

Taiwan thin-film manufacturers set for rapid growth

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The continued tight supply and increasing cost of polysilicon, coinciding with the growth in demand for solar energy, has been a key catalyst for the rapid adoption of thin-film technologies in just the last two years. After a long (15-year) gestation period, North America-headquartered First Solar has single-handedly thrust thin-film technologies into the spotlight with an impressive manufacturing ramp, full order books worth billions of U.S. dollars and a stock market evaluation in the \$20 billion bracket.

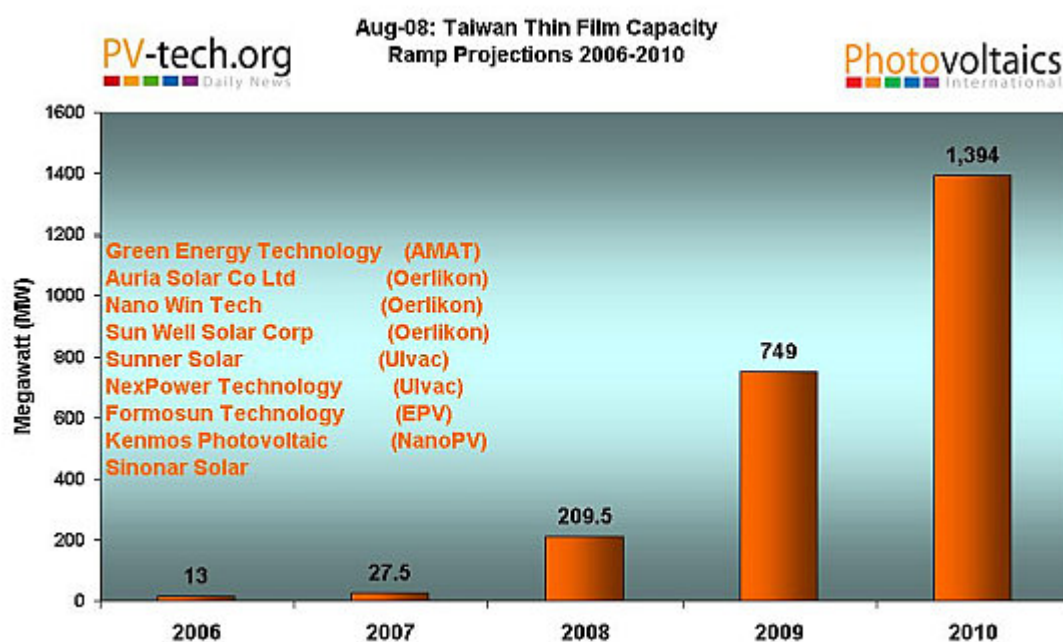
Not surprisingly, thin-film technologies have gained huge interest from potential new entrants as well as from established Si-cell producers such as Q-Cells, Suntech and Sharp to pursue thin-film manufacturing. E-Ton of Taiwan has also followed suit.

The technology is claimed to enable the lowest cost-per-watt and therefore bring about grid parity in many regions of the world sooner than Si-cell based technologies.

Thin films have also proven attractive to late entrants, eager to utilise turnkey processes and equipment solutions that significantly reduce the entry risks, while potentially allowing faster megawatt-scale production ramps and a quicker return on investment (ROI).

As Chart 1 below shows, Taiwan has attracted a small but growing group of thin-film converts that have established or are in the process of establishing initial volume production manufacturing plants.

Caption: Taiwan thin film manufactures capacity expansion plans.



Our research relies partially on projections produced earlier in the year by ITRI, as well as checks and updates we have undertaken subsequently. In 2006, nominal capacity stood at only 13MW, which consisted primarily of pilot line operations. As some of those projects have since matured, capacity is estimated to have risen to 27.5MW in 2007.

Although these capacity figures are small and when compared to ITRI/Photovoltaics International's estimates of Si-cell capacity having reached 990MW in 2007, thin-film has a long way to go to challenge silicon solar cells.

Interestingly, all of the current thin-film entrants have selected amorphous thin-film technologies from all of the key current suppliers (Applied Materials, Oerlikon Solar and Ulvac). Although development is taking place on cadmium telluride (CdTe) and copper indium gallium (di)selenide- (CIGS) based thin-film solar cells, current production ramps are all a-Si based. A key aspect of this are the less demanding learning curves with a-Si compared to the technical hurdles with which these alternative technologies are associated.

Work is also ongoing to boost conversion efficiencies to the 10 percent range with twin junction configurations to make them more competitive with CdTe and CIGS technologies.

Auria Solar has already announced that its first 30MW thin-film line will include Oerlikon Solar's micromorph tandem technology that utilises amorph and microcrystalline materials to boost conversion efficiency by 50 percent. Sunner Solar has employed ULVAC's thin film technology and has said that it too will incorporate ULVAC's tandem structure that uses a microcrystal (u-Si) layer followed by an a-Si process to boost efficiencies.

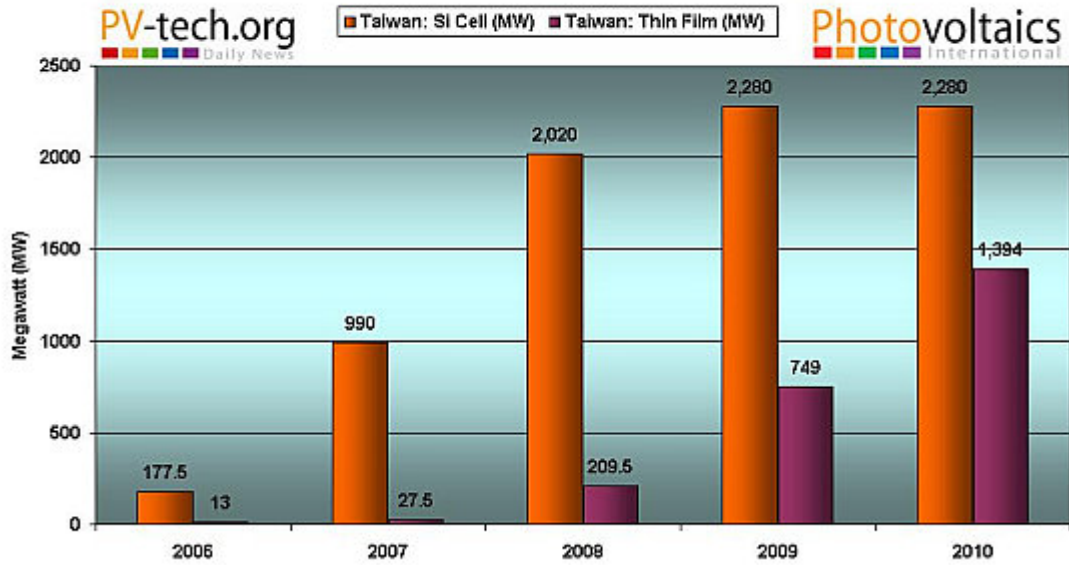
Therefore, 2008 looks like being a year of transition for the photovoltaics industry in Taiwan with both Si-cell and thin-film technologies ramping capacity considerably. Two Oerlikon Solar customers, Sun Well Solar Corp. and Auria Solar Co. Ltd., have stated that installed capacity using a-Si thin-film technology will reach 100MW combined by year-end.

NexPower Technology and Sunner Solar should also have ramped to 50MW combined capacity using a-Si technology from Ulvac by the end of 2008. Taking into account the prospect of Green Energy Technology's 40MW line using Applied Materials' SunFab system coming into operation by the end of 2008, the ramp becomes progressively steeper as we move through 2009 and 2010.

As Chart 2 highlights, there is the possibility that thin-film MW capacity will account for over half the capacity in Taiwan in 2010, a possible testament to the faster ramp capability of thin-film technology over conventional Si-cell approaches.

Caption: Taiwan PV manufacturers Si-cell and thin film capacity expansion plans

Taiwan: Capacity Comparison Ramps of SI-cell and Thin Film Technologies 2006-2010



These projections do not account for the likely possibility of the emergence of new thin-film entrants as well as greater capacity ramps from existing start-ups - should initial volume ramps prove highly successful. The prospects for Taiwan to compete with other regions of the world that are aggressively ramping thin film technology, is a realistic one.

By Mark Osborne

http://www.pv-tech.org/thin_film/article/taiwan_thin_film_manufacturers_set_for_rapid_growth#