



Renewable Energies in Germany - Impacts on the Environment and National Economy

Andreas Hahn (SCHOTT Solar AG), Sep 2010

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1 Renewable Energy Sources Act

2 Development of RE Sources in Germany

3 Opportunities and Challenges for the RE Industry

4 Conclusion

Historic Milestones SCHOTT AG



1884	Foundation of the company in Jena
1889	Ernst Abbe sets up Carl-Zeiss-Stiftung
1891/1919	SCHOTT becomes a foundation enterprise Sole owner: the Carl-Zeiss-Stiftung (Foundation)
1948	Expropriation of the original factory in Jena (GDR)
1952	Re-establishment of the foundation enterprise in Mainz, Mainz becomes the headquarters of the SCHOTT Group
As of 1963	Increasing internationalization
1991/1995	Following the reunification of Germany, SCHOTT takes over the ownership of Jenaer Glaswerk
As of 2000	Transformation into a technology group
2004	Converted into a corporation, SCHOTT AG
2009	125th anniversary of SCHOTT

The SCHOTT Group

Home Tech



Pharmaceutical Systems



Advanced Materials



Flat Glass



Electronic Packaging



Lighting and Imaging



Solar



- International technology company, Owner Carl-Zeiss-Foundation
- 2.26 bn EUR sales in 2008/09; 74% exported
- Approx. 17,300 employees worldwide
- Manufacturing sites and sales offices in 43 countries

SCHOTT Solar – 50 years experience in Solar Technology



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Why do we need renewable energies ?

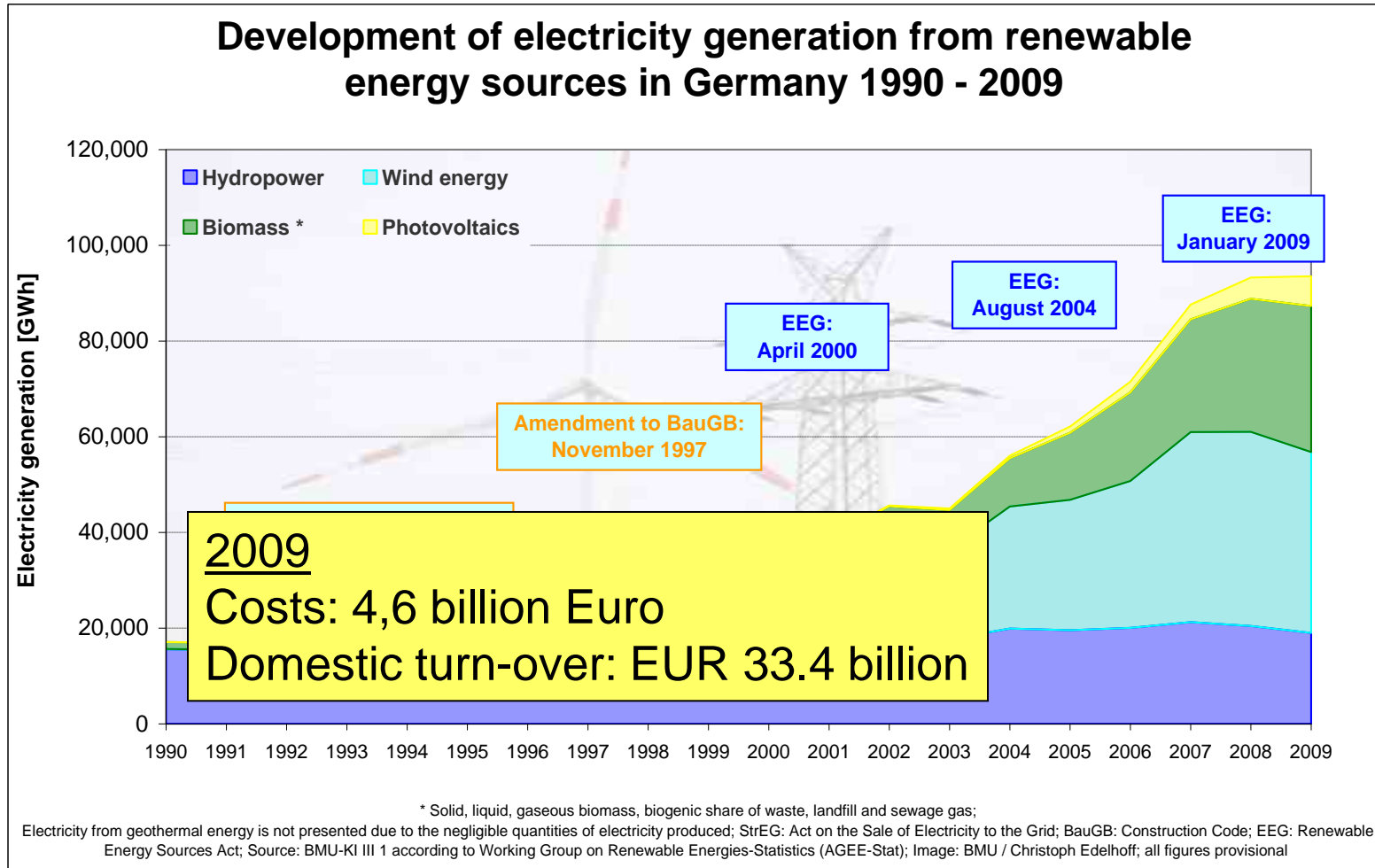
- Climate change and rapidly growing Asian economies have greatly increased the need to use renewable energy resources
- Germany was one of the first industrialised countries to complete ratification of the Kyoto Protocol
- Germany agreed on a binding target to increase the share of renewable energies in electricity generation to at least 12,5 % by 2010
- 2010 target was already met in the middle of 2007 !!
- New RE goal: At least 30 % of gross electricity consumption by 2020



„We should leave oil
before it leaves us“

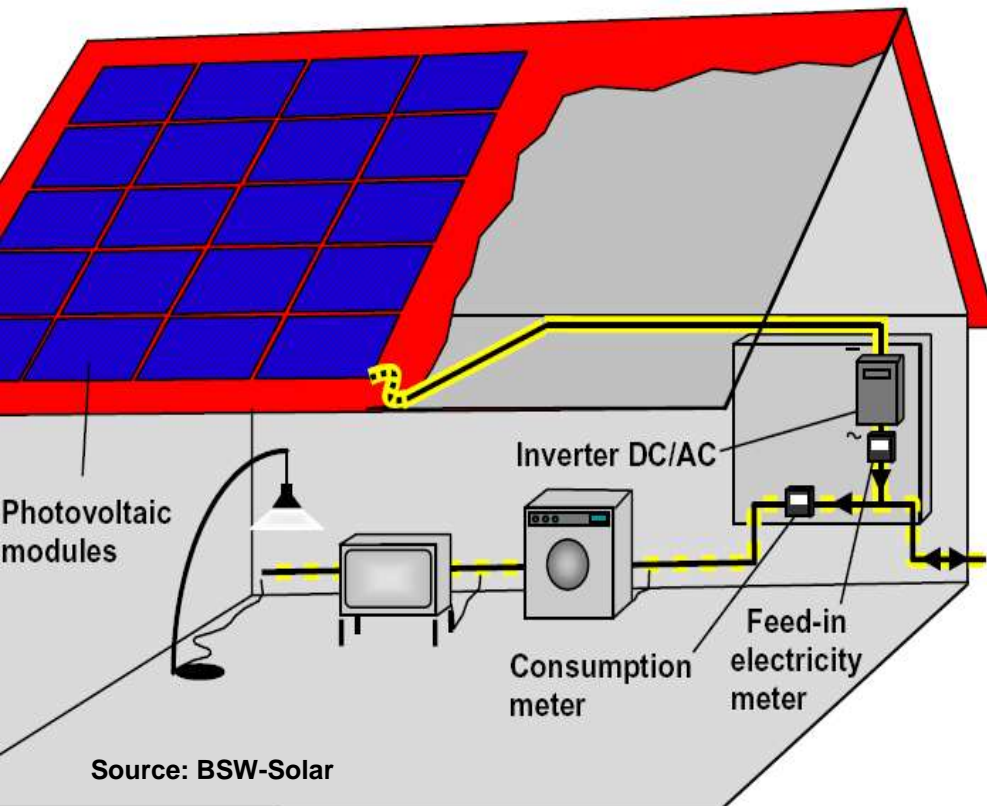
Fatih Birol, Chief Economist
IEA, March 2008

The Renewable Energy Resources Act (EEG) draws on 20 years of experience...



Grid-connected PV in Germany

Each kWh of solar electricity produced is fed into the grid, sold to the utility and paid at a fixed price



Typical data for a small PV system (per kW_p)

Investment costs: € 2,864

Annual production of solar electricity: 900 kWh/a

Feed-in tariff: €ct 39.14/kWh
guaranteed for 20 years

Feed-in payment: € 352/a

Interest rates (KfW): 4%/a eff

Independent from
government subsidies !

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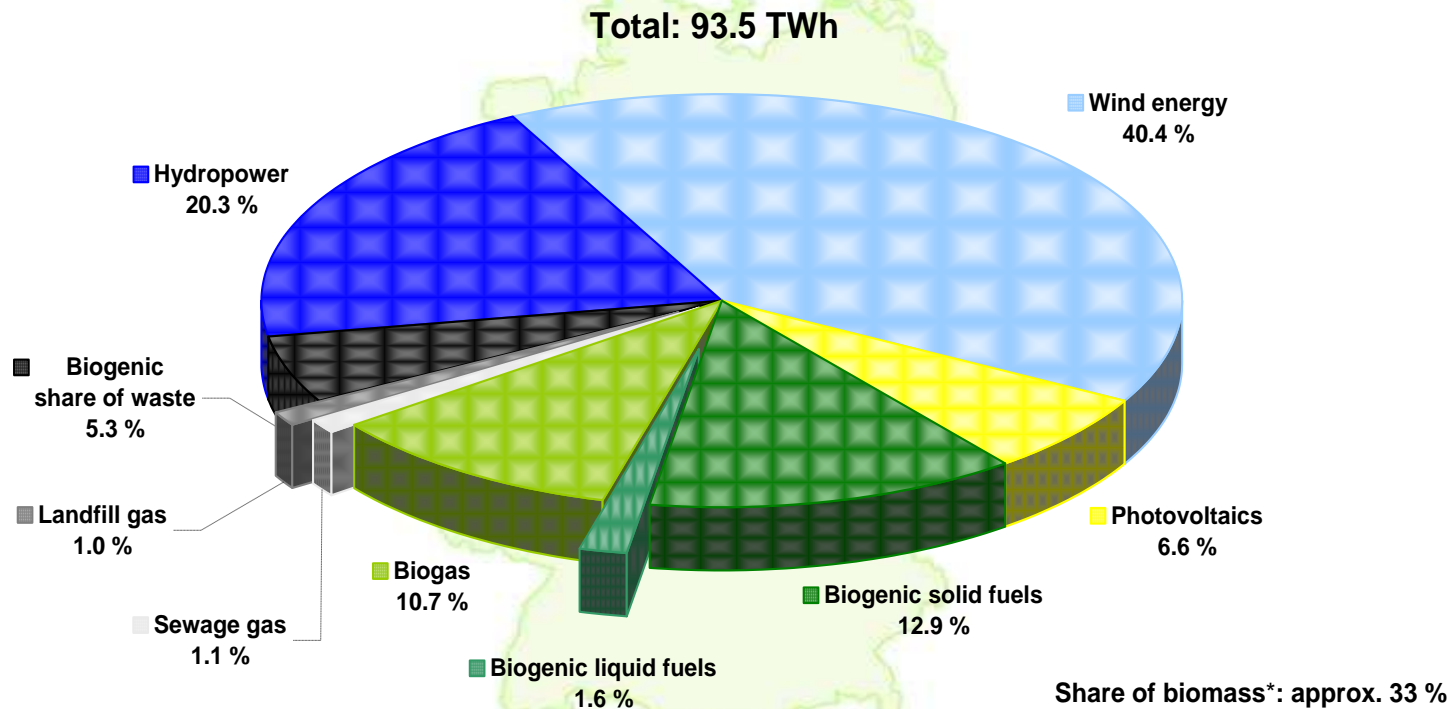
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16 % of Germany's electricity supplied by renewables...

Structure of electricity supply from renewable energy sources in Germany 2009



* Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas; Deviations in the totals are due to rounding;
Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); all figures provisional

Solar Power: A major international industry has developed in Germany

Market Data Photovoltaics in Germany 2009*

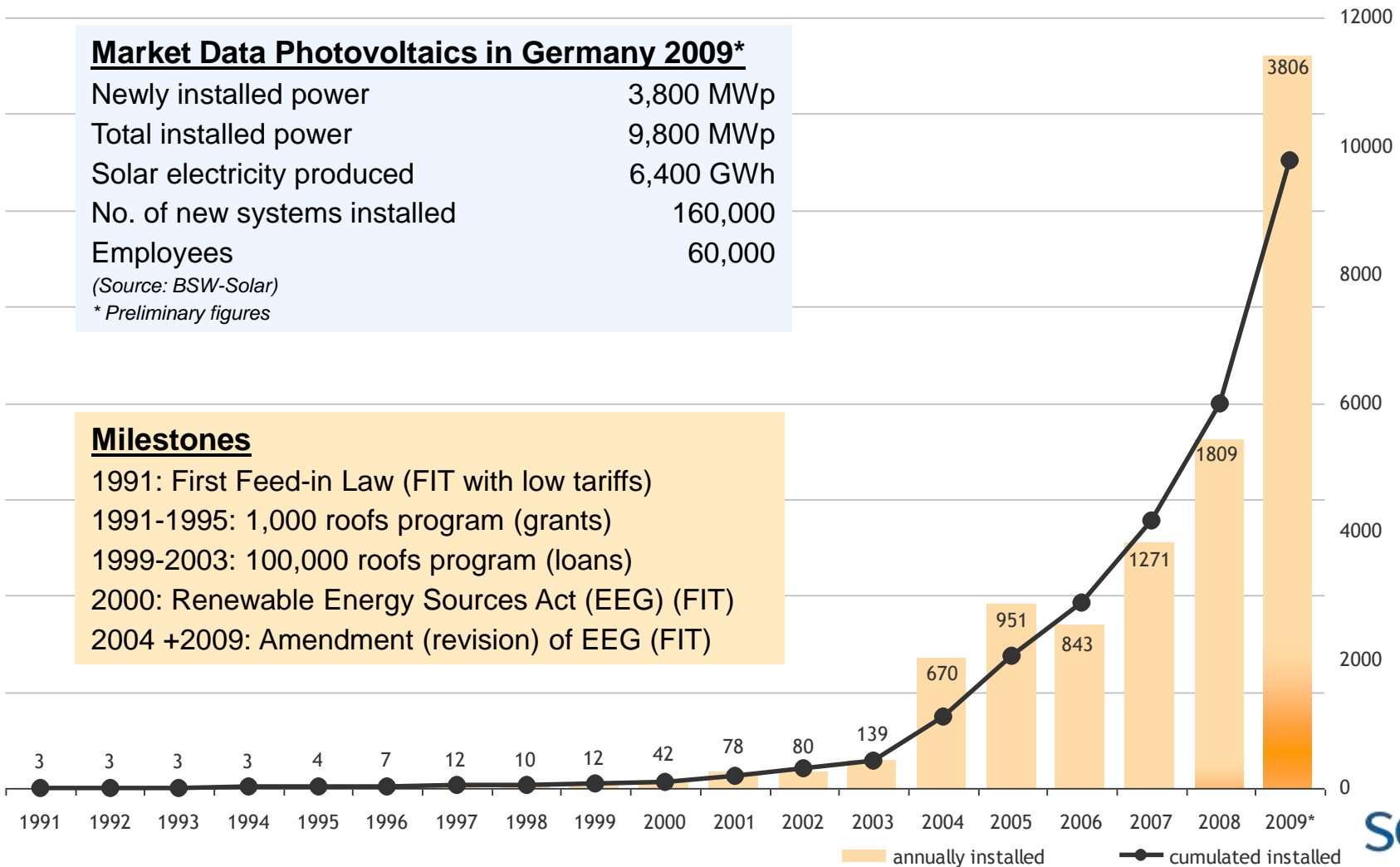
Newly installed power	3,800 MWp
Total installed power	9,800 MWp
Solar electricity produced	6,400 GWh
No. of new systems installed	160,000
Employees	60,000

(Source: BSW-Solar)

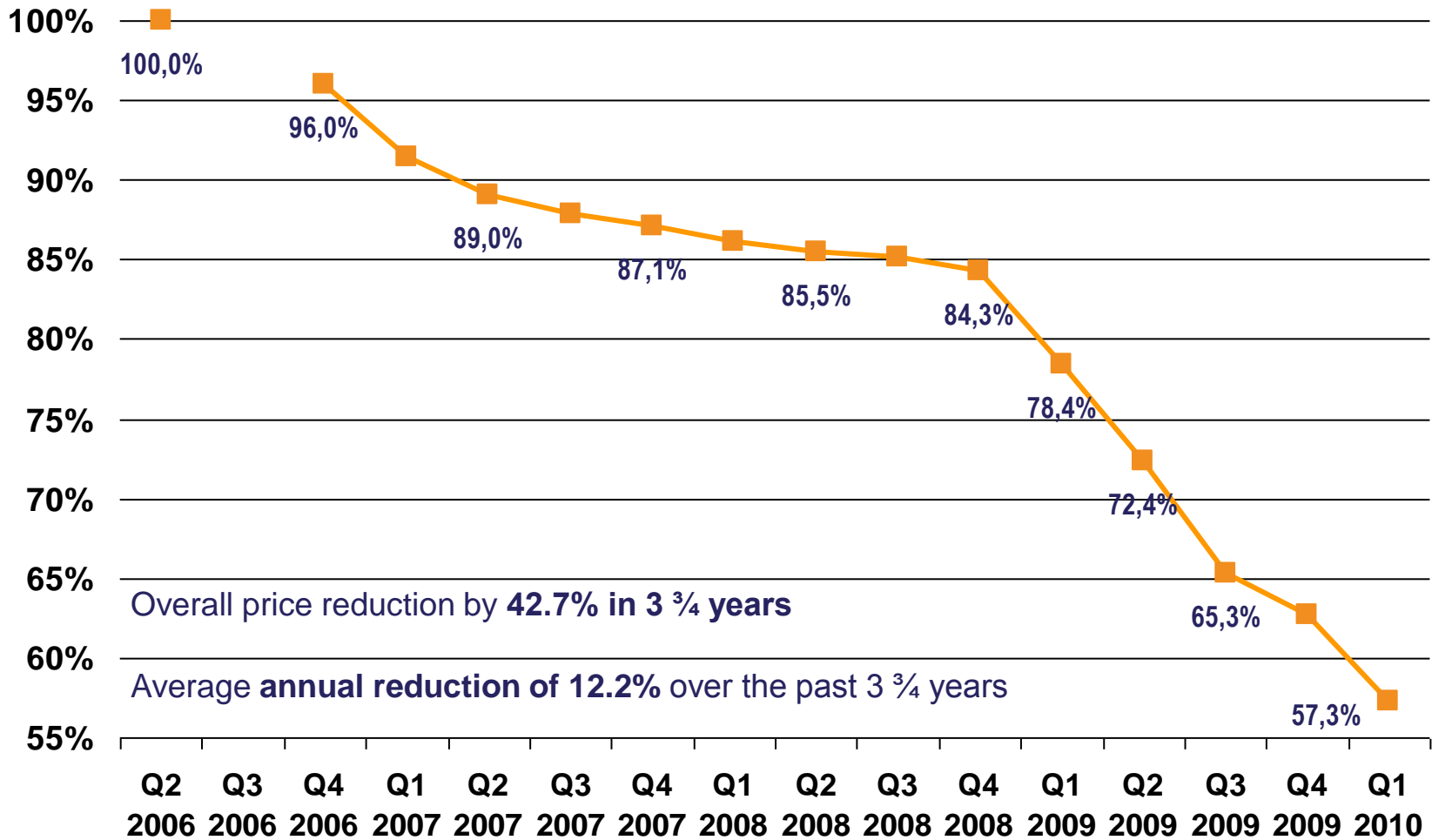
* Preliminary figures

Milestones

- 1991: First Feed-in Law (FIT with low tariffs)
- 1991-1995: 1,000 roofs program (grants)
- 1999-2003: 100,000 roofs program (loans)
- 2000: Renewable Energy Sources Act (EEG) (FIT)
- 2004 +2009: Amendment (revision) of EEG (FIT)

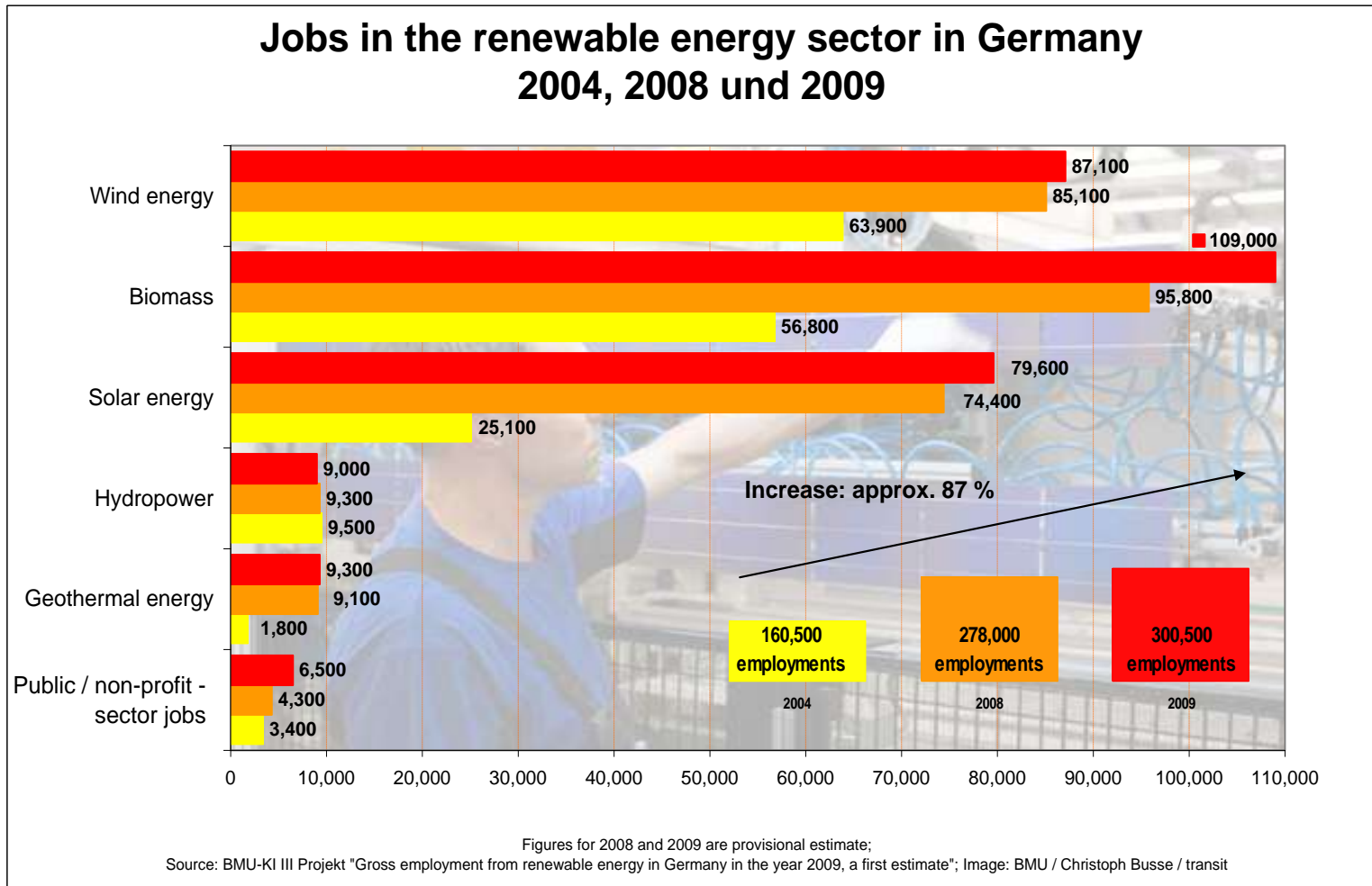


PV system prices decrease steadily

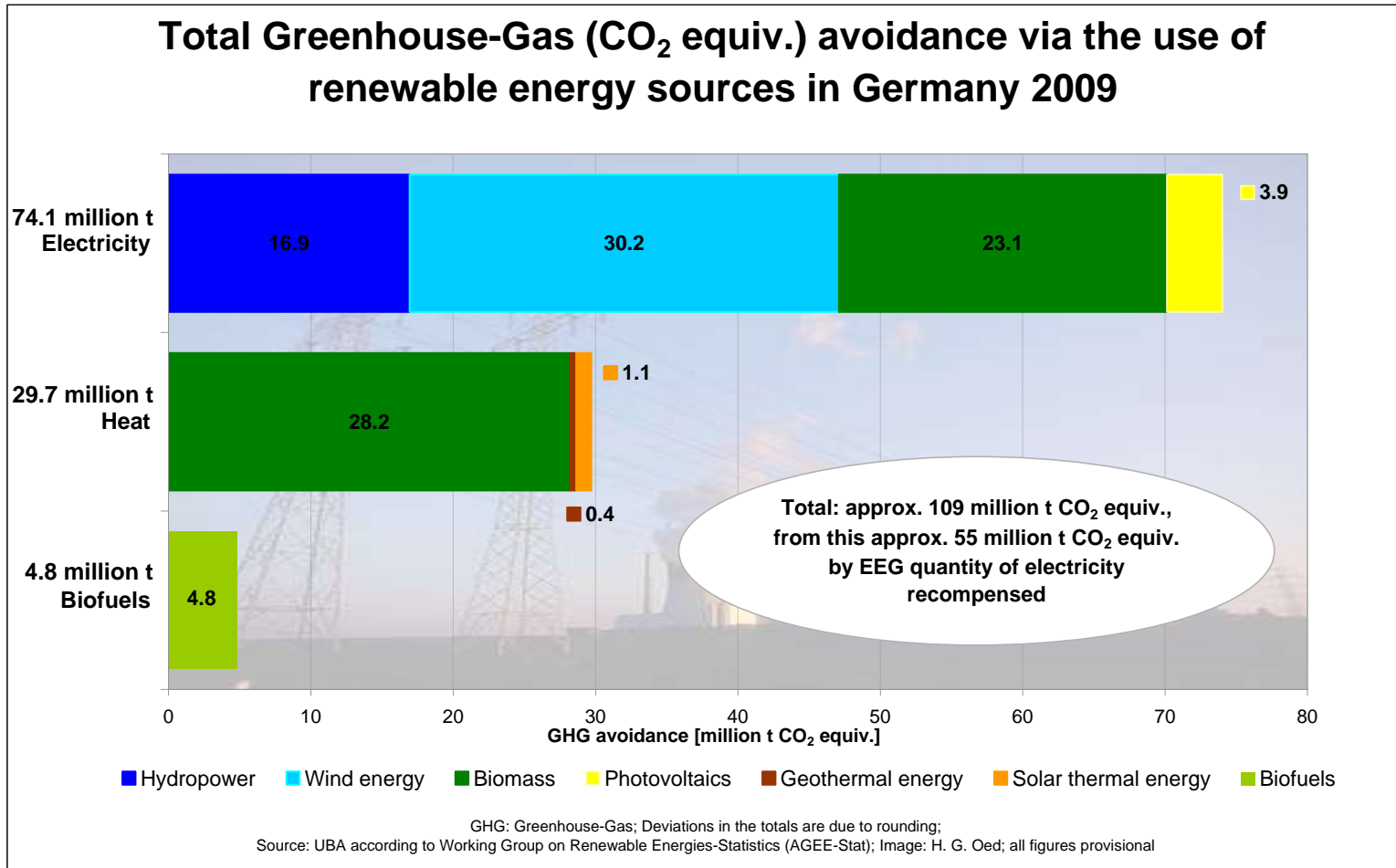


Source: BSW-Solar Price Index

Renewable energies as an economic factor – 33 billion Euro domestic turnover in 2009



Effective climate protection and a contribution to nature conservation....



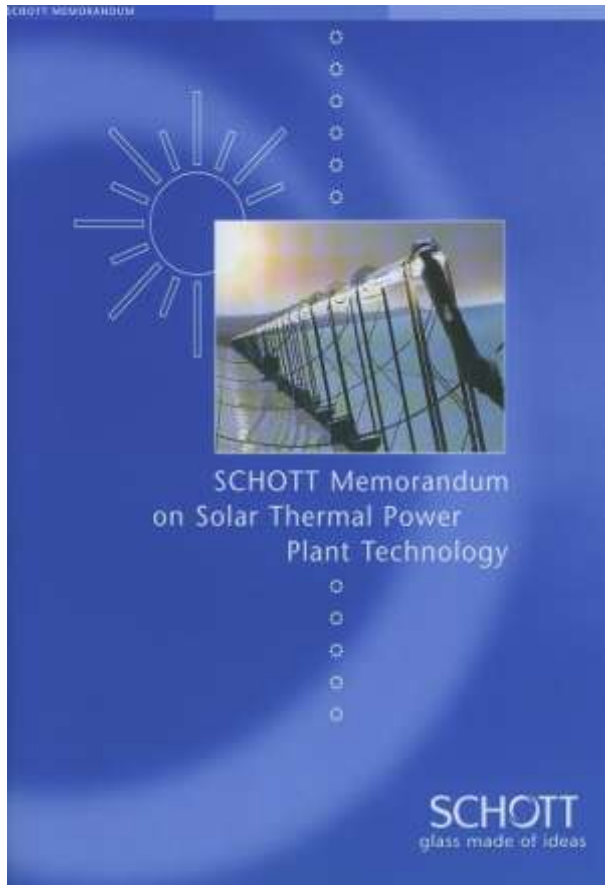
Concentrated Solar Power Plants (CSP) are gaining momentum

....and could contribute significantly to reduce CO₂-emissions



Technology Leader in
Parabolic Trough Receivers
SCHOTT PTR 70®

SCHOTT Memorandum on Solar Thermal Power Plant Technology



Download at:
<http://www.schottsolar.com>

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Why is the German model so successful compared to others ?

- In development longer than most; Enjoyed sustained support from the German Government and population
- Regular review and maintenance is part of the law, ensuring that tariff rates are adjusted as technologies improve
- Costs are shared equally, reducing the burden on end consumers. In 2009, the cost of the EEG to an average household with an electricity consumption of 3.500 kWh per annum was just 3,2 Euros per month.
- No limit to the amount of RE that can be generated and incorporated
- Industrial development has been supported by the law so that the sector employs about 300,000 qualified people
- RE are seen as an essential part of the economy, as well as part of the strategies tackling energy security and climate protection

Source: Renewable Energy Sources in Figures, June 2008

More information under www.erneuerbare-energien.de/englisch

Deutsche | www.bmu.de | Contact |

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Renewable Energy

TOPICS

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OFFSHORE WIND ENERGY

Germany's First Offshore Wind Turbines Connected to the Grid

On 13 August 2009 Federal Environment Minister Sigmar Gabriel visited the construction site of Germany's first offshore wind park Alpha Ventus in the North Sea. Anchored in a depth of 30 meters below sea level approx. 45 kilometres off the Borkum coast, the first five wind turbines are feeding power into the grid. [more](#)

RENEWABLE ENERGY SOURCES ACT 2009

Renewable Energy Sources Act (EEG) [more](#)

LEAD STUDY 2008

Further development of the 'Strategy to increase the use of renewable energies' [more](#)

ENERGY ROAD MAP

New Thinking - New Energy Policy Road Map 2020
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RENEWABLE ENERGIES / IRENA

IRENA agrees on a three-way solution to the headquarters question

A joint solution has been found to the competition between Germany, the United Arab Emirates (UAE) and Austria to host the headquarters of the new International Renewable Energy Agency (IRENA). Abu Dhabi will host the IRENA headquarters, Bonn will accommodate the centre of technology and innovation, and a liaison office in Vienna will facilitate contacts in the field of energy to UN bodies and other international institutions. [more](#)

www.erneuerbare-energien.de/english/irena
www.irena.org

AFRICA / SOLAR THERMAL POWER PLANTS

Gabriel welcomes business initiative on solar thermal power plants

Federal Environment Minister Sigmar Gabriel has welcomed the business initiative for the construction of solar thermal power plants in desert regions. Gabriel said, "Renewable energy sources in Africa and the Middle Eastern countries represent an immense potential which can be tapped by means of solar thermal power plants. ..." [more](#)

REPORT

Acceptance of renewable energies in the USA [more](#)

RFU BROCHURE

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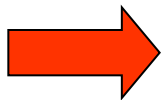
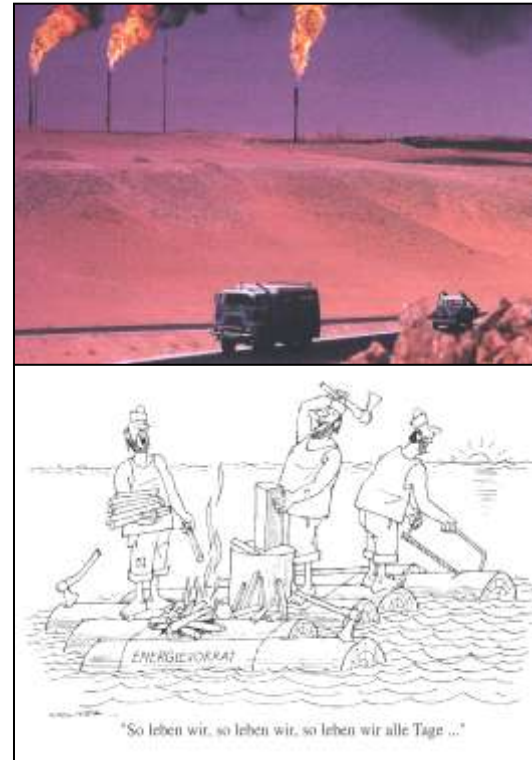
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What are the prospects for the RE industry ?

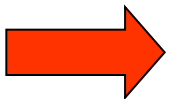
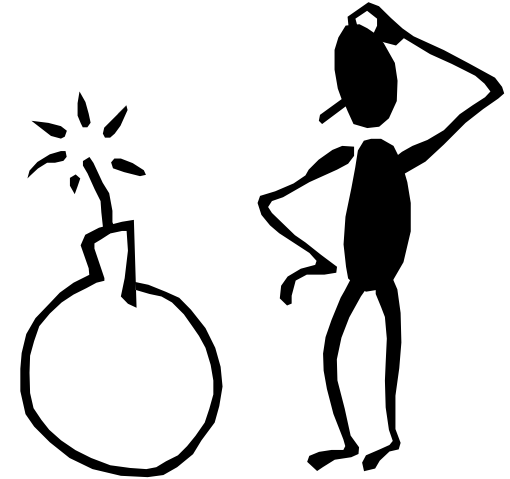
- Due to growth of world economy and population, world energy consumption is increasing fast
- To satisfy the increasing energy demand, energy saving and other environmental friendly technologies have to be employed
- Renewable energy sources (solar energy, hydro power, wind and biomass) will play an important role in the energy mix of the future
- RE companies need to cope with the growing challenges of this fast growing markets



**All major studies predict a strong growth
of the RE markets**

What are the major challenges for the PV industry?

- Many newcomers are trying to jump on the bandwagon without having the essential experience and high-quality products
- Already today, there is a huge over supply in terms of production - Who will buy the modules ?
- Germany is still the main buying market. Far down follow Italy, France, Japan and the USA
- German growth will slow down as feed-in remuneration is being lowered
- Continuation of consolidation phase in the PV sector is expected



The main challenge the PV industry faces is to make solar electricity cost effective and to develop new emerging markets in parallel

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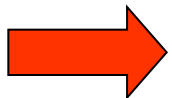
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Conclusion

- Solar technology is a profitable business which has already created a large number of jobs
- The Renewable Energy Sources Act is the most successful instrument to promote the expansion of renewable energies
- German households only pay around 3,2 Euro per month extra
- Low prices and threatening over-capacities suggest that competition will get tougher, especially at the end of the value chain
- Renewable energy sources will have to play an important role in the energy mix of the future



**Help spreading the “RE-Virus”
all over Europe !!**

Thank you very much for your attention !!



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