

# The Development and Future Outlook of China's PV Industry

Frank Haugwitz

Email: Frank.Haugwitz@gtz.de / @gmail.com

German Technical Cooperation, Tayuan Diplomatic Office Bldg. 1-13-1; No. 14 Liangmahe Nanlu; Chaoyang District, People's Republic of China

Tel: 0086 (0) 10 – 8532 3489 Ext. 26 / Fax: 0086 (0) 10 – 8532 3481

**SUMMARY** Just a few years ago China didn't play a significant role in the global PV industry. At the end of 2006 with a cell production output of 369.5 MW China claims the third position after Japan and Germany. In this context, according to a survey carried out early 2006 the total production capacity for wafers, cells, and modules will be 800 MW, 1500 MW and 2580 MW respectively by the end of 2007. This development indicates that China no longer only assembles PV-Modules, but rather will considerably move towards higher value added segments of the production line (i.e. wafers, cells) that have until recent years the almost exclusive domain of foreign competitors. Thus reducing the dependency from foreign imports which will enable China to further cut costs and increase its competitive advantage. However, the foreign dependency on supply of silicon feedstock will remain unchanged in the foreseeable future. Last year the demand has been estimated to amount to 3080 t however the domestic output totalled 340 t only. A moderate domestic installation of 5-10 MW/a compared to the existing production capacities has urged Chinese manufacturer to tap foreign markets through mergers and acquisitions and the establishment of distribution and sales networks throughout Europe and the USA. Nevertheless, a number of strengths and weaknesses can be attributed to this relatively young industry and it remains to be seen how successful China will be in the future since foreign competitors are looking ahead as well!

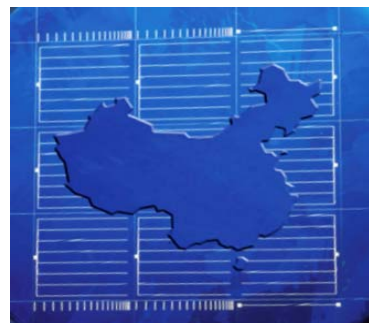
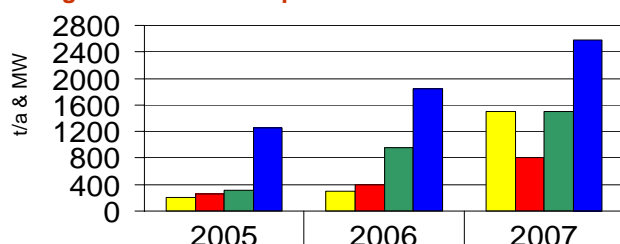


Fig. 1: Production Capacities 2005-2007



■ Silicon t/a	200	300	1500
■ Wafer (MW)	260	400	800
■ Cells (MW)	320	960	1500
■ Modules (MW)	1250	1850	2580

Source: ENF Study 2006; personal research and interviews.

**Poly-Silicon Situation:** Rapid expansion of production capacities in the fields of wafers, cells, and modules, however the poly-silicon demand is outpacing domestic supply and makes Chinese manufacturer highly depended on foreign imports (more than 95%) and market price fluctuations. Therefore, today approx. 20 Chinese companies are involved in the production of poly-silicon and plan to construct a production capacity of in total 63,460 t/a (incl. the table below) in the years ahead. In this context, the Chinese government stepped up its efforts through corresponding R&D programmes in order to support domestic manufacturer. Under the assumption that Chinese companies will master the handling of such technologically sophisticated production processes in the near future, it will not only enable Chinese companies to further cut costs but as well strengthen their international competitiveness.

Table 1: Domestic Supply and Demand of Poly-Silicon (ton)

Year	2004	2005	2006 (Est.)
Demand	585	1596	3080
Supply	57.5	80	340
Shortage	527.5	1516	2740

Source: China Solar Energy Society, 2006.

Table 2: Domestic Poly-Silicon Production Capacities (ton)

Manufacturer	Capacity t/a	Invest. Mio. €	Schedule
Sichuan Emei	300	--	2006/8
Luoyang Zhonggui	300	--	2005/12
Luoyang Zhonggui	700 / 1260	-- / 140	2007/3 / 2008
Sichuan Xinguang	2000	110	2007/6
CSG Holding Co.	1500 / (5000?)	600 (?)	2008/12 ?
Qujing Aixingui	3000 / (10000?)	250	2008 ?
<b>Total</b>	<b>9060</b>		

Source: China Renewable Energy Society, Internet, personal research.

## Questions for Discussion:

- 1) Can China's PV industry sustain its current high growth rates - if so, under which conditions?
- 2) Could or is China already a competitive threat to other PV manufacturers in Europe, Japan, and USA?
- 3) Will China taps its own solar resources by promoting the development of the domestic market?
- 4) Are Chinese companies today competing only on thin margins via its advantageous location, i.e. abundant pool of cheap labour, income tax grace periods, etc. or is it already gradually moving up the technology and quality ladder?

**Strengths vs. Weaknesses:** China's PV Industry is rapidly emerging as a serious player in global PV markets. Specific local conditions and various preferential policies facilitated its rapid development which so far is predominately characterized by expansion of production capacities. Today Chinese manufacturer have comparative advantages like access to an unrivalled pool of cheap labours and low cost manufacturing technologies offering the potential to further reduce cost along the value chain. Thus supporting them to strengthen their position in a highly competitive global business environment. The future development and success will however depend as well on a number of crucial factors which are beyond the pure installation of hardware.

### Strengths

Unskilled labour 1 €/hrs
Willingness to constantly improve production process
Domestic production technologies could further reduce costs
OEM Manufacturer Ambitions
Income Tax Grace Period / VAT Refund
Lower Costs for Construction, Lease Land and Electricity
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### Weaknesses

Limited skilled labour
Lack of Quality Consciousness
80% of all production technology imported
Lack of Transparency regarding Market Stakeholder
Relatively ambitious govt. support
Limited Poly-Silicon Production Expertise
Moderate govt. budget for R&D

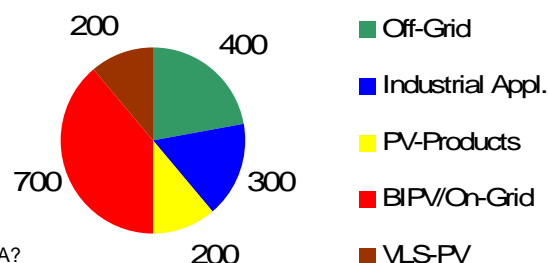
Table 3: National Installation Targets for PV (GW)

Year	2004	2010	2020
Japan	1.2	5	30
Europe	1.2	3	15
US	0.34	3	15
Rest of World	1.195	2.6	8.2
<b>China</b>	<b>0.065</b>	<b>0.3</b>	<b>1.8</b>

Source: Review of China PV Development 2007, Greenpeace, CREIA, EPIA, forthcoming Sept. 2007.

At the end of 2006 the installed PV power capacity amounted to 80 MW only. Over the previous years China's annually installed PV capacity were in the order of moderate 5-10 MW. In order to meet the national target of 1,8 GW by 2020 approximately 120 MW needs to be installed each year.

Fig. 2: Chinese PV-Market Segments by 2020 (MW)



Source: Review of China PV Development 2007, Greenpeace, CREIA, EPIA, forthcoming Sept. 2007.