

## Solar Conference Takeaways

### ■ Solar projects still on track despite macro economic and credit uncertainty

We attended the large Solar Power 2008 industry conference in San Diego yesterday. After discussions with our industry contacts and meetings with 9 global solar company management teams, we found that large solar project financing currently remains in place given attractive internal rates of return of over 8%.

### ■ U.S. solar market still remains in the early stages

Our discussions with solar companies found limited signs of "pent up" demand for solar panels in the U.S. despite the recent passage extending solar tax credits and still estimate the U.S. market will be 580MW in 2009 (8% of the global total). Our channel checks did find increased solar panel sales leads at U.S. utility customers who now qualify to receive a 30% tax credit for the first time.

### ■ Still estimate solar panel prices will decline -20% yoy in 2009

We continue to estimate that global solar demand will grow 42% in 2009 but will require solar panel prices of about \$3.22 per watt to drive this increased demand. Our channel checks found that 4Q08 polysilicon spot prices are tracking on average, down -10% q/q, to around \$300/kg.

### ■ Top U.S. solar picks: Applied Materials and Energy Conversion Devices

We believe AMAT's sign off of its first thin film solar equipment sale to Signet Solar, is a positive inflexion point and supports our view of likely P/E multiple expansion as solar related sales grow from 9% of its total currently to 30%+ in FY10. We also favor ENER as we believe another 10% points of gross margin expansion to 50% is possible from additional factory operational improvements.

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## Key takeaways from solar field trip

We visited 4 local solar installations in the San Diego area which included rooftop solar panels at the New Children's Museum, solar panels on top of a parking structure at the University of California, rooftop solar panel deployment at the IBEW training center and ground mounted panels at the Alvarado Water Treatment Plant

## Power Purchase Agreements nearing Grid Parity in Southern CA.

The installations at the University of California – San Diego, and the Alvarado water treatment facility were both structured as power purchase agreements. Both systems were 1MW in size. In both cases, the end customer was attracted to the PPA model given the lack of upfront capital expense, and maintenance costs, and a long term supply of electricity at grid competitive rates. PPAs also allowed the end customer to meet RPS requirements quite easily. In the case of UCSD, all UC campuses are mandated to install 1MW of PV by 2010. The table below outlines key metrics of the PPAs.

**Table 1: Power Purchase Agreement Details**

	UC – San Diego	San Diego Water Treatment Facility
Period Installed	Began in June 2008. 166kW installed to date	3 yrs ago
PPA electricity rate (\$cents/kWh)	14	12
Annual PPA rate escalator (%)	4%	1%
End customer blended grid rate (\$cents/kWh)	16	12.5
End customer grid rate escalator (%)	6%	3%
System Size (MW)	1	1
Installation Type	mixed - rooftop, solar tree	Ground mount
Gross system cost (\$M)	\$9	\$6.50
Net system cost (post rebates and incentives) (\$M)	\$3.30	\$1.60
Who keeps the Renewable Energy Credits?	USCD (\$0.02/kWh higher rate)	PPA provider

Source: UCSD; SunEdison; Borrego Solar

## Municipalities and public entities increasingly finding PPA model attractive

Our research suggests that many municipal governments view PV as an attractive option to enhance their green credentials and also meet renewable portfolio standards where applicable; however, in most cases they do not have the expertise required to source, install, own, and maintain PV systems over the life of the systems therefore they are attracted to the PPA model because it shifts the risks of the investment to the PPA provider. The public entity is guaranteed electricity at a rate which is fixed near its blended grid rate growing annually at a slower rate than the grid rate. The PPA provider, who is the expert in sourcing, installation, and maintenance, and system performance optimization assumes those responsibilities in return for fixed a cashflow stream over the life of the system which enables it to achieve a high rate of return.

Table 2: Solar Facility Tour

	San Diego Children's Museum	UC - San Diego	IBEW	San Diego Water Treatment Facility
Year Installed	2008	2008	2003	2005
Type	Roof Top	Solar Tree; Roof Top	Roof Top	Ground Mount
System output	96.4 kW	1MW	99 kW	1MW
Panel power	165 watt	205 watt	various	205 watt
Inverter efficiency DC/AC	94%	95%	94%	95%
Mono/Multi	Multi	Multi	multi	multi
Panel maker	Kyocera	Kyocera	Schott	Kyocera
Power supplied annually	136 gWh	1800 gWh	144 gWh	1800 gWh
% of annual consumption	50%		95%	20%
Savings (annual)	\$20k			
System cost (installed)	\$750k	\$9m		\$6.5m
System cost post rebate	\$400k	\$3.3m		\$1.6m
Design cost	\$25k			
Payback	12 yrs			

Source: UBS

## Takeaways from Solar Company Management Meetings

### Suntech Power – Amy Huang

- Solar panel prices in 2009 are likely tracking down -10% yoy
- Expect U.S. demand will be comprised of 20% for the dealer residential channel, 40% for commercial customers and 40% will be for utility customers.
- Italy will likely be a strong market with Suntech's module shipments to Italy potentially growing from 20MW-30MW in 2008 to around 150MW-200MW in 2009
- German market will likely see solar panel price declines of 9% in 2009 (in line with feed in tariff)
- Spain will still be a good market for Suntech with shipments potentially near 100MW in 2009 despite the 500MW cap
- France is still only in the early stages with 10MW of shipments to this region in 2008 and potentially growing to 50MW in 2009
- Suntech's proprietary Pluto technology deployment remains on track with a 30MW line in place by the end of 2008 but is mostly a positive financial impact in 2010.
- Pluto evaluations have seen 18-19% solar cell efficiencies for mono-crystalline compared to 16.5% without using Pluto technology.

- Suntech has responded to several requests for proposals from U.S. utility customers
- Suntech still remains confident that its risk adjusted 2009 polysilicon supply of 1GW is on track as only 35% is from new entrants and 65% is from mature suppliers.
- Suntech does not anticipate the need to inject additional capital into its key polysilicon suppliers at this time.
- Expects polysilicon prices to decline 20% yoy in 2009.
- Suntech still estimates it will generate positive cash flow from operations in 2009 and will be free cash flow positive at the end of 2010

### GT Solar – Tom Zarrella

- No signs of any solar equipment customers asking for delayed delivery dates of reactors or furnaces and no signs of customer financing problems
- DC Chemical and LDK remain GT Solar's polysilicon reactor equipment customers that the company will likely be able to recognize revenue from first
- New solar furnace prototypes are in-process now which can produce 100-200bps higher efficiency solar wafers
- New 400 metric ton polysilicon reactor project has also begun which is 2x larger than its current 48-rod product and uses 30% less electricity in the same footprint.
- Potential opportunity to sell new 400 metric ton polysilicon reactor to established incumbent suppliers in new Greenfield expansion projects next year
- New 400 metric ton polysilicon reactor will have a prototype available in mid-2009
- GT Solar furnaces have been shown to effectively purify metallurgical polysilicon and effectively cast this material into larger ingots
- New solar equipment to address the silane gas market is another potential key growth opportunity that GT Solar is contemplating
- Company still believes that there is room for more new polysilicon entrants that are well capitalized to enter the polysilicon market
- Turn-key solar wafer services remains an important strategic area that GT Solar likely remains committed to longer term

## Applied Materials – John Antone

- Final thin film solar equipment acceptance by Signet Solar was completed earlier this week.
- Signet's solar panels made with Applied's single junction solar equipment have achieved the 6% efficiency threshold necessary for final sign-off
- We estimate Signet Solar's use of Applied's single junction solar equipment will likely enable solar panel costs of around \$1.50 per watt
- Applied's 3 other lead customers are each at varying stages of qualification with SunFilm likely the next key customer with tandem junction solar equipment enabling 8.5% efficiency panels
- Longer term, Applied remains confident that it has a path to making thin film solar panels with 10% efficiencies and a cost per watt of \$1.00
- Applied has not seen any of its solar customers asking for financing terms and Applied is not interested in financing its customers
- Applied's crystalline based solar equipment continues to have solid momentum
- The production output of wire saws and screen printers have effectively doubled since Applied acquired both HCT and Baccini.
- Applied receives less customer concerns about Oerlikon's intellectual property violation claim against Sunfilm, which is Applied's first tandem junction solar equipment customer.
- Applied expects another update from a second ruling body on this patent dispute in March 2009.

## Meyer Burger – Peter Pauli & Michel Hirschi

- Expects to continue to grow inline with Solar industry
  - Orders to grow yoy
  - Increasing capacity in 2009
  - No signs of double ordering
- Biggest market remains China
- Current wire saws capable of cutting 150um wafers.
- All tools are upgradeable, only requiring a change or wire rolls and some software updates to move to thinner wafers.
- Six competitors in wire saws, including 1 small Chinese player.
- Service business is 10% of revenues
- Current backlog is CHF 732m

- Recent orders from Renesola; REC; Jinglong
- Current capacity is 12 wire saws a week
- Entering ingot crystallization space with EMIX acquisition. Acquiring 72% of shares in a Cash/Share deal likely to close next month. Will have option to purchase remaining shares also. Getting factory and head quarters in France, and 20-25 people.
- EMIX has developed Innovative crystallization technology
  - A continuous growth process (8 meter high furnace)
  - No need to heat up and cool down, which could lead to around 50% energy savings
  - Similar to steel industry process
  - No crucible required (340kg)
  - Yield's 15 MW per furnace
  - Furnace average selling price estimated at €2m likely sold as part of turnkey line
  - Expects to deliver up to 5 furnaces in 2009.
- Supplies sapphire cutting equipment to Monocrystal, and Rubicon.

### Ascent Solar – Ashutosh Misra

- Hydro now owns 35% of Ascent Solar
- Working on 5 meter long module for first 30MW line
- Module efficiency currently at 8%, with roadmap to 10-11%
- 30MW line estimated to achieve \$1/watt cash cost/watt at \$85m capex
- 110MW line estimated to achieve \$0.90/watt cash cost/watt at \$250m capex
- Focused on establishing value-add reseller relationships
  - Hydro
  - Texsa – Spanish roofing company
  - Icopel – French roofing company
  - ITOCHU
- Sources >50% of equipment from Japan
- Every ENER customer is looking at ASTI as a likely second source
- Equipment arriving January 2009-July 2009.
- Production on 30MW in 1Q10.

## Solon – Thomas Krupke

- Not seeing any negative impacts from financing crises
- Banks using PV system financing to improve their risk portfolios.
- Demand by country estimates in 2009:
  - Germany – 2 to 3GW
  - Italy – 0.5 to 1GW
  - US – 1 GW
  - Spain – 0.5 GW
  - Japan – 0.5 GW
  - Rest of World – 2.5GW
  - Total – 7.5GW
- Entering the US market, working with Borrego and other installers
- Signing contracts in USD for US market
- Will have 50-60MW capacity in Tucson facility
- 1<sup>st</sup> quarter is always the weakest
- In negotiations for 2009 supply contracts
- US suppliers will be 30-40 MW in 2009:
  - ARISE already begun deliveries
  - Suniva to begin delivery in 2Q09
  - SpectraWatt to deliver in 4Q09

## Q-Cells – Anton Milner

- Feeling very comfortable with Q-Cells financial picture. €700m consortium loan from 4 banks, able to take on more debt, €280m in cash, and generates €250m in cash from operations, also looking to IPO EverQ in 2009. Can use REC stake for more liquidity.
- On their customers, they see fear about financing but nothing concrete. Not a single customer has asked to push or delay cell deliveries due to financing issues. Everything is sold out ex module.
- Banks view small residential systems as relatively safe bets.
- Average selling prices will track EEG degression in 2009
- Italy is pulling product at higher average selling prices
- Expects 2-3% incremental drop in system price for every 50 bps increase in spreads.

- Does not expect wafer prices to drop in 2009
- Cell prices could fall slightly below the EEG degression
- US market is getting more interesting, primarily as the dollar strengthens against the Euro.
- Does not expect to see a demand boost in US similar to Spain with Investment Tax Credit extension
- US utilities demanding triple digit MW projects
- US sales account for 6-7% of Q-cells revenues
- Average module selling price in Germany is €3.10/watt and system price is €4.25/watt, implying €1.15 balance of system costs. (37% of system costs)
- LDK remains the most reliable supplier and 2<sup>nd</sup> best quality supplier
- Signing 5-10 year MGSi contracts. Deliveries began in August.
- Best MGSi cells achieve 16% efficiencies, average MGSi efficiency is 15.4%
- 90% of warranty claims are for module fabrication steps in solar value chain.

### LDK – Chairman Peng & Nick Sarno

- Not concerned about financial crises impacting LDK. Very well financed with \$700m in customer deposits; \$500m in cash; raised \$400m in convertible bond offering in April; raised another \$200m in secondary offering in September; and expect to get another \$200-\$300m in customer deposits in the next few quarters.
- Tier 3 customers are seeing some financing difficulties, but tier 1 customer have no issues
- Current backlog is 1.5GW
- Factory is 100% utilized
- 1000mt plant is mechanically complete. Beginning the startup and commissioning phase, which could take 1-6 months
- Still expect to make 150-350mt by the end of 2008, but probably low end of range is likely.
- 15000mt plant is slightly behind schedule
- On track to produce 5000-7000mt in 2009
- 15000m plant designed to produce poly at \$22-\$35/kg at full capacity, but initially \$80-\$100/kg is more likely and could be a couple years to get to \$22-\$35/kg cost.
- Need to spend another \$800m in capex in 2009.

- Currently keep 1-2 quarters of poly inventory on hand. This would likely be reduced as they reach 15k tons internal capacity
- Wacker long term contract which begins in 2009 is priced at well below \$100/kg.
- Expect 2009 silicon costs for LDK to decline by 50% on a combination of in-house poly production and long term contracts
- Believes spot price is \$250/kg currently
- Thinks small 2000-3000mt polysilicon plants will not be cost competitive in the long term
- Does not believe anyone is producing polysilicon at full capacity in China today
- Electricity rates locked in at RMB0.25/kWh for the life of the plant. The government will reimburse the difference to LDK if rates increase
- China could install 5GW if module prices decline to \$2/watt.

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#### ■ **Statement of Risk**

Demand for solar is still dependent on individual country government intervention through tax rebates or tariffs. Any material change in an individual country's position on support for solar energy could have a negative impact on the growth of the solar market.

Manufacturers of crystalline polysilicon photovoltaic wafers and cells are dependant on the feedstock polysilicon as a key raw material. Polysilicon is also used by semiconductor industry, and is currently in shortage. Continued shortage could have a negative impact on the growth of the solar market, and impact Energy Conversion, GT Solar, Evergreen Solar, First Solar and SunPower.

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UBS 12-Month Rating	Rating Category	Coverage <sup>1</sup>	IB Services <sup>2</sup>
Buy	Buy	56%	36%
Neutral	Hold/Neutral	35%	33%
Sell	Sell	8%	27%
UBS Short-Term Rating	Rating Category	Coverage <sup>3</sup>	IB Services <sup>4</sup>
Buy	Buy	less than 1%	32%
Sell	Sell	less than 1%	14%

1:Percentage of companies under coverage globally within the 12-month rating category.

2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.

3:Percentage of companies under coverage globally within the Short-Term rating category.

4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 30 September 2008.

### UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
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UBS Short-Term Rating	Definition
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

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**Company Disclosures**

Company Name	Reuters	12-mo rating	Short-term rating	Price	Price date
Applied Materials Inc. <sup>8, 16</sup>	AMAT.O	Buy	N/A	US\$12.75	14 Oct 2008
Energy Conversion Devices, Inc. <sup>2, 4, 6, 16, 20</sup>	ENER.O	Buy (CBE)	N/A	US\$45.15	14 Oct 2008

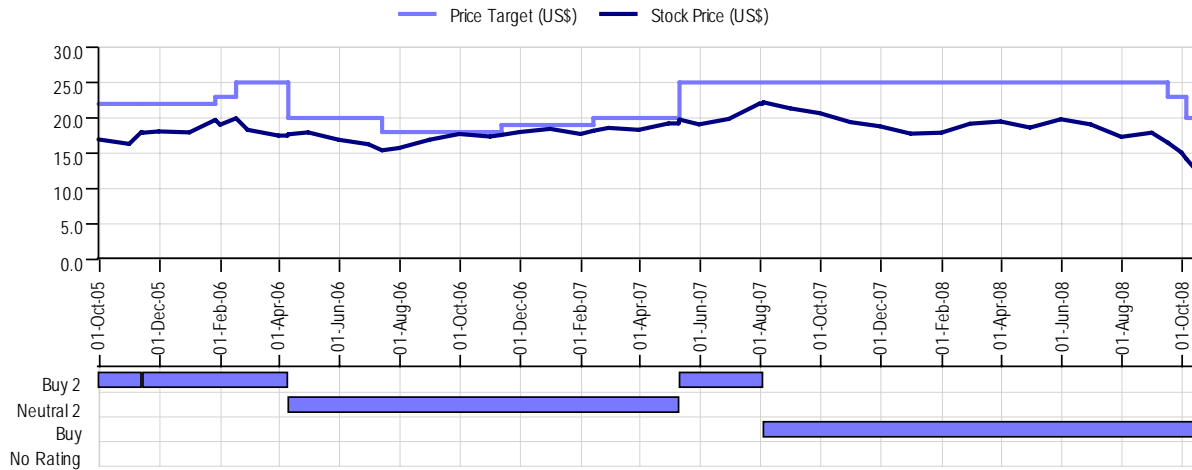
Source: UBS. All prices as of local market close.

Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date

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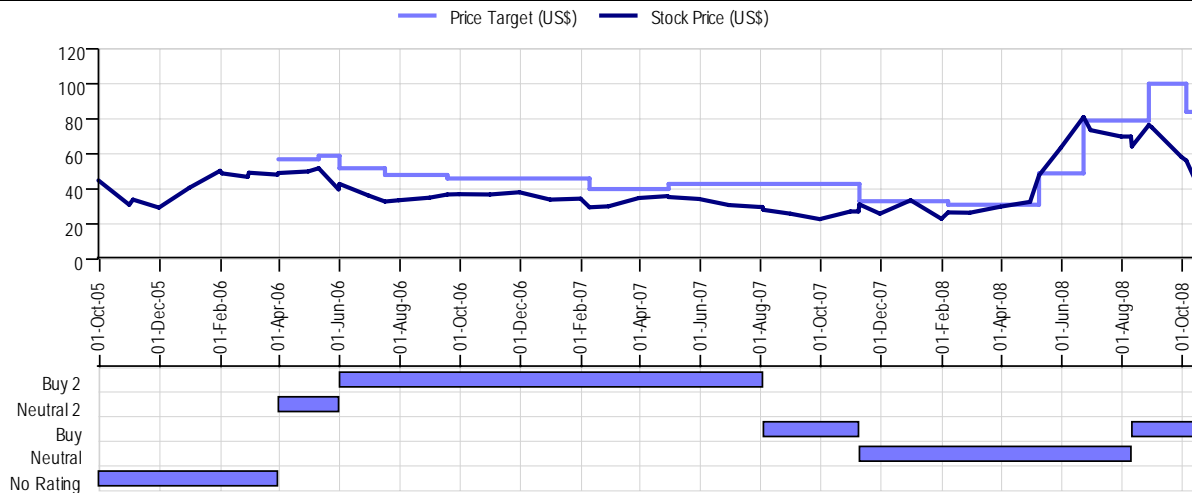
Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

Applied Materials Inc. (US\$)



Source: UBS; as of 14 Oct 2008

Energy Conversion Devices, Inc (US\$)



Source: UBS; as of 14 Oct 2008

Note: On August 4, 2007 UBS revised its rating system. (See 'UBS Investment Research: Global Equity Rating Definitions' table for details). From September 9, 2006 through August 3, 2007 the UBS ratings and their definitions were: Buy 1 = FSR is > 6% above the MRA, higher degree of predictability; Buy 2 = FSR is > 6% above the MRA, lower degree of predictability; Neutral 1 = FSR is between -6% and 6% of the MRA, higher degree of predictability; Neutral 2 = FSR is between -6% and 6% of the MRA, lower degree of predictability; Reduce 1 = FSR is > 6% below the MRA, higher degree of predictability; Reduce 2 = FSR is > 6% below the MRA, lower degree of predictability. The predictability level indicates an analyst's conviction in the FSR. A predictability level of '1' means that the analyst's estimate of FSR is in the middle of a narrower, or smaller, range of possibilities. A predictability level of '2' means that the analyst's estimate of FSR is in the middle of a broader, or larger, range of possibilities. From October 13, 2003 through September 8, 2006 the percentage band criteria used in the rating system was 10%.

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