

The PV-Industry: Current Investment Risks and Opportunities

Matthias Fawer



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Agenda

- A remarkable 2005
- Slump in the market in spring 2006
- Success factors for PV companies
- Forecast for national PV markets



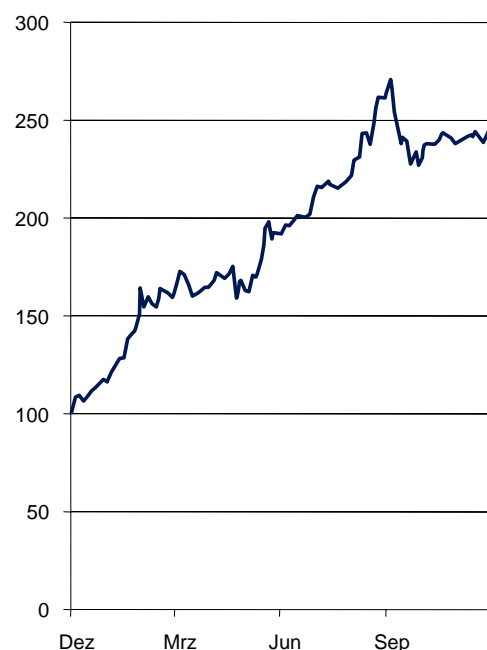
Remarkable growth in 2005 despite solar silicon bottleneck

- **In 2005 worldwide solar cell production grew from 1'230 to 1'740 MW by 41%.**
- **How was this possible?**
 - Economical usage of solar-grade silicon (lesser cutting and sawing waste; thinner wafers, lesser breakage, etc.)
→ average use of 11 t solar silicon per MWp
 - Development of new production technologies such as string-ribbon and 'edge-defined film growth'
 - Improved efficiency of solar cells not only in yield (average 14.5% at the moment to >20%)
 - High poly silicon prices shifted further material from the semi-conductor industry to PV applications
 - All inventories of solar silicon and intermediary products are use up



Solar shares with huge increases in 2005 ...

- Since beginning of 2005 solar stocks have soared
- PPVX-Index increased by 150% between 1. Jan 2005 and 31. Dec 2005
- Many (smaller) companies took advantage of the positive market environment for capital increase or an IPO (20 new listed companies over the last 18 months)
- Investors seemed to make no differentiation and were willing to pay any price for solar shares

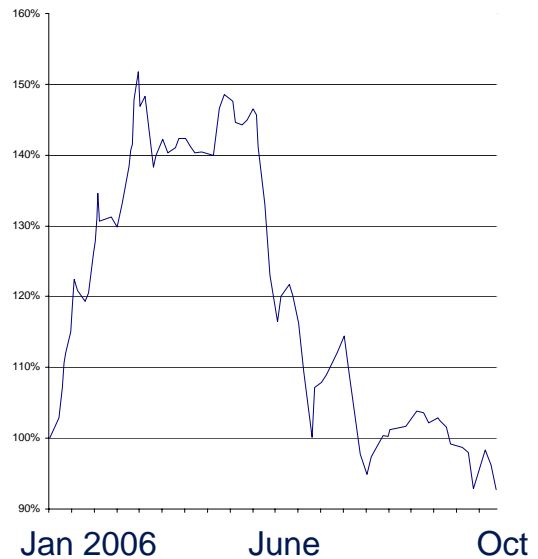


Source: Solar-Verlag, Öko-Invest



... correction during 2006...

- Until May 2006: PPVX-Index grew another 50%
- Over the whole year: PPVX-Index loses 7%
- Why up: California PV-programme; high oil price; still positive sentiment for solar
- Why down: Declining demand for PV-systems in Germany; growing price pressure; Uncertainty about EEG from 2007 on



Source: Öko-Invest



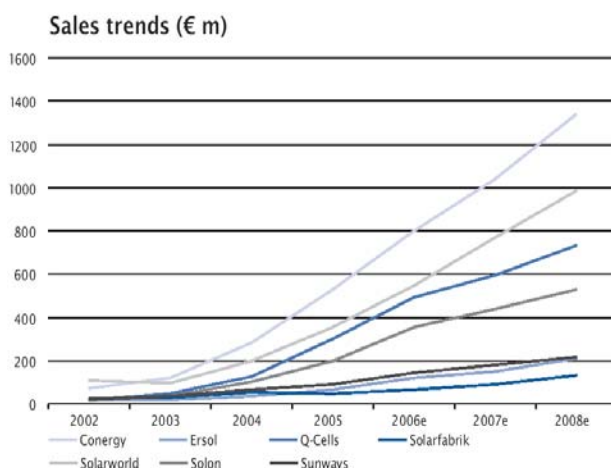
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... and investors starting to differentiate



Source: Company reports, forecast LBBW

- Time has come now to examine the potential of individual business models of solar shares more closely
- Already in 2005 operating profit margins ranged from 20% to loss making
- Also sales growth were anything but uniform
- These gaps will even widen in the near future
- Therefore, consolidation process is accelerating - what are the plans of the big players?



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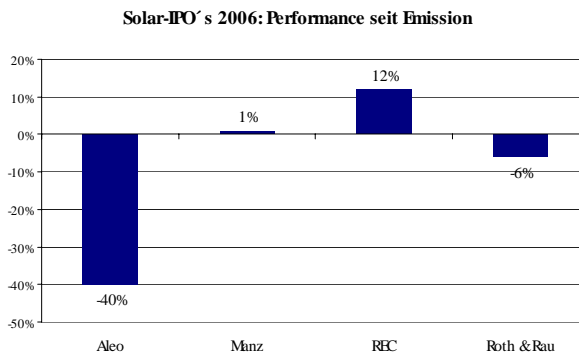
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PV 2006: separate the wheat from the chaff

- Price pressure and stagnation of the German Market: Clear slowdown in the quarterly results of smaller German players (e.g. Aleo, SAG Solarstrom, Sunways, Phoenix Sonnenstrom, Reinecke & Pohl, ...) but also brilliant figures from internationally active upstream companies (e.g. SolarWorld, Q-Cells, REC)
- Solar-IPO's are no self-runner anymore. Investors investigate the business model in more details



- Aleo Solar (German module producer, mainly active in GER)
- Manz (German equipment producer, focus on Asia)
- REC (Integrated international solar company from Norway)
- Roth & Rau (German equipment producer, focus on Asia)

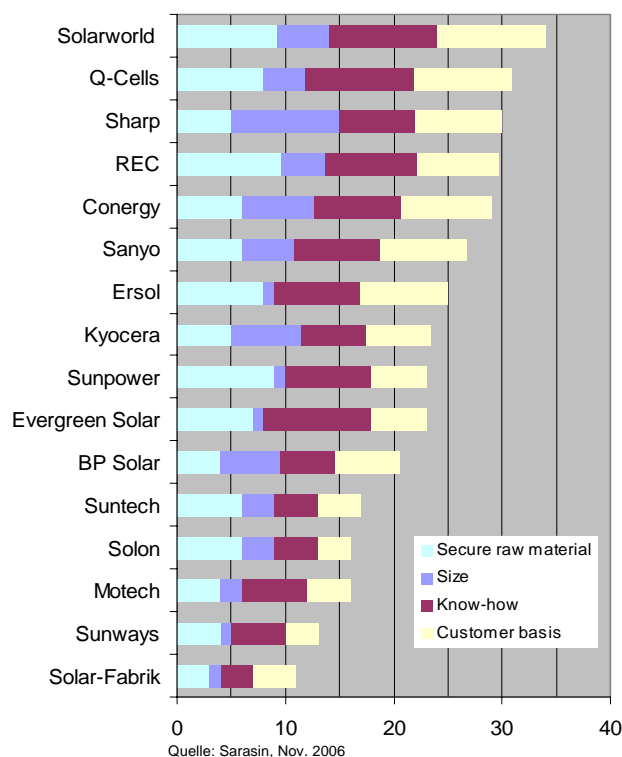


What factors determine the future success of PV-companies?

- **Growth despite solar silicon bottleneck:** Successful procurement strategy (e.g. *Q-Cells*); opening up joint ventures (e.g. *SolarWorld*), participations or own silicon production sites; Technological progress to improve MW yield per ton solar silicon; Expand thin-film activities.
- **Critical size of the company:** to fully profit from economy of scale. Suppliers of input materials may focus on long-term partnerships with larger customers with financial power to minimise risk.
- **Establish a clear business model and build-up unique know-how:** to outstand the mass. Examples are *Sunpower* (highly efficient solar cells), *Evergreen* (efficient production method).
- **International customer basis:** home market (especially for German companies) is not enough. Growth markets of the future are Southern Europe, Asia and North America.



Strategic position of PV-companies



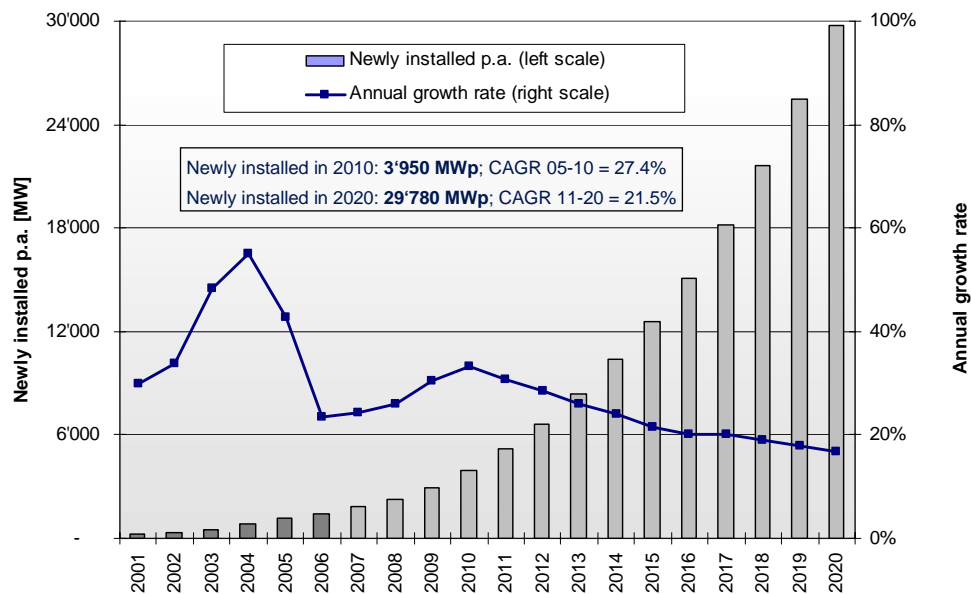
- Assessment of 16 quoted PV-companies along four success factors (secure raw material, size, Know-how und client basis).
- Leading companies are *SolarWorld* (34 out of max. 40 points) followed by *Q-Cells*, *Sharp*, *REC*, *Conergy* and *Sanyo*.
- Laggards are *Suntech*, *Solon*, *Motech*, *Sunways* and *Solar-Fabrik*.

2010 forecast for national PV markets

	Newly installed						CAGR 05-10
	2005	2006	2007	2008	2009	2010	
Germany	635	665	732	783	834	879	6.7%
Italy	7	25	43	74	130	202	97.0%
Spain	20	63	110	187	319	526	91.5%
Rest of Europe	47	62	77	104	140	189	32.1%
Europe	709	815	961	1'148	1'423	1'796	20.4%
USA	103	155	240	348	523	758	49.0%
China	5	32	48	79	135	229	114.8%
India	8	26	35	47	69	103	66.7%
Japan	290	317	362	411	462	514	12.1%
Rest of Asia	25	46	67	97	150	232	56.2%
Asia	328	421	512	634	815	1'078	26.9%
Rest of the World	35	61	92	142	206	319	55.6%
Newly installed cap. p.a.	1'175	1'452	1'805	2'273	2'966	3'951	27.4%
Annual Growth rate	43%	24%	24%	26%	30%	33%	

Source: Sarasin estimates, Nov. 2006

Sarasin Long-term forecast



Quelle: Sarasin Schätzung, Nov. 2006



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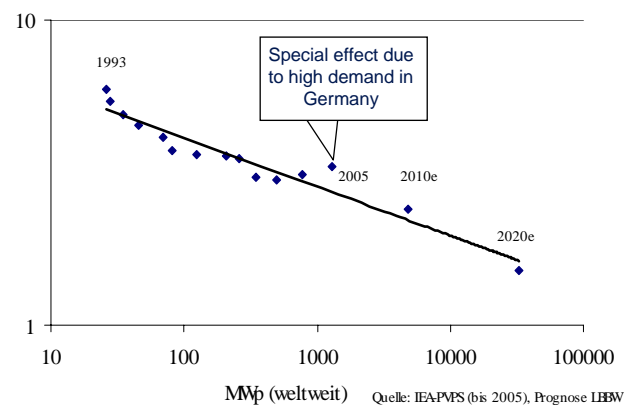
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Opportunities for the PV-sector

- Electricity from Photovoltaics will be one of the fastest growing energies in next decades.
- Competitive prices will be reached within the next 10-15 years. This will be at generation costs of appr. 0.20 €/kWh. (At the moment cost for PV-power are around 0.30 – 0.50 €/kWh).
- The fast technological development allows an annual efficiency increase of 5-10%.
- The current global volume of the PV-market is appr. EUR 9 Mrd. – in 2020 it could be around EUR 50 Mrd.

€/Wp Prices of solar modules and newly installed capacity (Deutschland)



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