

Global PV Market and Industry Development – Focus on China & Taiwan

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Global PV Development

- Recent changes of govt. support schemes (Spain 2008/1000 MW; 2009/300MW, Germany lower FiT > impact remains to be seen in 2009, potential that a cap will be introduced is likely)
- US Market perspectives (+ 50% compared to 2007) however, reduced incentives in CA, 50 federal states = 50 markets, financial crises impact
- In September EPIA announced to provide 12% of electricity by 2020 (350 GW) - appears ambitious ! By end of 2010 (approx. 15 GW)
- Global Demand: 4 GWp by 2008 // 7-13 GWp by 2010
- Production Capacity (Module&Cells): 2007: 4GW // 2010: 20 to 35 GW !
- Supply outpacing Demand (EU markets e.g. France, Italy, Greece won't grow that strong as hoped/anticipated) > consolidation of industry, vertically integrated might be in a better position to cope with ...
- Polysilicon shortage might ease by 2009/2010 (announcements made by existing and new players) > prices Wp/€cents will fall! Today US\$ 400/kg !
- Thin-Film market share 20% by 2020 (5 GW)
- Grid Parity: Italy/Spain 2010-2012 / Germany 2015 / 60-90% of EU by 2020



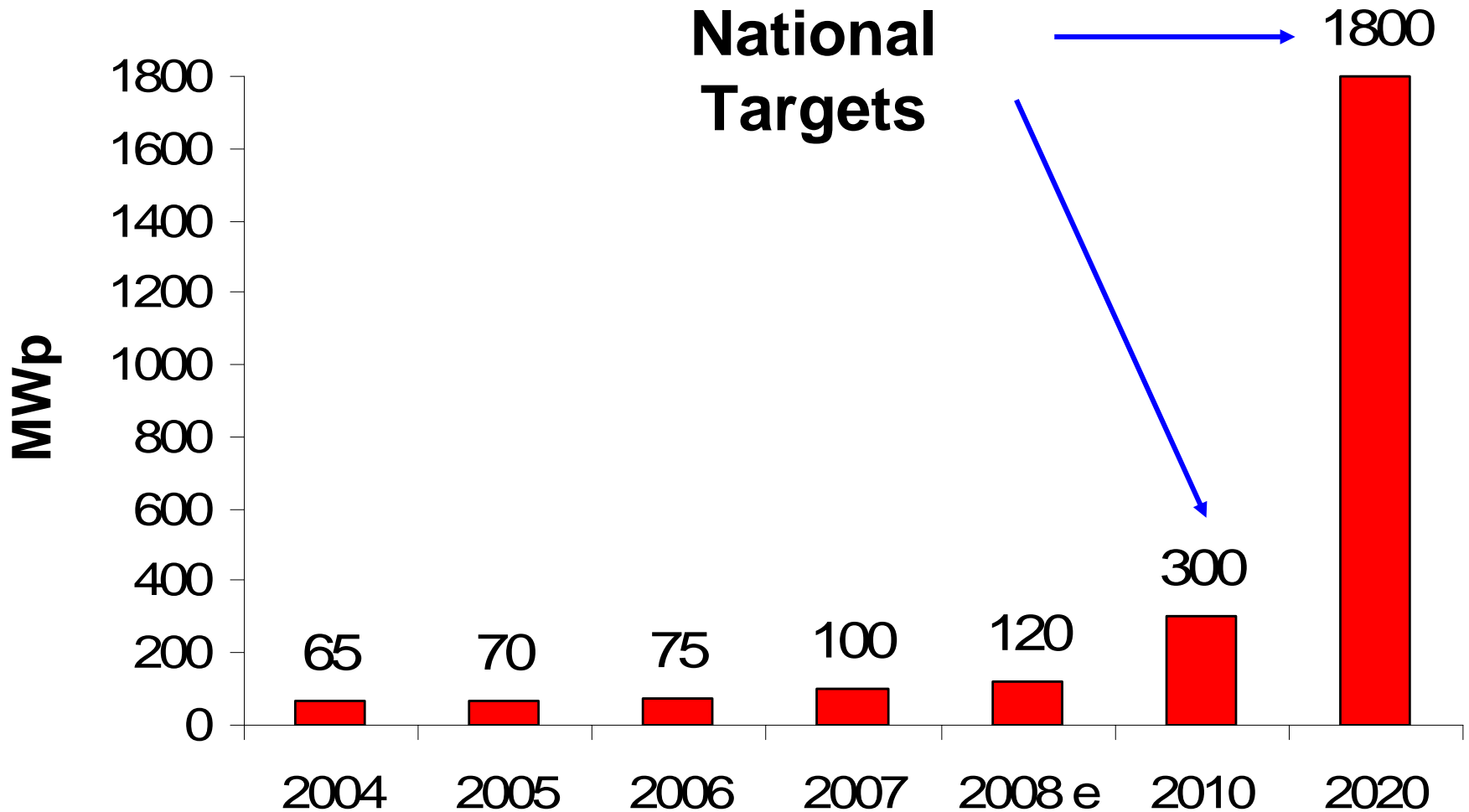
China

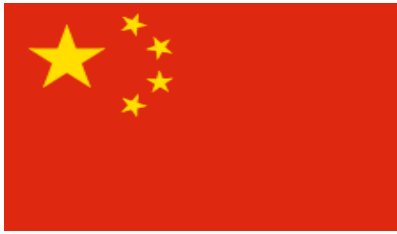
Political Framework Conditions

- Jan. 06 RE-Promotion Law came into effect
- PV is among the top priorities
- Sept. 07 Mid and Long-Term Targets announced
- No Feed-in-Tariff in foreseeable future, precondition is 20 €Cents/kWh (today 40 €Cents/kWh) however NDRC considers Net-Metering, but regulations not released yet
- Govt. Investments in larger PV-Systems 5-10 MWp announced

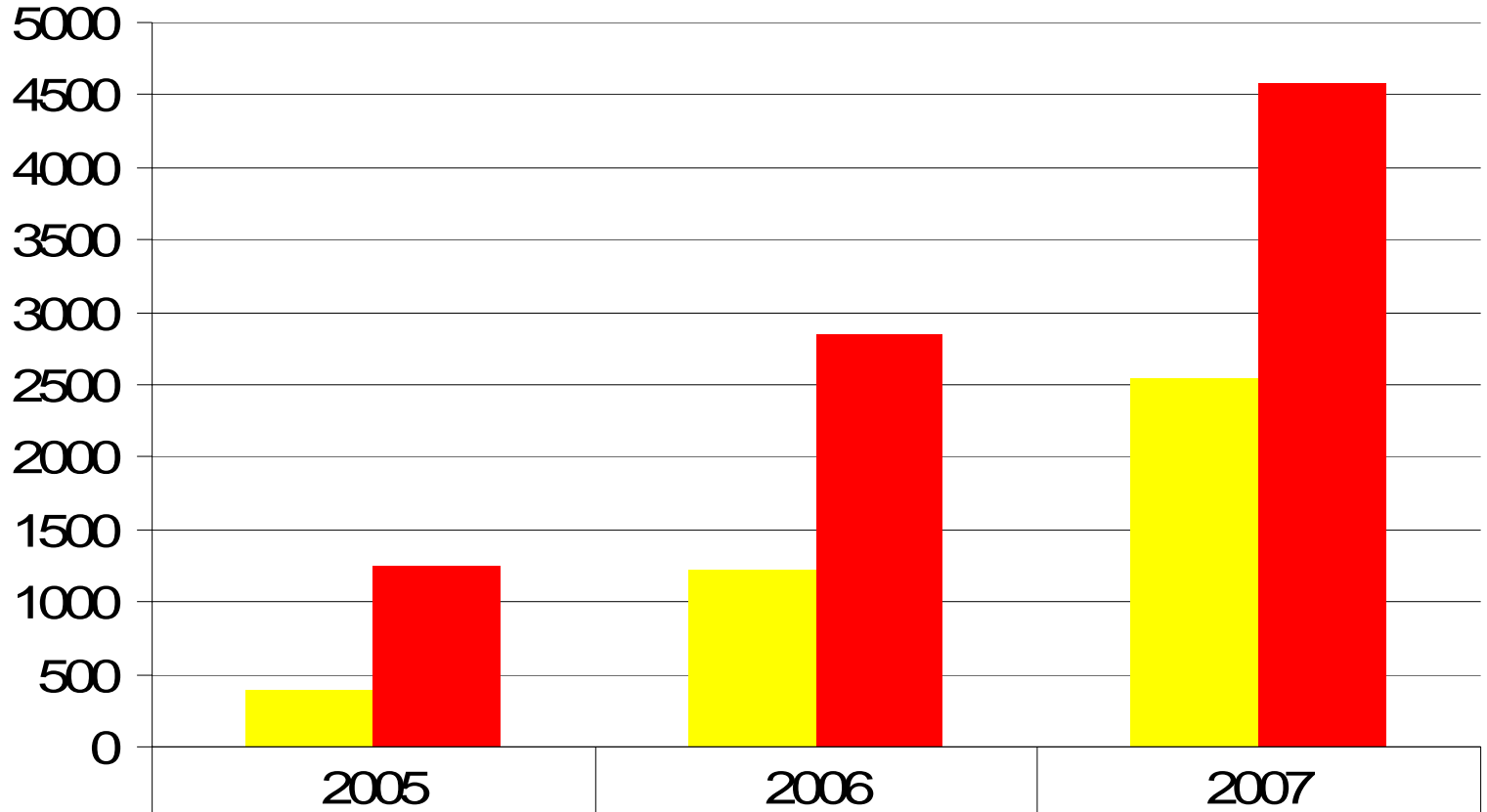


Market Development (2004-2020)





Cell & Module Prod.-Capacity (2005-2007)



Cells (MM)	388	1221	2549
Modules (MM)	1250	2850	4580



Mixed Issues

Limited Poly-Silicon Production
Expertise & Capacities
Highly depended on imports

Acc. to announcements by 2010
approx. 120,000 t available –
quality of output remains to be seen

Highly dependent on EU/US markets

Mid-Term domestic market
development not too promising

ASP prices are falling (20-25%)

Vertically integrated better positioned,
nevertheless profit margin shrinks

Over-Capacity Modules & Cells

Ø Capacity Factor 30-40%, Rule of
Thumb: min 80% to be profitable

Currency Exchange Rate (€/¥)
Stronger RMB/USD ; Weaker €

Difficult to pass on these costs to
customers

Lack of Transparency (Stakeholders,
Regulations, Admin. Procedures)

Newly established National Energy
Admin. may help

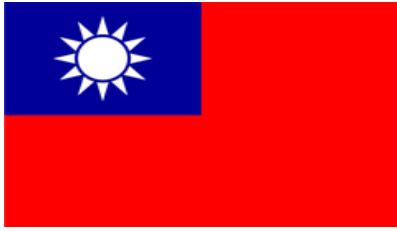
Impact of Global Financial Crisis /
Credit Crunch

So far limited, CN govt. remains
committed



Wind Power Development

- Govt. Targets (5 GW/2010 and 30 GW/2020)
6 GW/2007 > 11-12 GW / 2008
- National Concession Projects: Out of 3,4 GW only 680 MW (20%)
- Gansu Province 10 GW Wind Base: First batch 3,8 GW > 100% awarded to CN companies > de-centralized manufacturing taking place
- No FiT system in place, individual negotiations
- CN turbine suppliers (63% market share and increasing)
- 200 developers but the top 25 represent 91% of all installations and responsible for 76% for near and 73% for long term development
- Manufacturing: Foreigner will face price competition and need to develop export plans
- CDM projects provide data (capacity factor) CN much lower than foreigner > technical & managerial capacities of CN companies still lower
- Off-Shore is in an infant stage, almost no expertise locally available but has a huge potential due to vicinity to load centre along the coast



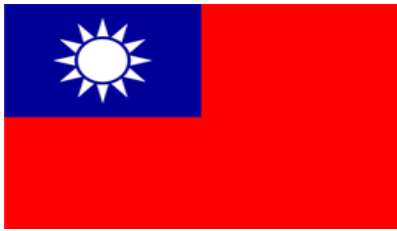
Taiwan

Political Framework Conditions

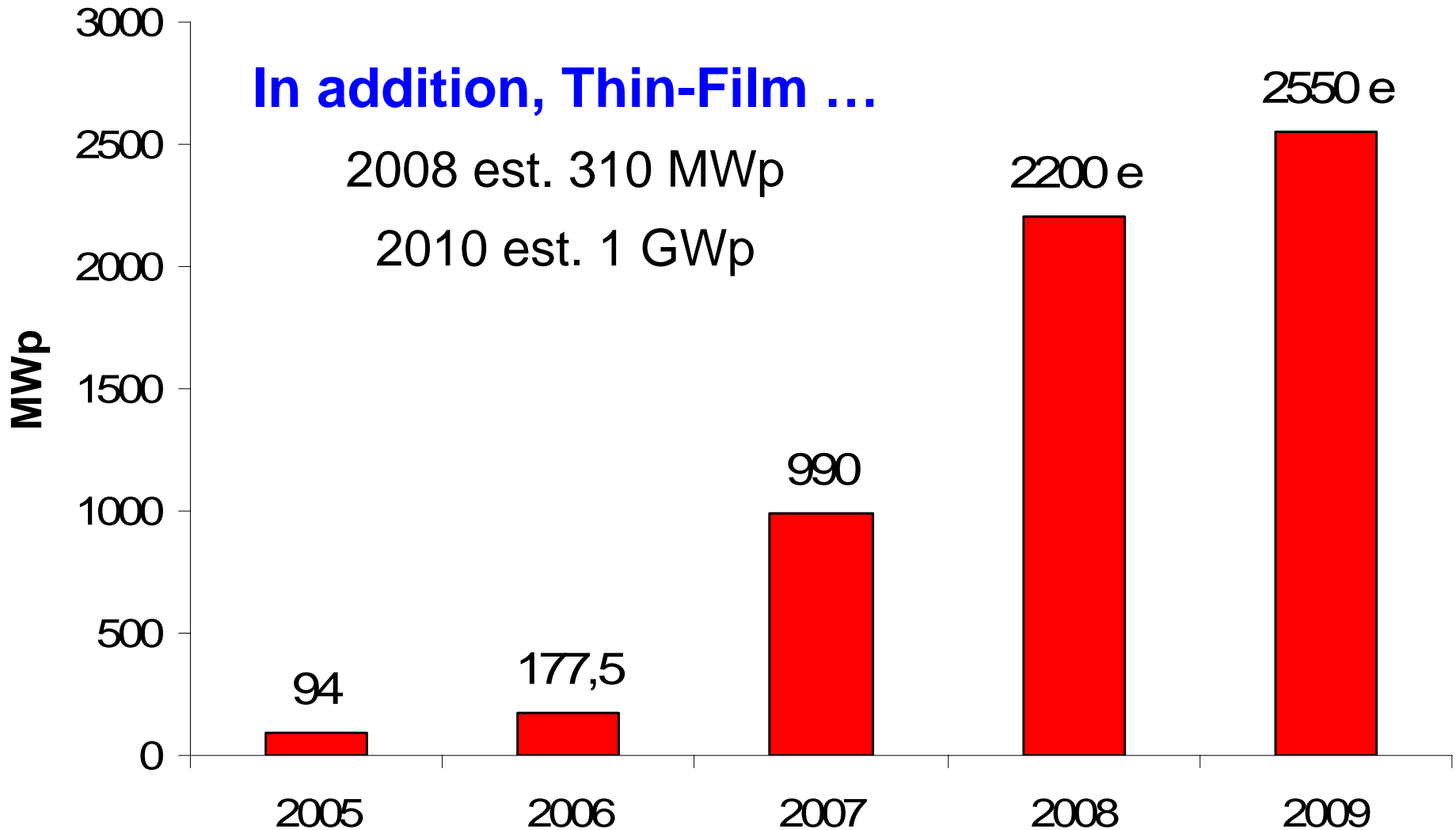
- Natl. Plan 10% of electricity consumption from RE by 2010
- 2010: Natl. Target is 31 MWp (2020: 546 MWp)
- Residential Investor Programme (50% subsidy)
- Renewable Energy Development Act (FiT) under discussion

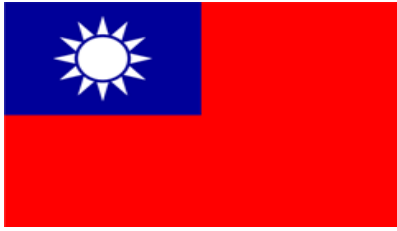
Status and Perspectives of Market Development

- BIPV 80%, Roof-Top/Ground mounted 20%
- 2015: 320 MWp, domestic HH Prog. under discussion
- 80% of all bldgs were illegally build > not entitled to obtain govt. support



Cell-Prod. Capacity (2005-2010)

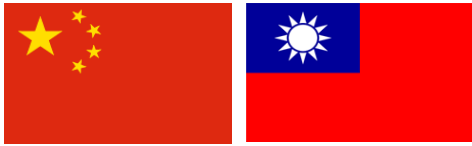




Industry Development

Perspectives

- 2nd largest Semiconductor Industry (Flat panel, LED Display)
- Since 1997 est. € 550 Mio. invested (R&D, Industry)
- Annual Turnover est. € 3,2 Bill. by 2010
- Highly dependent on foreign poly-silicon supply
≈ 98% of wafers imported and 97% of cells exported
- Increasing Investment in Poly-Silicon Facilities (e.g. Taiwan Semiconductor (2009/5000 t/a), Big Sun, E-ton, Motech)
- Host of Incentive: Tax, R&D subsidy, Low-Interest Loans offered by MOEA



Summary & Outlook

Political Framework Conditions

- Targets, Programmes & Investments confirms the political commitment to promote the utilization of PV

Industrial Development

- Future Global Centre of Production (incl. Japan/India)
- By 2010 half of the global Thin-Film Modules from Asia
- Entire value chain in Taiwan soon too; future domestic silicon supply will further enhance cost-competitiveness

Market Development

- In the near future moderate market demand expected
- All will depend on EU / US Markets in the foreseeable future

Summary & Outlook

- Global Financial Crises (Impact on Wind)
 - Turbine shortage/waiting list > Turbine surplus
 - Infinite availability of finance > Finance constraint
 - Limited focus on quality > focus on good projects, technologies, teams
 - > Consolidation of the wind industry

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