

PV in Germany

A success story due to a stable legal framework

Manila – 21. November 2011

Business Trip within the Exportinitiative Renewables from Germany



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German Solar Industry Association

2



TASK To represent the German solar industry in the solar thermal and photovoltaic sector

VISION A global sustainable energy supply provided by solar (renewable) energy

ACTIVITIES Lobbying, political advice, public relations, market observation, standardization

EXPERIENCE Active in the solar energy sector since more than 30 years

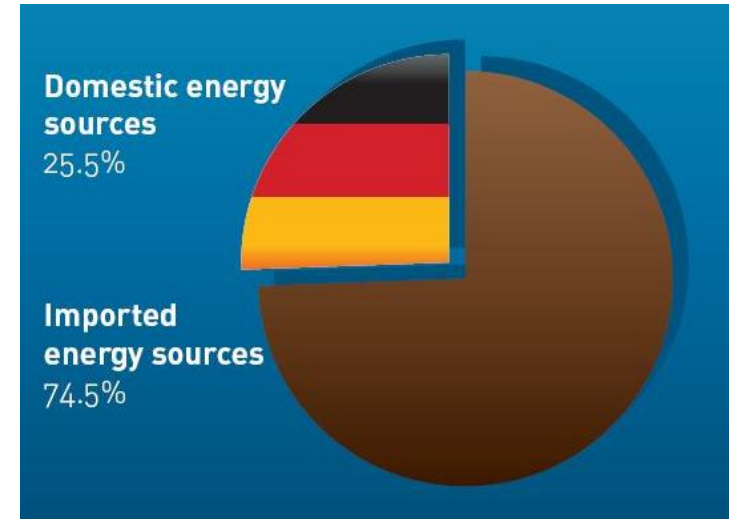
MEMBERS More than 900 solar producers, suppliers, wholesalers, installers and other companies active in the solar business

HEADQUARTERS Berlin

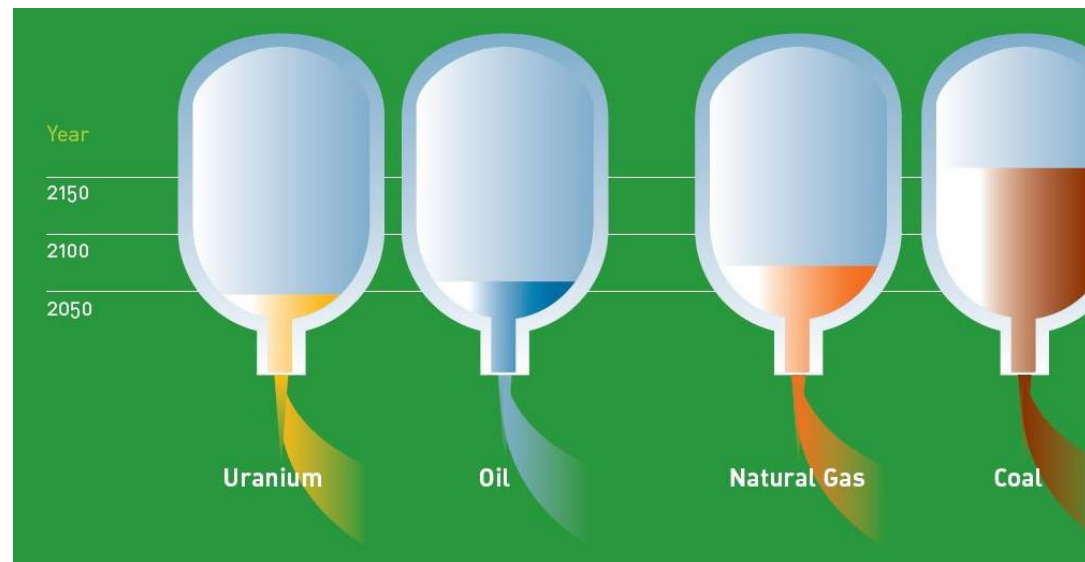
Why renewable energies in Germany...

...since:

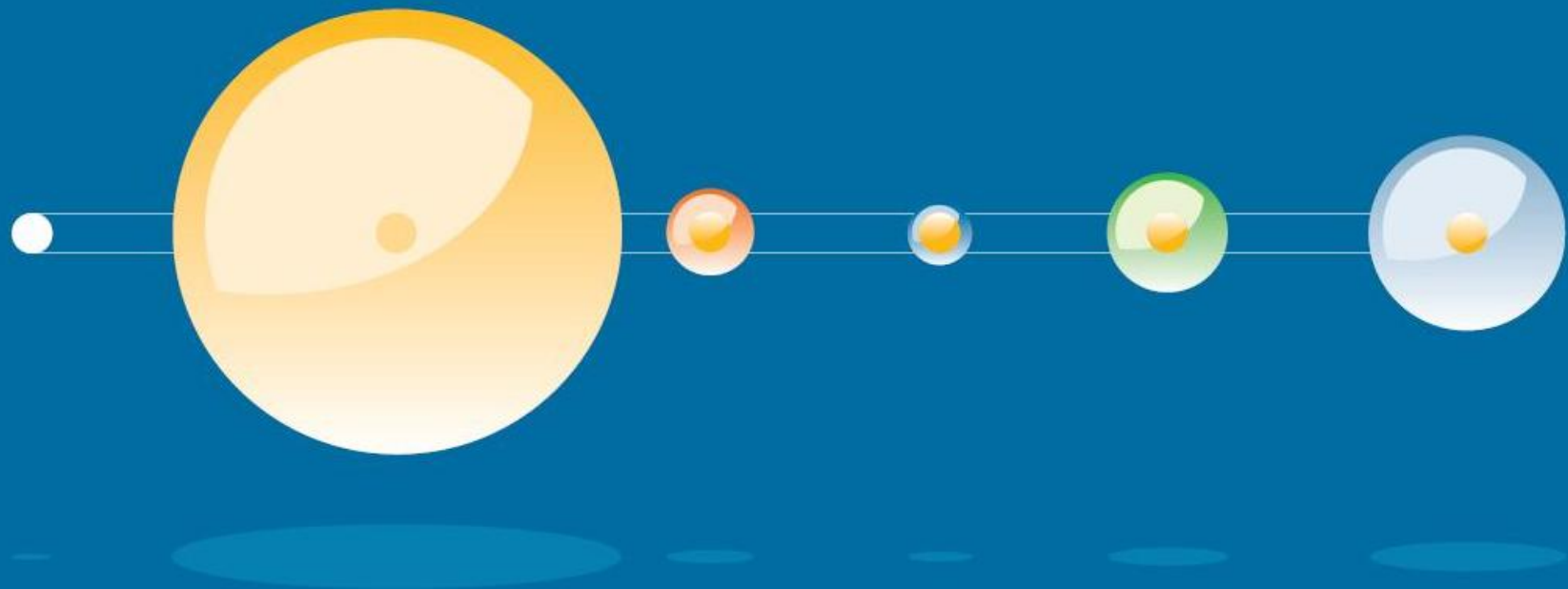
- We are highly dependent on energy imports (security of supply)
- Fossil & nuclear resources are finite (but demand is growing)
- Climate change requires us to act urgently
- Create an new industry and thousands of jobs



Diagrams: AEE / Sources: BMU, BMWI



Why solar? Well...



Annual world energy consumption

Solar energy:
2850-fold

Geothermal energy:
5-fold

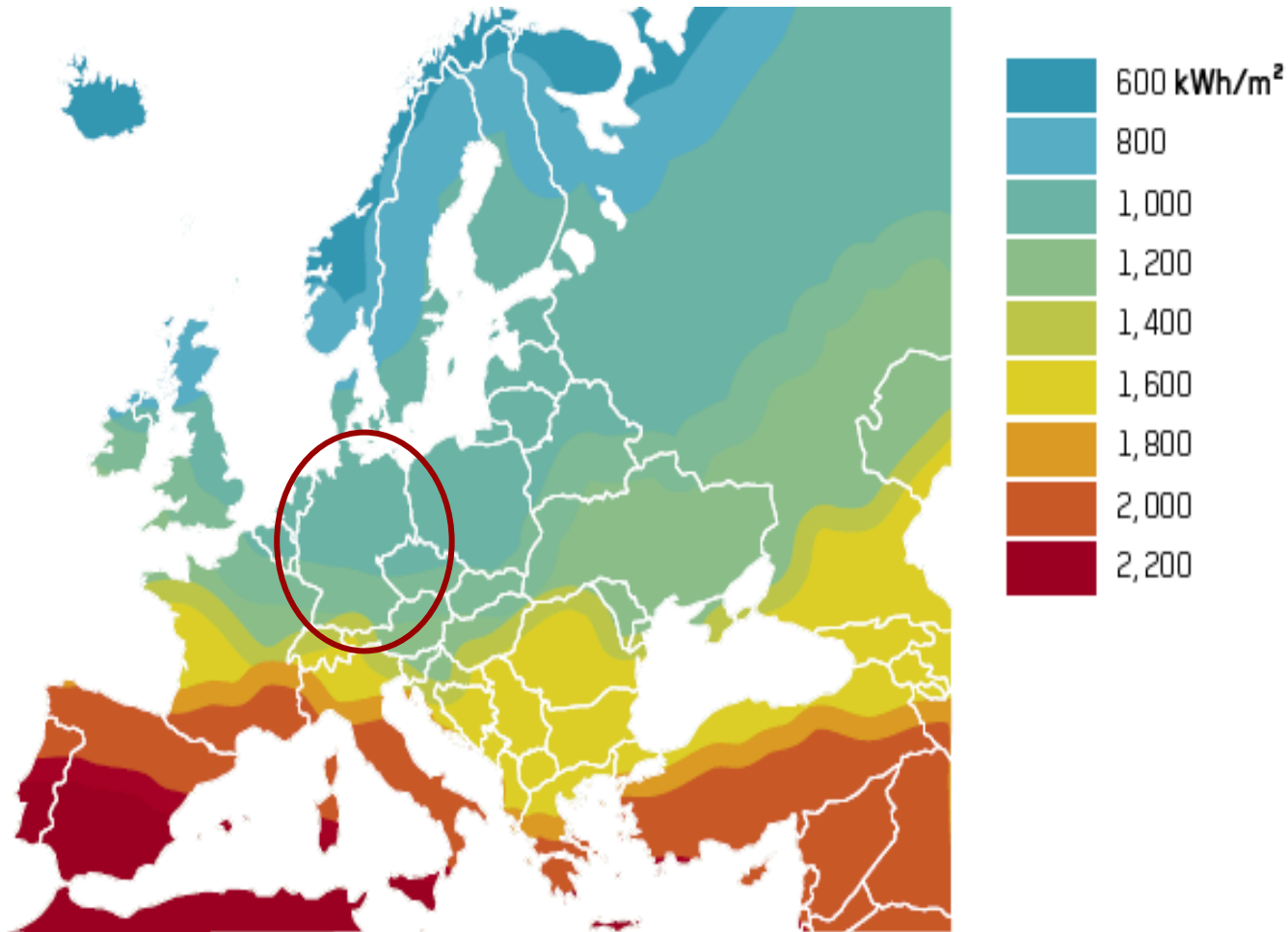
Water power:
3-fold

Bioenergy:
20-fold

Wind energy:
200-fold

The annual world energy consumption is theoretically covered 2,850-fold by the natural supply of solar energy—200-fold alone by wind energy supply.

Solar Potential in Europe and Germany



Our future is a mix of all renewable energies, but there are certain challenges:

- How to create widespread **understanding and support** among society and political and economic decision makers for RES?
- How to develop **new knowledge and skills**, adapt the education systems and spread this knowledge?
- **How to finance the investments** as long as RES often require higher up-front investments than fossil and nuclear energy?
- **How to adapt the energy supply system** from a centralized to a distributed generation system?



Source: BMU, Daten EE, Juni 2007



What was Germany's solution for these challenges?

Creation of a stable framework to incentivise the investments in renewable energies by introducing a technology specific Feed-In-Tariff (FIT)



Source: Solarwatt

Results of the German FIT for Photovoltaics

PV- Market development in Germany

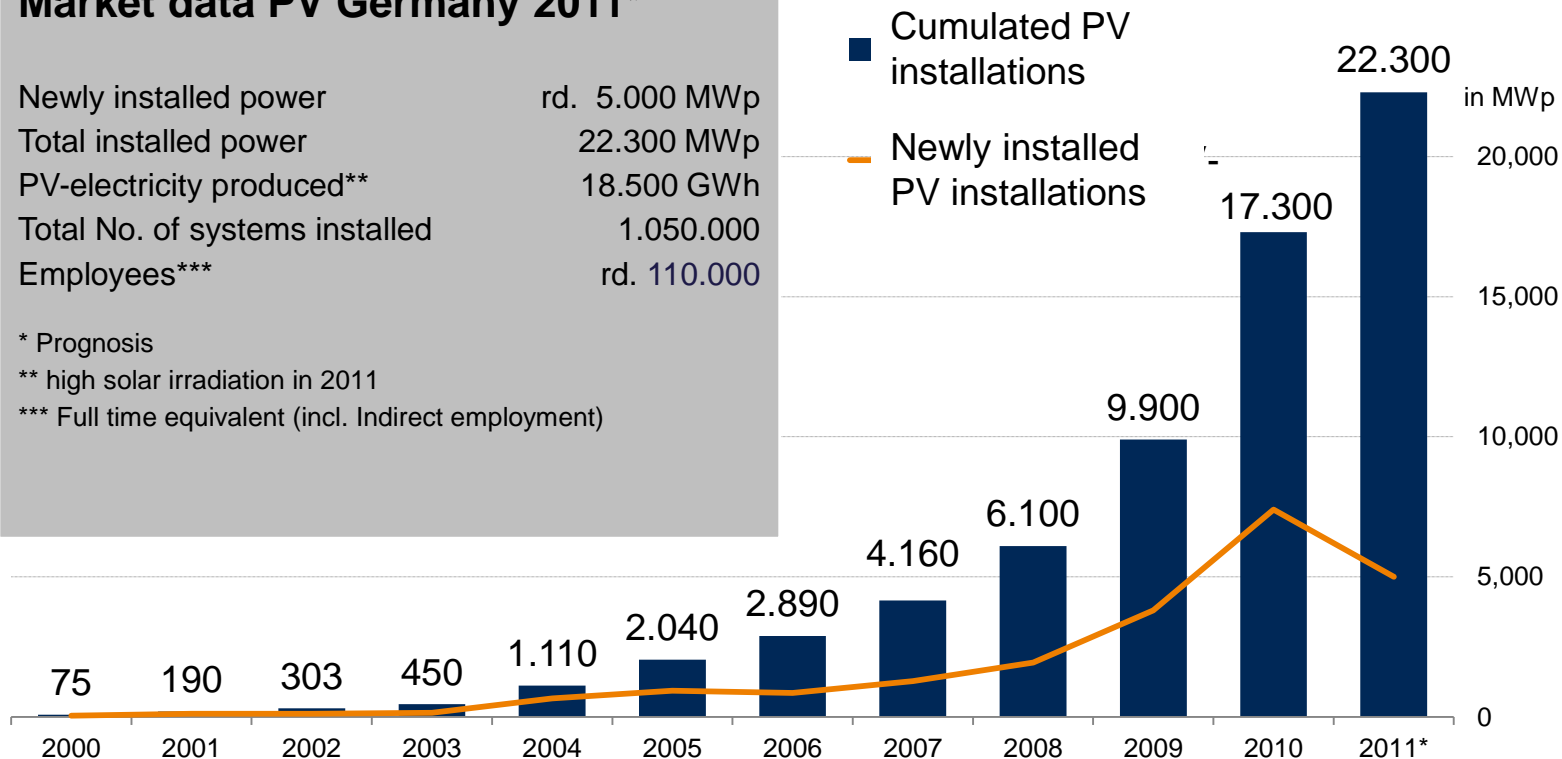
Market data PV Germany 2011*

Newly installed power	rd. 5.000 MWp
Total installed power	22.300 MWp
PV-electricity produced**	18.500 GWh
Total No. of systems installed	1.050.000
Employees***	rd. 110.000

* Prognosis

** high solar irradiation in 2011

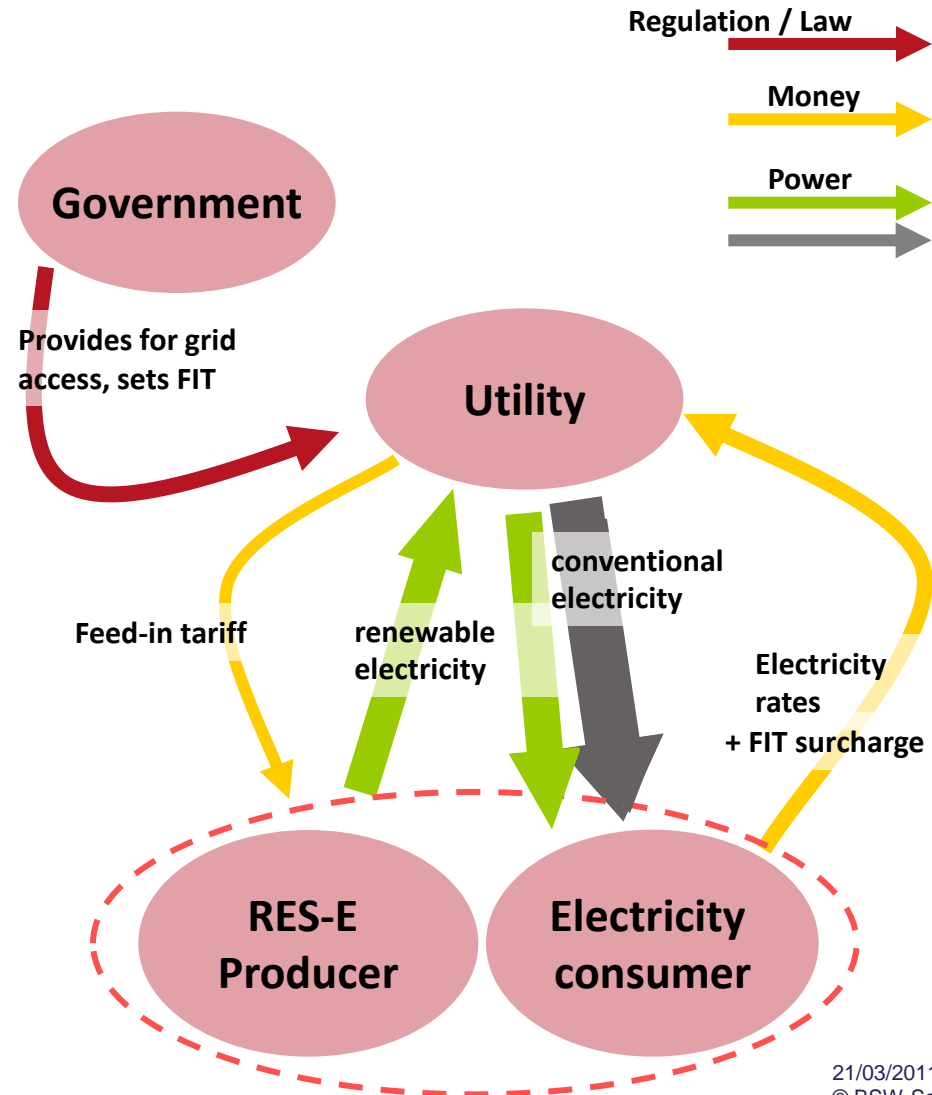
*** Full time equivalent (incl. Indirect employment)



- ➔ Prognosis for 2011: approx. 5 Gigawatt newly installed systems
- ➔ Market stabilizes according to political goals

FIT in Germany: Basic principles

- **Priority connection** for all PV systems granted
- Each solar kWh must be **purchased by the utility**
- **Fixed feed-in tariff** payment over 20 years
- Reduction of the feed-in tariff each year by approximately 9% for newly installed PV systems (**Degression**)
- Feed-in tariffs **are no state subsidy**, costs are redistributed to the rate payer



Current Feed-in Tariffs Germany

For systems at or on **buildings (or integrated)** feeding to the grid:

Year of commissioning	< 30 kWp (PHP/kWh)	> 30 kWp	> 100 kWp (PHP/kWh)	> 1.000 kWp (PHP/kWh)
Jan 1, 2011	17.24	16.40	15.51	12.94
Tariff degression Jan	15 %			
Tariffs as of Jan 1. 2012*	14.66	13.94	13.19	10.99

For **ground-mounted PV** systems feeding to the grid:

Year of commissioning	Commercial zones, on systems, along motor- & (PHP/kWh)	Conversion and (PHP/kWh)
Jan 1. 2011	12.67	13.24
Tariff degression Jan	15 %	
Tariffs as of Jan 1. 2012*	10.76	11.26

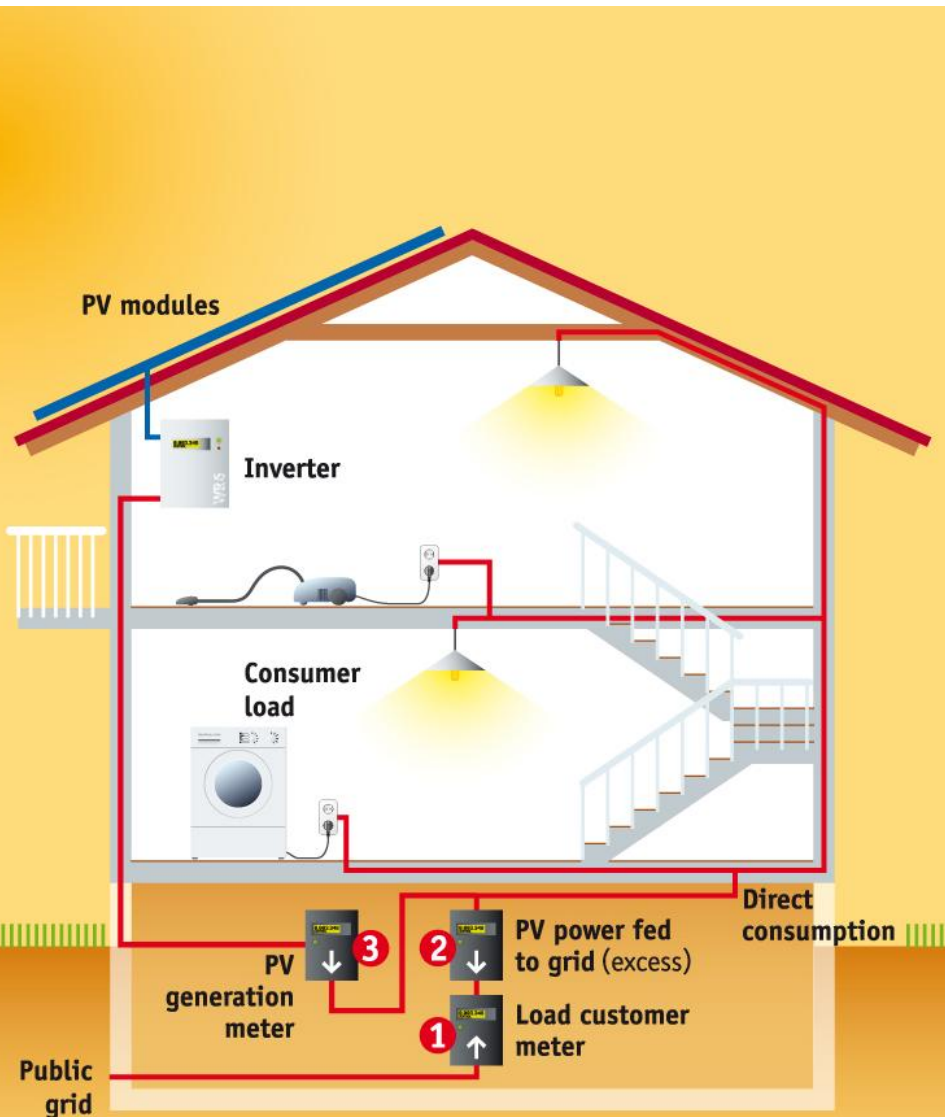
* Preliminary figures, BSW estimates, final figures subject to publication by the Federal Network Agency

1 € = 60 Phil. Pesos

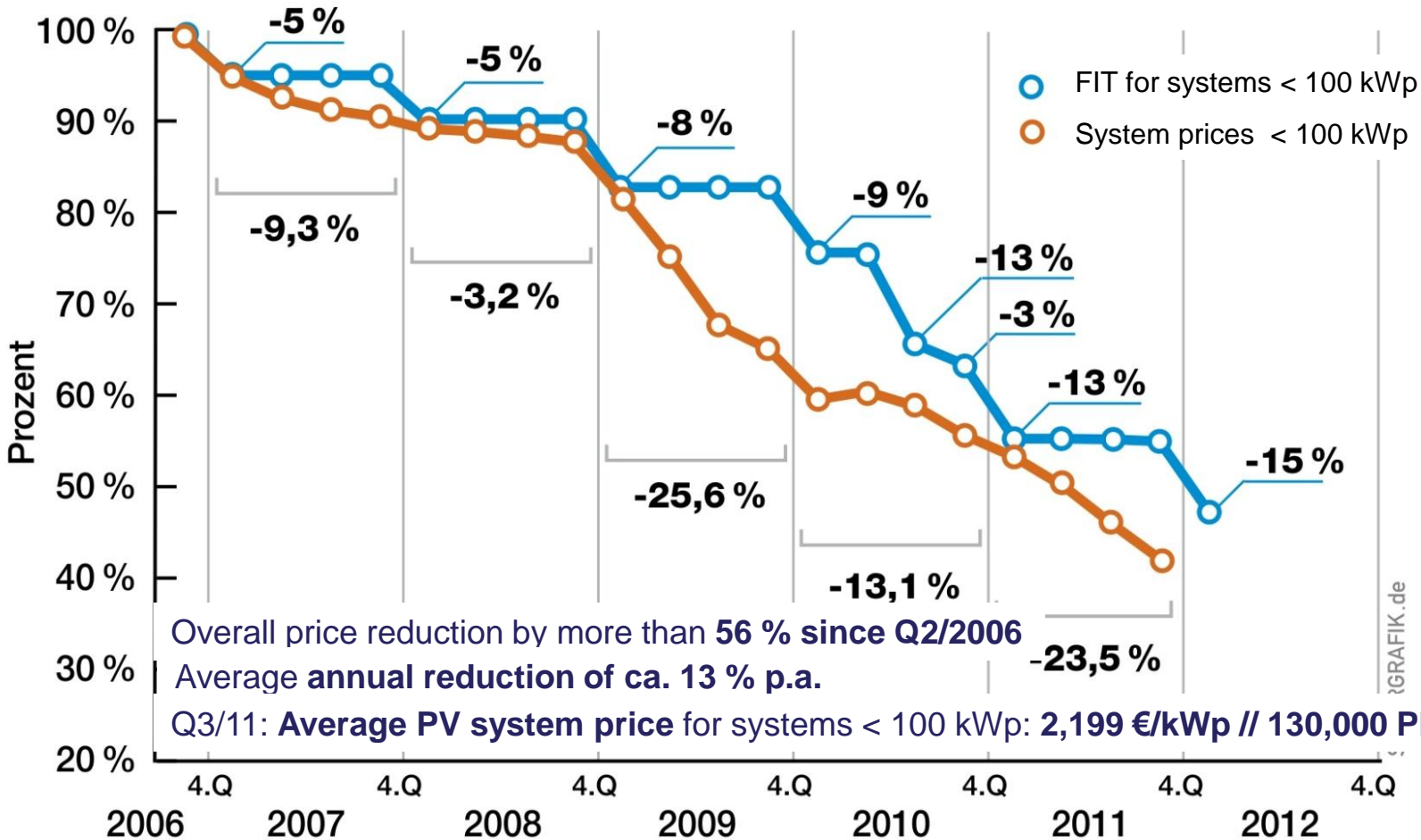
Direct consumption is possible

10

- Option can be chosen by PV system operator
- Direct consumption requires additional meter to be installed
- PV system does not longer feed all power to the grid
- kWh produced and consumed is in addition remunerated
- Aims to reduce overall FIT payments significantly

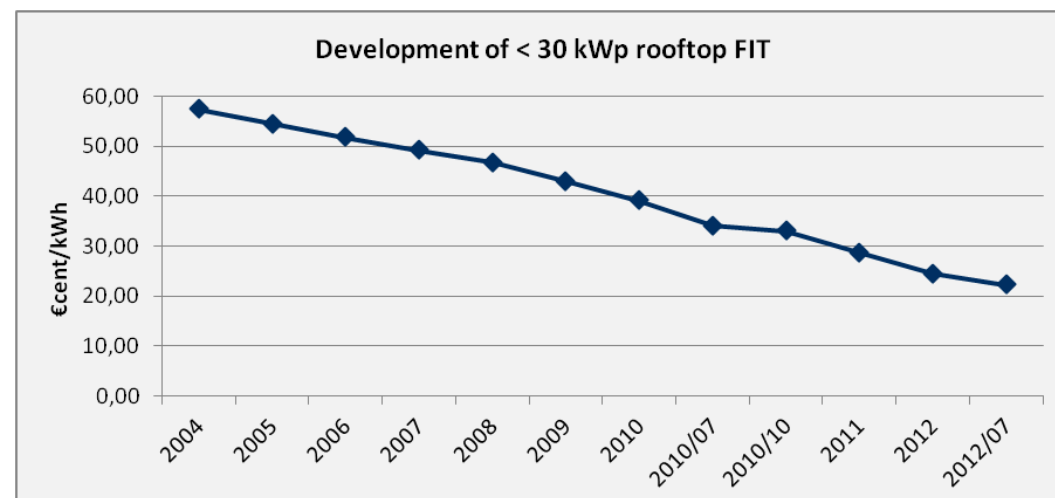
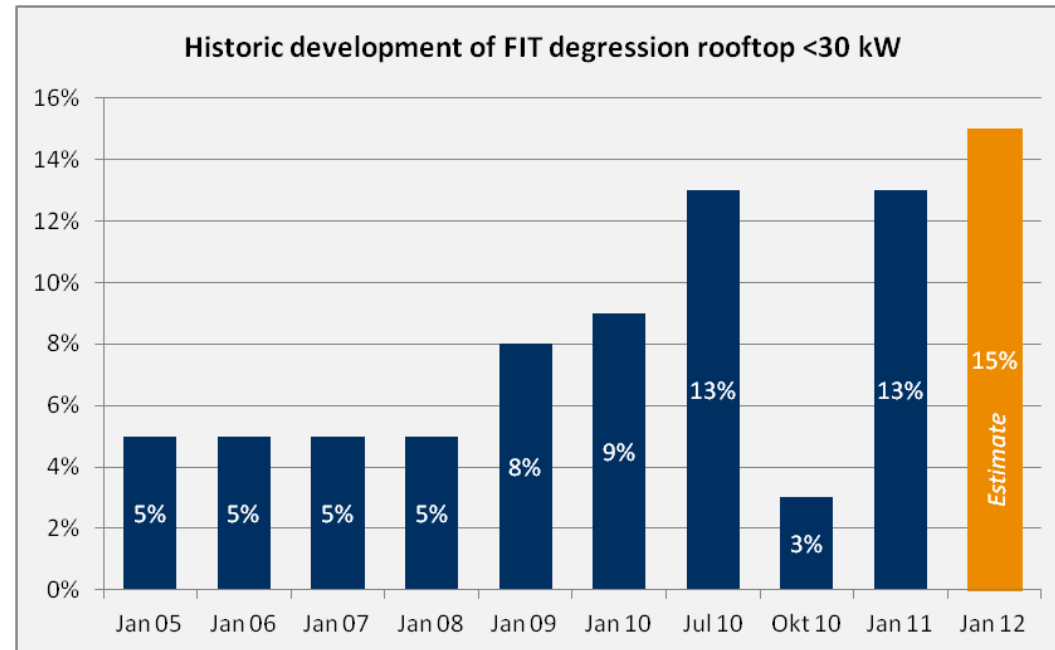


PV system prices decrease steadily, in line with FIT degression



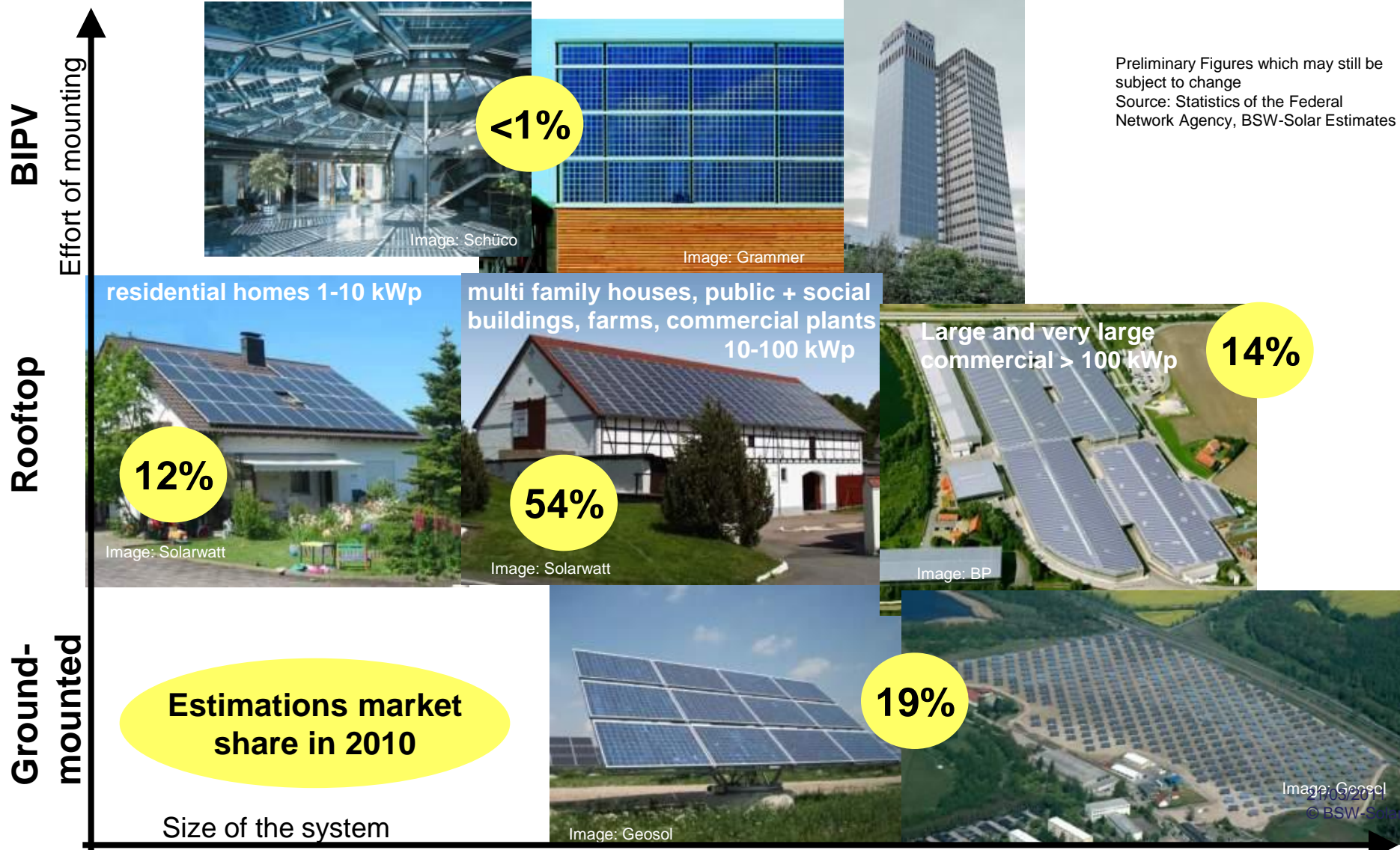
Decreasing FITs trigger cost reductions

- As of 2004, FITs in Germany have continuously been decreasing
- Only decreasing tariffs provide an impetus for cost reduction to the PV industry
- At first, they were decreased statically by 5% per year
- In 2008, the concept a degression depending of photovoltaic market growth was implemented
- It has been maintained since then, and recently been finetuned again



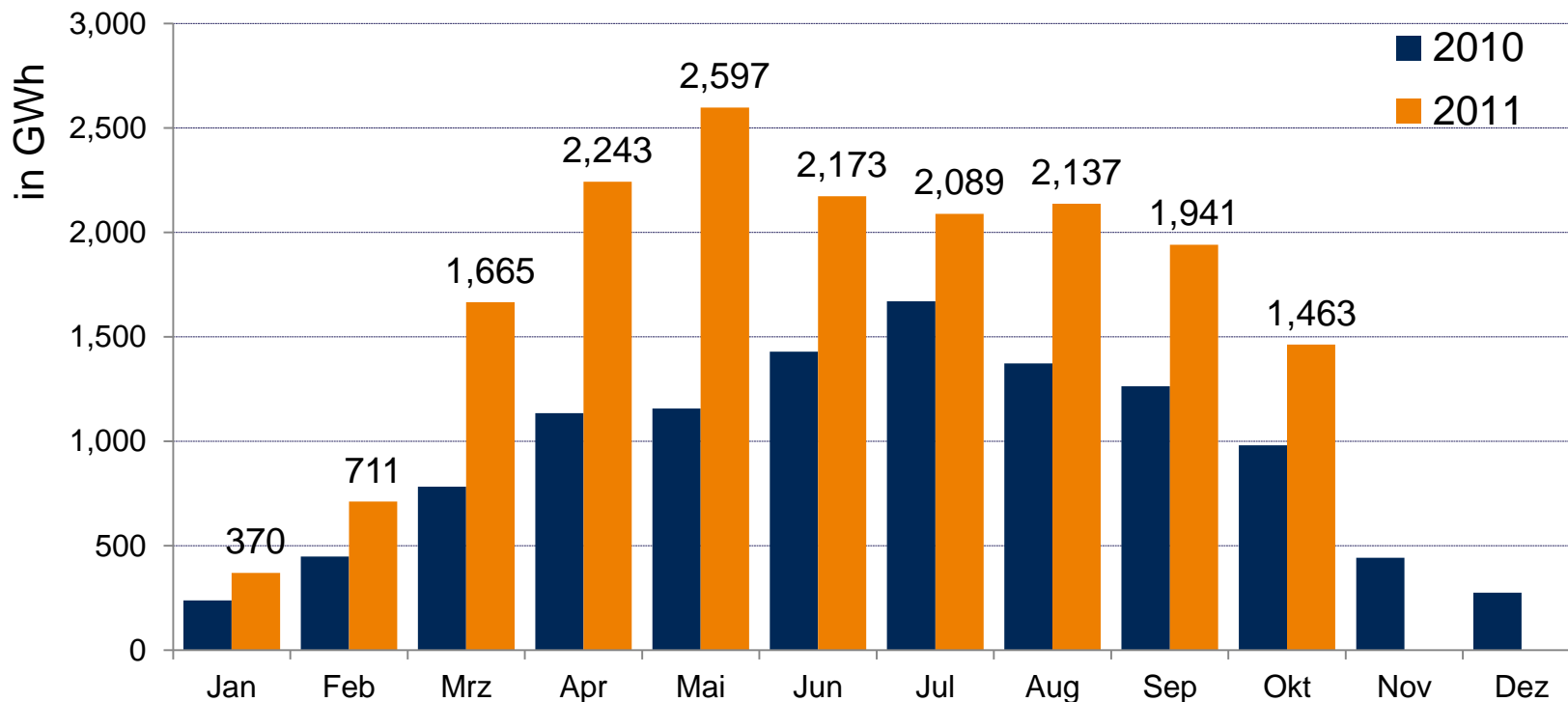
Market segments of on-grid PV systems

Preliminary Figures which may still be subject to change
 Source: Statistics of the Federal Network Agency, BSW-Solar Estimates



PV-electricity production increases significantly

15



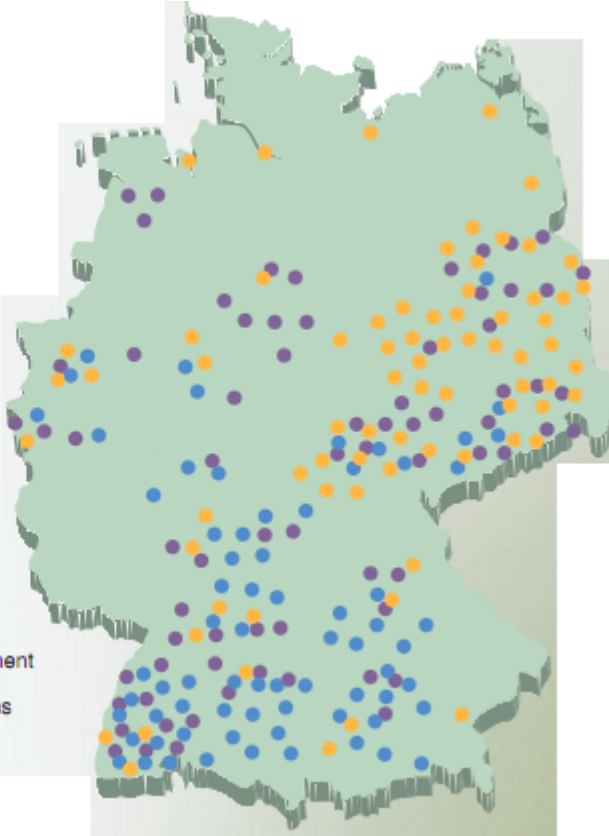
Quelle: ÜNB, EEX, BDEW, eigene Berechnungen BSW-Solar 11/2011

- 2011: approx 18,5 TWh PV-electricity: More than 50% above 2010
- PV covers around 3% of the electricity in Germany

German companies can rely on an excellent R&D-infrastructure

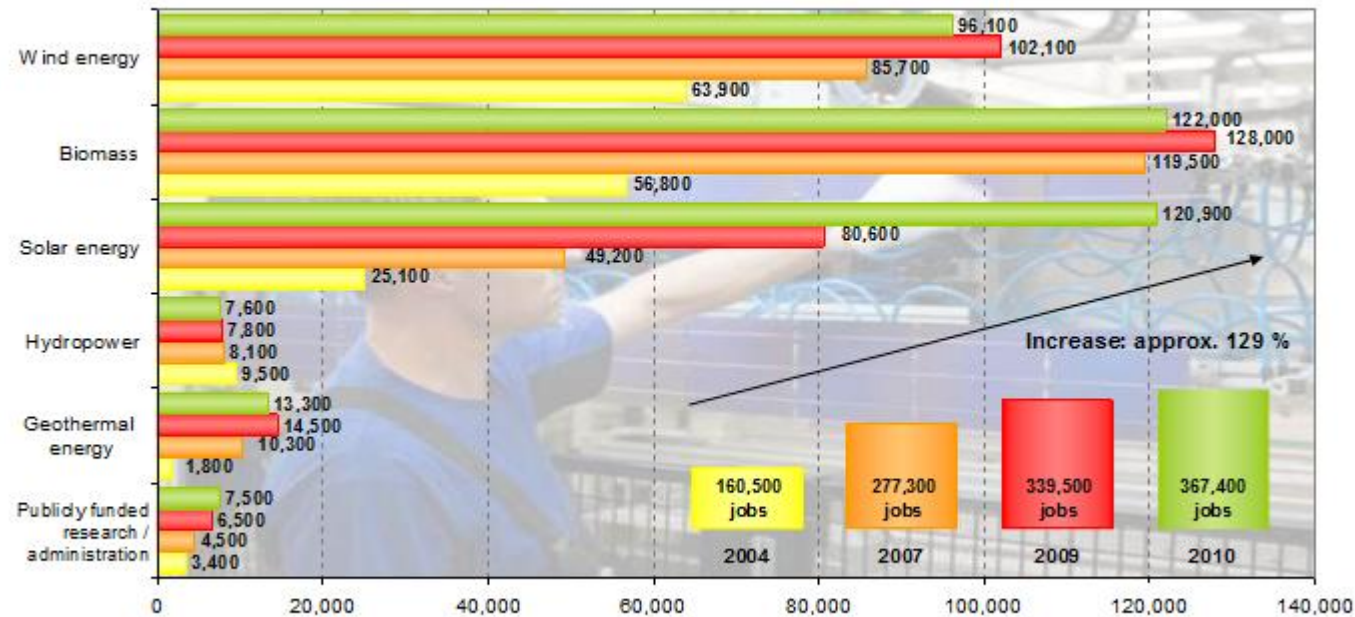
German PV companies closely cooperate with research institutes and heavily invest in R&D

- More than **50 state-of-the-art research institutes** as well as university faculties researching in PV
- ~**€1 billion investments** in PV R&D are planned by the industry through 2009-2013
- **290 German patents** in solar technologies registered in 2010

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- Manufacturers of photovoltaic equipment
 - Manufacturers of photovoltaic systems
 - Research

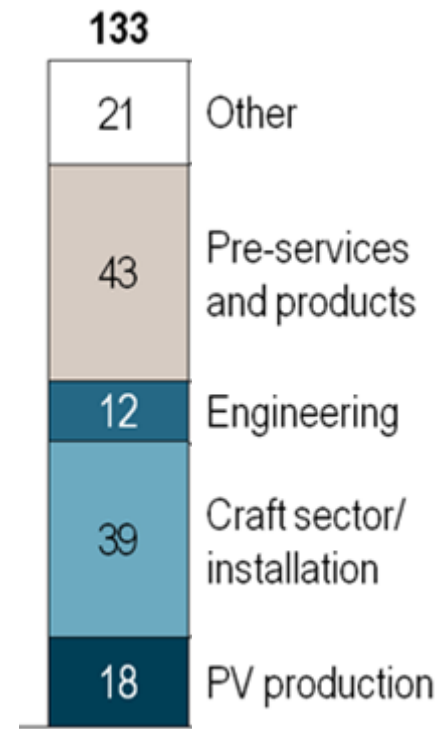
Renewable energies have created thousands of high quality jobs

Job creation in all Renewable energies



Figures for 2009 and 2010 are provisional estimate; deviations in totals are due to rounding.
 Source: O'Sullivan/Eder/Jan Mark/Nieder/Lehr: "Bruttobeschäftigung durch erneuerbare Energien im Jahr 2010 – eine erste Abschätzung", as at: March 2011; Interim report of research project „Kurz- und langfristige Auswirkungen des Ausbaus erneuerbarer Energien auf den deutschen Arbeitsmarkt“; Image: BM U / Christoph Busse / transit

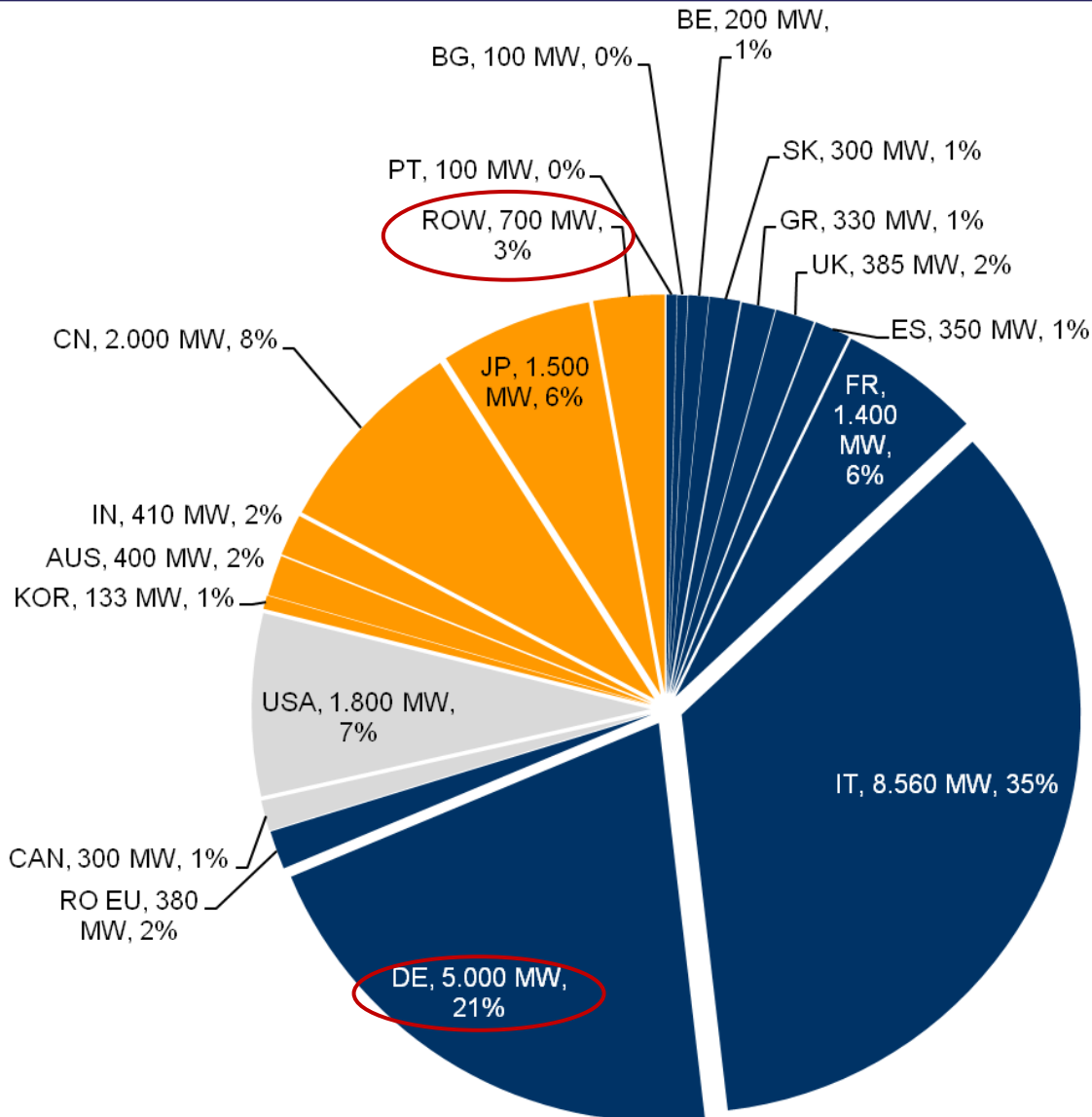
Job creation in PV



2010

Source: Berger / Prognos 2010

The German (FIT) has been adapted in many nations and led to the creation of a Global PV Market (2011*)



Global PV Market

2009:	7.200 MWp
2010:	17.100 MWp
2011:	24.300 MWp

Europe

North Amerika

Asia / ROW

*Estimates, grid-connected PV systems

Source: nat. PV Industry associations, BSW-Solar estimates

Update: 11/2011

What can German companies offer you?

19



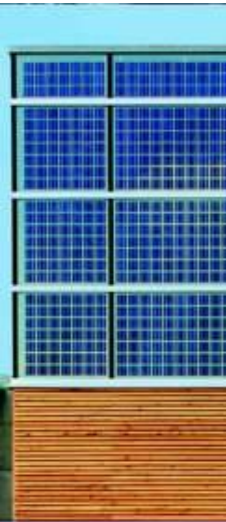
- **Solutions** to provide and manage your electricity grid reliably with electric energy from solar PV and / or hybrid sources!
- **Quality products** that are designed for a long life time at very low maintenance costs that undergo some of the strictest testing requirements in the world!
- Knowledge and a lot of experience around **marketing, sales, installation and maintainance!**
- Experience in **qualifying and training** your staff!
- Not only state-of-the art but also **innovative and reliable** technology with long warranties!
- Often **20 or more years** of experience with grid connected or off-grid solar applications!



Companies participating in this business trip!

Company	Activity
<u>Donauer Solartechnik</u>	Distribution of photovoltaic products (PV-modules, grid-inverters, installation (on- & off-grid))
<u>Energiebau Solar-</u>	Specialized wholesale trade of PV components, project planning, development and installation (on-/off-grid)
<u>Hoppecke Batterien</u>	Manufacturer for industrial battery systems providing energy applications
<u>IBC Solar AG</u>	Distribution of PV components, provision of complete PV development off-grid
<u>Inutec Solarzentrum</u>	Planning, development and installation of solar systems/ plants components (PV modules, inverters), capacity building seminars
<u>Schott Solar AG</u>	Manufacturing of PV modules and project development
<u>SMA Technology AG</u>	Development and manufacturing of solar inverters and monitoring systems for PV applications.
<u>Sonnenwerft GmbH</u>	Manufacturing and distribution of PV components (PV-modules, inverters), solar-thermal, project planning

Conclusions



- There is no alternative: PV is needed for a sustainable energy supply → the path is defined today!
- Germany has set a good example for the creation of a future oriented, labour intensive industry sector with an innovative legislation providing stable investment security for a green energy source!
- German companies a wealth of experience and offer a wide variety of technical solutions – products and concepts!
- The global photovoltaic market potential is huge – but PV markets only evolve, if they are developed systematically
 - ➔ The appropriate framework conditions need to be set!
- It took Germany more than 10 years to build up knowledge and experience – **benefit from this experience!**

THANK YOU FOR YOUR KIND ATTENTION



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