.12	5.26	5.60	5.60	5.48	5.66
Quick Ratio	2.75	2.86	2.97	3.02	3.23	3.01	2.94	3.80	3.92	3.92	3.90	4.03	4.37	4.33	4.14	4.32
Net Working Capital	\$282.7	\$300.7	\$309.9	\$299.2	\$293.3	\$274.9	\$292.5	\$298.5	\$305.3	\$315.6	\$329.1	\$343.4	\$354.4	\$368.3	\$388.1	\$409.2
Long-term Debt/Equity	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%
Total Debt/Equity	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%
Op Inc/Assets, exc. Cash	7.1%	5.2%	4.3%	1.1%	1.8%	4.5%	3.5%	3.9%	2.9%	4.5%	5.8%	6.0%	3.5%	4.6%	6.8%	7.0%
Op Inc (12 mth)/Avg Assets, exc. Cash	33.9%	28.2%	24.3%	19.3%	14.2%	13.0%	11.7%	14.9%	16.2%	15.9%	17.7%	21.6%	22.6%	22.0%	22.1%	23.5%
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$8.99	\$9.41	\$9.70	\$9.35	\$9.43	\$9.29	\$9.87	\$9.78	\$9.88	\$10.16	\$10.53	\$10.92	\$11.20	\$11.57	\$12.12	\$12.69
Tangible Book Value Per Share	\$6.82	\$7.30	\$7.60	\$7.29	\$7.29	\$7.09	\$7.64	\$7.64	\$7.79	\$8.10	\$8.51	\$8.93	\$9.25	\$9.66	\$10.24	\$10.85
Cash Per Share	\$3.17	\$3.30	\$3.54	\$3.29	\$3.65	\$3.76	\$4.53	\$5.24	\$5.15	\$5.14	\$5.15	\$5.45	\$6.02	\$6.06	\$5.89	\$6.32
Net Cash Per Share	\$3.17	\$3.30	\$3.54	\$3.29	\$3.65	\$3.76	\$4.53	\$5.24	\$5.15	\$5.14	\$5.15	\$5.45	\$6.02	\$6.06	\$5.89	\$6.32

Source: Citi Research

## Key risks

- Larger global players like SMA (S92-DE) and Power-One (Ticker PWER) making a bigger push into North America's Commercial and Utility market – which could put pressure on AEIS' margins and pricing power.
- Turn Key inverter commercial and utility scale projects becoming commoditized - similar to the module manufacturing business – putting pressure on system wide ASP's.
- Semiconductor equipment downturn continues past 2013 – placing more margin pressure on Thin Film segments semi power conversion business.
- The strategic move to diversify away from power conversion products for semiconductors into derivative sectors within the Thin Films fails to materialize or takes longer than anticipated.

Additional risk factors include:

- Low earnings stability and, with a Beta of 1.5, high stock price volatility.
- AEIS derives a significant portion of its revenue from the highly cyclical semiconductor industry and has exposure to other volatile markets such as flat panel display. Any unexpected drop in semiconductor demand or delays/cancellations in new fab projects or expansion could significantly lower demand for AEIS products.



- AEIS may face further margin erosion in its solar inverter business, particularly if solar demand growth is slower than industry's inverter production expansion.
- AEIS also is subject to competitive pricing pressure.
  - For its inverter business, AEIS's European competitors may choose to compete in US market which is dominated by AEIS right now, causing a pricing war for market share.
  - On semi side, as its OEM customers look to increase the proportion of their outsourced components, specifically in the form of subsystems, AEIS faces the risk of share loss should it not be able to offer its customers a complete solution similar to those being offered by some of its top rivals.

## Management Bio

### **Garry W. Rogerson - Chief Executive Officer**

Garry W. Rogerson joined Advanced Energy in August 2011 as chief executive officer and board member. Mr. Rogerson was chairman and chief executive officer of Varian, Inc., a major supplier of scientific instruments and consumable laboratory supplies, vacuum products, and services, from 2009 and 2004, respectively, until the purchase of Varian by Agilent Technologies, Inc., in May 2010. Mr. Rogerson served as Varian's chief operating officer from 2002 to 2004; as senior vice president, scientific instruments, from 2001 to 2002; and as vice president, analytical instruments, from 1999 to 2001. Mr. Rogerson received an honors degree and Ph.D. in biochemistry from the University of Kent at Canterbury. Mr. Rogerson is also the chairman of Coherent, Inc., a position he has held since 2007.

### **Yuval Wasserman - President, AE Thin Films**

Yuval Wasserman joined Advanced Energy in August 2007 as senior vice president, sales, marketing, and service. In October 2007, he was promoted to executive vice president, sales, marketing, and service. In April 2009, he was promoted to executive vice president and chief operating officer of the company, and then in August 2011, he was promoted to president of the thin films business unit. Beginning in May 2002, Mr. Wasserman served as the president and later as chief executive officer of Tevet Process Control Technologies, Inc., a semiconductor metrology company, until July 2007. Prior to that, he held senior executive and general management positions at Boxer Cross (a metrology company acquired by Applied Materials, Inc.), Fusion Systems (a plasma strip company that is a division of Axcelis Technologies, Inc.), and AG Associates (a semiconductor capital equipment company focused on rapid thermal processing). Mr. Wasserman started his career at National Semiconductor, Inc., where he held various process engineering and management positions. Mr. Wasserman joined the board of Synchroness, Inc., an outsourced engineering and product development company in 2010.

### **Gordon Tredger - President, AE Solar Energy**

Gordon Tredger joined Advanced Energy in December 2011, bringing nearly 25 years of technology management experience to the Solar Energy division. He served most recently as executive vice president of operations at the Chemical Analysis Division of Bruker Daltonics, a leading provider of high-performance scientific instruments and solutions, and as vice president of analytical instruments at Varian Inc., a leading worldwide supplier of scientific instrumentation. Mr. Tredger held prior executive roles at Argonaut Technologies, Perkin-Elmer Instruments, and

Photovac (acquired by Perkin-Elmer). Mr. Tredger received a Bachelor of Arts degree from the University of Toronto in Ontario, Canada.

**Danny C. Herron - Executive Vice President and Chief Financial Officer**

Danny C. Herron joined Advanced Energy in September 2010 as executive vice president and chief financial officer. He was chief financial officer of Sundrop Fuels, Inc., a solar gasification-based renewable fuels company, from October 2009 through August 2010. From May 2009 through October 2009, Mr. Herron was a consultant at Tatum LLC, a financial consulting business, providing interim chief financial officer and financial consulting services. Mr. Herron served VeraSun Energy Corporation, a corn-based ethanol company, from 2006 through 2008 first as senior vice president and chief financial officer and later as president and chief financial officer. From 2002 through 2006, Mr. Herron was executive vice president and chief financial officer at Swift & Company, a beef and pork producer acquired from Conagra Foods, Inc. Prior to that, Mr. Herron served as division chief financial officer of Conagra Foods, Inc., Beef Division.

**Financial models**

Figure 94. AEIS income statement model

	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2009 FY	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2010 FY	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2011 FY	2012 Q1	2012 Q2	2012 Q3	2012 Q4E	2012 FYE	2013 Q1E	2013 Q2E	2013 Q3E	2013 Q4E	2013 FYE	2014 FYE
<b>Total Revenues</b>	<b>32,627</b>	<b>35,567</b>	<b>51,762</b>	<b>66,439</b>	<b>186,395</b>	<b>81,552</b>	<b>100,107</b>	<b>140,968</b>	<b>148,653</b>	<b>471,278</b>	<b>137,652</b>	<b>138,154</b>	<b>128,498</b>	<b>112,495</b>	<b>516,799</b>	<b>105,787</b>	<b>115,658</b>	<b>117,515</b>	<b>110,875</b>	<b>449,835</b>	<b>115,314</b>	<b>126,189</b>	<b>139,133</b>	<b>141,644</b>	<b>522,280</b>	<b>596,829</b>
Q1Q (%)	(51.7%)	9.0%	45.8%	28.4%	(43.3%)	22.7%	22.8%	40.8%	5.5%	(17.4%)	0.4%	(7.0%)	(12.3%)	(12.3%)	9.7%	(6.0%)	9.3%	1.6%	(5.7%)	-13.0%	4.0%	9.4%	10.3%	1.8%	1.8%	1.8%
Y/Y (%)	(63.3%)	(59.6%)	(38.8%)	(1.8%)	(43.3%)	150.0%	181.5%	172.3%	123.7%	152.8%	68.8%	38.0%	(8.8%)	(24.3%)	9.7%	(23.1%)	(16.3%)	(8.5%)	(1.4%)	9.7%	9.0%	9.1%	18.4%	27.8%	16.1%	14.3%
Cost of Goods	26,239	27,636	36,181	41,972	132,028	48,069	55,159	79,861	83,389	266,478	75,059	82,097	79,006	72,974	309,136	65,402	71,023	71,321	67,634	275,379	71,495	76,344	83,480	84,986	316,305	361,081
<b>Gross Margin</b>	<b>6,388</b>	<b>7,931</b>	<b>15,581</b>	<b>24,467</b>	<b>54,367</b>	<b>33,483</b>	<b>44,948</b>	<b>61,105</b>	<b>65,264</b>	<b>204,800</b>	<b>62,593</b>	<b>56,057</b>	<b>49,492</b>	<b>39,521</b>	<b>207,663</b>	<b>40,385</b>	<b>44,635</b>	<b>46,194</b>	<b>43,241</b>	<b>174,456</b>	<b>43,820</b>	<b>49,844</b>	<b>55,653</b>	<b>56,657</b>	<b>205,975</b>	<b>235,747</b>
GM (%)	19.6%	22.3%	30.1%	36.8%	29.2%	41.1%	44.9%	43.3%	43.9%	43.5%	45.5%	40.6%	38.5%	35.1%	40.2%	38.2%	38.6%	39.3%	39.0%	38.8%	38.0%	39.5%	40.0%	40.0%	39.4%	39.5%
Incremental GM (%)	NM	52.5%	47.2%	60.5%	NM	59.7%	61.8%	39.5%	54.1%	52.8%	NM	-1302.0%	NM	NM	6.3%	NM	43.1%	83.9%	NM	NM	13.0%	55.4%	44.9%	40.0%	43.5%	39.9%
R&D	10,848	10,492	9,945	10,977	42,262	10,840	12,737	15,842	14,233	53,652	14,766	15,777	16,303	13,126	59,972	13,833	12,689	13,630	15,000	55,152	15,000	15,500	16,000	16,000	62,500	71,619
% of Sales	33.2%	29.5%	19.2%	16.5%	22.7%	13.3%	12.7%	11.2%	9.6%	11.4%	10.7%	11.4%	12.7%	11.7%	11.6%	13.1%	11.0%	11.6%	13.5%	12.3%	13.0%	12.3%	11.5%	11.3%	12.0%	12.0%
SG&A	9,145	9,916	10,538	10,885	40,494	12,533	16,405	19,715	23,544	72,197	19,809	18,641	15,194	21,076	74,710	18,777	14,893	18,875	15,000	67,545	18,280	18,280	18,280	18,280	73,119	77,588
% of Sales	28.0%	27.9%	20.4%	16.4%	21.7%	15.4%	16.4%	14.0%	15.8%	15.3%	14.4%	13.5%	11.8%	18.7%	14.5%	17.7%	12.9%	16.1%	13.5%	15.0%	15.9%	14.5%	13.1%	12.9%	14.0%	13.0%
Amortization of Intangibles	0.222	0.120	0.123	0.148	0.613	0.122	0.767	1.177	0.920	2.986	0.921	0.921	0.989	1.021	3.852	1.372	1.351	1.416	1.416	5.555	1.416	1.416	1.416	1.416	5.664	5.664
BLF	20,215	20,528	20,606	22,010	83,359	23,495	29,909	36,734	38,696	128,834	35,496	35,340	32,476	35,223	138,535	33,982	28,933	33,921	31,416	128,252	34,696	35,196	35,696	35,696	141,283	154,871
<b>Operating Margin</b>	<b>(13,827)</b>	<b>(12,597)</b>	<b>(5,025)</b>	<b>2,457</b>	<b>(28,992)</b>	<b>9,988</b>	<b>15,039</b>	<b>24,371</b>	<b>26,568</b>	<b>75,966</b>	<b>27,097</b>	<b>20,717</b>	<b>17,016</b>	<b>4,298</b>	<b>69,128</b>	<b>6,403</b>	<b>15,702</b>	<b>12,273</b>	<b>11,825</b>	<b>46,203</b>	<b>9,124</b>	<b>14,649</b>	<b>19,958</b>	<b>20,962</b>	<b>64,692</b>	<b>80,876</b>
OpM (%)	-42.4%	-35.4%	-9.7%	3.7%	-15.6%	12.2%	15.0%	17.3%	17.9%	16.1%	19.7%	15.0%	13.2%	3.8%	13.4%	6.1%	13.6%	10.4%	10.7%	10.3%	7.9%	11.6%	14.3%	14.8%	12.4%	13.6%
Incremental OpM (%)	NM	41.8%	46.8%	51.0%	NM	49.8%	27.2%	22.8%	28.6%	36.8%	NM	-1270.9%	NM	NM	-15.0%	NM	NM	-184.7%	NM	NM	-60.9%	50.8%	41.0%	40.0%	25.5%	21.7%
Other Income (Exp)	0.282	0.627	0.506	0.495	1.910	0.386	0.220	1.224	0.392	2.222	0.663	0.092	(0.259)	0.721	1.217	0.411	1.775	0.065	0.803	3.054	0.955	0.954	0.956	0.956	3.822	19,662
Interest Income	0.544	0.692	0.571	0.560		0.451	0.285	1.289	0.457	2.483	0.728	0.157	(0.194)	0.786	1.478	0.476	1.840	0.130	0.868	3.315	1.021	1.019	1.021	1.021	4.083	20,707
FX Gain (Loss)	(0.065)	(0.065)	(0.065)	(0.065)		(0.065)	(0.065)	(0.065)	(0.065)	(0.261)	(0.065)	(0.065)	(0.065)	(0.065)	(0.261)	(0.065)	(0.065)	(0.065)	(0.065)	(0.261)	(0.065)	(0.065)	(0.065)	(0.065)	(0.261)	(1.046)
Other, net	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit Before Taxes	(13,545)	(11,970)	(4,519)	2,952	(27,082)	10,374	15,259	25,595	26,960	78,188	27,760	20,809	16,757	5,019	70,345	6,814	17,477	12,338	12,628	49,257	10,079	15,603	20,914	21,918	68,513	100,538
Taxes	(0.938)	2,825	3,177	0.923	5.987	2,282	1,857	5,964	4,624	14,727	6,254	3,898	4,227	1,331	15,710	1,292	5,688	2,416	4,420	13,816	3,024	4,681	6,274	6,575	20,554	30,161
Eff Tax Rate (%)	6.9%	0.0%	0.0%	31.3%	(22.1%)	22.0%	12.2%	23.3%	17.2%	18.8%	22.5%	18.7%	25.2%	26.5%	22.3%	19.0%	32.5%	19.6%	35.0%	28.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Stock Based Compensation	0.500	0.500	0.500	0.500	2.000	1.875	1.945	2.075	2.606	8.501	2.740	3.399	3.223	3.167	12,529	3,205	4,532	2,335	2,335	12,407	1,500	1,500	1,500	1,500	6,000	6,000
Other After Tax	-	-	-	-	-	-	2.162	-	-	2.162	0.140	0.074	(0.579)	(0.175)	(0.540)	0.303	0.127	-	-	0.430	-	-	-	-	-	-
Extraordinary Item	66,656	0.739	0.235	0.006	67,636	-	-	(2,392)	(11,678)	(14,070)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Income-Ops	(12,607)	(14,795)	(7,696)	2,029	(33,969)	8,092	15,564	19,631	22,336	65,623	21,646	16,995	11,951	3,513	54,995	5,825	11,916	9,922	8,208	35,871	7,055	10,922	14,640	15,342	47,959	70,377
GAAP Net Income	(79,753)	(16,034)	(8,431)	1,523	(102,705)	6,217	13,619	19,948	31,408	71,192	18,906	13,686	6,592	(2,770)	36,314	1,069	8,928	5,735	3,873	19,605	5,555	9,422	13,140	13,842	41,959	64,377
<b>EPS-Ops (exc SBC)</b>	<b>\$ (0.301)</b>	<b>\$ (0.353)</b>	<b>\$ (0.183)</b>	<b>\$ 0.048</b>	<b>\$ (0.786)</b>	<b>\$ 0.190</b>	<b>\$ 0.359</b>	<b>\$ 0.448</b>	<b>\$ 0.510</b>	<b>\$ 1.507</b>	<b>\$ 0.490</b>	<b>\$ 0.384</b>	<b>\$ 0.273</b>	<b>\$ 0.081</b>	<b>\$ 1.231</b>	<b>\$ 0.141</b>	<b>\$ 0.301</b>	<b>\$ 0.259</b>	<b>\$ 0.209</b>	<b>\$ 0.905</b>	<b>\$ 0.178</b>	<b>\$ 0.276</b>	<b>\$ 0.369</b>	<b>\$ 0.387</b>	<b>\$ 1.210</b>	<b>\$ 1.776</b>
GAAP EPS	\$ (1.905)	\$ (0.382)	\$ (0.201)	\$ 0.036	\$ (2.441)	\$ 0.146	\$ 0.314	\$ 0.455	\$ 0.717	\$ 1.632	\$ 0.428	\$ 0.307	\$ 0.150	\$ (0.064)	\$ 0.826	\$ 0.026	\$ 0.226	\$ 0.150	\$ 0.098	\$ 0.495	\$ 0.140	\$ 0.238	\$ 0.332	\$ 0.349	\$ 1.059	\$ 1.624
Basic Shares Outstanding																										
<b>Diluted Shares Outstanding</b>	<b>41,881</b>	<b>41,948</b>	<b>42,004</b>	<b>42,464</b>	<b>42,074</b>	<b>42,680</b>	<b>43,327</b>	<b>43,849</b>	<b>43,796</b>	<b>43,413</b>	<b>44,133</b>	<b>44,187</b>	<b>43,819</b>	<b>43,546</b>	<b>43,954</b>	<b>41,292</b>	<b>39,583</b>	<b>38,330</b>	<b>39,330</b>	<b>39,634</b>	<b>39,634</b>	<b>39,634</b>	<b>39,634</b>	<b>39,634</b>	<b>39,634</b>	<b>39,634</b>
Year weighted shares																										
<b>TTM EPS (Ops) (inc SBC)</b>	<b>(0.001)</b>	<b>(0.514)</b>	<b>(0.848)</b>	<b>(0.837)</b>		<b>(0.378)</b>	<b>0.301</b>	<b>0.896</b>	<b>1.311</b>		<b>1.594</b>	<b>1.587</b>	<b>1.386</b>	<b>0.943</b>		<b>0.578</b>	<b>0.457</b>	<b>0.456</b>	<b>0.597</b>		<b>0.674</b>	<b>0.725</b>	<b>0.859</b>	<b>1.059</b>		
TTM Revs	272.7	220.2	187.5	186.4		235.3	299.9	389.1	471.3		527.4	565.4	553.0	516.8		484.9	462.4	451.5	449.8		459.4	469.9	491.5	522.3		
TTM OpM	0%	-9%	-16%	-16%		(0.0)	0.1	0.1	0.2		0.2	0.2	0.2	0.1		0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1		
TTM GM	37%	33%	28%	29%		0.3	0.4	0.4	0.4		0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4		
<b>EPS-Ops (inc SBC)</b>	<b>\$ (0.313)</b>	<b>\$ (0.365)</b>	<b>\$ (0.195)</b>	<b>\$ 0.036</b>	<b>\$ (0.834)</b>	<b>\$ 0.146</b>	<b>\$ 0.314</b>	<b>\$ 0.400</b>	<b>\$ 0.450</b>	<b>\$ 1.316</b>	<b>\$ 0.428</b>	<b>\$ 0.307</b>	<b>\$ 0.199</b>	<b>\$ 0.008</b>	<b>\$ 0.946</b>	<b>\$ 0.063</b>	<b>\$ 0.187</b>	<b>\$ 0.198</b>	<b>\$ 0.149</b>	<b>\$ 0.592</b>	<b>\$ 0.140</b>	<b>\$ 0.238</b>	<b>\$ 0.332</b>	<b>\$ 0.349</b>	<b>\$ 1.059</b>	<b>\$ 1.624</b>

Source: Citi Research

Units in \$mm unless noted

Figure 95. AEIS balance sheet model

	2009				2010				2011				2012				2013				2014			
FYE: DEC	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4E	Q1E	Q2E	Q3E	Q4E	Q1	Q2E	Q3E	Q4E
Assets																								
Cash & Securities	\$145.00	\$175.31	\$177.28	\$177.51	\$163.45	\$128.86	\$112.40	\$140.55	\$140.04	\$145.69	\$154.92	\$143.21	\$150.74	\$149.02	\$173.66	\$206.26	\$204.16	\$203.89	\$204.29	\$215.95	\$238.60	\$240.00	\$233.39	\$250.30
Accounts Receivable	35.58	32.30	37.16	50.27	61.90	75.18	112.46	119.89	121.24	128.80	132.05	132.49	103.41	100.85	101.41	85.29	88.70	97.07	107.03	108.96	97.78	106.74	125.79	128.79
Inventories	46.02	39.81	36.47	37.12	47.72	56.61	66.69	77.59	90.11	100.39	92.82	80.28	83.16	80.61	87.61	60.28	63.73	68.05	74.41	75.75	71.73	78.31	92.28	94.48
Other Current Assets	17.43	15.35	9.63	14.86	18.81	50.14	53.17	23.73	26.30	21.77	26.65	34.51	34.60	27.35	23.34	23.34	23.34	23.34	23.34	23.34	23.34	23.34	23.34	23.34
Total Current Assets	244.03	262.77	260.55	279.76	291.87	310.79	344.71	361.77	377.69	396.65	406.44	390.49	371.92	357.83	386.03	375.17	379.93	392.35	409.06	423.99	431.45	448.40	474.80	496.91
Net PP&E	29.96	29.39	29.92	30.62	29.58	22.24	24.73	34.57	36.21	38.41	40.84	42.34	41.25	39.67	38.78	40.36	42.05	44.11	46.59	49.07	50.91	53.13	56.23	59.37
Other Assets	49.94	22.59	28.61	34.76	31.70	127.22	126.45	108.82	107.90	106.95	106.15	100.55	99.32	98.07	96.85	95.43	94.02	92.60	91.18	89.77	88.35	86.94	85.52	84.10
Total Assets	\$323.93	\$314.74	\$319.07	\$345.13	\$353.15	\$460.25	\$495.89	\$505.16	\$521.80	\$542.00	\$553.43	\$533.38	\$512.49	\$495.57	\$521.65	\$510.96	\$516.00	\$529.05	\$546.83	\$562.83	\$570.71	\$588.47	\$616.55	\$640.38
Liab. & Shareholders' Equity																								
Short-Term Debt	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other Current Liabilities	27.93	28.08	34.18	47.98	50.90	106.76	114.93	102.33	94.98	95.96	96.56	91.24	78.61	82.91	93.57	76.67	74.65	76.79	79.92	80.58	77.03	80.13	86.72	87.75
Total Current Liabilities	27.93	28.08	34.18	47.98	50.90	106.76	114.93	102.33	94.98	95.96	96.56	91.24	78.61	82.91	93.57	76.67	74.65	76.79	79.92	80.58	77.03	80.13	86.72	87.75
Long-Term Debt	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Liabilities	10.58	11.54	11.66	18.81	18.69	42.86	43.22	28.86	29.96	30.39	31.78	34.80	44.32	44.90	49.61	49.61	49.61	49.61	49.61	49.61	49.61	49.61	49.61	49.61
Total Liabilities	38.58	39.62	45.83	66.79	69.58	149.62	158.15	131.19	124.94	126.35	128.33	126.04	122.94	127.81	143.18	126.28	124.26	126.39	129.53	130.19	126.64	129.74	136.32	137.36
Shareholders' Equity	285.35	275.12	273.24	278.33	283.57	310.63	337.74	373.97	396.86	415.65	425.10	407.34	389.55	367.76	378.48	384.68	391.74	402.66	417.30	432.64	444.08	458.73	480.23	503.02
Total Liab. and Equity	\$323.93	\$314.74	\$319.07	\$345.13	\$353.15	\$460.25	\$495.89	\$505.16	\$521.80	\$542.00	\$553.43	\$533.38	\$512.49	\$495.57	\$521.65	\$510.96	\$516.00	\$529.05	\$546.83	\$562.83	\$570.71	\$588.47	\$616.55	\$640.38

Source: Citi Research

Units in \$mm unless noted

Figure 96. AEIS rolling 12M P&L

	Q1-2009	Q2-2009	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4E-2012	Q1E-2013	Q2E-2013	Q3E-2013	Q4E-2013	Q1E-2014	Q2E-2014	Q3E-2014	Q4E-2014
<b>Total Revenues</b>	\$272.7	\$220.2	\$187.5	\$186.4	\$235.3	\$299.9	\$389.1	\$471.3	\$527.4	\$565.4	\$553.0	\$516.8	\$484.9	\$462.4	\$451.5	\$449.8	\$459.4	\$469.9	\$491.5	\$522.3	\$534.1	\$546.7	\$571.0	\$596.8
- % of Revenue	-17.1%	-19.2%	-14.9%	-0.6%	28.2%	27.4%	29.7%	21.1%	11.9%	7.2%	-2.2%	-6.5%	-6.2%	-4.6%	-2.4%	-0.4%	2.1%	2.3%	4.6%	6.3%	2.3%	2.4%	4.5%	4.3%
- Sequential Change	-25.6%	-37.3%	-45.7%	-43.3%	-13.7%	36.2%	107.5%	152.8%	124.1%	88.6%	-1.1%	9.7%	-8.0%	-18.2%	-18.4%	-13.0%	-5.3%	1.6%	8.9%	16.1%	16.3%	16.2%	14.3%	
- Yr to Yr Change																								
<b>Cost of Goods</b>	\$172.2	\$147.2	\$134.1	\$132.0	\$153.9	\$181.4	\$225.1	\$266.5	\$293.5	\$320.4	\$319.6	\$309.1	\$299.5	\$288.4	\$280.7	\$275.4	\$281.5	\$286.8	\$299.0	\$316.3	\$321.7	\$329.3	\$344.8	\$361.1
- % of Revenue	63.2%	66.8%	71.5%	70.8%	65.4%	60.5%	57.8%	56.5%	55.6%	56.7%	57.8%	59.8%	61.8%	62.4%	62.2%	61.2%	61.3%	61.9%	60.8%	60.6%	60.2%	60.2%	60.4%	60.5%
<b>Gross Margin</b>	\$100.4	\$73.1	\$53.4	\$54.4	\$81.5	\$118.5	\$164.0	\$204.8	\$233.9	\$245.0	\$233.4	\$207.7	\$185.5	\$174.0	\$170.7	\$174.5	\$177.9	\$183.1	\$192.6	\$212.4	\$217.3	\$226.3	\$235.7	\$235.7
- % of Revenue	36.8%	33.2%	28.5%	29.2%	34.6%	39.5%	42.2%	43.5%	44.4%	43.1%	42.2%	40.2%	38.2%	37.6%	37.8%	38.8%	38.7%	39.0%	39.2%	39.4%	39.8%	39.8%	39.6%	39.5%
- Sequential Change	(22.7%)	-27.2%	-24.9%	1.8%	49.8%	45.4%	38.4%	24.9%	14.2%	4.7%	-4.7%	-11.0%	(10.7%)	-6.2%	-1.9%	2.2%	2.0%	2.9%	5.2%	7.0%	3.1%	2.3%	4.1%	4.2%
- Yr to Yr Change	-34.2%	-48.9%	-61.6%	-58.1%	-18.9%	62.1%	207.1%	276.7%	187.1%	106.8%	42.3%	1.4%	-20.7%	-29.0%	-26.9%	-16.0%	-4.1%	5.2%	12.8%	18.1%	19.4%	18.7%	17.5%	14.5%
- Basis Sequential	(266)	(365)	(470)	69	545	489	264	130	90	102	(112)	(203)	(194)	(61)	19	96	(6)	24	21	26	33	(1)	(13)	(12)
- Basis Yr to Yr	(482)	(730)	(1,184)	(1,012)	(221)	633	1,367	1,429	974	382	6	(127)	(611)	(570)	(439)	(140)	48	133	136	66	104	79	45	6
<b>R&amp;D</b>	\$52.0	\$48.9	\$44.5	\$42.3	\$42.3	\$44.5	\$50.4	\$53.7	\$57.6	\$60.6	\$61.1	\$60.0	\$59.0	\$56.0	\$53.3	\$55.2	\$56.3	\$59.1	\$61.5	\$62.5	\$65.4	\$67.8	\$69.7	\$71.6
- % of Revenue	19.1%	22.2%	23.7%	22.7%	18.0%	14.8%	13.0%	11.4%	10.9%	10.7%	11.0%	11.6%	12.2%	12.1%	11.8%	12.3%	12.3%	12.6%	12.9%	12.0%	12.2%	12.4%	12.2%	12.0%
- Sequential Change	(3.7%)	-5.8%	-4.2%	-4.9%	(0.0%)	5.2%	13.3%	6.5%	7.3%	5.2%	0.8%	-1.8%	(1.6%)	-5.2%	-4.8%	3.5%	2.1%	5.0%	4.0%	1.6%	4.6%	3.7%	2.8%	2.7%
- Yr to Yr Change	3.0%	-4.6%	-16.2%	-21.7%	-18.7%	-9.1%	13.4%	26.9%	36.3%	36.2%	21.2%	11.8%	1.2%	-7.7%	-12.8%	-8.0%	-4.6%	5.7%	15.4%	13.3%	16.1%	14.7%	13.4%	14.0%
- Basis Sequential	266	317	149	(104)	(472)	(312)	(189)	(157)	(47)	(20)	33	56	57	(8)	(30)	46	(0)	32	(7)	(55)	28	16	(20)	(21)
- Basis Yr to Yr	529	762	835	627	(110)	(738)	(1,076)	(1,129)	(704)	(412)	(191)	22	126	138	76	66	9	48	71	(29)	(1)	(18)	(30)	3
<b>SG&amp;A</b>	\$46.2	\$42.4	\$38.9	\$40.5	\$43.9	\$50.4	\$59.5	\$72.2	\$79.5	\$81.7	\$77.2	\$74.7	\$73.7	\$69.9	\$73.6	\$67.5	\$67.0	\$70.4	\$69.8	\$73.1	\$74.2	\$75.4	\$76.5	\$77.6
- % of Revenue	16.9%	19.3%	20.7%	21.7%	18.6%	16.8%	15.3%	15.3%	15.1%	14.5%	14.0%	14.5%	15.2%	15.1%	16.3%	15.0%	14.6%	15.0%	14.2%	14.0%	13.9%	13.8%	13.4%	13.0%
- Sequential Change	(9.9%)	-8.2%	-4.4%	4.2%	8.4%	14.8%	18.2%	21.1%	10.1%	2.8%	-5.5%	-3.2%	(1.4%)	-5.1%	5.3%	-8.3%	-1.5%	4.3%	4.7%	1.5%	1.3%	1.5%	1.5%	1.5%
- Yr to Yr Change	-23.6%	-28.2%	-32.8%	-21.0%	-5.0%	18.7%	53.2%	78.3%	81.1%	62.2%	29.6%	3.5%	-7.3%	-14.4%	-8.2%	-9.6%	-9.0%	0.7%	-5.1%	8.3%	10.7%	7.0%	9.5%	6.1%
- Basis Sequential	136	231	147	99	(308)	(185)	(149)	2	(25)	(62)	(49)	50	74	(7)	119	(129)	(42)	39	(78)	(21)	(10)	(12)	(39)	(100)
- Basis Yr to Yr	43	245	398	613	170	(246)	(543)	(640)	(357)	(234)	(135)	(86)	12	67	235	56	(60)	(13)	(210)	(102)	(70)	(121)	(82)	(100)
<b>BLE</b>	\$98.2	\$91.4	\$83.3	\$82.7	\$86.1	\$94.9	\$109.9	\$125.8	\$137.1	\$142.3	\$138.3	\$134.7	\$132.7	\$125.9	\$126.9	\$122.7	\$123.4	\$129.6	\$131.3	\$135.6	\$139.6	\$143.2	\$146.2	\$149.2
- % of Revenue	36.0%	41.5%	44.4%	44.4%	36.6%	31.6%	28.3%	26.7%	26.0%	25.2%	25.0%	26.1%	25.7%	27.2%	28.1%	27.3%	26.9%	27.6%	26.7%	26.0%	25.1%	25.0%	25.6%	25.0%
- Sequential Change	(6.7%)	-6.9%	-8.8%	-0.7%	4.1%	10.1%	15.9%	14.5%	8.9%	3.9%	-2.9%	-2.6%	(1.5%)	-5.2%	0.8%	-3.3%	1.4%	3.5%	1.4%	3.3%	3.0%	2.5%	2.1%	2.1%
- Yr to Yr Change	-11.5%	-17.2%	-24.9%	-21.4%	-12.3%	3.8%	31.9%	52.1%	59.1%	50.0%	25.8%	7.0%	-2.3%	-11.6%	-8.2%	-8.9%	-7.0%	2.9%	3.9%	10.5%	12.3%	10.5%	11.3%	10.0%
- Basis Sequential	401	548	296	(5)	(779)	(496)	(338)	(155)	(72)	(82)	(17)	106	131	(15)	89	(83)	(42)	72	(85)	(75)	18	4	(59)	(60)
- Basis Yr to Yr	571	1,007	1,233	1,240	60	(985)	(1,619)	(1,769)	(1,061)	(546)	(325)	(64)	138	205	311	122	(51)	35	(139)	(131)	(71)	(138)	(112)	(97)
<b>Operating Margin</b>	\$2.3	(\$18.3)	(\$29.9)	(\$28.4)	(\$4.7)	\$23.6	\$54.1	\$79.0	\$96.9	\$102.7	\$95.1	\$73.0	\$52.7	\$48.2	\$43.8	\$51.8	\$54.5	\$53.5	\$61.2	\$70.4	\$72.7	\$74.2	\$80.1	\$86.5
- % of Revenue	0.8%	-8.3%	-16.0%	-15.2%	-2.0%	7.9%	13.9%	16.8%	18.4%	18.2%	17.2%	14.1%	10.9%	10.4%	9.7%	11.5%	11.9%	11.4%	12.5%	13.5%	13.6%	13.6%	14.0%	14.5%
- Sequential Change	(90.8%)	-909.9%	63.7%	-5.2%	(63.6%)	406.4%	128.9%	46.0%	22.7%	6.0%	-7.3%	-23.3%	(27.7%)	-8.7%	-9.0%	18.1%	5.3%	-1.8%	14.4%	14.9%	3.4%	2.6%	8.0%	8.1%
- Yr to Yr Change	-94.6%	-156.2%	-202.6%	-21.1%	-38.6%	-229.2%	-280.7%	-378.2%	-217.8%	-334.8%	-76.0%	-21.6%	-45.6%	-51.1%	-53.9%	-29.1%	3.4%	11.2%	39.7%	35.9%	33.4%	38.5%	30.8%	23.0%
- Basis Sequential	(667)	(913)	(766)	74	1,324	986	602	286	161	(20)	(95)	(309)	(245)	(44)	(70)	180	36	(48)	106	102	15	(5)	46	48
- Basis Yr to Yr	(1,053)	(1,757)	(2,417)	(2,272)	(281)	1,618	2,986	3,198	2,035	1,029	331	(263)	(749)	(773)	(750)	(262)	99	98	275	196	175	217	157	103
<b>Other Income (Exp)</b>	\$2.3	\$1.9	\$2.0	\$1.9	\$2.0	\$1.6	\$2.3	\$2.2	\$2.5	\$2.4	\$0.9	\$1.2	\$1.0	\$2.6	\$3.0	\$3.1	\$3.6	\$2.8	\$3.7	\$3.8	\$7.7	\$11.6	\$15.5	\$19.7
- % of Revenue	0.8%	0.9%	1.0%	1.0%	0.9%	0.5%	0.6%	0.5%	0.5%	0.4%	0.2%	0.2%	0.2%	0.6%	0.7%	0.7%	0.8%	0.6%	0.7%	0.7%	1.4%	2.1%	2.7%	3.3%
- Sequential Change	(21.6%)	-16.3%	4.1%	-2.9%	5.4%	-20.2%	44.7%	-4.4%	12.5%	-5.1%	-62.5%	37.0%	(20.7%)	174.4%	12.2%	2.8%	17.8%	-22.8%	32.1%	4.2%	101.7%	50.4%	33.6%	27.0%
- Yr to Yr Change	-45.7%	-40.2%	-47.8%	-33.7%	-10.9%	-15.0%	18.1%	16.3%	24.1%	47.5%	-61.8%	-45.2%	-41.4%	11.7%	234.7%	150.9%	272.9%	4.9%	23.4%	25.1%	114.2%	317.3%	322.6%	414.5%
- Basis Sequential	(5)	3	19	(3)	(17)	(32)	6	(13)	0	(5)	(26)	7	(4)	37	9	2	10	(19)	16	(1)	71	68	59	58
- Basis Yr to Yr	(31)	(18)	(4)	15	3	(32)	(45)	(55)	(38)	(12)	(44)	(24)	(27)	15	50	44	58	2	9	5	66	153	196	256
<b>Profit Before Taxes</b>	\$4.5	(\$16.4)	(\$28.0)	(\$26.5)	(\$2.7)	\$25.2	\$55.4	\$81.2	\$99.4	\$105.1	\$96.0	\$74.2	\$53.7	\$50.8	\$46.8	\$54.8	\$58.1	\$56.3	\$64.9	\$74.2	\$80.4	\$85.8	\$95.6	\$106.2
- % of Revenue	1.7%	-7.4%	-14.9%	-14.2%	-1.1%	8.4%	14.5%	17.2%	18.8%	18.6%	17.4%	14.4%	11.1%	11.0%	10.4%	12.2%	12.7%	12.0%	13.2%	14.2%	15.1%	15.7%	16.7%	17.8%
- Sequential Change	(63.6%)	-462.8%	70.8%	-5.3%	(90.0%)	-1051.9%	123.6%	43.9%	22.4%	5.7%	-8.6%	-22.7%	(27.6%)	-5.4%	-7.9%	17.1%	6.0%	-3.1%	15.2%	14.3%	8.4%	6.6%	11.4%	11.1%
- Yr to Yr Change	-90.1%	-145.3%	-187.1%	-196.1%	-158.7%	-253.9%	-301.7%	-406.7%	-348.6%	-316.5%	-70.3%	-61.6%	-66.0%	-61.6%	-51.3%	-26.1%	8.2%	10.9%	38.4%	55.3%	38.4%	42.3%	47.3%	43.2%
- Basis Sequential	(672)	(910)	(747)	71	1,307	954	608	273	162	(26)	(121)	(801)	(328)	(9)	(62)	182	47	(67)	122	100	86	63	105	106
- Basis Yr to Yr	(1,084)	(1,775)	(2,421)	(2,257)	(278)	1,585	2,941	3,142	1,997	1,017	287	(287)	(777)	(760)	(600)	(217)	158	100	283	202	241	370	553	339
<b>Taxes</b>	\$1.5	\$2.3	\$4.9	\$6.0	\$9.2	\$8.2	\$11.0	\$14.7	\$18.7	\$20.7	\$19.0	\$15.7	\$10.7	\$12.5	\$10.7	\$13.8	\$15.5	\$14.5	\$18.4	\$20.6	\$22.4	\$24.0	\$27.0	\$30.2
- Tax Rate																								
<b>Other After Tax Extraordinary Item</b>	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$2.2	\$2.2	\$2.2	\$2.3	\$0.2	(\$0.4)	(\$0.5)	(\$0.4)	(\$0.3)	\$0.3	\$0.4	\$0.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>Net Income-Ops</b>	\$87.6	\$87.9	\$87.6	\$87.6	\$1.0	\$0.2	(\$2.4)	(\$14.1)	(\$14.1)	(\$14.1)	(\$9.5)	\$5.3	\$6.8	\$5.3	\$5.0	\$3.9	\$2.3	\$3.9	\$2.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
- % of Revenue	0.3%	-8.8%	-17.9%	-17.7%	-5.3%	6.0%	11.8%	13.9%	15.0%	14.3%	13.2%	10.5%	7.9%	7.2%	6.9%	8.0%	8.1%	7.7%	8.3%	9.2%	9.8%	10.3%	11.0%	11.8%
- Sequential Change	(98.5%)	-104.7%	72.3%	-1.5%	(62.6%)	-245.4%	151.9%	44.8%	20.7%	1.8%	-9.5%	-23.8%	(29.2%)	-13.2%	-6.1%	15.1%	3.4%	-2.7%	13.1%	17.5%	9.1%	7.1%	12.2%	11.8%
- Yr to Yr Change	-93.8%	-171.0%	-235.8%	-251.6%	-700.2%	-192.3%	-235.0%	-298.4%	-740.1%	-348.0%	-57.2%	-17.6%	-51.7%	-58.8%	-57.2%	-33.7%	-3.1%	8.7%	31.0%	33.7%	41.1%	55.3%	54.2%	46.7%
- Basis Sequential	(587)	(961)	(906)	1																				

## Company Focus

- Company Update
- Initiation of Coverage

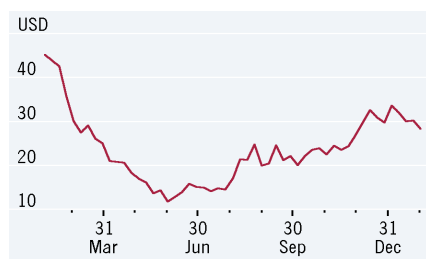
**Shahriar (Shar) Pourreza, CFA**

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<b>Buy/High Risk</b>	<b>1H</b>
Price (01 Feb 13)	US\$28.33
Target price	US\$41.00
Expected share price return	44.7%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>44.7%</b>
Market Cap	US\$2,465M

**Price Performance**  
(RIC: FSLR.O, BB: FSLR US)



## First Solar Inc. (FSLR)

### The Bellwether Downstream Player – Launching With Buy

- **Launching US coverage of FSLR with a non consensus Buy (1H)** — We are launching research coverage of First Solar (Ticker FSLR) with a Buy/High Risk (1H) rating and \$41 target price. As highlighted in the industry section of our launch report, our sector tilt is favorable towards solar downstream names versus the upstream manufacturers – FSLR is the bellwether in the downstream market. Our new \$41 target price translates into an ETR of 45% - supporting our outlook.
- **Revenue certainty driven by robust US pipeline near term; further growth expected from sustainable market strategy overseas** — First Solar is by far the dominant player in the large scale utility project market. We estimate over 2,400 MW of utility scale projects alone in its US pipeline in various stages of development (not operating yet) with signed PPAs – driving revenue certainty through our forecast period and beyond. Additional, FSLR has an estimate +1,700MW of potential projects in the US in the pre-PPA contract phase which could add to additional growth opportunities. This solid US pipeline coupled with an evolving strategy of focusing in overseas sustainable markets versus historical growth regions translate into a sizeable expansion story over next several years – even as US utility spending outlook slows from peak levels in the outer years.
- **Still not liked; can you say short squeeze** — Given the fundamental growth outlook for the story, we are surprised to see short interest levels far exceeding every other solar name – including the more balance sheet challenged Chinese panel manufacturers. FSLR is not a fundamentally broken story. We do not buy into the bear argument that FSLR's project pipeline will dry up - our industry level work points to the opposite occurring – see sections above/below. Recent moves in key sustainable markets (i.e. Dubai, Australia, Chile, India) in a short period of time should serve as a precursor for investors – the pipeline will remain full.
- **EPS driven by robust spending; tempered pricing outlook** — Our EPS for 2012/2013/2014 is \$4.57/\$4.01/\$3.80. The lower EPS profile through our forecast period is driven by the contraction of industry wide ASPs for utility scale projects and Thin Film solar panels – a dynamic well understood by investors.
- **With FSLR becoming primarily a downstream player with some module exposure, we employ sum-of-parts valuation** — Our \$41/share target price is based on valuing the pure EPC/Development business separately from Thin Film module sales. As a secondary measure for valuing FSLR, we incorporate a risk adjusted/probability weighted free cash flow model to the entire business. This secondary valuation methodology further supports our \$41 target price.
- **Time to become a tech agnostic downstream player?** As FSLR becomes increasingly a solar downstream player, the panel manufacturing business will become more deemphasized by investors. FSLR remains the only major manufacturer in the Thin Film market (CdTe). With the continued drop in Crystalline Silicone panels, the cost competitive nature of Thin Film is expected to dissipate – a strategic move to become a tech agnostic project developer with some Thin Film capacity may increase the project development net.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
<b>2011A</b>	1.33A	0.70A	2.25A	1.65A	6.00A	6.01A
<b>2012E</b>	-0.08A	1.65A	1.27A	1.73E	4.57E	4.62E
Previous	na	na	na	na	na	na
<b>2013E</b>	0.82E	0.95E	0.99E	1.24E	4.01E	4.01E
Previous	na	na	na	na	na	na
<b>2014E</b>	na	na	na	na	3.80E	3.35E
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## The Bellwether Downstream Player – Launching With Buy

We are launching research coverage of First Solar (Ticker FSLR) with a Buy (1H) rating and \$41 target price. As highlighted in the industry section of our launch report, our sector tilt is favorable towards solar downstream names versus the upstream manufacturers – FSLR is the bellwether in the downstream market. FSLR's balance sheet strength and bankability premium should allow it to continue to capture large scale projects in key growth regions globally – we see a robust pipeline outlook for the next several years. Our new \$41 target price translates into an ETR of 45% - supporting our outlook.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

### Why FSLR shares remain attractive

- From a top down sector standpoint, we favor downstream players versus upstream manufacturers – FSLR is the bellwether downstream player in the large scale utility and commercial space.
  - FSLR's bankability should allow it to continue to capture downstream business at the commercial and utility scale level.
- The project pipeline remains robust – backlog driving revenue visibility near term.
  - Strategic move to focus on sustainable growth regions should mitigate the lower utility spending outlook in the outer years in the US from recent peak levels. The pipeline should remain filled - contrary to the bear argument.
  - Recent moves in key sustainable markets (i.e. Dubai, Australia, Chile, India) in a short period of time should serve as a precursor for investors.
- Many emerging growth regions early in the cycle have climate characteristics optimal for CdTe. These include India, Indonesia, Australia, Chile and the Middle East – regions that First Solar has begun to gain traction.
  - Higher energy yield in hot, humid climates will allow First Solar's Thin Film panels to compete aggressively with traditional Crystalline Silicon.
- Management has displayed great execution over a short period of time following the announced April 17<sup>th</sup> restructuring effort.
  - Has won several projects in key growth regions – adding to the pipeline. This is a precursor of growth opportunities going forward.
  - FSLR is now a stronger, leaner company well positioned to capture large scale solar opportunities globally.
  - With the trimming of manufacturing capacity, FSLR now has much lower exposure to the highly commoditized panel manufacturing segment – though some exposure remains.
- Strongest balance sheet and cash flow position within the solar space.
- Despite a drop in ASPs for utility scale systems and Thin Film panels, margins remain healthy through our forecast period.

- Note: The clear benefit of the drop in utility scale PPA rates is that it better aligns solar with conventional peaking capacity (grid parity) from a LCOE standpoint. This will help transition solar from a legislatively mandated growth sector to an economically driven industry. See industry above for a discussion on grid parity and LCOE (page 25).
- Note: while it is true that the utility scale PPA market is competitive and pricing has come down substantially; costs across the value chain have come down as well.
- With a short interest level far exceeding anyone sector – including the Chinese manufacturers with crippling debt levels – shares remain unloved. This leaves an opportunity, in our view.
- Our 12 month target price of \$41 equates to an ETR of 45% - supporting our Buy rating.

### Where we can be wrong?

- The US PPA market is very competitive and traditional growth states like CA have met their RPS standards through 2016 – FSLR has heavy exposure in CA. We expect lower pricing to continue in the large scale utility market – FSLR's failure to diversify away from historical growth regions to sustainable markets could impact margins.
  - I.e. in CA's Renewable Auction Mechanism saw bids in the \$70/MWh range for project deliveries in 2016. Prices were closer to the \$300/MWh range a few years back.
- If FSLR is not able to negate the lower spending outlook (from peaks) at the utility level in the US with new project wins in other sustainable markets – the project pipeline could begin to dry up in the 2015/16 timeframe.
- The panel manufacturing business remains a drag for FLSR – a continued decline in prices could partially offset healthy margins in the downstream business.
  - We favor a tech agonistic project development approach in light of the structure changes in the industry - we get the sense that management's near term strategy is to remain in the Thin Film business.
- FSLR's recent move to focus on sustainable markets (first discussed on the 12/14/2011 guidance call) will make forecasting growth/modeling challenging given the lack of near term visibility.

### Background

**First Solar, Inc. is a leading manufacturer of solar modules based on thin film technology.** By leveraging a proprietary process centered on the semiconductor material cadmium telluride (CdTe), the company has been able to achieve a significant manufacturing cost advantage relative to its silicon-based peers in the solar photovoltaic market – although this benefit gap has contracted with the drop in Poly prices. Headquartered in AZ, the company boasts a global manufacturing base with sites in North America and Asia. First Solar's copy-exact manufacturing strategy, combined with its minimal need for polysilicon, continues to drive capacity expansion that has fueled better growth than many of its solar PV peers in the utility



### Good progress since restructuring plan

scale market. Moving forward, First Solar will increasingly become known as a project developer as the panel manufacturing segment becomes deemphasized.

**December 14<sup>th</sup> 2011 guidance call and April 17<sup>th</sup> 2012 restructuring effort re-energizes focus; establishes a leaner, less commoditized project developer.**

Key takeaways from the restructuring plan include:

- Closing of Frankfurt panel manufacturing facility in 4Q 2012 – built into our model.
- Idling of 4 production lines in Kulim, Malaysia in 2Q 2012 – built into our model.
- Workforce reduction of ~2,000.

This plan translates into:

- \$100-\$120mm in cost savings per year – not expected to return.
- Lowering panel manufacturing costs to a range of \$0.60 - \$0.64/watt in 2013.
- Debt repayment of ~\$145mm for German government loan agreements.

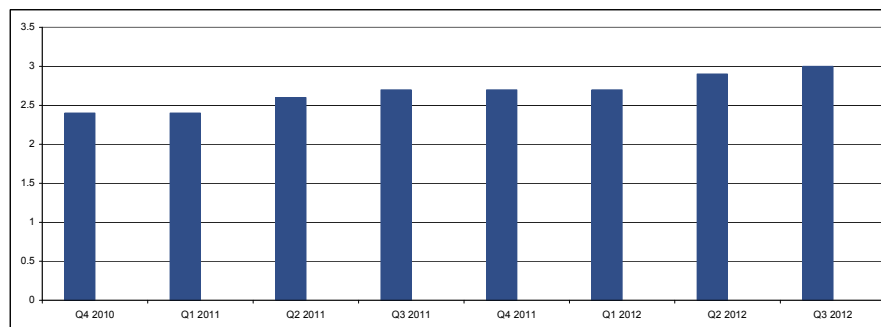
### The project pipeline is the value driver – we see robust spending outlook maintained

### The pipeline will remain filled – driving revenue visibility

**Current US project pipeline alone translates into revenue visibility through 2015; Best visibility out of peers.** First Solar is by far the dominant player in the large scale utility project market with an estimated +2,400 MW of utility scale projects alone in its US pipeline at various stages of development with signed PPAs (not operating yet). This is driving revenue certainty through our forecast period and beyond. Additional, FSLR has an estimate +1,700MW of potential projects in the US in the pre-PPA contract phase which could add to additional growth opportunities (see Figures below).

**Track record speaks volumes.** FSLR has a history of maintaining a robust pipeline – we do not envision this to change over the next few years. This is predicated on: (1) the US remaining early in the spending cycle as solar economics begin to trump legislatively mandated growth in certain states (see Grid Parity section for US on page 28) and (2) a re-energized focus of shifting resources to sustainable markets (see recent project wins below) from historical growth regions now in contraction phase (i.e. Western Europe).

Figure 97. FSLR historical pipeline (GW<sub>AC</sub>)



Source: Citi Research

This robust US pipeline coupled with an evolving strategy of focusing in overseas sustainable markets versus historical growth regions translates into a sizeable expansion story over next several years – even as US utility spending outlook slows from historical peak levels in the outer years (in the absence of grid parity – which can re-emerge utility scale spending as discussed in the industry section above).

See Figures below for FSLR's key utility scale project pipeline in US.

Figure 98. FSLR US project pipeline – in development

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	COD	Owner	Power Offtaker	EPC Firm	Business Model	PPA Term (yrs)	Land Type	BOS Type
Cuyama Solar	First Solar	40	CA	Development	N	2019	First Solar	Pacific Gas & Electric	First Solar	PPA			1-Axis
Lost Hills	First Solar	32.5	CA	Development	N	2019	First Solar	Pacific Gas & Electric	First Solar	PPA			
Silver State South Solar Project	First Solar	250	NV	Development	N	2017	First Solar	Southern California Edison	First Solar	PPA		Public	Fixed
Desert StateLine	First Solar	300	CA	Development	N	2016	First Solar	Southern California Edison	First Solar	PPA	20	Private	Fixed
Topaz Solar Farm	First Solar	550	CA	Development	Y	2015	MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Desert Sunlight PG&E	First Solar	300	CA	Development	Y	2015	NextEra, GE, Sunbomto Corp.	Pacific Gas & Electric	First Solar	PPA	25	Public	Fixed
Desert Sunlight SCE	First Solar	250	CA	Development	Y	2015	NextEra, GE, Sunbomto Corp.	Southern California Edison	First Solar	PPA	25	Public	Fixed
Sempra Copper Mountain II: Phase 2	Sempra Generation	58	NV	Development	Y	2015	Sempra Generation	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Agua Caliente Solar - Phase V	First Solar	40	AZ	Development	Y	2014	NRG Energy, MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Antelope Valley Solar Ranch One	First Solar	230	CA	Development	Y	2013	Exelon Corporation	Pacific Gas & Electric	First Solar	PPA	25	Private	1-Axis
Campo Verde Solar	First Solar	139	CA	Development	Y	2013	First Solar, US Solar Holdings	San Diego Gas & Electric	First Solar	PPA	20		
Imperial Solar Energy Center South	Tenaska Solar Ventures	130	CA	Development	Y	2013	Csolar Development, LLC	San Diego Gas & Electric	First Solar	PPA	25	Private	
PNM First Solar Project #7	First Solar	5	NM	Development	N	2013	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #9	First Solar	5	NM	Development	N	2013	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #8	First Solar	5	NM	Development	N	2013	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #6	First Solar	5	NM	Development	N	2013	PNM	PNM	First Solar	UOG		Private	Fixed
Alpine Solar Project	NRG Energy	66	CA	Development	Y	2012	NRG Energy	Pacific Gas & Electric	First Solar	PPA		Private	
Maryland Solar Farm	First Solar	20	MD	Development	Y	2012	First Solar	Belectric	FirstEnergy Solutions	PPA	20	Public	
First Solar - Mesa	First Solar	4.1	AZ	Development	Y	2012	First Solar	First Solar	Blue Oak Energy			Private	Rooftop
Total US MW in Development		2,430											

Source: Citi Research, GTM Research, Public Filings

Figure 99. FSLR's additional us pipeline growth opportunities – pre PPA phase

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	COD	Owner	Power Offtaker	EPC Firm	Business Model	PPA Term (yrs)	Land Type	BOS Type
Desert Opal	First Solar	1205	CA	Pre-Contract	N	NA	First Solar		First Solar			Public	Fixed
Willow Springs Solar	First Solar	160	CA	Pre-Contract	N	NA	First Solar		First Solar	PPA			
Rosamond Solar - FSLR	First Solar	155	CA	Pre-Contract	N	NA	First Solar		First Solar			Public	
Gray Butte Solar	First Solar, AES Solar	150	CA	Pre-Contract	N	NA	First Solar		First Solar				
Monte Vista Solar	First Solar	126	CA	Pre-Contract	N	NA	First Solar		First Solar	PPA			Fixed
Additional Opportunities - Pre PPA		1,796											

Source: Citi Research GTM Research, Public Filings

Figure 100. FSLR MW in operation in US

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	COD	Owner	Power Offtaker	EPC Firm	Business Model	PPA Term (yrs)	Land Type	BOS Type
Agua Caliente Solar - Phase III	First Solar	100	AZ	Operating	N	2012	NRG Energy, MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Sempra Copper Mountain II: Phase 1	Sempra Generation	92	NV	Operating	N	2012	Sempra Generation	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Agua Caliente Solar - Phase II	First Solar	70	AZ	Operating	N	2012	NRG Energy, MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Silver State North Solar Project	First Solar	50	NV	Operating	N	2012	Enbridge	NV Energy	First Solar	PPA	25	Public	1-Axis
Agua Caliente Solar - Phase IV	First Solar	50	AZ	Operating	N	2012	NRG Energy, MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Agua Caliente Solar - Phase I	First Solar	30	AZ	Operating	N	2012	NRG Energy, MidAmerican Energy Holdings	Pacific Gas & Electric	First Solar	PPA	25	Private	Fixed
Avra Valley Solar Project	NRG Energy	25	AZ	Operating	N	2012	NRG Energy	Tucson Electric Power	First Solar	PPA	20		1-Axis
Mount St. Mary's	Constellation Energy	15.1	MD	Operating	N	2012	Constellation Energy	MD Department of General Services	First Solar	Retail PPA	20	Private	
Roadrunner Solar Electric Facility	NRG Energy	20	NM	Operating	N	2011	NRG Energy	El Paso Electric	First Solar	PPA	20	Private	1-Axis
APS AZ Sun - Palomar Solar Plant	First Solar	17	AZ	Operating	N	2011	Arizona Public Service	Arizona Public Service	First Solar	UOG		Private	Fixed
PNM First Solar Project #4 (Alamogordo S)	First Solar	5	NM	Operating	N	2011	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #5 (Las Vegas So)	First Solar	5	NM	Operating	N	2011	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #2 (Las Lunas Sol)	First Solar	5	NM	Operating	N	2011	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #3	First Solar	5	NM	Operating	N	2011	PNM	PNM	First Solar	UOG		Private	Fixed
PNM First Solar Project #1	First Solar	2	NM	Operating	N	2011	PNM	PNM	First Solar	UOG		Private	Fixed
Sempra Copper Mountain I: Phase 2	Sempra Generation	40	NV	Operating	N	2010	Sempra Generation	Pacific Gas & Electric	First Solar	PPA		Private	Fixed
Cimarron I Solar	First Solar	30	NM	Operating	N	2010	Southern Company, Turner Renewable Energy	Tri-State Generation	First Solar	PPA	25	Private	Fixed
Sempra Copper Mountain I: Phase 1	Sempra Generation	8	NV	Operating	N	2010	Sempra Generation	Pacific Gas & Electric	First Solar	PPA		Private	Fixed
FSE Blythe	First Solar	21.5	CA	Operating	N	2009	NRG Energy	Southern California Edison	First Solar	PPA	20	Private	Fixed
Southern California Edison Solar PV Prog	Southern California Edison	2	CA	Operating	N	2009	Southern California Edison	Southern California Edison	First Solar	UOG		Private	Rooftop
Southern California Edison Solar PV Prog	Southern California Edison	1	CA	Operating	N	2009	Southern California Edison	Southern California Edison	First Solar	UOG		Private	Rooftop
El Dorado Solar I	Sempra Generation	10	NV	Operating	N	2008	Sempra Generation	Pacific Gas & Electric	First Solar	PPA	20	Private	Fixed
US MW in Operation		664											

Source: Citi Research GTM Research, Public Filings

**Management execution is key for maintaining growth opportunities beyond 2014/15 – good start so far.** FSLR's strategy to move resources into sustainable markets has begun to show success – in a relatively short period of time. That said, further execution to diversify away from historical growth regions now in contraction phase will be crucial for maintaining forward looking growth projections and a filled project pipeline as installations occur.

**Nice wins/acquisition so far – good precursor**

Key wins in Q2 and Q3 2012 in regions early in the solar growth cycle include (note: please refer to industry sections beginning on page 16 for a deep dive into various solar markets mentioned below):

- 13MW in **Dubai** (Phase one out of 1GW approved for new builds)
- 75 MW in **Rajasthan**
- 100MW MOU in **Indonesia**
- 159 MW in **Australia**
- 1/9/2013 acquisition of Solar Chile – a utility scale developer with ~1,500MW of projects in Northern **Chile**.
  - Note: Chile is a good example of a sustainable market: (1) unsubsidized, (2) high irradiation - some of the best irradiation on the world, (3) high electricity prices. Industry checks are pointing to costs of PV equating to ~\$2,300/KW in Chile – close to the cost of a coal plant.

**A higher energy yield in hot, humid climates will allow First Solar's Thin Film panels to compete aggressively with traditional Crystalline Silicon.** Thin Film (i.e. CdTe) tends to perform better than its Crystalline Silicon counterparts in warm, humid, sunny environments given a lower temperature coefficient (i.e. doesn't lose as much voltage when temperatures increase). So at peak times of the day, the lower loss of power translates into a higher energy yield or performance on a kWh/kW basis versus its Crystalline Silicon counterparts. Industry checks point to ~100-200 bps increase in stated efficiency levels in high irradiation regions. Key takeaway, many emerging solar growth regions have climate characteristic optimal for CdTe. These include India, Indonesia, Australia, Chile and the Middle East – regions that First Solar has begun to gain traction. FSLR should be able to compete very effectively in the high growth, sustainable regions given this particular attribute.

**FSLR has a 20% market share in India.** We attribute this to: (1) the higher energy yield from CdTe versus competing technologies as discussed in the above paragraph and (2) local content requirements for Crystalline Si panels to spur domestic manufacturing – i.e. requirement to make panels locally (there are no requirements for Thin Film under the National Solar Mission). These two factors give First Solar a clear advantage in the India market which is expected to grow substantially in the 2013-2015 timeframe – see Industry section above for a discussion on the India market (Page 36). It is important to note that there has been some speculation around India lifting their local content requirements. Our industry checks indicate that there is no evidence that this will occur. A more possible scenario would be a WTO appeal by c-Si panel manufacturers which could force India to lift the requirement pending a final outcome – this remains the uncertainty.

**Still not liked; can you say short squeeze?**

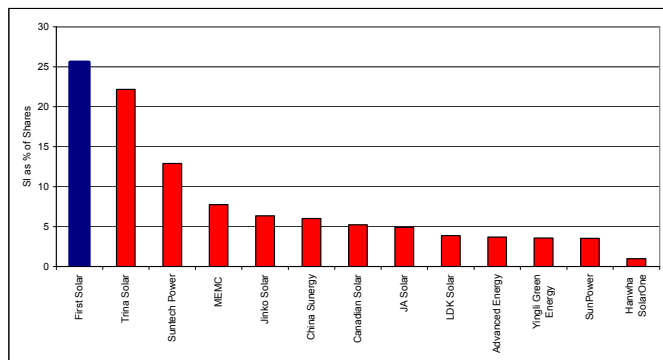
**Why so unloved? Time for a squeeze**

**Why so unloved?** Given the fundamental growth outlook for the story, we are surprised to see short interest levels far exceeding every other solar name – including the more balance sheet challenged Chinese panel manufacturers. FSLR is not a fundamentally broken story, in our view. As stated, we do not buy in to the bear argument that FSLR's project pipeline will dry up - our industry level work points to the opposite occurring – see sections above. FSLR's balance sheet strength and bankability premium should allow it to continue to capture large scale projects in key growth regions globally – we see a robust pipeline outlook for the

next several years. Recent wins in key sustainable markets (i.e. Dubai, Australia, India) in a short period of time should serve as a precursor for investors.

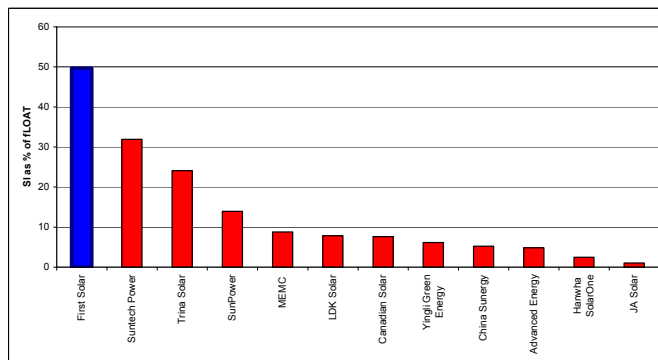
The current negative sentiment around the shares leaves an opportunity, in our view.

Figure 101. Short Interest as a % of outstanding shares



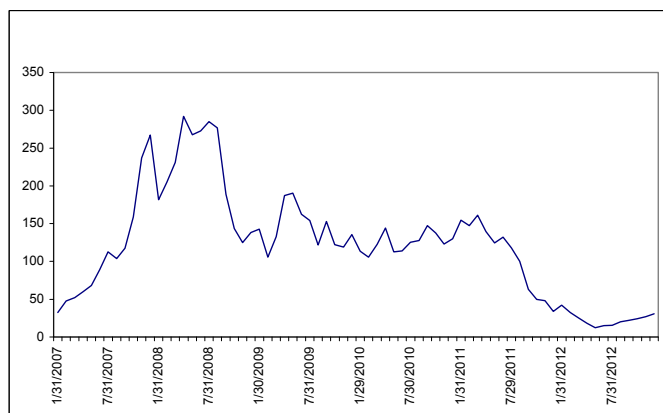
Source: Citi Research

Figure 102. Short Interest as a % of free float



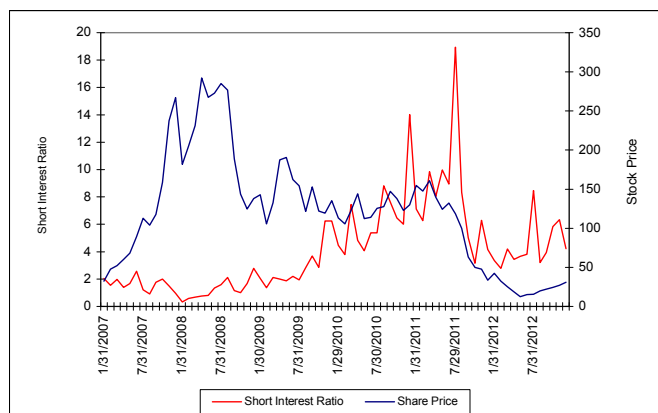
Source: Citi Research

Figure 103. FSLR historical share price



Source: Citi Research

Figure 104. Days To Cover versus stock price



Source: Citi Research

## Rating and valuation

We are launching research coverage of First Solar (Ticker FSLR) with a Buy (1H) rating and \$41 target price. As highlighted in the industry section of our launch report, our sector tilt is favorable towards solar downstream names versus the upstream manufacturers – FSLR is the bellwether in the downstream market. Our new \$41 target price translates into an ETR of 45% - supporting our outlook.

With FSLR becoming primarily a downstream player with modest module exposure, we employ sum-of-parts valuation. Our \$41/share target price is based on valuing the pure EPC/Development business separately from Thin Film module sales (see Figure 106 below). As a secondary measure for valuing FLSLR (see Figure 107 below), we incorporate a risk adjusted/probability weighted free cash flow model to the entire business. This secondary valuation methodology further supports our \$41 target price. See below.

Figure 105. FSLR DCF key valuation inputs

<b>Cost of Capital</b>			
Risk-free rate		3.03%	
<b>Cost of Equity</b>			
Beta		1.550	
Equity risk premium		3.00%	
<b>Cost of Debt, after-tax</b>			
Malaysian Ringgit loan, KLIBOR +2%	152,001	4.00%	
Euro loan, 4.54% interest thru 2016	138,628	4.50%	
2.25% loan, due 2006 thru 2015	4,983	2.25%	
Revolving credit facility 2.66%	235	2.67%	
<b>Capital Structure</b>			
Equity	2,733	83.7%	
Debt	532.71	16.3%	
<b>WACC</b>		<b>6.9%</b>	

Source: Citi Research

Figure 106. FSLR sum-of-the-parts valuation

	2012	2013	2014	2015	2016	2017	2018	2019	2020	
EPC Pipeline BOP (MW)	3,000	3,080	2,715	2,152	1,854	1,718	1,553	1,576	1,578	
- Installed	1,120	1,565	1,764	1,497	1,336	1,365	1,177	1,198	1,221	
+ Added	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
= EPC Pipeline EOP	3,080	2,715	2,152	1,854	1,718	1,553	1,576	1,578	1,557	
EPC ASP/w	\$ 2.02	\$ 1.79	\$ 1.75	\$ 1.64	\$ 1.55	\$ 1.45	\$ 1.37	\$ 1.28	\$ 1.21	
- System CoGS / w	\$ 1.26	\$ 1.20	\$ 1.20	\$ 1.16	\$ 1.13	\$ 1.09	\$ 1.06	\$ 1.03	\$ 1.00	
= System Gross Profit/w	\$ 0.75	\$ 0.59	\$ 0.55	\$ 0.48	\$ 0.42	\$ 0.36	\$ 0.31	\$ 0.26	\$ 0.21	
- System Opex / w	\$ 0.56	\$ 0.42	\$ 0.39	\$ 0.33	\$ 0.27	\$ 0.22	\$ 0.18	\$ 0.13	\$ 0.09	
= System Operating Profit/w	\$ 0.19	\$ 0.17	\$ 0.17	\$ 0.16	\$ 0.15	\$ 0.14	\$ 0.13	\$ 0.12	\$ 0.11	
x Installed MW	1,120	1,565	1,764	1,497	1,336	1,365	1,177	1,198	1,221	
= EPC EBIT	\$ 214	\$ 267	\$ 293	\$ 234	\$ 196	\$ 188	\$ 153	\$ 146	\$ 140	
Tax Expense	\$ 64	\$ 80	\$ 59	\$ 47	\$ 39	\$ 38	\$ 31	\$ 29	\$ 28	Terminal
EPC CF	\$ 150	\$ 187	\$ 234	\$ 187	\$ 157	\$ 151	\$ 122	\$ 117	\$ 112	\$ 1,623

Discount Rate 6.9%

a	FSLR EPC Enterprise Value - Ex Modules	\$1,872.04
b	Module Segment-3rd party/Systems	
c	Revenue 2013	\$1,365.42
d = b * c	Multx	0.8
	FSLR Module Enterprise Value	\$1,092.34
e	Net Debt (cash exceeds debt)	-698.10
f = a + d + e	FSLR Equity Value	\$3,662.48
g = f / 89.52	FSLR Equity Value Per Share	\$41

Source: Citi Research

Figure 107. FSLR - secondary valuation methodology

		2013	2014	2015	2016	2017	2018	2019	2020
Operating income (EBIT)		\$552.87	\$536.77	\$386.19	\$328.18	\$321.50	\$265.79	\$259.90	\$254.36
After-tax income (EBI)		\$458.88	\$445.52	\$308.95	\$262.55	\$257.20	\$212.63	\$207.92	\$203.49
+ Depreciation & amortization		\$295.36	\$309.91	\$316.35	\$318.10	\$320.42	\$317.79	\$315.96	\$314.88
- Capex		\$417.16	\$440.82	\$374.29	\$333.90	\$341.27	\$294.11	\$299.56	\$305.09
FSLR FCF		\$337.09	\$314.61	\$251.01	\$246.75	\$236.34	\$236.30	\$224.33	\$213.27
Cash Flow Risk Analysis									
Upside Scenario	35%	\$455.07	\$424.72	\$338.86	\$333.11	\$319.06	\$319.01	\$302.84	\$287.92
Middle Scenario	0%	\$337.09	\$314.61	\$251.01	\$246.75	\$236.34	\$236.30	\$224.33	\$213.27
Downside Scenario	15%	\$286.52	\$267.42	\$213.36	\$209.73	\$200.89	\$200.86	\$190.68	\$181.28
Probability Weighted Cash Flows									
Upside Scenario probability	35%	\$159.27	\$148.65	\$118.60	\$116.59	\$111.67	\$111.65	\$106.00	\$100.77
Middle Scenario probability	60%	\$202.25	\$188.77	\$150.61	\$148.05	\$141.81	\$141.78	\$134.60	\$127.96
Downside Scenario probability	5%	\$14.33	\$13.37	\$10.67	\$10.49	\$10.04	\$10.04	\$9.53	\$9.06
Free Cash Flow to the firm (Risk adjusted)									
PV of each cash flows		\$375.85	\$350.79	\$279.88	\$275.12	\$263.52	\$263.48	\$250.13	\$237.80
		\$351.59	\$306.97	\$229.10	\$210.67	\$188.77	\$176.55	\$156.79	\$139.44
Fair Value									
Terminal value		\$2,020.82							
PV of future cash flows		\$1,759.88							
PV of terminal value		\$1,184.96							
FSLR Enterprise Value		\$2,944.84							
Net Debt		-\$698.10							
FSLR Equity		\$3,642.94							
Shares outstanding (in millions)		89.52							
Implied Valuation per share	\$ 41		31%						

31%

Source: Citi Research

## Earnings, cash flow and other key metrics

Our EPS for 2012/2013/2014 is \$4.57/\$4.01/\$3.80. The lower EPS profile through our forecast period is driven by the contraction of industry wide ASPs for utility scale projects and Thin Film solar panels – a dynamic well understood by investors.

Figure 108. FSLR: Cit Versus Consensus

<u>FSLR</u>		Dec		Mar	Jun	Sept	Dec					
		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E	Rating	Target Price	
Citi Est	Rev	\$1,208	\$3,501	\$1,246	\$903	\$933	\$1,090	\$4,172	\$4,408	Buy	\$41	
	EPS	\$1.73	\$4.57	\$0.82	\$0.95	\$0.99	\$1.24	\$4.01	\$3.80			
Consensus	Rev	\$1,332	\$3,627	\$840	\$837	\$883	\$939	\$3,570	na	Neutral	\$24	
	EPS	\$1.75	\$4.60	\$0.91	\$0.94	\$1.00	\$1.12	\$4.04	\$3.27			

Source: Citi Research, Factsset

See below for key model assumptions including pricing and MW data.

Figure 109. FSLR model inputs

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar
<b>MODULES</b>																						
ASP, \$/W	\$ 1.82	\$ 1.68	\$ 1.59	\$ 1.51	\$ 1.56	\$ 1.58	\$ 1.49	\$ 1.30	\$ 1.52	\$ 1.13	\$ 1.36	\$ 0.71	\$ 0.78	\$ 0.88	\$ 0.67	\$ 0.70	\$ 0.67	\$ 0.66	\$ 0.64	\$ 0.64	\$ 0.65	\$ 0.60
% Δ	(26%)	1%	(5%)	(5%)	3%	(13%)	(4%)	(13%)	17%	(26%)	(14%)	(37%)	10%	(13%)	(2%)	(48%)	0%	(1%)	(3%)	0%	(7%)	(6%)
Shipments, MW	1,069	313	313	380	371	1,377	346	364	402	410	1,523	328	389	414	658	1,769	729	414	450	494	2,086	528
% Δ	122%	(3%)	(0%)	21%	(2%)	29%	(7%)	5%	11%	2%	11%	(20%)	13%	12%	59%	16%	11%	(43%)	9%	10%	18%	7%
Revenue, \$MM	\$ 1,951	\$ 526	\$ 499	\$ 574	\$ 579	\$ 2,177	\$ 517	\$ 474	\$ 610	\$ 463	\$ 2,065	\$ 233	\$ 288	\$ 282	\$ 441	\$ 1,243	\$ 488	\$ 273	\$ 288	\$ 316	\$ 1,365	\$ 316
Y/Y %	64%	27%	(4%)	19%	8%	12%	(2%)	(5%)	6%	(20%)	(5%)	(55%)	(39%)	(54%)	(5%)	(40%)	110%	(5%)	2%	(28%)	10%	(35%)
Total Cost, \$/W	\$ 0.87	\$ 0.81	\$ 0.76	\$ 0.77	\$ 0.75	\$ 0.77	\$ 0.75	\$ 0.75	\$ 0.74	\$ 0.73	\$ 0.74	\$ 0.73	\$ 0.72	\$ 0.67	\$ 0.64	\$ 0.69	\$ 0.63	\$ 0.63	\$ 0.62	\$ 0.62	\$ 0.62	\$ 0.59
Y/Y %	(20%)	(13%)	(13%)	(9%)	(11%)	(11%)	(7%)	(1%)	(4%)	(3%)	(4%)	(3%)	(4%)	(9%)	(13%)	(7%)	(14%)	(13%)	(8%)	(3%)	(10%)	(6%)
GM, %	82%	52%	52%	49%	52%	51%	50%	42%	42%	26%	40%	(3%)	8%	2%	5%	3%	7%	5%	4%	4%	5%	2%
<b>EPC - Ex Module</b>																						
ASP, \$/W	\$ 1.85	\$ 1.37	\$ 1.95	\$ 2.23	\$ 1.90	\$ 2.01	\$ 15.00	\$ 11.15	\$ 2.77	\$ 6.65	\$ 3.89	\$ 1.46	\$ 2.14	\$ 2.01	\$ 2.20	\$ 2.02	\$ 1.39	\$ 2.03	\$ 1.91	\$ 2.09	\$ 1.79	\$ 1.30
Y/Y %	(1%)	(26%)	8%	26%	3%	9%	993%	472%	24%	250%	94%	(90%)	(81%)	(27%)	(67%)	(48%)	(5%)	(5%)	(5%)	(5%)	(11%)	(6%)
MW's installed	55	28	44	100	16	169	3	5	141	30	179	180	314	277	349	1,120	546	310	338	370	1,565	421
Cumulative MWs	82	110	154	254	270	270	273	279	420	450	450	630	944	1,221	1,570	1,570	2,116	2,427	2,764	3,134	3,134	3,555
EPC Cost, \$/W	\$ 1.70	\$ 1.22	\$ 1.44	\$ 1.83	\$ 1.35	\$ 1.61	\$ 14.55	\$ 10.25	\$ 1.88	\$ 5.07	\$ 2.89	\$ 1.00	\$ 1.33	\$ 1.23	\$ 1.37	\$ 1.26	\$ 1.00	\$ 1.33	\$ 1.23	\$ 1.37	\$ 1.20	\$ 0.97
Realized System ASP, \$/W	\$ 1.01	\$ 39	\$ 87	\$ 223	\$ 30	\$ 379	\$ 47	\$ 61	\$ 390	\$ 199	\$ 697	\$ 263	\$ 670	\$ 558	\$ 767	\$ 2,258	\$ 758	\$ 630	\$ 645	\$ 774	\$ 2,808	\$ 549
Revenue, \$MM	\$ 101	\$ 39	\$ 87	\$ 223	\$ 30	\$ 379	\$ 47	\$ 61	\$ 390	\$ 199	\$ 697	\$ 263	\$ 670	\$ 558	\$ 767	\$ 2,258	\$ 758	\$ 630	\$ 645	\$ 774	\$ 2,808	\$ 549
GM, %	(514%)	11%	26%	16%	29%	20%	3%	8%	32%	24%	28%	32%	38%	39%	38%	37%	28%	35%	36%	34%	33%	28%
<b>TOTAL FSLR</b>																						
Revenue, \$MM	\$ 2,066	\$ 568	\$ 588	\$ 798	\$ 610	\$ 2,564	\$ 567	\$ 533	\$ 1,006	\$ 660	\$ 2,766	\$ 497	\$ 957	\$ 839	\$ 1,208	\$ 3,501	\$ 1,246	\$ 903	\$ 933	\$ 1,090	\$ 4,172	\$ 864
Non GAAP GM, %	51%	50%	49%	41%	50%	47%	47%	38%	38%	42%	41%	22%	28%	32%	26%	27%	20%	26%	26%	26%	24%	17%
EPS*	\$ 7.37	\$ 2.00	\$ 1.84	\$ 2.04	\$ 1.80	\$ 7.68	\$ 1.33	\$ 0.70	\$ 2.25	\$ 1.65	\$ 6.00	\$ (0.08)	\$ 1.65	\$ 1.27	\$ 1.73	\$ 4.57	\$ 0.82	\$ 0.95	\$ 0.99	\$ 1.24	\$ 4.01	\$ 0.17
Y/Y %	74%	9%	(13%)	14%	9%	4%	(33%)	(62%)	10%	(8%)	(22%)	(108%)	135%	44%	5%	(24%)	(1129%)	(42%)	(22%)	(28%)	(12%)	(80%)

Source: Citi Research

Figure 110. FSLR key metrics

	2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Profitability Ratios																
Return On Equity	13.0%	12.6%	11.5%	6.7%	-56.0%	-53.5%	-52.0%	12.3%	7.3%	7.1%	6.9%	7.8%	1.5%	1.4%	1.4%	9.3%
Return On Avg Equity	22.4%	18.5%	17.6%	2.2%	-14.5%	-12.3%	-14.5%	0.3%	15.3%	13.6%	12.9%	11.4%	9.8%	10.1%	10.4%	10.3%
Return on Invested Capital	11.7%	10.7%	6.0%	15.5%	1.0%	1.1%	13.3%	10.7%	7.3%	7.1%	7.7%	7.8%	2.7%	2.6%	8.3%	8.2%
Return on Invested Capital ex cash	13.0%	11.8%	7.0%	18.0%	1.2%	1.3%	15.7%	13.3%	9.3%	9.8%	10.7%	10.6%	3.8%	3.5%	11.4%	11.1%
Return On Assets	10.5%	9.4%	8.1%	4.2%	-31.1%	-32.8%	-30.1%	7.2%	4.2%	4.2%	4.1%	4.7%	0.9%	0.9%	0.8%	5.8%
Return On Assets	18.2%	14.5%	13.0%	1.5%	-9.6%	-8.3%	-9.3%	0.2%	8.6%	8.1%	7.6%	6.8%	5.7%	6.1%	6.3%	6.3%
Return On Net Assets	11.4%	10.1%	9.2%	4.7%	-34.8%	-37.0%	-33.5%	8.2%	4.8%	5.2%	5.1%	5.7%	1.1%	1.0%	1.0%	7.1%
Return On Net Assets	20.2%	16.1%	15.0%	1.8%	-10.6%	-9.1%	-10.4%	0.2%	9.8%	9.6%	8.9%	8.0%	6.9%	7.4%	7.7%	7.7%
Return On Sales	20.4%	20.4%	20.4%	11.5%	-90.4%	-90.4%	-90.4%	11.6%	5.5%	5.5%	5.5%	8.8%	1.7%	1.7%	1.7%	9.1%
Return on Sales	28.0%	24.7%	23.8%	2.8%	-18.2%	-13.8%	-18.3%	0.4%	12.5%	11.6%	11.1%	10.5%	10.1%	10.1%	10.1%	10.0%
Return on Capital Employed	16.8%	15.4%	13.4%	8.8%	1.4%	1.4%	1.3%	16.3%	9.3%	9.1%	9.0%	9.7%	3.5%	3.4%	3.3%	10.6%
<b>* Avg Over Last 4 Qtrs</b>																
<b>Efficiency Ratios</b>																
Sales/Total Assets	0.51	0.43	0.70	0.46	0.34	0.70	0.56	0.78	0.76	0.56	0.57	0.64	0.51	0.66	0.64	0.68
A/R Days Sales Out	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventory Turns	6.07	12.44	29.52	23.32	29.34	24.43	22.48	35.11	39.30	26.29	27.16	31.80	28.09	34.33	33.76	37.24
Days of Inventory	60	29	12	16	12	15	16	10	9	14	13	11	13	11	11	10
<b>Liquidity Ratios</b>																
Current Ratio	3.0	3.1	3.3	2.7	2.5	2.6	2.4	2.4	2.2	2.4	2.5	2.4	2.5	2.5	2.5	2.5
Quick Ratio	2.0	1.7	1.7	1.0	0.8	0.9	1.0	1.1	1.1	1.3	1.4	1.3	1.4	1.3	1.4	1.4
Net Working Capital	\$924.4	\$1,244.4	\$1,683.5	\$1,639.5	\$1,729.4	\$1,502.2	\$1,570.2	\$1,729.0	\$1,750.6	\$1,807.6	\$1,866.9	\$1,946.1	\$1,953.7	\$2,016.2	\$2,082.0	\$2,162.8
Long-term Debt/Equity	2.9%	9.0%	14.5%	17.0%	25.1%	14.0%	13.5%	12.9%	12.6%	12.3%	11.9%	11.5%	11.4%	11.1%	10.7%	10.4%
Total Debt/Equity	3.7%	9.8%	15.1%	18.2%	26.9%	15.4%	15.3%	14.6%	14.3%	13.9%	13.5%	13.0%	12.9%	12.5%	12.1%	11.7%
Op Inc/Assets, exc. Cash	4.1%	2.3%	5.1%	3.2%	0.3%	4.2%	3.2%	4.3%	2.1%	2.5%	2.6%	3.0%	0.9%	2.7%	2.7%	2.9%
Op Inc (12 mth)/Avg Assets, exc. Cash																
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$40.96	\$42.26	\$46.19	\$42.17	\$37.10	\$38.35	\$39.40	\$41.05	\$41.87	\$42.81	\$43.78	\$45.00	\$45.20	\$46.38	\$47.56	\$48.88
Book Value Per Share (Tangible)	\$35.69	\$36.99	\$40.93	\$41.42	\$36.34	\$37.60	\$38.66	\$40.31	\$40.85	\$41.51	\$42.22	\$43.17	\$43.10	\$44.02	\$44.94	\$46.00
Cash Per Share	\$5.78	\$6.11	\$10.12	\$9.33	\$10.32	\$10.24	\$10.26	\$12.41	\$13.60	\$16.67	\$17.03	\$16.77	\$18.08	\$16.89	\$17.62	\$17.65
Net Cash Per Share	\$4.87	\$1.19	\$1.77	\$0.09	-\$2.32	\$2.57	\$2.13	\$4.33	\$5.57	\$8.68	\$9.09	\$8.87	\$10.22	\$9.08	\$9.85	\$9.92

Source: Citi Research

## Key risks

- The US PPA market is very competitive and traditional growth states like CA have met their RPS standards through 2016 – FSLR has heavy exposure in CA. FSLR needs to diversify away from historical growth regions to sustainable markets or growth will be negatively impacted.

- If FSLR is not able to negate the lower spending outlook (from peaks) at the utility level in the outer years in the US with new project wins in other sustainable markets – the project pipeline could begin to dry up in the 2015/16 timeframe.
- The panel manufacturing business remains a drag for FLSR – offsetting healthy margins in the downstream business.
- We favor a tech agonistic project development approach in light of the structure changes in the industry - we get the sense that management's near term strategy is to remain in the Thin Film business.
- FSLR's recent move to focus on sustainable markets (first discussed on the 12/14/2011 guidance call) will make forecasting growth and modeling challenging given the lack of near term visibility.

Additional risk factors include:

- FSLR is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving.
- Raw material shortages in key manufacturing inputs such as tellurium (Te) could limit FSLR's ability to expand capacity and/or add pressure to margins as prices increase.
- FSLR's business model is relatively capital-intensive and could limit the company's ability to generate positive cash flows while also driving increased need to raise additional capital, potentially via dilutive equity/debt offerings.
- FSLR's sales are concentrated among a handful of large customers. Moreover, a large percentage of its sales are from Europe (primarily Germany) and any material weakening of the Euro relative to USD could impact its results.
- Demand for solar photovoltaic technology has been largely driven by a favorable regulatory environment in key countries like Germany and Italy. Any material reductions in these financial incentive programs could crimp demand for solar PV.
- Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general.

## Management Bio

### James A. Hughes - Chief Executive Officer

James A. Hughes joined First Solar in March 2012 as Chief Commercial Officer and was appointed Chief Executive Officer in May 2012. Prior to joining First Solar, Mr. Hughes served, from October 2007 until April 2011, as Chief Executive Officer and Director of AEI Services LLC, which owned and operated power distribution, power generation (both thermal and renewable), natural gas transportation and services, and natural gas distribution businesses in emerging markets worldwide. From 2004 to 2007, he engaged in principal investing with a privately held company based in Houston, Texas that focused on micro-cap investments in North American distressed manufacturing assets. Previously, he served, from 2002 until March 2004, as President and Chief Operating Officer of Prisma Energy International, which was formed out of former Enron interests in international electric and natural gas utilities. Prior to that role, Mr. Hughes spent almost a decade with Enron



Corporation in positions that included President and Chief Operating Officer of Enron Global Assets, President and Chief Operating Officer of Enron Asia, Pacific Africa and China and as Assistant General Counsel of Enron International. Mr. Hughes is a Non-Executive Director of APR Energy plc, a London Stock Exchange-listed energy company participating in the global market for gas and diesel fired temporary power plants. Mr. Hughes holds a juris doctor degree from the University of Texas at Austin School of Law, a Certificate of Completion in international business law from Queen Mary's College, University of London, and a bachelor's degree in business administration from Southern Methodist University.

**Mark Widmar - Chief Financial Officer and Chief Accounting Officer**

Mark Widmar joined First Solar in April 2011 as the company's Chief Financial Officer. In this role he oversees all financial operations, including Financial Planning & Analysis, Treasury, Internal Audit, Investor Relations, Accounting, and Tax. Prior to joining First Solar, Mr. Widmar was the Chief Financial Officer for Graftech International, and was also President of Graftech's Engineering Solutions business. From 2005 to 2006 Mr. Widmar served as Corporate Controller for NCR Inc. Prior to his appointment to Controller, he was a Business Unit Chief Financial Officer for NCR, with responsibility for setting the financial vision and strategy for a \$2 billion global enterprise. In this position Mr. Widmar was instrumental in the establishment of strategic plans, annual operating plans, and pricing strategy. Mr. Widmar has also held various financial and managerial positions with Dell, Inc., Lucent Technologies, Inc., AlliedSignal, Inc., and Bristol Myers/Squibb, Inc. He began his career in 1987 as an accountant with Ernst & Young. He holds a Bachelor of Science and a Masters of Business Administration from Indiana University.

**Georges Antoun - Chief Operating Officer**

Georges Antoun joined First Solar in July 2012 as the company's Chief Operating Officer. Mr. Antoun has over 20 years of operational and technical experience, including leadership positions at several global technology companies. Mr. Antoun most recently served as Venture Partner at Technology Crossover Ventures (TCV), a private equity and venture firm that he joined in July 2011. Prior to joining TCV, Mr. Antoun was the Head of Product Area IP & Broadband Networks for Ericsson, based in San Jose, California. Mr. Antoun joined Ericsson in 2007, when Ericsson acquired Redback Networks, a telecommunications equipment company, where Mr. Antoun served as the Senior Vice President of World Wide Sales & Operations. After the acquisition, Mr. Antoun was promoted to Chief Executive Officer of the Redback Networks subsidiary. Prior to Redback Networks, Mr. Antoun spent five years at Cisco Systems, where he served as Vice President of Worldwide Systems Engineering and Field Marketing, Vice President of Worldwide Optical Operations, and Vice President of Carrier Sales. He has also held senior management positions at Newbridge Networks, a data and voice networking company, and Nynex (now Verizon Communications), where he was part of its Science and Technology Division. Mr. Antoun earned a Bachelor of Science degree in Engineering from the University of Louisiana at Lafayette and a Master's degree in Information Systems Engineering from Polytechnic Institute of New York University.

## Financial models



Figure 111. FSLR income statement model

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	FY
Total Revenues	418,208	525,876	480,851	641,265	2,066,200	567,961	587,854	797,899	609,801	2,563,515	567,293	532,774	1,005,788	660,352	2,766,207	497,055	957,332	839,147	1,207,750	3,501,284	1,246,072	902,949	932,884	1,089,647	4,171,553	4,408,175
PPA revs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue growth (%)	-3.6%	25.7%	-8.6%	33.4%	65.8%	-11.4%	3.5%	35.7%	-23.6%	24.1%	-7.0%	-6.1%	88.8%	-34.3%	7.9%	-24.7%	92.6%	-12.3%	43.9%	26.6%	-64.4%	-27.5%	3.3%	16.8%	19.1%	5.7%
Cost of Goods	179,905	224,297	231,525	368,336	1,004,963	282,025	288,660	470,767	307,297	1,358,749	302,515	331,722	620,887	384,647	1,638,770	388,450	690,891	573,434	895,354	2,545,129	1,002,333	670,445	692,791	811,109	3,176,677	3,402,831
Gross Margin	238,303	301,579	249,326	272,929	1,061,237	285,936	289,194	327,132	302,504	1,204,766	264,778	201,052	384,901	275,705	1,126,437	108,605	266,441	265,713	312,397	956,155	243,740	232,505	240,094	278,538	994,876	1,005,344
Gross Margin (%)	57.0%	57.3%	51.9%	42.6%	51.4%	50.3%	49.2%	41.0%	49.6%	47.0%	46.7%	37.7%	38.3%	41.8%	40.7%	21.8%	27.8%	31.7%	25.9%	27.2%	19.6%	25.7%	25.7%	25.6%	23.8%	22.8%
Incremental GM (%)	NM	59%	NM	15%	45%	NM	16%	18%	NM	29%	NM	NM	39%	NM	-39%	NM	34%	NM	13%	-24%	-179%	NM	25%	25%	6%	4%
R&D	9,885	16,505	21,882	20,356	68,628	20,938	20,336	18,852	24,711	84,837	28,794	29,975	35,295	35,016	129,080	33,724	29,615	30,972	30,000	124,311	37,500	37,500	37,500	37,500	150,000	160,000
R&D as a % of Sale	2.4%	3.1%	4.6%	3.2%	3.3%	3.7%	3.5%	2.4%	4.1%	3.3%	5.1%	5.6%	3.5%	5.3%	4.7%	6.8%	3.1%	3.7%	2.5%	3.6%	3.0%	4.2%	4.0%	3.4%	3.6%	3.6%
SG&A	39,441	61,072	38,727	73,147	212,387	53,214	61,097	66,621	71,052	251,984	69,103	64,962	92,662	73,894	300,641	58,676	32,934	63,707	50,000	205,317	87,225	63,206	65,302	76,275	292,009	308,572
SG&A as a % of Sale	9.4%	11.6%	8.1%	11.4%	10.3%	9.4%	10.4%	8.3%	11.7%	9.8%	12.2%	12.2%	9.2%	11.2%	10.9%	11.8%	3.4%	7.6%	4.1%	5.9%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
BLU	49,326	77,577	60,609	93,503	281,015	74,152	81,433	85,473	95,763	336,821	97,887	94,957	127,957	108,910	429,722	92,400	62,549	94,679	80,000	329,628	124,725	100,706	102,802	113,775	442,095	468,572
Operating Margin	188,977	224,002	188,717	179,426	781,122	211,784	207,761	241,659	206,741	867,945	166,881	106,095	256,944	166,795	696,715	16,205	203,892	171,034	232,397	623,528	119,015	131,798	137,292	164,762	552,867	536,771
Operating Margin (%)	45%	43%	39%	28%	38%	37%	35%	30%	34%	34%	29%	20%	26%	25%	25%	3%	21%	20%	19%	18%	10%	15%	15%	15%	13%	12%
Incremental OPM (%)	24%	33%	-78%	-6%	31%	44%	-20%	16%	-19%	17%	-94%	-176%	32%	-26%	-84%	-92%	41%	-28%	17%	-10%	-296%	4%	18%	18%	-11%	-7%
Other Income (Exp)	(0.324)	(2.743)	2.176	5.590	4.699	4.218	(0.035)	1.277	7.714	13,174	3.624	7.427	0.022	3.878	14,951	1.007	(4.312)	3.716	(1.264)	(0.853)	(0.8449)	0.2080	0.3628	0.3036	0.030	2.617
Profit Before Taxes	188,653	221,259	190,893	185,016	785,821	216,002	207,726	242,936	214,455	881,119	170,505	113,522	256,966	170,673	711,666	17,212	199,580	174,750	231,133	622,675	118,170	132,006	137,655	165,066	552,897	539,388
Taxes	16,637	20,719	11,623	8,697	57,676	23,014	21,395	36,046	17,421	97,676	17,039	10,819	26,251	(6,996)	47,513	(3,526)	27,260	23,426	50,849	98,009	20,089	22,441	23,401	28,061	93,992	91,696
effective rate	8.8%	9.4%	6.1%	4.7%	7.3%	10.7%	10.3%	14.8%	8.1%	11.1%	10.0%	9.5%	10.2%	-3.9%	6.7%	-20.5%	13.7%	13.4%	22.0%	15.7%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Production start-up	5,737	2,204	3,739	1,099	12,779	1,143	2,288	3,821	12,190	19,442	11,931	10,294	5,514	5,881	33,620	4,058	0,533	25,792	-	30,383	-	-	-	-	-	-
Other After Tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stock Based Compensation	15,184	17,757	22,187	33,600	88,728	19,500	25,000	26,200	28,900	99,600	25,567	31,271	28,687	28,903	114,428	23,600	27,500	14,000	27,500	92,600	25,000	25,000	25,000	25,000	100,000	100,000
Extraordinary Item	(13,500)	-	-	-	(13,500)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Income-Ops (Ex SBC)	166,279	198,336	175,531	175,220	715,366	191,845	184,043	203,069	184,844	763,301	141,535	92,409	225,201	171,388	555,598	442,496	33,304	23,165	15,000	513,965	5,000	5,000	5,000	5,000	20,000	-
Total Net Income	164,595	180,579	153,344	141,620	640,138	172,345	159,043	176,869	155,944	664,201	115,968	61,138	196,514	(413,113)	(39,493)	(449,416)	110,983	88,367	137,784	(112,282)	68,081	79,565	84,253	107,005	338,904	347,592
EPS-Ops (exc SBC)	\$ 2.01	\$ 2.32	\$ 2.04	\$ 2.04	\$ 8.41	\$ 2.23	\$ 2.13	\$ 2.34	\$ 2.13	\$ 8.83	\$ 1.63	\$ 1.06	\$ 2.58	\$ 1.98	\$ 7.33	\$ 0.19	\$ 1.96	\$ 1.43	\$ 2.04	\$ 5.05	\$ 1.10	\$ 1.23	\$ 1.27	\$ 1.52	\$ 5.13	\$ 4.89
Total EPS - GAAP	\$ 1.99	\$ 2.11	\$ 1.79	\$ 1.65	\$ 7.53	\$ 2.00	\$ 1.84	\$ 2.04	\$ 1.80	\$ 7.68	\$ 1.33	\$ 0.70	\$ 2.25	\$ (4.78)	\$ (0.46)	\$ (5.20)	\$ 1.27	\$ 1.01	\$ 1.56	\$ (1.36)	\$ 0.77	\$ 0.89	\$ 0.94	\$ 1.19	\$ 3.79	\$ 3.80
Shares Outstanding (basic)	81,685	83,723	84,179	84,413	83,500	84,505	84,852	85,072	85,181	84,903	85,324	86,164	86,338	87,338	86,067	86,507	86,855	86,992	87,992	87,087	87,742	87,492	87,242	86,992	87,367	86,367
Shares Outstanding (fully diluted)	82,612	85,668	85,892	86,004	85,044	86,092	86,401	86,610	86,840	86,486	87,053	87,126	87,151	86,400	86,067	86,507	87,653	87,765	88,265	87,549	88,765	89,265	89,765	90,265	89,515	91,515
Year Weighted Shares	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TTM Revenue	\$ 5.49	\$ 6.75	\$ 7.33	\$ 7.37	\$ 7.54	\$ 7.54	\$ 7.27	\$ 7.53	\$ 7.68	\$ 7.01	\$ 5.87	\$ 6.08	\$ 5.94	\$ 5.94	\$ 6.00	\$ 4.53	\$ 5.47	\$ 4.49	\$ 4.57	\$ 5.47	\$ 4.77	\$ 4.77	\$ 4.50	\$ 4.01	\$ 4.01	\$ 3.80
EPS-Ops (inc SBC)	\$ 1.83	\$ 2.11	\$ 1.79	\$ 1.65	\$ 7.37	\$ 2.00	\$ 1.84	\$ 2.04	\$ 1.80	\$ 7.68	\$ 1.33	\$ 0.70	\$ 2.25	\$ 1.65	\$ 6.00	\$ (0.08)	\$ 1.65	\$ 1.27	\$ 1.73	\$ 4.57	\$ 0.82	\$ 0.95	\$ 0.99	\$ 1.24	\$ 4.01	\$ 3.80
Statistical	-	-	-	-	74%	-	-	-	-	4%	-	-	-	-	-22%	-	-	-	-	2%	-	-	-	-	-14%	-16%
Capex	86,404	59,562	64,791	69,184	279,941	105,976	133,530	137,641	211,767	588,914	168,990	220,976	223,895	117,953	731,814	125,000	157,500	57,200	84,543	424,243	124,607	90,295	93,288	108,965	417,155	440,817
Capex, % Sales	20.7%	11.3%	13.5%	10.8%	13.5%	18.7%	22.7%	17.3%	34.7%	23.0%	29.8%	41.5%	22.3%	17.9%	26.5%	25.1%	16.5%	6.8%	7.0%	12.1%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Depreciation & Amortization	26,085	30,028	34,607	38,908	129,628	39,089	38,658	35,176	43,170	156,093	48,269	56,018	62,240	68,704	235,231	73,000	65,229	65,600	78,000	281,829	78,161	67,736	68,369	81,096	295,362	309,907
Depreciation	26,085	30,028	34,607	38,908	129,628	39,089	38,658	35,176	43,170	156,093	48,269	56,018	62,240	68,704	235,231	73,000	65,229	65,600	78,000	281,829	78,161	67,736	68,369	81,096	295,362	309,907

Source: Citi Research

Units in \$mm unless noted

Figure 112. FSLR balance sheet

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	FY
<b>ASSETS</b>																										
Cash & Cash Equivalents	624.932	429.160	364.814	664.499	664.499	420.886	510.482	621.216	765.689	765.689	355.725	357.477	678.560	605.619	605.619	610.480	630.240	614.699	809.834	809.834	921.533	1,202.304	1,243.568	1,227.795	1,227.795	1,342.779
Restricted Cash	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Short-Term Investments	172.176	160.714	158.847	120.236	120.236	293.288	285.993	212.200	167.889	167.889	199.785	106.866	84.350	66.146	66.146	53.107	113.453	102.295	102.295	102.295	102.295	102.295	102.295	102.295	102.295	102.295
Accounts Receivable	164.790	351.266	348.965	226.826	226.826	269.222	361.677	464.624	305.537	305.537	362.695	541.977	481.978	310.568	310.568	315.915	143.670	467.640	464.519	464.519	547.724	396.901	410.059	478.966	478.966	550.303
Inventories	131.468	162.501	178.032	152.821	152.821	172.119	194.308	184.006	200.442	200.442	287.236	502.030	476.174	529.651	529.651	705.566	733.395	662.579	688.733	688.733	771.025	515.727	532.916	623.930	623.930	730.541
Prepaid expenses and other current asse	126.338	140.846	152.734	186.889	186.889	249.018	263.410	132.795	144.903	144.903	188.814	327.781	709.406	1,101.277	1,101.277	1,215.335	843.666	862.823	862.823	862.823	862.823	862.823	862.823	862.823	862.823	862.823
<b>Total Current Assets</b>	1,239.704	1,244.487	1,203.392	1,351.271	1,351.271	1,404.533	1,615.870	1,614.841	1,584.460	1,584.460	1,394.255	1,836.231	2,430.468	2,613.261	2,613.261	2,900.403	2,464.424	2,710.036	2,928.205	2,928.205	3,205.400	3,080.050	3,151.661	3,295.808	3,295.808	3,588.740
Net PP&E	867.660	911.869	962.732	968.782	968.782	1,030.219	1,094.877	1,244.598	1,430.789	1,430.789	1,549.529	1,727.993	1,840.295	1,815.958	1,815.958	1,540.953	1,567.367	1,549.689	1,556.232	1,556.232	1,602.678	1,625.237	1,650.157	1,678.025	1,678.025	1,808.935
Net Goodwill	33.829	294.962	284.005	286.515	286.515	286.515	286.515	433.288	433.288	433.288	458.808	458.808	458.808	65.444	65.444	65.444	65.444	65.444	65.444	65.444	90.444	115.444	140.444	165.444	165.444	265.444
Intangible Assets, net	30.148	33.695	37.173	36.404	36.404	77.343	81.103	95.024	86.003	86.003	147.707	174.698	203.763	200.550	200.550	282.526	267.411	285.573	285.573	285.573	285.573	285.573	285.573	285.573	285.573	285.573
Restricted Investments	117.091	425.166	607.770	686.450	686.450	674.904	552.950	814.020	845.863	845.863	883.682	741.502	789.978	1,082.401	1,082.401	984.186	1,122.688	1,370.987	1,370.987	1,370.987	1,370.987	1,370.987	1,370.987	1,370.987	1,370.987	1,370.987
Other long-term assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total Assets</b>	2,288.432	2,910.179	3,095.072	3,349.512	3,349.512	3,473.514	3,631.315	4,201.771	4,380.403	4,380.403	4,433.981	4,939.232	5,723.312	5,777.614	5,777.614	5,773.512	5,487.334	5,981.729	6,206.440	6,206.440	6,555.082	6,477.291	6,598.822	6,795.837	6,795.837	7,319.680
<b>LIAB. &amp; SHRLDRS' EQUITY</b>																										
Short-Term Debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Current portion of long-term debt	32.952	76.639	29.169	28.559	28.559	26.355	24.465	26.639	26.587	26.587	28.169	28.334	25.597	44.505	44.505	58.238	47.768	61.398	61.398	61.398	61.398	61.398	61.398	61.398	61.398	61.398
Accounts Payable	41.853	55.631	72.338	75.744	75.744	76.029	68.268	71.135	82.312	82.312	99.398	189.875	170.904	176.448	176.448	218.216	194.554	235.744	295.171	295.171	550.732	368.376	380.654	445.664	445.664	521.815
Accrued Expenses	188.492	163.671	160.045	195.422	195.422	157.199	212.441	282.832	244.271	244.271	228.956	242.250	271.991	406.659	406.659	434.333	476.817	575.156	575.156	575.156	575.156	575.156	575.156	575.156	575.156	575.156
Current portion on customer advances	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	52.542	70.187	85.107	95.202	95.202	62.891	20.045	77.172	116.507	116.507	113.366	131.410	278.509	346.112	346.112	460.246	243.126	267.529	267.529	267.529	267.529	267.529	267.529	267.529	267.529	267.529
<b>Total Current Liabilities</b>	315.839	365.128	346.659	394.927	394.927	322.474	325.219	457.776	469.677	469.677	469.889	591.889	747.001	973.724	973.724	1,171.033	962.265	1,139.827	1,199.254	1,199.254	1,454.815	1,272.459	1,284.737	1,349.747	1,349.747	1,425.998
Long-Term Debt	195.216	156.935	163.320	146.399	146.399	136.129	114.168	223.756	210.804	210.804	103.531	332.492	582.744	619.143	619.143	806.070	471.083	468.294	468.294	468.294	468.294	468.294	468.294	468.294	468.294	468.294
Deferred Tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other liabilities	71.705	102.225	125.919	155.399	155.399	168.056	179.682	218.891	244.977	244.977	294.712	333.333	367.783	540.884	540.884	587.413	692.547	915.454	915.454	915.454	915.454	915.454	915.454	915.454	915.454	915.454
<b>Total Liabilities</b>	582.760	625.288	635.898	696.725	696.725	626.659	619.069	900.425	925.458	925.458	868.132	1,257.694	1,697.528	2,133.751	2,133.751	2,564.516	2,125.895	2,523.575	2,583.002	2,583.002	2,838.563	2,656.207	2,668.485	2,733.495	2,733.495	2,809.646
Employee stock options on redeemable shares	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Shareholders' Equity	1,705.672	2,284.891	2,459.174	2,652.787	2,652.787	2,846.855	3,012.246	3,301.346	3,454.945	3,454.945	3,565.849	3,681.538	4,025.784	3,643.863	3,643.863	3,208.996	3,361.439	3,458.154	3,623.438	3,623.438	3,716.519	3,821.084	3,930.337	4,062.342	4,062.342	4,510.034
<b>Total Liab. and Equity</b>	2,288.432	2,910.179	3,095.072	3,349.512	3,349.512	3,473.514	3,631.315	4,201.771	4,380.403	4,380.403	4,433.981	4,939.232	5,723.312	5,777.614	5,777.614	5,773.512	5,487.334	5,981.729	6,206.440	6,206.440	6,555.082	6,477.291	6,598.822	6,795.837	6,795.837	7,319.680

Source: Citi Research

Units in \$mm unless noted

Figure 113. FSLR rolling 12M P&L

FYE: Dec	2009				2010				2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
Total Revenues	\$1,467.6	\$1,726.4	\$1,858.6	\$2,066.2	\$2,216.0	\$2,277.9	\$2,595.0	\$2,563.5	\$2,562.8	\$2,507.8	\$2,715.7	\$2,766.2	\$2,696.0	\$3,120.5	\$2,953.9	\$3,501.3	\$4,250.3	\$4,195.9	\$4,289.7	\$4,171.6	\$3,789.9	\$4,040.0	\$4,245.9	\$4,408.2
- Sequential Change	17.8%	17.6%	7.7%	11.2%	7.2%	2.8%	13.9%	(1.2)%	(0.0)%	(2.1)%	8.3%	1.9%	(2.5)%	15.7%	(5.3)%	18.5%	21.4%	(1.3)%	2.2%	(2.8)%	(9.1)%	6.6%	5.1%	3.8%
- Yr to Yr Change	131.5%	109.6%	83.4%	65.8%	51.0%	31.9%	39.6%	24.1%	15.7%	10.1%	4.7%	7.9%	5.2%	24.4%	8.8%	25.6%	57.7%	34.5%	45.2%	19.1%	-10.8%	-3.7%	-1.0%	5.7%
Cost of Goods	\$645.6	\$750.7	\$832.4	\$1,004.1	\$1,106.2	\$1,180.5	\$1,419.8	\$1,358.7	\$1,379.2	\$1,412.3	\$1,562.4	\$1,639.8	\$1,725.7	\$2,084.9	\$2,037.4	\$2,548.1	\$3,162.0	\$3,141.6	\$3,260.9	\$3,176.7	\$2,890.8	\$3,096.0	\$3,264.2	\$3,402.8
- % of Revenue	44.0%	43.5%	44.8%	48.6%	49.9%	51.8%	54.7%	53.0%	53.8%	56.3%	57.5%	59.3%	64.0%	66.8%	69.0%	72.8%	74.4%	74.9%	76.0%	76.2%	76.3%	76.6%	76.9%	77.2%
Gross Margin	\$822.0	\$975.8	\$1,026.2	\$1,062.1	\$1,109.8	\$1,097.4	\$1,175.2	\$1,204.8	\$1,183.6	\$1,095.5	\$1,153.2	\$1,126.4	\$970.3	\$1,035.7	\$916.5	\$953.2	\$1,088.3	\$1,054.4	\$1,028.7	\$994.9	\$899.1	\$944.0	\$981.6	\$1,005.3
- % of Revenue	56.0%	56.5%	55.2%	51.4%	50.1%	48.2%	45.3%	47.0%	46.2%	43.7%	42.5%	40.7%	36.0%	33.2%	31.0%	27.2%	25.6%	25.1%	24.0%	23.8%	23.7%	23.4%	23.1%	22.8%
- Sequential Change	18.9%	18.7%	5.2%	3.5%	4.5%	-1.1%	7.1%	2.5%	(1.8)%	-7.4%	5.3%	-2.3%	(13.9)%	6.7%	-11.5%	4.0%	14.2%	-3.1%	-2.4%	-3.3%	(8.6)%	5.0%	4.0%	2.4%
- Yr to Yr Change	143.7%	114.8%	80.5%	53.6%	35.0%	12.5%	14.5%	13.4%	6.7%	(0.2)%	(1.9)%	(6.5)%	-18.0%	(5.5)%	(20.5)%	(15.4)%	12.2%	1.8%	12.3%	4.4%	-17.4%	(10.5)%	(4.6)%	1.1%
- Basis Sequential	52	51	(131)	(381)	(132)	(191)	(289)	171	(81)	(250)	(122)	(174)	(473)	(280)	(216)	(380)	(162)	(48)	(115)	(13)	(12)	(38)	(25)	(31)
- Basis Yr to Yr	281	138	(88)	(408)	(593)	(834)	(993)	(441)	(390)	(449)	(282)	(628)	(1,019)	(1,049)	(1,144)	(1,350)	(1,038)	(806)	(704)	(337)	(188)	(176)	(86)	(104)
R&D	\$33.9	\$44.2	\$57.8	\$68.6	\$79.7	\$83.5	\$80.5	\$84.8	\$92.7	\$102.3	\$118.8	\$129.1	\$134.0	\$133.7	\$129.3	\$124.3	\$128.1	\$136.0	\$142.5	\$150.0	\$152.5	\$155.0	\$157.5	\$160.0
- % of Revenue	2.3%	2.6%	3.1%	3.3%	3.6%	3.7%	3.1%	3.3%	3.6%	4.1%	4.4%	4.7%	5.0%	4.3%	4.4%	3.6%	3.0%	3.2%	3.3%	3.6%	4.0%	3.8%	3.7%	3.6%
- Sequential Change	24.3%	30.5%	30.9%	18.7%	16.1%	4.8%	-3.6%	5.4%	9.3%	10.4%	16.1%	8.7%	3.8%	-0.3%	-3.2%	-3.9%	3.0%	6.2%	4.8%	5.3%	1.7%	1.6%	1.6%	1.6%
- Yr to Yr Change	188.2%	182.0%	175.7%	152.1%	135.4%	89.1%	39.2%	23.6%	16.3%	22.5%	47.6%	52.2%	44.6%	30.6%	8.9%	(3.7)%	-4.4%	1.7%	10.2%	20.7%	19.1%	14.0%	10.5%	6.7%
- Basis Sequential	12	25	55	21	27	7	(56)	21	31	46	29	29	30	(69)	10	(83)	(54)	23	8	27	43	(19)	(13)	(8)
- Basis Yr to Yr	45	66	104	114	129	111	(1)	(1)	2	41	127	136	135	20	0	(112)	(196)	(104)	(106)	5	101	60	39	3
SG&A	\$151.3	\$179.5	\$181.3	\$212.4	\$226.2	\$226.2	\$254.1	\$252.0	\$267.9	\$271.8	\$297.8	\$300.6	\$290.2	\$258.2	\$229.2	\$205.3	\$233.9	\$264.1	\$265.7	\$292.0	\$265.3	\$282.8	\$297.2	\$308.6
- % of Revenue	10.3%	10.4%	9.8%	10.3%	10.2%	9.9%	9.8%	9.8%	10.5%	10.8%	11.0%	10.9%	10.8%	8.3%	7.8%	5.9%	5.5%	6.3%	6.2%	7.0%	7.0%	7.0%	7.0%	7.0%
- Sequential Change	12.4%	18.7%	1.0%	17.1%	6.5%	0.0%	12.3%	-0.8%	6.3%	1.5%	9.6%	1.0%	(3.5)%	-11.0%	-11.2%	-10.4%	13.9%	12.9%	0.6%	9.9%	(9.1)%	6.6%	5.1%	3.8%
- Yr to Yr Change	113.7%	101.2%	62.6%	57.8%	49.5%	26.0%	40.1%	18.6%	18.4%	20.1%	17.2%	19.3%	8.3%	(5.0)%	(23.0)%	(31.7)%	-19.4%	2.3%	15.9%	42.2%	13.4%	7.1%	11.8%	5.7%
- Basis Sequential	(46)	9	(64)	62	(7)	(20)	(14)	4	62	38	13	(10)	(10)	(249)	(51)	(180)	(36)	79	(10)	81	150	70	81	-
- Basis Yr to Yr	(86)	(44)	(125)	(52)	(10)	(47)	3	(45)	25	91	117	104	31	(256)	(321)	(500)	(526)	(198)	(156)	114	150	70	81	-
BLE	\$185.1	\$223.7	\$239.2	\$281.0	\$305.8	\$309.7	\$334.6	\$336.8	\$360.6	\$374.1	\$416.6	\$429.7	\$424.2	\$391.8	\$358.5	\$329.6	\$362.0	\$400.1	\$408.2	\$442.0	\$417.8	\$437.8	\$454.7	\$468.6
- % of Revenue	12.6%	13.0%	12.9%	13.6%	13.8%	13.6%	12.9%	13.1%	14.1%	14.9%	15.3%	15.5%	15.7%	12.6%	12.1%	9.4%	8.5%	9.5%	9.5%	10.6%	11.0%	10.8%	10.7%	10.8%
- Sequential Change	14.4%	20.8%	6.9%	17.5%	8.3%	1.3%	6.0%	0.7%	7.0%	3.8%	11.4%	3.2%	(1.3)%	-7.6%	-8.5%	-8.1%	9.8%	10.5%	2.0%	8.3%	(5.5)%	4.8%	3.9%	3.0%
- Yr to Yr Change	124.3%	113.2%	80.5%	73.6%	65.2%	38.5%	39.9%	19.9%	17.9%	20.8%	24.5%	27.6%	17.7%	4.7%	(13.9)%	(23.3)%	-14.7%	2.1%	13.9%	34.1%	15.4%	9.4%	11.4%	6.0%
- Basis Sequential	(37)	34	(9)	73	20	(21)	(70)	25	93	85	42	19	20	(318)	(42)	(272)	(90)	102	(2)	108	43	(19)	(13)	(8)
- Basis Yr to Yr	(41)	22	(20)	62	119	64	2	(46)	27	132	245	240	167	(236)	(320)	(612)	(722)	(302)	(262)	118	251	130	119	3
Operating Margin	\$636.8	\$752.1	\$787.0	\$781.1	\$803.9	\$787.7	\$840.6	\$867.9	\$823.0	\$721.4	\$736.7	\$696.7	\$546.0	\$643.8	\$557.9	\$623.5	\$726.3	\$654.2	\$620.5	\$552.9	\$481.3	\$506.2	\$526.9	\$536.8
- % of Revenue	43.4%	43.6%	42.3%	37.8%	36.3%	34.6%	32.4%	33.9%	32.1%	28.8%	27.1%	25.2%	20.3%	20.6%	18.9%	17.8%	17.1%	15.6%	14.5%	13.3%	12.7%	12.5%	12.4%	12.2%
- Sequential Change	20.2%	18.1%	4.6%	-0.7%	2.9%	-2.0%	6.7%	3.2%	(5.2)%	-12.4%	2.1%	-5.4%	(21.6)%	17.9%	-13.3%	11.8%	16.5%	-9.9%	-5.2%	-10.9%	(12.9)%	5.2%	4.1%	1.9%
- Yr to Yr Change	150.1%	115.3%	80.5%	47.5%	26.2%	4.7%	6.8%	11.1%	2.4%	(8.4)%	(12.4)%	(19.7)%	-33.7%	(10.7)%	(24.3)%	(10.5)%	33.0%	1.6%	11.2%	(11.3)%	-33.7%	(22.6)%	(15.1)%	(2.9)%
- Basis Sequential	90	17	(122)	(454)	(153)	(170)	(218)	146	(174)	(335)	(164)	(194)	(493)	38	(174)	(108)	(72)	(150)	(113)	(121)	(55)	(17)	(12)	(23)
- Basis Yr to Yr	322	116	(68)	(469)	(711)	(898)	(995)	(395)	(416)	(581)	(527)	(867)	(1,186)	(613)	(824)	(738)	(316)	(504)	(442)	(458)	(439)	(308)	(205)	(108)
Other Income (Exp)	\$18.0	\$10.2	\$9.4	\$4.7	\$9.2	\$11.9	\$11.1	\$13.2	\$12.6	\$20.0	\$18.8	\$15.0	\$12.3	\$0.6	\$4.3	(\$0.9)	(\$2.7)	\$1.8	(\$1.5)	\$0.0	\$1.7	\$1.9	\$2.2	\$2.6
- % of Revenue	1.2%	0.6%	0.5%	0.2%	0.4%	0.5%	0.4%	0.5%	0.5%	0.8%	0.7%	0.5%	0.5%	0.0%	0.1%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
- Sequential Change	(29.1)%	-43.6%	-7.6%	-50.0%	96.7%	29.3%	-7.5%	19.2%	(4.5)%	59.3%	-6.3%	-20.4%	(17.5)%	-95.2%	620.8%	-119.9%	217.2%	-167.1%	-184.7%	-101.9%	5502.4%	12.1%	17.7%	19.7%
- Yr to Yr Change	-19.4%	(60.0)%	(59.2)%	(81.5)%	-48.8%	17.6%	17.6%	180.4%	36.1%	67.7%	70.0%	13.5%	-2.0%	(97.0)%	(77.2)%	(105.7)%	-121.9%	205.1%	(135.9)%	(103.5)%	-161.2%	2.3%	(242.1)%	8753.2%
- Basis Sequential	(81)	(64)	(6)	(25)	19	11	(10)	9	(2)	31	(11)	(15)	(6)	(44)	13	(17)	(4)	11	(8)	-4	11	0	9	6
- Basis Yr to Yr	(230)	(250)	(177)	(181)	(81)	(6)	(8)	29	7	27	27	3	(3)	(78)	(55)	(56)	(52)	2	(18)	3	11	0	9	6
Profit Before Taxes	\$618.8	\$741.9	\$777.6	\$776.4	\$794.7	\$775.7	\$829.6	\$854.8	\$810.5	\$701.3	\$717.9	\$681.8	\$533.7	\$643.2	\$553.6	\$624.4	\$729.0	\$652.4	\$622.0	\$552.8	\$479.7	\$504.4	\$524.7	\$534.2
- % of Revenue	42.2%	43.0%	41.8%	37.6%	35.9%	34.1%	32.0%	33.3%	31.6%	28.0%	26.4%	24.6%	19.8%	20.6%	18.7%	17.8%	17.2%	15.5%	14.5%	13.3%	12.7%	12.5%	12.4%	12.1%
- Sequential Change	22.7%	19.9%	4.8%	-0.2%	2.4%	-2.4%	6.9%	3.0%	(5.2)%	-13.5%	2.4%	-5.0%	(21.7)%	20.5%	-13.9%	12.8%	16.8%	-10.5%	-4.7%	-11.1%	(13.2)%	5.1%	4.0%	1.8%
- Yr to Yr Change	166.4%	129.1%	88.3%	54.0%	28.4%	4.6%	6.7%	10.1%	2.0%	(9.6)%	(13.5)%	(20.2)%	-34.1%	(8.3)%	(22.9)%	(8.4)%	36.6%	1.4%	12.4%	(11.5)%	-34.2%	22.7%	(15.6)%	(3.4)%
- Basis Sequential	171	81	(114)	(426)	(172)	(181)	(209)	138	(172)	(366)	(153)	(179)	(485)	82	(187)	(91)	(68)	(160)	(105)	(125)	(60)	(17)	(12)	(24)
- Basis Yr to Yr	552	366	109	(288)	(630)	(892)	(987)	(423)	(424)	(609)	(553)	(870)	(1,183)	(735)	(769)	(681)	(264)	(506)	(424)	(458)	(450)	(307)	(214)	(114)
Taxes	\$113.5	\$110.0	\$87.8	\$57.7	\$64.1	\$64.7	\$89.2	\$97.9	\$91.9	\$81.3	\$71.5	\$47.5	\$26.9	\$43.4	\$40.6	\$98.0	\$12							

## Company Focus

- Company Update
- Initiation of Coverage

**Shahriar (Shar) Pourreza, CFA**

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<b>Buy/High Risk</b>	<b>1H</b>
Price (01 Feb 13)	US\$4.29
Target price	US\$5.40
Expected share price return	25.9%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>25.9%</b>
Market Cap	US\$991M

### Price Performance

(RIC: WFR.N, BB: WFR US)



## MEMC Electronic Materials Inc. (WFR)

### Future Looks Sunnier – Launching With Buy

- **Launching US coverage of WFR with a non consensus Buy (1H)** — We are launching coverage of MEMC Electronic Materials Inc. (Ticker WFR) with a Buy/High Risk (1H) rating and a \$5.40 target price. Our favorable outlook on WFR shares is predicated on: (1) solid growth prospects at SunEdison – WFR's tech agonistic project development solar business and (2) demand/pricing improvement in the semi 300mm wafer segment in 2013 as highlighted by Citi Analyst Takao Kanai. That said, the solar segment is the key area of growth for us. With our favorable sector tilt towards downstream players in the solar space (vs. upstream manufacturers), we believe SunEdison is well positioned to capitalize on emerging growth opportunities in the US and oversees sustainable markets. Our new \$5.40 target price per share translates into an ETR of 26% - warranting the Buy rating.
- **SunEdison now focusing on key growth regions early in the cycle** — With the sale of the 60MW Bulgaria project and 38MW in Italy in July 2012, SunEdison exposure to Western Europe – a source of historical growth opportunities with a tepid outlook going forward – is minimal. With a pipeline focused in early high growth regions like the US, Canada and the Emerging Markets coupled with a tech agonistic strategy well poised to capitalize on the drop in module prices, we see a solid outlook going forward for SunEdison.
- **Semi wafer outlook improvement on the horizon; positive inflection point in 2013** — In December, Citi Analyst Takao Kanai, upgraded shares of SUMCO (3436.T; ¥948; 1) and increased target price of Shin-Etsu Chemical (4063.T; ¥5,510; 1) on the visible prospects for 300mm semi wafer S/D tightening and pricing improvement in 2013. With a number ~#3 market share position (SUMCO and Shin-Etsu control ~ 60% of the market), WFR's semi wafer business is poised to benefit from the noted recovery mentioned above (see note for details including key links). With seasonal weakness occurring between December-February, recovery could begin in March 2013.
- **Above consensus EPS outlook Driven By SunEdison; below historical average growth at Semiconductor Materials** — Our new above consensus EPS outlook for 2012/2013/2014 is \$0.20/\$0.24/\$0.51. Our forecast period is driven by solid growth prospects at SunEdison coupled with below average growth trends at Semiconductor Materials. Key takeaway, if our Citi semi wafer outlook prospects do materialize as highlighted by Takao Kanai, our estimates for this segment could prove conservative. Through our forecast period and beyond, we estimate very healthy gross margins driven mostly by SunEdison with margin expectations in the 10-14% range for the Semi Materials Segment (wafers).
- **With SunEdison increasingly becoming the driver of the story, we employ a sum-of-parts valuation** — For the Solar Energy segment; we apply a discounted cash flow analysis to our forecasted project pipeline. For Semiconductor Materials segment, we employ a comparable EV/Sale multiple approach - consistent with a #3 market position (i.e. Wacker) in the Semi Wafer industry. The sum of these segments equate to our new 12 month target price of \$5.40/share. This equates to an ETR of 26% - supporting our Buy thesis.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2011A	0.09A	0.29A	0.03A	-0.21A	0.20A	0.20A
2012E	-0.26A	0.15A	0.30A	0.01E	0.20E	0.16E
Previous	na	na	na	na	na	na
2013E	-0.06E	0.05E	0.14E	0.11E	0.24E	0.20E
Previous	na	na	na	na	na	na
2014E	na	na	na	na	0.51E	0.39E
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## Future Looks Sunnier – Launching With Buy

We are launching coverage of MEMC Electronic Materials Inc. (Ticker WFR) with a Buy (1H) rating and a \$5.40 target price. Our favorable outlook on WFR shares is predicated on: (1) solid growth prospects at SunEdison – WFR's tech agnostic project development solar business and (2) demand/pricing improvement in the semi 300mm wafer segment in 2013 as highlighted by Citi Analyst Takao Kanai. That said, the solar segment is the key area of growth for us. With our favorable sector tilt towards downstream players in the solar space (vs. upstream manufacturers), we believe SunEdison is well positioned to capitalize on emerging growth opportunities in the US and overseas sustainable markets. Our new \$5.40 target price per share translates into an ETR of 26% - warranting the Buy rating.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

### Key reasons why WFR shares appear attractive

- Our sector tilt is positively biased towards downstream solar players versus upstream manufacturers, WFR's project development arm (SunEdison) fits well with our thesis.
  - SunEdison is the key contributor to growth at WFR going forward.
- With the strategic move to predominately exit out of 3<sup>rd</sup> party solar wafer sales, WFR's exposure to the highly commoditized upstream value chain remains minimal.
- SunEdison's tech agnostic strategy with modules stands to benefit the most versus the other solar downstream names in this highly commoditized module pricing environment where we expect further contraction in ASP's (average selling prices).
  - No panels in inventory. Flextronics partnership assures ample module supplies for projects (mainly US and Canada) while protecting SunEdison from the highly commoditized part of the solar value chain.
- With the sale of 98MW of solar projects in Bulgaria and Italy combined, SunEdison's exposure to Western Europe – a source of historical growth opportunities with a very tepid outlook going forward – is minimal.
  - The pipeline of projects is now focused on high growth regions very early in the solar cycle – mainly US, Canada and Emerging Markets.
- Semi Wafer industry poised for recovery in 2013 per Citi Analyst Takao Kanai – a positive read-through for WFR's Semiconductor Materials segment.
  - Expectations remain low for Semi Wafers so a recovery is upside to estimates.
- Balance Sheet and Cash Flow strong and improving.
- Our Sum-Of-The-Parts valuation methodology equates to a target price of \$5.40/share – yielding an ETR of 26% which supports our Buy thesis.

## Where we can be wrong?

- Growth opportunities in emerging markets remain in infancy stages – if growth fails to materialize, WFR's financial results could be materially impacted given that 28% of the project pipeline is located in emerging areas.
- The project development business becomes commoditized from increased competition from Chinese counterparts – similar to the panel manufacturing business.
- Project finance market dries up which will negatively impact SunEdison more versus the other downstream players who are equipped with larger balance sheets.
- Semi Wafer outlook deteriorates in 2013 versus Citi expectations – putting more pressure on the Semiconductor Materials segment.

## Background

### SunEdison is the value driver for us

**MEMC Electronic Materials, Inc. has essentially two operating segments: Solar Energy and Semiconductor Materials.** The Solar Energy segment is WFR's technology agnostic, solar project development business that designs, installs, finances and monitors solar energy projects at the commercial and utility scale level through SunEdison. SunEdison also provides EPC and operations and maintenance services. The Semiconductor Materials segment is a leading supplier of raw silicon wafers to the semiconductor industry. MEMC's Semi Materials segment includes virtually all major chipmakers in its customer base, with a ~#3 leading market share – essentially tied with Wacker. The company's products include 100mm, 125mm, 150mm, 200mm and 300mm prime polished wafers, epitaxial wafers, and test and monitor wafers for semiconductor devices including memory, logic and microprocessors. MEMC Electronics was founded in 1959 and located in St. Peters, MO.

## Solar Energy (SunEdison) – Value driver for WFR

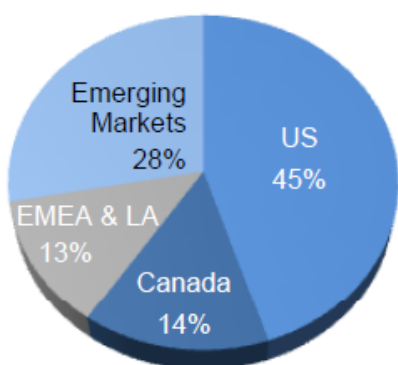
**Tech agnostic strategy works in this environment.** SunEdison remains the only name in our coverage space that is essentially “tech agnostic” when competing for Solar project development business. What we mean by this is the project development business is open to using any panel manufacturer – and they have. The most notable benefit to this strategy is, unlike the other downstream players, SunEdison does not have a separate panel manufacturing arm that would incur losses as panel prices drop – only a partnership with Flextronics to build them modules for a fee (see below). So, SunEdison stands to completely benefit as module prices drop given the lower LCOE (levelized Cost Of Energy) and improved project returns. While this is also true for our other downstream players, losses at their module manufacturing business (as module ASP's fall) partially offset the gains in the downstream project development segments. SunEdison absorbs all the benefits when panel prices drop. It's important to note that the panel manufacturing business has not only gone through cyclical but also structural changes – mainly the commoditization of the modules – we expect depressed panel ASPs for the next few years (see industry section above; page 16 for a summary). So, the tech agnostic strategy works well in this environment.

**Flextronics partnership assures ample module supplies for projects in US and Canada; shields WFR from the most highly commoditized part of the solar upstream value chain.** WFR and Flextronics have a partnership where Flextronics

supplies WFR with modules for a fee. Most of the modules being produced serve the US and Canada market – signed in 12/2010. The Flextronics facility in Ontario, Canada produces modules for WFR that qualify for the Ontario FiT (Feed-In-Tariff) market. The Flextronics facility in Malaysia produces modules for the WFR's US project business. The important takeaway is that WFR does not produce their own modules (no inventory) and is thus, not susceptible to losses in the module business as ASP's fall – unlike peers. For a background on the partnership, refer to Flextronics' website.

- Through the Flextronics partnership, WFR announced a mono crystalline panel with an efficiency rating of 16.9% - modestly higher than the industry average for mono. Given the high efficiency, versus multi crystalline panels, the product is ideal for space constrained areas like rooftops – should help with the commercial project business. See the company's website for more information.

Figure 114. SunEdison pipeline by region



Source: Citi Research; Company Filings

**Minimal exposure to Western Europe; now focusing on key growth regions – a positive attribute.** In July 2012 – SunEdison announced the closure of 98MW of solar projects in Western Europe: 60MW in Bulgaria; 38MW in Italy. This was a major overhang with the shares given the cash drag. The key takeaway is following this transaction; SunEdison's exposure to West Europe – a historical growth area with a very tepid outlook (see demand section on page 32) on solar spending going forward – is minimal. All that remains is 14MW in Spain as of 3Q 2012. Additionally, management has redeployed those teams to higher growth regions including Asia and Sub-Saharan Africa. For a deep dive into our global industry thoughts, refer to Chapter 1 above in the industry section.

- **Announced 58MW South African solar project a precursor of growth opportunities in emerging markets.** On 11/28/2012, SunEdison closed \$314mm in debt and equity financing for two utility scale projects in Limpopo Province, South Africa. The project ASP was north of \$5/watt (USD) driven by an above average FiT (Feed-In-Tariff). For comparative purposes, ASP's for utility scale projects in the US range between \$2-\$3/watt.

Figure 115. WFR: key projects in US – not all inclusive

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	Expected Completion Date	Owner	Power Offtaker	Offtaker Type	EPC Firm	Business Model	Land Type
Lakeland Electric - SunEdison JV	SunEdison	18.5	FL	Development	N	2018	SunEdison	Lakeland Electric	Muni	SunEdison	PPA	Private
North Lake I (Diamond Valley Solar)	SunEdison	20	CA	Development	N	2015	SunEdison	Riverside Public Utilities	Public Utility		PPA	Private
Orion Solar II	SunEdison	8	CA	Development	N	2014	SunEdison	Southern California Edison	IOU		PPA	Private
Twisselman Solar	SunEdison	20	CA	Development	N	2014	SunEdison	Southern California Edison	IOU		PPA	Private
Vega Solar	SunEdison	20	CA	Development	N	2014	SunEdison	Southern California Edison	IOU		PPA	Private
Adobe Solar	SunEdison	20	CA	Development	N	2013	SunEdison	Southern California Edison	IOU		PPA	Private
Cynnia Solar	SunEdison	20	CA	Development	N	2013	SunEdison	Southern California Edison	IOU		PPA	Private
Mojave Solar	SunEdison	20	CA	Development	N	2013	SunEdison	Southern California Edison	IOU		PPA	Private
Mojave Solar 4	SunEdison	20	CA	Development	N	2013	SunEdison	Southern California Edison	IOU		PPA	Private
Orion Project	SunEdison	20	CA	Development	N	2013	SunEdison	Pacific Gas & Electric	IOU		PPA	Private
Regulus Solar	SunEdison	60	CA	Development	N	2013	SunEdison	Southern California Edison	IOU		PPA	Private
SMECO Solar	SunEdison	5.5	MD	Development	N	2013	Southern Maryland Electric Coop	Southern Maryland Electric Cooperative	Coop		PPA	Private
Spectrum Solar	SunEdison	30	NV	Development	N	2013	Southern Co. Turner Renewable	NV Energy	IOU		PPA	Private
Sussex Solar Project	SunEdison	4	DE	Development	N	2013	Delaware Electric Cooperative	Delaware Electric Cooperative	Coop	SunEdison	PPA	Private
Virgin Islands Solar	WFR, Toshiba, Lanco	18	VI	Development	N	2013	SunEdison, Toshiba, Lanco	Virgin Islands Water and Power Authority	Public Utility		PPA	Private
CA Dept. of Corrections and Rehabilitation - Phase II	SunEdison	7.5	CA	Development	Y	2012	CA Dep of Corrections	CA Dep of Corrections	Commercial		PPA	Private
Campbell Industrial Park Project	SunEdison	5	HI	Development	N		SunEdison	Hawaiian Electric Company	IOU	IC Sunshine	PPA	Private
Davis-Monthan Air Force Base Project	SunEdison	12.6	AZ	Development	N		SunEdison	U.S. Air Force	Govt Agency		PPA	Private
FRV Bryan Solar	SunEdison	10	TX	Development	N		SunEdison	Bryan Texas Utilities	Muni		PPA	Private
Picture Rocks Solar	SunEdison	20	AZ	Development	N		SunEdison	Tucson Electric Power	IOU	SunEdison	PPA	Private
Pittsfield Solar Farm	SunEdison	1.7	MA	Development	N		SunEdison	Town of Pittsfield			PPA	Public
Sonoma County Water Authority	SunEdison	20	CA	Development	N		SunEdison	Sonoma County Water Agency	Commercial		Retail PPA	Private
US MW In Development		380.8										

Source: Citi Research

Figure 116. WFR: additional pipeline opportunities – pre PPA phase

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	Expected Completion Date	Owner	Power Offtaker	Offtaker Type	EPC Firm	Business Model	Land Type
Oro Verde	SunEdison	350	CA	Pre-Contract	N	2016	SunEdison					
East Street Landfill Project	SunEdison	1.5	MA	Pre-Contract	N	2013	SunEdison	Mansfield Municipal Electric Department	Muni		PPA	
Rigel Solar	SunEdison	20	CA	Pre-Contract	N	2013	SunEdison					
Additional PPA Opportunities		371.5										

Source: Citi Research



Figure 117. WFR: US MW in operation – not all inclusive

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	Completion Date	Owner	Power Offtaker	Offtaker Type	EPSC Firm	Business Model	Land Type
Apex Solar	SunEdison	20	NV	Operating	N	2012	Southern Co. Turner Renewable	NV Energy	IOU	ABB	PPA	Private
APS AZ Sun - Chino Valley	SunEdison	19	AZ	Operating	N	2012	Arizona Public Service	Arizona Public Service	IOU	SunEdison	UOG	Private
APS AZ Sun - Hyder Solar I - Phase 2	SunEdison	5	AZ	Operating	N	2012	Arizona Public Service	Arizona Public Service	IOU	SunEdison	UOG	Private
California Department of Corrections and Rehabilitation - P	SunEdison	16.008	CA	Operating	N	2012	CA Dep of Corrections	CA Dep of Corrections	Commercial	SunEdison	PPA	Private
CPS STEP - III: Somerset	SunEdison	10.6	TX	Operating	N	2012	SunEdison	CPS Energy	Muni	SunEdison	PPA	Private
El Chaparral Solar Farm	SunEdison	11.3	NM	Operating	N	2012	SunEdison	El Paso Electric	IOU	SunEdison	PPA	Private
FRV Tucson Solar	SunEdison	21.8	AZ	Operating	N	2012	SunEdison	Tucson Electric Power	IOU	SunEdison	PPA	Private
Granville Solar Facility	SunEdison	2.5	NC	Operating	N	2012	Southern Co. Turner Renewable	Power Energy Carolinas	IOU	SunEdison	PPA	Private
Greenfield Solar Farm	SunEdison	1.7	MA	Operating	N	2012	SunEdison	Town of Greenfield	Commercial	SunEdison	Retail PPA	Public
Lakeland Linder Regional Airport - Phase II	SunEdison	3.2	FL	Operating	N	2012	SunEdison	Lakeland Electric	IOU	SunEdison	PPA	Private
Las Cruces Centennial Solar Farm	SunEdison	12	NM	Operating	N	2012	Cir	El Paso Electric	IOU	SunEdison	PPA	Private
William R. Sinkin Centennial Solar 1	SunEdison	9.9	TX	Operating	N	2012	SunEdison	CPS Energy	Muni	SunEdison	PPA	Private
William R. Sinkin Centennial Solar 2	SunEdison	9.9	TX	Operating	N	2012	SunEdison	CPS Energy	Muni	SunEdison	PPA	Private
APS AZ Sun - Hyder Solar I - Phase 1	SunEdison	11	AZ	Operating	N	2011	Arizona Public Service	Arizona Public Service	IOU	SunEdison	UOG	Private
APS SunEd Prescott Project	SunEdison	10	AZ	Operating	N	2011	SunEdison	Arizona Public Service	IOU	SunEdison	PPA	Private
Colorado State University Solar - Phase II	SunEdison	2.87	CO	Operating	N	2011	SunEdison	Colorado State University	Other	Global Energy Services	PPA	Private
Irvine Unified School District	SunEdison	2	CA	Operating	N	2011	SunEdison	Irvine Unified School District	Commercial	SPG Solar	Retail PPA	Private
Lakeland Linder Regional Airport - Phase I	SunEdison	2.3	FL	Operating	N	2011	SunEdison	Lakeland Electric	IOU	SunEdison	PPA	Private
San Jose's Central Service Yard	SunEdison	1.2	CA	Operating	N	2011	SunEdison	City of San Jose	Commercial	Santa Clara	Retail PPA	Private
University of Maryland Eastern Shore	SunEdison	2.2	MD	Operating	N	2011	SunEdison	University of Maryland Eastern Shore	Commercial	SunEdison	Retail PPA	Private
Webberville Solar	SunEdison	29.6	TX	Operating	N	2011	MetLife Longsol Holdings US	Austin Energy	Muni	RES Americas	PPA	Private
Xcel Energy - Carlsbad	SunEdison	9.5	NM	Operating	N	2011	SunEdison	Xcel Energy - New Mexico	IOU	Signal Energy	PPA	Private
Xcel Energy - Eunice	SunEdison	9.2	NM	Operating	N	2011	SunEdison	Xcel Energy - New Mexico	IOU	SunEdison	PPA	Private
Xcel Energy - Jal I	SunEdison	9.3	NM	Operating	N	2011	SunEdison	Xcel Energy - New Mexico	IOU	SunEdison	PPA	Private
Xcel Energy - Jal II	SunEdison	9.3	NM	Operating	N	2011	SunEdison	Xcel Energy - New Mexico	IOU	SunEdison	PPA	Private
Xcel Energy - Monument	SunEdison	9.2	NM	Operating	N	2011	SunEdison	Xcel Energy - New Mexico	IOU	SunEdison	PPA	Private
Davidson County Solar Farm Part II (II, III, IV, V)	SunEdison	12.1	NC	Operating	N	2010	SunEdison	Duke Energy	IOU	SunEdison	PPA	Private
Davidson County Solar Farm Phase I	SunEdison	3.4	NC	Operating	N	2010	MetLife Bank of America	Duke Energy	IOU	SunEdison	PPA	Private
PSEG Solar 4 A - Trenton	SunEdison	1.1	NJ	Operating	N	2010	PSEG	PSEG	IOU	SunEdison	UOG	Private
Roger Road Wastewater Reclamation Facility	SunEdison	1	AZ	Operating	N	2010	SunEdison	Pima County	Commercial	SunEdison	Retail PPA	Private
Staples Hagerstown	SunEdison	1.5	MD	Operating	N	2010	SunEdison	Staples	Commercial	SunEdison	Retail PPA	Private
Staples Hanover	SunEdison	1	MD	Operating	N	2010	SunEdison	Staples	Commercial	SunEdison	Retail PPA	Private
Taylorville Solar Farm	SunEdison	1	NC	Operating	N	2010	Duke Energy Generation Services	EnergyUnited	Muni	SunEdison	PPA	Private
Colorado State University Solar - Phase I	SunEdison	1.74	CO	Operating	N	2009	SunEdison	Colorado State University	Other	AMEC	PPA	Private
Nellis Air Force Base	SunEdison	12	NV	Operating	N	2007	SunEdison	U.S. Air Force	Govt Agency	SunPower	PPA/EUL	Private
SunE Alamosa I	SunEdison	7.2	CO	Operating	N	2007	SunEdison	Xcel Energy - Colorado	IOU	SunEdison	PPA	Private
US MW in Operation		292.6										

Source: Citi Research

## Minimal exposure to upstream value chain

**Restructuring efforts leave WFR with very little exposure to the highly commoditized solar value chain; improved cash flow position.** Key takeaways from the restructuring efforts include:

- Closing of Merano, Italy polysilicon facility.
- Reduced production at Portland, Oregon solar monocrystalline facility.
- 300MW capacity limit for solar wafers in Kuching, Malaysia.
- Consolidation of Solar Materials and Solar Energy segments as solar wafer manufacturing for 3<sup>rd</sup> party sales is largely eliminated – mainly for in-house project needs.
- 1,400 workforce reduction – 20% of company.

Following these efforts, SunEdison has very minimal exposure to the solar value chain (i.e. Poly, Wafers) – a segment that has become highly commoditized and plagued with price declines through and beyond our forecast period. This coupled with a very healthy cash position, SunEdison is now well poised to capture and retain healthy margins in the downstream solar market in key growth regions including US, Canada and Emerging Markets.

**Our assumptions for SunEdison indicate very healthy margins through our forecast period.** Much of this is driven by: (1) our outlook for commercial and utility scale growth in US, Canada and Emerging Markets (See demand section on page 32), (2) tech agnostic strategy that protects the segment from module price declines and, (3) a healthier, self sustaining cash situation that positions SunEdison to compete more effectively for larger scale projects.

See Figure 118 below for key assumptions for SunEdison.



Figure 118. Condensed SunEdison model

	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014	2014	2014	2014	2014	2014	2015	2015	2015	2015	2015				
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1 E	Q2 E	Q3 E	Q4 E	FY E	Q1 E	Q2 E	Q3 E	Q4 E	FY E	Q1 E	Q2 E	Q3 E	Q4 E	FY E	Q1 E	Q2 E	Q3 E	Q4 E	FY E
Direct sale/leaseback (MWs)	8.3	5.9	10.7	133.0	158.9	40.0	27.0	85.5	98.1	250.6	49.0	169.0	74.0	99.0	391.0	77.6	129.4	155.3	155.3	517.5	104.6	174.4	209.3	209.3	697.5	67.5	112.5	135.0	135.0	450.0	67.5	112.5	135.0	135.0	450.0
Share of total	75%	75%	75%	100%	95%	100%	90%	90%	90%	91%	100%	100%	100%	90%	97%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
New captive assets (PPAs)	2.8	2.0	3.6	0.0	8.3	0.0	3.0	9.5	10.9	23.4	0.0	0.0	0.0	11.0	11.0	8.6	14.4	17.3	17.3	57.5	11.6	19.4	23.3	23.3	77.5	7.5	12.5	15.0	15.0	50.0	7.5	12.5	15.0	15.0	50.0
Existing PPAs	108	111	113	116	108	116	116	119	129	116	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Average PPAs	109	112	115	116	112	116	118	124	134	128	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
										65%					47%					43%					32%										
Total Deals (MWs)	11.1	7.9	14.3	133.0	166.3	40.0	30.0	95.0	109.0	274.0	49.0	169.0	74.0	110.0	402.0	86.3	143.8	172.5	172.5	575.0	116.3	193.8	232.5	232.5	775.0	75.0	125.0	150.0	150.0	500.0	75.0	125.0	150.0	150.0	500.0
Pipeline	788			1,416		1,870	2,496	3,000	3,000		2,900	2,900	2,900																						
Construction	32	11	155	78		105	160	330	255		147	104	117																						
Direct sale/leaseback (revs)	64.5	32.6	59.0	396.3	552.4	244.6	170.9	380.3	423.8	1,219.6	214.1	594.9	286.4	346.5	1,441.9	305.3	409.9	540.7	489.0	1,744.9	370.3	497.2	655.9	593.2	2,116.7	227.0	304.7	402.0	363.6	1,297.3	227.0	304.7	402.0	363.6	1,297.3
\$/W	\$7.75	\$5.50	\$5.50	\$2.98	\$3.52	\$6.12	\$6.33	\$4.45	\$4.32	\$4.87	\$4.37	\$3.52	\$3.87	\$3.50	\$3.69	\$3.93	\$3.33	\$3.17	\$3.48	\$3.15	\$3.37	\$3.94	\$2.85	\$3.13	\$2.84	\$3.03	\$3.36	\$2.71	\$2.98	\$2.69	\$2.88	\$2.71	\$2.98	\$2.69	\$2.88
PPAs (revs)	9.6	14.7	10.0	10.2	44.5	10.2	10.3	10.9	11.8	43.1	0.0	0.0	0.0	12.7	12.7	8.8	9.5	10.4	11.4	40.1	10.3	11.1	12.1	13.2	46.7	13.9	14.4	15.1	15.8	59.3	13.9	14.4	15.1	15.8	59.3
Capacity factor	20%	20%	20%	20%	22%	20%	20%	20%	20%	20%	0%	0%	0%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
\$/MWh	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	130	130	130	130	130	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Total Revenues (Non-GAAP)	74.1	47.3	69.0	406.5	596.9	254.8	181.2	391.2	435.6	1,262.8	214.1	594.9	286.4	359.2	1,454.6	314.1	419.3	551.1	500.4	1,785.0	380.7	508.2	668.0	606.4	2,163.3	240.9	319.2	417.1	379.4	1,356.6	240.9	319.2	417.1	379.4	1,356.6
Non-GAAP Adjustment	(13.4)	(16.8)	(47.7)	(58.9)	(176.9)	(66.7)	(34.0)	(342.8)	(54.3)	(527.6)	(4.6)	(125.0)	(107.3)	0.0	(236.9)	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	0.0	0.0	0.0	0.0
Total Revenues (GAAP)	60.7	30.5	21.3	307.6	420.1	188.1	147.2	48.4	381.3	735.0	209.5	469.9	179.1	359.2	1,217.7	314.1	419.3	551.1	500.4	1,785.0	380.7	508.2	668.0	606.4	2,163.3	240.9	319.2	417.1	379.4	1,356.6	240.9	319.2	417.1	379.4	1,356.6
Direct Sales	41.6	29.6	48.3	319.2	438.7	195.7	136.7	315.7	389.9	1,038.0	199.1	526.5	221.9	258.1	1,205.7	233.6	309.4	419.1	379.0	1,341.1	283.3	375.4	508.4	459.7	1,628.8	173.6	230.1	311.6	281.8	997.1	173.6	230.1	311.6	281.8	997.1
\$/W	\$5.00	\$5.00	\$4.50	\$2.40	\$2.78	\$4.68	\$5.08	\$3.69	\$3.97	\$4.14	\$4.08	\$3.12	\$3.00	\$2.61	\$3.38	\$3.01	\$2.39	\$2.70	\$2.44	\$2.58	\$2.71	\$2.15	\$2.43	\$2.20	\$2.33	\$2.57	\$2.05	\$2.31	\$2.09	\$2.32	\$2.05	\$2.31	\$2.09	\$2.32	\$2.05
PPAs	2.9	4.4	3.0	2.0	12.3	2.0	2.1	2.2	2.4	8.8	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cost of Goods (Non-GAAP)	44.5	34.0	51.3	321.2	451.0	197.7	138.8	317.8	392.2	1,046.6	199.1	526.5	221.9	258.1	1,205.7	233.6	309.4	419.1	379.0	1,341.1	283.3	375.4	508.4	459.7	1,628.8	173.6	230.1	311.6	281.8	997.1	173.6	230.1	311.6	281.8	997.1
Non-GAAP Adjustment	(10.1)	(12.6)	(35.8)	(74.2)	(132.6)	(61.1)	(18.5)	(276.8)	(3.0)	(359.4)	(8.0)	(75.2)	(61.0)	0.0	(165.9)	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	0.0	0.0	0.0	0.0
Cost of Goods (GAAP)	34.4	21.4	15.5	247.1	318.4	136.6	120.3	41.0	389.2	687.2	190.3	451.3	140.9	258.1	1,040.7	233.6	309.4	419.1	379.0	1,341.1	283.3	375.4	508.4	459.7	1,628.8	173.6	230.1	311.6	281.8	997.1	173.6	230.1	311.6	281.8	997.1
Gross Profits	26.3	9.0	5.8	60.6	101.7	57.1	42.4	73.4	43.3	216.2	15.0	68.4	64.4	101.1	248.9	80.6	109.9	132.0	121.4	443.9	97.3	132.9	169.7	146.7	536.6	67.3	89.1	105.5	97.6	359.5	67.3	89.1	105.5	97.6	359.5
GM - Total	38.9%	28.9%	26.7%	21.0%	24.4%	22.4%	23.4%	18.8%	9.9%	17.1%	7.8%	11.8%	22.8%	28.1%	17.1%	26.8%	26.2%	24.6%	24.3%	24.9%	25.8%	26.1%	23.9%	24.6%	24.9%	27.9%	27.9%	25.3%	28.7%	26.8%	27.9%	25.3%	28.7%	26.8%	
GM - Direct Sales	35.0%	5.1%	18.2%	19.9%	20.6%	20.0%	20.0%	17.0%	8.0%	14.8%	7.0%	11.8%	22.9%	25.0%	16.4%	23.0%	24.9%	22.9%	22.9%	23.1%	23.9%	24.0%	22.9%	22.9%	23.1%	23.9%	24.0%	22.9%	22.9%	23.1%	23.9%	24.0%	22.9%	22.9%	
GM - PPAs	70.0%	70.0%	70.0%	80.0%	72.3%	80.0%	80.0%	80.0%	80.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
OpEx	19.0	16.0	16.0	20.0	71.0	28.1	35.4	37.0	30.1	130.5	30.0	35.0	35.0	35.0	135.0	35.0	35.0	35.0	35.0	140.0	35.0	35.0	35.0	35.0	140.0	35.0	35.0	35.0	35.0	140.0	35.0	35.0	35.0	140.0	35.0
EBIT	7.3	(7.0)	(10.2)	40.6	30.7	29.0	7.1	36.4	13.2	85.7	(15.0)	33.4	29.4	66.1	113.9	45.6	74.9	97.0	86.4	303.9	62.3	97.9	124.7	111.7	396.6	32.3	54.1	70.5	62.6	219.5	32.3	54.1	70.5	62.6	219.5
Operating Margin	9.8%	-14.7%	-14.7%	10.0%	7.3%	11.4%	3.9%	9.3%	3.0%	11.7%	-2.2%	7.1%	16.4%	18.4%	9.4%	14.8%	17.9%	17.6%	17.3%	17.0%	16.4%	19.3%	18.7%	18.4%	18.3%	13.4%	16.9%	16.9%	16.8%	16.2%	16.9%	13.4%	16.9%	16.9%	16.8%
D&A	4.4	5.1	6.5	5.0	21.0	6.0	7.3	7.9	8.0	40.2	11.7	11.7	11.7	11.7	46.8	12.9	12.9	12.9	12.9	51.5	14.4	14.4	14.4	14.4	57.6	15.1	15.1	15.1	15.1	60.5	15.1	15.1	15.1	60.5	
EBITDA	11.7	(1.9)	(3.7)	45.6	51.7	35.0	14.4	44.3	21.2	125.9	(3.4)	45.1	41.1	77.7	160.5	58.5	87.8	109.9	99.3	355.4	76.8	112.3	139.1	126.1	454.2	47.4	69.2	85.7	77.8	280.1	47.4	69.2	85.7	77.8	280.1
Capex - Construction Of Solar Energy Systems	45	67	67	102	280	53	174	244	128	588	99	59	36	39	232	34	46	60	54	194	41	55	73	66	235	25	34	45	40	144	25	34	45	40	144

Source: Citi Research

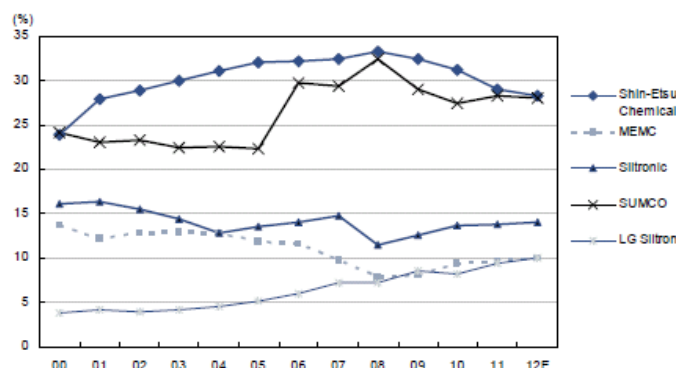
Units in \$mm unless noted

## Semiconductor Materials – Recovery around the horizon?

### Citi calling for a bottom in Semi Wafers in 2013

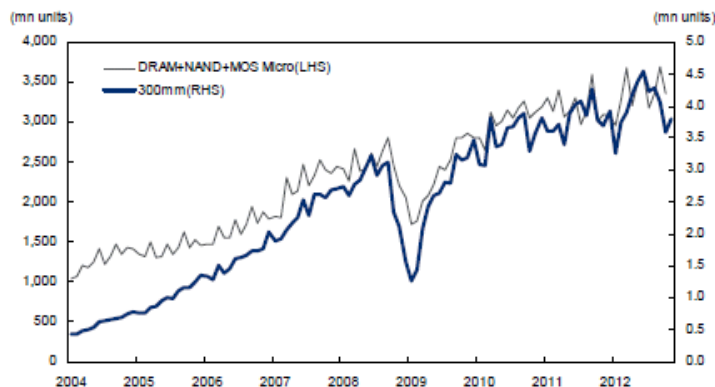
**Semi wafer outlook improvement on the horizon – a positive read-through for WFR's Semiconductor Materials segment.** In December 2012, Citi Analyst Takao Kanai published updated thoughts on the 300mm Semi Wafer industry – a primary source of sales growth for WFR's Semiconductor Materials segment. This positive inflection point led to an upgrade of SUMCO to Buy (see [Upgrading to Buy: 300mm tightening visible up ahead](#)) and a target price increase for Shin-Etsu (see [Raising target price: Outlook for 300mm supply/demand improves](#)). While these companies control ~60% of the global semi wafer market, WFR has a ~#3 (can vary quarter-to-quarter) leadership position (essentially tied with Wacker) so a clear inflection point in the industry will have a positive impact for WFR. As a reminder, the Semi Materials segment comprises of ~35% of WFR's consolidated sales outlook. Below we highlight some industry takeaways from Takao's analysis in December 2012 as well as his updated thoughts in January 2013. For a deep dive discussion on the Semi wafer industry, see Takao's 1/8/2013 thoughts here: [Silicon wafer industry: Wafer-thin margins to fatten](#).

Figure 119. Semi Wafer market share



**What's driving the recovery?** Improved prospects are driven by the demand for smartphones and tablets (chipmakers have been shrinking 300mm wafer inventory) – PC market not expected to contribute to recovery in the near term. See Figure 120 below for the relationship of 300mm wafer demand versus demand for DRAM, NAND, and MOS micro (application processors for MPUs for PCs and for smartphones and tablets). As the chart below clearly depicts, the demand components are highly correlated.

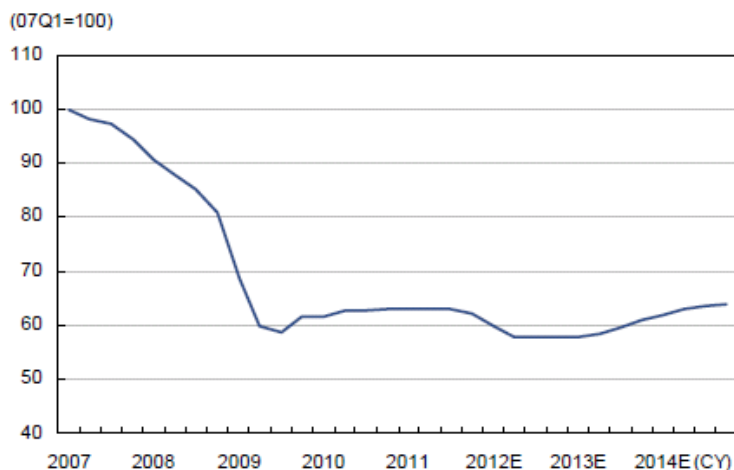
Figure 120. Shipments of advanced chips (DRAM+NAND+MOS Micro) Vs. 300mm wafers



Source: Citi Research (Takao Kanai)

**When will the clear inflection point be reached?** It may have already started. According to Citi Research (see links above), price hikes in the 300mm segment may be already occurring which is attributed to an anticipated supply shortage in 2013. The 300mm semi wafer industry has added minimal capacity since the 2008 financial crisis so this factor coupled with a recovery in demand yields a much tighter environment in 2013. With seasonal weakness occurring between December-February, the recovery could begin in March 2013. 300mm Semi Wafer prices may already be anticipating this clear inflection point with the near term supply/demand outlook (see Figure 121 below).

Figure 121. 300mm Semi Wafer price curve (USD) – Price hikes before demand recovery



Source: Citi Research(Takao Kanai)

Figure 122. 300mm wafer production capacity and demand (calendar year)

('000 units/month)	2006	2007	2008	2009	2010	2011	2012E	2013E	2014E
Capacity	2,000	2,780	3,850	4,250	4,550	4,650	4,600	4,600	4,600
Shin-Etsu Chemical	750	1,100	1,250	1,250	1,250	1,250	1,250	1,250	1,250
SUMCO	595	815	1,250	1,350	1,400	1,400	1,250	1,250	1,250
Siltronic	225	285	400	500	550	550	550	550	550
MEMC	280	330	400	400	450	500	550	550	550
LG Siltron	60	100	250	350	500	550	600	600	600
Sino-American Silicon	40	50	150	150	150	150	150	150	150
Demand	1,849	2,659	2,008	3,273	3,563	3,803	3,700	4,500	4,800
Utilization rate	92%	96%	52%	77%	78%	82%	80%	98%	104%

Source: Citi Research (Takao Kanai)

Our below average growth assumptions could prove conservative

**Our below average growth assumptions could prove conservative.** We forecast sales through our forecast period below the 6-8% historical growth assumption for this segment with margin expectations in the 10-14% range. Should Citi's outlook for the 300mm semi wafer segment materialize, our below average growth trend may prove conservative. We await additional visibility following the seasonal week period between December-February. Citi Analyst Takao Kanai expects 300mm demand volume growth at 8% YoY in 2013 and 7% in 2014 – see links above.

For reference, below we present different wafer products and the corresponding devices they are used in.

Figure 123. Silicon wafer types and applications

Single crystal	Processing	Diameter	Main devices
Float Zone (FZ)		200mm and less	Power semiconductor, Discrete
Czochralski (CZ)	Polished wafer	300mm	DRAM, NAND
		200mm and less	Analog, LCD driver, Other logics
	Epitaxial wafer	300mm	MPU, CPU, Micro controller, Communication logic, DRAM
		200mm and less	Power semiconductor
	Annealed wafer	300mm	NAND, DRAM
	Diffused wafer	200mm and less	Power semiconductor, Discrete
	Thick layer SOI	200mm and less	Power semiconductor, MEMS
	Thin layer SOI	200mm, 300mm	MPU, Communication logic

Source: Citi Research (Takao Kanai)

Figure 124. Inputs For WFR DCF

<b>Cost of Capital</b>		
Risk-free rate		3.03%
<b>Cost of Equity</b>		
Beta	12/7/2012	2.230
Equity risk premium		3.00%
<b>Cost of Debt, after-tax</b>		
SunEdison Financings	0.0	5.00%
Other L/T debt	19.5	5.00%
Current Portion	147.0	5.00%
Senior Notes, 7 3/4% coupon	550.0	7.34%
<b>Capital Structure</b>		
Equity	\$ 755.00	51.3%
Debt	\$ 716.50	48.7%
<b>WACC</b>		<b>7.5%</b>

Source: Citi Research

Note: we exclude project level financing from leverage calculations

## Rating and valuation

**Our target price for WFR shares is \$5.40.** Our 12 month target price for WFR shares is based on a Sum-Of-The-Parts analysis – valuing the Semiconductor Materials and Solar Energy (SunEdison) segment separately. See Figure 125 below for our valuation methodology.

For the Solar Energy segment (SunEdison), we apply a discounted cash flow analysis to our forecasted project pipeline to arrive at an estimated Solar Energy enterprise value of \$2.3B.

For the Semiconductor Materials segment, we employ a comparable EV/Sales multiple approach. To our 2013 Semiconductor Material sales forecast of \$946mm, we apply a 0.9x EV/Sales multiple to arrive at an enterprise value of \$852mm. Our Semiconductor Materials target multiple is consistent with a #3 market position (i.e. Wacker) in the Semi Wafer industry (the #1 and #2 market share leaders trade at 1.7x EV/Sales and control over 60% of the industry).

The sum of our Solar Energy and Semiconductor Materials enterprise value equates to \$3.2B to which we back out \$1.9B in consolidated net debt to arrive at an equity value of \$1.3B or \$5.40/share.

Figure 125. WFR SOP valuation

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2021
EPC Pipeline BOP (MW)	2,900	2,498	2,273	1,848	1,698	1,598	1,498	1,398	1,298	1,198	
- Installed	402	575	775	500	450	450	450	450	450	450	
+ Added	-	350	350	350	350	350	350	350	350	350	
= EPC Pipeline EOP	2,498	2,273	1,848	1,698	1,598	1,498	1,398	1,298	1,198	1,098	
System ASP/w	\$ 3.69	\$ 3.37	\$ 3.03	\$ 2.88	\$ 2.74	\$ 2.74	\$ 2.60	\$ 2.47	\$ 2.60	\$ 2.73	
- System CoGS / w	3.06	2.53	2.33	2.12	2.05	2.05	1.95	1.85	1.95	2.04	
= System Gross Profit/w	\$ 0.63	\$ 0.84	\$ 0.70	\$ 0.76	\$ 0.68	\$ 0.68	\$ 0.65	\$ 0.62	\$ 0.65	\$ 0.68	
- System Opex / w	\$ 0.29	\$ 0.26	\$ 0.15	\$ 0.30	\$ 0.19	\$ 0.19	\$ 0.18	\$ 0.17	\$ 0.18	\$ 0.19	
= System Operating Profit/w	\$ 0.34	\$ 0.57	\$ 0.56	\$ 0.47	\$ 0.49	\$ 0.49	\$ 0.47	\$ 0.44	\$ 0.47	\$ 0.49	
x Installed MW	402	575	775	500	450	450	450	450	450	450	
= Sun Edison EBIT	\$ 139	\$ 330	\$ 431	\$ 233	\$ 222	\$ 222	\$ 211	\$ 200	\$ 210	\$ 221	
Tax Expense	\$ 35	\$ 83	\$ 108	\$ 58	\$ 55	\$ 55	\$ 53	\$ 50	\$ 53	\$ 55	Terminal CF
SunEdison CF	\$ 104	\$ 248	\$ 323	\$ 175	\$ 166	\$ 166	\$ 158	\$ 150	\$ 158	\$ 166	\$ 2,217

SunEdison Enterprise Value \$2,339.52

2013 Semi Wafer Sales \$946.48  
Wafer Multx 0.9

Semi Materials Enterprise Value \$851.83

Total WFR Enterprise Value \$3,191.35  
2013 Consolidated Net Debt \$1,916.99  
WFR Equity Value \$1,274.36

Equity Value Per Share \$5.4

Source: Citi Research

## Earnings, cash flow and other key metrics

**Above consensus EPS outlook driven by SunEdison; below historical average growth at Semiconductor Materials.** Our new above consensus EPS outlook for 2012/2013/2014 is \$0.20/\$0.24/\$0.51. Our forecast period is driven by solid growth prospects at SunEdison coupled with below average growth trends at Semiconductor Materials. Key takeaway, if our Citi semi wafer outlook prospects do materialize as highlighted by Takao Kanai, our estimates for this segment could prove conservative as we note above.

**WFR's cash flow picture has materially improved.** Historical cash flow issues were mostly attributed to cash being tied up with the European projects which are now sold (see above). WFR was originally expected to sell the projects in 4Q 2011 but was unable to given the freezing up of the debt markets in Europe. Holding onto these assets longer than expected created a material cash drag – this overhang is now in the rearview mirror with the July 2012 sale.

Figure 126. WFR: Citi vs. consensus

		Dec		Mar	Jun	Sept	Dec				
WFR		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$597	\$2,763	\$561	\$684	\$825	\$760	\$2,831	\$3,288	Buy	\$5.4
	EPS	\$0.01	\$0.20	(\$0.06)	\$0.05	\$0.14	\$0.11	\$0.24	\$0.51		
Consensus	Rev	\$667	\$2,779	\$557	\$720	\$786	\$836	\$2,814	NA	Neutral	\$4.2
	EPS	\$0.00	\$0.04	(\$0.06)	\$0.03	\$0.10	\$0.13	\$0.18	\$0.39		

Source: Citi Research

Figure 127. WFR key metrics

FYE: Dec	2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Profitability Ratios																
Return On Equity	(0.8%)	8.0%	(16.8%)	(804.7%)	(56.8%)	(42.4%)	25.2%	0.8%	(9.0%)	7.5%	20.5%	15.0%	0.4%	16.2%	27.0%	19.4%
Return On Avg Equity	1.7%	3.2%	(1.8%)	(102.8%)	(109.1%)	(117.2%)	(112.9%)	(17.2%)	(5.9%)	6.1%	5.3%	8.9%	11.1%	13.3%	15.1%	16.3%
Return On Invested Capital	4.3%	6.9%	2.7%	2.1%	(4.3%)	6.8%	9.3%	3.7%	1.8%	5.0%	7.6%	6.5%	3.5%	6.7%	9.2%	7.6%
Return On Invested Capital ex cash	5.6%	8.6%	3.4%	2.7%	(5.0%)	8.4%	12.0%	4.3%	2.1%	5.7%	8.6%	7.6%	4.6%	8.9%	12.2%	10.2%
Return On Assets	(0.4%)	3.6%	(6.0%)	(121.6%)	(7.7%)	(5.4%)	3.2%	0.1%	(1.2%)	1.0%	2.8%	2.1%	0.1%	2.4%	4.1%	3.1%
Return On Assets (12 mth)	0.9%	1.6%	(0.8%)	(32.3%)	(33.3%)	(35.3%)	(29.2%)	(2.5%)	(0.8%)	0.8%	0.7%	1.2%	1.5%	1.9%	2.2%	2.5%
Return On Net Assets	(0.4%)	4.1%	(6.9%)	(138.5%)	(8.3%)	(6.1%)	3.6%	0.1%	(1.3%)	1.1%	3.0%	2.3%	0.1%	2.8%	4.8%	3.6%
Return On Net Assets (12 mth)	1.1%	1.9%	(0.9%)	(37.6%)	(37.5%)	(39.9%)	(33.5%)	(2.8%)	(0.9%)	0.9%	0.8%	1.3%	1.7%	2.1%	2.4%	2.8%
Return On Sales	(0.5%)	6.1%	(11.0%)	(192.3%)	(17.6%)	(6.6%)	5.2%	0.2%	(2.4%)	1.7%	4.0%	3.3%	0.1%	3.7%	5.5%	4.5%
Return On Sales (12 mth)	1.5%	2.4%	(1.2%)	(47.4%)	(55.3%)	(56.1%)	(54.5%)	(4.2%)	(1.3%)	1.4%	1.2%	2.0%	2.4%	2.9%	3.4%	3.7%
Return on Capital Employed	5.1%	8.2%	3.0%	0.3%	(4.8%)	7.7%	11.2%	4.4%	2.2%	6.0%	9.3%	8.0%	4.3%	8.3%	11.4%	9.5%
<b>Efficiency Ratios</b>																
Sales/Total Assets	0.67	0.59	0.55	0.63	0.44	0.83	0.60	0.54	0.51	0.60	0.69	0.64	0.55	0.65	0.75	0.68
A/R Days Sales Out	44	32	27	24	45	23	32	40	40	40	40	40	40	40	40	40
Inventory Turns	5.78	4.14	3.79	3.92	2.33	6.15	4.83	4.10	4.00	4.00	4.00	4.00	8.00	8.00	8.00	8.00
Days of Inventory	63	88	96	93	156	59	75	89	91	91	91	91	46	46	46	46
<b>Liquidity Ratios</b>																
Current Ratio	1.95	1.62	1.36	1.32	1.28	1.18	1.36	1.26	1.27	1.27	1.29	1.34	1.37	1.37	1.37	1.42
Quick Ratio	1.15	0.83	0.65	0.55	0.46	0.56	0.72	0.57	0.57	0.55	0.54	0.60	0.89	0.88	0.88	0.93
Net Working Capital	916.85	701.90	581.90	457.10	393.85	228.05	438.65	278.64	288.75	318.46	365.51	408.23	417.59	449.25	499.32	541.99
Long-term Debt/Equity	50.4%	56.1%	76.9%	241.1%	293.5%	312.0%	368.9%	335.6%	344.2%	340.2%	327.0%	318.1%	319.7%	310.1%	294.2%	284.1%
Total Debt/Equity	52.8%	59.1%	86.0%	261.1%	325.7%	335.1%	394.0%	360.3%	369.1%	364.4%	349.7%	339.8%	341.2%	330.5%	313.0%	301.9%
Op Inc/Assets, exc. Cash	1.2%	1.8%	0.6%	0.1%	(0.9%)	1.6%	2.4%	0.9%	0.4%	1.2%	1.8%	1.6%	1.0%	1.8%	2.5%	2.1%
Op Inc (12 mth)/Avg Assets, exc. C	3.9%	5.4%	4.7%	4.2%	1.9%	1.4%	2.6%	3.8%	5.1%	4.9%	4.4%	5.2%	6.0%	6.4%	6.7%	7.2%
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$10.17	\$10.35	\$9.76	\$3.20	\$2.81	\$2.51	\$2.53	\$2.56	\$2.52	\$2.59	\$2.75	\$2.88	\$2.90	\$3.04	\$3.27	\$3.46
Tangible Book Value Per Share	\$8.41	\$8.37	\$7.22	\$2.56	\$2.18	\$1.88	\$1.93	\$1.97	\$1.93	\$2.00	\$2.16	\$2.29	\$2.31	\$2.45	\$2.69	\$2.88
Cash Per Share	\$3.09	\$2.91	\$3.45	\$2.58	\$1.68	\$1.98	\$2.66	\$1.53	\$1.59	\$1.46	\$1.35	\$1.67	\$3.03	\$3.08	\$3.22	\$3.42
Net Cash Per Share	(\$2.28)	(\$3.20)	(\$4.94)	(\$5.79)	(\$7.46)	(\$6.41)	(\$7.31)	(\$7.70)	(\$7.72)	(\$7.99)	(\$8.26)	(\$8.10)	(\$6.85)	(\$6.95)	(\$7.03)	(\$7.01)
Net Cash Per Share (adjusted)	\$0.19	(\$0.05)	\$0.64	\$0.10	(\$0.79)	(\$0.48)	(\$0.64)	(\$0.92)	(\$0.85)	(\$0.97)	(\$1.07)	(\$0.75)	\$0.63	\$0.68	\$0.83	\$1.04

Source: Citi Research

## Key risks

- Growth opportunities in emerging markets remain in infancy stages – if growth fails to materialize, WFR's financial results could be materially impacted given that 28% of the project pipeline is located in emerging areas.
- The project development business becomes commoditized from increased competition from Chinese counterparts – similar to the panel manufacturing business.
- Project finance market dries up which will negatively impact SunEdison more versus the other downstream players who are equipped with larger balance sheets.
- Semi Wafer outlook deteriorates in 2013 versus Citi expectations – putting more pressure on the Semiconductor Materials segment.

Additional risk factors include:

- WFR has heavy exposure to the cyclical semiconductor industry that typically has limited visibility and a high degree of uncertainty regarding the timing and duration of cycles. Silicon wafer demand is highly correlated to semiconductor units, and thus any fall-off in chip demand would negatively affect wafer demand.
- The commodity nature of wafers subjects wafer suppliers to intense competitive pressures and aggressive pricing.
- WFR has a high debt/equity and we note that the company competes in an industry where there are few product differentiators, thus making capital spending one of the key differentiators.
- WFR's solar revenues are hard to predict and now depend on the spot market for wafers which can be volatile.

- SunEdison revenue is very hard to predict and the financials are reported as non-GAAP.

## Management Bio

### **Ahmad Chatila - President and Chief Executive Officer**

Ahmad became President and Chief Executive Officer and a member of the Board of Directors in March 2009. Prior to MEMC Ahmad served as Executive Vice President of the Memory and Imaging Division, and head of global manufacturing for Cypress Semiconductor. In these roles, he was responsible for strategy, financial performance and revenue growth for the Memory and Imaging Division, as well as global manufacturing for all divisions of Cypress. Previously Ahmad served as managing director of Cypress' Low Power Memory Business Unit. Prior to these roles at Cypress, Ahmad served in sales at Taiwan Semiconductor Manufacturing Co. (TSMC). Ahmad holds a bachelor's degree in Electrical Engineering from Arizona State University, a Master's degree in Electrical Engineering from Cornell University, and has completed the Stanford Executive Program at Stanford University.

### **Dr. Shaker Sadasivam - Executive VP and President, Semiconductor Materials**

Shaker has been with MEMC since 1993, currently serving as Executive Vice President & President, Semiconductor Materials. He has also served as Senior Vice President, Research & Development, President of MEMC Japan, Director of U.S. Technology, Corporate Director for Operations Technology and Director of Research & Development for MEMC Korea. In these positions, he has played a key role in developing proprietary technologies for MEMC. Shaker holds doctorate and master's degrees in chemical engineering and a Master's degree in business administration.

### **Carlos Domenech - Executive VP and President, SunEdison**

Carlos joined MEMC's management team upon the company's acquisition of SunEdison in November of 2009. He currently co-manages the Solar Energy business unit, where he oversees solar project development, energy sales, business development, pipeline generation, project finance and services. Prior to this role (and prior to the company's consolidation of its two solar business units in early 2012), Carlos served as President, SunEdison, overseeing all aspects of the SunEdison business unit. Prior to the acquisition, Carlos was Chief Operating Officer of SunEdison beginning in September of 2007. Prior to joining SunEdison, he served as CFO at Universal Pictures' International Entertainment, where he led its integration with NBC. He managed financial operations across 25 countries and played an essential role in the growth of the company. Prior to that, Carlos spent 14 years with GE, where he served in a variety of leadership roles. Carlos has an MBA from Northwestern University, Kellogg School of Management and a BS in Business Administration from Virginia Commonwealth University. He is a graduate of GE's Financial Management Program, and Corporate Audit Staff.

### **Brian Wuebbels - Executive VP and Chief Financial Officer**

Brian has been with MEMC since 2007. He was appointed Executive Vice President and Chief Financial Officer in May 2012. Prior to this position, Brian was Vice President and General Manager – Balance of System Products. At MEMC, he has also served as Vice President, Solar Wafer Manufacturing, Vice President of Financial Planning and Analysis, and Vice President Operations Finance. Before joining MEMC, he was Vice President and CFO of Honeywell's Sensing and Controls Business. Prior to Honeywell, Brian spent 10 years at the General Electric Company in various senior finance and operations roles in multiple businesses around the world. Brian holds a Master's degree in Business Administration from University of Southern California, Marshall School of Business and a Bachelor of

Science degree in Mechanical Engineering from the University of Illinois Urbana-Champaign.

## **Financial models**

Figure 128. WFR income statement model

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	FY
<b>Total Revenues</b>	214,000	282,900	310,000	356,700	1,163,600	437,700	448,300	503,100	850,100	2,239,200	832,600	779,600	859,000	772,100	3,243,300	523,800	933,400	708,900	597,256	2,763,356	561,176	683,971	825,470	760,052	2,830,668	3,287,756
Semi and Solar Materials (Semi only from 2012)				352,900	1,159,800	377,000	417,600	481,600	542,500	1,818,700	577,800	598,400	467,800	336,500	1,980,500	216,000	232,700	240,300	221,076	910,076	224,640	242,008	249,912	229,919	946,479	1,012,733
SunEdison (Solar Energy from 2012)				3,800	3,800	60,700	30,700	21,500	307,600	426,500	254,800	181,200	391,200	436,600	1,262,800	307,800	700,700	468,600	376,180	1,853,280	336,536	441,963	575,558	530,133	1,884,169	2,275,024
Revenue growth (%)	(40.7%)	32.2%	9.8%	15.1%	(42.0%)	22.7%	(61.5%)	14.9%	89.6%	92.4%	(2.1%)	(65.2%)	3.2%	(1.0%)	44.6%	(32.2%)	(71.2%)	35.3%	(36.0%)	(14.8%)	(6.0%)	(75.2%)	47.1%	11.1%	2.4%	16.1%
Cost of Goods	192,600	246,300	287,800	302,000	1,026,700	374,994	365,744	415,044	722,194	1,877,975	679,969	579,469	731,056	679,088	2,669,581	469,019	775,075	593,169	471,601	2,308,864	460,898	550,545	662,527	606,822	2,280,792	2,598,353
Semi and Solar Materials (Semi only from 2012)					1,026,680	341,396	345,727	400,335	476,107	1,563,565	483,001	441,559	414,044	290,799	1,629,403	205,200	204,776	211,464	190,515	811,955	197,027	212,197	216,574	199,380	825,178	862,288
SunEdison (Solar Energy from 2012)				54,700	2,020	33,598	20,017	14,708	246,086	314,410	196,968	137,909	317,013	388,268	1,040,178	263,819	570,299	381,705	281,087	1,496,909	263,871	338,348	445,953	407,441	1,455,614	1,736,065
Gross Margin (%)	10.0%	12.9%	7.2%	15.3%	11.6%	14.3%	18.4%	17.5%	15.0%	16.1%	18.3%	25.7%	14.9%	12.0%	17.7%	10.5%	17.0%	16.3%	21.0%	16.4%	17.5%	19.5%	19.7%	20.2%	19.4%	21.0%
Incremental Gross Margin (%)	N/A	N/A	N/A	N/A	N/A	9.9%	N/A	38.8%	11.3%	21.0%	N/A	N/A	(90.9%)	N/A	21.2%	N/A	25.3%	N/A	N/A	N/A	N/A	N/A	27.0%	20.9%	N/A	141.7%
R&D	8,800	9,100	9,500	9,800	37,200	9,397	8,672	12,422	17,047	47,538	19,584	23,344	20,603	20,494	84,116	18,959	17,238	16,134	21,000	73,331	21,250	21,250	21,250	21,250	85,000	90,000
R&D as a % of sale	4.1%	3.2%	3.1%	2.7%	3.2%	2.1%	1.9%	2.5%	2.0%	2.1%	2.4%	3.0%	2.4%	2.7%	2.6%	3.6%	1.8%	2.3%	3.5%	2.7%	3.8%	3.1%	2.6%	2.8%	3.0%	2.7%
SG&A	22,800	36,200	31,000	44,600	126,600	50,278	52,903	48,353	69,428	220,863	62,391	91,841	72,022	70,156	316,409	76,716	78,163	1,741	67,807	224,466	60,791	60,791	60,791	60,791	243,164	283,164
Semi and Solar Materials (Semi only from 2012)					126,600	34,259	41,752	35,115	52,946	163,972	56,943	59,571	37,996	43,392	197,903	33,712	30,022	(46,045)	20,000	37,689	12,500	12,500	12,500	12,500	50,000	90,000
SunEdison (Solar Energy from 2012)					8,570	16,020	11,051	13,238	16,582	56,891	25,448	32,269	34,026	26,764	118,507	43,004	48,141	47,785	47,867	186,797	48,291	48,291	48,291	48,291	193,164	193,164
SG&A as a % of sale	10.7%	12.8%	10.0%	12.5%	11.6%	11.5%	11.8%	9.6%	8.2%	9.9%	9.9%	11.8%	8.4%	9.1%	9.8%	14.6%	8.4%	0.2%	11.4%	8.1%	10.8%	8.9%	7.4%	8.0%	8.6%	8.6%
BLE	31,600	45,300	40,500	54,400	171,800	59,675	61,475	60,775	86,475	268,400	101,975	115,275	92,625	90,650	400,525	95,675	95,400	17,875	88,867	297,817	82,041	82,041	82,041	82,041	328,164	373,164
Operating Margin	(10.200)	(8.700)	(18.300)	0.300	(36.900)	3,031	21,081	27,281	41,431	92,525	50,656	84,656	35,319	2,363	173,184	(40,894)	62,925	97,656	36,788	156,676	18,236	51,385	80,901	71,189	221,712	316,239
Operating Margin (%)	(4.8%)	(3.1%)	(5.9%)	0.1%	(3.2%)	0.7%	4.7%	5.4%	4.9%	4.1%	6.1%	10.9%	4.1%	0.3%	5.3%	(7.6%)	6.7%	13.9%	8.2%	5.7%	3.2%	7.5%	9.8%	8.4%	7.8%	8.6%
Incremental Operating Margin (%)	N/A	2.2%	(35.4%)	39.8%	N/A	3.4%	N/A	37.1%	5.1%	12.1%	N/A	N/A	(58.1%)	N/A	8.0%	N/A	75.0%	N/A	N/A	N/A	N/A	N/A	20.9%	N/A	N/A	96.6%
Other Income (Exp)	8,700	6,200	(2,000)	4,000	16,900	(15,700)	(4,000)	(5,000)	(8,600)	(33,300)	(6,500)	0.200	(30.100)	(39.700)	(76.100)	(27.100)	(45.800)	(24.700)	(23.395)	(120.995)	(26.576)	(26.983)	(27.544)	(28.084)	(109.188)	(115.920)
JV Royalty Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit Before Taxes	(1,500)	(2,500)	(20,300)	4,300	(20,000)	(12,669)	17,081	22,281	32,831	59,525	44,156	85,056	5,219	(37,338)	97,094	(67,994)	17,125	73,156	13,393	35,681	(8,340)	24,402	53,357	43,105	112,524	200,319
Taxes	(15,480)	(6,532)	(3,168)	(3,720)	(28,900)	(8,469)	(5,919)	(7,919)	(2,769)	(25,075)	0.356	9,056	(12,581)	11,463	8,294	(15,694)	(26,275)	(5,944)	3,348	(44,564)	(2,085)	6,100	13,339	10,778	28,131	50,080
Stock Based Compensation	6,080	5,632	5,568	6,720	24,900	10,900	18,100	10,100	12,500	51,600	9,700	11,300	10,700	12,200	43,900	7,300	6,800	8,100	7,800	30,000	6,250	6,250	6,250	6,250	25,000	25,000
Equity in (loss)/income of JVs	-	(3,300)	(2,500)	(6,000)	(11,800)	7,300	-	(0.100)	-	7,200	1,300	2,000	1,200	11,600	16,100	(1,200)	(0.600)	0.900	-	(0,900)	-	-	-	-	-	-
Minority Interest	0,800	1,800	0.300	(1,400)	1,500	(0.500)	(1,600)	(0.800)	(10,700)	(13,600)	(13,800)	(0.500)	(2,200)	0.500	(16,000)	0.900	(1,300)	(1,400)	(1,000)	(2,800)	(0.700)	(0.700)	(0.700)	(0.700)	(2,800)	(2,800)
Extraordinary Item	6,700	(4,500)	39,700	1,000	42,900	1,300	(10,500)	1,600	1,000	(6,600)	26,100	18,900	100,500	1,435,500	1,581,600	32,100	96,000	33,500	-	161,600	-	-	-	-	-	-
Net Income-Ops	14,780	2,532	(19,332)	0,620	(1,400)	2,600	21,400	29,300	24,900	78,200	31,300	77,500	16,800	(36,700)	88,900	(52,600)	41,500	78,600	9,045	76,545	(6,955)	17,601	39,318	31,629	81,593	147,439
Total Net Income	2,000	1,400	(64,600)	(7,100)	(68,300)	(8,600)	13,800	17,600	11,400	33,200	(4,500)	47,300	(94,400)	(1,484,400)	(1,536,000)	(92,000)	(61,300)	37,000	1,245	(115,655)	(13,205)	11,351	33,068	25,370	56,593	122,439
EPS-Ops (exc SBC)	\$ 0.07	\$ 0.01	\$ (0.09)	\$ 0.00	\$ (0.01)	\$ 0.01	\$ 0.09	\$ 0.13	\$ 0.11	\$ 0.34	\$ 0.14	\$ 0.34	\$ 0.07	\$ (0.16)	\$ 0.39	\$ (0.23)	\$ 0.18	\$ 0.34	\$ 0.04	\$ 0.33	\$ (0.03)	\$ 0.08	\$ 0.17	\$ 0.13	\$ 0.35	\$ 0.62
Total EPS	\$ 0.01	\$ 0.01	\$ (0.29)	\$ (0.03)	\$ (0.30)	\$ (0.04)	\$ 0.06	\$ 0.08	\$ 0.05	\$ 0.15	\$ (0.02)	\$ 0.21	\$ (0.41)	\$ (6.44)	\$ (6.67)	\$ (0.40)	\$ (0.27)	\$ 0.16	\$ 0.01	\$ (0.49)	\$ (0.06)	\$ 0.05	\$ 0.14	\$ 0.11	\$ 0.24	\$ 0.51
EPS-Ops - adjusted for depreciation	\$ (0.23)	\$ 0.01	\$ (0.08)	\$ (0.01)	\$ (0.31)	\$ 0.00	\$ 0.06	\$ 0.09	\$ (0.08)	\$ 0.07	\$ (0.01)	\$ 0.25	\$ (0.35)	\$ (0.23)	\$ (0.01)	\$ (0.23)	\$ (0.25)	\$ 0.28	\$ 0.06	\$ (0.69)	\$ (0.02)	\$ 0.05	\$ 0.10	\$ 0.08	\$ 0.21	\$ 0.39
Shares Outstanding (basic)																										
Shares Outstanding (fully diluted)	224,000	224,000	223,600	225,300	224,225	226,800	228,000	227,600	228,700	227,775	228,900	229,800	230,300	230,400	230,400	230,700	230,800	232,000	232,750	232,750	233,500	234,250	235,000	235,750	235,750	238,750
Year Weighted Shares				224,225					227,775					229,850										234,625		
TTM EPS Ops	\$ 2.57	\$ 1.63	\$ 0.65	\$ (0.01)		\$ (0.06)	\$ 0.00	\$ 0.24	\$ 0.34		\$ 0.47	\$ 0.71	\$ 0.66	\$ 0.39		\$ 0.02	\$ (0.13)	\$ 0.75	\$ 0.33		\$ 0.53	\$ 0.42	\$ 0.25	\$ 0.13		
TTM Revenue	1717.1	1468.6	1232.6	1163.6		1,387.3	2,278.6	1,745.8	2,239.2		2,634.1	2,965.4	3,321.3	3,243.3		2,934.5	3,088.3	5,657.7	2,763.4		2,800.7	2,951.3	2,667.9	2,830.7		
TTM OpM	38%	26%	11%	-3%		-2%	-1%	3%	4%		5%	7%	6%	5%		3%	2%	6%	6%		8%	8%	7%	8%		
TTM GM	45%	36%	22%	12%		13%	13%	16%	16%		17%	19%	16%	17%		18%	14%	17%	16%		18%	19%	20%	19%		
EPS-Ops (inc SBC)	\$ 0.04	\$ (0.01)	\$ (0.11)	\$ (0.03)	\$ (0.11)	\$ (0.04)	\$ 0.01	\$ 0.08	\$ 0.05	\$ 0.12	\$ 0.09	\$ 0.29	\$ 0.03	\$ (0.21)	\$ 0.20	\$ (0.26)	\$ 0.15	\$ 0.30	\$ 0.01	\$ 0.20	\$ (0.06)	\$ 0.05	\$ 0.14	\$ 0.11	\$ 0.24	\$ 0.51

Source: Citi Research

Units in \$mm unless noted



Figure 129. WFR balance sheet model

FYE: Dec	2009				2010				2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Assets</b>																								
Cash & Securities	1,153.55	1,141.05	1,035.60	805.05	692.80	719.05	612.50	727.95	706.95	669.60	795.40	593.90	388.65	457.35	617.15	356.46	371.63	341.20	318.37	393.67	717.32	731.40	766.53	816.82
Accounts Receivable	169.10	172.50	188.30	173.30	265.80	276.70	251.90	296.00	401.30	272.90	254.00	202.90	258.40	235.20	252.00	262.53	246.67	300.65	362.84	334.09	285.74	349.33	422.91	387.19
Inventories	118.30	108.60	110.00	160.80	188.30	207.50	426.40	452.10	471.50	561.90	773.80	694.80	806.00	505.90	492.10	461.36	462.16	552.06	664.35	608.49	259.87	313.19	381.12	348.57
Other Current Assets	37.90	97.40	99.10	196.90	207.10	181.70	276.60	290.20	302.40	332.90	377.80	402.40	338.40	262.90	285.40	285.40	285.40	285.40	285.40	285.40	285.40	285.40	285.40	285.40
Total Current Assets	1,478.85	1,519.55	1,433.00	1,336.05	1,354.00	1,384.95	1,567.40	1,766.25	1,882.15	1,837.30	2,201.00	1,894.00	1,791.45	1,461.35	1,646.65	1,365.75	1,365.86	1,479.30	1,630.96	1,621.64	1,548.32	1,679.32	1,855.95	1,837.99
Net PP&E	1,018.20	1,046.30	1,065.40	1,460.70	1,487.30	1,579.40	1,870.40	2,027.90	2,144.10	2,417.50	2,886.80	2,393.10	2,416.60	2,445.50	2,445.50	2,450.35	2,461.12	2,486.15	2,527.18	2,560.26	2,591.43	2,640.11	2,707.95	2,764.89
Net Goodwill	0.00	0.00	0.00	332.00	330.40	329.20	403.50	399.30	402.10	455.00	584.90	149.20	145.90	143.50	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
Other Assets	302.55	278.45	381.40	437.75	394.00	298.75	362.10	425.25	530.95	587.60	612.90	445.30	451.85	453.05	462.55	462.55	462.55	462.55	462.55	462.55	462.55	462.55	462.55	462.55
<b>Total Assets</b>	<b>2,799.60</b>	<b>2,844.30</b>	<b>2,879.80</b>	<b>3,566.50</b>	<b>3,565.70</b>	<b>3,592.30</b>	<b>4,203.40</b>	<b>4,618.70</b>	<b>4,959.30</b>	<b>5,297.40</b>	<b>6,285.60</b>	<b>4,881.60</b>	<b>4,805.80</b>	<b>4,503.40</b>	<b>4,693.00</b>	<b>4,416.95</b>	<b>4,427.84</b>	<b>4,566.31</b>	<b>4,758.99</b>	<b>4,782.75</b>	<b>4,740.60</b>	<b>4,920.28</b>	<b>5,164.75</b>	<b>5,203.73</b>
<b>Liab. &amp; Shareholders' Equity</b>																								
Short-Term Debt	5.80	5.20	5.50	32.20	42.70	45.90	112.00	72.10	56.70	69.70	204.60	147.90	208.10	133.80	147.00	147.00	147.00	147.00	147.00	147.00	147.00	147.00	147.00	147.00
Other Current Liabilities	366.20	364.10	362.60	476.90	511.30	595.00	886.70	1,220.00	908.60	1,065.70	1,414.50	1,289.00	1,189.50	1,099.50	1,061.00	940.11	930.11	1,013.85	1,118.44	1,066.41	983.73	1,083.08	1,209.62	1,149.00
Total Current Liabilities	372.00	369.30	368.10	509.10	554.00	640.90	998.70	1,292.10	965.30	1,135.40	1,619.10	1,436.90	1,397.60	1,233.30	1,208.00	1,087.11	1,077.11	1,160.85	1,265.44	1,213.41	1,130.73	1,230.08	1,356.62	1,296.00
Long-Term Debt	24.30	22.10	23.40	384.40	401.20	413.40	492.10	610.60	1,172.40	1,334.70	1,728.90	1,778.90	1,901.50	1,803.90	2,166.40	2,001.20	2,028.34	2,064.77	2,112.84	2,156.31	2,189.22	2,233.42	2,291.72	2,344.45
Other Liabilities	323.20	321.00	364.40	466.20	397.40	348.40	427.70	421.60	446.90	400.90	584.30	880.90	806.10	824.80	665.10	665.10	665.10	665.10	665.10	665.10	665.10	665.10	665.10	665.10
Total Liabilities	719.50	712.40	755.90	1,359.70	1,352.60	1,402.70	1,918.50	2,324.30	2,584.60	2,871.00	3,932.30	4,096.70	4,105.20	3,862.00	4,039.50	3,753.41	3,770.55	3,890.72	4,043.38	4,034.82	3,985.06	4,128.60	4,313.45	4,305.55
Minority Interest	34.00	28.80	30.00	38.20	45.20	47.70	51.30	43.90	46.50	48.60	105.40	47.00	52.80	63.20	66.30	67.30	68.00	68.70	69.40	70.10	70.80	71.50	72.20	72.90
Redeemable Preferred Stock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shareholders' Equity	2,046.10	2,103.10	2,093.90	2,168.60	2,167.90	2,141.90	2,233.60	2,250.50	2,328.20	2,377.80	2,247.90	737.90	647.80	578.20	587.20	596.24	589.29	606.89	646.21	677.84	684.75	720.19	779.10	825.28
<b>Total Liab. and Equity</b>	<b>2,799.60</b>	<b>2,844.30</b>	<b>2,879.80</b>	<b>3,566.50</b>	<b>3,565.70</b>	<b>3,592.30</b>	<b>4,203.40</b>	<b>4,618.70</b>	<b>4,959.30</b>	<b>5,297.40</b>	<b>6,285.60</b>	<b>4,881.60</b>	<b>4,805.80</b>	<b>4,503.40</b>	<b>4,693.00</b>	<b>4,416.95</b>	<b>4,427.84</b>	<b>4,566.31</b>	<b>4,758.99</b>	<b>4,782.75</b>	<b>4,740.60</b>	<b>4,920.28</b>	<b>5,164.75</b>	<b>5,203.73</b>

Source: Citi Research

Units in \$mm unless noted

Figure 130. WFR 12M P&L

	2009				2010				2011				2012				2013				2014			
	Q1-2009	Q2-2009	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4-2012	Q1-2013	Q2-2013	Q3-2013	Q4-2013	Q1-2014	Q2-2014	Q3-2014	Q4-2014
Total Revenues	\$1,717.1	\$1,468.6	\$1,232.6	\$1,163.6	\$1,387.3	\$1,552.7	\$1,745.8	\$2,239.2	\$2,634.1	\$2,965.4	\$3,321.3	\$3,243.3	\$2,934.5	\$3,088.3	\$2,938.2	\$2,763.4	\$2,800.7	\$2,551.3	\$2,667.9	\$2,830.7	\$2,919.5	\$3,030.3	\$3,166.9	\$3,287.8
- Sequential Change	(14.3%)	(14.5%)	(16.1%)	(5.6%)	19.2%	11.9%	12.4%	28.3%	17.6%	12.6%	12.0%	(2.3%)	(9.5%)	5.2%	(4.9%)	(6.0%)	1.4%	(8.9%)	4.6%	6.1%	3.1%	3.8%	4.5%	3.8%
- Yr to Yr Change	-13.4%	-28.1%	-41.7%	-42.0%	-19.2%	5.7%	41.6%	92.4%	89.9%	91.0%	90.2%	44.8%	11.4%	4.1%	-11.5%	-14.8%	-4.6%	-17.4%	-9.2%	2.4%	4.2%	18.8%	18.7%	16.1%
Cost of Goods	\$945.9	\$945.2	\$958.9	\$1,028.7	\$1,211.1	\$1,330.5	\$1,457.8	\$1,878.0	\$2,183.0	\$2,396.7	\$2,712.7	\$2,669.6	\$2,458.6	\$2,654.2	\$2,516.4	\$2,308.9	\$2,300.7	\$2,076.2	\$2,145.6	\$2,280.8	\$2,338.2	\$2,412.3	\$2,509.9	\$2,598.4
- % of Revenue	55.1%	64.4%	77.8%	88.4%	87.3%	85.7%	83.5%	83.9%	82.9%	80.8%	81.7%	82.3%	83.8%	85.9%	85.6%	83.6%	82.1%	81.4%	80.4%	80.6%	80.1%	79.6%	79.3%	79.0%
Gross Margin	\$771.2	\$523.5	\$273.7	\$134.9	\$176.2	\$222.2	\$288.0	\$361.2	\$451.2	\$568.7	\$608.6	\$573.7	\$475.9	\$434.1	\$421.9	\$454.5	\$500.0	\$475.1	\$522.3	\$549.9	\$581.3	\$618.0	\$657.0	\$689.4
- % of Revenue	44.9%	35.6%	22.2%	11.6%	12.7%	14.3%	16.5%	16.1%	17.1%	19.2%	18.3%	17.7%	16.2%	14.1%	14.4%	16.4%	17.9%	18.6%	19.6%	19.4%	19.9%	20.4%	20.7%	21.0%
- Sequential Change	-23.8%	-32.1%	-47.7%	-50.7%	30.6%	26.1%	29.6%	25.4%	24.9%	26.1%	7.0%	-5.7%	-17.1%	-8.8%	-2.8%	7.7%	10.0%	-5.0%	9.9%	5.3%	5.7%	6.3%	6.3%	4.9%
- Yr to Yr Change	(26.3%)	(51.7%)	(75.4%)	(86.7%)	(77.2%)	(57.6%)	5.2%	167.8%	156.0%	156.0%	111.3%	58.8%	5.5%	(23.7%)	(30.7%)	(20.8%)	5.1%	9.5%	23.8%	21.0%	16.3%	30.1%	25.8%	25.4%
- Basis Sequential	(559)	(927)	(1,344)	(1,061)	111	161	219	(37)	100	205	(85)	(64)	(147)	(216)	30	209	140	77	96	(15)	49	48	35	22
- Basis Yr to Yr	(786)	(1,742)	(3,048)	(3,891)	(3,221)	(2,133)	(571)	454	443	487	183	156	(91)	(512)	(397)	(124)	164	457	522	298	206	177	117	154
R&D	\$37.6	\$37.3	\$37.4	\$37.2	\$37.8	\$37.4	\$40.3	\$47.5	\$57.7	\$72.5	\$80.7	\$84.1	\$83.5	\$77.3	\$72.8	\$73.3	\$75.6	\$79.6	\$84.8	\$85.0	\$86.3	\$87.5	\$88.8	\$90.0
- % of Revenue	2.2%	2.5%	3.0%	3.2%	2.7%	2.4%	2.3%	2.1%	2.2%	2.4%	2.4%	2.6%	2.8%	2.5%	2.5%	2.7%	2.7%	3.1%	3.2%	3.0%	3.0%	2.9%	2.8%	2.7%
- Sequential Change	-0.6%	-0.7%	0.3%	-0.5%	1.6%	-1.1%	7.8%	18.0%	21.4%	25.6%	11.3%	4.3%	-0.7%	-7.4%	-5.8%	0.7%	3.1%	5.3%	6.4%	0.3%	1.5%	1.4%	1.4%	1.4%
- Yr to Yr Change	3.1%	0.2%	(0.5%)	(1.6%)	0.6%	0.2%	7.7%	27.8%	52.7%	94.0%	100.2%	76.9%	44.6%	6.6%	(9.7%)	(12.8%)	(9.4%)	3.0%	16.4%	15.9%	14.1%	9.9%	4.7%	5.9%
- Basis Sequential	30	35	49	16	(47)	(32)	(10)	(18)	7	25	(2)	16	25	(34)	(2)	18	5	42	6	(17)	(5)	(7)	(9)	(6)
- Basis Yr to Yr	35	72	126	131	54	(13)	(73)	(107)	(53)	4	12	47	65	6	5	6	(15)	62	70	35	25	(23)	(37)	(27)
SG&A	\$87.3	\$97.3	\$102.2	\$134.6	\$162.1	\$178.7	\$196.0	\$220.9	\$253.0	\$292.0	\$315.7	\$316.4	\$310.7	\$297.1	\$226.8	\$224.5	\$208.6	\$191.2	\$250.2	\$243.2	\$253.2	\$263.2	\$273.2	\$283.2
- % of Revenue	5.1%	6.6%	8.3%	11.6%	11.7%	11.5%	11.2%	9.9%	9.6%	9.8%	9.5%	9.8%	10.6%	9.6%	7.7%	8.1%	7.4%	7.5%	9.4%	8.6%	8.7%	8.7%	8.6%	8.6%
- Sequential Change	0.4%	11.4%	5.1%	31.7%	20.4%	10.2%	9.7%	12.7%	14.5%	15.4%	8.1%	0.2%	-1.8%	-4.4%	-23.7%	-1.0%	-7.1%	-8.3%	30.9%	-2.8%	4.1%	4.0%	3.8%	3.7%
- Yr to Yr Change	(6.0%)	2.0%	4.1%	54.8%	85.6%	83.6%	91.8%	64.1%	56.1%	63.4%	61.0%	43.3%	22.8%	1.7%	(28.2%)	(29.1%)	(32.9%)	(35.6%)	10.3%	8.3%	21.4%	37.6%	9.2%	16.4%
- Basis Sequential	75	154	167	328	12	(18)	(28)	(137)	(26)	24	(34)	25	83	(97)	(190)	41	(68)	5	189	(79)	8	1	(6)	(1)
- Basis Yr to Yr	40	195	365	723	660	489	294	(170)	(208)	(166)	(172)	(11)	99	(23)	(179)	(163)	(314)	(212)	166	47	122	119	(75)	2
BLE	\$124.9	\$134.6	\$139.6	\$171.8	\$199.9	\$216.1	\$236.3	\$268.4	\$310.7	\$364.5	\$396.4	\$400.5	\$394.2	\$374.4	\$299.6	\$297.8	\$284.2	\$270.8	\$335.0	\$328.2	\$339.4	\$350.7	\$361.9	\$373.2
- % of Revenue	7.3%	9.2%	11.3%	14.8%	14.4%	13.9%	13.5%	12.0%	11.8%	12.3%	11.9%	12.3%	13.4%	12.1%	10.2%	10.8%	10.1%	10.6%	12.6%	11.6%	11.6%	11.4%	11.4%	11.4%
- Sequential Change	0.1%	7.7%	3.8%	23.1%	16.3%	8.1%	9.4%	13.6%	15.8%	17.3%	8.7%	1.1%	-1.6%	-5.0%	-20.0%	-0.6%	-4.6%	-4.7%	23.7%	-2.0%	3.4%	3.3%	3.2%	3.1%
- Yr to Yr Change	(3.4%)	1.5%	2.8%	37.7%	60.0%	60.6%	69.3%	56.2%	55.4%	68.7%	67.7%	49.2%	26.9%	2.7%	(24.4%)	(25.6%)	(27.9%)	(27.7%)	11.8%	10.2%	19.4%	29.5%	8.0%	13.7%
- Basis Sequential	105	189	216	344	(36)	(49)	(38)	(155)	(19)	50	(36)	42	108	(131)	(192)	58	(63)	47	194	(96)	3	(5)	(14)	(8)
- Basis Yr to Yr	75	267	490	854	713	475	221	(278)	(261)	(162)	(160)	36	164	(17)	(174)	(157)	(329)	(151)	236	82	148	96	(113)	(24)
Operating Margin	\$646.3	\$388.9	\$134.1	(\$36.9)	(\$23.7)	\$6.1	\$51.7	\$92.8	\$140.5	\$204.2	\$212.3	\$173.2	\$81.6	\$59.7	\$122.3	\$156.7	\$215.8	\$204.3	\$187.3	\$221.7	\$241.9	\$267.3	\$295.1	\$316.2
- % of Revenue	37.6%	26.5%	10.9%	-3.2%	-1.7%	0.4%	3.0%	4.1%	5.3%	6.9%	6.4%	5.3%	2.8%	1.9%	4.2%	5.7%	7.7%	8.0%	7.0%	7.8%	8.3%	8.8%	9.3%	9.6%
- Sequential Change	-27.2%	-39.8%	-65.5%	-127.5%	-35.9%	-125.8%	745.7%	79.6%	51.3%	45.4%	3.9%	-18.4%	-52.9%	-26.9%	104.7%	28.2%	37.7%	-5.3%	-8.3%	18.4%	9.1%	10.5%	10.4%	7.2%
- Yr to Yr Change	(29.5%)	(59.1%)	(86.3%)	(104.2%)	(103.7%)	(98.4%)	(61.5%)	(351.6%)	(693.4%)	3241.1%	310.6%	86.6%	(41.9%)	(70.8%)	(42.4%)	(9.5%)	164.3%	242.1%	53.2%	41.5%	12.1%	30.9%	57.5%	42.6%
- Basis Sequential	(664)	(1,116)	(1,560)	(1,405)	147	210	257	118	119	155	(50)	(105)	(256)	(85)	223	151	204	30	(99)	81	45	53	50	30
- Basis Yr to Yr	(861)	(2,008)	(3,539)	(4,745)	(3,935)	(2,609)	(792)	732	704	649	343	119	(255)	(495)	(223)	33	492	607	286	216	58	82	230	179
Other Income (Exp)	\$20.2	\$19.7	\$13.9	\$16.9	(\$7.5)	(\$17.7)	(\$20.7)	(\$33.3)	(\$24.1)	(\$19.9)	(\$45.0)	(\$76.1)	(\$96.7)	(\$142.7)	(\$137.3)	(\$121.0)	(\$120.5)	(\$101.7)	(\$104.5)	(\$109.2)	(\$110.9)	(\$112.5)	(\$114.2)	(\$115.9)
- % of Revenue	1.2%	1.3%	1.1%	1.5%	-0.5%	-1.1%	-1.2%	-1.5%	-0.9%	-0.7%	-1.4%	-2.3%	-3.3%	-4.6%	-4.7%	-4.4%	-4.3%	-4.0%	-3.9%	-3.9%	-3.8%	-3.7%	-3.6%	-3.5%
- Sequential Change	-10.2%	-2.5%	-29.4%	21.6%	-144.4%	136.0%	16.9%	60.9%	-27.6%	-17.4%	126.1%	69.1%	27.1%	47.6%	-3.8%	-11.9%	-0.4%	-15.6%	2.8%	4.5%	1.6%	1.4%	1.5%	1.5%
- Yr to Yr Change	(66.9%)	(61.5%)	(59.4%)	(24.9%)	(137.1%)	(189.8%)	(248.9%)	(297.0%)	221.3%	12.4%	117.4%	128.5%	301.2%	617.1%	205.1%	59.0%	24.6%	(28.8%)	(23.9%)	(9.8%)	(7.9%)	10.7%	9.3%	6.2%
- Basis Sequential	5	17	(21)	32	(199)	(60)	(5)	(30)	57	24	(68)	(99)	(95)	(133)	(5)	29	8	32	7	6	6	9	11	8
- Basis Yr to Yr	(190)	(117)	(49)	33	(172)	(248)	(231)	(294)	(37)	47	(17)	(86)	(238)	(395)	(332)	(203)	(101)	64	76	52	50	27	31	33
Profit Before Taxes	\$666.5	\$408.6	\$148.0	(\$20.0)	(\$31.2)	(\$11.6)	\$31.0	\$59.5	\$116.4	\$184.3	\$167.3	\$97.1	(\$15.1)	(\$83.0)	(\$15.0)	\$35.7	\$95.3	\$102.6	\$82.8	\$112.5	\$131.0	\$154.8	\$180.9	\$200.3
- % of Revenue	38.8%	27.8%	12.0%	-1.7%	-2.2%	-0.7%	1.8%	2.7%	4.4%	6.2%	5.0%	3.0%	-0.5%	-2.7%	-0.5%	1.3%	3.4%	4.0%	3.1%	4.0%	4.5%	5.1%	5.7%	6.1%
- Sequential Change	-26.8%	-38.7%	-63.8%	-113.5%	55.8%	-62.8%	-367.5%	92.1%	95.5%	58.4%	-9.3%	-42.0%	-115.5%	451.2%	-81.9%	-337.1%	167.2%	7.6%	-19.3%	35.9%	16.4%	18.2%	16.9%	10.7%
- Yr to Yr Change	(31.9%)	(59.2%)	(85.4%)	(102.2%)	(104.7%)	(102.8%)	(79.1%)	(397.6%)	(473.3%)	(1690.7%)	439.7%	63.1%	(112.9%)	(145.0%)	(109.0%)	(63.3%)	(733.2%)	(223.6%)	(650.2%)	215.4%	37.4%	50.9%	118.5%	78.0%
- Basis Sequential	(658)	(1,099)	(1,582)	(1,373)	(53)	150	252	88	176	180	(118)	(204)	(351)	(217)	217	180	211	62	(92)	87	51	62	60	38
- Basis Yr to Yr	(1,051)	(2,125)	(3,588)	(4,712)	(4,106)	(2,857)	(1,023)	438	666															

## Company Focus

- Best Ideas
- Company Update
- Initiation of Coverage

**Shahriar (Shar) Pourreza, CFA**

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<b>Buy/High Risk</b>	<b>1H</b>
Price (01 Feb 13)	US\$7.83
Target price	US\$12.00
Expected share price return	53.3%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>53.3%</b>
Market Cap	US\$932M

### Price Performance

(RIC: SPWR.O, BB: SPWR US)



## SunPower Corp. (SPWR)

### The Perfect Package – Launching With Buy; Adding To TPL!

- **Launching US coverage of SPWR with a non consensus Buy (1H); Adding shares to high conviction buy list** — We are launching US research coverage of SunPower (ticker SPWR) with a Buy/High Risk (1H) rating and a target price of \$12. Shares are now being added to our high conviction Buy list (Top Picks Live!). SPWR's industry leading efficiency panels, massive downstream channel, the backing of oil giant Total and, strategic JVs with key industry players make it the perfect package. With a global recognized brand and distribution channel, we believe SPWR is best positioned to capture growth in the residential and commercial scale market – early growth segments. Recent wins at the utility scale level have been gravy – we see additional opportunities with SPWR's Tracker systems.
- **Premium priced product remains premium through downstream channel.** While premium pricing for SunPower's high efficiency panels have come down modestly – they still command above market pricing. Aside from leading edge technology, much of this is attributed to a large downstream business that has served as a captive sales channel at the commercial, residential and utility scale level for its market leading efficiency panels. We do not expect this to change.
- **Sizeable global pipeline not concentrated around one or two projects** — We estimate well over 5GW of projects in the US and Canada which are not concentrated around one or two large scale projects – this pipeline diversification leaves SPWR to be less scrutinized than other downstream players (i.e. FSLR) when it comes down to the ability to re-fill the pipeline as installations occur.
- **The Total "Put" provides downside protection** — With 66% of SPWR shares owned by French oil giant Total (TOTF.PA; €39.95; 2), SPWR has been able to leverage Total's well capitalized balance sheet, bankability and industry contacts to attain captive business, freely access the capital markets among other items. The only question that remains is whether Total purchases the remaining shares.
- **Big growth expected from Japan entry with strategic JV's** — SPWR remains the only US firm to materially penetrate the Japan market – attributed to the JV with Toshiba and newly minted deal with Sharp. Japan remains a region with attractive FiT's (Feed-In-Tariffs) and early in the solar spending growth cycle.
- **The Buffet Halo a precursor?** Warren Buffet's MidAmerican purchased SPWR's 579MW Antelope Valley Solar Project for ~\$2.5B – bringing a major jolt to SPWR and the industry. We now see more revenue certainty for next several years and a recycling of capital for key growth programs (i.e. residential leases).
- **Launching EPS outlook** — Our New EPS for 2012/2013/2014 is \$0.10/\$0.39/\$0.63 – with above consensus estimate for 2013 and 2014. The main driver of our EPS outlook through our forecast period is attributed to increased market share in the residential and commercial customer class as the aggressive push downstream serves as an avenue for the module business.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
<b>2011A</b>	0.15A	-0.19A	0.16A	0.16A	0.28A	0.27A
<b>2012E</b>	-0.12A	0.08A	0.04A	0.09E	0.10E	0.15E
Previous	na	na	na	na	na	na
<b>2013E</b>	0.08E	0.10E	0.14E	0.07E	0.39E	0.20E
Previous	na	na	na	na	na	na
<b>2014E</b>	na	na	na	na	0.63E	0.44E
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## The Perfect Package – Launching With Buy; Adding To TPL

We are launching US research coverage of SunPower (ticker SPWR) with a Buy (1HJ) rating and a target price of \$12. Shares are now being added to our high conviction Buy list (Top Picks Live!). SPWR's industry leading efficiency panels, massive downstream channel, the backing of oil giant Total and, strategic JVs with key industry players make it the perfect package. With a global recognized brand and distribution channel, we believe SPWR is best positioned to capture growth in the residential and commercial scale market. Recent project wins at the utility scale level have been gravy – we see additional opportunities with their Tracker system. Our new SPWR \$12 target price translates into an ETR of 53% - supporting our strong stance.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

SPWR is our high conviction Buy

### Why SPWR shares are a top pick?

- Overall, it's the total package: (1) industry leading panels, (2) massive distribution channel, (3) 66% owned by oil giant Total, (4) key strategic JV's and acquisitions, (5) global recognized brand and distribution channel.
- Despite some contraction, SPWR has maintained a premium priced product because of: (1) industry leading technology and (2) large downstream business that has served as a captive sales channel at the commercial, residential and utility scale level for their market leading efficiency panels.
- SPWR is 66% owned by French oil giant Total. This limits downside while providing full leverage to the upside.
- Strategic partnership with Toshiba and now Sharp has allowed SPWR to access the Japanese market – only major US firm to achieve this milestone.
  - Japan is the largest residential market in the world – a perfect fit for SPWR's high efficiency panels.
- The Warren Buffet's halo factor. The ~\$2.5B purchase of 579MW Antelope Valley brought a major jolt to SPWR and the industry. We now see more revenue certainty for the next several years and a recycling of capital for key growth programs including residential leases.
  - While leveraging the Total relationship, we would not be surprised to hear announcements of future large scale project wins in key global growth regions like the Middle East – a suitable environment for SPWR's T20 and T0 Trackers.
- SPWR project pipeline is very diverse – with over 5GW of projects alone in NA. This leaves SPWR to be less scrutinized than other downstream players (i.e. FSLR) when it comes down to the ability to re-fill the pipeline as installations occur.
  - Pipeline is also geographically well diversified.
- No exposure to the highly commoditized components of the solar value chain – does not manufacture poly, ingots and wafers (only produces modules).
- Balance sheet and liquidity position strong and improving.

- Margins remain healthy through our forecast period.
- Our \$12 target price per share translates into an ETR of 53% - supporting the Buy rating.

### Where we could be wrong?

- SPWR's cost structure is higher than the industry. If Chinese panel manufacturers close the efficiency gap with SPWR, than SPWR could be disadvantaged.
- SPWR recent change in reporting segments make modeling very challenging.
- SPWR has sizeable exposure to Western Europe – a region that was the historical growth driver for the space – now in contraction. If SPWR is not able to diversify into other growth regions (i.e. Asia, Middle East) or is not able to gain traction in the commercial/residential rooftop market in Germany – margins could be negatively impacted.

### Background

Headquartered in California, SunPower Corp. is a vertically integrated manufacturer and service provider of solar photovoltaic technology. The company offers a suite of solar cells and solar panels based on traditional crystalline silicon technology and leverages proprietary manufacturing processes that have enabled it to achieve industry-leading conversion efficiencies. With its acquisition of PowerLight in early 2007, the company also entered into the solar systems segment where it designs, manufactures, and installs grid-connected commercial solar electric products and systems, integrating solar panels from both SunPower and external suppliers. Before its IPO in late 2005, SunPower operated as a subsidiary of Cypress Semiconductor.

Reorganization better positions  
company; reduces cost structure

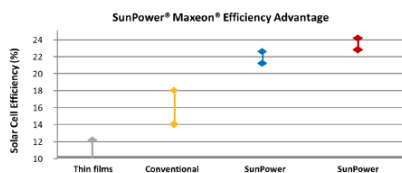
**Reorganization better positions company; reduces cost structure.** Over the past year, SPWR initiated on several reorganization plans which better positions the company to weather the structural changes going on in the space as well as bring costs more inline – albeit still higher than the industry.

Key feature of the strategic steps in 2011 and 2012 include:

- Reporting segments changed to: Americas, EMEA and APAC (From Utility & Power Plants and Residential and Commercial).
- The elimination of 900 employees in Philippines.
- Temporary idling of 6 of 12 lines at its Fab 2 cell manufacturing plant and 20% of panel manufacturing in the Philippines.

## Premium product continues to command premium pricing through downstream channel

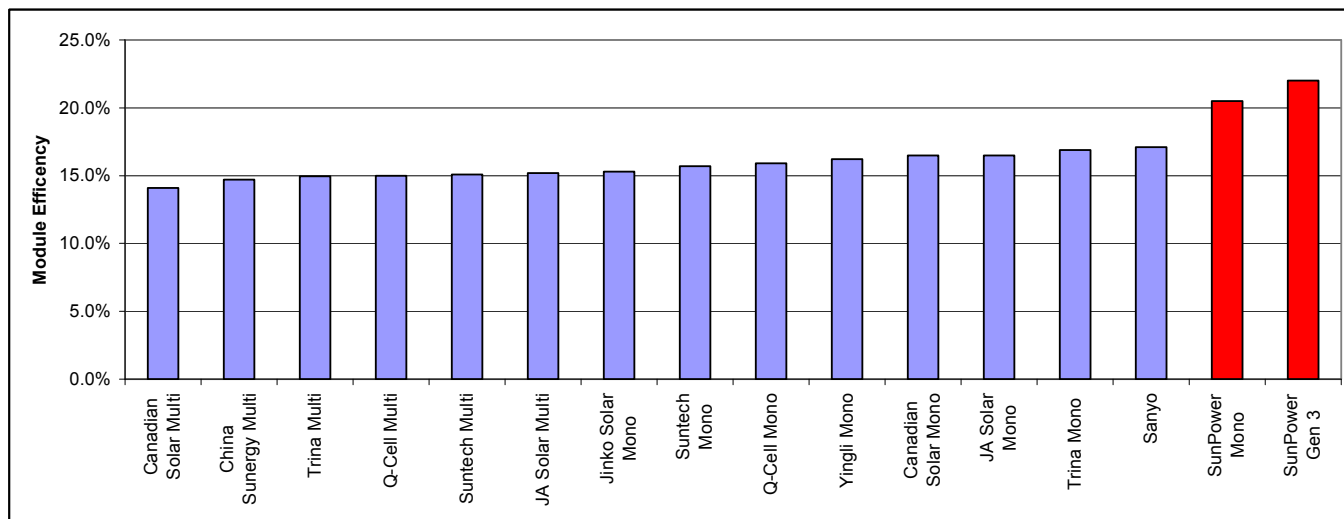
Figure 131. Cell efficiency comparison



Source: Company Filings

**Still Maxing out the efficiency curve with superior technology.** SPWR's boasts the highest efficiency cells and panels in the industry and this has resulted in commanding a premium price for the product. Contrary to the bear argument, SPWR has been able to maintain premium pricing by leveraging a massive downstream network that includes well over 2,500 dealers. SPWR's all-back contact technology yields cell and module efficiencies approaching 24% and 22%, respectively, for the Gen 3's. Instead of wasting light entering the cell and not getting fully captured by intermittent electrical contacts that block sunlight on the top and can miss the bottom of a cell, the use of a backside mirror reflects the light – thereby increased efficiency. Additional benefits of back contact technology include less prone to cracking, less use of silver and more use of copper. See below for an efficiency comparison versus the group. The obvious key benefit on SPWR's industry leading efficiency roadmap is that their modules generate more electricity per square foot – making them perfect candidates for space constrained areas.

Figure 132. Panel efficiency comparisons for the industry



Source: Citi Research

**Still maintaining premium prices.** As stated above, SPWR has been able to attain above market prices for their panels mainly by aggressively utilizing their global distribution channel and marketing their products as full “systems” versus merely commoditized module “components”. The over 2,500 dealers in their network are supplied with everything they need including leads, perks and product financing – encouraging the dealers to sell the SPWR brand. Industry checks indicate that SPWR panels still command a 5-7% premium over the market.

## Huge pipeline not concentrated around one or two projects

**Project pipeline deep and well diversified geographically**

**Project pipeline exceeds 5GW alone in North America.** While extrapolating SPWR's exact pipeline on a global scale is difficult given the vast number of smaller scale projects <1 MW, industry checks seem to point to over 5GW alone in North

America. This pipeline diversification leaves SPWR in a situation to be less scrutinized than other downstream players (i.e. FSLR) when it comes down to the ability to re-fill the pipeline as installations occur. Below we highlight key larger scale projects in the developing and operational phase for SPWR in the US.

Figure 133. SPWR: sample of US projects in pre operation phase

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	Owner	Power Offtaker	Offtaker Type	EPC Firm	Business Model	Module Technology	Module Manufacturer	BOS Type
Henrietta Solar Project	SunPower	100	CA	Development	N	SunPower	Pacific Gas & Electric	IOU	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Antelope Valley Solar I (Solar Star California XX)	SunPower	309	CA	Development	N	MidAmerican Energy Holdings	Southern California Edison	IOU	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Antelope Valley Solar II (Solar Star California XX)	SunPower	270	CA	Development	N	MidAmerican Energy Holdings	Southern California Edison	IOU	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Quinto Solar (Solar Star California XIII)	SunPower	110	CA	Development	N	SunPower	Southern California Edison	IOU	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
SunPower TEP Project - PV	SunPower	2	AZ	Development	N	Tucson Electric Power	Tucson Electric Power	IOU	SunPower	UDG	Super Mono c-Si	SunPower	Rooftop
Lake Air Force Base Project	SunPower	15	AZ	Development	Y	Arizona Public Service	Arizona Public Service	IOU	SunPower	UDG	Super Mono c-Si	SunPower	1-Axis
California Valley Solar Ranch - Phase III	SunPower	124	CA	Development	N	NRG Energy	Pacific Gas & Electric	IOU	Bechtel	PPA	Super Mono c-Si	SunPower	1-Axis
Shandin Solar	SunPower	30	NM	Pre-Contract	N	SunPower	Tucson Electric Power	IOU	SunPower	UDG	Super Mono c-Si	SunPower	1-Axis
SunPower TEP Project - CPV	SunPower	6	AZ	Development	N	Tucson Electric Power	Tucson Electric Power	IOU	SunPower	UDG	Super Mono c-Si	SunPower	1-Axis
Apple Maiden Data Center	SunPower	20	NC	Development	N	Apple	Salt River Project	Commercial	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
ASU - SunPower CPV Project	SunPower	1	AZ	Development	Y	SunPower	Hawes Electric Company	Commercial	SunPower	PPA	CPV	SunPower	1-Axis
Katahdin Solar Two	SunPower	5	HI	Development	Y	D.E. Shaw Bright Plains	Y	Commercial	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Mount Diablo Unified School District Project	SunPower	12.1	CA	Development	Y	SunPower	Mount Diablo Unified School District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Porterville Unified School District Solar	SunPower	3.7	CA	Development	Y	Porterville Unified School District	Porterville Unified School District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Princeton University	SunPower	5.3	NJ	Development	Y	Superior	Princeton University	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Scottsdale Unified School District	SunPower	5.5	AZ	Development	N	Scottsdale Unified School District	Scottsdale Unified School District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Total		1016.6											

Source: Citi Research, GTM Research

Figure 134. SPWR: sample of US projects in operation

Project Name	Developer	Capacity (MWac)	State	Status	Construction?	Owner	Power Offtaker	Offtaker Type	EPC Firm	Business Model	Module Technology	Module Manufacturer	BOS Type
Bloombergy - New Jersey	SunPower	1.8	NJ	Operating	N	Integrus Energy Services	Bloomberg	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Embarcadero Exploratorium Solar	SunPower	1.3	CA	Operating	N	San Jose Evergreen Community College District	Embarcadero Exploratorium	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Evergreen Valley College	SunPower	1.5	CA	Operating	N	San Jose Evergreen Community College District	San Jose Evergreen Community College District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
East Wastewater Treatment Plant	SunPower	1	CA	Operating	N	PNC Energy Capital	City of Salt	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
McHenry Solar Farm	SunPower	25.8	CA	Operating	N	K Road Power	Modesto Irrigation District	Other	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Naval Air Weapons Station - China Lake	SunPower	12	CA	Operating	N	MetLife	U.S. Navy	Gov't Agency	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Rancho California Water District Headquarters	SunPower	0.6	CA	Operating	N	SunPower	Rancho California Water District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Rio Vista Water Treatment Plant	SunPower	1	CA	Operating	N	PNC Energy Capital	Castaic Lake Water Agency	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Santa Clara Valley Transportation Authority	SunPower	2.1	CA	Operating	N	Wells Fargo & Co.	Santa Clara Valley Transportation Authority	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Sengs Doherty Pump Station	SunPower	1.1	CA	Operating	N	SunPower	Rancho California Water District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
California Valley Solar Ranch - Phase I	SunPower	22.7	CA	Operating	N	NRG Energy	Pacific Gas & Electric	IOU	Bechtel	PPA	Super Mono c-Si	SunPower	1-Axis
California Valley Solar Ranch - Phase II	SunPower	107	CA	Operating	N	NRG Energy	Pacific Gas & Electric	IOU	Bechtel	PPA	Super Mono c-Si	SunPower	1-Axis
City of Tucson Project	SunPower	1	AZ	Operating	N	Wells Fargo	City of Tucson	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Dow Jones	SunPower	4.1	NJ	Operating	N	SunPower	Dow Jones	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	Fixed
Grainger, Inc.	SunPower	1.6	NJ	Operating	N	SunPower	Grainger, Inc.	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Laboon North America Headquarters	SunPower	0.8	CA	Operating	N	SunPower	Laboon	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
May's Rooftop	SunPower	3.5	AZ	Operating	N	SunPower	May's, Inc.	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Mission College	SunPower	1.1	CA	Operating	N	SunPower	Mission College	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Murfreesboro Solar Project	SunPower	5	NC	Operating	N	Duke Energy Generation Services	North Carolina Electric Membership Corporation	Coop	rsion Const	PPA	Super Mono c-Si	SunPower	1-Axis
Preferred Unlimited Seabrook	SunPower	4.5	NJ	Operating	N	Gloucester Marine Terminal	Preferred Unlimited Seabrook	Commercial	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Riverside Renewable Energy	SunPower	7.8	NJ	Operating	N	Gloucester Marine Terminal	Gloucester Marine Terminal	Commercial	SunPower	PPA	Super Mono c-Si	SunPower	Rooftop
San Juan Water District Phase I	SunPower	0.7	CA	Operating	N	San Juan Water District	San Juan Water District	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
San Ramon Valley Unified	SunPower	3.3	CA	Operating	N	SunPower	San Ramon Valley Unified	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
Sky Harbor International Airport	SunPower	5.4	AZ	Operating	N	SunPower	Sky Harbor International Airport	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	Rooftop
Tucson Water Department	SunPower	1	AZ	Operating	N	Wells Fargo & Co.	Colorado Springs Utilities	Commercial	SunPower	Retail PPA	Super Mono c-Si	SunPower	1-Axis
U.S. Air Force Academy Project	SunPower	5.2	CO	Operating	N	SunPower	Exelon Corporation	Wholesale	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Exelon City Solar	SunPower	8.7	IL	Operating	N	Duke Energy Generation Services	North Carolina Municipal Power Agency Number 1	IOU	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
Shelby Solar Project	SunPower	0.9	NC	Operating	N	Connecticut Energy	Vineyard Municipal Electric Utility	Muni	SunPower	PPA	Super Mono c-Si	SunPower	1-Axis
SunPower Greater Sandhill	SunPower	19	CO	Operating	N	SAS	Duke Energy	IOU	SunPower	PPA	Super Mono c-Si	SunPower	Fixed
Vineyard Solar One	SunPower	2	NJ	Operating	N	SAS	Duke Energy	IOU	SunPower	PPA	Super Mono c-Si	SunPower	Fixed
SAS Solar Farm - 1	SunPower	1	NC	Operating	N	SAS	Duke Energy	IOU	SunPower	PPA	Super Mono c-Si	SunPower	Fixed
Total		294.5											

Source: Citi Research, GTM Research

## Growth opportunities abound for SPWR moving forward

**SPWR has heavy exposure to the residential and commercial sector – segments in the early solar growth phase in North America.** As highlighted above in the industry sections of this note (see page 35), the outlook for growth in installations is expected to be strong in North America – much of this driven by residential and commercial scale customers as utility scale spending outlook tempers with RPS (Renewable Portfolio Standards) being met for the next few years. As also highlighted in the industry section, the next wave of utility scale spending will be driven by the need for fuel diversity and pure economics – versus legislatively driven growth. On the residential and commercial scale side – growth remains in the infancy stage as the drop in system costs and a new wave of 3<sup>rd</sup> party financing takes hold. With our current installation forecast for US for 2012 (see demand table on page 33), we estimate that over 60% was sourced from the non utility sector – a trend we expect to continue.

**Quick thoughts: Demand from the emergence of residential 3<sup>rd</sup> Party financing in the infancy stage – big growth opportunity for SPWR.** The obvious benefit of 3<sup>rd</sup> party ownership of rooftop solar for the homeowner is the avoidance of upfront system costs which can range from \$25k to \$35k – so this type of financing arrangement is cash flow positive from day 1 for the homeowner. We expect this class of financing/3<sup>rd</sup> party ownership of PV systems will comprise of most of the growth going forward within the residential class. With states that have an approved residential leasing product – this dynamic has already begun to occur. A data point worth monitoring is the emergence of 3<sup>rd</sup> party financing for the commercial sector



(i.e. schools) – a highly likely scenario and an additional growth engine for SPWR. The key takeaway here is the growth in this segment is early in the cycle and much of it will be propelled by new financing options - SPWR's strong presence within this customer class should leave it highly leveraged to the upside.

- SPWR residential leasing product has grown to >100MW totaling 13,000 leases as of 3Q 2012. Key states the product is available: AZ, CA, CO, HI, MA, NJ, NY & PA.

Totals ownership in SPWR acts like a put option...

## The Total “Put” provides downside protection while leaving complete exposure to the upside

**With French oil giant owning 66% of SPWR shares – we see limited downside given its stake.** As a reminder, this transaction closed in mid 2011. While the deal was originally initiated by Total to gain exposure in SPWR's development capabilities, SPWR has been the major beneficiary. In the short term, SPWR has clearly been able to leverage Total's well capitalized balance sheet and bankability to attain easier and cheaper access to the capital markets among other items (i.e. Total investing in SPWR's R&D, providing credit support/LOC). Over the long term, we expect SPWR's access to Total's industry contacts to yield significant project wins in key growth regions including the Middle East.

...while leaving full leverage to the upside

**We would not be surprised to see announcements regarding project wins over the next 12-18 months in key growth regions including the Middle East.** As a quick reminder (and please refer to demand section on page 32), the Middle East region is expected to become a major player in the solar space. Some recent examples include: (1) Dubai announcing 1GW of projects by 2030, (2) Saudi Arabia new target of 17GW of solar by 2030 and (3) Qatar ~1.8GW target over next couple of years. All this has been brought on by the regions goal of reducing their own oil consumption for electricity – leaving more oil supplies to be exported. These renewable targets are only the beginning within the region, in our view. We expect SPWR to leverage Total's relationship in the region to win a sizeable chunk of new projects.

It's important to note, while a potential, industry checks indicate an unlikely scenario of Total purchasing outright all the remaining outstanding shares of SPWR (~34%) even after the lock-up period ends in 2014.

## Strategic JV's and acquisitions help increase SPWR global presence in sustainable markets

SPWR has inked key JV's including acquisitions that will increase its exposure in the global market – within key sustainable growth regions. Below we highlight two crucial partnerships in Japan: Toshiba and Sharp as well as touch on recent acquisitions expected to increase the global base.

Big growth expected in Japan

**Toshiba partnership opened door into Japan – one of the largest residential markets in the world.** Japan remains a country very earlier in the growth cycle with attractive FIT's that began in mid 2012 – yielding high single digit/double digit project IRR's (see IRR section on page 57 for an in-depth discussion). As we highlight in the industry section above, we expect material growth in installations YoY from low base levels in 2012. The Japanese market has historically been dominated by local manufacturers including Sharp, Panasonic (Sanyo), Kyocera and Mitsubishi so access to the region by outsiders has been challenging especially given the local preference for domestic manufacturers - JV's/partnerships remain the most viable option for outsiders. For SPWR, the move into Japan is key given the sheer size of the residential base (largest in the world) which tends to be in very



space constrained areas – the target market for SPWR's high efficiency panels. The Toshiba partnership opened up this door. With Toshiba controlling ~8% panel market share (out of a ~1GW market in YE 2011), we estimate that SPWR has shipped ~80MW in 2011 out of a total 150MW. On 12/4/2012, SPWR and Toshiba extended their partnership agreement through 2018 with SPWR providing an additional +100MW to the residential segment – we expect this figure to be substantially higher through 2018 given the growth potential.

#### Sharp partnership a game changer?

**Sharp partnership to propel market share in Japan?** The recently announced partnership with Sharp can be a game changer in Japan. With Sharp controlling the largest market share in the country (~35%) per industry checks, SPWR's position could grow materially. SPWR management has stated that Japan could, in the future, equate to ~10% of consolidated sales – with these two partnerships, this outlook could seem probable.

Additional noteworthy acquisitions recently geared towards increasing SPWR's global presence include:

- **December 2011 purchase of French based Tenesol from Total (closed in mid 2012).** This private placement transaction upped Total's ownership in SPWR to 66% from 60%. Tenesol is a major global EPC provider of solar systems – a perfect fit with SPWR's large project pipeline. We have already begun to see results. See below.

- Most recently, SPWR's Tenesol (12/20/12) announced two South African projects equating to 33MW with AE-AMD Renewable Energy. COD expected in 2Q 2014.

- **October 2012 investment in electricity retailer Diamond Energy in Australia.** SPWR's 42% stake in the retailer will increase SPWR presence within the country with an option to increase the ownership. The goal of the partnership is to ultimately develop large scale projects at the commercial and utility level. For S/D figures in Australia, see demand section beginning on page 32.

- **December 2012 partnership announcement in China with Inner Mongolia Power and Hohhot City to build and sell C7 tracker within the region shows promise.** SPWR has a 25% stake in the partnership. While still prelim with needed approvals from the PRC, the C7 Trackers could begin to be deployed in 2013.

#### The Buffet Halo a precursor for more?

Warren Buffet's MidAmerican purchase of SPWR 579MW Antelope Valley Solar Project for ~\$2.5B on 1/2/2013 brought a major jolt to SPWR and the industry – SPWR wasn't going to take on a project this size without financing in place. While the sale of the project was not a surprise - management projected on the last earnings call that they were already in advanced discussions with a buyer – Buffet's involvement was a surprise. With construction expected to begin this year, we now see more revenue certainty for the next several years and a recycling of capital for key growth programs including residential leases – a key part of the value proposition with SPWR. At very least, Buffet's involvement in the largest solar project to date displays great confidence in SPWR – elevating its bankability for future projects. SPWR's bankability coupled with leveraging the Total relationship, we see situations like this being more than just a one-off.

**The Buffet acquisition will not be an isolated instance**

**If you develop it, they will come.** After 4 years of development, the project (AVSP) sold and SPWR is taking on the EPC role as well as operations and maintenance of the facility once live under a multi year contract. The purchase from MidAmerican's standpoint appears to be attractive and relatively risk free. Only risks from MidAmerican's standpoint center around: (1) volumetric (MidAmerican has the responsibility of delivering the energy to Southern California Edison) and (2) SPWR's survival as an entity (especially since SPWR has taken on the EPC and O&M role as well as providing the panels with 25 year warranties). MidAmerican doesn't obviously think #2 is an issue – this builds credible confidence around the story, in our view.

Using top level calculations, below we highlight the IRR from MidAmerican's standpoint for the Antelope Valley Solar Project. The project equates to a relatively risk free return of ~9.5% for MidAmerican – a very attractive return in this low bond yield environment.

**Figure 135. MidAmericans' relatively risk free return on AVSP**

Project Assumptions		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Capex	2200 \$mm																													
Generation	1158 GWh	0	0	0	1158	1157	1156	1155	1153	1152	1151	1150	1149	1148	1146	1145	1144	1143	1142	1141	1140	1138	1137	1136	1135	1134	1133	1132	1131	
Degradation	0.1 %																													
Est. PPA rate (2008)	0.15 \$/kWh																													
Time Of Day Factor	1.6 Factor																													
O&M Assumption	0.02 \$/W																													
		Generation (GWh)	0	0	0	1158	1157	1156	1155	1153	1152	1151	1150	1149	1148	1146	1145	1144	1143	1142	1141	1140	1138	1137	1136	1135	1134	1133	1132	1131
		Revenue (\$mm)	-1100	-550	-550	270	270	270	270	269	269	269	269	268	268	268	267	267	267	267	266	266	266	266	265	265	265	265	264	264
		O&M (\$mm)				12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
		FCF (\$mm)	-1100	-550	-550	259	259	258	258	258	257	257	257	257	256	256	256	256	255	255	255	255	254	254	254	253	253	253	253	252
		MidAmerican IRR	9.3%																											

Source: Citi Research, Public Filings

## Rating and valuation

**We are launching US research coverage of SunPower (ticker SPWR) with a Buy (1H) rating and a target price of \$12/share.** Shares are now being added to our high conviction Buy list (Top Picks Live!). SPWR's industry leading efficiency panels, massive downstream channel, the backing of oil giant Total and, strategic JVs with key industry players make it the perfect package. With a global recognized brand and distribution channel, SPWR is best positioned to capture growth in the residential and commercial scale market. Recent project wins at the utility scale level have been gravy – we see additional opportunities with their Tracker system.

**Our target price for SPWR shares is \$12 – we employ a DCF.** With SPWR becoming increasingly a project development and EPC business, we employ a DCF valuation methodology which attempts to capture the future value of projects. Incorporating a risk adjusted, probabilistic free cash flow DCF model, we arrive at a SPWR enterprise value of \$1.6B. To this value we back out 2013 net debt of \$92mm to arrive at an equity value of \$1.5B or ~\$12/share. See below.

**Figure 136. DCF inputs**

<b>Cost of Capital</b>	
Risk-free rate	3.03%
<b>Cost of Equity</b>	<b>10.8%</b>
Beta	2.580
Equity risk premium	3.00%
<b>Cost of Debt, after-tax</b>	<b>4.0%</b>
2014 Sr. Convertible Debentures \$230MM	230 4.75%
Convertible \$250MM	250 4.50%
LOCs and Promissory Notes for SunRun (\$MM)	93 4.00%
LC and Credit Facilities (\$MM)	279 5.00%
<b>Capital Structure</b>	
Equity	958 52.9%
Debt	851 47.1%
<b>WACC</b>	<b>7.6%</b>

Source: Citi Research

## Research Best Ideas Update

**Relative Call - Replacing GXP with SPWR and POM with STP Absolute Call - Adding SPWR, Closing GXP**

**Summary** — We name SPWR a Most Preferred stock and STP a Least Preferred stock relative to our fundamental analyst coverage for the next 3 Months, replacing GXP as a terms in the next 1 Year based on the last closing price of US\$7.79.

Updating our relative call idea

**Rationale** — We are updating our most and least preferred idea as well as our absolute call with the new launch of coverage in the solar sector. With the transfer of utility coverage to Brian Chin, we are removing our relative/absolute call on GXP and POM.

### **SunPower Corp.**

**Catalyst and Thesis** — SPWR is the total solar package, including: (1) industry leading efficiency panels, (2) massive distribution channel, (3) 66% ownership by oil giant Total creates floor w/ full upside leverage, (4) big growth expected w/ strategic JV's and acquisitions and, (5) global recognized brand/geographically diverse project pipeline. With this package, SPWR is strategically best positioned to capture growth at all customer scale levels.

### **Suntech Power Holdings Co Ltd**

**Catalyst and Thesis** — STP shares are facing several near term headwinds above and beyond the structural and cyclical changes going on in the solar space.

**Summary** — We name SPWR a Most Preferred stock and STP a Least Preferred stock relative to our fundamental analyst coverage for the next 3 Months, replacing GXP as a Most Preferred stock and POM as a Least Preferred stock, both of which we last selected on 11 Sep 2012. In Addition, we believe that the share price of SPWR will move Up in absolute terms in the next 1 Year based on the last closing price of US\$7.79.

**Rationale** — We are updating our most and least preferred idea as well as our absolute call with the new launch of coverage in the solar sector. With the transfer of utility coverage to Brian Chin, we are removing our relative/absolute call on GXP and POM.

Figure 137. SPWR DCF valuation

		2013	2014	2015	2016	2017	2018	2019	2020
Operating income (EBIT)		\$119.60	\$166.02	\$211.66	\$244.31	\$277.60	\$294.32	\$346.71	\$367.60
After-tax income (EBI)		\$80.13	\$111.24	\$143.93	\$166.13	\$188.77	\$200.13	\$235.76	\$249.96
+ Depreciation & amortization		\$127.91	\$131.22	\$134.62	\$138.10	\$141.67	\$145.33	\$149.09	\$152.95
- Capex		\$146.35	\$157.54	\$169.59	\$182.57	\$196.53	\$211.57	\$227.75	\$245.17
- Changes to working capital		-\$19.34	-\$18.35	-\$18.35	-\$18.35	-\$18.35	-\$18.35	-\$18.35	-\$18.35
SPWR FCF		\$81.04	\$103.27	\$127.30	\$140.01	\$152.26	\$152.25	\$175.46	\$176.09
Cash Flow Risk Analysis									
Upside Scenario	25%	\$101.30	\$129.08	\$159.13	\$175.02	\$190.32	\$190.31	\$219.32	\$220.11
Middle Scenario	0%	\$81.04	\$103.27	\$127.30	\$140.01	\$152.26	\$152.25	\$175.46	\$176.09
Downside Scenario	20%	\$64.83	\$82.61	\$101.84	\$112.01	\$121.81	\$121.80	\$140.36	\$140.87
Probability Weighted Cash Flows									
Upside Scenario probability	30%	\$30.39	\$38.72	\$47.74	\$52.51	\$57.10	\$57.09	\$65.80	\$66.03
Middle Scenario probability	60%	\$48.62	\$61.96	\$76.38	\$84.01	\$91.35	\$91.35	\$105.27	\$105.65
Downside Scenario probability	10%	\$6.48	\$8.26	\$10.18	\$11.20	\$12.18	\$12.18	\$14.04	\$14.09
Free Cash Flow to the firm (Risk adjusted)									
PV of each cash flows		\$79.48	\$94.15	\$107.89	\$110.32	\$111.52	\$103.67	\$111.06	\$103.61
Fair Value									
Terminal value	\$1,368.51								
PV of future cash flows	\$821.69								
PV of terminal value	\$763.27								
SPWR Enterprise Value	\$1,584.96								
Net Debt	\$91.19								
SPWR Equity	\$1,493.77								
Shares outstanding (in millions)	120.59								
Implied Valuation per share	\$ 12								

Source: Citi Research

\$MM unless otherwise stated

## Earnings, cash flow and other key metrics

**Our New EPS for 2012/2013/2014 is \$0.10/\$0.39/\$0.63 – with above consensus estimate for 2013 and 2014.** The main driver of our EPS outlook through our forecast period is attributed to increased market share in the residential and commercial customer class segment as the aggressive push downstream serves as an avenue for the module business.

Figure 138. SPWR: Citi vs. consensus

		Dec		Mar	Jun	Sept	Dec				
SPWR		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev	\$810	\$2,648	\$587	\$780	\$813	\$747	\$2,927	\$3,151	Buy	\$12
	EPS	\$0.09	\$0.10	\$0.08	\$0.10	\$0.14	\$0.07	\$0.39	\$0.63		
Consensus	Rev	\$772	\$2,593	\$543	\$612	\$678	\$740	\$2,590	NA	Neutral	\$6
	EPS	\$0.15	\$0.15	(\$0.09)	\$0.01	\$0.10	\$0.13	\$0.22	\$0.46		

Source: Citi Research

Figure 139. SPWR Key ratios

FYE: Dec	2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Profitability Ratios																
Return On Equity	-0.5%	-39.6%	-126.4%	-30.3%	-23.9%	-29.0%	-17.3%	-0.5%	-1.1%	0.0%	2.5%	-1.2%	1.2%	2.8%	5.1%	1.3%
Return On Avg Equity	10.8%	1.5%	-28.3%	-43.8%	-47.1%	-46.2%	-25.3%	-18.7%	-11.5%	-4.6%	0.3%	0.1%	0.6%	1.3%	2.0%	2.6%
Return on Invested Capital	2.9%	-0.4%	0.8%	0.4%	-1.2%	3.6%	1.5%	3.7%	2.6%	3.3%	3.3%	3.1%	3.5%	4.4%	4.5%	4.6%
Return on Invested Capital ex cash	3.4%	-0.5%	1.0%	0.5%	-1.4%	4.3%	1.9%	5.4%	3.9%	4.6%	4.7%	4.5%	5.2%	6.2%	6.2%	5.9%
Return On Assets	-0.2%	-17.8%	-47.0%	-10.1%	-9.3%	-10.6%	-6.1%	-0.2%	-0.3%	0.0%	0.8%	-0.4%	0.4%	0.9%	1.7%	0.5%
Return On Assets	4.9%	0.7%	-12.2%	-18.1%	-20.3%	-18.8%	-9.1%	-6.1%	-4.1%	-1.5%	0.1%	0.0%	0.2%	0.4%	0.6%	0.9%
Return On Net Assets	-0.3%	-19.2%	-53.4%	-12.7%	-10.2%	-11.9%	-4.9%	-0.2%	-0.4%	0.0%	1.0%	-0.5%	0.5%	1.1%	2.1%	0.5%
Return On Net Assets	5.6%	0.7%	-13.6%	-22.4%	-22.5%	-20.8%	-10.4%	-7.7%	-4.9%	-1.8%	0.1%	0.0%	0.3%	0.5%	0.8%	1.1%
Return On Sales	-0.5%	-25.0%	-52.6%	-11.1%	-12.8%	-12.9%	-8.0%	-0.2%	-0.5%	0.0%	0.9%	-0.5%	0.5%	1.0%	1.8%	0.5%
Return On Sales	7.0%	0.9%	-13.7%	-24.2%	-25.7%	-22.8%	-11.2%	-7.9%	-5.2%	-1.9%	0.1%	0.0%	0.2%	0.5%	0.8%	1.0%
Return on Capital Employed	3.2%	-0.7%	1.1%	1.2%	-1.1%	5.8%	2.1%	5.7%	3.8%	5.1%	5.3%	4.8%	5.3%	7.0%	7.1%	7.1%
* Avg Over Last 4 Qtrs																
<b>Efficiency Ratios</b>																
Sales/Total Assets	\$0.52	\$0.71	\$0.89	\$0.91	\$0.72	\$0.82	\$0.76	\$0.90	\$0.67	\$0.85	\$0.88	\$0.82	\$0.71	\$0.90	\$0.92	\$0.91
A/R Days Sales Out	69	61	57	48	55	48	45	40	40	40	40	40	40	40	40	40
Inventory Turns	2.96	5.04	5.90	6.63	3.94	4.93	5.13	8.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Days of Inventory	123	72	62	55	93	74	71	46	61	61	61	61	61	61	61	61
Number of Employees	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Liquidity Ratios</b>																
Current Ratio	2.8	2.5	2.8	2.8	2.3	2.5	1.9	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.1	1.9
Quick Ratio	1.1	0.9	1.1	1.1	0.6	0.8	0.7	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	0.8
Net Working Capital	\$1,480.3	\$1,277.8	\$1,526.1	\$1,493.4	\$1,332.4	\$1,398.0	\$912.1	\$1,236.1	\$1,248.3	\$1,253.2	\$1,261.1	\$1,251.6	\$1,268.6	\$1,279.7	\$1,294.0	\$1,060.3
EV/Net Working Capital																
Long-term Debt/Equity	52.5%	54.9%	82.5%	88.8%	55.6%	71.9%	47.8%	76.4%	75.7%	75.0%	73.9%	72.3%	71.3%	70.1%	68.7%	48.5%
Total Debt/Equity	52.5%	54.9%	82.5%	88.8%	55.6%	71.9%	47.8%	76.4%	75.7%	75.0%	73.9%	72.3%	71.3%	70.1%	68.7%	48.5%
Op Inc/(12 mth)/Avg Assets, exc. Cash	0.7%	-0.1%	0.3%	0.3%	-0.2%	1.1%	0.4%	1.3%	0.9%	1.1%	1.1%	1.1%	1.2%	1.5%	1.5%	1.4%
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$16.87	\$15.28	\$11.94	\$11.14	\$11.16	\$9.81	\$9.42	\$9.33	\$9.60	\$9.60	\$9.65	\$9.62	\$9.80	\$9.87	\$9.98	\$10.01
Book Value Per Share (Tangible)	\$12.92	\$11.44	\$11.77	\$10.98	\$10.76	\$9.48	\$9.42	\$9.33	\$9.60	\$9.60	\$9.65	\$9.62	\$9.80	\$9.87	\$9.98	\$10.01
Cash Per Share	\$3.81	\$3.50	\$4.30	\$7.07	\$2.70	\$3.75	\$5.71	\$8.80	\$6.81	\$8.78	\$8.67	\$8.68	\$6.67	\$8.60	\$8.56	\$6.80
Net Cash Per Share	-\$4.50	-\$4.89	-\$5.55	-\$2.82	-\$2.80	-\$3.29	\$1.21	\$1.67	\$2.09	\$1.58	\$1.54	\$1.73	\$2.17	\$1.67	\$1.71	\$1.95

Source: Citi Research

## Key risks

- SPWR's cost structure is higher than the industry. If Chinese panel manufacturers close the efficiency gap with SPWR, than SPWR could be disadvantaged.
- SPWR recent change in reporting segments make modeling very challenging.
- SPWR has sizeable exposure to Western Europe – a region that was the historical growth driver for the space – now in contraction. If SPWR is not able to diversify into other growth regions (i.e. Asia, Middle East) or is not able to gain traction in the commercial rooftop market in Germany – margins could be negatively impacted.

Additional risk factors include:

- SPWR is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving.
- Raw material shortages in key manufacturing inputs (i.e. polysilicon) - which the industry has experienced over the past several years - increase the risk that SPWR will be unable to meet its capacity and production targets.
- SPWR's business model is relatively capital-intensive and could limit the company's ability to generate positive cash flows while also driving increased need to raise additional capital, potentially via dilutive equity/debt offerings.
- As a standalone business, SPWR's systems segment historically relied on third-party suppliers for the majority of its solar panels. This unit's ability to source panels from external suppliers going forward will likely be limited given its relationship with SPWR makes it a competitor to panel makers and thus more panels will need to be sourced internally. If SPWR's components segment cannot offset the reduced supply from third-party suppliers, SPWR's systems segment may not be able to achieve its financial targets.

- Demand for solar photovoltaic technology has been largely driven by a favorable regulatory environment in key countries like Germany and Spain. Any material reductions in these financial incentive programs could crimp demand for solar PV.
- Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general.

## Management Bio

### **Tom Werner - President and Chief Executive Officer**

Tom Werner serves as SunPower's president and chief executive officer, and as chairman of the SunPower board of directors. Prior to joining SunPower, he held the position of chief executive officer of Silicon Light Machines, Inc., an optical solutions subsidiary of Cypress Semiconductor Corporation. Previously, Werner was vice president and general manager of the Business Connectivity Group of 3Com Corp., a network solutions company, and has also held a number of executive management positions at Oak Industries, Inc., and General Electric Co. He currently serves as a board member of Cree, Inc., Silver Spring Networks, Silicon Valley Leadership Group, and is a member of the Marquette University board of trustees. Werner holds a bachelor's degree in industrial engineering from the University of Wisconsin, Madison, a bachelor's degree in electrical engineering from Marquette University and a master's degree in business administration from George Washington University.

### **Charles D. Boynton - Executive Vice President and Chief Financial Officer**

financial officer for SunPower Corp., where he leads the company's treasury, project finance, investor relations, financial planning, accounting and corporate development organizations. Previously, he was the company's vice president of corporate finance and corporate development, with global responsibility for finance, planning and analysis and leading strategic investments, joint ventures, and mergers and acquisitions. Prior to joining SunPower, Boynton was chief financial officer for ServiceSource International, where he was responsible for all aspects of finance, accounting, legal and facilities. Boynton also held the position as chief financial officer at Intelliden where he drove finance, legal, IT, human resources and professional services. Earlier in his career, Boynton held key financial positions at Commerce One, Inc., Kraft Foods, Inc. and Grant Thornton, LLP, and is a current member of the board of trustees of the San Jose Technology Museum of Innovation. Boynton was a certified public accountant, State of Illinois, and a Member FEI, Silicon Valley Chapter. He earned his MBA at Northwestern University and his Bachelor of Science in Business from Indiana University.

### **Peter Aschenbrenner - Vice President, Corporate Strategy**

Peter Aschenbrenner is SunPower's VP of corporate strategy, and has served as VP of sales and marketing since June 2003. Prior to joining SunPower, he was senior VP of global operations at AstroPower, Inc., a solar product manufacturing company. Aschenbrenner has over 25 years of solar industry experience, including management positions at Siemens Solar, PV Electric GmbH, and ARCO Solar. He graduated from Stanford University in 1978 with a BA in product design.

### **Marty T. Neese - Chief Operating Officer**

As SunPower's Chief Operating Office, Marty Neese is responsible for leading SunPower's global strategic operations and worldwide materials sourcing, and cell and module research and development. He brings more than 25 years of experience driving cost effective, scalable manufacturing processes and policies. Most recently, Neese held the position of executive vice president, worldwide operations, for Flextronics International. Prior to that, he was executive vice president, operations at Solelectron Corp., where he was responsible for the daily cost, quality, delivery, and end-to-end supply chain optimization and performance for customers who were partnered with the company. Previously, Neese held the positions of vice president, worldwide program management and sales operations at Sanmina-SCI Corp., and director, business development for Jabil Circuit Co. He also served in the U.S. Army for five years, reaching the rank of Captain. Neese is a graduate of the United States Military Academy at West Point. He received his master's degree in business administration from the University of Florida.

## **Financial Models**

Figure 140. SPWR income statement model

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1E	Q2E	Q3E	Q4E	FYE	FYE
<b>Total Revenues</b>	211,643	299,341	468,361	547,938	<b>1,524,283</b>	347,274	392,143	553,821	937,073	<b>2,230,311</b>	451,418	592,255	705,427	749,168	<b>2,498,268</b>	580,141	650,721	606,680	810,073	<b>2,647,615</b>	586,509	780,143	813,264	747,022	<b>2,926,938</b>	<b>3,150,842</b>
UPP Revenues (System previously)	103,953	110,421	167,466	207,630	<b>589,470</b>	144,004	127,904	260,979	664,158	<b>1,197,135</b>	245,909	302,439	324,542	377,028	<b>1,249,918</b>	-	-	-	411,465	<b>411,465</b>	297,736	396,033	412,846	379,219	<b>1,485,835</b>	<b>1,644,731</b>
R&C Revenues (Component previously)	107,690	188,920	297,895	340,308	<b>934,813</b>	203,180	264,239	292,842	272,915	<b>1,033,176</b>	205,509	289,816	380,885	372,140	<b>1,248,350</b>	-	-	-	386,607	<b>386,607</b>	288,773	384,110	400,417	367,803	<b>1,441,103</b>	<b>1,506,111</b>
Revenue growth (%)	-	41.4%	65.5%	17.7%	<b>6.2%</b>	-	12.9%	41.2%	69.2%	<b>46.3%</b>	-51.8%	-73.4%	56.3%	26.5%	<b>12.0%</b>	-22.6%	43.2%	-6.8%	33.5%	<b>12.0%</b>	-27.6%	33.0%	4.2%	-8.1%	<b>10.6%</b>	<b>7.6%</b>
Cost of Goods	175,219	250,071	358,062	429,277	<b>1,212,629</b>	269,133	288,861	430,423	687,878	<b>1,676,295</b>	359,646	516,042	625,135	656,211	<b>2,159,394</b>	506,612	552,680	520,487	690,619	<b>2,270,398</b>	498,027	662,449	690,573	634,324	<b>2,485,373</b>	<b>2,638,225</b>
UPP COGS	92,955	92,374	138,648	162,133	<b>486,110</b>	109,147	94,543	208,845	480,009	<b>892,544</b>	201,639	276,870	283,519	312,076	<b>1,074,104</b>	-	-	-	351,803	<b>351,803</b>	255,458	339,796	334,222	325,370	<b>1,274,847</b>	<b>1,388,153</b>
R&C COGS	82,264	157,697	219,414	267,144	<b>726,519</b>	159,986	194,318	221,578	207,869	<b>783,751</b>	158,007	241,532	341,616	344,135	<b>1,085,290</b>	-	-	-	338,816	<b>338,816</b>	242,569	322,653	336,350	308,954	<b>1,210,526</b>	<b>1,250,072</b>
Gross Margin (%)	36.424	49.270	107,299	118,661	<b>311,654</b>	78.141	103,282	123,398	249,195	<b>554,016</b>	91,772	73,853	80,292	92,957	<b>338,874</b>	73,529	98,041	86,193	119,454	<b>377,217</b>	88,482	117,694	122,691	112,698	<b>441,565</b>	<b>512,617</b>
Incremental GM (%)	17.2%	16.5%	23.1%	21.7%	<b>20.4%</b>	22.5%	26.3%	22.3%	26.6%	<b>24.9%</b>	20.3%	12.5%	11.4%	12.4%	<b>13.6%</b>	12.7%	15.1%	14.2%	14.7%	<b>14.2%</b>	15.1%	15.1%	15.1%	15.1%	<b>16.1%</b>	<b>16.3%</b>
R&D	6,533	5,371	6,514	6,928	<b>25,346</b>	8,724	8,953	11,496	12,362	<b>41,535</b>	11,877	13,520	11,054	15,152	<b>51,603</b>	14,943	13,006	13,908	14,000	<b>55,857</b>	11,730	15,603	16,265	14,940	<b>58,539</b>	<b>63,017</b>
R&D as a % of Sale	3.1%	1.8%	1.4%	1.3%	<b>1.7%</b>	2.5%	2.3%	2.1%	1.3%	<b>1.9%</b>	2.6%	2.3%	1.6%	2.0%	<b>2.1%</b>	2.6%	2.0%	2.3%	1.7%	<b>2.1%</b>	2.0%	2.0%	2.0%	2.0%	<b>2.0%</b>	<b>2.0%</b>
SG&A	34,334	35,519	36,952	51,462	<b>158,267</b>	55,891	61,297	66,710	67,847	<b>251,745</b>	58,647	64,423	62,596	70,988	<b>256,654</b>	64,888	52,942	60,894	70,000	<b>248,524</b>	52,786	70,213	73,194	67,232	<b>263,424</b>	<b>283,576</b>
SG&A as a % of Sale	16.2%	11.9%	7.9%	9.4%	<b>10.4%</b>	16.1%	15.6%	12.0%	7.2%	<b>11.3%</b>	13.0%	10.9%	8.9%	9.5%	<b>10.3%</b>	11.2%	8.1%	10.0%	8.6%	<b>9.4%</b>	9.0%	9.0%	9.0%	9.0%	<b>9.0%</b>	<b>9.0%</b>
BL	40,867	40,890	43,466	58,390	<b>183,613</b>	64,615	70,250	78,206	80,209	<b>293,280</b>	70,524	77,943	73,650	86,140	<b>308,257</b>	79,631	65,948	74,802	84,000	<b>304,361</b>	64,516	85,816	80,459	82,172	<b>321,963</b>	<b>346,593</b>
<b>Operating Margin</b>	(4.443)	8.380	63.833	60.271	<b>128.041</b>	13.526	33.032	45.192	168.986	<b>260.736</b>	21.248	(4.090)	6.842	6.817	<b>30.617</b>	(6.102)	32.093	11.391	35.454	<b>72.836</b>	23.966	31.879	33.232	30.525	<b>119.602</b>	<b>166.024</b>
Operating Margin (%)	-2%	3%	14%	11%	<b>8%</b>	4%	8%	8%	18%	<b>12%</b>	5%	-1%	1%	1%	<b>1%</b>	-1%	5%	2%	4%	<b>3%</b>	4%	4%	4%	4%	<b>4%</b>	<b>5%</b>
Incremental OPM (%)	-43%	15%	33%	4%	<b>-149%</b>	-23%	-8%	15%	25%	<b>19%</b>	-30%	-16%	-8%	7%	<b>-86%</b>	-8%	54%	-47%	12%	<b>28%</b>	-5%	4%	4%	-4%	<b>17%</b>	<b>21%</b>
Other Income (Exp)	(7,723)	(1,281)	(4,384)	(6,455)	<b>(19,843)</b>	(10,771)	(17,500)	(21,016)	(6,947)	<b>(50,234)</b>	(12,750)	(18,949)	12,895	7,428	<b>(11,376)</b>	(9,677)	(16,135)	(11,682)	(18,055)	<b>(55,589)</b>	(8,724)	(14,009)	(8,521)	(17,975)	<b>(50,229)</b>	<b>(50,280)</b>
Profit Before Taxes	(12,166)	7,099	59,449	53,816	<b>108,198</b>	2,755	15,532	24,176	168,039	<b>210,502</b>	8,488	(22,939)	10,447	14,245	<b>19,241</b>	(15,779)	15,958	(2,091)	17,359	<b>17,246</b>	14,242	17,870	24,711	12,550	<b>69,373</b>	<b>115,746</b>
Taxes	(3,035)	1,786	15,034	10,945	<b>24,730</b>	0,714	3,149	3,718	20,552	<b>28,133</b>	1,219	(4,714)	4,976	(3,460)	<b>(1,979)</b>	(5,752)	7,278	(9,339)	6,075	<b>3,662</b>	4,700	5,897	8,154	4,141	<b>22,893</b>	<b>38,196</b>
effective % rate	24.9%	25.2%	25.3%	20.3%	<b>22.9%</b>	25.0%	20.3%	15.4%	12.2%	<b>13.4%</b>	14.4%	20.6%	25.6%	-24.3%	<b>-10.3%</b>	36.5%	45.6%	135.3%	35.0%	<b>21.2%</b>	33.0%	33.0%	33.0%	33.0%	<b>33.0%</b>	<b>33.0%</b>
Other After Tax	1,245	3,133	2,627	2,924	<b>9,929</b>	3,118	2,030	5,825	(4,128)	<b>6,845</b>	7,133	(0,172)	0,971	(1,929)	<b>6,003</b>	(3,425)	1,075	0,578	-	<b>(1,772)</b>	-	-	-	-	<b>-</b>	<b>-</b>
Stock Based Compensation	9,054	12,078	13,074	12,790	<b>46,994</b>	10,808	11,591	15,665	16,308	<b>54,372</b>	13,163	12,817	11,849	7,296	<b>45,125</b>	12,541	12,000	9,271	12,000	<b>45,812</b>	12,541	12,000	9,271	12,000	<b>45,812</b>	<b>45,812</b>
Extraordinary Item	(7,088)	(18,189)	14,324	24,462	<b>13,509</b>	(18,223)	9,038	(9,498)	(25,200)	<b>(43,895)</b>	3,390	116,058	374,377	91,962	<b>585,967</b>	48,537	81,936	43,456	0,050	<b>174,578</b>	-	-	-	-	<b>-</b>	<b>-</b>
Net Income-Ops	(7,886)	8,446	47,042	45,795	<b>83,937</b>	5,159	14,413	26,283	143,359	<b>189,214</b>	14,402	(18,397)	15,442	15,776	<b>77,223</b>	(13,452)	9,755	4,226	11,283	<b>11,812</b>	9,542	11,973	16,556	8,408	<b>46,480</b>	<b>77,549</b>
Net Total Income	(9,852)	14,559	19,644	8,543	<b>32,894</b>	12,573	(6,216)	20,116	152,251	<b>178,724</b>	(2,121)	(147,872)	(370,784)	(83,082)	<b>(603,859)</b>	(74,530)	(84,181)	(48,500)	(1,367)	<b>(208,578)</b>	(2,999)	(9,027)	7,285	(3,592)	<b>0.668</b>	<b>31,737</b>
<b>EPS-Ops (exc SBC)</b>	<b>\$ (0.09)</b>	<b>\$ 0.09</b>	<b>\$ 0.45</b>	<b>\$ 0.47</b>	<b>\$ 1.01</b>	<b>\$ 0.05</b>	<b>\$ 0.15</b>	<b>\$ 0.25</b>	<b>\$ 1.35</b>	<b>\$ 1.79</b>	<b>\$ 0.15</b>	<b>\$ (0.19)</b>	<b>\$ 0.16</b>	<b>\$ 0.16</b>	<b>\$ 0.28</b>	<b>\$ (0.12)</b>	<b>\$ 0.08</b>	<b>\$ 0.04</b>	<b>\$ 0.09</b>	<b>\$ 0.10</b>	<b>\$ 0.08</b>	<b>\$ 0.10</b>	<b>\$ 0.14</b>	<b>\$ 0.07</b>	<b>\$ 0.39</b>	<b>\$ 0.63</b>
<b>Total EPS</b>	<b>\$ (0.12)</b>	<b>\$ 0.16</b>	<b>\$ 0.19</b>	<b>\$ 0.09</b>	<b>\$ 0.35</b>	<b>\$ 0.13</b>	<b>\$ (0.07)</b>	<b>\$ 0.19</b>	<b>\$ 1.43</b>	<b>\$ 1.69</b>	<b>\$ (0.02)</b>	<b>\$ (1.51)</b>	<b>\$ (3.77)</b>	<b>\$ (0.84)</b>	<b>\$ (6.18)</b>	<b>\$ (0.67)</b>	<b>\$ 0.71</b>	<b>\$ (0.41)</b>	<b>\$ (0.01)</b>	<b>\$ (1.77)</b>	<b>\$ (0.03)</b>	<b>\$ (0.00)</b>	<b>\$ 0.06</b>	<b>\$ (0.03)</b>	<b>\$ 0.01</b>	<b>\$ 0.26</b>
Shares Outstanding (basic)	83,749	90,873	94,868	94,910	<b>91,050</b>	95,154	95,564	95,940	96,081	<b>95,606</b>	96,453	97,656	98,259	98,527	<b>97,724</b>	111,785	118,498	118,952	121,152	<b>117,594</b>	118,794	119,994	121,194	122,594	<b>120,594</b>	<b>123,594</b>
Shares Outstanding (fully diluted)	83,749	92,840	105,031	96,447	<b>92,746</b>	96,472	95,564	105,648	106,431	<b>105,606</b>	96,453	97,656	98,259	98,527	<b>97,724</b>	111,785	118,498	118,952	121,152	<b>117,594</b>	118,794	119,994	121,194	122,594	<b>120,594</b>	<b>123,594</b>
Year Weighted Shares				94,467					101,029																	
<b>TTM EPS Ops (inc SBC)</b>	<b>\$ 0.92</b>	<b>\$ 0.49</b>	<b>\$ 0.45</b>	<b>\$ 0.42</b>	<b>\$ 0.57</b>	<b>\$ 0.64</b>	<b>\$ 0.41</b>	<b>\$ 0.41</b>	<b>\$ 1.27</b>	<b>\$ 1.34</b>	<b>\$ 0.99</b>	<b>\$ 0.92</b>	<b>\$ 0.92</b>	<b>\$ 1.08</b>	<b>\$ (0.43)</b>	<b>\$ (0.13)</b>	<b>\$ (0.21)</b>	<b>\$ (0.30)</b>	<b>\$ (0.09)</b>	<b>\$ (0.07)</b>	<b>\$ 0.03</b>	<b>\$ 0.01</b>	<b>\$ 0.03</b>	<b>\$ 0.01</b>	<b>\$ 0.01</b>	<b>\$ 0.26</b>
<b>TTM Revenue</b>	<b>1,372.9</b>	<b>1,792.7</b>	<b>1,377.3</b>	<b>1,524.3</b>	<b>1,659.9</b>	<b>1,782.7</b>	<b>1,841.2</b>	<b>2,230.3</b>	<b>2,230.3</b>	<b>2,334.5</b>	<b>2,534.6</b>	<b>2,686.2</b>	<b>4,277.2</b>	<b>4,277.2</b>	<b>2,627.0</b>	<b>2,685.5</b>	<b>2,586.7</b>	<b>2,647.6</b>	<b>2,647.6</b>	<b>2,654.0</b>	<b>2,783.4</b>	<b>2,990.0</b>	<b>2,902.9</b>	<b>2,902.9</b>	<b>2,902.9</b>	<b>2,902.9</b>
<b>EPS-Ops (inc SBC)</b>	<b>\$ (0.20)</b>	<b>\$ (0.04)</b>	<b>\$ 0.32</b>	<b>\$ 0.34</b>	<b>\$ 0.50</b>	<b>\$ (0.06)</b>	<b>\$ 0.03</b>	<b>\$ 0.10</b>	<b>\$ 1.19</b>	<b>\$ 1.28</b>	<b>\$ 0.01</b>	<b>\$ (0.32)</b>	<b>\$ 0.04</b>	<b>\$ 0.09</b>	<b>\$ (0.18)</b>	<b>\$ (0.23)</b>	<b>\$ (0.02)</b>	<b>\$ (0.04)</b>	<b>\$ (0.01)</b>	<b>\$ (0.29)</b>	<b>\$ (0.03)</b>	<b>\$ (0.00)</b>	<b>\$ 0.06</b>	<b>\$ (0.03)</b>	<b>\$ 0.01</b>	<b>\$ 0.26</b>

Source: Citi Research

Units in \$mm unless noted

Figure 141. SPWR balance sheet model

	2009				2010				2011				2012				2013				2014			
FYE: Dec	Q1A	Q2A	Q3A	Q4E	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Assets</b>																								
Cash & Securities	\$168.08	\$475.32	\$480.55	\$615.88	\$499.15	\$382.97	\$281.21	\$605.42	\$367.86	\$245.79	\$374.56	\$657.93	\$302.14	\$366.25	\$377.13	\$763.91	\$809.09	\$750.91	\$747.98	\$760.11	\$812.43	\$754.73	\$760.96	\$550.49
Restricted Cash	\$12.66	\$28.30	\$77.09	\$61.87	\$109.09	\$58.32	\$37.21	\$156.30	\$161.03	\$125.61	\$126.51	\$240.45	\$151.61	\$79.31	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28	\$111.28
Short-term investments	\$2.30	\$0.80	\$0.80	\$0.17	\$0.17	\$0.17	\$0.17	\$38.72	\$42.09	\$0.00	\$96.96	\$9.15	\$99.09	\$9.38	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76	\$106.76
Accounts Receivables	\$149.18	\$219.64	\$243.53	\$248.83	\$221.64	\$199.60	\$265.83	\$381.20	\$341.40	\$395.99	\$438.09	\$390.26	\$332.83	\$341.56	\$329.70	\$356.08	\$257.81	\$342.92	\$357.48	\$328.36	\$279.40	\$377.64	\$382.56	\$351.40
Prepaid expenses and other current assets	\$345.17	\$262.91	\$262.91	\$202.64	\$262.91	\$262.91	\$202.64	\$262.91	\$345.17	\$262.91	\$262.91	\$202.64	\$345.17	\$262.91	\$262.91	\$202.64	\$345.17	\$262.91	\$262.91	\$202.64	\$345.17	\$262.91	\$262.91	\$202.64
	\$148.93	\$161.34	\$203.53	\$153.38	\$424.14	\$628.26	\$540.10	\$747.51	\$888.99	\$941.23	\$905.83	\$1,033.89	\$1,185.95	\$1,177.27	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94	\$847.94
<b>Total Current Assets</b>	<b>822.42</b>	<b>1,148.30</b>	<b>1,244.71</b>	<b>1,282.43</b>	<b>1,296.38</b>	<b>1,536.08</b>	<b>1,410.33</b>	<b>2,242.55</b>	<b>2,288.81</b>	<b>2,121.23</b>	<b>2,358.39</b>	<b>2,468.05</b>	<b>2,374.76</b>	<b>2,352.25</b>	<b>1,952.01</b>	<b>2,336.22</b>	<b>2,269.81</b>	<b>2,466.65</b>	<b>2,437.08</b>	<b>2,382.50</b>	<b>2,317.59</b>	<b>2,469.59</b>	<b>2,500.64</b>	<b>2,219.34</b>
Restricted Cash	171.80	189.24	244.70	246.79	205.57	199.37	119.32	467.96	205.57	100.00	100.00	100.00	20.00	13.94	13.94	13.94	13.94	13.94	13.94	13.94	13.94	13.94	13.94	13.94
Net Goodwill	687.16	683.01	683.01	683.01	687.16	683.01	683.01	687.16	687.16	683.01	683.01	687.16	687.16	683.01	683.01	687.16	687.16	683.01	683.01	687.16	687.16	683.01	683.01	687.16
Inangible Assets, Net	35.39	33.09	29.12	24.97	24.97	34.40	353.90	74.86	387.08	380.94	374.44	26.92	44.35	39.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Advances to suppliers, net of current portion	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20	181.20
Other long-term assets	78.32	85.83	89.84	92.35	91.58	183.65	209.39	20.00	20.00	20.00	20.00	20.00	20.00	20.00	244.82	244.82	244.82	244.82	244.82	244.82	244.82	244.82	244.82	244.82
<b>Total Assets</b>	<b>\$2,168.08</b>	<b>\$2,450.35</b>	<b>\$2,616.23</b>	<b>\$2,696.90</b>	<b>\$3,292.97</b>	<b>\$3,426.64</b>	<b>\$2,908.74</b>	<b>\$3,379.33</b>	<b>\$3,464.62</b>	<b>\$3,328.93</b>	<b>\$3,153.18</b>	<b>\$3,275.20</b>	<b>\$3,214.09</b>	<b>\$3,185.48</b>	<b>\$3,193.06</b>	<b>\$3,592.35</b>	<b>\$3,523.23</b>	<b>\$3,667.16</b>	<b>\$3,706.28</b>	<b>\$3,657.06</b>	<b>\$3,911.13</b>	<b>\$3,752.60</b>	<b>\$3,794.37</b>	<b>\$3,520.22</b>
<b>Liab. &amp; Shareholders' Equity</b>																								
Short-Term Debt	\$0.00	\$0.00	\$135.52	\$149.22	\$192.82	\$176.68	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts Payable	\$272.60	\$151.99	\$232.55	\$234.69	\$257.03	\$329.31	\$373.17	\$382.88	\$365.40	\$413.55	\$428.49	\$416.62	\$402.50	\$416.19	\$417.90	\$478.12	\$399.52	\$531.42	\$553.98	\$508.85	\$426.94	\$567.89	\$584.58	\$536.96
Accounts Payable to Cypress	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accrued Liabilities	\$104.35	\$130.02	\$159.70	\$114.01	\$346.93	\$190.21	\$258.91	\$249.00	\$355.12	\$365.45	\$320.20	\$367.33	\$369.84	\$372.65	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69	\$140.69
Current portion of corporate advances	\$15.40	\$19.01	\$22.41	\$19.83	\$17.19	\$17.19	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83	\$19.83
Other	\$6.90	\$50.71	\$17.48	\$17.35	\$17.35	\$175.71	\$16.45	\$48.72	\$70.84	\$47.21	\$63.81	\$170.83	\$170.16	\$145.66	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51	\$461.51
<b>Total Current Liabilities</b>	<b>399.25</b>	<b>351.73</b>	<b>567.65</b>	<b>535.10</b>	<b>803.95</b>	<b>895.40</b>	<b>645.74</b>	<b>700.44</b>	<b>888.55</b>	<b>843.40</b>	<b>823.34</b>	<b>974.62</b>	<b>1,042.24</b>	<b>914.63</b>	<b>1,039.93</b>	<b>1,100.15</b>	<b>1,021.55</b>	<b>1,153.45</b>	<b>1,176.01</b>	<b>1,130.89</b>	<b>1,068.97</b>	<b>1,186.91</b>	<b>1,206.61</b>	<b>1,061.51</b>
Long-Term Debt	46.62	669.18	584.35	636.31	910.73	816.44	585.34	839.93	854.71	819.19	967.64	974.98	693.46	834.99	535.37	863.80	863.80	863.80	863.80	863.80	851.30	851.30	851.30	608.80
Deferred Tax	6.96	10.47	10.47	10.47	6.96	11.87	6.96	11.87	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96
Corporate Advances, net of current portion	87.87	83.21	74.74	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29	72.29
Other Liabilities	24.51	24.57	26.40	70.05	22.92	158.40	171.17	102.46	95.25	95.18	100.68	149.02	151.96	155.05	250.46	250.46	250.46	250.46	250.46	250.46	250.46	250.46	250.46	250.46
<b>Total Liabilities</b>	<b>988.01</b>	<b>1,137.96</b>	<b>1,262.61</b>	<b>1,320.52</b>	<b>1,870.30</b>	<b>1,961.69</b>	<b>1,480.25</b>	<b>1,721.90</b>	<b>1,837.58</b>	<b>1,836.83</b>	<b>1,979.73</b>	<b>2,177.69</b>	<b>2,062.43</b>	<b>2,027.79</b>	<b>2,461.44</b>	<b>2,382.84</b>	<b>2,514.74</b>	<b>2,537.30</b>	<b>2,479.68</b>	<b>2,390.76</b>	<b>2,538.72</b>	<b>2,585.40</b>	<b>2,605.29</b>	<b>2,138.97</b>
Shareholders' Equity	1,179.07	1,312.39	1,353.63	1,376.38	1,422.67	1,464.95	1,428.50	1,657.43	1,627.04	1,492.10	1,173.45	1,097.51	1,247.77	1,168.06	1,120.26	1,130.93	1,140.45	1,152.42	1,168.98	1,177.36	1,193.37	1,213.89	1,238.97	1,254.98
<b>Total Liab. and Equity</b>	<b>\$2,168.08</b>	<b>\$2,450.35</b>	<b>\$2,616.23</b>	<b>\$2,696.90</b>	<b>\$3,292.97</b>	<b>\$3,328.63</b>	<b>\$2,908.74</b>	<b>\$3,379.33</b>	<b>\$3,464.62</b>	<b>\$3,328.93</b>	<b>\$3,153.18</b>	<b>\$3,275.20</b>	<b>\$3,214.09</b>	<b>\$3,185.48</b>	<b>\$3,193.06</b>	<b>\$3,592.35</b>	<b>\$3,523.23</b>	<b>\$3,667.16</b>	<b>\$3,706.28</b>	<b>\$3,657.06</b>	<b>\$3,911.13</b>	<b>\$3,752.60</b>	<b>\$3,794.37</b>	<b>\$3,520.22</b>



Figure 142. SPWR rolling 12M P&L

EYE: Oct	2009				2010				2011				2012				2013				2014			
	Q1-2009	Q2-2009	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011	Q3-2011	Q4-2011	Q1-2012	Q2-2012	Q3-2012	Q4-2012	Q1E-2013	Q2E-2013	Q3E-2013	Q4E-2013	Q1E-2014	Q2E-2014	Q3E-2014	Q4E-2014
Total Revenues	\$1,372.9	\$1,289.5	\$1,377.3	\$1,524.3	\$1,659.9	\$1,752.7	\$1,841.2	\$2,230.3	\$2,334.5	\$2,534.6	\$2,686.2	\$2,498.3	\$2,627.0	\$2,685.5	\$2,586.7	\$2,647.6	\$2,654.0	\$2,783.4	\$2,990.0	\$2,926.9	\$2,976.1	\$3,041.4	\$3,098.4	\$3,150.8
- Sequential Change																								
- Yr to Yr Change	51.5%	15.6%	9.5%	6.2%	20.9%	35.9%	33.7%	46.3%	40.6%	44.6%	45.9%	12.0%	12.5%	6.0%	-3.7%	6.0%	1.0%	3.6%	15.6%	10.6%	12.1%	9.3%	3.6%	7.6%
Cost of Goods	\$1,002.1	\$970.5	\$1,064.5	\$1,212.6	\$1,306.5	\$1,345.3	\$1,417.7	\$1,676.3	\$1,766.8	\$1,996.3	\$2,191.1	\$2,159.4	\$2,306.4	\$2,340.6	\$2,236.0	\$2,270.4	\$2,261.8	\$2,371.6	\$2,541.7	\$2,485.4	\$2,519.6	\$2,565.0	\$2,603.2	\$2,638.2
- % of Revenue	73.0%	75.3%	77.3%	79.6%	78.7%	76.8%	77.0%	75.2%	75.7%	78.8%	81.6%	86.4%	87.8%	87.2%	86.4%	85.8%	85.2%	85.2%	85.0%	84.8%	84.7%	84.3%	84.0%	83.7%
Gross Margin	\$370.7	\$318.9	\$312.8	\$311.7	\$353.4	\$407.4	\$423.5	\$554.0	\$567.6	\$538.2	\$495.1	\$338.9	\$320.6	\$344.8	\$350.7	\$377.2	\$392.2	\$411.8	\$448.3	\$441.6	\$456.5	\$476.4	\$495.3	\$512.6
- % of Revenue	27.0%	24.7%	22.7%	20.4%	21.3%	23.2%	23.0%	24.8%	24.3%	21.2%	18.2%	13.6%	12.2%	12.8%	13.6%	14.2%	14.8%	14.8%	15.0%	15.1%	15.3%	15.7%	16.0%	16.3%
- Sequential Change	-7.3%	-14.0%	-1.9%	-0.4%	13.4%	15.3%	4.0%	30.8%	2.5%	-5.2%	-8.0%	-31.6%	-5.4%	7.5%	1.7%	7.6%	4.0%	5.0%	8.9%	-1.5%	3.4%	4.4%	4.0%	3.5%
- Yr to Yr Change	76.2%	17.5%	(7.2%)	(22.1%)	(4.7%)	27.7%	35.4%	77.8%	60.6%	32.1%	16.9%	(38.8%)	(43.5%)	(35.9%)	(29.2%)	11.3%	22.3%	19.4%	27.8%	17.1%	16.4%	15.7%	10.5%	16.1%
- Basis Sequential	(87)	(227)	(202)	(227)	84	195	(24)	184	(52)	(308)	(280)	(487)	(136)	63	72	69	53	2	20	9	25	32	32	29
- Basis Yr to Yr	380	39	(407)	(743)	(572)	(149)	29	439	303	(201)	(457)	(1,126)	(1,211)	(639)	(487)	68	257	196	144	84	56	87	99	29
R&D	\$20.2	\$21.7	\$23.2	\$25.3	\$27.5	\$31.1	\$36.1	\$41.5	\$44.7	\$49.3	\$48.8	\$51.6	\$54.7	\$54.2	\$57.0	\$55.9	\$52.6	\$55.2	\$57.6	\$58.5	\$59.5	\$60.8	\$62.0	\$63.0
- % of Revenue	1.5%	1.7%	1.7%	1.7%	1.7%	1.8%	2.0%	1.9%	1.9%	1.9%	1.8%	2.1%	2.1%	2.0%	2.2%	2.1%	2.0%	2.0%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%
- Sequential Change	15.5%	7.6%	6.7%	9.4%	8.6%	13.0%	16.0%	15.1%	7.6%	10.2%	-0.9%	5.7%	5.9%	-0.9%	5.3%	-2.0%	-5.8%	4.9%	4.3%	1.6%	1.7%	2.2%	1.9%	1.7%
- Yr to Yr Change	53.6%	49.7%	44.1%	45.0%	36.4%	43.3%	55.8%	63.9%	62.3%	58.3%	35.2%	24.2%	22.3%	9.9%	16.8%	8.2%	(3.7%)	2.0%	1.0%	4.8%	13.1%	10.1%	7.6%	7.6%
- Basis Sequential	25	21	(6)	(2)	(6)	12	19	(10)	5	3	(13)	25	2	(6)	19	(9)	(13)	0	(6)	7	0	-	0	(6)
- Basis Yr to Yr	2	38	40	44	19	9	28	20	26	17	(14)	20	17	7	39	4	(10)	(3)	(28)	(11)	2	2	7	(6)
SG&A	\$133.2	\$139.1	\$144.3	\$158.3	\$179.8	\$205.6	\$235.4	\$251.7	\$254.5	\$257.6	\$253.5	\$256.7	\$262.7	\$251.2	\$249.5	\$248.5	\$236.6	\$253.9	\$266.2	\$263.4	\$267.8	\$273.7	\$278.9	\$283.6
- % of Revenue	9.7%	10.8%	10.5%	10.4%	10.8%	11.7%	12.8%	11.3%	10.9%	10.2%	9.4%	10.3%	10.0%	9.4%	9.6%	9.4%	8.9%	9.1%	8.9%	9.0%	9.0%	9.0%	9.0%	9.0%
- Sequential Change	9.5%	4.5%	3.7%	9.7%	13.6%	14.3%	14.5%	7.0%	1.1%	1.2%	-1.6%	1.2%	2.4%	-4.4%	-0.7%	-0.4%	-4.8%	7.3%	4.8%	-1.0%	1.7%	2.2%	1.9%	1.7%
- Yr to Yr Change	73.7%	53.3%	37.2%	30.1%	35.0%	47.8%	63.1%	59.1%	41.5%	25.3%	7.7%	1.9%	3.2%	(2.5%)	(1.6%)	(3.2%)	(9.9%)	1.1%	6.7%	6.0%	13.2%	7.8%	4.8%	7.6%
- Basis Sequential	121	109	(31)	(10)	80	140	(150)	(150)	(19)	(70)	(73)	84	(27)	(65)	29	20	(47)	21	(22)	8	(8)	0	0	(6)
- Basis Yr to Yr	124	265	212	191	113	94	230	90	7	(157)	(335)	(101)	(90)	(81)	21	89	(108)	(23)	(74)	(39)	8	(12)	10	(6)
BLE	\$153.4	\$160.9	\$167.5	\$183.6	\$207.4	\$236.7	\$271.5	\$293.3	\$299.2	\$306.9	\$302.3	\$308.3	\$317.4	\$305.4	\$306.5	\$304.4	\$289.3	\$309.1	\$323.8	\$322.0	\$327.4	\$334.6	\$340.8	\$346.6
- % of Revenue	11.2%	12.5%	12.2%	12.0%	12.5%	13.5%	14.7%	13.1%	12.8%	12.1%	11.3%	12.3%	12.1%	11.4%	11.8%	11.5%	10.9%	11.1%	10.8%	11.0%	11.0%	11.0%	11.0%	11.0%
- Sequential Change	10.3%	4.9%	4.1%	9.6%	12.9%	14.2%	14.7%	8.0%	2.0%	2.6%	-1.5%	2.0%	3.0%	-3.8%	0.4%	-0.7%	-5.0%	6.9%	4.7%	-0.6%	1.7%	2.2%	1.9%	1.7%
- Yr to Yr Change	70.8%	52.8%	38.2%	32.0%	35.2%	47.2%	62.1%	59.7%	44.3%	29.6%	11.4%	5.1%	43.3%	(10.5%)	1.4%	(1.3%)	(8.9%)	1.2%	5.6%	5.8%	13.2%	8.2%	5.3%	7.6%
- Basis Sequential	148	130	(31)	(11)	45	101	124	(159)	(33)	(71)	(85)	108	(26)	(71)	48	(35)	(60)	21	(28)	17	-	-	-	-
- Basis Yr to Yr	126	303	253	235	132	103	258	110	32	(140)	(349)	(81)	(74)	(74)	59	(84)	(118)	(26)	(102)	(50)	10	(11)	17	-
Operating Margin	\$217.4	\$158.1	\$145.3	\$128.0	\$146.0	\$170.7	\$152.0	\$260.7	\$268.5	\$231.3	\$192.8	\$30.6	\$3.3	\$39.4	\$44.2	\$72.8	\$102.9	\$102.7	\$124.5	\$119.6	\$129.1	\$141.8	\$154.4	\$166.0
- % of Revenue	15.8%	12.3%	10.6%	8.4%	8.8%	9.7%	8.3%	11.7%	11.5%	9.1%	7.2%	1.2%	0.1%	1.5%	1.7%	2.8%	3.9%	3.7%	4.2%	4.1%	4.3%	4.7%	5.0%	5.3%
- Sequential Change	-16.7%	-27.3%	-8.1%	-11.9%	14.0%	16.9%	-10.9%	71.5%	3.0%	-13.8%	-16.7%	-84.1%	-89.3%	1107.5%	12.0%	64.8%	41.3%	-0.2%	21.3%	-64.2%	8.0%	9.8%	8.9%	7.5%
- Yr to Yr Change	80.3%	(4.5%)	(32.6%)	(50.9%)	(32.8%)	8.0%	4.6%	103.6%	83.9%	35.6%	26.8%	(83.3%)	(98.8%)	(82.9%)	(77.1%)	137.9%	3049.8%	160.3%	181.7%	64.2%	25.5%	38.1%	24.0%	38.8%
- Basis Sequential	(235)	(357)	(171)	(218)	40	94	(148)	343	(19)	(237)	(195)	(595)	(110)	134	24	104	113	(19)	134	48	25	32	32	29
- Basis Yr to Yr	253	(264)	(660)	(978)	(704)	(252)	(229)	329	270	(61)	(108)	(1,047)	(1,138)	(766)	(547)	153	375	222	246	134	46	97	82	118
Other Income (Exp)	(\$27.6)	(\$27.5)	(\$29.6)	(\$19.8)	(\$22.9)	(\$39.1)	(\$55.7)	(\$50.2)	(\$52.2)	(\$53.6)	(\$19.8)	(\$11.4)	(\$8.3)	(\$5.6)	(\$30.1)	(\$55.6)	(\$55.6)	(\$53.5)	(\$50.3)	(\$50.2)	(\$50.1)	(\$50.1)	(\$50.0)	(\$50.3)
- % of Revenue	-2.0%	-2.1%	-2.1%	-1.3%	-1.4%	-2.2%	-3.0%	-2.3%	-2.2%	-2.1%	-0.7%	-0.5%	-0.3%	-0.2%	-1.2%	-2.1%	-2.1%	-1.9%	-1.7%	-1.7%	-1.7%	-1.6%	-1.6%	-1.6%
- Sequential Change	71.3%	-0.3%	7.5%	32.9%	15.4%	70.9%	42.5%	-9.9%	4.0%	2.6%	63.1%	-42.4%	27.1%	-32.7%	438.9%	84.9%	0.1%	-3.8%	-5.9%	-0.2%	-0.2%	-0.2%	0.0%	0.0%
- Yr to Yr Change	(329.7%)	(73.6%)	(729.6%)	24.8%	(17.0%)	42.3%	88.6%	153.2%	128.1%	37.0%	(64.6%)	(77.4%)	(84.1%)	(89.6%)	52.2%	388.7%	570.9%	859.1%	67.5%	(9.6%)	(9.9%)	(6.4%)	(0.8%)	0.1%
- Basis Sequential	(90)	(12)	(1)	84	(8)	(85)	(80)	78	2	12	138	28	14	11	(95)	(94)	0	17	24	(3)	3	4	3	2
- Basis Yr to Yr	(333)	(303)	(252)	(19)	63	(10)	(88)	(95)	(86)	12	229	180	192	191	(43)	(164)	(178)	(171)	(52)	38	41	28	7	12
Profit Before Taxes	\$189.8	\$130.6	\$115.8	\$108.2	\$123.1	\$131.6	\$96.3	\$210.5	\$216.2	\$177.8	\$173.0	\$19.2	(\$5.0)	\$33.9	\$14.1	\$17.2	\$47.3	\$49.2	\$74.2	\$69.4	\$79.0	\$91.7	\$104.5	\$115.7
- % of Revenue	13.8%	10.1%	8.4%	7.1%	7.4%	7.5%	5.2%	9.4%	9.3%	7.0%	6.4%	0.8%	-0.2%	1.3%	0.5%	0.7%	1.8%	1.8%	2.5%	2.4%	2.7%	3.0%	3.4%	3.7%
- Sequential Change	-24.5%	-31.2%	-11.4%	-6.3%	13.8%	6.8%	-26.8%	118.6%	2.7%	-17.8%	-2.7%	-88.9%	-126.1%	-773.9%	-58.3%	22.0%	174.1%	4.0%	50.8%	-6.5%	13.9%	16.1%	13.9%	10.8%
- Yr to Yr Change	42.2%	(25.9%)	(47.5%)	(55.8%)	(35.1%)	0.7%	(16.8%)	94.6%	75.6%	31.5%	79.7%	(90.9%)	(102.3%)	(80.9%)	(91.3%)	(10.4%)	(1040.5%)	45.2%	424.9%	302.3%	67.1%	86.5%	40.8%	66.8%
- Basis Sequential	(202)	(370)	(172)	(131)	32	9	(228)	421	(18)	(225)	(57)	(567)	(96)	145	(77)	11	113	(1)	71	111	28	36	36	30
- Basis Yr to Yr	(80)	(567)	(911)	(998)	(641)	(262)	(318)	234	185	(49)	121	(867)	(945)	(575)	(590)	(12)	197	51	193	172	87	125	89	130
T																								

## Company Focus

- Company Update
- Initiation of Coverage

**Shahriar (Shar) Pourreza, CFA**

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<b>Sell/High Risk</b>	<b>3H</b>
Price (01 Feb 13)	US\$1.71
Target price	US\$1.50
Expected share price return	-12.3%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>-12.3%</b>
Market Cap	US\$310M

### Price Performance

(RIC: STP.N, BB: STP US)



## Suntech Power Holdings Co Ltd (STP) Messy Headwinds Abound – Launching With Sell

- **Launching US coverage of STP with a Sell rating (3H)** — We are initiating US coverage of Suntech Power (ticker STP) with a Sell/High Risk (3H) rating and \$1.50 target price. With company-specific factors serving as an overhang, STP shares are facing several near term headwinds above and beyond the structural and cyclical changes going on in the solar space, in our view. Our \$1.50 target price equates to an ETR of -12% - supporting our negative stance.
- **Modest downstream exposure a positive but more centered in China with tighter margins** — As we highlighted prior in the note, our sector stance is favorable towards solar downstream players versus the upstream manufacturers. While STP is predominately a panel manufacturer (once the largest), there is some downstream presence – a positive. That said, most of the project business is sourced in China where margins remain tight per industry checks. Also, STP still generates a significant piece of their business from Western Europe – a region with a very tepid outlook for solar spending growth going forward.
- **Global Solar Fund (GSF) holding has value but questions remain** — We ultimately think STP will monetize its ownership position in GSF (Global Solar Fund) following a conclusion of the hearings – providing some much needed liquidity as we account for in our valuation. One key uncertainty remains. The German Government bonds pledged to STP as collateral for its guarantee of a China Development Bank loan to GSF do not exist as already established. We question how STP's loan guarantee to China Development Bank – which is now unsecured – will impact future borrowing costs with potential new lenders.
- **No reported results since Q1 2012; not expected until conclusion of GSF hearings** — Given the open issues surrounding the GSF case, STP has not reported earnings since Q1 2012 – only announced prelim results. Without reported results, it's become challenging assessing the current financial health of the company. We expect closure in the GSF hearings sometime between Q1 and Q2 2013 at which point, management will report current financial results.
- **Significant short term debt pose liquidity concerns; one key maturity to note** — A ~\$575mm convertible note due March 2013 - a key overhang.
- **Shares have nearly doubled over the past month – aggressive move given several near term company headwinds** — STP shares have joined in with the recent rally in the solar space which we attribute to a general beta trade, as well as fresh investor perception that poor industry fundamentals may have reached a bottom. While this may be partially true, STP shares are up ~100% over the past month which we deem excessive given the multitude of near term headwinds. We caution investors to not buy into this rally with STP. At this juncture, we believe fundamentals are taking a back seat and the real driver will center on investor perception regarding the long-term viability of the company. Our negative stance remains until we get more visibility on the above mentioned items.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
<b>2011A</b>	0.17A	-0.19A	-0.19A	-0.76A	-0.95A	-5.58A
<b>2012E</b>	<b>-0.64A</b>	<b>-0.46A</b>	<b>-0.52A</b>	<b>-0.49E</b>	<b>-2.11E</b>	<b>-2.58E</b>
Previous	na	na	na	na	na	na
<b>2013E</b>	<b>-0.34E</b>	<b>-0.29E</b>	<b>-0.31E</b>	<b>-0.34E</b>	<b>-1.28E</b>	<b>-1.63E</b>
Previous	na	na	na	na	na	na
<b>2014E</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>-1.02E</b>	<b>-1.23E</b>
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## Messy Headwinds Abound – Launching With Sell

We are initiating US coverage of Suntech Power (ticker STP) with a Sell (3H) rating and \$1.50/share target price. With company-specific factors serving as an overhang, STP shares are facing several near term headwinds above and beyond the structural and cyclical changes going on in the solar space. Our \$1.50 target price equates to an ETR of -12% - supporting our negative stance.

### Too many headwinds near term

## Why our negative stance with STP shares?

- While STP has been a market leader in many of the regions it operates in, volumes has never been an issue, it's been about margins – which remain very depressed.
  - Note: Being the largest producer in a highly commoditized solar manufacturing space is a tough proposition, in our view.
- The GSF investigations remain open – closure expected over the next few months.
  - Positive: STP's GSF ownership has value and we do assume monetization of its interest. We account for this in our valuation.
  - Negative: The German Government bonds (EUR 560mm) pledged to STP as collateral for its guarantee of a China Development Bank loan (EUR 554mm) to GSF do not exist. We question how STP's loan guarantee to CDB – which is now unsecured – will impact future borrowing costs with new lenders.
- A lack of reporting since Q1 2012 poses a challenge when trying to assess the current financial position of the company.
- The company has significant short term debt outstanding which poses liquidity concerns. That said, much of the short term debt centers around local/state owned bank borrowings which we expect to be refinanced – especially in light of the recent pledges by local provisional governments as well as the CDB to provide ample liquidity to tier 1 manufactures.
  - The main concern is the \$575mm convertible bond due in March 2013 – UBS has been hired to look at strategic options. This remains a key uncertainty.
- STP's business is heavily exposed to Europe (including Germany, Italy and Spain) – a historical growth region now with a very tepid spending outlook (see industry sections above starting on page 16).
- With a slighter better than average panel efficiency/module premium price comes a slightly higher cost structure versus peers – another tough proposition in a highly commoditized market.
- Shares are up ~100% over the past month due in large part to the bounce in the solar space. We attribute this to a general beta trade, as well as, renewed investor perception that poor industry fundamentals may have reached a bottom. Some of this is driven by the news coming out of China on solar spending growth (see demand sections above on page 34). While this may be partially true, STP is facing too many company specific headwinds over the near term – the share price move over the past month is excessive, in our view.

- Our 12 month target price of \$1.50 – which already includes a sizeable monetization of GSF – equates to an ETR of ~ negative 12% - supporting our sell rating.

There are some positives

## Some positives...

- STP has modest MW exposure in China which we expect will increase. China is a region targeting a sizeable boost in solar installations with several growth initiatives/incentives being announced and increased. This is helping drive a renewed sense of optimism for the space despite falling incentives in Western Europe. See Industry sections above on page 34 for a deep dive discussion.
- STP has a downstream business – albeit more focused in China with tighter margins – that is more developed than its Chinese pure-play manufacturing peers (i.e. YGE). STP currently has ~50MW in projects in China with a goal of adding 200+MW in 2013.
  - Additional, STP has a lease program in CA with additional state expansions expected.
- STP is a Tier 1 manufacturer with a globally recognized brand and distribution channel. It was once the largest manufacturer in the world (YGE is projected to overtake STP in shipments).
  - ~ 7GW of product deployed globally to more than 1,000 customers in over 80 countries.
- STP has the largest foreign market share in Japan (~6%) – expected to increase to 8% in 2013. Japan is a region with significant solar growth ambitions. See Japan section on page 35 of this note for additional clarity.

## Background

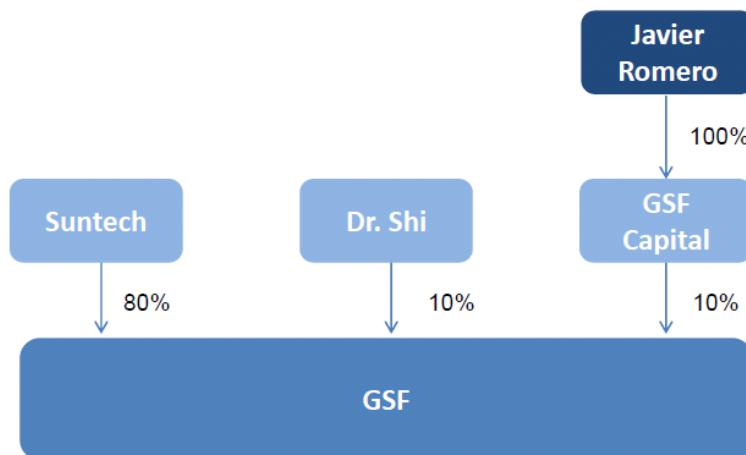
Based in China, Suntech Power is one of the largest manufacturer of silicon-based solar modules for the photovoltaic (PV) industry. In addition to its crystalline cells and modules, Suntech's broad product portfolio includes a growing mix of high-efficiency cells based on its Pluto technology. Suntech sells these products in key solar regions across the globe including Germany, U.S., and China through value-added resellers, distributors, and direct sales primarily targeting applications in the traditional rooftop, ground-mount, and building-integrated (BIPV) end markets. Additionally, Suntech is starting to grow as a project developer via its downstream systems business which focuses on large-scale PV installations leveraging Suntech technology.

## The value of GSF?

We see positives and negatives with the GSF hearings

**A near term monetization is a positive catalyst.** As a quick reminder, Global Solar Fund or GSF is a fund that was created to make investments in developing and/or operating solar projects with a main focus in Italy. Suntech is currently an ~ 80% owner in GSF with the additional 20% being owned by Dr. Shi (Founder/CEO of STP) and GSF Capital (owned by Javier Romero). See below for org chart.

Figure 143. GSF org chart



Source: Citi Research

The issue around GSF centers on German Government Bonds (EUR\$560mm) that were thought to be pledged to STP as collateral for its guarantee of a China Development Bank loan (EUR\$554mm) to GSF. As it turns out, the German Government Bonds never existed, which now leaves STP's CDB loan guarantee unsecured. The issue for us in this case is how this could impact STP's future borrowing costs with new lenders given that STP essentially made a significant loan guarantee to CDB without the existence of pledged securities – this materially increases their risk profile from a future lenders standpoint, in our view.

#### Status on GSF?

- As a result of this guarantee, which is now unsecured, STP will record a guarantee obligation in the range of \$60-\$80mm for 2010 and restate financial results. Financial impact for 2011/2012 is immaterial. Restated financial results are expected at the conclusion of an audit committee review by mid 2013.
- As of result of the fraud investigations, the assets of GSF and Mr. Javier Romero (see above org chart) have been frozen. An independent court appointed manager will oversee the assets pending a conclusion in the case. Mr. Romero has been removed from the fund. The timing of the case is uncertain and we expect STP to sue Mr. Javier Romero for damages.

**GSF has value for STP and will provide liquidity through monetization, in our view.** We think ultimately, STP will monetize its ownership interest in GSF (~80%). Depending on the outcome of the case, it is possible that Mr. Javier Romero will use his ownership interest (~10%) to pay for any damages. It remains to be seen whether Dr. Shi will use his ownership (~10%) interest following a monetization for personal reasons or provide STP with additional liquidity which it materially needs.

Figure 144. GSF valuation assumptions

Sunshine hours	1450 hours
Plant capacity	141.7 MW
Annual generation	205,465 MWh
Degradation/year	0.01 %
Inverter efficiency	99 %
WACC	7 %
Italian FIT	126 €/MWh
Power price (wholesale)	124.5 €/MWh
Electricity inflation	2.5 %
FX (12/27/2012)	1.3267 USD/EUR

Source: Citi Research

**GSF has ~142MW of solar plants with ~111MW accepted into the Italian FiT (Feed-In-Tariff) program to date.** For our valuation purposes, we assume that the entire 142MW will receive the Italian FiT. Below we present a top level model of the fund and the amount of cash we expect STP to receive following a complete monetization after ownership interests are accounted for.

As we highlight below and in the left margin Figure, using simple assumptions, we estimate that a potential monetization of the GSF could create a cash inflow of \$292mm for STP after accounting for ownership positions and a modest tax gain. As stated above, it remains uncertain how the remaining 20% of the ownership sale will flow down to STP – if any.

We account for the \$292mm cash inflow as a reduction in our net debt figure - an input in our EV/Sales multiple based valuation methodology. See Valuation section below.

Figure 145. GSF NPV value for STP

Net Generation (MWh)	203,410	203,390	203,370	203,349	203,329	203,309	203,288	203,268	203,248	203,227	203,207	203,187	203,166	203,146	203,126	203,105	203,085	203,065	203,045	203,024	203,004	202,984	202,963	202,943	202,923	202,902	202,882	202,862	202,842	202,821	
Revenue																															
	FIT (€mm)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6		41.4	25.9	25.9	26.5	26.5	26.5	26.5	26.5	26.5	
	Merchant Sale (€mm)																														
Total revenue (€mm)		25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	41.4	25.9	25.9	26.5	26.5	26.5	26.5	26.5	26.5	
Opex Assumption (€mm)		2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.5	3.6
Margin		23.6	23.6	23.6	23.5	23.5	23.4	23.4	23.3	23.3	23.2	23.2	23.1	23.1	23.0	23.0	22.9	22.8	22.8	22.7	22.7	38.4	22.9	22.8	23.4	23.3	23.2	23.2	23.1	23.0	23.0
Margin NPV (EUR)		292.3	€mm																												
NPV (USD Terms)		387.8	\$mm																												
Est. GSF Cost Basis		260.0	\$mm																												
Tax rate		15	%																												
Cash Inflow (USD)		369	\$mm																												
Shareholder Structure																															
Suntech		79.3%																													
Dr. Shi		10.7%																													
GSF Capital		10.0%																													
Suntech Cash Proceeds		292.32	\$mm																												

Source: Citi Research

## Rating and valuation

Figure 146. STP EV/Sales valuation

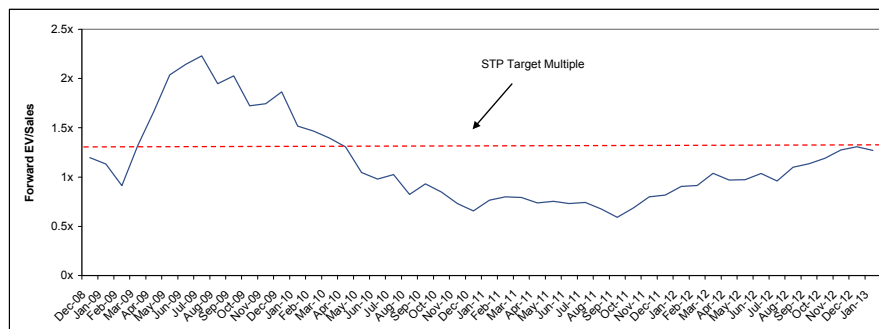
a	2013 Sales (\$mm)	\$1,556.50
b	EV/Sales Multiple	1.3x
c = a * b	STP Enterprise Value	\$2,023.44
d	2013 Net Debt (\$MM)	\$2,027.03
e	Cash Inflow From GSF (\$MM)	\$292.00
f = c - d + e	STP Equity Value (\$MM)	\$288.42
g = f / 189	STP Target Price Per Share	\$1.5

Source: Citi Research

**Our target price for STP shares is \$1.50.** We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Incorporating a 1.3x EV/Sales multiple – consistent with STP's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.6B yields an enterprise value of ~\$2.0B. Backing out 2013 net debt of ~\$1.7B (excluding restricted cash) translates into a STP equity value of \$288mm or ~\$1.50/share. Our net debt figure includes a cash inflow assumption from an after tax monetization of STP's net ownership interest in GSF of \$292mm as calculated above.

It is important to note that our EV/Sales target multiple for STP is higher than the average comp for our globally diverse solar universe to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

Figure 147. STP EV/Sales multiple



Source: Citi Research

## Earnings, cash flow and other key metrics

Our EPS for 2012/2013/2014 is \$(2.11)/\$(1.28)/\$(1.02). The main driver of our EPS outlook through our forecast period is centered on a depressed GM% environment (albeit bottoming) coupled with an increase in module and system-related sales. See our key model inputs and as well as pricing data below – the main driver of our outlook.

Figure 148. STP model inputs and pricing data

	2009	2010	1Q:11	2Q:11	3Q:11	4Q:11	2011	1Q:12	2Q:12	3Q:12	4Q:12E	2012 E	1Q:13E	2Q:13E	3Q:13E	4Q:13E	2013 E	1Q:14E	2Q:14E	3Q:14E	4Q:14E	2014 E
<b>MODULES</b>																						
ASP, \$/W	\$ 2.29	\$ 1.88	\$ 1.77	\$ 1.66	\$ 1.39	\$ 1.18	\$ 1.52	\$ 1.01	\$ 0.98	\$ 0.87	\$ 0.77	\$ 0.93	\$ 0.75	\$ 0.74	\$ 0.74	\$ 0.74	\$ 0.74	\$ 0.70	\$ 0.70	\$ 0.71	\$ 0.71	\$ 0.70
% Δ	(38%)	(18%)	(3%)	(6%)	(16%)	(15%)	(19%)	(14%)	(3%)	(12%)	(12%)	(39%)	(3%)	(0%)	(1%)	(0%)	(20%)	(5%)	(0%)	1%	(0%)	(5%)
Shipments, MW	672	1,476	484	476	556	486	2,002	389	434	374	377	1,573	512	436	426	553	1,927	519	442	433	562	1,956
% Δ	45%	120%	(1%)	(2%)	17%	(13%)	36%	(20%)	12%	(14%)	1%	(21%)	36%	(15%)	(2%)	30%	22%	(6%)	(15%)	(2%)	30%	1%
Revenue, \$MM	\$ 1,608	\$ 2,779	\$ 865	\$ 806	\$ 788	\$ 591	\$ 3,048	\$ 397	\$ 438	\$ 341	\$ 289	\$ 1,465	\$ 382	\$ 325	\$ 314	\$ 407	\$ 1,428	\$ 365	\$ 310	\$ 308	\$ 397	\$ 1,377
% Δ	(10%)	73%	(6%)	(7%)	(2%)	(25%)	10%	(33%)	10%	(22%)	(15%)	(52%)	32%	(15%)	(3%)	30%	(3%)	(11%)	(15%)	(1%)	30%	(4%)
Wafer Cost, \$/W	\$ 1.19	\$ 0.92	\$ 0.83	\$ 0.82	\$ 0.60	\$ 0.48	\$ 0.75	\$ 0.43	\$ 0.38	\$ 0.36	\$ 0.31	\$ 0.37	\$ 0.30	\$ 0.28	\$ 0.27	\$ 0.27	\$ 0.28	\$ 0.26	\$ 0.26	\$ 0.26	\$ 0.26	\$ 0.26
Avg poly ASP, \$/kg	\$ 135	\$ 67	\$ 57	\$ 63	\$ 48	\$ 49	\$ 54	\$ 32	\$ 31	\$ 27	\$ 25	\$ 29	\$ 25	\$ 24	\$ 23	\$ 23	\$ 24	\$ 23	\$ 23	\$ 23	\$ 23	\$ 23
Ingot/wafering, \$/W	\$ 0.43	\$ 0.51	\$ 0.49	\$ 0.44	\$ 0.31	\$ 0.20	\$ 0.43	\$ 0.24	\$ 0.20	\$ 0.20	\$ 0.16	\$ 0.20	\$ 0.15	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13
Cell/module, \$/W	\$ 0.61	\$ 0.56	\$ 0.59	\$ 0.59	\$ 0.57	\$ 0.58	\$ 0.58	\$ 0.52	\$ 0.54	\$ 0.47	\$ 0.43	\$ 0.49	\$ 0.43	\$ 0.43	\$ 0.43	\$ 0.43	\$ 0.43	\$ 0.41	\$ 0.39	\$ 0.39	\$ 0.39	\$ 0.40
Total Cost, \$/W	\$ 1.80	\$ 1.48	\$ 1.42	\$ 1.41	\$ 1.17	\$ 1.06	\$ 1.33	\$ 0.95	\$ 0.92	\$ 0.83	\$ 0.74	\$ 0.86	\$ 0.73	\$ 0.71	\$ 0.70	\$ 0.70	\$ 0.71	\$ 0.67	\$ 0.65	\$ 0.65	\$ 0.65	\$ 0.66
% Δ	(40%)	(18%)	(6%)	(1%)	(17%)	(9%)	(10%)	(10%)	(3%)	(10%)	(11%)	(35%)	(2%)	(2%)	(1%)	0%	(18%)	(4%)	(3%)	0%	0%	(7%)
GM, %	21%	21%	20%	15%	16%	10%	13%	6%	6%	4%	4%	7%	3%	5%	5%	4%	4%	4%	7%	8%	8%	6%
<b>SYSTEMS AND OTHER</b>																						
ASP, \$/W	\$ 3.06	\$ 2.96	\$ 2.85	\$ 2.65	\$ 2.55	\$ 2.50	\$ 2.59	\$ 2.52	\$ 2.45	\$ 2.42	\$ 2.38	\$ 2.43	\$ 2.22	\$ 2.16	\$ 2.13	\$ 2.09	\$ 2.15	\$ 2.22	\$ 2.16	\$ 2.13	\$ 2.09	\$ 2.15
% Δ	(58%)	(3%)	0%	(7%)	(4%)	(2%)	(13%)	1%	(3%)	(1%)	(2%)	(6%)	(6%)	(3%)	(1%)	(2%)	(12%)	6%	(3%)	(1%)	(2%)	0%
MW's installed	28	41	4	9	9	15	38	5	13	19	12	49	16	13	13	17	60	22	18	18	23	81
Cumulative MW's	50	91	95	105	114	129	129	134	148	167	179	179	194	208	221	238	238	260	278	296	320	320
System Cost, \$/W	\$ 3.05	\$ 3.53	\$ 2.97	\$ 2.11	\$ 2.02	\$ 2.24	\$ 2.23	\$ 2.39	\$ 2.30	\$ 2.33	\$ 2.19	\$ 2.29	\$ 2.08	\$ 2.06	\$ 2.05	\$ 2.05	\$ 2.06	\$ 1.92	\$ 1.90	\$ 1.90	\$ 1.90	\$ 1.91
Revenue, \$MM	\$ 87	\$ 123	\$ 12	\$ 25	\$ 24	\$ 38	\$ 99	\$ 12	\$ 33	\$ 46	\$ 28	\$ 119	\$ 35	\$ 29	\$ 28	\$ 36	\$ 128	\$ 48	\$ 40	\$ 38	\$ 49	\$ 175
GM, %	0%	(19%)	(4%)	21%	21%	10%	14%	6%	6%	4%	8%	6%	7%	4%	4%	2%	4%	13%	12%	11%	9%	11%
<b>TOTAL STP</b>																						
Revenue, \$MM	\$ 1,693	\$ 2,902	\$ 877	\$ 831	\$ 810	\$ 629	\$ 3,147	\$ 410	\$ 471	\$ 387	\$ 317	\$ 1,585	\$ 417	\$ 354	\$ 342	\$ 443	\$ 1,556	\$ 413	\$ 349	\$ 344	\$ 446	\$ 1,552
GM, %	20%	18%	19%	15%	16%	10%	15%	6%	6%	4%	4%	5%	3%	5%	4%	4%	4%	5%	7%	8%	8%	7%
EPS	\$ 0.50	\$ 0.60	\$ 0.17	\$ (0.19)	\$ (0.19)	\$ (0.76)	\$ (0.95)	\$ (0.64)	\$ (0.46)	\$ (0.52)	\$ (0.49)	\$ (2.11)	\$ (0.34)	\$ (0.29)	\$ (0.31)	\$ (0.34)	\$ (1.28)	\$ (0.28)	\$ (0.25)	\$ (0.24)	\$ (0.25)	\$ (1.02)

Source: Citi Research

Figure 149. STP: Citi vs. consensus

		Dec	Mar	Jun	Sept	Dec				
STP		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E	Rating
Citi Est	Rev \$	317	\$1,585	\$417	\$354	\$342	\$443	\$1,556	\$1,552	Sell
	EPS \$	(0.49)	(\$2.11)	(\$0.34)	(\$0.29)	(\$0.31)	(\$0.34)	(\$1.28)	(\$1.02)	
Consensus	Rev \$	406	\$1,728	\$380	\$383	\$414	\$447	\$1,729	NA	Sell
	EPS \$	(0.51)	(\$2.66)	(\$0.40)	(\$0.40)	(\$0.39)	(\$0.37)	(\$1.55)	(\$1.85)	

Source: Citi Research



Figure 150. STP key stats

FYE: Dec	2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4E	Q1A	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Profitability Ratios																
Return On Equity	6.7%	-62.5%	-235.6%	-56.8%	-66.2%	-46.0%	-61.1%	-246.8%	-76.3%	-78.3%	-104.5%	-160.7%	-190.2%	-289.9%	-760.1%	954.0%
Return On Avg Equity	33.4%	32.8%	-7.9%	-41.2%	-59.9%	-55.0%	-20.4%	-42.8%	-32.4%	-30.9%	-25.4%	27.7%	44.1%	70.4%	115.9%	240.5%
Return on Invested Capital	5.1%	2.7%	1.4%	-9.1%	-7.1%	-3.8%	-5.0%	-5.0%	-2.5%	-1.8%	-1.8%	-2.5%	-1.2%	-0.5%	-0.3%	-0.4%
Return on Invested Capital ex cash	6.1%	3.1%	1.6%	-10.7%	-8.4%	-4.4%	-5.7%	-6.2%	-3.0%	-2.1%	-2.1%	-2.7%	-1.5%	-0.6%	-0.3%	-0.5%
Return On Assets	2.3%	-19.1%	-52.5%	-12.0%	-12.2%	-8.1%	-9.8%	-26.5%	-7.0%	-6.2%	-6.8%	-7.6%	-5.7%	-5.4%	-5.2%	-5.4%
Return On Assets	12.5%	11.1%	-2.2%	-12.1%	-16.4%	-13.7%	-4.0%	-7.1%	-4.6%	-4.0%	-2.9%	2.2%	2.7%	3.4%	4.1%	4.8%
Return On Net Assets	2.7%	-21.7%	-57.9%	-13.5%	-13.6%	-8.9%	-10.8%	-31.5%	-7.8%	-7.1%	-7.6%	-8.1%	-6.8%	-6.4%	-6.2%	-6.1%
Return On Net Assets	14.8%	13.0%	-2.5%	-14.1%	-18.8%	-15.4%	-4.4%	-8.2%	-5.2%	-4.5%	-3.3%	2.4%	3.1%	4.0%	4.7%	5.3%
Return On Sales	3.6%	-31.2%	-79.3%	-21.8%	-32.5%	-17.7%	-24.9%	-76.3%	-15.2%	-15.6%	-17.3%	-14.9%	-13.1%	-14.1%	-13.7%	-11.0%
Return on Sales	18.5%	15.1%	-2.9%	-18.8%	-30.2%	-28.3%	-9.3%	-18.3%	-11.6%	-10.5%	-7.6%	5.0%	6.3%	7.9%	9.4%	11.1%
Return on Capital Employed	13.6%	6.8%	3.5%	-10.2%	-30.6%	-18.4%	-25.3%	-30.1%	-16.1%	-7.0%	-7.5%	-10.5%	-4.4%	-1.8%	-1.1%	-1.8%
* Avg Over Last 4 Qtrs																
<b>Efficiency Ratios</b>																
Sales/Total Assets	\$0.64	\$0.61	\$0.66	\$0.55	\$0.37	\$0.46	\$0.39	\$0.35	\$0.46	\$0.40	\$0.39	\$0.51	\$0.44	\$0.38	\$0.38	\$0.49
A/R Days Sales Out	12	13	12	31	42	37	45	55	42	49	51	39	42	50	50	39
Inventory Turns	5.17	4.94	3.92	4.40	3.05	4.56	4.87	4.56	4.56	4.56	4.56	4.56	4.87	4.87	4.87	4.87
Days of Inventory	71	74	93	83	120	80	75	80	80	80	80	80	75	75	75	75
<b>Liquidity Ratios</b>																
Current Ratio	1.0	0.9	0.9	0.8	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.7	0.7
Quick Ratio	0.6	0.6	0.5	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.5	0.5	0.5	0.4
Net Working Capital	-\$21.0	-\$212.9	-\$344.3	-\$483.2	-\$1,123.9	-\$1,199.5	-\$1,283.1	-\$1,108.1	-\$1,163.5	-\$696.3	-\$742.1	-\$801.7	-\$498.0	-\$535.1	-\$569.6	-\$613.3
Long-term Debt/Equity	39.9%	46.1%	71.9%	76.9%	22.1%	24.6%	28.2%	45.3%	53.4%	244.5%	304.3%	419.6%	913.5%	1525.1%	4191.8%	-5041.5%
Total Debt/Equity	125.8%	146.5%	217.4%	238.9%	281.8%	312.9%	359.0%	577.3%	680.8%	805.0%	1002.0%	1381.6%	2301.3%	3842.2%	10560.6%	-12701.2%
Op Inc/(12 mth)/Avg Assets, exc. Cash	2.1%	1.0%	0.4%	-1.3%	-2.6%	-1.5%	-2.1%	-2.2%	-1.1%	-0.8%	-0.8%	-1.0%	-0.5%	-0.2%	-0.1%	-0.2%
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$10.41	\$9.21	\$6.04	\$5.34	\$4.44	\$3.96	\$3.41	\$2.10	\$1.78	\$1.49	\$1.19	\$0.85	\$0.59	\$0.35	\$0.13	-\$0.10
Book Value Per Share (Tangible)	\$8.09	\$6.84	\$5.90	\$5.21	\$4.32	\$3.84	\$3.30	\$1.99	\$1.67	\$1.38	\$1.08	\$0.74	\$0.48	\$0.24	\$0.02	-\$0.21
Cash Per Share	\$4.94	\$4.26	\$3.14	\$3.92	\$3.67	\$3.22	\$3.06	\$4.14	\$3.20	\$3.24	\$3.02	\$2.22	\$4.06	\$4.09	\$3.90	\$3.22
Net Cash Per Share	-\$8.16	-\$9.24	-\$9.98	-\$8.83	-\$8.84	-\$9.16	-\$9.19	-\$7.98	-\$8.94	-\$8.78	-\$8.87	-\$9.55	-\$9.56	-\$9.38	-\$9.43	-\$9.98

Source: Citi Research

## Key risks

Besides the items highlighted on page 139 on key risks surrounding the story, additional risk factors include:

- STP is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving.
- Raw materials make up a large portion of STP's cost structure and much of this supply is secured under long-term contracts that have historically been quoted as fixed-price contracts. If STP is unable to keep its raw material costs competitive with prevailing market rates, this could pressure margins and/or result in share loss.
- Given its aggressive expansion, STP has encountered periods of significant excess inventory and remains burdened by a debt-laden balance sheet which includes a large amount of short-term debt.
- Demand for solar technology has been largely driven by a favorable regulatory environment in key countries like Germany. Any material reductions in these financial incentives could crimp demand for solar PV.
- Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving our target price.

## Management Bio

### Dr. Zhengrong Shi - Founder, Executive Chairman and Chief Strategy Officer

Dr. Zhengrong Shi is our founder, Executive Chairman of our board of directors and our Chief Strategy Officer. Prior to founding our company in 2001, he was a research director and executive director of Pacific Solar Pty., Ltd., an Australian PV company engaged in the commercialization of next-generation thin film technology, from 1995 to 2001. From 1992 to 1995, he was a senior research scientist and the



leader of the Thin Film Solar Cells Research Group in the Centre of Excellence for Photovoltaic Engineering at the University of New South Wales in Australia, the only government-sponsored PV industry research center in Australia. Dr. Shi is the inventor for 15 patents in PV technologies and has published or presented a number of articles and papers in PV-related scientific magazines and at conferences. Dr. Shi received a bachelor's degree in optical science from Changchun University of Science and Technology in China in 1983, a master's degree in laser physics from the Shanghai Institute of Optics and Fine Mechanics, the Chinese Academy of Sciences in 1986, and a Ph.D degree in electrical engineering from the University of New South Wales in Australia in 1992.

**Mr. David King - Chief Executive Officer and Acting Chief Financial Officer**

Mr. David King is Suntech's Chief Executive Officer and Acting Chief Financial Officer. Previously, Mr. King served as Suntech's Chief Financial Officer, joining Suntech in May 2011. Mr. King is the former Chief Financial Officer and Treasurer of Tetra Tech, Inc., a leading provider of consulting, engineering, program management, construction, and technical services addressing the resource management, energy and infrastructure markets. Prior to Tetra Tech, Mr. King served as Vice President of Finance and Operations of Walt Disney Imagineering, and earlier, as Vice President and Chief Financial Officer of the Asia Pacific region for Bechtel Group, Inc., a global engineering, construction and project management company. Mr. King began his career at Price Waterhouse where he gained a decade of international and transactional experience at the firm's Seattle, Los Angeles and Hong Kong offices. Mr. King studied Business Administration at the University of Washington and is a Certified Public Accountant.

**Financial models**

Figure 151. STP income statement model

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	FY
<b>Total Revenues</b>	315,656	320,959	473,113	583,619	<b>1,693,347</b>	588,034	625,142	743,673	945,082	<b>2,901,931</b>	877,001	830,700	809,800	629,000	<b>3,146,501</b>	409,500	471,000	387,000	317,148	<b>1,584,648</b>	417,344	383,714	342,165	443,273	<b>1,566,496</b>	<b>1,562,133</b>
Revenue growth (%)	-23.8%	1.7%	47.4%	23.4%	-12.0%	0.8%	6.2%	18.0%	27.1%	<b>71.4%</b>	-7.2%	-5.3%	-2.5%	-22.3%	<b>8.4%</b>	-87.0%	15.0%	-17.8%	-18.0%	<b>-49.6%</b>	-73.7%	-15.2%	-3.3%	29.5%	-1.8%	-0.3%
Cost of Goods	297,969	293,793	388,056	444,358	<b>1,350,174</b>	427,441	509,182	620,516	790,147	<b>2,302,266</b>	708,946	703,910	680,645	565,965	<b>2,659,396</b>	386,920	442,740	371,520	304,801	<b>1,505,991</b>	403,695	336,964	326,949	424,428	<b>1,492,036</b>	<b>1,443,651</b>
<b>Gross Margin</b>	57,687	61,166	85,057	139,263	<b>343,173</b>	115,593	115,960	123,157	154,935	<b>599,665</b>	168,155	126,790	129,155	63,035	<b>487,135</b>	22,580	28,260	15,480	12,348	<b>78,658</b>	13,649	16,749	15,216	18,845	<b>64,460</b>	<b>108,491</b>
Gross Margin (%)	18.3%	19.1%	18.0%	23.9%	<b>20.3%</b>	19.7%	18.5%	16.6%	16.4%	<b>17.6%</b>	19.2%	15.3%	15.9%	10.0%	<b>15.5%</b>	5.5%	6.0%	4.0%	3.9%	<b>5.0%</b>	3.3%	4.3%	4.4%	4.3%	<b>4.1%</b>	<b>7.0%</b>
Incremental GM (%)	NM	66%	16%	49%	<b>NM</b>	-536%	1%	6%	16%	<b>14%</b>	NM	NM	NM	NM	<b>-9%</b>	NM	9%	NM	NM	<b>NM</b>	NM	NM	NM	4%	<b>NM</b>	<b>NM</b>
R&D	3,923	3,272	6,053	12,623	<b>25,871</b>	8,811	7,342	11,056	8,857	<b>36,066</b>	9,345	7,850	10,875	7,475	<b>35,545</b>	8,200	8,000	7,000	7,000	<b>30,200</b>	4,173	3,537	3,422	4,433	<b>15,665</b>	<b>15,621</b>
R&D as a % of Sale	1.2%	1.0%	1.3%	2.2%	<b>1.5%</b>	1.5%	1.2%	1.5%	0.9%	<b>1.2%</b>	1.1%	0.9%	1.3%	1.2%	<b>1.1%</b>	2.0%	1.7%	1.8%	2.2%	<b>1.9%</b>	1.0%	1.0%	1.0%	1.0%	<b>1.0%</b>	<b>1.0%</b>
SG&A	26,821	32,629	31,453	38,017	<b>130,720</b>	40,261	42,087	46,345	51,490	<b>180,183</b>	60,611	73,940	99,680	105,760	<b>339,991</b>	111,580	75,000	78,000	70,000	<b>334,580</b>	41,733	35,373	34,222	44,333	<b>155,650</b>	<b>124,171</b>
SG&A as a % of Sale	9.1%	10.2%	6.6%	6.5%	<b>7.7%</b>	6.8%	6.7%	6.2%	5.4%	<b>6.2%</b>	6.9%	8.9%	12.3%	16.8%	<b>10.8%</b>	27.2%	15.9%	20.2%	22.1%	<b>21.1%</b>	10.0%	10.0%	10.0%	10.0%	<b>10.0%</b>	<b>8.0%</b>
BLE	32,544	35,901	37,506	50,640	<b>156,591</b>	49,072	49,429	57,401	60,347	<b>216,249</b>	69,956	81,790	110,555	113,235	<b>375,536</b>	119,780	83,000	85,000	77,000	<b>364,780</b>	45,908	38,909	37,638	48,700	<b>171,215</b>	<b>139,692</b>
<b>Operating Margin</b>	25,143	25,265	47,351	88,623	<b>186,562</b>	66,521	68,531	65,756	94,588	<b>293,396</b>	98,189	45,000	18,600	(50,200)	<b>111,589</b>	(97,200)	(54,740)	(69,520)	(64,652)	<b>(286,112)</b>	(32,258)	(22,159)	(22,422)	(29,915)	<b>(106,755)</b>	<b>(31,212)</b>
Operating Margin (%)	8.0%	7.9%	10.1%	15.2%	<b>11.0%</b>	11.3%	10.8%	8.8%	10.0%	<b>10.1%</b>	11.2%	5.4%	2.3%	-8.0%	<b>3.5%</b>	-23.7%	-11.5%	-18.0%	-20.4%	<b>-18.1%</b>	-7.7%	-6.3%	-6.6%	-6.1%	<b>-6.9%</b>	<b>-2.0%</b>
Incremental OPM (%)	66%	2%	15%	37%	<b>NM</b>	-501%	0%	-1%	14%	<b>9%</b>	5%	-115%	-126%	-38%	<b>-74%</b>	-8%	69%	-18%	7%	<b>NM</b>	22%	16%	-2%	-7%	<b>NM</b>	<b>NM</b>
Net interest income (Exp)	(21,645)	(24,307)	(23,533)	(24,218)	<b>(83,703)</b>	(22,585)	(22,653)	(23,059)	(23,530)	<b>(91,827)</b>	(30,334)	(32,500)	(35,700)	(37,400)	<b>(135,934)</b>	(32,200)	(35,913)	(36,036)	(35,804)	<b>(139,953)</b>	(35,515)	(36,133)	(40,399)	(40,628)	<b>(152,675)</b>	<b>(178,350)</b>
Other Income (Exp)	6,376	14,984	6,698	(16,844)	<b>11,214</b>	(21,766)	(37,359)	(32,084)	(3,232)	<b>(94,441)</b>	(26,970)	(29,700)	(66,400)	(8,100)	<b>(131,170)</b>	29,200	-	-	-	<b>29,200</b>	(67,774)	(58,293)	(62,821)	(70,543)	<b>(256,430)</b>	<b>(209,561)</b>
Profit Before Taxes	9,874	15,942	30,716	47,561	<b>104,063</b>	22,170	6,519	10,613	67,626	<b>107,128</b>	40,895	(17,200)	(83,500)	(95,700)	<b>(155,985)</b>	(100,200)	(90,653)	(105,556)	(100,457)	<b>(396,956)</b>	(67,774)	(58,293)	(62,821)	(70,543)	<b>(256,430)</b>	<b>(209,561)</b>
Taxes	(0,078)	(0,168)	0,122	2,643	<b>2,519</b>	3,150	(5,194)	(2,739)	2,295	<b>(2,458)</b>	5,479	16,800	(50,500)	(19,000)	<b>(47,221)</b>	8,200	(10,878)	(12,057)	(12,055)	<b>(26,620)</b>	(8,133)	(6,995)	(7,538)	(8,465)	<b>(31,132)</b>	<b>(25,147)</b>
effective rate %	-0.8%	-1.1%	0.4%	5.6%	<b>2.4%</b>	14.2%	-79.2%	-25.8%	3.4%	<b>-2.3%</b>	13.4%	-97.7%	60.5%	19.9%	<b>30.4%</b>	-9.0%	12.0%	12.0%	12.0%	<b>6.7%</b>	12.0%	12.0%	12.0%	12.0%	<b>12.0%</b>	<b>12.0%</b>
Stock Based Compensation	4,000	4,200	2,800	1,600	<b>12,600</b>	3,000	6,000	3,200	4,400	<b>16,600</b>	3,700	3,400	3,300	2,100	<b>12,500</b>	2,800	3,500	3,500	3,500	<b>13,300</b>	3,750	3,750	3,750	3,750	<b>15,000</b>	<b>15,000</b>
Other After Tax	(4,166)	(1,936)	1,998	0,705	<b>(3,399)</b>	4,685	-	-	-	<b>4,685</b>	0,213	3,600	2,700	(58,100)	<b>(51,587)</b>	(4,700)	-	-	-	<b>(4,700)</b>	-	-	-	-	<b>-</b>	<b>-</b>
Dividend on Series A converts	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	<b>-</b>
Extraordinary Item	-	-	-	-	<b>-</b>	-	180,544	(22,915)	(322,204)	<b>(164,665)</b>	-	225,700	608,600	-	<b>834,300</b>	16,320	-	-	150,000	<b>166,320</b>	-	-	-	-	<b>-</b>	<b>-</b>
<b>Net Income-Ops</b>	5,796	14,174	32,592	45,623	<b>98,175</b>	23,705	11,683	13,352	65,531	<b>114,271</b>	35,629	(30,400)	(30,300)	(134,800)	<b>(199,871)</b>	(113,880)	(79,775)	(92,889)	(88,402)	<b>(374,946)</b>	(59,641)	(51,297)	(55,282)	(62,078)	<b>(228,298)</b>	<b>(184,414)</b>
Net Total Income	1,786	9,974	29,792	44,023	<b>85,575</b>	20,705	(174,861)	33,067	383,425	<b>262,336</b>	31,929	(259,500)	(642,200)	(136,900)	<b>(1,006,671)</b>	(133,000)	(83,275)	(96,389)	(241,902)	<b>(564,566)</b>	(63,391)	(55,047)	(59,032)	(65,828)	<b>(243,298)</b>	<b>(199,414)</b>
EPS-Ops (exc SBC)	\$ 0.04	\$ 0.08	\$ 0.18	\$ 0.25	<b>\$ 0.57</b>	\$ 0.13	\$ 0.07	\$ 0.07	\$ 0.33	<b>\$ 0.62</b>	\$ 0.20	\$ (0.17)	\$ (0.17)	\$ (0.75)	<b>\$ (0.88)</b>	\$ (0.63)	\$ (0.44)	\$ (0.50)	\$ (0.47)	<b>\$ (2.04)</b>	\$ (0.32)	\$ (0.27)	\$ (0.29)	\$ (0.32)	<b>\$ (1.21)</b>	<b>\$ (0.95)</b>
Total EPS	\$ 0.01	\$ 0.06	\$ 0.16	\$ 0.27	<b>\$ 0.50</b>	\$ 0.11	\$ (0.97)	\$ 0.18	\$ 1.08	<b>\$ 1.49</b>	\$ 0.17	\$ (1.44)	\$ (3.56)	\$ (0.76)	<b>\$ (5.56)</b>	\$ (0.73)	\$ (0.46)	\$ (0.52)	\$ (1.30)	<b>\$ (3.80)</b>	\$ (0.34)	\$ (0.29)	\$ (0.31)	\$ (0.34)	<b>\$ (1.28)</b>	<b>\$ (1.02)</b>
Shares Outstanding (basic)	155,881	164,483	178,917	179,047	<b>169,672</b>	179,299	179,598	179,598	179,635	<b>179,582</b>	180,153	180,394	180,552	180,688	<b>180,447</b>	180,964	183,679	186,434	189,231	<b>185,077</b>	188,203	191,028	193,891	196,800	<b>192,400</b>	<b>200,179</b>
Shares Outstanding (fully diluted)	156,795	172,011	182,139	182,323	<b>172,491</b>	182,268	179,598	181,262	196,053	<b>184,796</b>	182,467	180,394	180,552	180,688	<b>181,025</b>	180,964	182,864	184,785	186,725	<b>183,835</b>	186,393	188,350	190,328	192,327	<b>189,350</b>	<b>196,300</b>
<b>Year Weighted Shares</b>					<b>173,467</b>					<b>184,796</b>					<b>181,025</b>					<b>183,835</b>					<b>189,350</b>	<b>196,300</b>
<b>TTM EPS Ops (inc SBC)</b>	\$ 0.23	\$ (0.02)	\$ (0.11)	\$ 0.50	<b>\$ 1.04</b>	\$ 0.57	\$ 0.47	\$ 0.43	\$ 0.50	<b>\$ 1.17</b>	\$ 0.38	\$ 0.14	\$ (0.53)	\$ 0.50	<b>\$ 1.17</b>	\$ 0.94	\$ (2.81)	\$ (2.57)	\$ (2.11)	<b>\$ (3.47)</b>	\$ (3.24)	\$ (3.05)	\$ (2.69)	\$ (2.69)	<b>\$ 1.56</b>	<b>\$ 1.56</b>
<b>TTM Revenue</b>	1,804.7	1,645.4	1,524.1	1,693.3	<b>\$ 3,338.1</b>	2,269.9	2,540.5	2,901.9	2,901.9	<b>\$ 5,467.7</b>	3,396.5	3,462.6	5,171.4	5,171.4	<b>\$ 5,467.7</b>	4,994.8	4,655.0	4,414.0	1,584.6	<b>\$ 4,994.8</b>	2,706.1	2,672.9	2,697.9	2,697.9	<b>\$ 1,566.5</b>	<b>\$ 1,566.5</b>
<b>EPS-Ops (inc SBC)</b>	\$ 0.01	\$ 0.06	\$ 0.16	\$ 0.27	<b>\$ 0.50</b>	\$ 0.11	\$ (0.97)	\$ 0.18	\$ 1.08	<b>\$ 1.49</b>	\$ 0.17	\$ (1.44)	\$ (3.56)	\$ (0.76)	<b>\$ (5.56)</b>	\$ (0.73)	\$ (0.46)	\$ (0.52)	\$ (1.30)	<b>\$ (3.80)</b>	\$ (0.34)	\$ (0.29)	\$ (0.31)	\$ (0.34)	<b>\$ (1.28)</b>	<b>\$ (1.02)</b>
Interest add-back for converts dilution from converts	4,472	4,453	4,567	4,331	<b>17,823</b>	3,816	-	5,596	4,298	<b>13,710</b>	3,852	-	-	-	<b>3,852</b>	-	-	-	-	<b>15,172</b>	-	-	-	-	<b>15,172</b>	<b>15,172</b>
<b>Statistical</b>					<b>19,675</b>	15,172	15,172	15,172	15,172	<b>15,172</b>	15,172	15,172	15,172	15,172	<b>15,172</b>	15,172	15,172	15,172	15,172	<b>15,172</b>	15,172	2,778	2,778	2,778	2,778	<b>2,778</b>
Capex	60,900	20,900	25,400	35,400	<b>142,600</b>	72,400	92,600	137,000	33,600	<b>335,600</b>	128,500	119,900	80,800	37,600	<b>368,800</b>	22,600	28,200	23,200	19,029	<b>93,109</b>	29,21	24,76	23,95	31,03	<b>106,955</b>	<b>106,649</b>
Capex, % Sales	19.3%	6.5%	5.4%	6.1%	<b>8.4%</b>	12.3%	14.8%	18.4%	3.6%	<b>11.6%</b>	14.7%	14.4%	10.0%	6.0%	<b>11.7%</b>	5.5%	6.0%	6.0%	6.0%	<b>5.9%</b>	7.0%	7.0%	7.0%	7.0%	<b>7.0%</b>	<b>7.0%</b>
Capex/W	\$0.01	\$0.01	\$0.01	\$0.01	<b>\$0.01</b>	\$0.00	\$0.02	\$0.35	\$0.06	<b>\$0.09</b>	\$0.69	\$0.69	\$0.69	\$0.69	<b>\$0.69</b>	\$0.00	\$1.90	\$1.55	\$(0.25)	<b>\$1.90</b>	\$1.90	\$1.90	\$1.90	\$1.90	<b>\$1.90</b>	<b>\$1.90</b>
Depreciation & Amortization	15,300	14,400	15,700	16,400	<b>61,800</b>	22,295	22,295	22,295	22,295	<b>89,180</b>	38,200	31,600	36,700	35,100	<b>141,600</b>	39,400	32,450	32,450	32,450	<b>136,751</b>	33,403	33,403	33,403	33,403	<b>133,971</b>	<b>131,439</b>

Source: Citi Research

Units in \$mm unless noted

Figure 152. STP balance sheet

	2009				2010				2011				2012				2013				2014			
FYE: Dec	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1A	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b><u>Assets</u></b>																								
Cash & Securities	406.00	760.54	655.74	833.16	677.16	765.60	946.22	872.47	782.59	648.20	458.40	492.40	473.70	398.13	375.18	583.52	406.72	420.47	384.71	236.61	589.09	604.24	573.99	447.05
Restricted Cash	179.13	180.37	158.41	204.88	162.76	82.21	153.51	142.53	118.15	119.70	109.30	216.60	190.10	190.10	190.10	190.10	190.10	190.10	190.10	190.10	190.10	190.10	190.10	190.10
Short-term investments	0.00	0.00	200.00	128.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Accounts Receivables	265.35	292.15	230.19	344.42	404.97	443.72	515.80	475.40	515.80	462.75	499.50	409.50	342.13	297.40	321.63	279.40	321.63	279.40	321.63	340.90	342.95	317.37	268.75	268.75
Inventories	242.69	269.71	284.55	280.05	314.12	355.55	447.37	558.23	550.19	571.40	696.30	516.50	508.40	389.22	306.20	267.96	354.90	296.23	287.43	373.12	322.35	267.14	261.22	339.11
Prepaid expenses and other current assets	413.09	333.05	376.83	332.66	377.58	394.32	417.23	325.23	401.78	354.80	370.00	397.50	402.30	402.30	402.30	402.30	402.30	402.30	402.30	402.30	402.30	402.30	402.30	402.30
<b>Total Current Assets</b>	<b>1,506.26</b>	<b>1,835.81</b>	<b>2,095.92</b>	<b>2,155.99</b>	<b>1,999.25</b>	<b>2,028.64</b>	<b>2,408.05</b>	<b>2,414.32</b>	<b>2,568.31</b>	<b>2,556.80</b>	<b>2,419.10</b>	<b>2,098.30</b>	<b>1,984.00</b>	<b>1,742.06</b>	<b>1,571.47</b>	<b>1,687.83</b>	<b>1,675.05</b>	<b>1,581.19</b>	<b>1,527.74</b>	<b>1,543.11</b>	<b>1,821.21</b>	<b>1,732.53</b>	<b>1,692.49</b>	<b>1,721.51</b>
<b><u>Restricted Cash</u></b>																								
Net PP&E	720.82	733.68	766.51	777.58	816.56	846.72	1,004.37	1,326.22	1,420.34	1,523.90	1,538.10	1,509.20	1,539.20	1,535.01	1,525.78	1,512.36	1,508.08	1,499.35	1,489.81	1,487.34	1,483.36	1,474.96	1,466.20	1,464.55
Net Goodwill	80.93	83.57	87.99	86.06	84.21	85.33	91.26	251.63	278.05	280.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Intangible Assets, Net	163.62	165.22	172.38	166.69	162.69	171.84	179.42	214.59	145.86	147.80	24.60	23.00	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10
Long-term prepaids	195.35	181.99	174.49	188.09	187.40	184.62	203.50	213.84	212.84	128.00	172.30	185.10	154.40	154.40	154.40	154.40	154.40	154.40	154.40	154.40	154.40	154.40	154.40	154.40
Other long-term assets	602.01	591.24	602.03	609.26	673.19	557.49	585.95	793.78	555.52	728.60	737.80	672.00	679.90	679.90	679.90	679.90	679.90	679.90	679.90	679.90	679.90	679.90	679.90	679.90
<b>Total Assets</b>	<b>\$3,268.99</b>	<b>\$3,921.51</b>	<b>\$3,899.33</b>	<b>\$3,963.66</b>	<b>\$3,923.30</b>	<b>\$3,874.54</b>	<b>\$4,072.55</b>	<b>\$5,214.38</b>	<b>\$5,480.91</b>	<b>\$5,465.40</b>	<b>\$4,891.90</b>	<b>\$4,549.60</b>	<b>\$4,378.60</b>	<b>\$4,132.47</b>	<b>\$3,952.65</b>	<b>\$3,655.59</b>	<b>\$3,638.53</b>	<b>\$3,535.94</b>	<b>\$3,472.95</b>	<b>\$3,485.85</b>	<b>\$3,759.97</b>	<b>\$3,662.89</b>	<b>\$3,614.09</b>	<b>\$3,641.46</b>
<b><u>Liab. &amp; Shareholders' Equity</u></b>																								
Short-Term Debt	1,031.05	1,021.61	1,067.16	1,024.37	839.76	943.33	1,424.63	1,401.18	1,630.81	1,659.50	1,586.40	1,562.40	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90	2,085.90
Accounts Payable	153.38	120.13	196.78	264.24	384.32	366.10	394.59	456.97	474.23	521.20	632.00	542.90	579.90	413.55	326.61	267.96	310.53	259.20	251.50	326.48	300.86	249.33	243.81	316.50
Accrued Liabilities	228.89	178.61	216.44	229.47	213.26	229.49	617.54	487.52	484.22	579.00	545.00	476.20	442.10	442.10	442.10	442.10	442.10	442.10	442.10	442.10	442.10	442.10	442.10	442.10
Current portion of customer advances	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Current Liabilities</b>	<b>1,413.32</b>	<b>1,320.35</b>	<b>1,480.38</b>	<b>1,518.08</b>	<b>1,437.34</b>	<b>1,538.92</b>	<b>2,036.76</b>	<b>2,345.68</b>	<b>2,589.26</b>	<b>2,769.70</b>	<b>2,763.40</b>	<b>2,581.50</b>	<b>3,107.90</b>	<b>2,941.55</b>	<b>2,854.61</b>	<b>2,795.96</b>	<b>2,838.53</b>	<b>2,777.50</b>	<b>2,269.80</b>	<b>2,344.78</b>	<b>2,319.16</b>	<b>2,267.63</b>	<b>2,262.11</b>	<b>2,334.80</b>
Long-Term Debt	464.45	589.92	646.04	654.93	656.67	674.48	702.84	714.49	758.14	766.00	783.70	742.10	177.70	177.70	177.70	177.70	177.70	687.44	687.44	687.44	1,037.44	1,037.44	1,037.44	1,037.44
Deferred Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Liabilities	162.89	161.07	206.70	197.88	198.84	189.31	251.25	248.62	233.93	237.80	254.70	281.40	289.80	289.80	289.80	289.80	289.80	289.80	289.80	289.80	289.80	289.80	289.80	289.80
<b>Total Liabilities</b>	<b>2,048.64</b>	<b>2,071.24</b>	<b>2,333.12</b>	<b>2,370.90</b>	<b>2,295.85</b>	<b>2,402.71</b>	<b>2,990.84</b>	<b>3,362.79</b>	<b>3,581.34</b>	<b>3,773.50</b>	<b>3,580.10</b>	<b>3,364.90</b>	<b>3,575.83</b>	<b>3,224.74</b>	<b>3,119.11</b>	<b>3,264.66</b>	<b>3,306.43</b>	<b>3,254.74</b>	<b>2,949.04</b>	<b>3,322.02</b>	<b>3,446.40</b>	<b>3,589.34</b>	<b>3,584.83</b>	<b>3,664.03</b>
Minority Interest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shareholders' Equity	1,228.33	1,520.18	1,566.21	1,612.76	1,630.40	1,471.83	1,481.71	1,905.59	1,899.58	1,661.90	1,090.10	964.70	803.20	723.43	630.54	392.13	332.49	281.20	225.91	163.84	113.57	68.03	24.75	20.46
<b>Total Liab. and Equity</b>	<b>\$3,268.99</b>	<b>\$3,591.51</b>	<b>\$3,899.33</b>	<b>\$3,963.66</b>	<b>\$3,923.30</b>	<b>\$3,874.54</b>	<b>\$4,072.55</b>	<b>\$5,214.38</b>	<b>\$5,480.91</b>	<b>\$5,465.40</b>	<b>\$4,891.90</b>	<b>\$4,549.60</b>	<b>\$4,378.60</b>	<b>\$4,132.47</b>	<b>\$3,952.65</b>	<b>\$3,655.59</b>	<b>\$3,638.53</b>	<b>\$3,535.94</b>	<b>\$3,472.95</b>	<b>\$3,485.85</b>	<b>\$3,759.97</b>	<b>\$3,662.89</b>	<b>\$3,614.09</b>	<b>\$3,641.46</b>

Figure 153. STP rolling 12M P&L

FYE: Dec	2009					2010					2011					2012					2013					2014					
	Q1A	Q2A	Q3A	Q4A	FY09A	Q1A	Q2A	Q3A	Q4A	FY10A	Q1A	Q2A	Q3A	Q4A	FY11A	Q1A	Q2E	Q3E	Q4E	FY12E	Q1E	Q2E	Q3E	Q4E	FY13E	Q1E	Q2E	Q3E	Q4E	FY14E	
Total Revenues	315.7	321.0	473.1	583.6	1,693.3	588.0	625.1	743.7	945.1	2,901.9	877.0	830.7	809.8	629.0	3,146.5	409.5	471.0	387.0	317.1	1,584.6	417.3	353.7	342.2	443.3	1,556.5	412.6	349.4	344.3	445.8	1,552.1	
Sequential Change	(23.8%)	1.7%	47.4%	23.4%		0.8%	6.3%	19.0%	27.1%		(7.2%)	(5.3%)	(2.5%)	(22.3%)		(34.9%)	15.0%	(17.8%)	(18.0%)		31.6%	(15.2%)	(3.3%)	29.5%		(6.9%)	(15.3%)	(1.4%)	29.5%		
Yr to Yr Change	(27.4%)	(33.2%)	(20.4%)	40.8%	(12.0%)	86.3%	94.8%	57.2%	61.9%	71.4%	49.1%	32.9%	8.9%	(33.4%)	8.4%	(53.3%)	(43.3%)	(52.2%)	(49.6%)	(49.6%)	1.9%	(24.9%)	(11.6%)	39.8%	(1.8%)	(1.1%)	(1.2%)	0.6%	0.6%	(0.3%)	
Cost of Goods	258.0	259.8	388.1	444.4	1,350.2	472.4	509.2	620.5	790.1	2,392.3	708.8	703.9	680.6	566.0	2,659.4	386.9	442.7	371.5	304.8	1,506.0	403.7	337.0	326.9	424.4	1,492.0	391.1	324.1	317.0	411.4	1,443.7	
% of Revenue	81.7%	80.9%	82.0%	76.1%	79.7%	80.3%	81.5%	83.4%	83.6%	82.4%	80.8%	84.7%	84.1%	90.0%	84.5%	94.5%	94.0%	96.0%	96.1%	95.0%	96.7%	95.3%	95.6%	95.7%	95.9%	94.8%	92.8%	92.0%	92.3%	93.0%	
Gross Margin	57.7	61.2	85.1	139.3	343.2	115.6	116.0	123.2	154.9	509.6	168.2	126.8	129.2	63.0	487.1	22.6	28.3	15.5	12.3	78.7	13.6	16.7	15.2	18.8	64.5	21.5	25.2	27.4	34.4	108.5	
% of Revenue	18.3%	19.1%	18.0%	23.9%	20.3%	19.7%	18.5%	16.6%	16.4%	17.6%	19.2%	15.3%	15.9%	10.0%	15.5%	5.5%	6.0%	4.0%	3.9%	5.0%	3.3%	4.7%	4.4%	4.3%	4.1%	5.2%	7.2%	8.0%	7.7%	7.0%	
R&D	3.9	3.3	6.1	12.6	25.9	8.8	7.3	11.1	8.9	36.1	9.3	7.9	10.9	7.5	35.5	8.2	8.0	7.0	7.0	30.2	4.2	3.5	3.4	4.4	15.6	4.1	3.5	3.4	4.5	15.5	
% of Revenue	1.2%	1.0%	1.3%	2.2%	1.5%	1.5%	1.2%	1.5%	0.9%	1.2%	1.1%	0.9%	1.3%	1.2%	1.1%	2.0%	1.7%	1.8%	2.2%	1.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	
SG&A	28.6	32.6	31.5	38.0	130.7	40.3	42.1	46.3	51.5	180.2	60.6	73.9	99.7	105.8	340.0	111.6	75.0	78.0	70.0	334.6	41.7	35.4	34.2	44.3	155.6	33.0	28.0	27.5	35.7	124.2	
% of Revenue	9.1%	10.2%	6.6%	6.5%	7.7%	6.8%	6.7%	6.2%	5.4%	6.2%	6.9%	8.9%	12.3%	16.8%	10.8%	27.2%	15.9%	20.2%	22.1%	21.1%	10.0%	10.0%	10.0%	10.0%	10.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
Operating Margin	25.1	25.3	47.6	88.6	186.6	66.5	66.5	65.8	94.6	293.4	98.2	45.0	18.6	(50.2)	111.6	(97.2)	(54.7)	(69.5)	(64.7)	(286.1)	(32.3)	(22.2)	(22.4)	(29.9)	(106.8)	(15.7)	(6.2)	(3.6)	(5.7)	(31.2)	
% of Revenue	8.0%	7.9%	10.1%	15.2%	11.0%	11.3%	10.6%	8.8%	10.0%	10.1%	11.2%	5.4%	2.3%	(8.0%)	3.5%	(23.7%)	(11.6%)	(18.0%)	(20.4%)	(18.1%)	(7.7%)	(6.3%)	(6.6%)	(6.7%)	(6.9%)	(3.8%)	(1.8%)	(1.0%)	(1.3%)	(2.0%)	
Other Income (Exp)	(21.6)	(24.3)	(23.5)	(24.2)	(93.7)	(22.6)	(22.7)	(23.1)	(23.5)	(91.8)	(30.3)	(32.5)	(35.7)	(37.4)	(135.9)	(32.2)	(35.9)	(36.0)	(35.8)	(140.0)	(35.5)	(36.1)	(40.4)	(40.6)	(152.7)	(41.4)	(45.6)	(45.6)	(45.8)	(178.4)	
% of Revenue	(6.9%)	(7.6%)	(5.0%)	(4.1%)	(5.5%)	(3.8%)	(3.6%)	(3.1%)	(2.5%)	(3.2%)	(3.5%)	(3.9%)	(4.4%)	(5.9%)	(4.3%)	(7.9%)	(7.6%)	(9.3%)	(11.3%)	(8.8%)	(8.5%)	(10.2%)	(11.8%)	(9.2%)	(9.8%)	(10.0%)	(13.0%)	(10.3%)	(11.5%)	(11.5%)	
Profit Before Taxes	9.9	15.9	30.7	47.6	104.1	22.2	6.5	10.6	67.8	107.1	40.9	(17.2)	(83.5)	(95.7)	(155.5)	(100.2)	(90.7)	(105.6)	(100.5)	(396.9)	(67.8)	(58.3)	(62.8)	(70.5)	(259.4)	(57.1)	(51.8)	(49.2)	(51.5)	(209.6)	
% of Revenue	3.1%	5.0%	6.5%	8.1%	6.1%	3.8%	1.0%	1.4%	7.2%	3.7%	4.7%	(2.1%)	(10.3%)	(15.2%)	(4.9%)	(24.5%)	(19.2%)	(27.3%)	(31.7%)	(25.0%)	(16.2%)	(16.5%)	(18.4%)	(15.9%)	(16.7%)	(13.8%)	(14.8%)	(14.3%)	(11.6%)	(13.5%)	
Taxes	(0.1)	(0.2)	0.1	2.6	2.5	3.2	(5.2)	(2.7)	2.3	(2.5)	5.5	16.8	(50.5)	(19.0)	(47.2)	9.0	(10.9)	(12.7)	(12.1)	(26.6)	(8.1)	(7.0)	(7.5)	(8.5)	(31.1)	(6.9)	(6.2)	(5.9)	(6.2)	(25.1)	
Tax Rate	-0.8%	-1.1%	0.4%	5.6%	2.4%	14.2%	-79.2%	-25.8%	3.4%	-2.3%	13.4%	-97.7%	60.5%	19.9%	30.4%	-9.0%	12.0%	12.0%	12.0%	6.7%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Extraordinary Item	0.0	0.0	0.0	0.0	0.0	0.0	180.5	(22.9)	(322.3)	(164.7)	0.0	225.7	608.6	0.0	834.3	16.3	0.0	0.0	150.0	166.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income-Ops	5.8	14.2	32.6	45.6	98.2	23.7	11.7	13.4	65.5	114.3	35.6	(30.4)	(30.3)	(134.8)	(159.9)	(113.9)	(79.8)	(92.9)	(88.4)	(374.9)	(59.6)	(51.3)	(55.3)	(62.1)	(228.3)	(50.3)	(45.5)	(43.3)	(45.3)	(184.4)	
% of Revenue	1.8%	4.4%	6.9%	7.8%	5.8%	4.0%	1.9%	1.8%	6.9%	3.9%	4.1%	(3.7%)	(3.7%)	(21.4%)	(5.1%)	(27.8%)	(16.9%)	(24.0%)	(27.9%)	(23.7%)	(14.3%)	(14.5%)	(16.2%)	(14.0%)	(14.7%)	(12.2%)	(13.0%)	(12.6%)	(10.2%)	(11.9%)	
Incremental OPM	66%					-501%					5%					-8%					22%					8%					
Sequential Change	NM	145.0%	129.9%	40.0%		(48.0%)	(30.7%)	14.3%	390.8%		(45.6%)	NM	0.3%	(344.9%)		15.5%	29.9%	(16.4%)	4.8%		32.5%	14.0%	(7.8%)	(12.3%)		19.0%	9.4%	5.0%	(4.7%)		
Yr to Yr Change	(88.7%)	(74.9%)	(30.0%)	NM	(6.0%)	309.7%	(17.6%)	(59.0%)	45.6%	16.4%	50.3%	NM	NM	NM	NM	NM	(162.4%)	(206.6%)	34.4%	(134.5%)	47.6%	35.7%	40.5%	29.8%	39.1%	15.7%	11.2%	21.7%	27.0%	19.2%	
Total Net Income	1.8	10.0	29.8	44.0	85.6	20.7	(174.9)	33.1	383.4	262.3	31.9	(259.5)	(642.2)	(136.9)	(1,006.7)	(133.0)	(83.3)	(96.4)	(241.9)	(554.6)	(63.4)	(55.0)	(59.0)	(65.8)	(243.3)	(54.0)	(49.3)	(47.0)	(49.1)	(199.4)	
% of Revenue	0.6%	3.1%	6.3%	7.5%	5.1%	3.5%	(28.0%)	4.4%	40.6%	9.0%	3.6%	(31.2%)	(79.3%)	(21.8%)	(32.0%)	(32.5%)	(17.7%)	(24.9%)	(76.3%)	(35.0%)	(15.2%)	(15.6%)	(17.3%)	(14.9%)	(15.6%)	(13.1%)	(14.1%)	(13.7%)	(11.0%)	(12.8%)	
Sequential Change	NM	458.5%	198.7%	47.8%		(53.0%)	NM	NM	1059.5%		(91.7%)	NM	(147.5%)	78.7%		2.8%	37.4%	(15.7%)	(151.0%)		73.8%	13.2%	(7.2%)	(11.5%)		17.9%	8.7%	4.6%	(4.4%)		
Yr to Yr Change	(96.2%)	(80.9%)	(30.1%)	NM	(3.0%)	1059.3%	NM	11.0%	771.0%	206.6%	54.2%	(48.4%)	NM	NM	NM	NM	67.9%	85.0%	(76.7%)	44.9%	52.3%	33.9%	38.8%	72.8%	56.1%	14.8%	10.4%	20.3%	25.4%	18.0%	
EPS-Ops (exc SBC)	\$ 0.04	\$ 0.08	\$ 0.18	\$ 0.25	\$ 0.57	\$ 0.13	\$ 0.07	\$ 0.07	\$ 0.33	\$ 0.62	\$ 0.20	\$ (0.17)	\$ (0.17)	\$ (0.75)	\$ (0.88)	\$ (0.63)	\$ (0.44)	\$ (0.50)	\$ (0.47)	\$ (2.04)	\$ (0.32)	\$ (0.27)	\$ (0.29)	\$ (0.32)	\$ (1.21)	\$ (0.26)	\$ (0.23)	\$ (0.22)	\$ (0.23)	\$ (0.95)	
Sequential Change	NM	122.5%	117.9%	39.8%		(48.0%)	(50.0%)	13.2%	353.8%		(41.6%)	NM	0.4%	(344.5%)		15.6%	30.7%	(15.2%)	5.8%		32.4%	14.9%	(6.6%)	(11.1%)		18.9%	10.3%	6.0%	(3.7%)		
Yr to Yr Change	(87.4%)	(73.1%)	(28.7%)	(178.5%)	(12.6%)	252.4%	(20.8%)	(58.8%)	33.6%	8.6%	50.1%	(359.1%)	(327.8%)	(323.2%)	NM	NM	158.9%	199.5%	(36.5%)	(130.9%)	49.2%	(37.6%)	(42.2%)	(31.8%)	40.9%	18.2%	(13.8%)	(24.0%)	(29.1%)	21.6%	
EPS-Ops (inc SBC)	\$0.01	\$0.06	\$0.16	\$0.27	\$0.50	\$0.11	\$0.03	\$0.06	\$0.33	\$0.60	\$0.17	\$ (0.19)	\$ (0.19)	\$ (0.76)	\$ (0.95)	\$ (0.64)	\$ (0.46)	\$ (0.52)	\$ (0.49)	\$ (2.11)	\$ (0.34)	\$ (0.29)	\$ (0.31)	\$ (0.34)	\$ (1.28)	\$ (0.28)	\$ (0.25)	\$ (0.24)	\$ (0.25)	\$ (1.02)	
Total EPS	\$ 0.01	\$ 0.06	\$ 0.16	\$ 0.27	\$ 0.50	\$ 0.11	\$ (0.97)	\$ 0.18	\$ 1.98	\$ 1.49	\$ 0.17	\$ (1.44)	\$ (3.56)	\$ (0.76)	\$ (5.56)	\$ (0.73)	\$ (0.46)	\$ (0.52)	\$ (1.30)	\$ (3.02)	\$ (0.34)	\$ (0.29)	\$ (0.31)	\$ (0.34)	\$ (1.28)	\$ (0.28)	\$ (0.25)	\$ (0.24)	\$ (0.25)	\$ (1.02)	
Sequential Change	NM	407.3%	183.1%	62.1%		(57.2%)	NM	NM	984.1%		(91.2%)	NM	(147.3%)	78.7%		3.0%	38.0%	(14.5%)	(148.4%)		73.7%	14.1%	(6.1%)	(10.4%)		17.8%	9.7%	5.6%	(3.3%)		
Yr to Yr Change	(95.9%)	(81.1%)	(35.4%)	NM	(9.8%)	897.3%	NM	11.5%	645.7%	201.1%	54.0%	(47.7%)	NM	NM	NM	NM	68.3%	85.3%	(71.0%)	45.8%	53.7%	35.8%	40.5%	73.6%	57.4%	17.3%	13.1%	22.7%	27.6%	20.4%	
Com & Equiv Sh	156.8	172.6	182.1	182.3	172.5	182.3	179.6	181.3	196.1	184.8	182.5	180.4	180.6	180.7	181.0	181.0	182.9	184.8	186.7	183.8	186.4	188.4	190.3	192.3	189.3	192.0	194.0	196.0	198.1	195.0	

Source: Citi Research

Units in \$mm unless noted

## Company Focus

- Company Update
- Initiation of Coverage

Shahriar (Shar) Pourreza, CFA

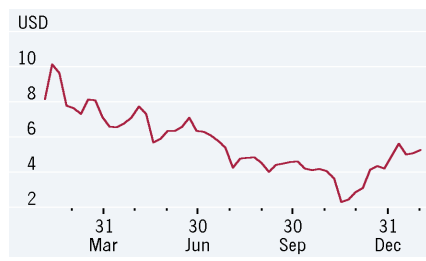
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<b>Neutral/High Risk</b>	<b>2H</b>
Price (01 Feb 13)	US\$5.28
Target price	US\$6.00
Expected share price return	13.6%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>13.6%</b>
Market Cap	US\$430M

### Price Performance

(RIC: TSL.N, BB: TSL US)



## Trina Solar (TSL)

### Improved Visibility Priced In – Launching With Neutral

- **Launching US coverage of TSL with a Neutral (2H) rating** — We are initiating research coverage of TSL with a Neutral/High Risk (2H) rating and \$6 target price. As one of the higher quality panel manufacturer in China, TSL is greatly leveraged to a recovery as the sector works off excess inventory over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$6 target price yields an ETR of 14% - supporting our stance.
- **More defined focus on shifting further downstream a positive but prelim** — Management has laid out an ambitious plan of shifting more resources further downstream and sees ~20% of 2013 revenues sourced from Systems (~500MW). While we view this as the correct path to take in light of the sectors structural and cyclical issues, the MW target may be ambitious - we assume ~100MW in downstream projects in 2013 with a more material jump in 2014.
- **Well diversified and growing in key regions** — TSL, regionally, is one of the more diversified China-based pure play panel manufacturer with expanding exposure in sustainable growth markets including China, India, US and Australia.
- **Relatively speaking, balance sheet management better than pure play peers** — This is reflected in key metrics as well as near term obligations which tend to be less of an issue for TSL vs. other Chinese panel manufacturer peers.
- **New EPS outlook** — Our new 2012/2013/2014 EPS estimate is (\$2.14)/ (\$1.55)/ (\$0.81). The improvement YoY is primarily driven by: (1) further non Poly cost reductions, (2) increased shipments, (3) business mix shifting further downstream and, (4) stabilization/improvement in margins. That said, we forecast a relatively benign gross margin environment through our forecast period.
- **Too early to change stance on pure play manufactures despite some improvement in visibility** — The panel manufacturers have seen a material bounce in performance over the past month - attributed to: (1) a risk-on mentality and (2) investor perception surrounding a potential bottoming of fundamentals. Much of this relates to news coming out of China on the Golden Sun program and a 10GW solar installation target for 2013 – double the prior goal. While this certainly improves the outlook for solar, we caution investors not to buy into what we consider an overzealous rally for 3 reasons: (1) China has not disclosed any details on how they will achieve their 10GW target for 2013, (2) Incentives like Golden Sun program in China are not new and despite having these incentives already in place, project installations are occurring much slower than anticipated – for a multitude of reasons and (3) we aren't convinced that improved fundamentals in China will offset the headwinds we are seeing globally. While we agree visibility has improved modestly, we believe TSL's 25% move over the 3 months prices in this notion. We look for more concrete signs of improvement before changing our stance on the pure play manufacturers. For now, we remain on the sidelines.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2011A	0.62A	0.17A	-0.45A	-0.59A	-0.18A	-0.54A
2012E	-0.11A	-0.30A	-0.78A	-0.94E	-2.14E	-3.27E
Previous	na	na	na	na	na	na
2013E	-0.57E	-0.36E	-0.34E	-0.28E	-1.55E	-2.04E
Previous	na	na	na	na	na	na
2014E	na	na	na	na	-0.81E	-1.10E
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## Potentially Improved Visibility Priced In – Launching With Neutral

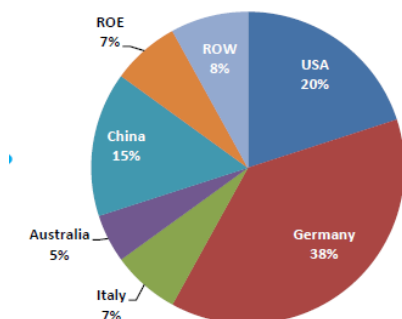
We are initiating research coverage of TSL with a Neutral (2H) rating and \$6 target price. As one of the higher quality panel manufacturer in China, TSL is greatly leveraged to a recovery as the sector works off excess inventory over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$6 target price yields an ETR of 14% - supporting our stance.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

### Why we remain on the sidelines?

- Given the structural and cyclical changes going on in the solar space, our sector tilt favors downstream players versus the upstream manufactures. TSL still remains mostly a pure play panel manufacturer with a goal of shifting further downstream – very prelim stage.
  - TSL's focus of shifting more resources downstream shows promise but management MW/revenue target seems very ambitious (i.e. 20% of consolidated revenue from project business or ~4-500MW in 2013).
  - We assume ~100MW in downstream activity with a more material bump in 2014. See model assumptions in the following pages.
  - Note: the downstream project segment in China has much tighter margins versus other regions including US – per industry checks.
- Regional diversification is a strong attribute for TSL. That said, TSL still has heavy exposure to historical growth regions which now have a more tepid outlook for solar spending (i.e. Germany, Italy).
  - The focus on sustainable growth regions like Australia (5% of shipments), China (15% of shipments) and US (20% of shipments) will show promise but still prelim at this stage.
  - To effectively improve margins, management will need to continue to diversify away from the traditional growth regions and into sustainable markets.
  - For deep dive thoughts into the above market regions including S/D, LCOE and IRRs, industry sections above.
- It's not about volumes, show me the margins.
  - Gaining market share and increasing volumes has never been an issue (Chinese panel manufacturer's account for ~ 70% of the market). It's been about margins – which remain fairly depressed over our forecast period.
- From an efficiency, R&D, technology or cost structure standpoint, TSL doesn't have any visible advantages to similar pure play peers including YGE – its closest competitor. Same premise for product services and module ASPs (Average Selling Prices).
- Our \$6 target price yields an ETR of 14% - supporting our Neutral rating.

Figure 154. Regional mix



Source: Citi Research

**It's not about volumes, show me the margins**

## Background

Based in China, Trina Solar is a vertically integrated manufacturer of silicon-based solar modules for the photovoltaic (PV) industry. From ingot to module, Trina's manufacturing operations cover nearly every portion of the solar value chain while its growing systems business also provides direct exposure to the project development and installation segment. Trina markets its products in key solar regions across the globe including Germany, U.S., and China through wholesalers, distributors, as well as direct sales to PV system integrators primarily targeting applications in the traditional rooftop and ground-mount end markets.

## What can cause us to turn positive?

**The potential visible improvements we see in the industry are a good start but likely not enough – especially given the recent outperformance.** In our view, it's too early to change our cautious stance on pure play manufacturers despite some improvement in visibility. The panel manufacturers have seen a material bounce in performance over the past month. We mainly attribute this to: (1) a risk-on mentality that can revert quickly and (2) fresh investor perception surrounding a potential bottoming of industry fundamentals.

**Much of this improved perception relates to news coming out of China on the Golden Sun program and a 10GW solar installation target for 2013 – double the prior goal.** While this certainly improves the outlook for solar, we caution investors not to buy into what we consider an overzealous rally for 3 reasons: (1) China has not disclosed any details on how they will achieve their 10GW target for 2013, (2) Incentives like Golden Sun program in China are not new and despite having these incentives already in place, project installations are occurring much slower than anticipated – for a multitude of reasons and (3) we aren't convinced that improved fundamentals in China will offset the headwinds you are seeing globally. See industry section above for a discussion on China on page 34.

While we agree that visibility has improved modestly, we believe TSL's 20% move over the past month prices in this notion (see performance table on page 78). We look for more concrete signs of improvement before changing our stance on the pure play manufactures. For now, we remain on the sidelines.

**It's not about volumes, show me the margins.** For any of the pure play manufacturers, gaining market share and increasing volumes has never been an issue (Chinese panel manufacturer's account for ~ 70% of the market). It's been about margins – which remain fairly depressed over our forecast period. As we have stated, being one of the largest producers in a highly commoditized solar manufacturing space is a tough proposition, in our view.

With cash costs nearing a floor, TSL margin improvement will center on:

- Visible follow-through in China on the governments announced solar initiatives relative to stated targets and TSL's success in gaining market share there.
- TSL's strategy of successfully diversifying away from traditional growth regions like Germany and Italy into sustainable markets like China, India, US, India etc.
- The successful shifting of resources further downstream into the project realm which can also serve as a captive sales channel for TSL's panels.
  - The recent announced (1/14/2013) right to develop a 50MW solar project (grid connected) in Gansu province in China is a good start.

## We could turn positive

If we see visible signs of success with the above mentioned items, margins should begin to improve and we could revisit our thesis. For now, TSL remains a show me story. See below for our module assumptions including our ASP and cost curve outlook.

## Rating and valuation

**Our target price for TSL shares is \$6.00.** We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Incorporating a 0.8x EV/Sales multiple – consistent with TSL's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.4B yields an enterprise value of ~\$1.2B. Backing out 2013 net debt of ~\$741mm translates into a TSL equity value of \$422mm or \$6.00/share.

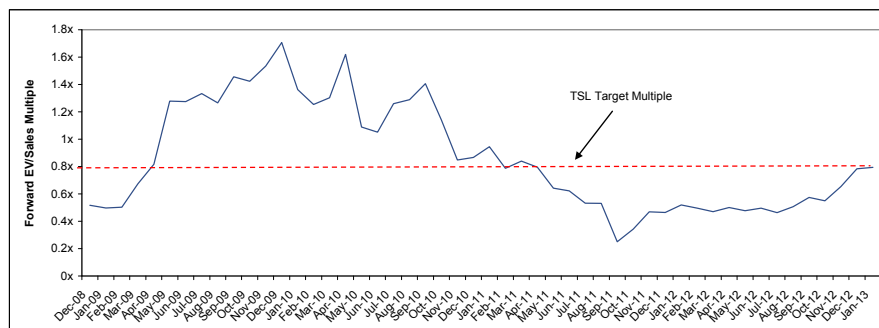
It is important to note that our EV/Sales target multiple for TSL is higher than the average comp for our globally diverse solar universe to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

Figure 155. TSL EV/Sales multiple valuation

a	2013 Sales (\$mm)	\$1,384.53
b	EV/Sales Multiple	0.8x
c = a * b	TSL Enterprise Value	\$1,163.00
d	2013 Net Debt (\$MM)	\$741.08
e	Minority Interest (\$MM)	\$0.20
f = c - d - e	TSL Equity Value (\$MM)	\$421.72
g = f / 72	<b>TSL Target Price</b>	<b>\$6</b>

Source: Citi Research

Figure 156. TSL EV/Sales



Source: Citi Research

## Earnings, cash flow and other key metrics

**Our new 2012/2013/2014 EPS estimate is (\$2.14)/ (\$1.55)/ (\$0.81).** The improvement YoY is primarily driven by: (1) further non Poly cost reductions, (2) increased shipments, (3) business mix shifting further downstream and, (4) stabilization/improvement in margins. That said, we forecast a relatively benign gross margin environment through our forecast period.

Figure 157. TSL: Citi vs. consensus

		Dec		Mar	Jun	Sept	Dec				
TSL		FQ4:12E	F2012E	FQ1:13E	FQ2:13E	FQ3:13E	FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev \$	271	\$1,265	\$416	\$355	\$304	\$310	\$1,385	\$1,686	Neutral	\$6.0
	EPS \$	(0.94)	(\$2.14)	(\$0.57)	(\$0.36)	(\$0.34)	(\$0.28)	(\$1.55)	(\$0.81)		
Consensus	Rev \$	272	\$1,268	\$271	\$309	\$343	\$359	\$1,294	NA	Neutral	\$4.3
	EPS \$	(0.81)	(\$3.39)	(\$0.70)	(\$0.60)	(\$0.48)	(\$0.52)	(\$2.07)	(\$1.30)		

Source: Citi Research



Figure 158. TSL model inputs and pricing data

	2010	1Q:11	2Q:11	3Q:11	4Q:11	2011	1Q:12	2Q:12	3Q:12	4Q:12E	2012 E	1Q:13E	2Q:13E	3Q:13E	4Q:13E	2013 E	1Q:14E	2Q:14E	3Q:14E	4Q:14E	2014 E
<b>MODULES</b>																					
ASP, \$/W	\$ 1.76	\$ 1.71	\$ 1.46	\$ 1.25	\$ 1.01	\$ 1.34	\$ 0.92	\$ 0.83	\$ 0.72	\$ 0.71	\$ 0.80	\$ 0.70	\$ 0.71	\$ 0.66	\$ 0.67	\$ 0.68	\$ 0.63	\$ 0.64	\$ 0.62	\$ 0.64	\$ 0.63
% Δ	(17%)	(6%)	(15%)	(14%)	(19%)	(24%)	(9%)	(9%)	(13%)	(1%)	(41%)	(2%)	1%	(7%)	2%	(14%)	(5%)	1%	(4%)	3%	(7%)
Shipments, MW	1,057	320	396	370	425	1,512	380	419	380	381	1,560	535	452	412	413	1,812	571	486	446	446	1,948
% Δ	165%	(9%)	24%	(7%)	15%	43%	(11%)	10%	(9%)	0%	3%	41%	(16%)	(9%)	0%	16%	38%	(15%)	(8%)	0%	8%
Revenue, \$MM	\$ 1,853	\$ 551	\$ 579	\$ 460	\$ 436	\$ 2,028	\$ 350	\$ 348	\$ 274	\$ 271	\$ 1,242	\$ 354	\$ 303	\$ 257	\$ 263	\$ 1,176	\$ 308	\$ 265	\$ 233	\$ 241	\$ 1,047
% Δ	119%	(14%)	5%	(21%)	(5%)	9%	(20%)	(1%)	(21%)	(1%)	(39%)	31%	(15%)	(15%)	2%	(5%)	17%	(14%)	(12%)	3%	(11%)
<b>SYSTEMS</b>																					
Wafer Cost, \$/W	\$ 0.70	\$ 0.75	\$ 0.71	\$ 0.65	\$ 0.47	\$ 0.64	\$ 0.37	\$ 0.30	\$ 0.35	\$ 0.34	\$ 0.34	\$ 0.31	\$ 0.31	\$ 0.29	\$ 0.29	\$ 0.30	\$ 0.28	\$ 0.28	\$ 0.28	\$ 0.28	\$ 0.28
Avg poly ASP, \$/kg	\$ 63	\$ 72	\$ 72	\$ 63	\$ 51	\$ 64	\$ 36	\$ 25	\$ 35	\$ 32	\$ 32	\$ 28	\$ 28	\$ 24	\$ 24	\$ 26	\$ 24	\$ 24	\$ 24	\$ 24	\$ 24
Ingot/wafering, \$/W	\$ 0.32	\$ 0.32	\$ 0.28	\$ 0.28	\$ 0.17	\$ 0.26	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14
Cell/module, \$/W	\$ 0.49	\$ 0.49	\$ 0.50	\$ 0.47	\$ 0.46	\$ 0.48	\$ 0.43	\$ 0.37	\$ 0.39	\$ 0.37	\$ 0.39	\$ 0.36	\$ 0.34	\$ 0.32	\$ 0.32	\$ 0.34	\$ 0.30	\$ 0.30	\$ 0.30	\$ 0.30	\$ 0.30
Total Cost, \$/W	\$ 1.20	\$ 1.24	\$ 1.21	\$ 1.12	\$ 0.93	\$ 1.12	\$ 0.80	\$ 0.67	\$ 0.74	\$ 0.71	\$ 0.73	\$ 0.67	\$ 0.65	\$ 0.61	\$ 0.61	\$ 0.64	\$ 0.58	\$ 0.58	\$ 0.58	\$ 0.58	\$ 0.58
% Δ	(21%)	(1%)	(2%)	(8%)	(17%)	(7%)	(15%)	(16%)	(12%)	(5%)	(35%)	(5%)	(3%)	(7%)	0%	(12%)	(5%)	0%	0%	0%	(9%)
GM, %	32%	27%	17%	11%	8%	11%	13%	20%	(3%)	1%	8%	4%	8%	7%	9%	7%	9%	10%	6%	9%	8%
<b>TOTAL TSL</b>																					
Revenue, \$MM	\$ 1,858	\$ 551	\$ 579	\$ 482	\$ 436	\$ 2,048	\$ 350	\$ 346	\$ 298	\$ 271	\$ 1,265	\$ 416	\$ 355	\$ 304	\$ 310	\$ 1,385	\$ 495	\$ 424	\$ 379	\$ 387	\$ 1,686
GM, %	31%	27%	17%	11%	8%	16%	13%	20%	(3%)	1%	8%	5%	9%	9%	10%	8%	12%	12%	10%	12%	11%
EPS	\$ 4.13	\$ 0.62	\$ 0.17	\$ (0.45)	\$ (0.59)	\$ (0.18)	\$ (0.11)	\$ (0.30)	\$ (0.78)	\$ (0.94)	\$ (2.14)	\$ (0.57)	\$ (0.36)	\$ (0.34)	\$ (0.28)	\$ (1.55)	\$ (0.20)	\$ (0.16)	\$ (0.27)	\$ (0.18)	\$ (0.81)

Source: Citi Research

Figure 159. TSL Key metrics

	2011				2012				2013				2014			
FYE DEC	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Valuation Ratios</b>																
Profitability Ratios																
Return On Equity	15.6%	3.8%	-10.4%	-23.0%	-10.7%	-36.0%	-23.7%	-30.0%	-18.9%	-12.5%	-12.2%	-10.4%	-7.4%	-6.3%	-10.4%	-7.3%
Return On Avg Equity	38.4%	33.0%	21.7%	5.5%	-3.2%	-11.2%	-15.3%	-15.1%	-14.5%	-9.4%	-3.5%	1.8%	5.1%	7.1%	7.9%	8.9%
Return on Invested Capital	10.9%	3.9%	-2.3%	-3.5%	-1.2%	0.7%	-7.9%	-6.6%	-3.3%	-1.5%	-1.3%	-0.8%	0.0%	0.3%	-0.7%	0.1%
Return on Invested Capital ex cash	14.0%	5.3%	-3.2%	-5.2%	-1.7%	1.0%	-10.5%	-9.8%	-4.7%	-2.1%	-1.8%	-1.1%	0.0%	0.4%	-0.8%	0.1%
Return On Assets	8.3%	1.8%	-4.5%	-9.1%	-4.0%	-11.7%	-8.0%	-10.1%	-6.1%	-4.0%	-3.9%	-3.3%	-2.2%	-1.9%	-3.2%	-2.3%
Return On Assets	19.8%	15.9%	9.8%	2.5%	-1.4%	-4.4%	-5.9%	-5.6%	-5.1%	-3.0%	-1.1%	0.6%	1.6%	2.2%	2.5%	2.8%
Return On Net Assets	10.5%	2.3%	-5.9%	-12.8%	-5.1%	-14.7%	-10.2%	-14.5%	-8.3%	-5.4%	-5.2%	-4.3%	-2.7%	-2.3%	-3.8%	-2.6%
Return On Net Assets	27.2%	22.2%	13.9%	3.7%	-1.8%	-5.6%	-7.6%	-7.9%	-6.6%	-3.9%	-1.5%	0.8%	2.1%	2.8%	3.1%	3.4%
Return On Sales	8.7%	2.0%	-6.5%	-15.1%	-8.5%	-26.6%	-19.3%	-25.0%	-9.8%	-7.4%	-8.1%	-6.7%	-2.9%	-2.9%	-5.2%	-3.5%
Return On Sales	19.6%	15.8%	10.8%	3.1%	-2.0%	-7.9%	-11.7%	-12.2%	-10.8%	-6.5%	-2.3%	1.1%	2.9%	3.7%	3.9%	4.0%
Return on Capital Employed	21.7%	8.3%	-4.6%	-6.9%	-2.6%	1.7%	-19.4%	-16.0%	-8.2%	-3.7%	-3.3%	-2.0%	0.0%	0.9%	-1.9%	0.2%
<b>Efficiency Ratios</b>																
Sales/Total Assets	\$0.96	\$0.88	\$0.69	\$0.61	\$0.47	\$0.44	\$0.42	\$0.41	\$0.62	\$0.55	\$0.48	\$0.49	\$0.76	\$0.66	\$0.63	\$0.65
A/R Days Sales Out	90	92	108	98	145	140	144	70	55	55	55	55	50	50	50	50
Inventory Turns	8.91	8.53	5.14	6.45	3.47	2.41	3.37	6.08	8.11	8.11	8.11	8.11	8.69	8.69	8.69	8.69
Days of Inventory	41	43	71	57	105	152	108	60	45	45	45	45	42	42	42	42
<b>Liquidity Ratios</b>																
Current Ratio	2.1	1.8	2.0	1.8	1.6	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	0.9	0.8
Quick Ratio	1.5	1.3	1.4	1.4	1.1	0.9	0.9	1.0	0.9	0.9	0.9	0.8	0.7	0.7	0.6	0.5
Net Working Capital	\$769.9	\$758.1	\$904.6	\$761.3	\$685.0	\$545.3	\$360.6	\$359.5	\$280.3	\$224.1	\$176.5	\$132.1	\$70.9	\$21.8	-\$131.6	-\$177.0
Long-term Debt/Equity	24.2%	30.8%	49.1%	56.6%	57.2%	55.5%	44.5%	61.4%	64.2%	66.1%	68.0%	69.7%	70.9%	71.8%	59.9%	60.9%
Total Debt/Equity	47.9%	69.5%	83.0%	90.6%	102.2%	127.2%	124.7%	147.6%	154.4%	159.0%	163.5%	167.5%	170.4%	172.8%	163.3%	166.0%
Op Inc/Assets, exc. Cash	4.9%	1.8%	-1.0%	-1.6%	-0.5%	0.3%	-3.3%	-3.5%	-1.7%	-0.8%	-0.7%	-0.4%	0.0%	0.2%	-0.3%	0.0%
<b>Book &amp; Cash Value</b>																
Book Value Per Share	\$15.47	\$17.56	\$17.23	\$16.23	\$15.77	\$14.50	\$13.70	\$12.54	\$11.99	\$11.63	\$11.29	\$10.84	\$10.65	\$10.49	\$10.23	\$9.89
Book Value Per Share (Tangible)	\$15.47	\$17.56	\$17.23	\$16.23	\$15.77	\$14.50	\$13.70	\$12.54	\$11.99	\$11.63	\$11.29	\$10.84	\$10.65	\$10.49	\$10.23	\$9.89
Cash Per Share	\$7.02	\$9.67	\$10.41	\$12.71	\$10.60	\$11.90	\$9.94	\$12.71	\$11.09	\$10.65	\$10.29	\$9.47	\$8.03	\$7.71	\$5.87	\$5.10
Net Cash Per Share	-\$0.39	-\$2.53	-\$3.89	-\$2.00	-\$5.53	-\$6.53	-\$7.15	-\$5.81	-\$7.42	-\$7.84	-\$8.17	-\$8.69	-\$10.11	-\$10.41	-\$10.83	-\$11.32

Source: Citi Research

## Key risks

- TSL is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving.
- Raw materials make up a large portion of TSL's cost structure and it purchases a significant amount of these key materials on the spot market where prices have fluctuated significantly in recent years.
- TSL carries a debt-laden balance sheet with a healthy amount of debt that is short-term in maturity.



- A good percentage of TSL's sales are concentrated in regions with strong financial incentive programs for solar power. To the extent that these incentives lessen over time, demand for TSL's products could be negatively impacted
- Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact on the company from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving/or may exceed our target price.

## Management bio

### Jifan Gao - Chairman and Chief Executive Officer

Mr. Gao established Trina Solar in December 1997. His success in developing Trina Solar over the past ten years originated from his experience with his prior two companies. Prior to founding Trina Solar, Mr. Gao established and managed Wujin Xiehe Fine Chemical Factory for five years. Earlier, Mr. Gao spent four years establishing and managing his first company, Guangdong Shunde Fuyou Detergent Plant. Mr. Gao currently serves as the Vice Chairman of the China Renewable Energy Society Solar Power Construction Committee and the standing Vice Chairman of New Energy Chamber of Commerce of All-China Federation of Industry and Commerce. He graduated from Jilin University with a MS degree in Physical Chemistry in 1988. He received his BS in Chemistry from Nanjing University in 1985.

### Terry Wang - Chief Financial Officer

Mr. Wang joined Trina Solar as our Senior Vice President of Finance in January 2008. Mr. Wang has 20 years of extensive experience in international financial operations and management in technology and manufacturing industries. Before joining Trina Solar, Mr. Wang served as the Executive Vice President of Finance of Spreadtrum Communications, Inc., a fabless semiconductor company listed on NASDAQ. Prior to Spreadtrum Communications, Mr. Wang served as CFO of a silicon valley-based technology company and controller at one of the world's largest NASDAQ-listed semiconductor assembly and testing companies. Mr. Wang holds a Certified Management Accountant (CMA) and a Certified in Financial Management (CFM) as well as an MBA in Finance from the University of Wisconsin.

## Financial models

Figure 160. TSL income statement model

	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014
	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	Q1	Q2	Q3	Q4	FY	FY
<b>Total Revenues</b>	132.109	150.005	249.750	313.271	<b>845.135</b>	336.841	370.762	508.298	641.788	<b>1,857.689</b>	550.853	579.459	481.900	435.690	<b>2,047.902</b>	349.880	346.054	297.974	271.167	<b>1,265.075</b>	415.872	354.555	304.068	310.034	<b>1,384.528</b>	<b>1,685.597</b>
Revenue growth (%)	-38.9%	13.5%	66.5%	25.4%	<b>1.6%</b>	7.5%	10.1%	37.1%	26.3%	<b>119.8%</b>	-14.2%	5.2%	-16.8%	-9.6%	<b>10.2%</b>	-19.7%	-1.1%	-13.9%	-9.0%	<b>-38.2%</b>	-67.1%	-14.7%	-14.2%	2.0%	<b>9.4%</b>	<b>21.7%</b>
Cost of Goods	109.402	108.829	178.677	211.073	<b>607.961</b>	232.606	251.838	348.870	440.013	<b>1,273.327</b>	399.573	481.138	429.885	401.364	<b>1,711.960</b>	303.419	278.162	308.118	268.703	<b>1,158.402</b>	394.685	323.950	278.011	278.399	<b>1,275.025</b>	<b>1,493.881</b>
Gross Margin (%)	22.707	41.176	71.073	102.198	<b>237.154</b>	104.235	118.924	159.428	201.775	<b>584.362</b>	151.280	88.321	52.015	34.326	<b>335.942</b>	46.461	67.892	(10.144)	2.464	<b>106.673</b>	21.207	30.605	26.057	31.635	<b>106.504</b>	<b>191.715</b>
Gross Margin (%)	17.2%	27.4%	28.5%	32.6%	<b>28.1%</b>	30.9%	32.1%	31.4%	31.4%	<b>31.5%</b>	27.5%	17.0%	10.8%	7.9%	<b>16.4%</b>	13.3%	19.6%	-3.4%	0.9%	<b>8.4%</b>	5.1%	8.6%	8.6%	10.2%	<b>7.9%</b>	<b>11.4%</b>
Incremental GM (%)	NM	103%	30%	40%	<b>549%</b>	9%	43%	29%	32%	<b>34%</b>	NM	-185%	NM	NM	<b>-131%</b>	NM	NM	NM	NM	<b>NM</b>	13%	NM	NM	94%	<b>2%</b>	<b>27%</b>
R&D	0.909	1.062	1.481	1.987	<b>5.439</b>	2.087	2.744	4.220	9.574	<b>18.625</b>	11.983	11.727	12.577	7.834	<b>44.121</b>	6.885	6.500	7.934	9.000	<b>30.119</b>	6.238	5.318	4.561	4.651	<b>20.768</b>	<b>25.284</b>
R&D as a % of Sale	0.7%	0.7%	0.6%	0.6%	<b>0.6%</b>	0.6%	0.7%	0.8%	1.5%	<b>1.0%</b>	2.2%	2.0%	2.6%	1.8%	<b>2.2%</b>	1.9%	1.9%	2.7%	3.3%	<b>2.4%</b>	1.5%	1.5%	1.5%	1.5%	<b>1.5%</b>	<b>1.5%</b>
SG&A	13.969	20.570	22.923	34.583	<b>92.045</b>	25.154	31.227	40.490	47.118	<b>143.989</b>	53.403	61.452	60.891	58.709	<b>224.455</b>	51.463	54.299	54.073	55.000	<b>214.835</b>	45.746	39.001	33.447	34.104	<b>152.239</b>	<b>168.560</b>
SG&A as a % of Sale	10.6%	13.7%	9.2%	11.0%	<b>10.9%</b>	7.5%	8.4%	8.0%	7.3%	<b>7.8%</b>	9.7%	8.9%	12.6%	13.5%	<b>11.0%</b>	14.7%	15.7%	18.1%	20.3%	<b>17.0%</b>	11.0%	11.0%	11.0%	11.0%	<b>11.0%</b>	<b>11.0%</b>
BLE	14.878	21.632	24.404	36.570	<b>97.484</b>	27.241	33.971	44.710	56.692	<b>162.614</b>	65.386	63.179	73.468	66.543	<b>268.576</b>	58.148	60.799	62.007	64.000	<b>244.954</b>	51.984	44.319	38.009	38.754	<b>173.066</b>	<b>193.844</b>
<b>Operating Margin</b>	7.829	19.544	46.669	65.628	<b>139.670</b>	76.994	84.953	114.718	145.083	<b>421.748</b>	85.894	35.142	(21.453)	(32.217)	<b>67.366</b>	(11.687)	7.093	(72.151)	(61.536)	<b>(138.281)</b>	(30.777)	(13.715)	(11.952)	(7.719)	<b>(63.562)</b>	<b>(2.128)</b>
Operating Margin (%)	5.9%	13.0%	18.7%	20.9%	<b>16.5%</b>	22.9%	22.9%	22.6%	22.6%	<b>22.7%</b>	15.6%	6.1%	-4.5%	-7.4%	<b>3.3%</b>	-3.3%	2.0%	-24.2%	-22.7%	<b>-10.9%</b>	-7.4%	-3.9%	-3.9%	-2.3%	<b>-4.6%</b>	<b>-0.1%</b>
Incremental OPM (%)	4%	65%	27%	30%	<b>255%</b>	48%	12%	22%	23%	<b>22%</b>	-65%	-177%	-58%	23%	<b>-106%</b>	24%	491%	-165%	40%	<b>NM</b>	21%	28%	3%	81%	<b>63%</b>	<b>20%</b>
Net interest income (Exp)	(5.411)	(5.803)	(5.910)	(6.947)	<b>(24.071)</b>	(9.044)	(8.229)	(7.468)	(6.621)	<b>(31.382)</b>	(6.709)	(7.213)	(9.705)	(8.338)	<b>(31.956)</b>	(8.777)	(9.331)	(13.789)	(16.132)	<b>(48.029)</b>	(15.131)	(15.315)	(15.384)	(15.475)	<b>(61.309)</b>	<b>(61.482)</b>
Other Income (Exp)	(7.581)	10.498	8.746	(0.682)	<b>10.981</b>	(14.657)	(29.476)	(8.603)	26.272	<b>(26.464)</b>	(17.812)	(10.829)	(1.215)	0.345	<b>(29.511)</b>	10.021	(20.267)	20.549	-	<b>10.303</b>	-	-	-	-	<b>-</b>	<b>-</b>
Profit Before Taxes	(5.163)	24.239	49.505	57.999	<b>126.580</b>	53.293	47.248	98.647	164.734	<b>363.922</b>	61.373	17.100	(32.373)	(40.210)	<b>5.890</b>	(10.443)	(22.505)	(65.391)	(77.667)	<b>(176.006)</b>	(45.908)	(29.030)	(27.336)	(22.594)	<b>(124.867)</b>	<b>(63.610)</b>
Taxes	4.459	4.399	8.200	7.637	<b>24.695</b>	7.752	6.835	14.079	19.403	<b>48.069</b>	12.320	3.040	(2.911)	(0.835)	<b>11.614</b>	(4.892)	(3.633)	(11.331)	(10.873)	<b>(30.749)</b>	(6.427)	(4.064)	(3.827)	(3.163)	<b>(17.481)</b>	<b>(8.905)</b>
effective rate %	-86.4%	18.1%	16.6%	13.2%	<b>19.5%</b>	14.5%	14.5%	14.3%	11.8%	<b>13.2%</b>	20.1%	17.8%	9.0%	2.1%	<b>197.2%</b>	46.8%	16.2%	17.3%	14.0%	<b>17.5%</b>	14.0%	14.0%	14.0%	14.0%	<b>14.0%</b>	<b>14.0%</b>
Other After Tax	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	(0.001)	<b>(0.001)</b>	-	0.005	(0.005)	-	<b>-</b>	-	-	-	-	<b>-</b>	<b>-</b>
Minority interest	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	2.000	2.700	1.100	1.000	<b>6.800</b>	1.250	1.250	1.250	1.250	<b>5.000</b>	<b>5.000</b>
Stock Based Compensation	1.000	0.900	1.200	1.200	<b>4.300</b>	1.000	1.700	1.700	1.800	<b>6.200</b>	1.400	2.300	2.000	2.000	<b>7.700</b>	2.000	2.700	1.100	1.000	<b>6.800</b>	1.250	1.250	1.250	1.250	<b>5.000</b>	<b>5.000</b>
Extraordinary item	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	-	-	-	-	<b>-</b>	22.270	70.550	2.295	-	<b>95.115</b>	-	-	-	-	<b>-</b>	<b>-</b>
<b>Net Income-Ops</b>	(9.622)	19.840	41.305	50.362	<b>101.885</b>	45.541	40.413	84.568	145.531	<b>315.853</b>	49.653	14.060	(29.462)	(39.376)	<b>(6.728)</b>	(5.551)	(18.847)	(54.065)	(66.794)	<b>(145.257)</b>	(30.481)	(24.965)	(23.550)	(19.431)	<b>(107.386)</b>	<b>(54.705)</b>
<b>Total Net Income</b>	(10.622)	18.940	40.105	49.162	<b>97.585</b>	44.541	38.713	82.868	143.531	<b>309.653</b>	47.653	11.760	(31.462)	(65.771)	<b>(37.826)</b>	(29.821)	(52.097)	(67.460)	(67.794)	<b>(147.172)</b>	(40.731)	(26.215)	(24.759)	(20.681)	<b>(112.386)</b>	<b>(58.705)</b>
EPS-ops (exc SBC)	\$ (0.10)	\$ 0.34	\$ 0.64	\$ 0.73	<b>\$ 1.83</b>	\$ 0.64	\$ 0.51	\$ 1.07	\$ 1.84	<b>\$ 4.12</b>	\$ 0.62	\$ 0.20	\$ (0.42)	\$ (0.56)	<b>\$ (0.08)</b>	\$ (0.08)	\$ (0.27)	\$ (0.76)	\$ (0.93)	<b>\$ (2.05)</b>	\$ (0.55)	\$ (0.35)	\$ (0.33)	\$ (0.26)	<b>\$ (1.48)</b>	<b>\$ (0.74)</b>
<b>Total EPS</b>	<b>\$ (0.21)</b>	<b>\$ 0.38</b>	<b>\$ 0.64</b>	<b>\$ 0.73</b>	<b>\$ 1.79</b>	<b>\$ 0.65</b>	<b>\$ 0.52</b>	<b>\$ 1.07</b>	<b>\$ 1.84</b>	<b>\$ (0.93)</b>	<b>\$ 0.62</b>	<b>\$ 0.17</b>	<b>\$ (0.45)</b>	<b>\$ (0.93)</b>	<b>\$ (0.52)</b>	<b>\$ (0.42)</b>	<b>\$ (1.30)</b>	<b>\$ (0.81)</b>	<b>\$ (0.94)</b>	<b>\$ (2.14)</b>	<b>\$ (0.57)</b>	<b>\$ (0.36)</b>	<b>\$ (0.34)</b>	<b>\$ (0.28)</b>	<b>\$ (1.55)</b>	<b>\$ (0.81)</b>
Shares Outstanding (basic)	50.183	50.208	56.701	60.729	<b>54.844</b>	62.050	69.925	70.055	70.174	<b>68.051</b>	70.226	70.319	70.441	70.550	<b>70.384</b>	70.587	70.679	70.751	71.961	<b>70.994</b>	71.999	72.093	72.166	73.400	<b>72.414</b>	<b>73.863</b>
<b>Shares Outstanding (fully diluted)</b>	<b>50.183</b>	<b>58.355</b>	<b>64.957</b>	<b>69.346</b>	<b>62.630</b>	<b>70.759</b>	<b>78.538</b>	<b>78.010</b>	<b>78.910</b>	<b>76.754</b>	<b>79.041</b>	<b>70.790</b>	<b>70.441</b>	<b>70.550</b>	<b>72.705</b>	<b>70.587</b>	<b>70.679</b>	<b>70.751</b>	<b>71.961</b>	<b>70.994</b>	<b>71.999</b>	<b>72.093</b>	<b>72.166</b>	<b>73.400</b>	<b>72.414</b>	<b>73.863</b>
Year Weighted Shares	-	-	-	-	<b>60.710</b>	-	-	-	-	<b>76.754</b>	-	-	-	-	<b>72.705</b>	-	-	-	-	<b>70.994</b>	-	-	-	-	<b>72.414</b>	<b>73.863</b>
<b>TTM EPS ops (inc SBC)</b>	<b>\$ 0.68</b>	<b>\$ 0.86</b>	<b>\$ 0.74</b>	<b>\$ 1.49</b>	<b>\$ 1.83</b>	<b>\$ 3.59</b>	<b>\$ 2.55</b>	<b>\$ 3.88</b>	<b>\$ 4.08</b>	<b>\$ 7.86</b>	<b>\$ 3.70</b>	<b>\$ 2.18</b>	<b>\$ (0.24)</b>	<b>\$ (0.56)</b>	<b>\$ (0.07)</b>	<b>\$ (0.97)</b>	<b>\$ (1.44)</b>	<b>\$ (1.78)</b>	<b>\$ (2.13)</b>	<b>\$ (2.59)</b>	<b>\$ (2.65)</b>	<b>\$ (2.65)</b>	<b>\$ (2.21)</b>	<b>\$ (1.55)</b>	<b>\$ (1.55)</b>	<b>\$ (0.81)</b>
Capex	843.3	789.2	748.2	845.1	<b>3,156</b>	1,049.9	1,270.6	2,037.5	1,857.7	<b>2,071.7</b>	2,280.4	2,254.0	2,254.0	2,254.0	<b>2,254.0</b>	1,846.9	1,613.5	1,429.6	1,265.1	<b>1,331.1</b>	1,339.6	1,345.7	1,384.5	1,384.5	<b>1,384.5</b>	<b>1,384.5</b>
EPS-ops (inc SBC)	\$ (0.21)	\$ 0.32	\$ 0.64	\$ 0.73	<b>\$ 1.56</b>	\$ 0.65	\$ 0.52	\$ 1.07	\$ 1.84	<b>\$ 4.13</b>	\$ 0.62	\$ 0.17	\$ (0.45)	\$ (0.59)	<b>\$ (0.18)</b>	\$ (0.11)	\$ (0.30)	\$ (0.78)	\$ (0.94)	<b>\$ (2.14)</b>	\$ (0.57)	\$ (0.36)	\$ (0.34)	\$ (0.28)	<b>\$ (1.55)</b>	<b>\$ (0.81)</b>
Interest add-back for converts	2.009	1.648	1.697	1.761	<b>7.116</b>	1.730	1.732	1.739	1.789	<b>6.993</b>	1.621	1.668	1.218	1.281	<b>5.788</b>	0.653	0.989	0.914	0.887	<b>-</b>	0.887	0.887	0.887	0.887	<b>-</b>	<b>-</b>
dilution from converts	3.855	3.961	3.974	3.927	<b>3.929</b>	3.950	3.950	3.950	3.950	<b>3.950</b>	3.950	3.950	3.950	3.771	<b>3.905</b>	3.483	3.483	3.043	3.043	<b>3.043</b>	3.043	3.043	3.043	3.043	<b>3.043</b>	<b>3.043</b>
<b>Statistical</b>	<b>17.000</b>	<b>9.000</b>	<b>34.121</b>	<b>76.362</b>	<b>136.483</b>	<b>55.000</b>	<b>30.000</b>	<b>28.000</b>	<b>44.000</b>	<b>162.000</b>	<b>92.000</b>	<b>86.910</b>	<b>32.000</b>	<b>104.001</b>	<b>315.000</b>	<b>80.000</b>	<b>11.000</b>	<b>11.000</b>	<b>70.000</b>	<b>172.000</b>	<b>58.222</b>	<b>49.638</b>	<b>42.570</b>	<b>43.405</b>	<b>193.834</b>	<b>235.984</b>
Capex	12.9%	6.0%	13.7%	24.4%	<b>16.1%</b>	16.3%	9.4%	5.5%	6.9%	<b>8.7%</b>	16.7%	15.0%	6.6%	10.4%	<b>15.4%</b>	22.9%	3.2%	3.7%	25.8%	<b>13.6%</b>	14.0%	14.0%	14.0%	14.0%	<b>14.0%</b>	<b>14.0%</b>
Implied \$/W	\$5.20	\$0.16	\$0.24	\$0.87	<b>\$0.47</b>	\$0.61	\$0.24	\$0.10	\$0.58	<b>\$0.28</b>	\$8.40	\$0.21	\$0.21	\$0.88	<b>\$0.45</b>	-\$0.02	\$0.03	\$0.84	\$5.31	<b>\$0.33</b>	-\$0.01	\$3.72	\$3.17	\$3.22	<b>\$3.62</b>	<b>\$4.31</b>
Depreciation & Amortization	7.200	7.500	8.000	11.420	<b>34.120</b>	10.661	10.661	10.661	10.661	<b>42.646</b>	13.871	13.871	16.000	13.871	<b>57.614</b>	16.310	16.310	20.000	12.620	<b>65.240</b>	18.453	18.453	18.453	18.453	<b>73.812</b>	<b>84.624</b>

Source: Citi Research

Units in \$mm unless noted

Figure 161. TSL summary balance sheet

Figure 162. TSL 12M rolling P&L

FYE: Dec	2009					2010					2011					2012					2013					2014				
	Q1A	Q2A	Q3A	Q4A	FY09A	Q1A	Q2A	Q3A	Q4A	FY10A	Q1A	Q2A	Q3A	Q4A	FY11A	Q1A	Q2	Q3	Q4E	FY12E	Q1E	Q2E	Q3E	Q4E	FY13E	Q1E	Q2E	Q3E	Q4E	FY14E
Total Revenues	132.1	150.0	249.8	313.3	845.1	336.8	370.8	508.3	641.8	1,857.7	559.9	579.5	481.9	435.7	2,047.9	349.9	346.1	298.0	271.2	1,265.1	415.9	354.6	304.1	310.0	1,384.5	494.8	424.0	379.3	387.5	1,685.6
Sequential Change	(38.9%)	13.5%	66.5%	25.4%		7.5%	10.1%	37.1%	26.3%		(14.2%)	5.2%	(16.8%)	(9.6%)		(19.7%)	(1.1%)	(13.9%)	(9.0%)		53.4%	(14.7%)	(14.2%)	2.0%		59.6%	(14.3%)	(10.6%)	2.2%	
Yr to Yr Change	9.5%	(26.5%)	(14.1%)	44.8%	1.6%	155.0%	147.2%	103.5%	104.9%	119.8%	63.5%	56.3%	(5.2%)	(32.1%)	10.2%	(36.5%)	(40.3%)	(38.2%)	(37.8%)	(38.2%)	18.9%	2.5%	2.0%	14.3%	9.4%	19.0%	19.6%	24.7%	25.0%	21.7%
Cost of Goods	109.4	108.8	178.7	211.1	608.0	232.6	251.8	348.9	440.0	1,273.3	399.6	481.1	429.9	401.4	1,712.0	303.4	278.2	308.1	268.7	1,158.4	394.7	323.9	278.0	278.4	1,275.0	437.7	372.3	341.7	342.2	1,493.9
% of Revenue	82.8%	72.6%	71.5%	67.4%	71.9%	69.1%	67.9%	68.6%	68.6%	68.5%	72.5%	83.0%	89.2%	92.1%	83.6%	86.7%	80.4%	103.4%	99.1%	91.6%	94.9%	91.4%	91.4%	89.8%	92.1%	88.5%	87.8%	90.1%	88.3%	88.6%
Gross Margin	22.7	41.2	71.1	102.2	237.2	104.2	118.9	159.4	201.8	584.4	151.3	98.3	52.0	34.3	335.9	46.5	67.9	(10.1)	2.5	106.7	21.2	30.6	26.1	31.6	109.5	57.1	51.8	37.6	45.3	191.7
% of Revenue	17.2%	27.4%	28.5%	32.6%	28.1%	30.9%	32.1%	31.4%	31.4%	31.5%	27.5%	17.0%	10.8%	7.9%	16.4%	13.3%	19.6%	(3.4%)	0.9%	8.4%	5.1%	8.6%	8.6%	10.2%	7.9%	11.5%	12.2%	9.9%	11.7%	11.4%
R&D	0.9	1.1	1.5	2.0	5.4	2.1	2.7	4.2	9.6	18.6	12.0	11.7	12.6	7.8	44.1	6.7	6.5	7.9	9.0	30.1	6.2	5.3	4.6	4.7	20.8	7.4	6.4	5.7	5.8	25.3
% of Revenue	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.7%	0.8%	1.5%	1.0%	2.2%	2.0%	2.6%	1.8%	2.2%	1.9%	1.9%	2.7%	3.3%	2.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
SG&A	14.0	20.6	22.9	34.6	92.0	25.2	31.2	40.5	47.1	144.0	53.4	51.5	60.9	58.7	224.5	51.5	54.3	54.1	55.0	214.8	45.7	39.0	33.4	34.1	152.3	49.5	42.4	37.9	38.7	168.6
% of Revenue	10.6%	13.7%	9.2%	11.0%	10.9%	7.5%	8.4%	8.0%	7.3%	7.8%	9.7%	8.9%	12.6%	13.5%	11.0%	14.7%	15.7%	18.1%	20.3%	17.0%	11.0%	11.0%	11.0%	11.0%	11.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Operating Margin	7.8	19.5	46.7	65.6	139.7	77.0	85.0	114.7	145.1	421.7	85.9	35.1	(21.5)	(32.2)	67.4	(11.7)	7.1	(72.2)	(61.5)	(138.3)	(30.8)	(13.7)	(12.0)	(7.1)	(63.6)	0.2	3.0	(6.0)	0.7	(2.1)
% of Revenue	5.9%	13.0%	18.7%	20.9%	16.5%	22.9%	22.9%	22.6%	22.6%	22.7%	15.6%	6.1%	(4.5%)	(7.4%)	3.3%	(3.3%)	2.0%	(24.2%)	(22.7%)	(10.9%)	(7.4%)	(3.9%)	(3.9%)	(2.3%)	(4.6%)	0.0%	0.7%	(1.6%)	0.2%	(0.1%)
Other Income (Exp)	(5.4)	(5.8)	(5.9)	(6.9)	(24.1)	(9.0)	(8.2)	(7.5)	(6.6)	(31.4)	(6.7)	(7.2)	(9.7)	(8.3)	(32.0)	(8.8)	(9.3)	(13.8)	(16.1)	(48.0)	(15.1)	(15.3)	(15.4)	(15.5)	(61.3)	(15.5)	(15.6)	(15.3)	(15.0)	(61.5)
% of Revenue	(4.1%)	(3.9%)	(2.4%)	(2.2%)	(2.8%)	(2.7%)	(2.2%)	(1.5%)	(1.0%)	(1.7%)	(1.2%)	(1.2%)	(2.0%)	(1.9%)	(1.6%)	(2.5%)	(2.7%)	(4.6%)	(5.9%)	(3.8%)	(3.6%)	(4.3%)	(5.1%)	(5.0%)	(4.4%)	(3.1%)	(3.7%)	(4.0%)	(3.9%)	(3.6%)
Profit Before Taxes	(5.2)	24.2	49.5	58.0	126.6	53.3	47.2	98.6	164.7	363.9	61.4	17.1	(32.4)	(40.2)	5.9	(10.4)	(22.5)	(65.4)	(77.7)	(176.0)	(45.9)	(29.0)	(27.3)	(22.6)	(124.9)	(15.3)	(12.6)	(21.3)	(14.3)	(63.6)
% of Revenue	(3.9%)	16.2%	19.8%	18.5%	15.0%	15.8%	12.7%	19.4%	25.7%	19.6%	11.1%	3.0%	(6.7%)	(9.2%)	0.3%	(3.0%)	(6.5%)	(21.9%)	(28.6%)	(13.9%)	(11.0%)	(8.2%)	(9.0%)	(7.3%)	(9.0%)	(3.1%)	(3.0%)	(5.6%)	(3.7%)	(3.8%)
Taxes	4.5	4.4	8.2	7.6	24.7	7.8	6.8	14.1	19.4	48.1	12.3	3.0	(2.9)	(0.8)	11.6	(4.9)	(3.7)	(11.3)	(10.9)	(30.7)	(6.4)	(4.1)	(3.8)	(3.2)	(17.5)	(2.1)	(1.8)	(3.0)	(2.0)	(8.9)
Tax Rate	-86.4%	18.1%	16.6%	13.2%	19.5%	14.5%	14.5%	14.3%	11.8%	13.2%	20.1%	17.8%	9.0%	2.1%	197.2%	46.8%	16.2%	17.3%	14.0%	17.5%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Extraordinary Item	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	24.4	24.4	22.3	70.6	2.3	0.0	95.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income-Ops	(9.6)	19.8	41.3	50.4	101.9	45.5	40.4	84.6	145.3	315.9	49.1	14.1	(29.5)	(39.4)	(5.7)	(5.6)	(18.8)	(54.1)	(66.8)	(145.3)	(39.5)	(25.0)	(23.5)	(19.4)	(107.4)	(13.2)	(10.9)	(18.3)	(12.3)	(54.7)
% of Revenue	(7.3%)	13.2%	16.5%	16.1%	12.1%	13.5%	10.9%	16.6%	22.6%	17.0%	8.9%	2.4%	(6.1%)	(9.0%)	(0.3%)	(1.6%)	(5.4%)	(18.1%)	(24.6%)	(11.5%)	(9.5%)	(7.0%)	(7.7%)	(6.3%)	(7.8%)	(2.7%)	(2.6%)	(4.8%)	(3.2%)	(3.2%)
Incremental OPM	4%					48%					-65%					24%					21%					4%				
Sequential Change	NM	NM	108.2%	21.9%		(9.6%)	(11.3%)	109.3%	71.9%		(66.2%)	(71.3%)	NM	(33.7%)		85.9%	(239.5%)	(186.9%)	(23.5%)		40.9%	36.8%	5.8%	17.3%		32.3%	17.4%	(68.7%)	32.7%	
Yr to Yr Change	NM	9.6%	26.5%	15301.2%	56.1%	NM	103.7%	104.7%	188.6%	210.0%	7.7%	(65.2%)	NM	NM	NM	NM	NM	(83.5%)	(69.6%)	(2437.2%)	(61.2%)	(32.5%)	56.5%	70.9%	26.1%	66.7%	56.5%	22.0%	36.5%	49.1%
Total Net Income	(10.6)	18.9	40.1	49.2	97.6	44.5	38.7	82.9	143.5	309.7	47.7	11.8	(31.5)	(65.8)	(37.8)	(29.8)	(92.1)	(57.5)	(67.8)	(247.2)	(40.7)	(26.2)	(24.8)	(20.7)	(112.4)	(14.4)	(12.1)	(19.6)	(13.6)	(59.7)
% of Revenue	(8.0%)	12.6%	16.1%	15.7%	11.5%	13.2%	10.4%	16.3%	22.4%	16.7%	8.7%	2.0%	(6.5%)	(15.1%)	(1.8%)	(8.5%)	(26.6%)	(19.3%)	(25.0%)	(19.5%)	(9.8%)	(7.4%)	(8.1%)	(6.7%)	(8.1%)	(2.9%)	(2.9%)	(5.2%)	(3.5%)	(3.5%)
Sequential Change	(1478.3%)	NM	111.7%	22.6%		(9.4%)	(13.1%)	114.1%	73.2%		(66.8%)	(75.3%)	NM	(109.0%)		54.7%	(208.8%)	37.6%	(18.0%)		39.9%	35.6%	5.6%	16.5%		30.3%	15.9%	(61.6%)	30.7%	
Yr to Yr Change	NM	10.8%	25.1%	NM	59.1%	NM	104.4%	106.6%	192.0%	217.3%	7.0%	(69.6%)	NM	NM	NM	NM	NM	(82.6%)	(3.1%)	(553.5%)	(36.6%)	71.5%	56.9%	69.5%	54.5%	64.6%	53.8%	20.9%	34.3%	46.9%
EPS-Ops (excl SBC)	\$ (0.19)	\$ 0.34	\$ 0.64	\$ 0.73	\$ 1.63	\$ 0.64	\$ 0.51	\$ 1.07	\$ 1.84	\$ 4.12	\$ 0.62	\$ 0.20	\$ (0.42)	\$ (0.56)	\$ (0.08)	\$ (0.08)	\$ (0.27)	\$ (0.76)	\$ (0.93)	\$ (2.05)	\$ (0.55)	\$ (0.35)	\$ (0.33)	\$ (0.26)	\$ (1.48)	\$ (0.18)	\$ (0.15)	\$ (0.25)	\$ (0.16)	\$ (0.74)
Sequential Change	NM	NM	87.0%	14.2%		(11.4%)	(20.0%)	108.5%	71.6%		(66.3%)	(68.0%)	NM	(33.4%)		85.9%	(239.1%)	(186.6%)	(21.5%)		40.9%	36.8%	5.9%	18.7%		32.3%	17.5%	(68.5%)	33.9%	
Yr to Yr Change	NM	(5.4%)	10.6%	11036.6%	29.4%	NM	51.3%	68.8%	153.6%	153.0%	(3.6%)	(61.4%)	(139.0%)	(130.3%)	NM	NM	(234.3%)	82.7%	66.3%	(2498.4%)	(597.3%)	29.9%	(57.4%)	(71.5%)	27.5%	67.3%	(57.3%)	(23.5%)	(37.8%)	
EPS-Ops (incl SBC)	(\$0.21)	\$0.32	\$0.64	\$0.73	\$1.56	\$0.65	\$0.52	\$1.07	\$1.84	\$4.13	\$0.62	\$0.17	(\$0.45)	(\$0.59)	(\$0.18)	(\$0.11)	(\$0.30)	(\$0.78)	(\$0.94)	(\$2.14)	(\$0.57)	(\$0.36)	(\$0.34)	(\$0.28)	(\$1.55)	(\$0.20)	(\$0.16)	(\$0.27)	(\$0.18)	(\$0.81)
Total EPS	\$ (0.21)	\$ 0.38	\$ 0.64	\$ 0.73	\$ 1.79	\$ 0.65	\$ 0.52	\$ 1.07	\$ 1.84	\$ 4.13	\$ 0.62	\$ 0.17	\$ (0.45)	\$ (0.93)	\$ (0.52)	\$ (0.42)	\$ (1.30)	\$ (0.81)	\$ (0.94)	\$ (3.48)	\$ (0.57)	\$ (0.36)	\$ (0.34)	\$ (0.28)	\$ (1.55)	\$ (0.20)	\$ (0.16)	\$ (0.27)	\$ (0.18)	\$ (0.81)
Sequential Change	(1477.1%)	NM	70.6%	14.1%		(11.0%)	(21.2%)	108.5%	71.5%		(66.1%)	(73.2%)	NM	(108.7%)		54.7%	(208.4%)	37.7%	(16.0%)		40.0%	35.7%	5.7%	17.9%		30.3%	16.0%	(61.5%)	31.8%	
Yr to Yr Change	NM	11.2%	14.0%	NM	46.0%	NM	36.5%	66.8%	150.8%	130.3%	(4.7%)	(67.5%)	NM	NM	NM	NM	NM	(81.8%)	(1.1%)	(569.3%)	(33.9%)	72.1%	57.8%	70.1%	55.4%	65.3%	54.7%	22.4%	35.6%	47.9%
Com & Equiv Sh	50.2	58.4	65.0	69.3	62.6	70.8	78.5	78.8	78.9	76.8	79.0	70.8	70.4	70.5	72.7	70.6	70.7	70.8	72.0	71.0	72.0	72.1	72.2	73.4	72.4	73.4	73.5	73.6	74.9	73.9

Source: Citi Research

Units in \$mm unless noted

## Company Focus

- Company Update
- Initiation of Coverage

Shahriar (Shar) Pourreza, CFA

+1-212-816-7903

shahriar.pourreza@citi.com

<b>Neutral/High Risk</b>	<b>2H</b>
Price (01 Feb 13)	US\$3.05
Target price	US\$3.50
Expected share price return	14.8%
Expected dividend yield	0.0%
<b>Expected total return</b>	<b>14.8%</b>
Market Cap	US\$478M

### Price Performance

(RIC: YGE.N, BB: YGE US)



## Yingli Green Energy Holding Co. Ltd (YGE) China Optimism Priced in; Looking For Concrete Improvement

- **Launching US coverage of YGE with a Neutral (2H) rating** — We are initiating coverage of YGE with a Neutral/High Risk (2H) rating and a \$3.50 target price. As a quality Tier 1 pure-play panel manufacturer in China, YGE is highly leveraged to a recovery in the sector as the industry S/D tightens over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$3.50 TP yields an ETR of 15% - supporting our stance.
- **Less regional diversification and heavy exposure to Germany a negative; bigger push into China a positive** — Relative to its closest competitor, TSL, YGE has been historically less globally diversified with more emphasis being placed on Germany – a country once the key growth region with a more tepid solar spending outlook going forward. On the flip side, YGE made a larger push into China in Q3 – a region with a sustainable spending outlook moving forward.
- **Lack of a defined path of shifting further downstream a negative** — Management hasn't presented a more defined approach, unlike peers, on whether it will or will not pursue a larger downstream strategy. In our view, without more resources being shifted further downstream, we see margins remaining depressed over the next few years – albeit stabilized – given the structural/cyclical headwinds. We model in very little downstream business in 2013 with a modest shift in business mix in 2014 but still trailing its peers.
- **New EPS outlook** — Our new 2012/2013/2014 EPS is (\$1.70)/ (\$1.39)/ (\$1.03). The improvement YoY is primarily driven by: (1) increased shipments, (2) stabilization/improvement in margins and (3) further non Poly cost reductions. That said, we forecast a relatively benign GM% environment through our forecast period versus historical, especially with the lack of downstream presence.
- **Too early to change stance on pure play manufacturers despite some improvement in visibility** — The panel manufacturers have seen a material bounce in performance over the past month - attributed to: (1) a risk-on mentality and (2) investor perception surrounding a potential bottoming of fundamentals. Much of this relates to news coming out of China on the Golden Sun program and a 10GW solar installation target for 2013 – double the prior goal. While this certainly improves the outlook for solar, we caution investors not to buy into what we consider an overzealous rally for 3 reasons: (1) China has not disclosed any details on how they will achieve their 10GW target for 2013, (2) Incentives like Golden Sun program in China are not new and despite having these incentives already in place, project installations are occurring much slower than anticipated – for a multitude of reasons and (3) we aren't convinced that improved fundamentals in China will offset the headwinds you are seeing globally. While we agree that visibility has improved modestly, YGE's ~70% move the past 3 months prices in this notion. We look for more concrete signs of improvement before changing stance on the pure play manufacturers. For now, we remain on the sidelines.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2011A	0.35A	0.36A	-0.18A	-0.17A	0.38A	0.19A
2012E	-0.18A	-0.56A	-0.40A	-0.56E	-1.70E	-2.14E
Previous	na	na	na	na	na	na
2013E	-0.42E	-0.36E	-0.31E	-0.31E	-1.39E	-1.38E
Previous	na	na	na	na	na	na
2014E	na	na	na	na	-1.03E	-0.59E
Previous	na	na	na	na	na	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

## China Optimism Priced in; Looking For Concrete Improvement

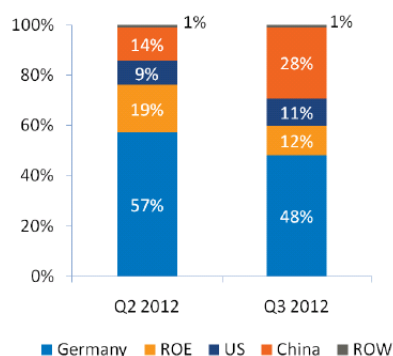
We are initiating US research coverage of YGE with a Neutral (2H) rating and a \$3.50 target price. As a quality Tier 1 pure-play panel manufacturer in China, YGE is highly leveraged to a recovery in the sector as the industry S/D tightens over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals. Our \$3.50 TP yields an ETR of 15% - supporting our stance.

*Note: To eliminate redundancy, for a deep dive discussion on solar specific industry dynamics on a regional level, please refer to the industry section of this note beginning on page 16.*

### Why we remain on the sidelines?

- Given the structural and cyclical changes going on in the solar space, our sector tilt favors downstream players versus the upstream manufacturers. YGE still remains a pure play panel manufacturer with no immediate goals of shifting further downstream.
  - Management hasn't presented a more defined strategy on whether it will or will not pursue a larger downstream business. In our view, without more resources being shifted further downstream, we see margins remaining depressed over the next few years – albeit stabilized – given the structural/cyclical headwinds.
  - We model in very little downstream business in 2013 with a modest shift in business mix in 2014 but still trailing its peers.
- Less regional diversification yields country-specific risks but trends improving.
  - Negative: Less regional diversification and heavy exposure to Germany - a country once the key growth region with a more tepid solar spending outlook going forward.
  - Positive: YGE made a larger push into China in Q3 – a region with a sustainable spending outlook moving forward. This dilutes some of the spending drag we are seeing in Germany and other Western European countries.
  - In the end, we would like to see a greater push into other sustainable regions including Middle East, Japan, India and Australia. As of Q3 2012, rest-of-world revenues (excludes Europe, US and China) only comprised of 1% of consolidated results – YGE needs to diversify into more growth regions.
- From an efficiency, R&D, technology or cost structure standpoint, YGE doesn't have any material visible advantages to similar pure play peers including TSL – its closest competitor. Same premise for product services and module ASPs (Average Selling Prices).
- It's not about volumes, show me the margins. YGE is projected to overtake STP in regards to shipments in 2012 – now the largest manufacturer in the world. While this may seem very positive on the surface, volumes have never been an issue; it's been about margins – which remain very depressed.
  - Note: Being the largest producer in a highly commoditized solar manufacturing space is a tough proposition, in our view.

Figure 163. Sales by region



Source: Citi Research

**It's not about volumes, show me the margins**

- Our \$3.50 TP yields an ETR of 15% - supporting our stance.

## Background

Based in China, Yingli Green Energy is a vertically-integrated manufacturer of raw materials and end products for the photovoltaic (PV) industry. Its operations cover every aspect of the solar value chain including raw material production of polysilicon, ingots, and wafers to the manufacture and installation of silicon-based solar modules/systems. Yingli markets its products in key solar regions across the globe including Germany, U.S., and China through value-added resellers, distributors, and direct sales primarily targeting applications in the traditional rooftop and ground-mount end markets.

## What can cause us to turn positive?

**The potential visible improvements we see in the industry is a good start but likely not enough – especially given the recent outperformance.** In our view, it's too early to change our cautious stance on pure play manufacturers despite some improvement in visibility. The panel manufacturers have seen a material bounce in performance over the past month. We mainly attribute this to: (1) a risk-on mentality which can revert quickly and (2) fresh investor perception surrounding a potential bottoming of industry fundamentals.

**Much of this improved perception relates to news coming out of China on the Golden Sun program and a 10GW solar installation target for 2013 – double the prior goal.** While this certainly improves the outlook for solar, we caution investors not to buy into what we consider an overzealous rally for 3 reasons: (1) China has not disclosed any details on how they will achieve their 10GW target for 2013, (2) Incentives like Golden Sun program in China are not new and despite having these incentives already in place, project installations are occurring much slower than anticipated – for a multitude of reasons and (3) we aren't convinced that improved fundamentals in China will offset the headwinds you are seeing globally. See industry section above for a discussion on China on page 34.

While we agree that visibility has improved modestly, YGE's ~70% move over the past 3 months prices in this notion (see performance table on page 78). We look for more concrete signs of improvement before changing our stance on the pure play manufactures. For now, we remain on the sidelines.

**It's not about volumes, show me the margins.** For any of the pure play manufacturers, gaining market share and increasing volumes has never been an issue (Chinese panel manufacturer's account for ~ 70% of the market). It's been about margins – which remain fairly depressed over our forecast period. As we have stated, being one of the largest producers in a highly commoditized solar manufacturing space is a tough proposition, in our view.

With cash costs nearing a floor, YGE's margin improvement will center on:

- Visible follow-through in China on the governments announced solar initiatives relative to stated targets and YGE's success in gaining market share there – Q3's push was a good start.
- YGE's embarks on a strategy of diversifying away from traditional growth regions like Germany and Italy into sustainable markets like China., India, US, India etc. We would like to see more MW's allocated to ROW (Rest-Of-World) which for now only comprises of ~1% of consolidated sales.

- YGE delivers and executes on a plan of shifting more MWs further downstream into the project development realm. Given the commoditization of the pure panel manufacturing business, we don't see a material improvement in margins with just selling panels – not until we work off excess capacity which could take time. See industry sections above starting on page 16.

#### We could turn positive

If we see visible signs of success with the above mentioned items, margins should begin to improve and we could revisit our thesis. For now, YGE remains a show me story – similar to TSL. See below for our module assumptions including our ASP and cost curve outlook.

## Rating and valuation

**Our target price for YGE shares is \$3.50.** We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Utilizing a 1.7x EV/Sales multiple – consistent with YGE's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.6B yields an enterprise value of ~\$2.9B. Backing out 2013 net debt of ~\$2B and minority interest of \$286mm translates into a YGE equity value of ~\$556mm or \$~3.50/share.

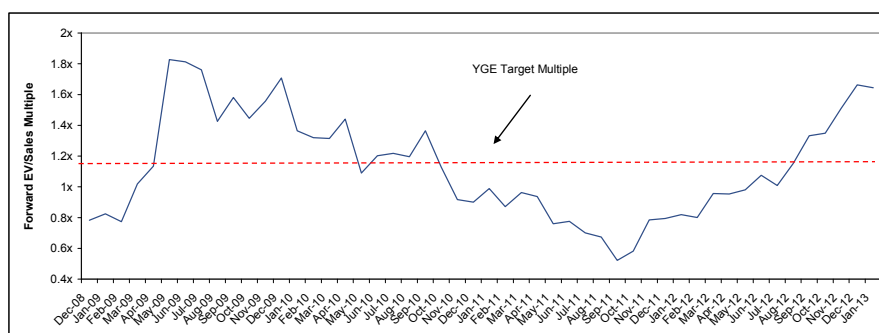
It is important to note that our EV/Sales target multiple for YGE is higher than the average comp for our globally diverse solar universe to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

Figure 164. YGE EV/Sale multiple valuation

a	2013 Sales (\$mm)	\$1,639.26
b	EV/Sales Multiple	1.7x
c = a * b	YGE Enterprise Value	\$2,852.32
d	2013 Net Debt (\$MM)	\$2,009.48
e	Minority Interest (\$MM)	\$286.01
f = c - d - e	YGE Equity Value (\$MM)	\$556.83
g = f / 158	YGE Target Price	\$3.5

Source: Citi Research

Figure 165. YGE forward EV/Sales



Source: Citi Research

## Earnings, cash flow and other key metrics

**Our new 2012/2013/2014 EPS is (\$1.70)/ (\$1.39)/ (\$1.03).** The improvement YoY is primarily driven by: (1) increased shipments, (2) stabilization/improvement in margins and (3) further non Poly cost reductions. That said, we forecast a relatively benign GM% environment through our forecast period versus historical, especially with the lack of downstream presence. See below for key model assumptions including pricing curve.



Figure 166. YGE: Citi vs. consensus

YGE		Dec FQ4:12E	Mar F2012E	Jun FQ1:13E	Sept FQ2:13E	Dec FQ3:13E	Dec FQ4:13E	F2013E	F2014E	Rating	Target Price
Citi Est	Rev \$	457	\$1,801	\$370	\$472	\$336	\$461	\$1,639	\$1,764	Neutral	\$3.50
	EPS \$	(0.56)	(\$1.70)	(\$0.42)	(\$0.36)	(\$0.31)	(\$0.31)	(\$1.39)	(\$1.03)		
Consensus	Rev \$	358	\$1,706	\$346	\$390	\$426	\$438	\$1,635	NA	Neutral	\$1.78
	EPS \$	(0.54)	(\$2.24)	(\$0.27)	(\$0.39)	(\$0.36)	(\$0.43)	(\$1.45)	(\$0.59)		

Source: Citi Research

Figure 167. YGE model inputs and pricing data

	2010	1Q:11	2Q:11	3Q:11	4Q:11	2011	1Q:12	2Q:12	3Q:12	4Q:12E	2012 E	1Q:13E	2Q:13E	3Q:13E	4Q:13E	2013 E	1Q:14E	2Q:14E	3Q:14E	4Q:14E	2014 E
<b>MODULES</b>																					
ASP, \$/W	\$ 1.76	\$ 1.73	\$ 1.62	\$ 1.32	\$ 1.13	\$ 1.44	\$ 0.98	\$ 0.83	\$ 0.71	\$ 0.67	\$ 0.79	\$ 0.65	\$ 0.67	\$ 0.68	\$ 0.67	\$ 0.67	\$ 0.63	\$ 0.63	\$ 0.64	\$ 0.64	\$ 0.64
% Δ	(13.2%)	(1.6%)	(8.6%)	(18.6%)	(14.0%)	(18.2%)	(13.8%)	(15.0%)	(15.1%)	(5.2%)	(45.2%)	(2.1%)	2.8%	0.6%	(1.2%)	(15.3%)	(6.0%)	0.6%	1.7%	(0.2%)	(4.8%)
Shipments, MW	1,062	300	410	500	351	1,561	505	574	488	679	2,247	562	699	493	696	2,440	568	706	498	693	2,465
% Δ	102.1%	(13.0%)	36.6%	21.9%	(29.8%)	47.0%	44.0%	13.7%	(15.0%)	39.1%	44.0%	(17.2%)	24.2%	(29.4%)	39.1%	8.6%	(17.2%)	24.2%	(29.4%)	39.1%	1.0%
Revenue, \$MM	\$1,860	\$520	\$664	\$659	\$396	\$2,240	\$494	\$477	\$344	\$453	\$1,769	\$368	\$469	\$333	\$458	\$1,628	\$339	\$424	\$304	\$423	\$1,490
% Δ	77.4%	(14.4%)	27.7%	(0.7%)	(39.6%)	20.4%	24.1%	(3.4%)	(27.8%)	31.6%	(21.0%)	(18.9%)	27.6%	(29.0%)	37.4%	(8.0%)	(25.9%)	25.0%	(28.2%)	38.8%	(8.5%)
Wafer Cost, \$/W	\$ 0.66	\$ 0.77	\$ 0.78	\$ 0.64	\$ 0.57	\$ 0.69	\$ 0.47	\$ 0.40	\$ 0.31	\$ 0.29	\$ 0.36	\$ 0.29	\$ 0.29	\$ 0.28	\$ 0.28	\$ 0.28	\$ 0.27	\$ 0.27	\$ 0.27	\$ 0.27	\$ 0.27
Avg poly ASP, \$/kg	\$ 68	\$ 90	\$ 93	\$ 73	\$ 60	\$ 79	\$ 51	\$ 39	\$ 27	\$ 25	\$ 36	\$ 25	\$ 25	\$ 24	\$ 24	\$ 25	\$ 24	\$ 24	\$ 24	\$ 24	\$ 24
Ingot/wafering, \$/W	\$ 0.23	\$ 0.25	\$ 0.24	\$ 0.22	\$ 0.22	\$ 0.23	\$ 0.17	\$ 0.17	\$ 0.15	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13
Cell/module, \$/W	\$ 0.51	\$ 0.48	\$ 0.48	\$ 0.44	\$ 0.42	\$ 0.45	\$ 0.40	\$ 0.39	\$ 0.39	\$ 0.37	\$ 0.39	\$ 0.35	\$ 0.34	\$ 0.34	\$ 0.33	\$ 0.34	\$ 0.31	\$ 0.31	\$ 0.31	\$ 0.31	\$ 0.31
Total Cost, \$/W	\$ 1.16	\$ 1.25	\$ 1.26	\$ 1.08	\$ 0.99	\$ 1.14	\$ 0.87	\$ 0.79	\$ 0.70	\$ 0.66	\$ 0.75	\$ 0.64	\$ 0.63	\$ 0.62	\$ 0.61	\$ 0.62	\$ 0.58	\$ 0.58	\$ 0.58	\$ 0.58	\$ 0.58
% Δ	(24.6%)	6.9%	0.6%	(13.9%)	(8.7%)	(1.8%)	(12.6%)	(8.6%)	(11.6%)	(6.0%)	(34.6%)	(3.0%)	(1.6%)	(0.9%)	(1.6%)	(16.5%)	(5.3%)	0.0%	0.0%	0.0%	(7.2%)
GM, %	33.8%	27.7%	22.3%	17.8%	12.7%	20.5%	11.5%	4.7%	0.8%	1.6%	5.2%	2.6%	6.7%	8.2%	8.5%	6.6%	7.8%	8.4%	9.9%	9.7%	8.9%
<b>SYSTEMS</b>																					
ASP, \$/W	\$ 2.85	\$ 2.85	\$ 2.65	\$ 2.55	\$ 2.50	\$ 2.54	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.38	\$ 2.46	\$ 2.38	\$ 2.38	\$ 2.38	\$ 2.26	\$ 2.34	\$ 2.26	\$ 2.26	\$ 2.26	\$ 2.14	\$ 2.22
% Δ	(26.3%)	9.6%	(7.0%)	(3.8%)	(2.0%)	(11.0%)	0.0%	0.0%	0.0%	(5.0%)	(3.1%)	0.0%	0.0%	0.0%	(5.0%)	(4.9%)	0.0%	0.0%	0.0%	(5.0%)	(5.0%)
MW's installed	3	0	0	1	2	3	1	1	2	1	5	1	1	1	1	5	28	35	25	35	123
Cumulative MW's	11	11	11	12	14	14	15	16	17	19	19	20	21	22	24	20	48	83	108	143	139
System Cost, \$/W	\$ 2.47	\$ 1.64	\$ 1.98	\$ 2.02	\$ 2.10	\$ 2.05	\$ 1.43	\$ 1.75	\$ 1.82	\$ 1.96	\$ 1.80	\$ 1.99	\$ 1.98	\$ 1.97	\$ 1.96	\$ 1.97	\$ 1.88	\$ 1.88	\$ 1.88	\$ 1.88	\$ 1.88
Revenue, \$MM	\$ 8.4	\$ 0.5	\$ 0.8	\$ 1.4	\$ 5.7	\$ 8.5	\$ 1.6	\$ 2.1	\$ 4.6	\$ 3.2	\$ 11.5	\$ 2.7	\$ 3.3	\$ 2.3	\$ 3.1	\$ 11.4	\$ 64.1	\$ 79.6	\$ 66.2	\$ 74.3	\$ 274.2
GM, %	13.3%	42.5%	25.4%	20.6%	16.1%	19.4%	42.7%	29.8%	27.1%	17.6%	27.1%	16.3%	16.7%	17.0%	13.0%	15.7%	16.7%	16.7%	16.7%	12.3%	15.5%
<b>TOTAL YGE</b>																					
Revenue, \$MM	\$ 1,869	\$ 520	\$ 664	\$ 660	\$ 403	\$ 2,248	\$ 495	\$ 479	\$ 349	\$ 457	\$ 1,780	\$ 370	\$ 472	\$ 336	\$ 461	\$ 1,639	\$ 403	\$ 504	\$ 361	\$ 497	\$ 1,764
GM, %	33.7%	27.7%	22.3%	17.8%	12.7%	20.5%	11.6%	4.9%	1.1%	1.8%	5.3%	2.7%	6.8%	8.2%	8.5%	6.6%	8.2%	9.7%	11.0%	10.1%	10.0%
EPS	\$ 1.36	\$ 0.35	\$ 0.36	\$ (0.18)	\$ (0.17)	\$ 0.38	\$ (0.18)	\$ (0.56)	\$ (0.40)	\$ (0.56)	\$ (1.70)	\$ (0.42)	\$ (0.36)	\$ (0.31)	\$ (0.31)	\$ (1.39)	\$ (0.27)	\$ (0.26)	\$ (0.24)	\$ (0.25)	\$ (1.03)

Source: Citi Research

Figure 168. YGE key metrics

	2011				2012				2013				2014			
FYE-DEC	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
Valuation Ratios																
Profitability Ratios																
Return On Equity	16.9%	16.4%	-8.0%	-292.4%	-22.9%	-50.8%	-107.0%	-71.9%	-62.4%	-61.6%	-60.6%	-72.0%	-74.8%	-87.2%	-99.8%	-136.4%
Return On Avg Equity	33.8%	33.4%	27.7%	-28.6%	-35.2%	-43.7%	-59.4%	-12.5%	-14.1%	-13.7%	7.6%	19.5%	30.7%	42.4%	55.4%	73.9%
Return on Invested Capital	5.6%	5.3%	1.4%	-0.8%	-0.1%	-2.4%	-2.9%	-4.5%	-2.8%	-2.0%	-1.4%	-1.5%	-0.9%	-0.7%	-0.4%	-0.6%
Return on Invested Capital ex cash	7.3%	7.1%	1.7%	-1.0%	-0.1%	-2.9%	-3.3%	-5.4%	-3.3%	-2.3%	-1.6%	-1.6%	-1.0%	-0.8%	-0.5%	-0.6%
Return On Assets	5.8%	5.3%	-2.4%	-54.9%	-4.0%	-7.4%	-13.7%	-8.3%	-6.6%	-5.6%	-5.1%	-5.1%	-4.4%	-4.3%	-4.1%	-4.2%
Return On Assets	12.3%	11.5%	9.0%	-7.4%	-8.9%	-10.0%	-12.8%	-1.9%	-2.0%	-1.7%	0.8%	1.8%	2.5%	3.0%	3.5%	3.7%
Return On Net Assets	7.6%	7.1%	-3.0%	-69.0%	-4.7%	-9.1%	-15.8%	-10.0%	-7.8%	-6.5%	-5.9%	-5.7%	-5.2%	-4.9%	-4.7%	-4.7%
Return On Net Assets	16.1%	15.0%	11.2%	-9.7%	-11.0%	-12.8%	-15.4%	-2.3%	-2.4%	-2.0%	0.9%	2.1%	3.0%	3.4%	4.0%	4.2%
Return On Sales	10.7%	8.5%	-4.2%	-146.9%	-9.2%	-18.5%	-42.9%	-19.1%	-17.8%	-12.0%	-14.5%	-10.7%	-10.8%	-8.4%	-10.9%	-8.2%
Return On Sales	19.4%	17.8%	14.4%	-13.1%	-16.7%	-22.5%	-33.7%	-4.5%	-5.2%	-4.5%	2.1%	4.5%	6.0%	7.0%	7.7%	8.3%
Return on Capital Employed	15.5%	13.2%	0.2%	-4.1%	-0.1%	-7.0%	-9.4%	-9.7%	-5.6%	-3.8%	-2.3%	-2.5%	-1.1%	-0.7%	-0.1%	-0.3%
* Avg Over Last 4 Qtrs																
Efficiency Ratios																
Sales/Total Assets	\$0.54	\$0.62	\$0.56	\$0.37	\$0.44	\$0.40	\$0.32	\$0.43	\$0.37	\$0.47	\$0.35	\$0.47	\$0.41	\$0.51	\$0.38	\$0.51
A/R Days Sales Out	67	62	72	86	97	94	131	50	55	55	55	55	55	55	55	55
Inventory Turns	3.33	5.38	5.77	3.42	3.43	3.08	3.07	5.21	6.08	6.08	6.08	6.08	7.30	7.30	7.30	7.30
Days of Inventory	110	68	63	107	106	118	119	70	60	60	60	60	50	50	50	50
Liquidity Ratios																
Current Ratio	1.3	1.2	1.0	1.0	1.0	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
Quick Ratio	0.8	0.8	0.7	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Net Working Capital	\$446.7	\$336.5	\$68.0	-\$53.6	-\$14.5	\$148.1	-\$79.2	-\$187.7	-\$91.8	-\$143.3	-\$186.9	-\$231.2	-\$129.8	-\$177.5	-\$222.1	-\$268.2
Long-term Debt/Equity	44.3%	50.5%	57.3%	113.5%	131.9%	195.2%	233.6%	272.4%	350.3%	401.9%	459.7%	538.3%	697.6%	840.7%	1037.1%	1369.0%
Total Debt/Equity	117.2%	132.9%	153.0%	275.6%	290.3%	378.7%	439.4%	514.2%	583.9%	669.8%	766.1%	897.0%	1119.6%	1349.3%	1664.5%	2197.2%
Op Inc/Assets, exc. Cash	3.0%	2.5%	0.0%	-0.7%	0.0%	-1.2%	-1.5%	-1.7%	-1.0%	-0.7%	-0.4%	-0.4%	-0.2%	-0.1%	0.0%	-0.1%
Op Inc (12 mth)/Avg Assets, exc. Cash																
Book & Cash Value																
Book Value Per Share	\$8.31	\$8.82	\$8.95	\$5.30	\$5.13	\$4.54	\$3.64	\$3.09	\$2.68	\$2.33	\$2.03	\$1.73	\$1.46	\$1.21	\$0.98	\$0.74
Book Value Per Share (Tangible)	\$7.91	\$8.42	\$8.55	\$5.19	\$5.03	\$4.45	\$3.57	\$3.02	\$2.61	\$2.25	\$1.96	\$1.65	\$1.39	\$1.14	\$0.91	\$0.67
Cash Per Share	\$5.74	\$6.81	\$5.87	\$5.76	\$4.33	\$5.64	\$3.78	\$4.59	\$4.04	\$3.43	\$3.48	\$2.87	\$3.64	\$3.07	\$3.14	\$2.50
Net Cash Per Share	-\$4.00	-\$4.90	-\$7.81	-\$8.84	-\$10.55	-\$11.55	-\$12.23	-\$11.30	-\$11.60	-\$12.17	-\$12.07	-\$12.63	-\$12.76	-\$13.27	-\$13.15	-\$13.74

Source: Citi Research

## Key risks

- YGE is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving.



- Raw materials make up a large portion of YGE's cost structure and it purchases the majority of these key materials on the spot market where prices have fluctuated significantly in recent years.
- YGE carries a debt-laden balance sheet with a healthy amount of debt short-term in maturity and is likely to need to raise money in the intermediate term to help fund its capital intensive move into manufacturing its own polysilicon.
- Geographically, YGE's sales are highly concentrated in Germany where feed-in-tariffs are apt to continue to come down and potentially at an accelerated rate and this could crimp demand and further pressure pricing.
- Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact on the company from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving/or may exceed our target price.

## Management Bio

### **Mr. Liansheng Miao - Chairman and Chief Executive Officer**

Mr. Liansheng Miao is the founder, Chairman of the Board, and Chief Executive Officer at Yingli Green Energy. Mr. Miao is also the founder and Chairman of Yingli Group, a privately held company. Mr. Miao also serves as the Executive Director on the Photovoltaic Committee of the China Renewable Energies Association, the Vice Chairman of the China Rural Area Electricity Supply Association, the Vice Chairman of the China Cells Industry Association, the Director of the Hebei New and High Technology Industry Association, and the Director of the New Energy Chamber of Commerce of All-China Federation of Industry and Commerce. Mr. Miao holds a bachelor's degree in Business Management from the Beijing Economics Institute and a master's degree in Business Administration from Peking University in China.

### **Mr. Xiangdong Wang - Executive Director and Vice President**

Mr. Xiangdong Wang is the Executive Director and Vice President at Yingli Green Energy. Prior to joining Yingli in 2001, Mr. Wang served as the Chief Accountant for Baoding Public Transportation Co., a company that provides urban public transportation services. Prior to Baoding Public Transportation Company, Mr. Wang was at Baoding Coal Co., a company engaged in the purchase and distribution of liquefied petroleum gas and liquefied natural gas, and Baoding Sewage Treatment Plant, a sewage treatment facility. Mr. Wang received his bachelor's degree in Economics from China People's University in China, and a master's degree in Economics from Hebei University in China.

### **Mr. Zhiheng Zhao - Vice President**

Mr. Zhiheng Zhao is the Vice President at Yingli Green Energy. Prior to joining Yingli in 2004, Mr. Zhao was the Head of the Project Department and later the Vice President of Tianwei Baobian, a manufacturer of large electricity transformers. Mr. Zhao later became the factory General Manager, overseeing the production of special transformers. Prior to that, Mr. Zhao also served as the General Manager of the Baoding Electric Transformer Manufacturing Company, an electricity transformer manufacturer, and as the General Manager of the Baoding Special Converter Manufacturing Factory, a manufacturer of special electricity converters. Mr. Zhao studied Management Engineering and graduated from the East China Institute of Heavy Machinery in China.

### **Mr. Zongwei (Bryan) Li - Director and Chief Financial Officer**

Mr. Zongwei (Bryan) Li is the Executive Director and Chief Financial Officer at Yingli Green Energy. Mr. Li also serves as an independent director and the chairman of the audit committee of Youku.com Inc., an Internet television company listed on the NYSE. Prior to joining Yingli in 2006, Mr. Li served as a senior audit manager PricewaterhouseCoopers for 11 years. Mr. Li holds a bachelor's degree in Mechanical Engineering from the Shanghai Institute of Technology and a bachelor's degree in International Finance and Insurance from the Shanghai Institute of Business and Administration. Mr. Li received his master's degree in Business Administration from the Olin School of Business of Washington University.

## **Financial models**

Figure 169. YGE income statement model

[illegible]

Source: Citi Research

Units in \$mm unless noted

Figure 170. YGE balance sheet

FYE-DEC	2009				2010				2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b><u>Assets</u></b>																								
Cash & Securities	199.38	383.68	389.32	507.37	613.52	576.81	630.21	985.01	922.12	1,092.81	929.17	891.87	674.68	882.48	591.99	721.35	637.09	541.43	551.43	456.28	580.38	491.57	503.93	403.10
Restricted Cash	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Short-term investments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Accounts Receivables	278.03	299.91	394.45	286.94	180.02	212.19	307.25	318.15	385.65	464.00	524.12	383.21	531.73	505.75	512.42	250.88	223.75	285.53	202.85	278.64	243.77	304.36	217.95	300.34
Inventory	344.71	278.73	256.36	243.93	275.47	275.47	335.50	382.37	461.02	395.47	424.36	424.37	515.96	290.45	461.74	345.08	237.53	290.45	202.11	278.03	249.06	240.17	176.41	285.71
Prepaid expenses and other current assets	143.01	140.26	150.63	141.71	178.56	196.03	244.55	269.89	269.48	240.77	320.96	324.47	386.36	362.69	343.81	343.81	343.81	343.81	343.81	343.81	343.81	343.81	343.81	343.81
<b>Total Current Assets</b>	<b>965.13</b>	<b>1,102.58</b>	<b>1,190.76</b>	<b>1,179.95</b>	<b>1,230.37</b>	<b>1,260.50</b>	<b>1,517.50</b>	<b>1,955.62</b>	<b>2,038.27</b>	<b>2,193.05</b>	<b>2,170.41</b>	<b>2,023.91</b>	<b>2,108.73</b>	<b>2,352.42</b>	<b>1,909.95</b>	<b>1,661.12</b>	<b>1,442.17</b>	<b>1,462.12</b>	<b>1,301.19</b>	<b>1,356.76</b>	<b>1,369.12</b>	<b>1,389.63</b>	<b>1,242.10</b>	<b>1,292.65</b>
Restricted Cash																								
Net PP&E	646.12	779.69	919.09	963.08	1,072.90	1,285.36	1,436.72	1,505.15	1,583.07	1,872.51	2,179.78	1,968.44	2,055.09	2,110.18	2,129.37	2,143.72	2,141.04	2,138.36	2,135.69	2,133.01	2,140.94	2,148.87	2,156.80	2,164.73
Net Goodwill	95.31	91.79	91.65	70.54	68.76	67.41	66.69	64.78	63.59	63.14	62.08	61.75	61.59	61.54	61.75	61.75	61.75	61.75	61.75	61.75	61.75	61.75	61.75	61.75
Intangible Assets, Net	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Long-term prepaids	91.97	100.21	98.59	99.37	89.38	78.43	80.93	76.41	133.40	172.68	226.50	210.16	205.27	197.72	202.95	202.95	202.95	202.95	202.95	202.95	202.95	202.95	202.95	202.95
Other long-term assets	46.09	44.86	45.12	83.06	83.30	87.14	88.93	66.88	73.84	83.51	104.00	146.62	155.39	193.34	209.65	209.65	209.65	209.65	209.65	209.65	209.65	209.65	209.65	209.65
<b>Total Assets</b>	<b>\$1,844.62</b>	<b>\$2,121.12</b>	<b>\$2,345.21</b>	<b>\$2,396.00</b>	<b>\$2,545.71</b>	<b>\$2,778.84</b>	<b>\$3,190.77</b>	<b>\$3,669.83</b>	<b>\$3,892.76</b>	<b>\$4,384.89</b>	<b>\$4,743.67</b>	<b>\$4,366.67</b>	<b>\$4,540.07</b>	<b>\$4,867.20</b>	<b>\$4,463.66</b>	<b>\$4,229.18</b>	<b>\$4,007.56</b>	<b>\$4,023.93</b>	<b>\$3,861.23</b>	<b>\$3,914.12</b>	<b>\$3,934.41</b>	<b>\$3,962.85</b>	<b>\$3,823.24</b>	<b>\$3,881.72</b>
<b><u>Liab. &amp; Shareholders' Equity</u></b>																								
Short-Term Debt	380.79	266.09	460.40	702.16	777.15	794.20	750.09	842.10	972.72	1,164.81	1,355.17	1,328.97	1,266.40	1,303.99	1,174.13	1,174.13	986.22	986.22	986.22	986.22	986.22	986.22	986.22	986.22
Accounts Payable	133.77	152.41	198.59	271.35	295.56	313.34	344.17	375.06	417.77	483.87	567.39	473.03	629.26	686.69	583.98	443.67	316.71	387.27	270.82	370.71	281.65	349.86	246.97	345.60
Accrued Liabilities	35.62	42.26	79.58	34.08	58.70	63.02	135.04	265.10	201.06	203.92	179.80	255.48	227.55	213.64	231.04	231.04	231.04	231.04	231.04	231.04	231.04	231.04	231.04	231.04
Current portion of customer advances	8.03	4.01	6.07	9.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Current Liabilities</b>	<b>558.21</b>	<b>466.77</b>	<b>744.64</b>	<b>1,016.63</b>	<b>1,131.42</b>	<b>1,170.56</b>	<b>1,229.29</b>	<b>1,482.27</b>	<b>1,591.54</b>	<b>1,856.56</b>	<b>2,102.37</b>	<b>2,057.49</b>	<b>2,123.31</b>	<b>2,204.32</b>	<b>1,989.15</b>	<b>1,848.85</b>	<b>1,533.98</b>	<b>1,604.54</b>	<b>1,488.09</b>	<b>1,587.98</b>	<b>1,498.91</b>	<b>1,567.13</b>	<b>1,464.24</b>	<b>1,560.83</b>
Long-Term Debt	361.78	427.27	359.14	1,026.96	1,208.38	245.81	429.29	543.78	591.87	1,184.16	810.37	930.79	1,059.91	1,386.96	1,332.32	1,322.95	1,479.54	1,479.54	1,479.54	1,479.54	1,630.10	1,630.10	1,630.10	1,630.10
Deferred Tax	7.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	35.92	29.46	31.58	46.15	49.28	49.28	49.28	49.28	87.43	87.43	87.43	87.43	282.71	285.71	285.71	285.71	285.71	285.71	285.71	285.71	285.71	285.71	285.71	285.71
<b>Total Liabilities</b>	<b>963.67</b>	<b>972.50</b>	<b>1,137.35</b>	<b>1,182.44</b>	<b>1,295.95</b>	<b>1,475.75</b>	<b>1,752.04</b>	<b>2,108.31</b>	<b>2,254.84</b>	<b>2,650.15</b>	<b>3,024.43</b>	<b>3,245.96</b>	<b>3,440.83</b>	<b>3,863.69</b>	<b>3,607.19</b>	<b>3,457.59</b>	<b>3,299.22</b>	<b>3,369.79</b>	<b>3,253.34</b>	<b>3,353.22</b>	<b>3,414.72</b>	<b>3,482.93</b>	<b>3,380.04</b>	<b>3,476.64</b>
Minority Interest	200.95	205.95	215.57	225.26	245.28	255.95	272.58	291.33	301.07	312.69	304.08	300.68	299.92	292.99	286.01	286.01	286.01	286.01	286.01	286.01	286.01	286.01	286.01	286.01
Shareholders' Equity	680.01	942.67	992.28	988.30	1,004.49	1,047.14	1,166.15	1,270.19	1,334.85	1,414.06	1,415.16	820.03	799.32	710.52	570.47	485.66	422.32	368.13	321.88	278.81	233.68	193.90	157.19	119.07
<b>Total Liab. and Equity</b>	<b>\$1,844.62</b>	<b>\$2,121.12</b>	<b>\$2,345.21</b>	<b>\$2,396.00</b>	<b>\$2,545.71</b>	<b>\$2,778.84</b>	<b>\$3,190.77</b>	<b>\$3,669.83</b>	<b>\$3,892.76</b>	<b>\$4,384.89</b>	<b>\$4,743.67</b>	<b>\$4,366.67</b>	<b>\$4,540.07</b>	<b>\$4,867.20</b>	<b>\$4,463.66</b>	<b>\$4,229.17</b>	<b>\$4,007.56</b>	<b>\$4,023.93</b>	<b>\$3,861.23</b>	<b>\$3,914.11</b>	<b>\$3,934.41</b>	<b>\$3,962.85</b>	<b>\$3,823.24</b>	<b>\$3,881.72</b>

Source: Citi Research

Units in \$mm unless noted

Figure 171. YGE rolling 12M P&amp;L

	2009				2010				2011				2012				2013				2014			
	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4A	Q1A	Q2A	Q3A	Q4E	Q1E	Q2E	Q3E	Q4E	Q1E	Q2E	Q3E	Q4E
<b>Total Revenues</b>	\$1,019.6	\$949.4	\$949.9	\$1,062.5	\$1,275.1	\$1,453.8	\$1,618.7	\$1,864.0	\$2,032.4	\$2,314.8	\$2,491.7	\$2,283.5	\$2,256.2	\$2,064.1	\$1,752.4	\$1,801.0	\$1,671.2	\$1,655.2	\$1,634.8	\$1,639.3	\$1,672.4	\$1,703.5	\$1,728.5	\$1,764.4
- Sequential Change	(7.4%)	(6.9%)	0.1%	11.9%	20.0%	14.0%	11.3%	15.2%	9.0%	13.9%	7.6%	(8.4%)	(1.2%)	(8.5%)	(15.1%)	2.8%	(7.2%)	(1.0%)	(1.2%)	0.3%	2.0%	1.9%	1.5%	2.1%
- Yr to Yr Change	42.5%	7.1%	-8.8%	-3.2%	23.1%	53.1%	70.4%	75.4%	59.4%	59.2%	53.9%	22.5%	11.0%	-10.8%	-29.7%	-21.1%	-25.9%	-19.8%	-6.7%	-9.0%	0.1%	2.9%	5.7%	7.0%
<b>Cost of Goods</b>	\$814.5	\$778.7	\$786.1	\$822.8	\$938.2	\$1,023.5	\$1,090.3	\$1,242.9	\$1,386.6	\$1,652.5	\$1,921.1	\$1,869.6	\$1,928.4	\$1,860.9	\$1,618.7	\$1,705.9	\$1,624.6	\$1,602.6	\$1,557.4	\$1,530.5	\$1,536.4	\$1,550.7	\$1,563.7	\$1,588.6
- % of Revenue	79.9%	82.0%	82.8%	77.4%	73.6%	70.4%	67.4%	66.7%	68.2%	71.4%	77.1%	81.9%	85.5%	90.2%	92.4%	94.7%	97.2%	96.8%	95.3%	91.4%	91.9%	91.0%	90.5%	90.0%
<b>Gross Margin</b>	\$205.1	\$170.7	\$163.8	\$239.7	\$336.9	\$430.3	\$528.3	\$621.1	\$645.7	\$662.3	\$570.6	\$414.0	\$327.8	\$203.3	\$133.6	\$95.1	\$46.6	\$52.5	\$77.4	\$108.8	\$136.0	\$152.8	\$164.8	\$175.8
- % of Revenue	20.1%	18.0%	17.2%	22.6%	26.4%	29.6%	32.6%	33.3%	31.8%	28.6%	22.9%	18.1%	14.5%	9.8%	7.6%	5.3%	2.8%	3.2%	4.7%	6.6%	8.1%	9.0%	9.5%	10.0%
- Sequential Change	(8.8%)	2.0%	12.6%	76.0%	20.5%	19.4%	15.9%	4.9%	6.5%	4.4%	5.9%	5.8%	2.5%	6.4%	-2.8%	-1.3%	(7.2%)	-4.8%	-9.4%	-2.0%	(0.4%)	-1.2%	-0.7%	-4.9%
- Yr to Yr Change	31.8%	13.9%	21.0%	103.9%	143.0%	184.3%	192.6%	54.8%	37.2%	20.0%	9.6%	24.6%	19.9%	22.2%	12.7%	5.1%	-4.9%	(18.1%)	(24.0%)	(29.0%)	(23.8%)	(17.8%)	(9.9%)	(3.1%)
- Basis Sequential	(156)	(214)	(73)	531	386	318	304	68	(155)	(316)	(571)	(477)	(360)	(468)	(222)	(235)	(249)	38	156	190	150	84	56	43
- Basis Yr to Yr	(404)	(693)	(707)	89	631	1,162	1,539	1,076	535	(99)	(974)	(1,519)	(1,724)	(1,877)	(1,527)	(1,285)	(1,174)	(667)	(289)	136	534	580	480	333
<b>R&amp;D</b>	\$10.9	\$16.8	\$22.0	\$27.0	\$25.6	\$24.6	\$22.1	\$20.5	\$25.5	\$35.9	\$43.8	\$44.4	\$42.4	\$33.6	\$28.7	\$27.3	\$29.4	\$29.6	\$28.5	\$30.0	\$30.0	\$30.0	\$30.0	\$30.0
- % of Revenue	1.1%	1.8%	2.3%	2.5%	2.0%	1.7%	1.4%	1.1%	1.3%	1.6%	1.8%	1.9%	1.9%	1.6%	1.6%	1.5%	1.8%	1.8%	1.7%	1.8%	1.8%	1.8%	1.7%	1.7%
- Sequential Change	30.4%	54.3%	30.5%	22.9%	(5.2%)	-4.0%	-9.9%	-7.3%	24.4%	40.7%	21.8%	1.4%	(4.4%)	-20.8%	-14.4%	4.9%	7.6%	0.7%	-3.7%	5.3%	0.0%	0.0%	0.0%	0.0%
- Yr to Yr Change	327.0%	466.7%	325.6%	222.6%	134.7%	46.0%	0.8%	(24.0%)	-4.3%	46.2%	97.6%	116.1%	66.0%	(6.6%)	(34.3%)	(38.4%)	-30.6%	(11.8%)	(0.8%)	9.8%	2.0%	1.3%	5.3%	0.0%
- Basis Sequential	31	70	54	23	(53)	(32)	(32)	(27)	16	30	20	19	(6)	(25)	1	(12)	24	3	(5)	9	(4)	(3)	(3)	(4)
- Basis Yr to Yr	71	144	182	178	94	(8)	(94)	(144)	(75)	(14)	39	84	62	7	(12)	(43)	(12)	16	10	31	3	(3)	(1)	(13)
<b>SG&amp;A</b>	\$56.3	\$57.5	\$64.7	\$113.9	\$136.9	\$163.4	\$189.4	\$176.3	\$187.8	\$196.0	\$207.6	\$219.6	\$225.2	\$239.6	\$233.9	\$230.9	\$214.2	\$196.2	\$177.8	\$163.9	\$163.2	\$161.3	\$160.2	\$158.8
- % of Revenue	5.5%	6.1%	6.8%	10.7%	10.7%	11.2%	11.7%	9.5%	9.2%	8.5%	8.3%	9.6%	10.0%	11.6%	13.3%	12.8%	12.8%	11.9%	10.9%	10.0%	9.8%	9.5%	9.3%	9.0%
- Sequential Change	(8.8%)	2.0%	12.6%	76.0%	20.5%	19.4%	15.9%	4.9%	6.5%	4.4%	5.9%	5.8%	2.5%	6.4%	-2.8%	-1.3%	(7.2%)	-4.8%	-9.4%	-2.0%	(0.4%)	-1.2%	-0.7%	-4.9%
- Yr to Yr Change	31.8%	13.9%	21.0%	103.9%	143.0%	184.3%	192.6%	54.8%	37.2%	20.0%	9.6%	24.6%	19.9%	22.2%	12.7%	5.1%	-4.9%	(18.1%)	(24.0%)	(29.0%)	(23.8%)	(17.8%)	(9.9%)	(3.1%)
- Basis Sequential	45	53	76	391	1	51	46	(224)	(22)	(77)	(14)	129	36	163	174	(53)	(0)	(96)	(98)	(88)	(24)	(29)	(20)	(27)
- Basis Yr to Yr	(45)	36	168	565	521	519	489	(126)	(149)	(277)	(337)	16	74	314	502	320	284	25	(247)	(282)	(306)	(239)	(161)	(100)
<b>BLE</b>	\$67.2	\$74.3	\$86.7	\$140.9	\$162.5	\$188.0	\$211.5	\$196.8	\$213.3	\$232.0	\$251.3	\$264.0	\$267.6	\$273.2	\$262.7	\$258.2	\$243.6	\$225.8	\$206.3	\$193.9	\$193.2	\$191.3	\$190.2	\$188.8
- % of Revenue	6.6%	7.8%	9.1%	13.3%	12.7%	12.9%	13.1%	10.6%	10.5%	10.0%	10.1%	11.0%	11.9%	13.2%	15.0%	14.3%	14.6%	13.6%	12.6%	11.8%	11.6%	11.2%	11.0%	10.7%
- Sequential Change	4.6%	10.5%	16.7%	62.6%	15.3%	15.7%	12.5%	-6.9%	8.4%	8.7%	8.4%	5.0%	1.4%	2.1%	-3.8%	-1.7%	(5.7%)	-7.3%	-8.6%	-6.0%	(0.4%)	-1.2%	-0.6%	-4.9%
- Yr to Yr Change	48.5%	39.0%	47.8%	119.3%	141.6%	153.0%	144.0%	39.7%	31.3%	23.4%	18.8%	34.1%	25.4%	17.8%	4.5%	(2.2%)	-9.0%	(17.3%)	(21.4%)	(24.9%)	-20.7%	(15.3%)	(7.8%)	(2.6%)
- Basis Sequential	76	123	130	414	(52)	19	14	(251)	(60)	(47)	7	147	30	138	175	(65)	24	(89)	(102)	(79)	(28)	(32)	(23)	(60)
- Basis Yr to Yr	26	180	350	743	615	510	394	(270)	(224)	(291)	(298)	100	136	321	490	278	272	41	(237)	(251)	(302)	(241)	(162)	(113)
<b>Operating Margin</b>	\$137.9	\$96.4	\$77.2	\$98.8	\$174.4	\$242.3	\$316.8	\$424.3	\$432.4	\$430.4	\$319.2	\$150.0	\$60.2	(\$69.9)	(\$129.1)	(\$163.1)	(\$197.0)	(\$173.3)	(\$128.9)	(\$85.2)	(\$57.2)	(\$38.4)	(\$25.4)	(\$13.0)
- % of Revenue	13.5%	10.2%	8.1%	9.3%	13.7%	16.7%	19.6%	22.8%	21.3%	18.6%	12.8%	6.6%	2.7%	-3.4%	-7.4%	-9.1%	-11.8%	-10.5%	-7.9%	-5.2%	-3.4%	-2.3%	-1.5%	-0.7%
- Sequential Change	(20.9%)	(30.1%)	(20.9%)	28.1%	76.6%	38.9%	30.7%	33.9%	1.9%	-6.5%	-25.8%	(53.0%)	(59.8%)	(216.1%)	(84.6%)	36.4%	20.7%	-12.0%	(25.4%)	(31.9%)	(32.8%)	(32.8%)	(34.1%)	(48.7%)
- Yr to Yr Change	8.1%	(42.4%)	(60.4%)	(43.3%)	26.5%	151.4%	310.6%	329.4%	147.9%	77.6%	0.8%	(64.6%)	-86.1%	(116.2%)	(140.4%)	(208.8%)	-427.0%	147.9%	(0.1%)	(47.8%)	(70.9%)	(77.8%)	(80.3%)	(84.7%)
- Basis Sequential	(231)	(337)	(203)	118	438	299	290	319	(149)	(268)	(578)	(624)	(390)	(606)	(398)	(169)	(273)	131	258	269	177	116	79	73
- Basis Yr to Yr	(431)	(873)	(1,056)	(653)	16	652	1,145	1,346	760	192	(676)	(1,619)	(1,861)	(2,198)	(2,018)	(1,563)	(1,445)	(708)	(52)	386	836	821	642	446
<b>Other Income (Exp)</b>	(\$27.1)	(\$39.1)	(\$49.3)	(\$54.2)	(\$55.7)	(\$48.9)	(\$47.6)	(\$55.3)	(\$61.7)	(\$75.1)	(\$85.3)	(\$93.3)	(\$104.0)	(\$113.8)	(\$130.5)	(\$138.2)	(\$142.9)	(\$145.5)	(\$141.2)	(\$142.5)	(\$144.7)	(\$146.7)	(\$148.7)	(\$150.7)
- % of Revenue	-2.7%	-4.1%	-5.2%	-5.1%	-4.4%	-3.4%	-2.9%	-3.0%	-3.0%	-3.2%	-3.4%	-4.1%	-4.6%	-5.5%	-7.4%	-7.7%	-8.6%	-8.2%	-8.6%	-8.7%	-8.7%	-8.6%	-8.6%	-8.5%
- Sequential Change	36.2%	44.4%	26.0%	9.9%	2.8%	-12.3%	-2.6%	16.2%	11.5%	21.8%	13.6%	9.3%	11.5%	9.4%	14.7%	5.9%	3.4%	1.8%	-2.9%	0.9%	1.6%	1.4%	1.4%	1.4%
- Yr to Yr Change	218.8%	266.4%	215.5%	172.6%	105.6%	24.9%	(3.5%)	2.1%	10.8%	53.8%	79.2%	68.5%	68.6%	51.5%	53.0%	48.2%	37.4%	27.8%	8.2%	3.1%	1.2%	0.8%	5.3%	5.8%
- Basis Sequential	(85)	(146)	(107)	7	73	101	42	(3)	(13)	(21)	(18)	(66)	(55)	(90)	(193)	(22)	(88)	24	(15)	(5)	4	1	4	5
- Basis Yr to Yr	(147)	(282)	(369)	(329)	(171)	76	225	213	133	12	(48)	(112)	(137)	(227)	(403)	(359)	(394)	(328)	(119)	(102)	(10)	18	4	15
<b>Profit Before Taxes</b>	\$164.9	\$135.5	\$126.5	\$153.0	\$230.1	\$291.2	\$364.4	\$479.6	\$494.1	\$505.5	\$404.5	\$243.3	\$164.2	\$43.9	\$1.5	(\$24.9)	(\$54.0)	(\$27.8)	\$12.3	\$57.3	\$87.5	\$108.3	\$123.4	\$137.7
- % of Revenue	16.2%	14.3%	13.3%	14.4%	18.0%	20.0%	22.5%	25.7%	24.3%	21.8%	16.2%	10.7%	7.3%	2.1%	0.1%	-1.4%	-3.2%	-1.7%	0.8%	3.5%	5.2%	6.4%	7.1%	7.8%
- Sequential Change	(15.1%)	-17.8%	-6.7%	21.0%	50.4%	26.5%	25.1%	31.6%	3.0%	2.3%	-20.0%	-39.9%	(32.5%)	-73.3%	-96.6%	-170.2%	116.6%	-48.5%	-144.4%	364.8%	52.6%	21.8%	13.9%	11.6%
- Yr to Yr Change	21.2%	(23.9%)	(39.9%)	(21.2%)	39.5%	114.9%	188.2%	213.5%	114.7%	73.6%	11.0%	(49.3%)	-66.8%	(91.3%)	(99.6%)	(110.3%)	-132.9%	(163.3%)	730.8%	(329.8%)	-262.0%	(489.6%)	900.5%	140.3%
- Basis Sequential	(146)	(190)	(96)	108	365	198	248	322	(142)	(248)	(560)	(558)	(337)	(515)	(204)	(147)	(185)	155	243	274	173	112	78	67
- Basis Yr to Yr	(284)	(581)	(687)	(324)	187	576	920	1,133	626	181	(628)	(1,508)	(1,703)	(1,971)	(1,615)	(1,204)	(1,051)	(381)	67	488	846	803	638	431
<b>Taxes</b>	(\$4.7)	(\$2.1)	\$2.5	\$4.8	\$12.5	\$19.9	\$31.2	\$44.9	\$50.9	\$52.5	\$31.2	(\$21.9)	(\$32.6)	(\$59.8)	(\$69.8)	(\$43.2)	(\$54.0)	(\$46.3)	(\$37.8)	(\$31.9)	(\$28.3)	(\$25.9)	(\$24.4)	(\$22.9)
- Tax Rate																								
<b>Other After Tax</b>	(\$25.4)	(\$16.7)	(\$16.9)	(\$15.3)	(\$25.8)	(\$30.1)	(\$33.5)	(\$46.5)	(\$48.1)	(\$41.9)	(\$15.4)	\$9.3	\$18.1	\$26.2	\$22.1	\$9.4	\$6.1	(\$3.2)	(\$16.3)	(\$15.0)	(\$15.0)	(\$15.0)	(\$15.0)	(\$15.0)
<b>Extraordinary Item</b>	\$0.0	\$0.0	\$0.0	\$19.2	\$19.2	\$19.2	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$573.8	\$590.9	\$594.1	\$683.3	\$109.5	\$92.5	\$89.2	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>Net Income-Ops</b>	\$53.7	(\$33.5)	(\$37.3)	(\$58.9)	\$9.9	\$99.8	\$150.4	\$221.7	\$249.9	\$275.7	\$179.0	\$70.6	(\$15.1)	(\$161.0)	(\$197.1)	(\$259.8)	(\$296.0)	(\$264.6)	(\$248.6)	(\$210.8)	(\$188.6)	(\$174.2)	(\$164.7)	(\$155.8)
- % of Revenue	5.3%	-3.5%	-3.9%	-5.5%	0.8%	6.9%	9.3%	11.9%	12.3%	11.9%	7.2%	3.1%	-0.7%	-7.8%	-11.2%	-14.4%	-17.7%	-16.0%</						

## Advanced Energy Industries Inc

### Company description

Advanced Energy Industries operates under two key business segments: Thin Films and Solar Energy. The latter segment has become a greater contributor to consolidated results recently with the rapid growth of North America inverter sales. Advanced Energy is a leading provider of components and subsystems to a variety of industries utilizing high-technology manufacturing processes. The firm's suite of products in power conversion are critical to the production of semiconductors, flat panel displays, data storage products, solar PV, architectural glass, and other advanced product applications. Targeting both OEMs and end users, Advanced Energy's operations reach around the globe with regional centers in North America, Asia, and Europe, in addition to its growing manufacturing base in China. Advanced Energy continues to enter new markets vis-à-vis strategic acquisitions and partnerships, as well as through internally developed proprietary, process-focused technologies - all key elements that further strengthen the company's position in process-critical, scalable, highly-patented technologies. Recently, more focus has been turned to the inverter segment (Solar Energy) which now comprises of greater than 50% of consolidated results. Founded in 1981, the company is headquartered in Fort Collins, Colorado and has 1,500 employees.

### Investment strategy

We rate the shares of AEIS Buy/High Risk (1H). Following the recently announced restructuring effort, AEIS has become a healthy cash generator well positioned to capitalize on the growth of commercial and utility scale projects in North America – a region remaining early in the growth cycle. Shares of AEIS are a core holding for investors looking to gain exposure into the downstream solar market while avoiding some of the pitfalls that have impacted the upstream segment - i.e. the commoditization of the module business.

### Valuation

Our target price for AEIS shares is \$20. At this juncture, we apply a premium mid cycle semi multiple of 14.0x (12.5x is mid cycle for semi sector as highlighted by our semi equipment team) to our 2013 EPS estimate of \$1.06. This equates to an equity value of \$14.82/share to which we add ~\$5/share for cash on hand to arrive at our 12 month target price of \$20/share. The solar inverter business remains at a very early growth stage in the cycle and only recently has become a greater contributor to consolidated results for AEIS. As AEIS' business shifts more towards solar energy inverters and less emphasis is placed on traditional cyclical industries, we will look to employ more of a traditional sum-of-the-parts valuation methodology.

### Risks

The key risks to our investment thesis on AEIS are: 1) low earnings stability and, with a Beta of 1.5, high stock price volatility; 2) AEIS derives a significant portion of its revenue from the highly cyclical semiconductor industry and has exposure to other volatile markets such as flat panel display. Any unexpected drop in semiconductor demand or delays/cancellations in new fab projects or expansion could significantly lower demand for AEIS products; 3) AEIS may face further margin erosion in its solar inverter business, particularly if solar demand growth is slower than industry's inverter production expansion; 4) AEIS also is subject to competitive pricing pressure. For its inverter business, AEIS's European competitors

may choose to compete in US market which is dominated by AEIS right now, causing a pricing war for market share. Additionally, on semi side, as its OEM customers look to increase the proportion of their outsourced components, specifically in the form of subsystems, AEIS faces the risk of share loss should it not be able to offer its customers a complete solution similar to those being offered by some of its top rivals.

On the other hand, upside risks to our target price include any increase in market share in solar inverter, particularly in Europe, and at its largest customer (AMAT) in semis, especially in the PVD business where AEIS only has the DC power supply exposure, as well as better-than-expected GM improvement driven by incremental outsourcing benefits.

## First Solar Inc.

### Company description

First Solar, Inc. is a leading manufacturer of solar modules based on thin film technology. By leveraging a proprietary process centered on the semiconductor material cadmium telluride, the company has been able to achieve a significant manufacturing cost advantage relative to its silicon-based peers in the solar photovoltaic market – although this benefit has contracted with the drop in Poly prices. Headquartered in AZ, the company boasts a global manufacturing base with sites in North America and Asia. First Solar's copy-exact manufacturing strategy, combined with its minimal need for polysilicon, continues to drive capacity expansion that has fueled better growth than many of its solar PV peers in the utility scale market. Moving forward, First Solar will increasingly become known as a

### Investment strategy

We rate shares of FSLR Buy/High Risk (1H). Our sector tilt is favorable towards solar downstream names versus the upstream manufacturers – FSLR is the bellwether in the downstream market. FSLR's balance sheet strength and bankability premium should allow it to continue to capture large scale projects in key growth regions globally – we see a robust pipeline outlook for the next several years.

### Valuation

Our target price for FSLR shares is \$41. Our 12 month target price for FSLR shares is based on a Sum-Of-The-Parts analysis – valuing the pure EPC/Development business separately from Thin Film module sales. For the pure EPC/project development segment (ex module sales), we apply a discounted cash flow analysis to our forecasted project pipeline to arrive at an estimated enterprise value of \$1.9B. For Thin Film module sales (3rd party and in-house projects), we employ an EV/Sales multiple based approach. To our 2013 module sales forecast of \$1.4B, we apply a 0.8x EV/Sales multiple – consistent with the average comp for our globally diverse solar index – to arrive a module-only enterprise value of \$1.0B. The sum of our pure EPC/project development segment and module only sales segment equates to a combined enterprise value of \$2.9B. With forecasted cash exceeding total debt levels in 2013, we add ~\$700mm to our enterprise value to arrive at an equity value of \$3.7B or \$41/share.

We also derive a secondary methodology for valuing FSLR shares where we incorporate a risk adjusted/probability weighted free cash flow model to the entire

business. This secondary valuation methodology equates to an equity value per share of ~\$41 as well.

## Risks

We rate FSLR High Risk primarily due to high earnings and stock price volatility. Additional risk factors include: 1) FSLR is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving, 2) Raw material shortages in key manufacturing inputs such as tellurium (Te) could limit FSLR's ability to expand capacity and/or add pressure to margins as prices increase, 3) FSLR's business model is relatively capital-intensive and could limit the company's ability to generate positive cash flows while also driving increased need to raise additional capital, potentially via dilutive equity/debt offerings, 4) FSLR's sales are concentrated among a handful of large customers. Moreover, a large percentage of its sales are from Europe (primarily Germany) and any material weakening of the Euro relative to USD could impact its results, 5) Demand for solar photovoltaic technology has been largely driven by a favorable regulatory environment in key countries like Germany and Italy. Any material reductions in these financial incentive programs could crimp demand for solar PV, 6) Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general.

On the other hand, if FSLR pulls forward some of its large-project business and/or is awarded additional utility-scale deals ahead of expectations, the stock is likely to outperform our price target.

If the impact on the company from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving/or may exceed our target price.

## MEMC Electronic Materials Inc.

### Company description

MEMC Electronic Materials, Inc. has essentially two operating segments: Semiconductor Materials and Solar Energy. The Solar Energy segment is WFR's technology agnostic, solar project development business that designs, installs, finances and monitors solar energy projects at the commercial and utility scale level through SunEdison. SunEdison also provides operations and maintenance services. The Semiconductor Materials segment is a leading supplier of raw silicon wafers to the semiconductor industry. MEMC's Semi Materials segment includes virtually all major chipmakers in its customer base, with a #3 leading market share – essentially tied with Wacker. The company's products include 100mm, 125mm, 150mm, 200mm and 300mm prime polished wafers, epitaxial wafers, and test and monitor wafers for semiconductor devices including memory, logic and microprocessors. The company was founded in 1959 and located in St. Peters, MO.

### Investment strategy

We rate shares of WFR Buy/High risk (1H). Our favorable outlook on WFR shares is predicated on: (1) solid growth prospects at SunEdison – WFR's tech agnostic project development solar business and (2) demand/pricing improvement in the semi 300mm wafer segment in 2013 as highlighted by Citi Analyst Takao Kanai. That said, the solar segment is the key area of growth for us. With our favorable

sector tilt towards downstream players in the solar space (vs. upstream manufacturers), SunEdison is well positioned to capitalize on emerging growth opportunities in the US and overseas sustainable markets.

## Valuation

Our target price for WFR shares is \$5.40. Our 12 month target price for WFR shares is based on a Sum-Of-The-Parts analysis – valuing the Semiconductor Materials and Solar Energy (SunEdison) segment separately. For the Solar Energy segment, we apply a discounted cash flow analysis to our forecasted project pipeline to arrive at an estimated Solar Energy enterprise value of \$2.3B for SunEdison. For the Semiconductor Materials segment, we employ a comparable EV/Sale multiple approach. To our 2013 Semiconductor Material sales forecast of \$946mm, we apply a 0.9x EV/Sales multiple to arrive at an enterprise value of \$851mm. Our Semiconductor Materials target multiple is consistent with a #3 market position (i.e. Wacker) in the Semi Wafer industry (the #1 and #2 market share leaders trade at 1.7x EV/Sales and control over 65% of the industry).

The sum of our Solar Energy and Semiconductor Materials enterprise value equates to \$3.2B to which we back out \$1.9B in consolidated net debt to arrive at an equity value of \$1.3B or \$5.40/share.

## Risks

We rate MEMC shares High risk due to a number of factors including the following.

1) WFR has heavy exposure to the cyclical semiconductor industry that typically has limited visibility and a high degree of uncertainty regarding the timing and duration of cycles. Silicon wafer demand is highly correlated to semiconductor units, and thus any fall-off in chip demand would negatively affect wafer demand. 2) The commodity nature of wafers subjects wafer suppliers to intense competitive pressures and aggressive pricing. 3) WFR has a high debt/equity and we note that the company competes in an industry where there are few product differentiators, thus making capital spending one of the key differentiators. 4) WFR's solar revenues are hard to predict and now depend on the spot market for wafers which can be volatile. 5) SunEdison revenue is very hard to predict and the financials are reported as non-GAAP.

If the impact on the company from any of these factors proves to be greater than we anticipate, the stock will likely have difficulty achieving our target price. However, should they be less than anticipated, the stock could trade above our target price.

## SunPower Corp.

### Company description

Headquartered in California, SunPower Corp. is a vertically integrated manufacturer and service provider of solar photovoltaic technology. The company offers a suite of solar cells and solar panels based on traditional crystalline silicon technology and leverages proprietary manufacturing processes that have enabled it to achieve industry-leading conversion efficiencies. With its acquisition of PowerLight in early 2007, the company also entered into the solar systems segment where it designs, manufactures, and installs grid-connected commercial solar electric products and systems, integrating solar panels from both SunPower and external suppliers. Before its IPO in late 2005, SunPower operated as a subsidiary of Cypress Semiconductor.



## Investment strategy

Our rating on SunPower is Buy/High Risk (1H). SPWR's industry leading efficiency panels, massive downstream channel, the backing of oil giant Total and, strategic JVs with key industry players make it the perfect package. With a global recognized brand and distribution channel, SPWR is best positioned to capture growth in the residential and commercial scale market. Recent project wins at the utility scale level have been gravy – we see additional opportunities with their Tracker system.

## Valuation

Our target price for SPWR shares is \$12. With SPWR becoming increasingly a project development and EPC business, we employ a DCF valuation methodology which attempts to capture the future value of projects. Incorporating a risk adjusted, probabilistic free cash flow DCF model, we arrive at a SPWR enterprise value of \$1.6B. To this value we back out 2013 net debt of \$92mm to arrive at an equity value of \$1.5B or ~\$12/share.

## Risks

We rate SPWR High Risk primarily due to high earnings and stock price volatility. Additional risk factors include: 1) SPWR is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving; 2) Raw material shortages in key manufacturing inputs (i.e. polysilicon) - which the industry has experienced over the past several years - increase the risk that SPWR will be unable to meet its capacity and production targets; 3) SPWR's business model is relatively capital-intensive and could limit the company's ability to generate positive cash flows while also driving increased need to raise additional capital, potentially via dilutive equity/debt offerings; 4) As a standalone business, SPWR's systems segment historically relied on third-party suppliers for the majority of its solar panels. This unit's ability to source panels from external suppliers going forward will likely be limited given its relationship with SPWRA makes it a competitor to panel makers and thus more panels will need to be sourced internally. If SPWR's components segment cannot offset the reduced supply from third-party suppliers, SPWR's systems segment may not be able to achieve its financial targets; 5) Demand for solar photovoltaic technology has been largely driven by a favorable regulatory environment in key countries like Germany and Spain. Any material reductions in these financial incentive programs could crimp demand for solar PV; 6) Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general.

On the flipside, if oil prices continue to rise beyond current levels, this could drive upside to our current target price on SPWR; 7) SPWR's panels have historically sold at a premium price due to higher conversion efficiencies. To the extent that SPWR is able to maintain a premium price in the market, there could be upside risk to our pricing estimates and thus valuation for the stock. If the impact on the company from any of these factors proves to be greater/less than we anticipate, the stock will likely have difficulty achieving our target price or could exceed it.

## Suntech Power Holdings Co Ltd

## Company description

Based in China, Suntech Power is one of the largest manufacturer of silicon-based solar modules for the photovoltaic (PV) industry. In addition to its crystalline cells and modules, Suntech's broad product portfolio includes a growing mix of high-efficiency cells based on its Pluto technology. Suntech sells these products in key solar regions across the globe including Germany, U.S., and China through value-added resellers, distributors, and direct sales primarily targeting applications in the traditional rooftop, ground-mount, and building-integrated (BIPV) end markets. Additionally, Suntech is starting to grow as a project developer via its downstream systems business which focuses on large-scale PV installations leveraging Suntech technology.

## Investment strategy

We rate shares of STP Sell/High Risk (3H). With company-specific factors serving as an overhang, STP shares are facing several near term headwinds above and beyond the structural and cyclical changes going on in the solar space.

## Valuation

Our target price for STP shares is \$1.50. We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Incorporating a 1.3x EV/Sales multiple – consistent with STP's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.6B yields an enterprise value of ~\$2.0B. Backing out 2013 net debt of ~\$1.7B (excluding restricted cash) translates into a STP equity value of \$288mm or ~\$1.50/share. Our net debt figure includes a cash inflow assumption from an after tax monetization of STP's net ownership interest in GSF of \$292mm.

It is important to note that our EV/Sales target multiple for STP is higher than the average comp for our globally diverse solar universe, as well as, STP's near term historical trading range to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

## Risks

We rate STP High Risk primarily due to high earnings and stock price volatility. Additional risk factors include: 1) STP is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving, 2) Raw materials make up a large portion of STP's cost structure and much of this supply is secured under long-term contracts that have historically been quoted as fixed-price contracts. If STP is unable to keep its raw material costs competitive with prevailing market rates, this could pressure margins and/or result in share loss, 3) Given its aggressive expansion, STP has encountered periods of significant excess inventory and remains burdened by a debt-laden balance sheet which includes a large amount of short-term debt, 4) Demand for solar technology has been largely driven by a favorable regulatory environment in key countries like Germany. Any material reductions in these financial incentives could crimp demand for solar PV, 5) Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving our target price.

On the flipside, if STP is able to scale costs faster than expected and sustain margins even as its product mix shifts to include more systems business, the stock is likely to outperform our price target.

## Trina Solar

### Company description

Based in China, Trina Solar is a vertically integrated manufacturer of silicon-based solar modules for the photovoltaic (PV) industry. From ingot to module, Trina's manufacturing operations cover nearly every portion of the solar value chain while its growing systems business also provides direct exposure to the project development and installation segment. Trina markets its products in key solar regions across the globe including Germany, U.S., and China through wholesalers, distributors, as well as direct sales to PV system integrators primarily targeting applications in the traditional rooftop and ground-mount end markets.

### Investment strategy

We rate shares of TSL Neutral/High Risk (2H). As one of the higher quality panel manufacturer in China, TSL is greatly leveraged to a recovery as the sector works off excess inventory over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals.

### Valuation

Our target price for TSL shares is \$6.00. We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Incorporating a 0.8x EV/Sales multiple – consistent with TSL's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.4B yields an enterprise value of ~\$1.2B. Backing out 2013 net debt of ~\$741mm translates into a TSL equity value of \$421mm or \$~6.00/share.

It is important to note that our EV/Sales target multiple for TSL is higher than the average comp for our globally diverse solar universe, as well as, TSL's near term historical trading range to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

### Risks

We rate TSL High Risk primarily due to high earnings and stock price volatility.

Additional risk factors include: 1) TSL is a relatively young company competing in an emerging industry where key factors such as business models, the overall supply chain, and supply/demand fundamentals are still evolving, 2) Raw materials make up a large portion of TSL's cost structure and it purchases a significant amount of these key materials on the spot market where prices have fluctuated significantly in recent years, 3) TSL carries a debt-laden balance sheet with a healthy amount of debt that is short-term in maturity, 4) A good percentage of TSL's sales are concentrated in regions with strong financial incentive programs for solar power. To

the extent that these incentives lessen over time, demand for TSL's products could be negatively impacted, 5) Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact on the company from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving/or may exceed our target price.

On the flipside, if TSL is able to scale costs faster than expected and sustain margins even as its product mix shifts to include more systems business, the stock is likely to outperform our price target.

## Yingli Green Energy Holding Co. Ltd

### Company description

Based in China, Yingli Green Energy is a vertically-integrated manufacturer of raw materials and end products for the photovoltaic (PV) industry. Its operations cover every aspect of the solar value chain including raw material production of polysilicon, ingots, and wafers to the manufacture and installation of silicon-based solar modules/systems. Yingli markets its products in key solar regions across the globe including Germany, U.S., and China through value-added resellers, distributors, and direct sales primarily targeting applications in the traditional rooftop and ground-mount end markets.

### Investment strategy

We rate shares of YGE Neutral/High Risk (2H). As a quality Tier 1 pure-play panel manufacturer in China, YGE is highly leveraged to a recovery in the sector as the industry S/D tightens over the next few years. That said, the industry is not only going through a cyclical trough but structural headwinds as well – mainly the commoditization of the modules business. Hence, our favorable stance towards more downstream players versus upstream manufacturers. We remain on the sidelines on challenging industry fundamentals.

### Valuation

Our target price for YGE shares is \$3.50. We apply an EV/Sales multiple methodology to our 2013 sales forecast to arrive at our 12 month target price. Utilizing a 1.7x EV/Sales multiple – consistent with YGE's current trading comp on consensus 2013 estimates – to our 2013 sales forecast of ~\$1.6B yields an enterprise value of ~\$2.9B. Backing out 2013 net debt of ~\$2B and minority interest of \$286mm translates into a YGE equity value of ~\$556mm or \$~3.50/share.

It is important to note that our EV/Sales target multiple for YGE is higher than the average comp for our globally diverse solar universe, as well as, YGE's near term historical trading range to account for lower liquidity concerns than implied by current short term debt levels. The China Development Bank as well local provisional governments have essentially made a pledge to provide adequate liquidity thereby lowering concerns around short term debt maturities for the tier 1 Chinese manufacturers. Our premium multiple accounts for this lower risk factor.

### Risks

We rate YGE High Risk primarily due to high earnings and stock price volatility. Additional risk factors include: 1) YGE is a relatively young company competing in an emerging industry where key factors such as business models, the overall

supply chain, and supply/demand fundamentals are still evolving, 2) Raw materials make up a large portion of YGE's cost structure and it purchases the majority of these key materials on the spot market where prices have fluctuated significantly in recent years, 3) YGE carries a debt-laden balance sheet with a healthy amount of debt short-term in maturity and is likely to need to raise money in the intermediate term to help fund its capital intensive move into manufacturing its own polysilicon, 4) Geographically, YGE's sales are highly concentrated in Germany where feed-in-tariffs are apt to continue to come down and potentially at an accelerated rate and this could crimp demand and further pressure pricing, 5) Solar stocks have historically exhibited a strong positive correlation with oil prices. This suggests any downward correction in oil prices could pressure solar stocks, in general. If the impact on the company from any of these factors proves to be greater/lesser than we anticipate, the stock will likely have difficulty achieving/or may exceed our target price.

On the flipside, if YGE is able to ramp down costs in manufacturing operations across the value chain faster than expected and/or moderate pricing cuts while still maintaining volume share, the stock is likely to outperform our price target.

## Appendix A-1

### Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

### IMPORTANT DISCLOSURES

#### SunPower Corp. (SPWR)

##### Ratings and Target Price History Fundamental Research



	Date	Rating	Target Price	Closing Price
1	19-Mar-10	3S	*15.00	18.96
2	11-May-10	3S	*12.00	15.29
3	28-May-10	*2S	*15.00	13.23
4	15-Nov-10	2S	*17.00	13.50

\* Indicates change

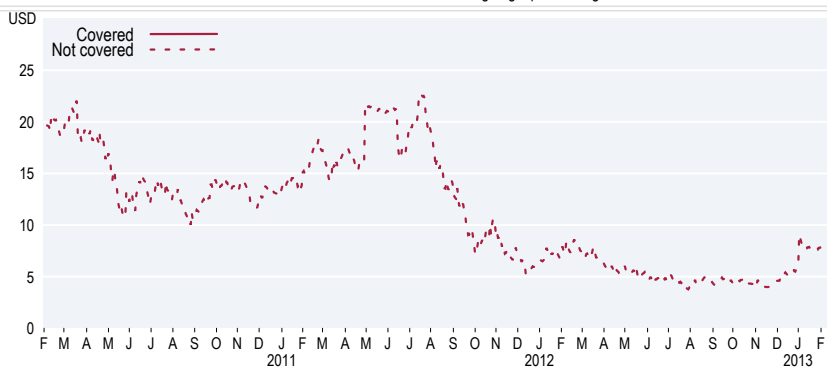
	Date	Rating	Target Price	Closing Price
5	14-Apr-11	2S	*16.50	16.23
6	4-Oct-11	2S	*8.50	7.46
7	8-Oct-11	Stock rating system changed		
8	8-Oct-11	*2H	8.50	8.11

	Date	Rating	Target Price	Closing Price
9	1-May-12	*1H	*10.00	6.05
10	17-Jul-12	Coverage terminated		

Rating/target price changes above reflect Eastern Standard Time

#### SunPower Corp. (SPWR)

##### Ratings and Target Price History Best Ideas Research Relative Call (3 Month)



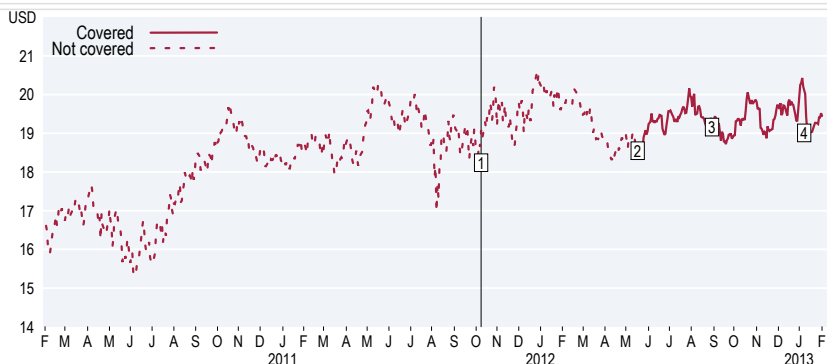
\* Indicates change

Rating/target price changes above reflect Eastern Standard Time

#### Pepco Holdings Inc. (POM)

##### Ratings and Target Price History Fundamental Research

Analyst: Brian Chin  
Covered since February 1 2013



	Date	Rating	Target Price	Closing Price
1	8-Oct-11	Stock rating system changed		
2	17-May-12	*2	*19.00	18.55

\* Indicates change

	Date	Rating	Target Price	Closing Price
3	30-Aug-12	2	*21.00	19.27
4	8-Jan-13	2	*22.00	20.11

Rating/target price changes above reflect Eastern Standard Time

## Pepco Holdings Inc. (POM)

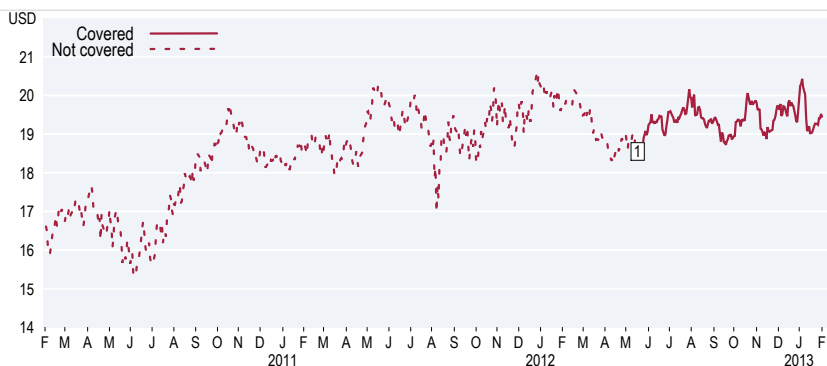
### Ratings and Target Price History

#### Best Ideas Research

#### Relative Call (3 Month)

Analyst: Brian Chin

Covered since February 1 2013



	Date	Rating	Target Price	Closing Price
1	17-May-12	*ADD LP	-	18.55

\* Indicates change

Rating/target price changes above reflect Eastern Standard Time

## Trina Solar (TSL)

### Ratings and Target Price History

#### Fundamental Research



	Date	Rating	Target Price	Closing Price
1	11-Jul-10	*1S	*30.00	21.11
2	24-Aug-10	1S	*36.00	23.70
3	20-Oct-10	1S	*39.00	27.10
4	30-Nov-10	1S	*35.00	22.39

\* Indicates change

	Date	Rating	Target Price	Closing Price
5	17-May-11	1S	*31.00	23.11
6	2-Aug-11	1S	*25.00	18.11
7	5-Oct-11	1S	*11.00	7.53
8	8-Oct-11	Stock rating system changed		

	Date	Rating	Target Price	Closing Price
9	8-Oct-11	*1H	11.00	6.02
10	23-May-12	1H	*10.00	5.55
11	17-Jul-12	Coverage terminated		

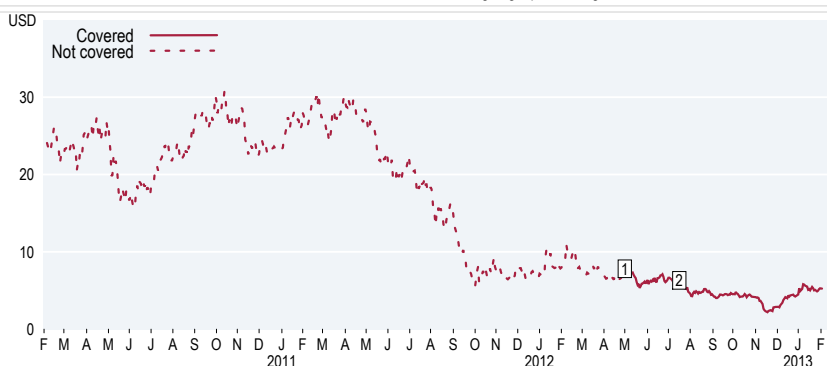
Rating/target price changes above reflect Eastern Standard Time

## Trina Solar (TSL)

### Ratings and Target Price History

#### Best Ideas Research

#### Relative Call (3 Month)



	Date	Rating	Target Price	Closing Price
1	1-May-12	*ADD MP	-	7.48

\* Indicates change

	Date	Rating	Target Price	Closing Price
2	17-Jul-12	*REM MP	-	6.20

Rating/target price changes above reflect Eastern Standard Time

## Suntech Power Holdings Co Ltd (STP)

### Ratings and Target Price History Fundamental Research



	Date	Rating	Target Price	Closing Price
1	11-Jul-10	*3S	*7.00	11.37
2	18-Nov-10	*2S	*8.50	7.48
3	6-Dec-10	2S	*10.50	8.78
4	25-May-11	2S	*7.50	7.41

\* Indicates change

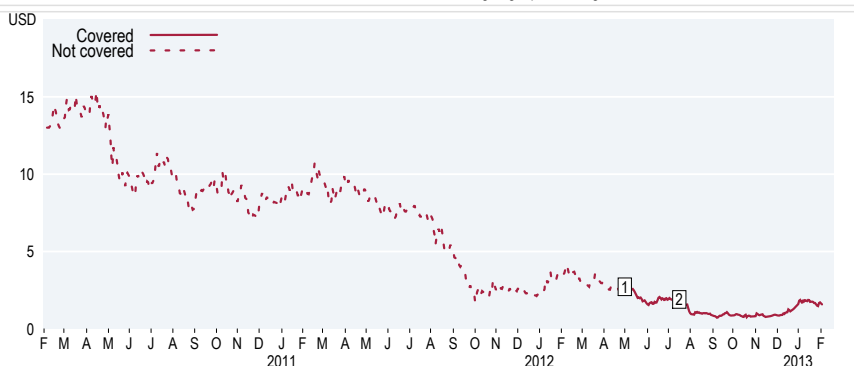
	Date	Rating	Target Price	Closing Price
5	23-Aug-11	2S	*6.50	5.19
6	5-Oct-11	2S	*2.50	2.38
7	8-Oct-11	Stock rating system changed		
8	8-Oct-11	*2H	2.50	2.34

	Date	Rating	Target Price	Closing Price
9	23-May-12	2H	*2.00	2.02
10	17-Jul-12	Coverage terminated		

Rating/target price changes above reflect Eastern Standard Time

## Suntech Power Holdings Co Ltd (STP)

### Ratings and Target Price History Best Ideas Research Relative Call (3 Month)



	Date	Rating	Target Price	Closing Price
1	1-May-12	*ADD LP	-	2.72

\* Indicates change

	Date	Rating	Target Price	Closing Price
2	17-Jul-12	*REM LP	-	1.70

Rating/target price changes above reflect Eastern Standard Time

## Advanced Energy Industries Inc (AEIS)

### Ratings and Target Price History Fundamental Research



	Date	Rating	Target Price	Closing Price
1	4-Jun-10	*2S	*16.00	12.79
2	1-Nov-10	2S	*15.00	12.58
3	15-Feb-11	2S	*18.00	15.14
4	5-Jul-11	2S	*16.00	13.27
5	26-Jul-11	2S	*15.00	11.40

\* Indicates change

	Date	Rating	Target Price	Closing Price
6	28-Sep-11	2S	*11.00	9.13
7	4-Oct-11	2S	*9.00	8.83
8	8-Oct-11	Stock rating system changed		
9	8-Oct-11	*2	9.00	8.97
10	2-Nov-11	2	*10.00	9.01

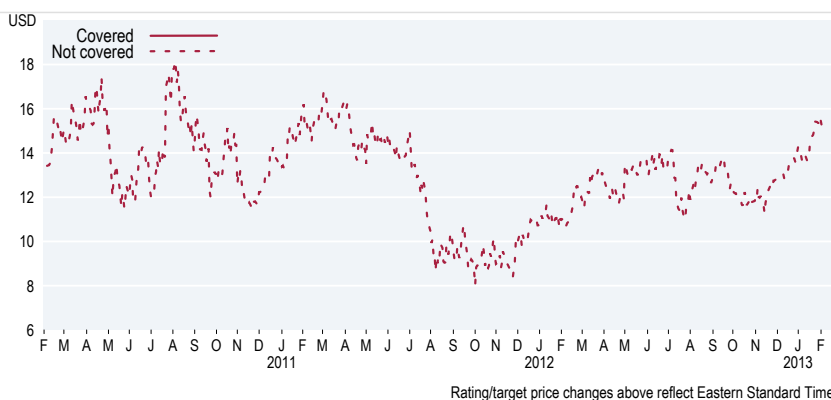
	Date	Rating	Target Price	Closing Price
11	20-Feb-12	*1H	*16.50	12.43
12	1-May-12	1H	*17.50	13.38
13	17-Jul-12	Coverage terminated		

Rating/target price changes above reflect Eastern Standard Time



## Advanced Energy Industries Inc (AEIS)

Ratings and Target Price History  
Best Ideas Research  
Relative Call (3 Month)



\* Indicates change

## MEMC Electronic Materials Inc. (WFR)

Ratings and Target Price History  
Fundamental Research



	Date	Rating	Target Price	Closing Price
1	30-Jul-10	2S	*15.00	9.56
2	2-Nov-10	*1S	*18.00	12.30
3	3-Aug-11	1S	*15.00	6.99

\* Indicates change

	Date	Rating	Target Price	Closing Price
4	8-Oct-11	Stock rating system changed		
5	8-Oct-11	*1H	15.00	5.61
6	2-Nov-11	1H	*10.00	5.78

	Date	Rating	Target Price	Closing Price
7	10-May-12	1H	*8.00	2.45
8	17-Jul-12	Coverage terminated		

Rating/target price changes above reflect Eastern Standard Time

## MEMC Electronic Materials Inc. (WFR)

Ratings and Target Price History  
Best Ideas Research  
Relative Call (3 Month)



	Date	Rating	Target Price	Closing Price
1	20-Jan-11	*ADD MP	-	11.25

\* Indicates change

	Date	Rating	Target Price	Closing Price
2	1-May-12	*REM MP	-	3.71

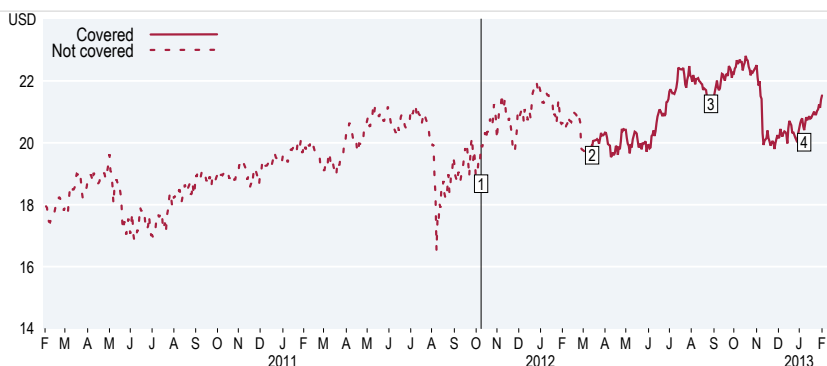
Rating/target price changes above reflect Eastern Standard Time

## Great Plains Energy Inc. (GXP)

### Ratings and Target Price History Fundamental Research

Analyst: Brian Chin

Covered since February 1 2013



	Date	Rating	Target Price	Closing Price
1	8-Oct-11	Stock rating system changed		
2	14-Mar-12	*1	*23.00	19.85

\* Indicates change

	Date	Rating	Target Price	Closing Price
3	29-Aug-12	1	*26.00	21.51
4	8-Jan-13	1	*23.00	20.41

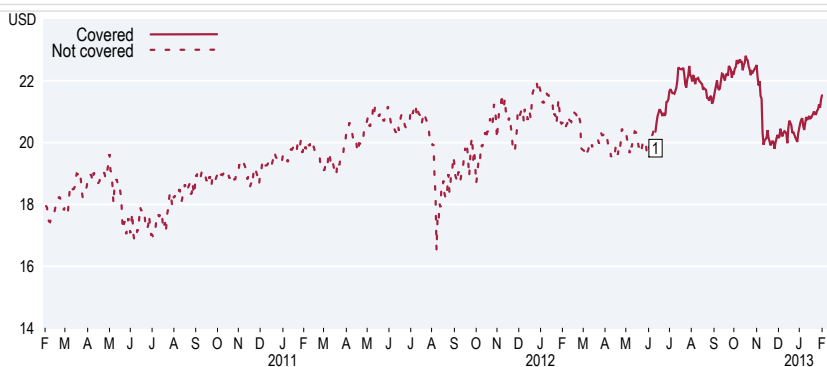
Rating/target price changes above reflect Eastern Standard Time

## Great Plains Energy Inc. (GXP)

### Ratings and Target Price History Best Ideas Research Relative Call (3 Month)

Analyst: Brian Chin

Covered since February 1 2013



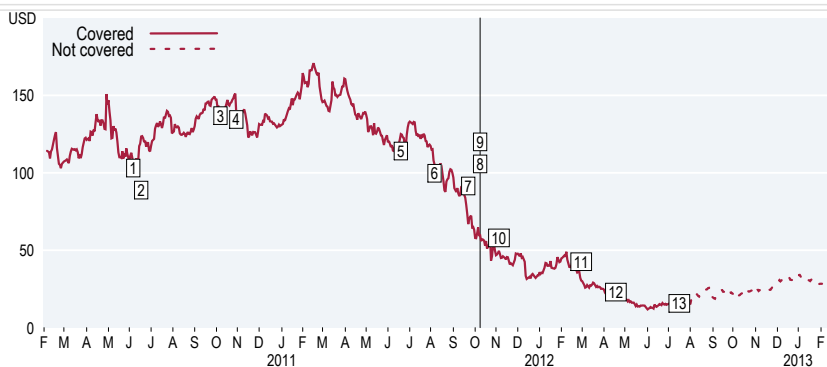
	Date	Rating	Target Price	Closing Price
1	12-Jun-12	*ADD MP	-	20.37

\* Indicates change

Rating/target price changes above reflect Eastern Standard Time

## First Solar Inc. (FSLR)

### Ratings and Target Price History Fundamental Research



	Date	Rating	Target Price	Closing Price
1	7-Jun-10	2S	*125.00	104.98
2	17-Jun-10	2S	*140.00	123.45
3	7-Oct-10	2S	*145.00	140.56
4	29-Oct-10	2S	*150.00	137.68
5	19-Jun-11	2S	*130.00	121.55

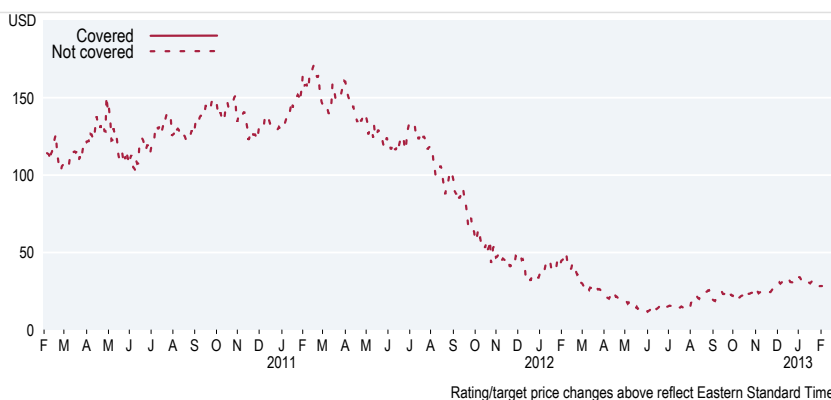
\* Indicates change

	Date	Rating	Target Price	Closing Price
6	5-Aug-11	2S	*120.00	105.43
7	22-Sep-11	2S	*90.00	66.85
8	8-Oct-11	Stock rating system changed		
9	8-Oct-11	*2H	*70.00	59.74
10	4-Nov-11	2H	*60.00	49.59

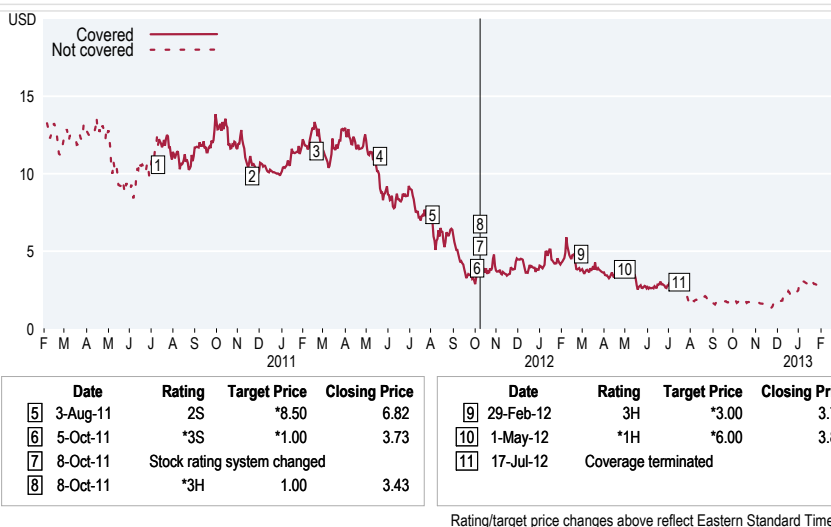
	Date	Rating	Target Price	Closing Price
11	29-Feb-12	2H	*45.00	30.42
12	18-Apr-12	2H	*28.50	21.35
13	17-Jul-12	Coverage terminated		

Rating/target price changes above reflect Eastern Standard Time

**First Solar Inc. (FSLR)**  
**Ratings and Target Price History**  
**Best Ideas Research**  
**Relative Call (3 Month)**



**Yingli Green Energy Holding Co. Ltd (YGE)**  
**Ratings and Target Price History**  
**Fundamental Research**



**Yingli Green Energy Holding Co. Ltd (YGE)**  
**Ratings and Target Price History**  
**Best Ideas Research**  
**Relative Call (3 Month)**



Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Samsung Electronics Co Ltd

Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Pepco Holdings Inc

Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Lam Research Corp

Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Applied Materials Inc

Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Intel Corp

BEST IDEAS UNIVERSE: The best ideas universe from which were chosen comprises: . All prices as of 31 Dec 1969.

Citigroup Global Markets Inc. or its affiliates beneficially owns 1% or more of any class of common equity securities of OCI. This position reflects information available as of the prior business day.

Within the past 12 months, Citigroup Global Markets Inc. or its affiliates has acted as manager or co-manager of an offering of securities of Samsung Electronics, Pepco Holdings Inc., First Solar Inc..

Citigroup Global Markets Inc. or its affiliates has received compensation for investment banking services provided within the past 12 months from SunPower Corp., Samsung Electronics, Renewable Energy Corporation, Pepco Holdings Inc., Green Energy, Total, Applied Materials Inc, Motech Industries, Toshiba, Intel Corp.

Citigroup Global Markets Inc. or its affiliates expects to receive or intends to seek, within the next three months, compensation for investment banking services from SunPower Corp., Samsung Electronics, Total, Motech Industries.

Citigroup Global Markets Inc. or an affiliate received compensation for products and services other than investment banking services from SunPower Corp., TSMC, Samsung Electronics, Renewable Energy Corporation, Pepco Holdings Inc., Green Energy, Trina Solar, Suntech Power Holdings Co Ltd, MEMC Electronic Materials Inc., Lam Research Corp, Total, First Solar Inc., SMA Solar Technology, Yingli Green Energy Holding Co. Ltd, Shin-Etsu Chemical, Applied Materials Inc, Motech Industries, Toshiba, OCI, Intel Corp in the past 12 months.

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as investment banking client(s): SunPower Corp., Samsung Electronics, Renewable Energy Corporation, Pepco Holdings Inc., Green Energy, Total, Applied Materials Inc, Motech Industries, Toshiba, Intel Corp.

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, securities-related: SunPower Corp., TSMC, Samsung Electronics, Renewable Energy Corporation, Pepco Holdings Inc., Green Energy, Trina Solar, Suntech Power Holdings Co Ltd, MEMC Electronic Materials Inc., Great Plains Energy Inc., Lam Research Corp, Total, First Solar Inc., SMA Solar Technology, Yingli Green Energy Holding Co. Ltd, Shin-Etsu Chemical, Applied Materials Inc, Motech Industries, Toshiba, OCI, Intel Corp, SolarWorld.

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, non-securities-related: SunPower Corp., TSMC, Samsung Electronics, Renewable Energy Corporation, Pepco Holdings Inc., Green Energy, Trina Solar, Suntech Power Holdings Co Ltd, MEMC Electronic Materials Inc., Lam Research Corp, Total, First Solar Inc., SMA Solar Technology, Yingli Green Energy Holding Co. Ltd, Shin-Etsu Chemical, Applied Materials Inc, Motech Industries, Toshiba, OCI, Intel Corp.

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