

3rd Gen Photovoltaics: CleanTech Day

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3rd Gen Photovoltaics: CleanTech Day CSEM Basel

Program 19 August 2009

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|-------|-------------------------|---|
| 13:30 | Dr. Carsten Winnewisser | Welcome |
| 13:35 | Dr. Christoph Harder | CTI Clean Technology Initiative |
| 13:55 | Dr. Stefan Oberholzer | Swiss SFOE PV Program |
| 14:10 | Dr. Ulrich Kroll | From R&D to Industrialization of Thin Film PV at Oerlikon |
| 14:35 | Dr. Tobias Meyer | All Screen Printed Dye Synthesized Organic Photovoltaics |
| 14:50 | Nina Ryser | BBT: Swedish-Swiss Innovaton and CleanTech Forum |
| 15:00 | | Networking Break |
| 15:30 | Dr. Jens Hauch | Product Development for Organic Photovoltaics |
| 15:45 | Dr. Bernhard Sailer | Thin Film Barrier Coatings |
| 16:00 | Dr. Roland Hany | Novel Organic Materials for PV Applications |
| 16:15 | Dr. Beat Ruhstaller | Modelling of PV Devices |
| 16:30 | Dr. Giovanni Nisato | Printing Organic PV Cells |
| 17:00 | | Workshop |
| 18:00 | | Apéro Riche |

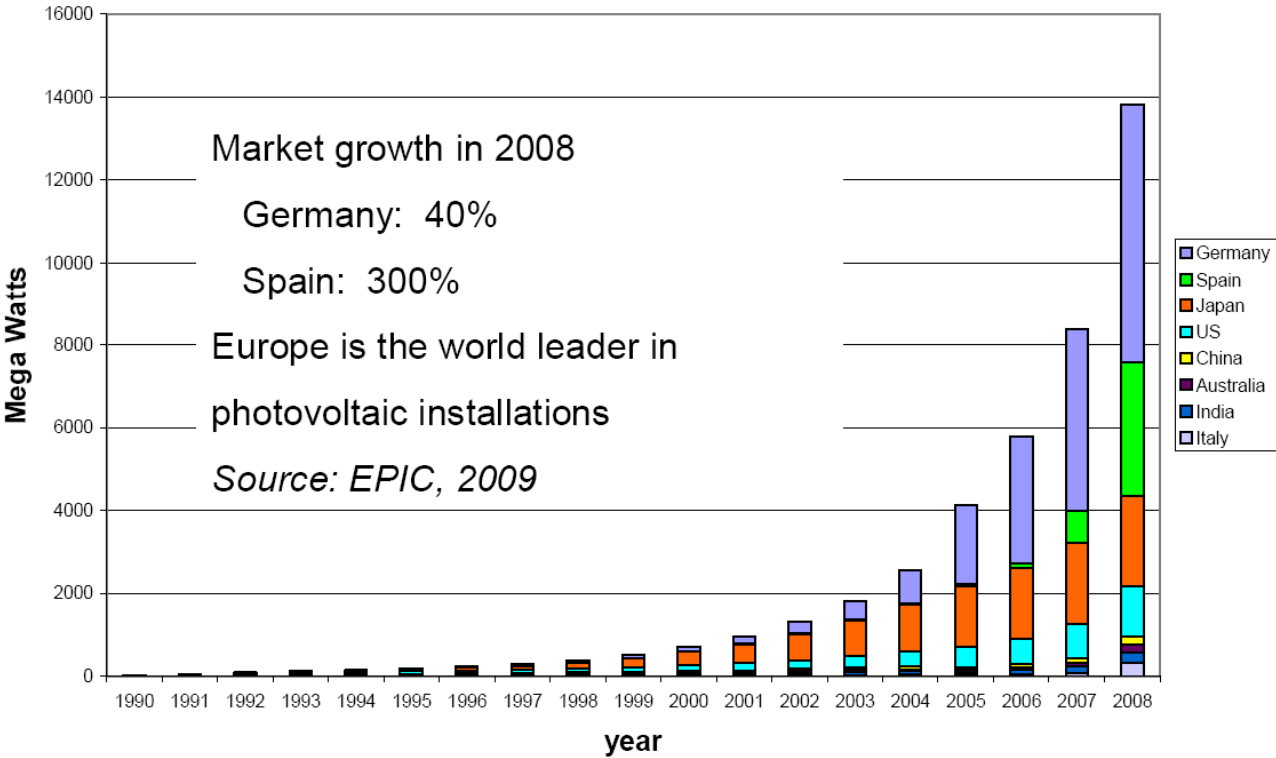
Photovoltaics

- ~ 37 billion euros in sales in 2008
 - Spain is the largest market (40% of installations)
 - Germany is the second largest market (30% of installations)
 - Oversupply: 40% more was produced than installed
- The PV market:
 - Sales depend on subsidies, access to credit, supplies and demand
 - The purchase is entirely discretionary
- In 2009
 - Germany and the US maintain incentives, but Spain cuts back
 - Shake-out: highly leveraged plants in Asia will close
 - Overall sales revenues will drop to levels in 2007 (-30%)
 - Q-cells saw its sales peak in the 3rd quarter of 2008
- Recovery to strong growth in 2011 or 2012

European reality

2008 Market data

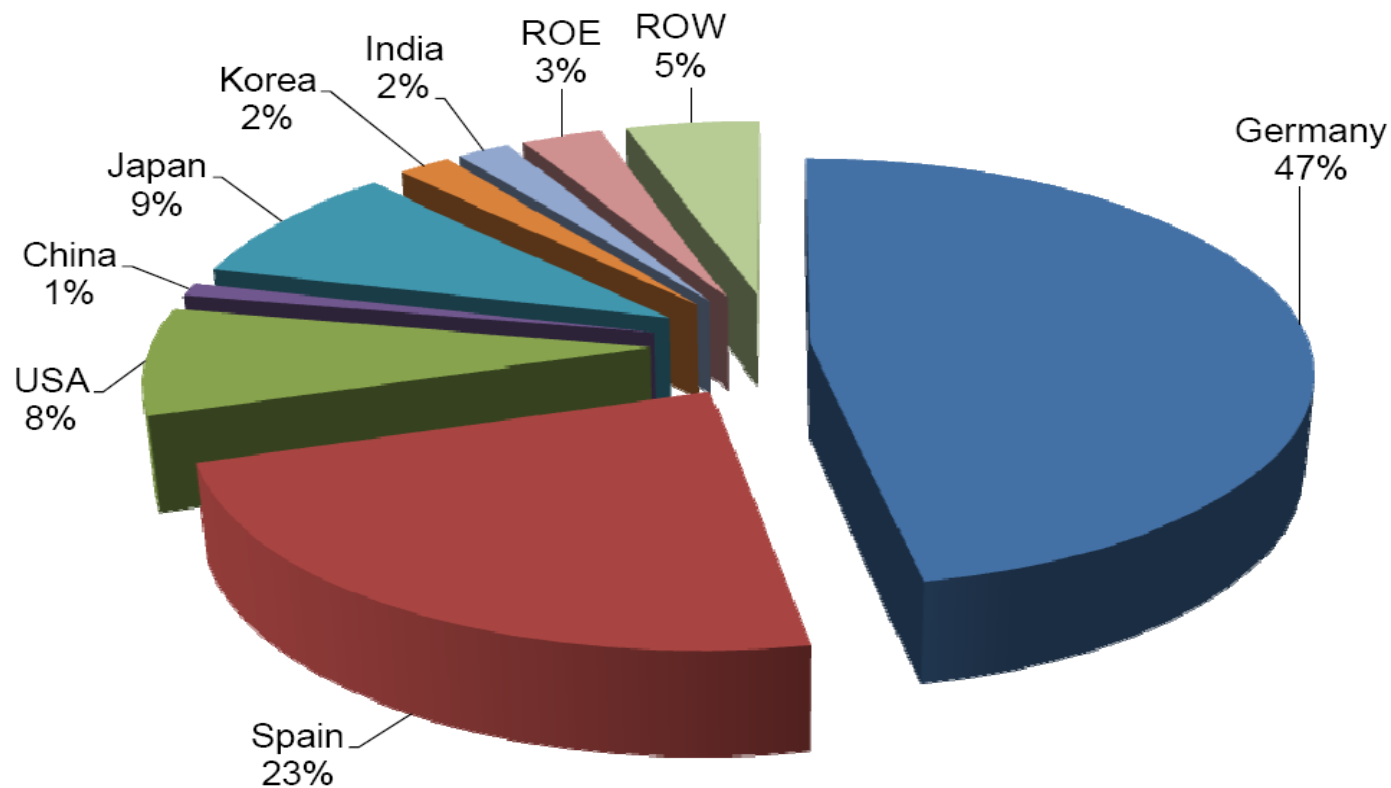
Cumulative installed power = 14 Giga watts



EPIC, The European Photonics Industry Consortium

European reality

Who was buying in 2007?



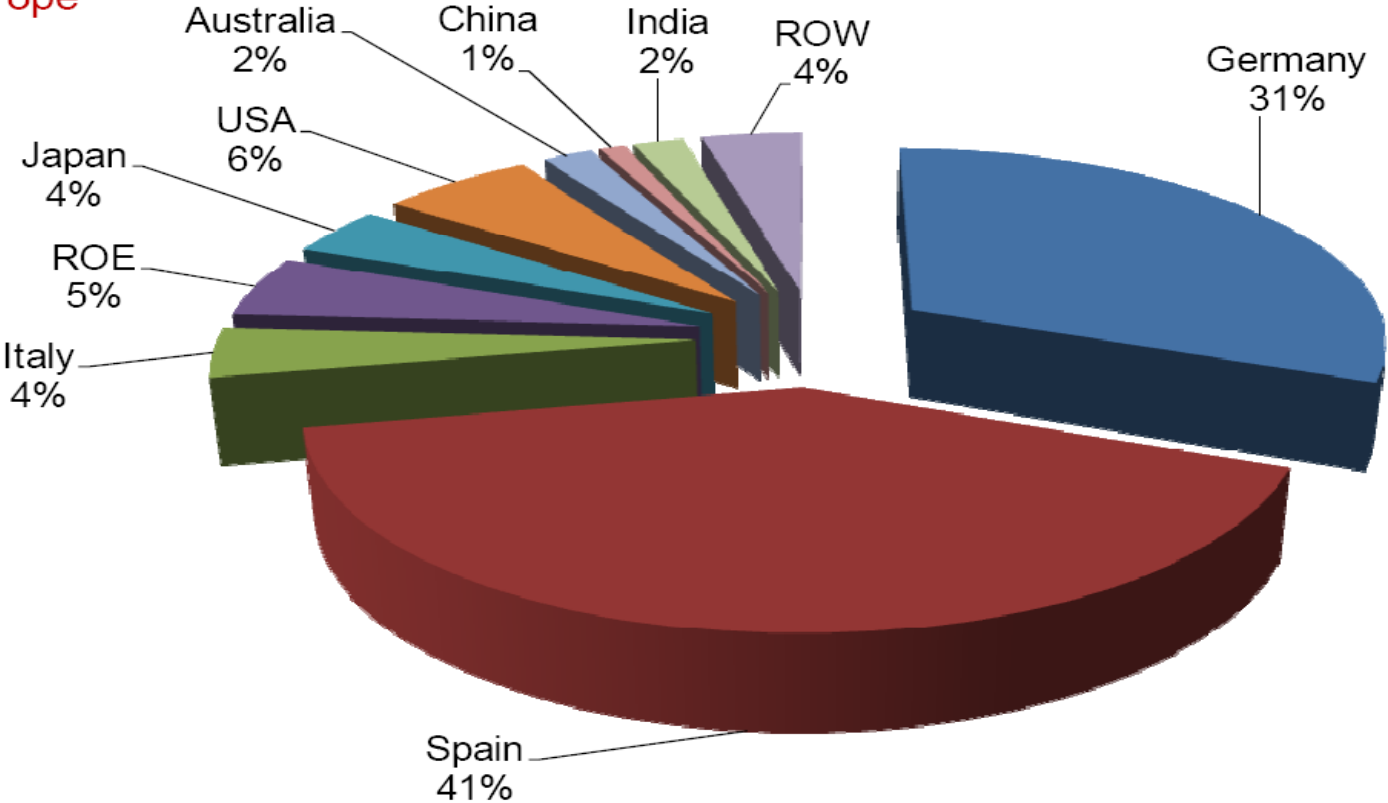
European reality



Who bought in 2008?

¾ of all installations were made in Europe

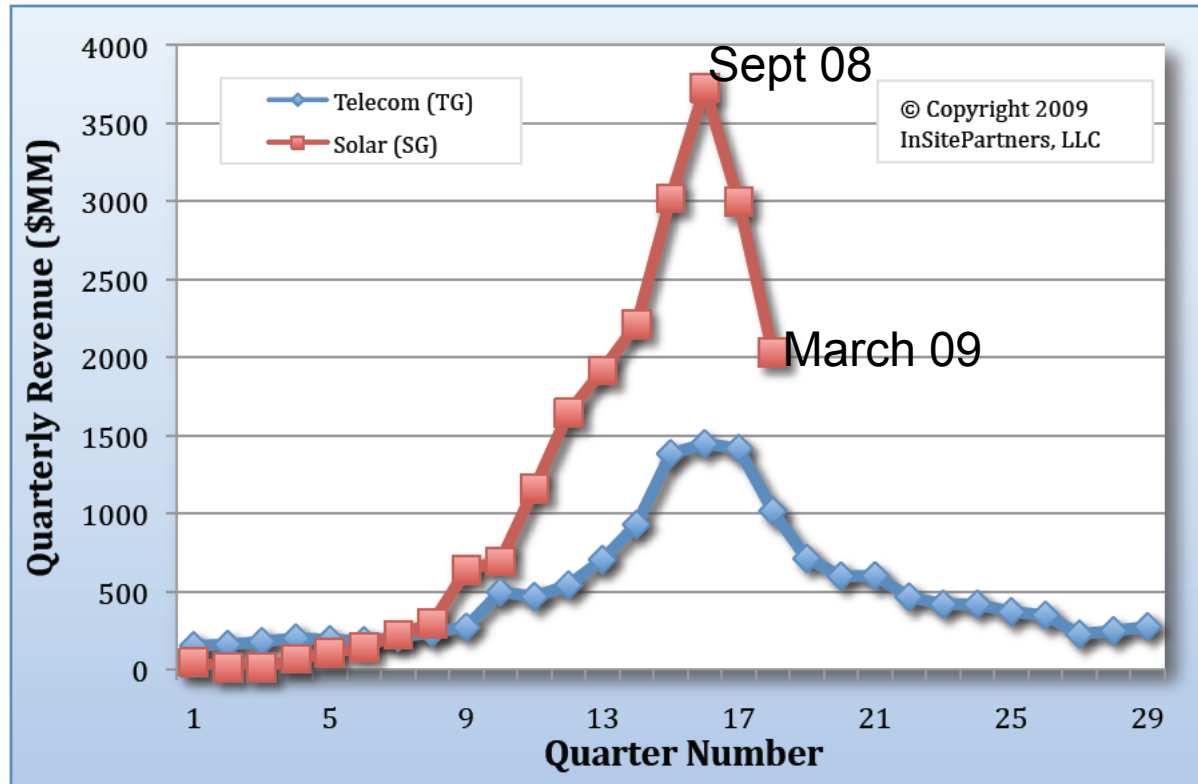
2008 PV Sales = \$37 Billion



Analysis:

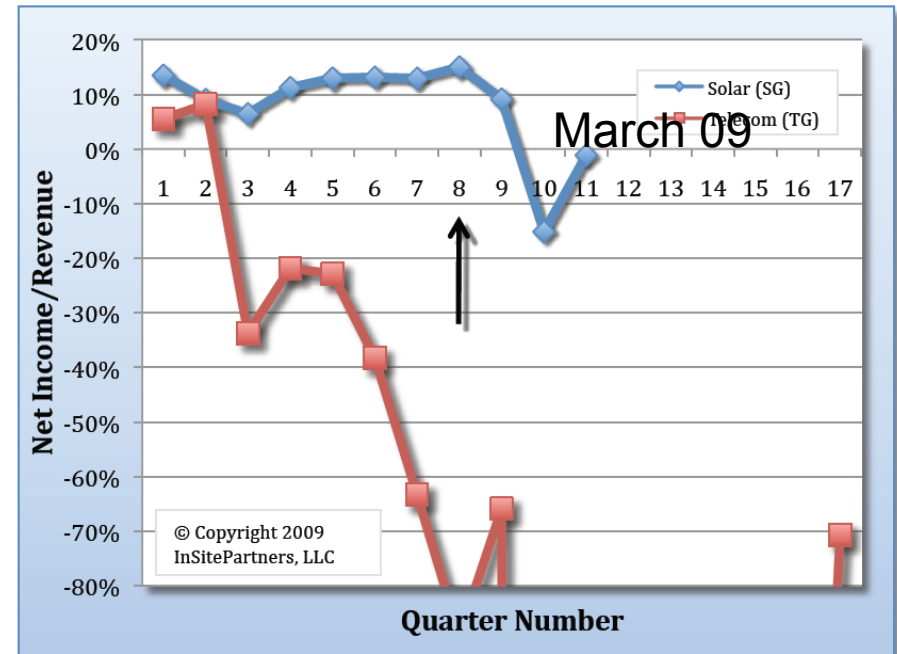
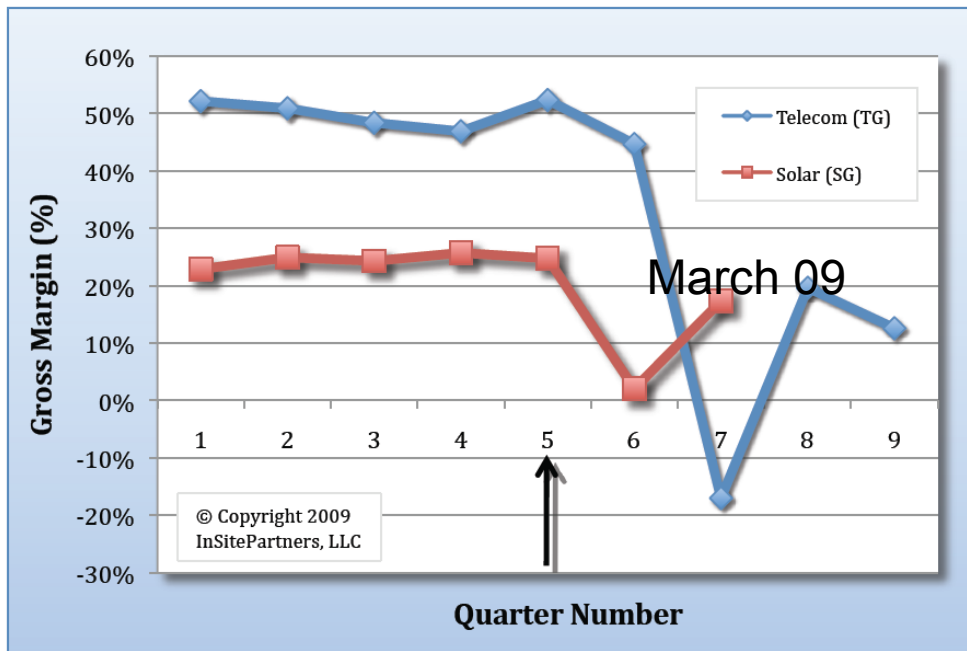
- Almost 6.000 Megawatts were installed worldwide in 2008
- In Germany, most solar PV installations are made by individuals seeking to benefit from the generous feed-in tariff. Since the installation usually requires taking out a loan, the decision to buy in 2009 may be delayed for several years due to poor economic conditions, uncertainty about employment, and difficulty to obtain sufficient credit from the bank. Consumer confidence in the economy will determine the result in Germany in 2009.
- In Spain, most solar PV installations are large farms of 50 to 100 Megawatts, installed by international engineering consortia that include the power utilities and local authorities. In 2008, 2.5 Gigawatts of generation capacity were installed. In October, 2008 the national government decided by adopting Royal Decree 1575 to reduce the extraordinary growth rate of solar capacity in Spain by limiting the subsidies to cover only 500 Megawatts per year. This decision will reduce the installation of new PV capacity by 80% in 2009.
- Solar PV installations in the United States, which is in 4th place, having 1.2 Gigawatts of installed power, stand to benefit from a generous and comprehensive tax credit program that was enacted as part of the TARP rescue plan for the banking industry in October of 2008. As in Germany, consumer confidence in the economy will play a deciding role in 2009.
- Installations world wide will continue to grow in 2009, driven by strong decreases in prices, due to excess production in 2008
- Taking these features into account, we estimate that installations of PV may reach 3.6 Gigawatts in 2009, based on current pricing. This would represent a decline of 38% from the record levels of 2008.

PV: Another telecom bubble?



- SG (Solar group)
 - Canadian Solar, China Sunergy, Evergreen Solar, First Solar, GT Solar International, JA Solar, LDK Solar, ReneSola, Solarfun Power, SunPower, SunTech Power, Trina Solar, and Yingli Green Energy.

PV: Another telecom bubble: No! (?)



- PV industry has managed to generate (most of the times) profit
 - Subsidies allow to work with smaller margins
 - Market prices are stabilized at high level through regulations
 - Regulations make and break the business in the next few years
- Shake out expected

Solar Group: Summary

- A collection of key solar cell companies is studied as a group.
 - Economic advantages for the SG will increase over time.
 - The SG has shown strong revenue growth.
 - The overall profitability of the SG is good.
 - In the ten quarters prior to the revenue peak, the SG had net profits.
 - The SG has responded well to the downturn and generated a small operational profit in the quarter ending 3/31/09
 - Operational expenses are quite lean and are inline with narrow gross margins
 - Research and Development of ~2%
 - Total operational expenses of ~10%
- The liquidity of the industry is degrading, which may force out weaker players or encourage marginal players to seek financing on expensive terms.
- The debt level of the industry may prove problematic for weaker players without normalization of demand.

Workshops

- 3rd gen PV: Who needs this? (Geleitet von T. Meyer)
 - PV Lifetime: Needs and Capabilities? (Geleitet von G. Nisato)
 - Cleantech: What is really clean/green? (Geleitet von Ch. Harder)
 - 3rd gen PV: Swiss Pilot Line? (Geleitet von C. Winnewisser)
1. Everybody picks one group during the break (pick one card)
 2. Group goes with leader to separate room and discusses for 30 minutes
 3. We get together
 4. Each group presents one page summary
 5. Aperero