

## **Survival of the fittest will mark a new era for solar energy**

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Edwin Koot (CEO SolarPlaza)

Several publications have stated recently that the latest downward price corrections for solar modules are related to the global economic slowdown and financial crisis. A visit to the bar at the top of the Jimao tower in Shanghai, one of the highest buildings in the world, presents the dynamics of the Chinese PV industry in better perspective – particularly if you visit with international friends from the PV industry such as those participating in the SolarPlaza PV trade mission to China. The conclusion: we are heading towards a serious situation of oversupply throughout the solar supply chain in 2009, which will result in rapid price decreases, fueled even more by the global economic crisis. This could offer new opportunities for PV and open up new markets, but it will also force several manufacturers out of business.

### **Impressive growth in the Chinese PV industry: new manufacturers still entering the market**

China's economy is still growing tremendously, with figures western economies can only dream of. And growth within the Chinese solar PV industry is perhaps even more impressive. Visits to relatively young and brand new thin-film and crystalline solar module manufacturers provide proof of the Chinese PV industry's ambitions. And every week, a new company in China announces that it is joining the rapidly growing PV industry. At a SolarPlaza conference in Shanghai, several, primarily new thin-film manufacturers, presented their ambitions. And although the figures quoted seem hard to believe, the past has taught us never to underestimate the Chinese. Three years ago, when the then unknown LDK announced its ambitions (1 GW production capacity in three years), they were greeted with some skepticism. Yet the company surpassed this milestone even before the target date. As did JA Solar, Trina Solar, Solarfun and many other manufacturers – all companies that now have a solid position in the global market. Several sources have indicated that more than 135 manufacturers will be producing thin-film solar modules in 2009. And this number is still growing....Which raises the question: where will all the solar modules go?

### **The target markets for thin-film solar modules**

When asked, almost all manufacturers say that their target markets are Europe (Spain, Italy, Germany) and the USA. They need to be ready to face some tough competition...Thin-film is mainly interesting for ground-mounted large scale power plant applications. Looking at the market segmentation in 2008, that reduces market potential by about 50%. In Germany, this market segment covers 10-15% of the total market. In Spain, this market segment will be limited by regulation to 233 MW in 2009, or less than 50% of the capped market of 500 MW. In Europe's third largest PV market, Italy, ground-mounted PV systems also still form a minor market segment. SolarPlaza's global forecast for newly installed PV systems in 2009 will be between 4500 and 5500 MW. This represents a growth of 10-30% compared to 2008. These figures mean that the market potential for ground-mounted PV systems, and so for thin-film in 2009, will be more or less 2250 to 2750 MWp. First Solar occupies the dominant position in this segment and will produce, and has actually already sold, around 700 MWp for 2009. This means that the market potential for all the other thin-film manufacturers is 1550 to 2050 MWp. If this is divided equally among other 135 thin-film manufacturers, it would result in a maximum of 15 MWp per company. But,

let's not forget that the more than 400 crystalline solar module manufacturers would like to have a piece of the cake too.

### **Poly silicon prices going down**

Interesting developments are taking place in the crystalline solar PV sector as well. High demand for, and shortages of, poly silicon over the last two years have attracted new poly manufacturers, and led to expansion plans among existing players. The rapid growth in poly silicon production capacity (partly in China) is now resulting in actual output, on top of which the semiconductor industry is seeing revenues decline due to the economic slowdown. As a result, poly silicon prices have fallen by 50% on the spot market over the past four weeks, and some insiders see prices dropping to less than \$ 100/kg soon. That will mean a 75% reduction in perhaps just a few months. Of course, this will spell good news for the price of crystalline solar modules, which have already dropped to € 2.50/Wp or less for tier one manufacturers, with delivery in 2009. And with poly silicon at \$ 100/kg, a further drop is possible, if not probable. There are even Chinese tier two manufacturers that expect, and are even offering, prices of € 2 - € 2.20/Wp for the second half of 2009. This is, of course, good news for the market. These lower prices will bring return on investment for ground-mounted projects in Germany to around 7-8%. In Italy, these module prices will result in much higher ROIs. Thus, crystalline PV modules will be an attractive, reliable and proven proposition for ground-mounted PV systems. This scenario could result in strong growth in the German PV market, which has no cap, and will therefore remain the biggest, most stable and most attractive PV market in the world.

### **Forces impacting thin-film modules to drive prices down**

While visiting factories during the SolarPlaza PV trade mission to China, and talking to some of these newer Chinese thin-film manufacturers, it became apparent that they are not yet fully aware of the current global market dynamics. Prices have fallen rapidly over the previous few weeks throughout the silicon supply chain. Some thin-film manufacturers, however, still believe they will be able to sell modules at above \$ 2.50/Wp, whereas price offers have already dropped to below \$ 1.90/Wp for 2009 deliveries. Developments in the crystalline supply chain will have an impact on thin-film prices too. In all, four forces will combine to drive thin-film module prices downwards.

Firstly, there is the competition surrounding crystalline products as discussed above. To remain competitive with crystalline modules, a price difference of at least 40% will be needed to compensate the extra cost of structures, cables, land etc. in large scale PV projects. Secondly, there is the acceptance of (new) thin-film module brands by banks for project financing. In the current financial situation, banks prefer experienced module brands. Strong companies that are likely to remain in business for the long-term, are able to survive a crisis, and are in position to fulfill their long-term guarantees. What competitive advantage will the new, mostly amorphous thin-film players, offer if they have just passed their first TÜV IEC certification? Many use the same production equipment, and their modules are relatively low in efficiency. It will leave them little other option than to compete on price and financial guarantees to enter the market. Thirdly, the currency ratio of the dollar versus the euro is currently making life more complicated for Asian thin-film manufacturers. Compared to September 2008, the euro lost around 20% of its value against the dollar. This means that Chinese (and Taiwanese) thin-film manufacturers will need to compensate for this in their pricing strategy to remain competitive, unless the euro recovers quickly. Finally, these 135 thin-film manufacturers will be competing in a

limited market of around 1.5 to 2 GWp in 2009. And they will also be up against the crystalline players.

### **Battle in the ground-mounted PV system market segment**

Let's make a simple analysis. The well respected Prometheus Institute has estimated that total thin-film production in 2009 will amount to 2.1 GWp. Subtracting the 700 MW from First Solar leaves 1.5 GWp from the other thin-film manufacturers to meet the 1.5-2 GWp ground-mounted PV systems market segment. It is unlikely that the whole large ground-mounted power plants market segment around the world will be fully covered by thin-film. Up to now, thin-film has had only a minority share in this segment. The perception of most developers, banks and investors is more 'conservative' and focused on proven crystalline technology. This will mean that hundreds of MWp thin modules will have to go elsewhere. With crystalline module prices falling, thin-film applications on roofs will be less attractive too. So, what options do these thin-film manufacturers have? Stop production of their brand new production lines? Or maybe sell at a very low price, making solar an attractive proposition in new markets even if these markets do not have financial incentives? That would require a price close to its close to its marginal cost of production (around \$1/Wp right now). It could make sense if manufacturers spread the depreciation cost of their production equipment over a longer period. This kind of strategy has occurred in the semiconductor industry in the past. But, what will happen if some thin-film manufacturers actually drop their prices significantly as a strategy to capture market share? Will this lead quickly enough to new sales volume? And how will crystalline manufacturers respond?

### **Long term future prosperous**

On top of the current very dynamic PV industry developments, a global financial and economic crisis is hitting the markets. Although this all looks pretty disastrous for the solar industry in the short-term, the longer-term future looks prosperous. Not only can we expect the global economy to recover, the IEA expects oil prices to rise again, and more and more countries will stimulate renewable energies as a solution for global warming and energy independence. The short-term future might mean a cold winter period for the solar industry, with margin compression, consolidation and some producers unable to survive. But, the expected price drop in thin-film and crystalline solar modules in the short-term will lead to sunny horizons with new markets. And the further prices fall, the closer we will get to new markets not being dependent on financial incentives. This will lead to a further increase in global demand for solar energy and a profitable future. The industry will face a period of survival of the fittest as it prepares itself for a new era where solar energy becomes a sustainable and price competitive energy source for everyone.

For a visual impression of the International trade mission to China, please go to:

<http://picasaweb.google.com/solarplaza.com/BusinessTourChinaNovember2008BySolarplaza#>

For more information please contact Johan Trip, [j.trip@solarplaza.com](mailto:j.trip@solarplaza.com)