

PV Markets - Overview from an investors perspectives

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SARASIN

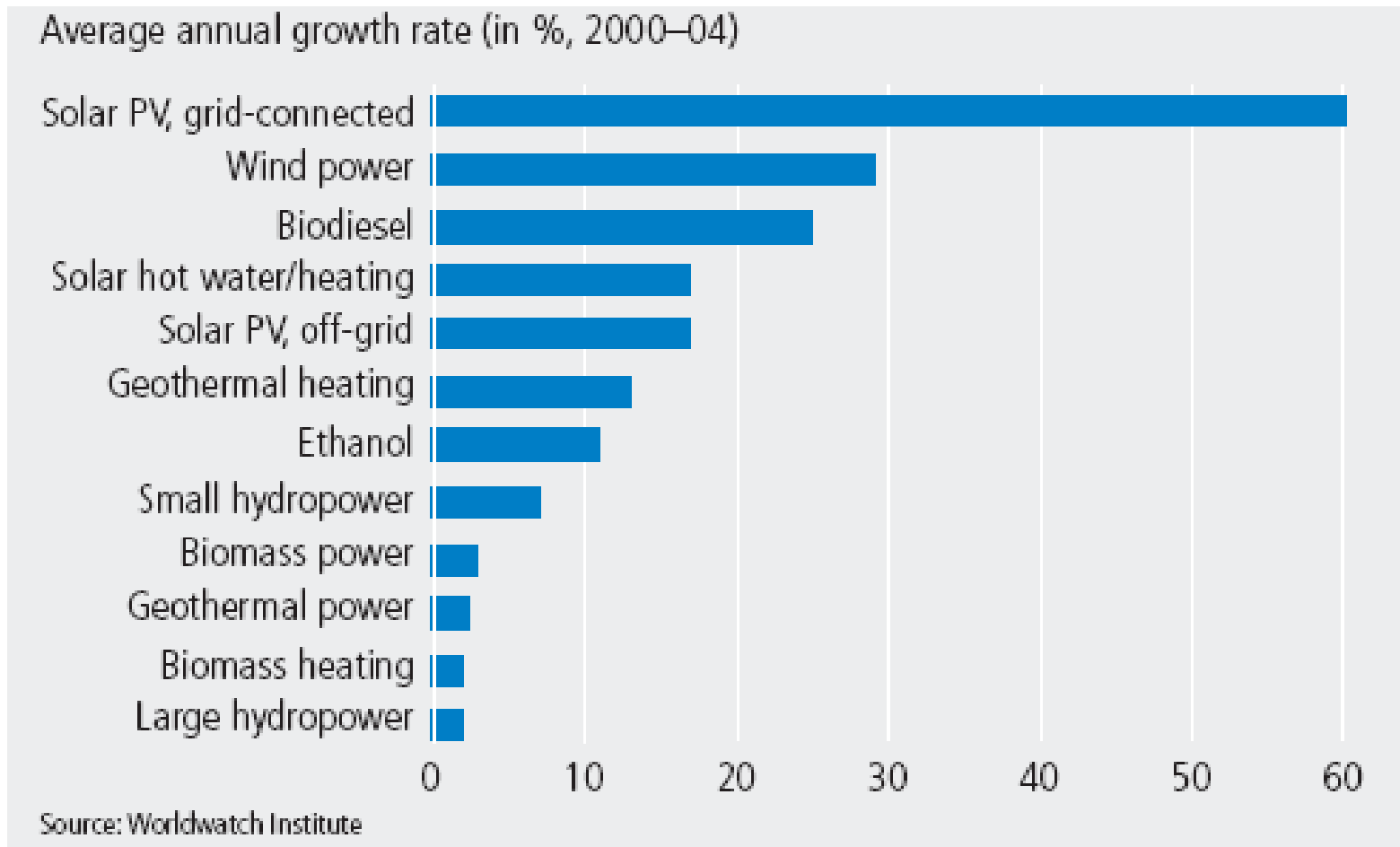
Presentation Structure

1. Growth of Renewable Energy in the Past
2. Photovoltaics with a top year 2007
3. Current threats for the PV-market
4. Perspectives – new markets
5. Conclusion



Renewable Energies with Incredible Growth Rates

During the same period total world wide energy consumption grew by 1.5% p.a.



Clean Energy: Current Investment Growth

- Investments in renewable energies resp. clean energy have continued to accelerate (public and private investments)

2004: USD 30 bn

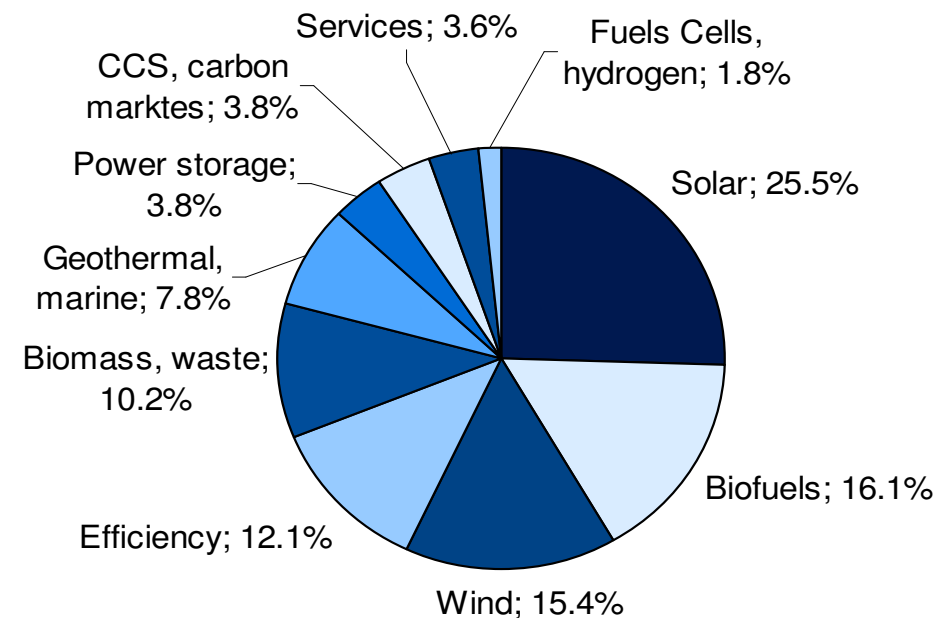
2005: USD 38 bn

2006: USD 84 bn (clean energy in total)

2007: USD 117 bn (clean energy in total)

- Investors with focus on four sectors: solar, 2nd generation biofuels, wind and energy efficiency

Investments in Clean Energy (2007)



Source: New energy finance, January 2008



2007 – A top year for Photovoltaics

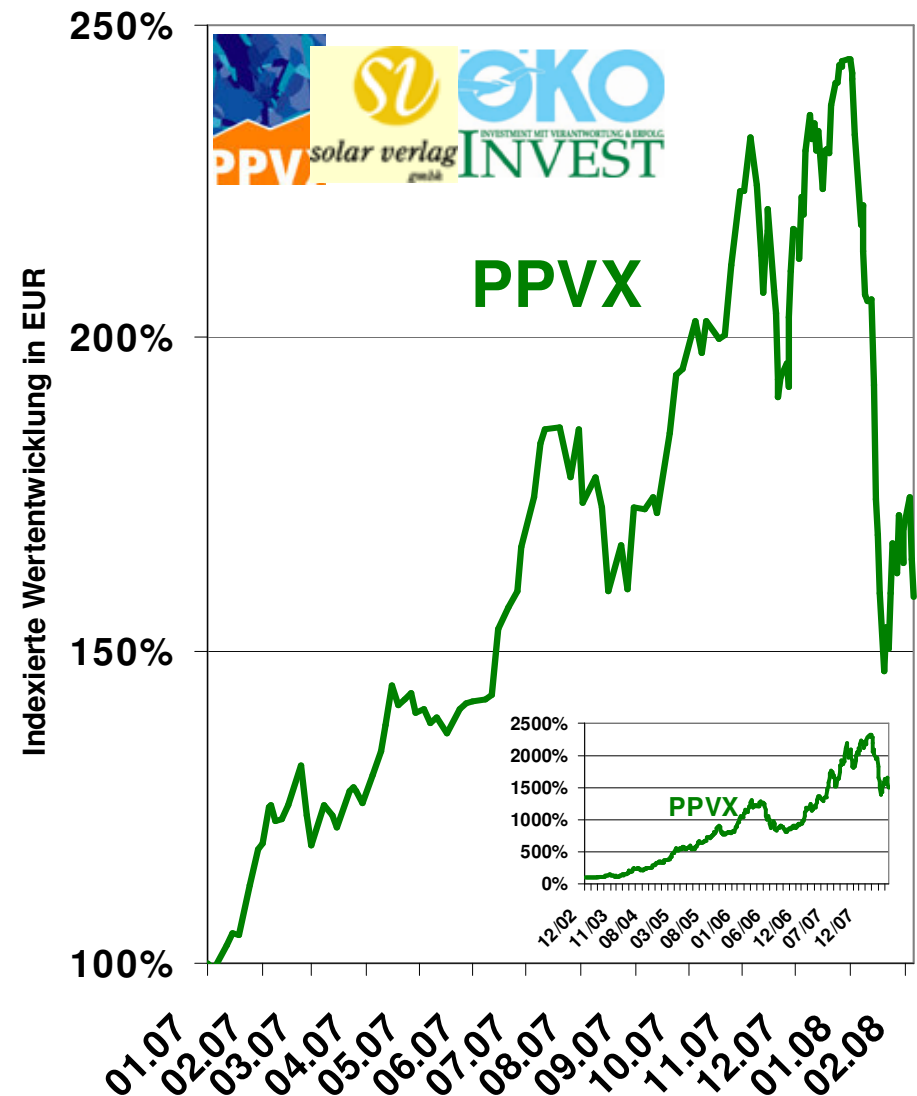
- PV industry in 2007 allocated more capital than ever before.
- Number of IPOs and secondary offerings increased from China, Spain, Canada and to the USA.
- New technologies emerged: First Solar with CdTe thin film modules and CIGS manufacturer such as Honda and Nanosolar. Thin film with the potential to gain 20% market share in 2010.
- Concentrating PV (CPV) with increasing number of active companies. Increasing interest from power utilities.
- Growing market diversification: Spain's market exploded to over 300 MW. Italy, Greece, France and South Korea with new support schemes.
- So, nothing to worry about...



Photovoltaics 2007 till now – high rise and deep fall

- PPVX is a photovoltaics index that contains 30 solar stocks from all over the world
- In the year 2007 the PPVX-Index increased by 145%. Definitely best performance of all “clean energy” sectors.
- The big slump came in January 2008 – 1 month minus 100 percentage points!
- Since inception in 2002:
 - Index value grew >20 times
 - Market cap of the stocks increased from 1.9 bn EUR to 60 bn EUR

PPVX in 2007 & Jan 08

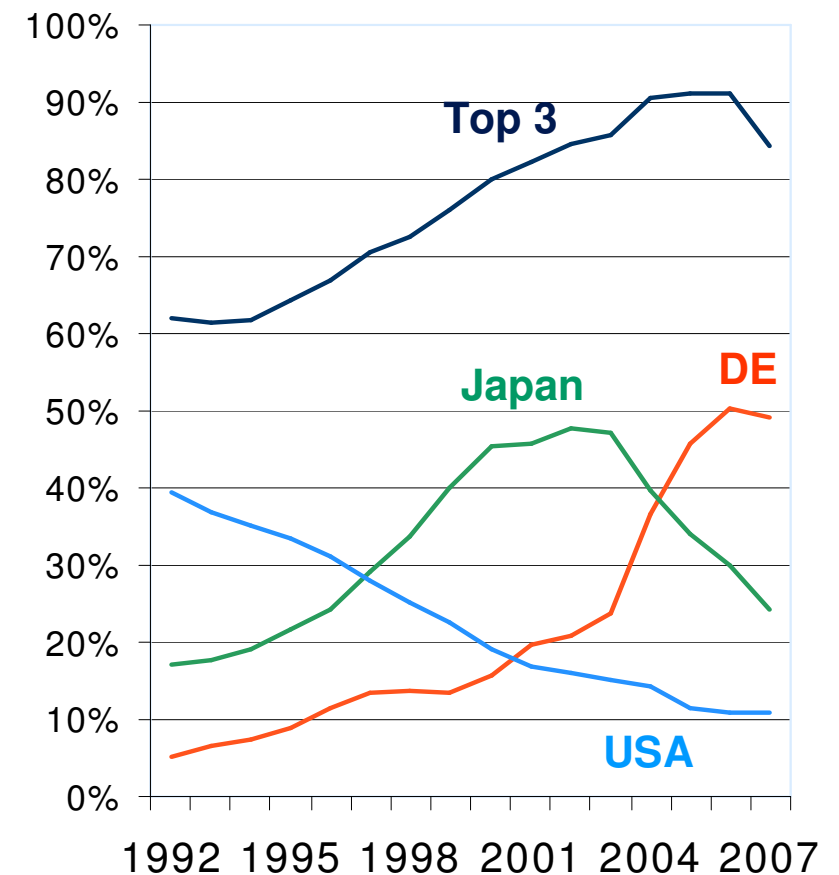


Can markets sustain its growth without support?

- Japan was Top Market between 2000 and 2003. With shrinking support scheme market has stagnated.
- US market lacks long-term security and stimulus. ITC prolongation still uncertain.
- Germany was the big stimulus for PV from 2004 onwards due to attractive EEG. Revision may lead to a dip in 2009.
- Spanish market has also benefited from favourable support programme (not shown)

➔ **PV-markets still need some sort of support schemes**

Percentage of cumulative installed PV-Capacity



Market growth & support schemes – a delicate balance

- PV industry dependence on support programmes is even more obvious and sensitive in today's unstable markets.
- USA: tax credits (ITC) worth 30% of the cost of a PV system is in danger to expire end of 2008.
- Average support levels in Germany and Spain will decline 5% in 2008 and 13% in 2009. → **Rush in 2008 in order to profit from today's feed-in tariffs.**
- Can the PV-sector maintain momentum? System prices will have to come down. → **Cut costs or face shrinking margins!**
- Who absorbs the impact of reduced subsidies? Everyone along the value chain will experience some **margin compression** and PV-systems owner will see a **decline in annualized returns.**
- What's happening with the demand side?

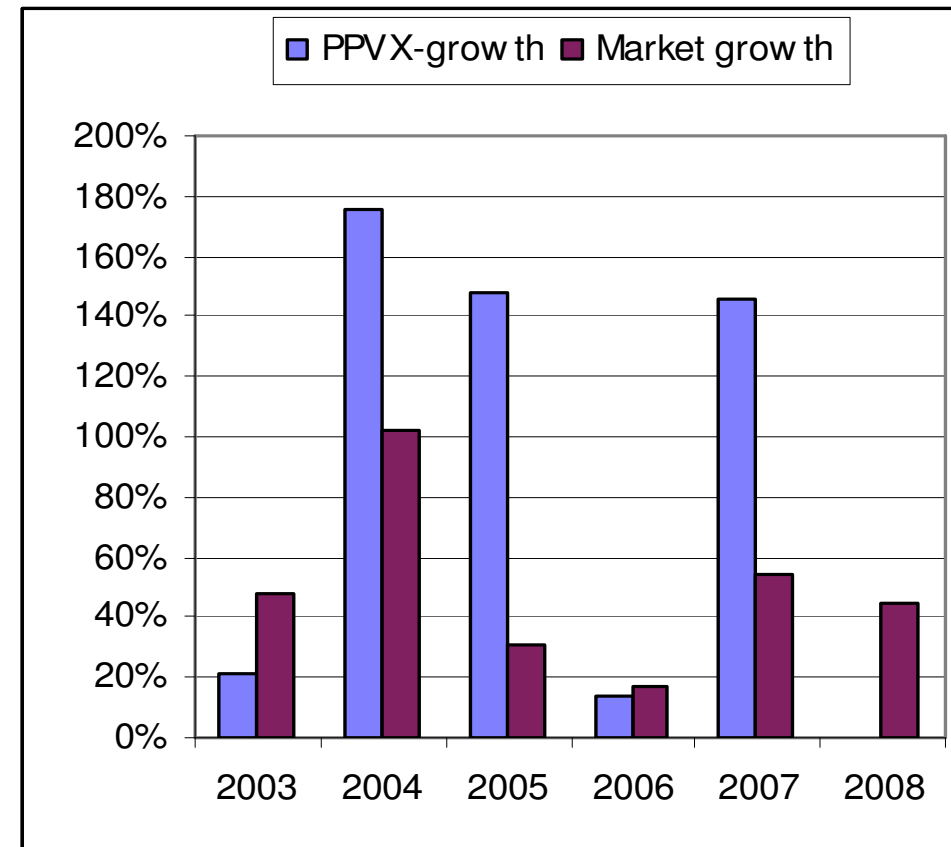


Are market growth and stock valuation linked?

- Rubbish, this comparison is too simplified.
- Yes, we see a certain pattern, that repeats itself 2003/04 and 2006/07.
- Please continue this pattern in a logical order for 2008...
- Additional important parameters for a stock valuation were mentioned before (feed-in tariffs, margins, raw material prices, etc.)

→ **We will see a positive PPVX performance at the end of 2008**

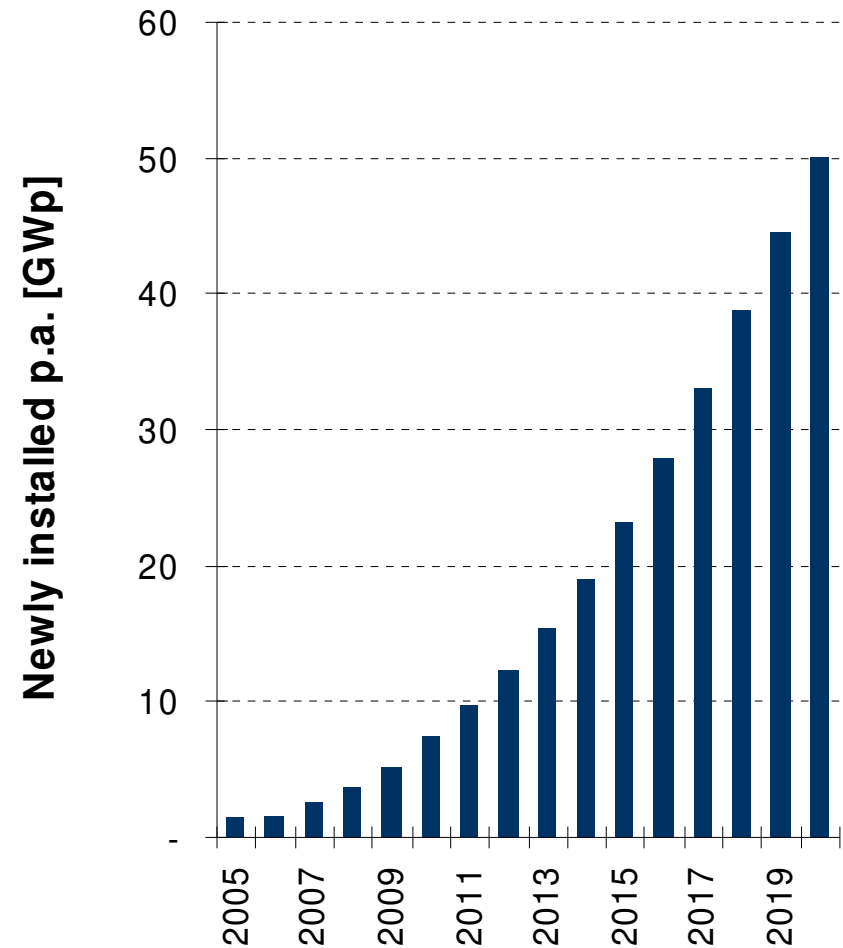
Annual Performance of PPVX-index vs global PV market growth



PV-Market grows to more than 50 GW in 2020

- 2010 we see new PV systems with a capacity of 7.5 GW.
- Market will grow from 2.5 GW in 2007 to more than 50 GW in 2020.
- Annual average growth rate will be 45% until 2010 and 20% from 2011 to 2020
- PV-Market will soon turn from being demand-driven to supply-driven.
- Will production capacities grow in a more harmonised manner on all levels?
- Or do we see new supply bottlenecks on the horizon? (glass, cadmium, indium, etc.)

Sarasin's forecast for the global PV market



Booming markets in Italy, Spain, USA, Asia (Korea) and ...

Average PV-market growth:

- until 2010: 45% p. a.
- 2011-2020: 20% p. a.

* Annual growth rate

	Newly installed capacity (MW)							CAGR*
	2004	2005	2006	2007	2008	2009	2010	06-10
Germany	613	866	953	1'191	1'608	1'930	2'258	24.1%
Italy	5	7	13	95	166	291	451	145.1%
Spain	10	20	61	370	537	805	1'127	107.7%
Rest of Europe	19	47	95	150	218	337	455	48.1%
Europe	647	940	1'121	1'806	2'528	3'363	4'291	39.9%
USA	100.8	103	145	261	470	846	1'480	78.7%
China	10	12	15	26	43	78	149	77.4%
India	7	8	9	17	31	57	106	85.1%
Japan	272	290	287	289	336	420	546	17.5%
Rest of Asia	14	20	25	60	119	222	417	102.0%
Asia	303	330	336	392	528	777	1'217	38.0%
Rest of the World	23	35	45	79	146	272	514	83.8%
Newly installed cap. p.a.	1074	1'408	1'646	2'538	3'672	5'257	7'501	46.1%
Annual Growth rate	102%	31%	17%	54%	45%	43%	43%	

Source: IEA-PVPS (until 2006), 2007-2010: Sarasin estimates, Febr. 2008



... stronger focus on emerging countries and rural electrification



Source: Fraunhofer ISE. Solar home system in Argentina

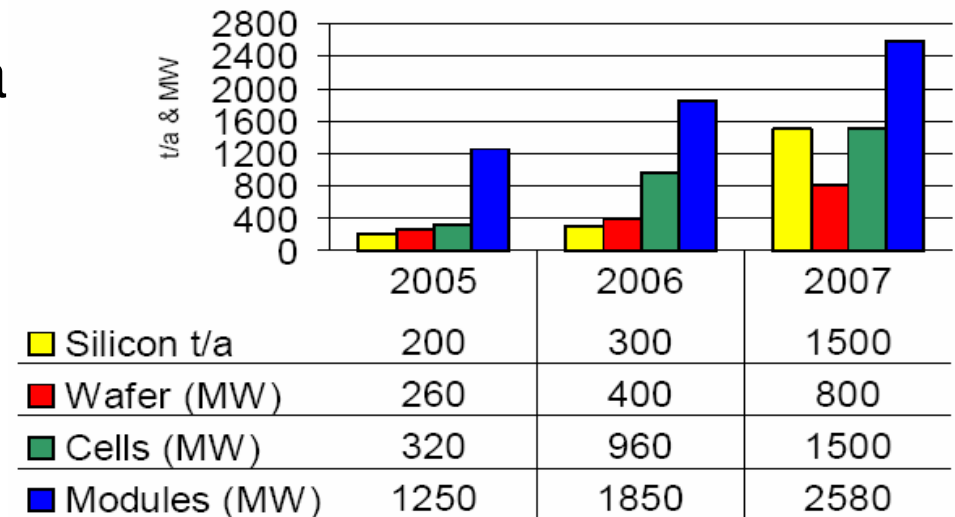
- Two billion people without electricity
- These people are very vulnerable to rising energy prices (gasoline, oil, gas, kerosene, etc.)
- These regions should skip high polluting technologies on their path to growth
- Already now PV systems can be economically competitive here
- PV system for rural electrification are the most sustainable with tremendous environmental and social benefits
- Potential market volume of € 3 bn



China – with explosive PV-industry but so far without domestic market

- Until a few years ago China was a No-Name in the PV-industry.
- 2007 China became No 3 of the solar cell producers behind Japa and Germany.
- Investments in Chinese PV stocks requires in-depth Know-how. Not everyone is well positioned with regard to experience, raw-material and management skills.
- In 2006 only 15 MW of PV-capacity was installed. Annual growth rates of >75% are expected over the next years.

Expansion plans of Chinese Production capacities 2005-2007



Quelle: Haugwitz, GTZ, 2007



Conclusions

- Fundamentals for PV are still intact. 50 GW of new installations globally in 2020 can be achieved.
- Dependence on support schemes must be reduced. This means cutting costs or face smaller margins.
- Demand side must be stimulated by attractive system prices that follow the shrinking subsidies.
- Striving for a lower dependence on solar silicon .
- As investors current valuations are again very appealing and if you believe in the sector it's time to invest now.
- Private investors needed that invest in new technologies and new companies.



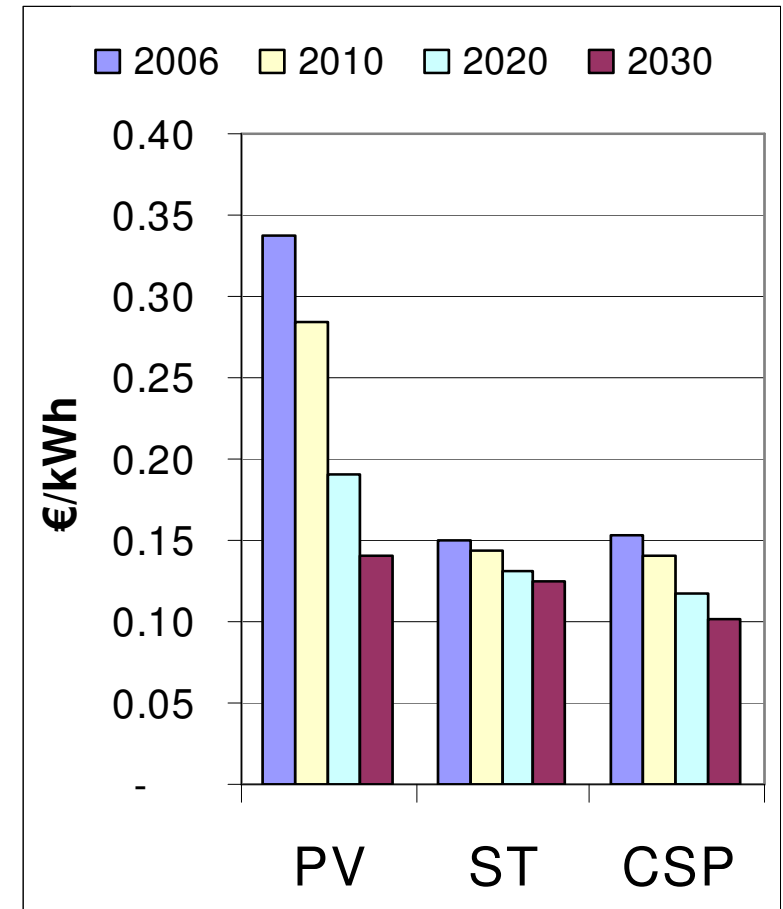
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Electricity/heat production costs of solar energy

- Reduction of production costs shows different dynamics
- PV is able to slash production costs from today 0.34 €/kWh to 0.14 €/kWh in 2030.
- PV is able to match peak-load electricity production **costs** of 0.19 €/kWh by 2022 onwards.
- Compared to peak load **prices** PV could become competitive in certain regions by 2012 onwards.



PV:Photovoltaics, ST: Solarthermal power, CSP: Concentrating solar power



Entwickelt sich das Ganze zu einer PV-Blase?

- Zum Teil hohe KGV's Kurs-Gewinn-Verhältnisse...
- ...Marktwachstum ist aber auch gross. Sarasin erwartet durchschnittl. Wachstumsrate von 50% p.a. bis 2010
- Abhängigkeit von Unterstützungsmechanismen besteht noch, aber nimmt stetig ab
- Wenn die Industrie es schafft die Kosten bis auf 1 EUR/Wp auf der Modulebene zu senken, entwickelt sich die Nachfrage fast unbegrenzt

Valuation table of major PV companies

PV Peer Group (€ wenn kein Hinweis) per 7.2.2008	KGV			PEG
	2007e	2008e	2009e	2007e-2009e
<u>Downstream</u>				
Aleo	19.4	13.5	11.9	0.9
Conergy	n.s.	n.s.	17.3	
Phoenix	23.7	16.4	13.8	0.8
Solarfabrik	66.0	13.5	11.8	0.6
Solon	19.5	16.2	12.7	0.9
Sunpower (USD)	51.1	30.6	19.2	0.7
Suntech (USD)	42.2	23.0	13.0	0.7
Sunways	80.3	21.7	8.1	0.5
Q-Cells	38.7	26.7	15.1	0.7
JA Solar (USD)	38.8	23.0	14.7	0.7
<u>Upstream</u>				
PV Crystalox (GBP)	n.s.	n.s.	8.4	
REC (NOK)	31.8	24.3	13.8	0.8
LDK Solar (USD)	22.6	17.1	7.1	0.7
<u>Integriert</u>				
Ersol	50.0	11.2	10.3	0.6
Solarworld	28.6	17.9	11.8	0.7
Yingli (USD)	38.1	19.2	8.1	0.6
<u>Dünnschicht</u>				
First Solar (USD)	139.2	82.8	33.6	0.6
<u>PV Zulieferer</u>				
Roth & Rau	42.7	20.9	15.7	0.7
Manz	78.4	34.1	22.3	0.7
Centrotherm	72.1	28.6	20.3	0.7
MeyerBurger (CHF)	41.7	16.8	14.0	0.7
MEDIAN	41.7	20.9	13.8	0.7

Quellen: mit * markierte Unternehmen: LBBW, sonstige: IBES

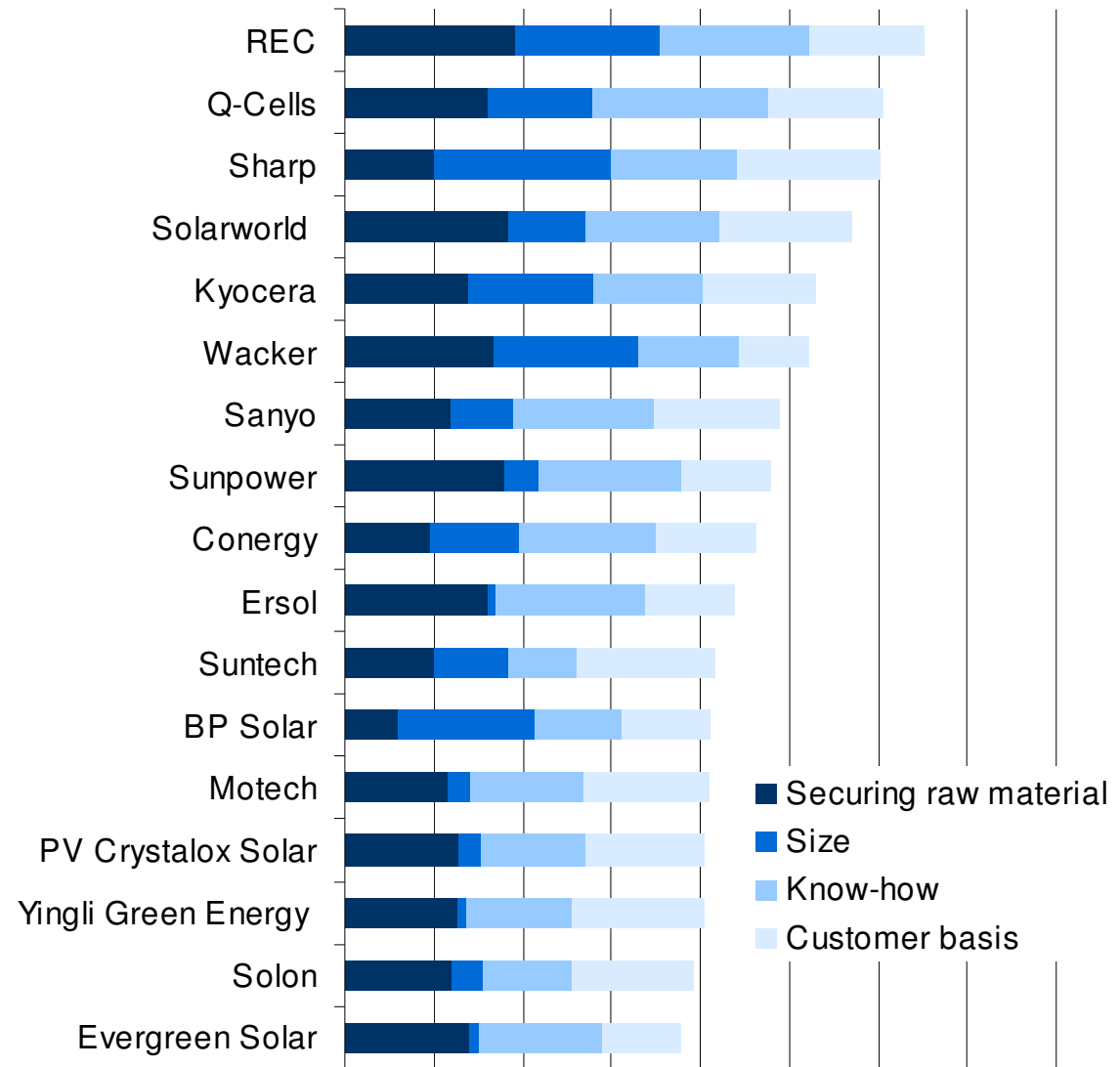
Quelle: LBBW (fettgedruckte Firmennamen), IBES (restliche Firmen)

21.02.2008



... but which companies will profit the most?

- Assessment of 26 quoted PV-companies along four success factors (secure raw material, size, Know-how and client base)
- Leading companies are *REC*, *Q-Cells*, *Sharp*, *SolarWorld* and *Kyocera*
- First Chinese company is *Suntech* at number 11, *Motech* (Taiwan) number 13...
- ... these new companies are not able to fully exploit the comparative advantages



Source: Sarasin, Nov 2007



Correction exaggerated – fundamentals intact

- Stock corrections in Jan 2008 were unfounded; market fundamentals have not changed.



Sarasin Solarenergie Studie 2007

- Seit 1999 publiziert die Bank Sarasin eine jährliche Analyse zum weltweiten PV-Markt.
- Ab 2004 wurde **Photovoltaik** durch Kapitel über **Solarkollektoren** und **solarthermische Kraftwerke** ergänzt
- Highlight 2007: Eigenes Kapitel zur CO₂-Vermeidung durch Solarenergie
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