

China Thin-Film Solar Cell Market Report, 2008

March 2009

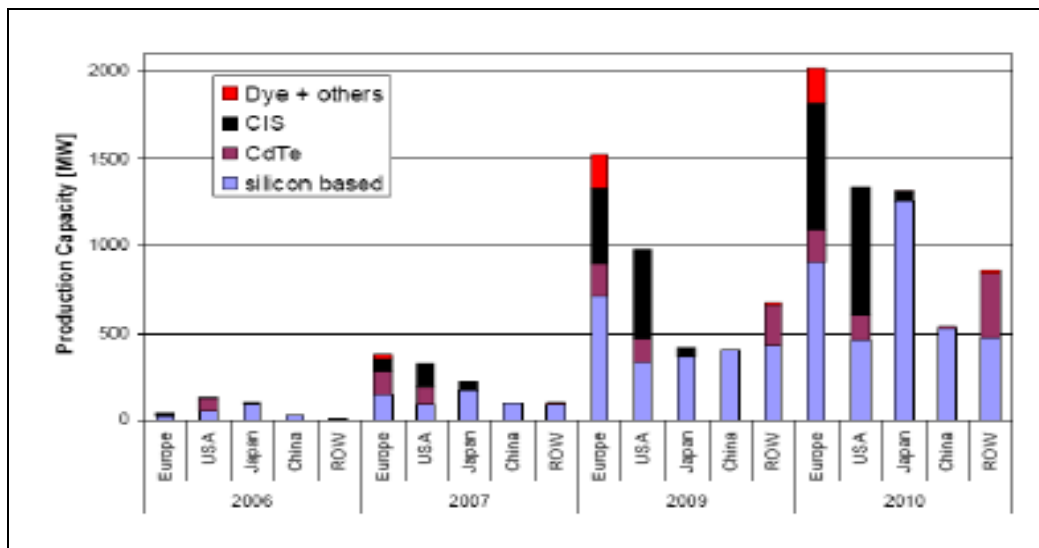


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2.3 Supply and Demand

Thin-film solar cell supply will increase by a big margin starting from 2008. The supply would reach above 6000MW by 2010, of which, CIS supply will increase with the fastest growth rate. During 2008-2010, the CIS supply will see the doubled increase. Due to the low cost and high efficiency as well as the constantly increasing price of silicon materials, the thin-film solar cell market is bound to have a promising future. As the world largest indium producing country, China employs the advantageous conditions of developing CIGS solar cell industry.

Supply Changes of Various Thin-film Solar Cells



Source: PV Status Report 2007

As we can see from the above chart, during 2009-2010, the supply of thin-film solar cell will increase with a rather fast speed and the CIS solar cell will take a larger proportion.

The newly-revised "Renewable Energy Law" of Germany has been officially implemented since Jan.1st 2004, which greatly stimulated the Germany's market demand for PV products. Under such circumstance, China's PV companies successfully penetrated the international market by virtue of the low cost, seizing this good opportunity. The technology level has been improved constantly; the product structure is getting closer to the perfect; the market size is expanding larger and larger. China's PV industry welcomes its fast developmental phase.

China's current solar cell manufacturers mainly include the followings: Suntech Power Co., Ltd.; CEEG (Nanjing) PV Co., Ltd.; Solarfun Power Co., Ltd.; JA Solar Holdings Co., Ltd and Shenzhen Topray Solar Co., Ltd. etc.

UNITED SOLAR from America and KANEKE from Japan can be regarded as the leading companies in the amorphous silicon solar cell field. The UNITED SOLAR output of 50MW amorphous silicon solar cell with stainless steel substrate tops the list globally.

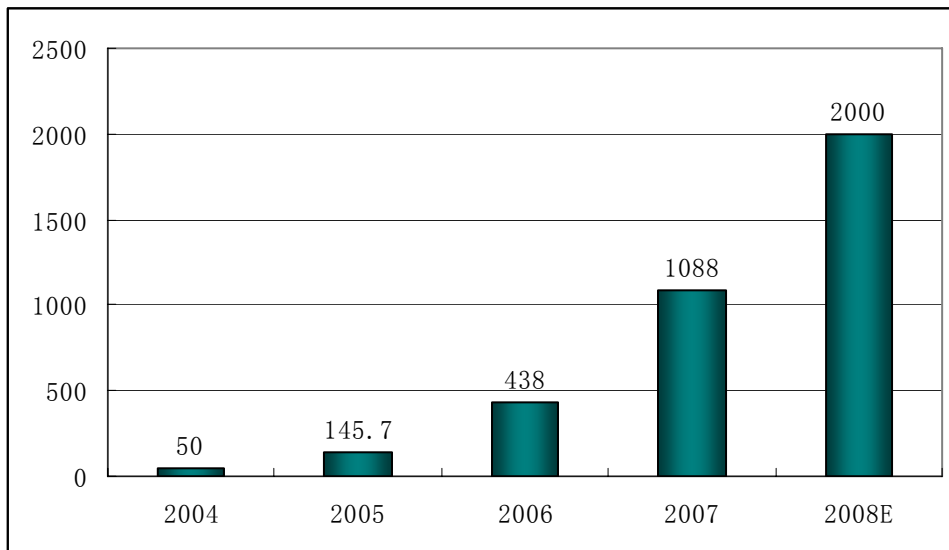
***International Major A-si Solar Cell Manufacturers and Corresponding
Production Capacities***

Company	Country	Production Capacity
Energy Photovoltaics, Inc.	US	5MWp/a
Free Energy Europe Energy	France	1.4MWp/a
Fuji Electric	Japan	3MWp/a
ICP Solar Technologies	Canada	3MWp/a
Iowa Thin Film Technologies	US	n/a
Kaneka Corporation	Japan	40MWp/a
Mitsubishi Heavy Industries	Japan	n/a
SANYO Electric Co., LTD.	Japan	n/a
Sinonor Corporation	Taiwan	3MWp/a
Solar Cells	Croatia	n/a
TerraSolar Inc	US	n/a
United Solar Ovonic Corp	US	50MW/p
VHF Technologies SA	Switzerland	n/a

Source: China Merchants Securities

Driven by the global PV market, China's PV industry developed very fast in recent years. China's solar cell output occupied 8.1% of the global total output in 2005 and this ratio increased to 17.1% in 2006, preceded only by Japan and Europe and becoming the third largest solar cell producing country worldwide. In 2007, China's solar cell output reached 1088MWp (excluding Taiwan), taking up 27.2% of the global total output. This figure has already surpassed the outputs of Japan and Europe, which respectively hit 920MWp and 1062.8MWp. In 2007, the output of China's packaged solar cell modules reached above 1800MWp. But in the other hand, China's PV market development is still quite slow. The installed capacity of PV system was about 20MWp in 2007, which only occupied 1.84% of the solar cell output. Above 98% products need to be exported. By the end of 2007, the accumulative installed capacity of China's PV system had amounted to 100MWp, less than 1% of the global total accumulative installed capacity of 12GWp.

China PV Cell Outputs, 2004-2008 (MW)



Source: ResearchInChina

China's solar cell industry maintained the strong growth during the period of 2006 to 2007. More and more companies entered the PV sector in these two years. By the end of 2007, there have been over 50 solar cell manufacturers in China. In terms of the current available production equipment, the reproduction capacity of solar cell can reach as high as 2900MWp (A-si thin-film cell's reproduction capacity hit around 100MWp).

Suntech Power ranks the national first in the battery field. Its battery outputs hit 157.5MWp and 327MWp respectively in 2006 and 2007, occupying 35.9% and 30.1% of the national total output separately during those two years. China's solar cell output reached 438MWp in 2006, among which, the amorphous silicon cell took 12MWp and crystalline silicon cell 426MWp. In 2007, the solar cell output reached 1088MWp, among which, the amorphous silicon cell took 28.2MWp and the crystalline silicon cell 1059.7MWp. The year-on-year growth of solar cell in the year of 2006 and 2007 were 201% and 148.1% respectively.

4 Chinese Thin-film Solar Cells Enterprises

4.1 Topray Solar

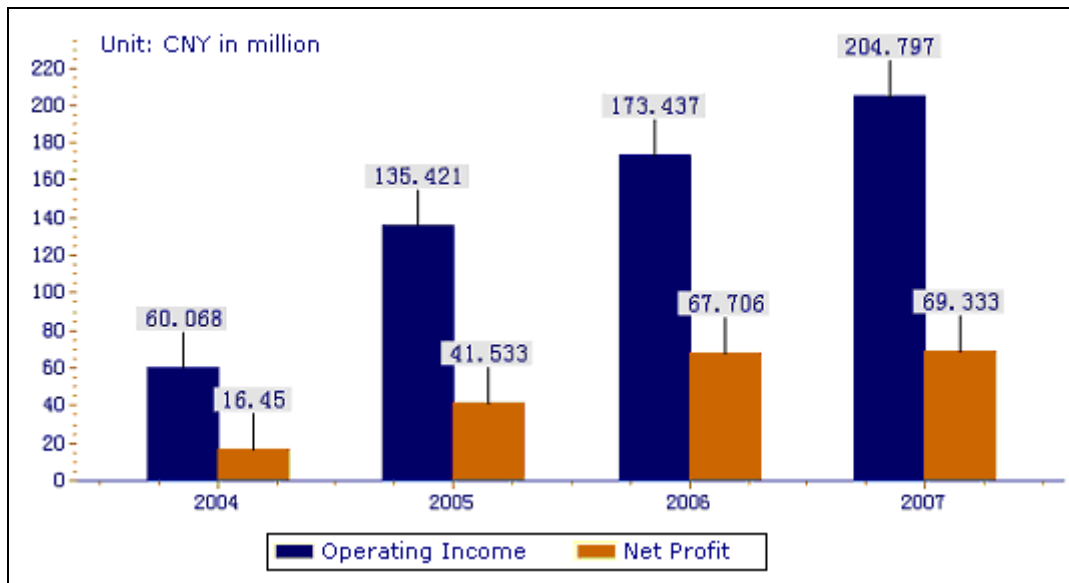
Overview

Name	SHENZHEN TOPRAYSOLAR Co.,Ltd.
Address	Buildings No.9 and No.10, Nangang 1st Industrial Park, Songbai Road, Xili, Nanshan, Shenzhen, China
Established in	August, 2002
Registered Capital	CNY 120,000,000
Total Assets	CNY 722,642,900 by Sep. 30, 2008
Listing	Shenzhen Stock Exchange, stock code: 002218
Legal Representative	Chen Wukui
Sales Income	CNY 195,970,400 by Sep.30, 2008
Staff	927 by the end of 2007

Shenzhen Topray Solar Co.,Ltd is devoted to manufacturing amorphous silicon, monocrystalline silicon, polycrystalline silicon solar cells, especially in the field of amorphous silicon solar cells, the company has broken through the situation that the equipment and technology of solar cell market is monopolized by foreign enterprises, and has become the largest enterprise in producing and selling amorphous silicon solar cells, taking the first position in exporting such products from 2004 to 2007 in China.

In 2007, the total operating income of the company was CNY 254,000,000, increasing 46.46% on a year-on-year basis, with the net profit of CNY 80,460,000 by a rise of 18.85% over the last year.

***Operating Income and Net Profit of Shenzhen Topray Solar Co., Ltd.,
2004-2008***

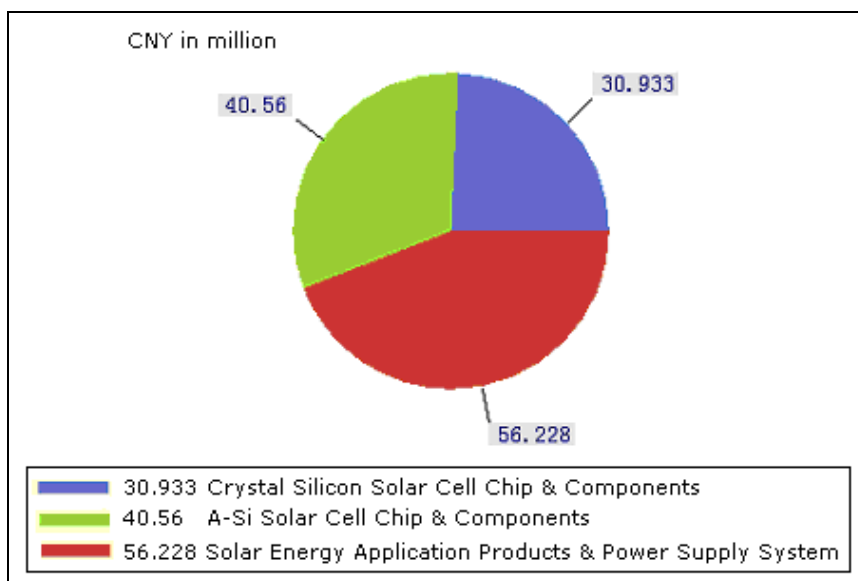


Source: ResearchInChina

During the first six months of 2008, the company achieved the total consolidated operating income of CNY 127,879,800 with a rise of 18.05% over 2007; the company gained the net profit of CNY 38,332,900 with an increase of 4.4% over 2007.

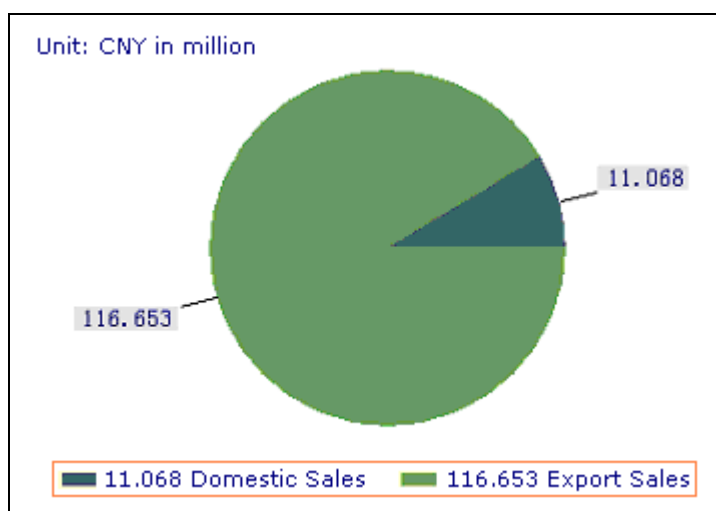
Meanwhile, the company continued to invest in R & D and innovation. In the first six months of 2008, the company invested CNY 4,209,100 in R & D, accounting for 3.29% of the operating income of the company.

Main Business Structure of Shenzhen Topray Solar Co., Ltd in 2008 (by Product)



Source: Topray Solar; ResearchInChina

Main Businesses of Shenzhen Topray Solar Co., Ltd in 2008 (by Region)



Source: ResearchInChina

In 2008, the company raised the fund of CNY 550,000,000 from IPO, which is mainly used in the projects of 25MW amorphous silicon solar cells and 15MW crystalline silicon solar cells as well as related components. By the end of July, 2008, the company had put the investment of over CNY 330,000,000 into execution, so the construction period of 18 months planned previously would be shortened greatly, and it was estimated that production capability would be realized by the end of 2008.

The products of the company are mostly amorphous silicon solar cells. At present, solar application products, power supply system, amorphous silicon solar cell chips and components account for over 80% of the company's income with the gross interest rate of more than 40%; however, the scale of the company is not large. The company adopts the production mode of "production is determined by sale", making production plans according to the orders of customers, so the sales/output ratio is beyond 90%.

The output of main products is as follows:

Monocrystalline Silicon and a-Si product Capacity, Output and Sales of Shenzhen Topray Solar Co., Ltd

<i>Product Type</i>	<i>Period</i>	<i>Capacity (MW)</i>	<i>Output (MW)</i>	<i>Sales (MW)</i>	<i>Volume</i>	<i>Production-Sale Ratio (%)</i>
<i>a-Si Cell Chip & Components</i>	2006	10	8.73	8.01		91.75
	2005	5	4.60	4.60		100
	2004	5	3.10	3.10		100
<i>Monocrystalline Silicon Cell Chip & Components</i>	2006	5	2.05	1.92		93.65
	2005	5	4.15	4.15		100
	2004	2	0.60	0.60		100

Source: ResearchInChina

The dominant products of the company are exported to 51 countries and regions in the North America, Europe, Oceania, Africa and Asia, sold in eight large-scale supermarkets and utilized in power plant projects in Europe and America. The customers of the company include Wal-mart, HomeDepot, K-Mart, MAPLIN, CentralPurchasing, and CONRAD. The brand "TOPRAYSOLAR" of the company has a good reputation in the world. Currently, the company has become the largest enterprise in producing and selling amorphous silicon solar cells.

The marketing mode of the company is direct marketing. First, over 80% of the products are exported; second, the products are supplied to 100 long-term customers; third, the direct retail network has not been established for civilian solar products. The customers of the company are mainly dealers or chain-supermarkets in the world. The customers can be divided into three sorts. Firstly, ordinary dealers or manufacturers that produce and sell solar application products in the world; Secondly, regional dealers, such as Transworld in the North America and Henan Light Industrial Products IMP. & EXP. Group Co., Ltd in the South Africa; Thirdly, foreign chain supermarkets that are the main customers.

***Sales Performance of Topray Solar's Customers of Three Sorts,
2004-2007(CNY10, 000)***

Customer Type	Jan-Jun, 2007		2006		2005		2004	
	Sum	Proportion	Sum	Proportion	Sum	Proportion	Sum	Proportion
Ordinary distributor or manufacturer	7,035.47	64.95%	10,256.43	59.14%	9,463.04	69.88%	3,636.40	60.54%
Regional distributor	1,796.19	16.58%	4,049.90	23.35%	3,440.59	25.41%	1,780.90	29.65%
Overseas chain supermarkets	2,001.07	17.47%	3,037.36	17.51%	638.46	4.71%	589.49	9.81%
Total	10,832.73	100.00%	17,343.69	100.00%	13,542.09	100.00%	6,006.80	

Source: ResearchInChina

**Main Customers of Topray Solar's Regional Distributors and Customer Sales,
2004-2007**

(Unit: CNY10, 000)

Customer	Region	Jan-Jun. 2007		2006		2005		2004	
		Sales	Proportion	Sales	Proportion	Sales	Proportion	Sales	Proportion
Transworld	Occident	1,683.57	15.54%	3,600.64	20.76%	2,892.85	21.36%	1,051.50	17.51%
Henan	South	112.62	1.04%	449.26	2.59%	547.74	4.05%	729.40	12.14%
Light Industry Products Importing Group Co., Ltd	Africa								
Total		1,796.19	16.58%	4,049.90	23.35%	3,440.59	25.41%	1,780.90	29.65%

Source: ResearchInChina

**Sales of Shenzhen Topray Solar Co.,Ltd in Foreign Chain Supermarkets
2004-2007**

(CNY '0000)

Customer	Region	Jan. to June, 2007		2006		2005		2004	
		Sales	%	Sales	%	Sales	%	Sales	%
HOMEPOOT	USA	7.76	0.07%	5.10	0.05%	-	-	-	-
K-MART	Australia	25.64	0.24%	22.24	0.13%	39.59	0.29%	-	-
PURPLE LINE	UK	25.96	0.24%	25.00	0.14%	85.15	0.65%	-	-
CONRAD	UK	60.01	0.55%	41.00	0.24%	195.13	1.44%	108.25	1.80%
MAPLIN	UK	371.54	3.43%	345.95	1.99%	-	-	-	-
CentralPurchasing	USA	664.31	6.13%	2051.98	11.83%	293.87	2.17%	63.46%	1.05%
WAL-MAT	USA	326.04	3.01%	0.59	0.00%	-	-	-	-
NETTO	Denmark	519.79	4.80%	545.50	3.13%	24.72	0.18%	417.77	6.96%
Total		2001.07	18.47%	3037.36	17.51%	638.46	4.71%	589.5	9.81%

Source: ResearchInChina

The company sets up its wholly-owned subsidiary in Leshan, Sichuan, with the investment of CNY 20,000,000 in cash.

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