



Adviser Soapbox

The Great Solar Shakeout

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In October it began to seem like there would be no end to the carnage on Wall Street. Unlike the prospective solutions, the cause of the crisis was very simple. Too many investors had begun to believe that some things always go up, like the price of a house or a barrel of oil, and other things will forever stay down, like the cost of capital.

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You would think advocates of solar technology would know better, given the sun's somewhat obvious metaphor for how things move in nature. Despite expectations for rising sales, steadily growing demand over the long term, and another year of exuberant investment from venture capital, the solar bubble has been increasingly overdue for a correction and got a good one over the past month.

The solar industry can be divided into five key technologies, two of which are mature enough to be represented by public companies today. These two are crystalline silicon (c-Si) and inorganic thin-films.

The first category, c-Si cells and modules, are the heavyweights in terms of market share (74%), and how efficiently they convert photons to electrons. In terms of capacity, the global market for c-Si modules is expected to more than double from last year. According to emerging tech research firm, Lux Research, the c-Si segment will increase from 1.5 GigaWatts (GW) to 3.5 GW in 2008 and expand to 13.8 GW by 2013 [Full disclosure: my venture firm is an equity investor in Lux Research].

Although less efficient, thin-film solar modules offer a better cost/watt than c-Si devices, allowing them to undercut c-Si while maintaining margins. The thin-film segment breaks out further to include amorphous silicon (a-Si) as well as newer compounds based on CdTe, CIS or CIGS.

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Lux Research's expected growth for each is as follows:

-Amorphous silicon capacity will grow aggressively at a CAGR of 38%, from 550 MW today to 2.8 GW in 2013 fueled, in part, by the emergence of turnkey manufacturing systems from equipment providers like Applied Materials, Ulvac and Oerlikon.

-CdTe capacity will keep pace with a-Si, growing 37% annually from 480 MW in 2008 to 2.4 GW by 2013. Most of that capacity will be represented by modules with a First Solar label, but the company is seeing new competition from Q-Cells subsidiary Calyxo, General Electric subsidiary PrimeStar Solar and AVA Solar.

-Nearly 30 companies are developing thin-film modules based on CIGS or CIS compounds, making it questionable how

many will survive the current economic climate. Those that do will compete for share in a market expected to grow at a 96% CAGR, from 41.3 MW this year to 1.2 GW in 2013.

Hidden behind these glowing CAGRs is a mass of shadows, including the prospect of diminishing government subsidies, an oversupply of modules, rising materials costs and the freeze among credit markets. Combined, these factors help explain why solar stocks over the past 52 weeks and even in October, took a steeper dive than the Nasdaq Composite.

On Oct. 20, the Nasdaq closed down 38% from its 52-week high of 2861.51. Solar module-maker Energy Conversion Devices came closest to the index's performance, shedding only 46% from its 12-month peak of \$83.33. Evergreen Solar collapsed over 80% from a high of \$18.85. Bear in mind that current share prices appear low when viewed in the context of past earnings, but it's the earnings from upcoming quarters that will count.

While the good news is that solar technology is poised to continue its impressive growth streak, the bad news is that a perfect storm is on the horizon as a wave of supply converges with diminishing government subsidies and a very chilly credit market. This will require solar manufacturers to reduce prices to compete and could spell trouble for smaller module makers or companies overly reliant on credit to operate.

"In the long term, we expect the solar industry to look more like the display industry, growing strongly year by year on volumes and revenue but with very slim margins, making it difficult for manufacturers to make money," said Ted Sullivan, a senior analyst at Lux Research.

The average selling price (ASP) for solar modules has been inflated by generous subsidy programs, mostly in Germany and Spain. These subsidies have generated a steady, stable market for solar modules over the past several years. This arrangement appears increasingly expensive, however, when framed against the backdrop of the emerging economy. And, it grows even more costly as more and more solar installations come online. These factors help explain why Germany and Spain, the largest solar capacity markets, are now reducing or even capping the subsidies they pay.

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Another type of subsidy made the news in October when Congress wrapped an eight-year extension of its solar investment tax credit program into the bailout bill. The \$18 billion incentives package offers a 30% rebate for residential and commercial solar installations. This can't hurt, particularly as the U.S.'s largest domestic market, California, is unlikely to fund solar projects until it weathers a financial crisis of its own.

An even sunnier possibility is that China will step in with solar subsidies to support its growing energy consumption. Despite its slowing economy, Chinese solar subsidies would support domestic players like photovoltaic wafer-maker LDK Solar and Suntech Power, China's largest supplier of photovoltaic modules.

Another casualty of diminishing subsidies could be the solar sector's historically stellar margins. Goldman Sachs analyst Michael Molnar estimates that, in June, First Solar's estimated gross margins were as high as 50%, while those for Energy Conversion Devices and Evergreen Solar hovered above 30%. Normally high margins are a good thing, but they may come back to haunt PV suppliers as government budget committees pull out the red pen.

After subsidies, Plan B for module makers is to sell products at a discount to keep inventory moving. It helps that manufacturing costs continue to decline about 10% each year, thanks to design improvements and benefits of scale. But it seems a little coincidental that most solar companies happened to predict the ASP for their products will decline at the exact same rate.

Analysts from Deutsche Bank, UBS, Hapoalim Securities and Goldman Sachs all reached a different consensus, namely that ASPs will need to decline closer to 20% in 2009 to absorb excess inventory, and as much as 25% the following year.

Again, the balance sheet of companies like Arizona-based First Solar can probably survive that kind of margin compression, although the impact on their share price will not be pretty. Predicting worse-than-expected ASP declines and contracting multiples, Goldman Sach's Molnar expects First Solar will reverse its quarterly pattern of beating and raising earning expectations. He got a jump on the prospective bloodletting in October by downgrading FSLR's stock from a buy to a conviction sell, and slashed its target price from \$365 to \$103.

In his research note, Molnar wrote that First Solar and California-based SunPower were "two of the best solar companies in the world and both will be part of the growing solar industry for years to come. However, in our view, even these companies will face headwinds in a market that is oversupplied with modules."

SunPower didn't fare much better than FSLR in Molnar's view. He downgraded its stock to sell from buy and adjusted its target price to \$43 from \$100.

The coming shakeout could adversely impact some otherwise promising companies. Massachusetts-based Evergreen Solar, for example, has a promising wafer-making technology and solid orders on its book.

It also secured \$375 million worth of capital in July, just before the credit markets began to seize up. But the company has \$39.5 million and 12 million shares tied up in a capped call deal made with Lehman Brothers.

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The shares have turned up on the books of Barclays, which bought part of the brokerage when it was liquidated. But there's no telling if or when Barclays will release those shares back to Evergreen, even in the wake of a lawsuit the company filed this month.

The icy state of the credit markets not only threatens small players, and those surviving on leverage, it could worsen projections on oversupply. Things are particularly difficult for crystalline silicon PV suppliers who, in addition to being hindered by the tightening of credit, are pushing a more expensive technology with a lot of capacity in the ground. Current credit markets could also slow the ramp up of a-Si module makers who are still in the early stages of expanding their capacity.

Meanwhile, the comparatively crowded market for thin-film CIGS modules is packed with small start-ups like Nanosolar, Miasole, Heliolt, DayStar Technologies and others who must differentiate themselves to compete for financing.

Add Fremont, Calif.-based Solyndra to the list. Last month, the thin-film CIGS module maker burst from stealth mode with a uniquely compact cylindrical solar panel, a factory capable of producing 110 MW worth of solar modules annually and \$1.2 billion in orders already on its books.

It just goes to show that, even in the current economic climate, solar opportunities are always shining somewhere. But we remain cautious on the sector as a whole and maintain our hold rating on First Solar. We believe there will be opportunities for long-term investors to buy shares well below \$100 in the near future.

Josh Wolfe is editor of the [Forbes-Wolfe Emerging Technology Report](#) and founding partner of Lux Capital.

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