Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

The German *Energiewende*

German Renewable Energy Policy

Markus Kurdziel

Programme Office
International Climate Initiative (BMU)



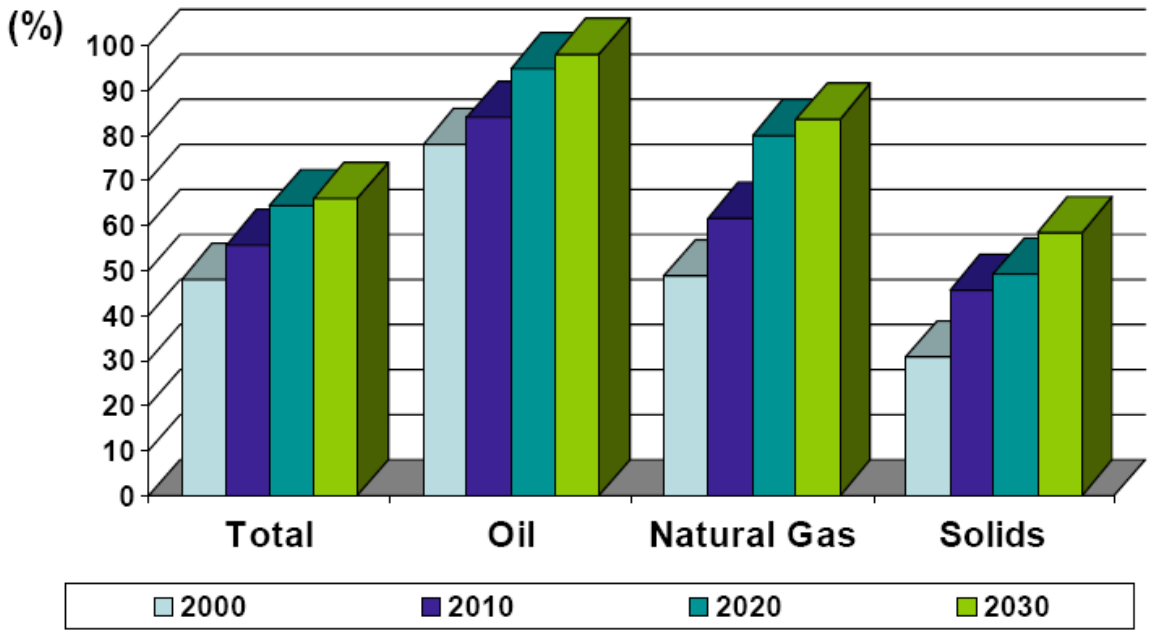

October 2012

Overview

- Drivers and Targets of Germany‘s Energy Policy
- German RE Policies
- Recent Development of PV in Germany
- Integrating RE into the Energy System
- Perspectives on the EEG Surcharge
- Impacts and Perspectives

Driver: Energy Security

2.10. EU-27 Development of Import Dependence up to 2030 (Baseline Scenario)

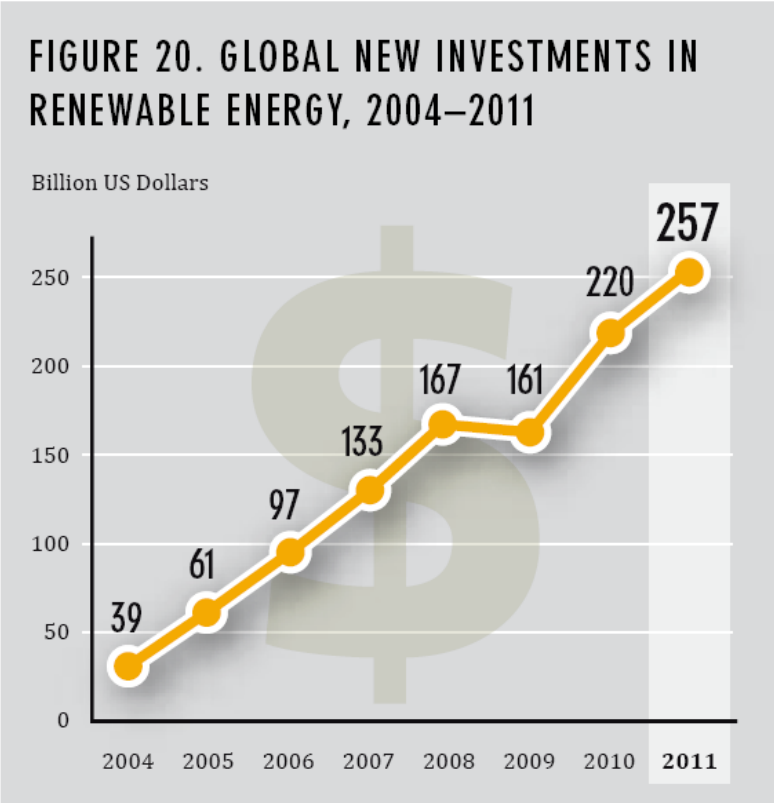


Source: European Commission DG TREN, PRIMES

Driver: Sustainable Growth

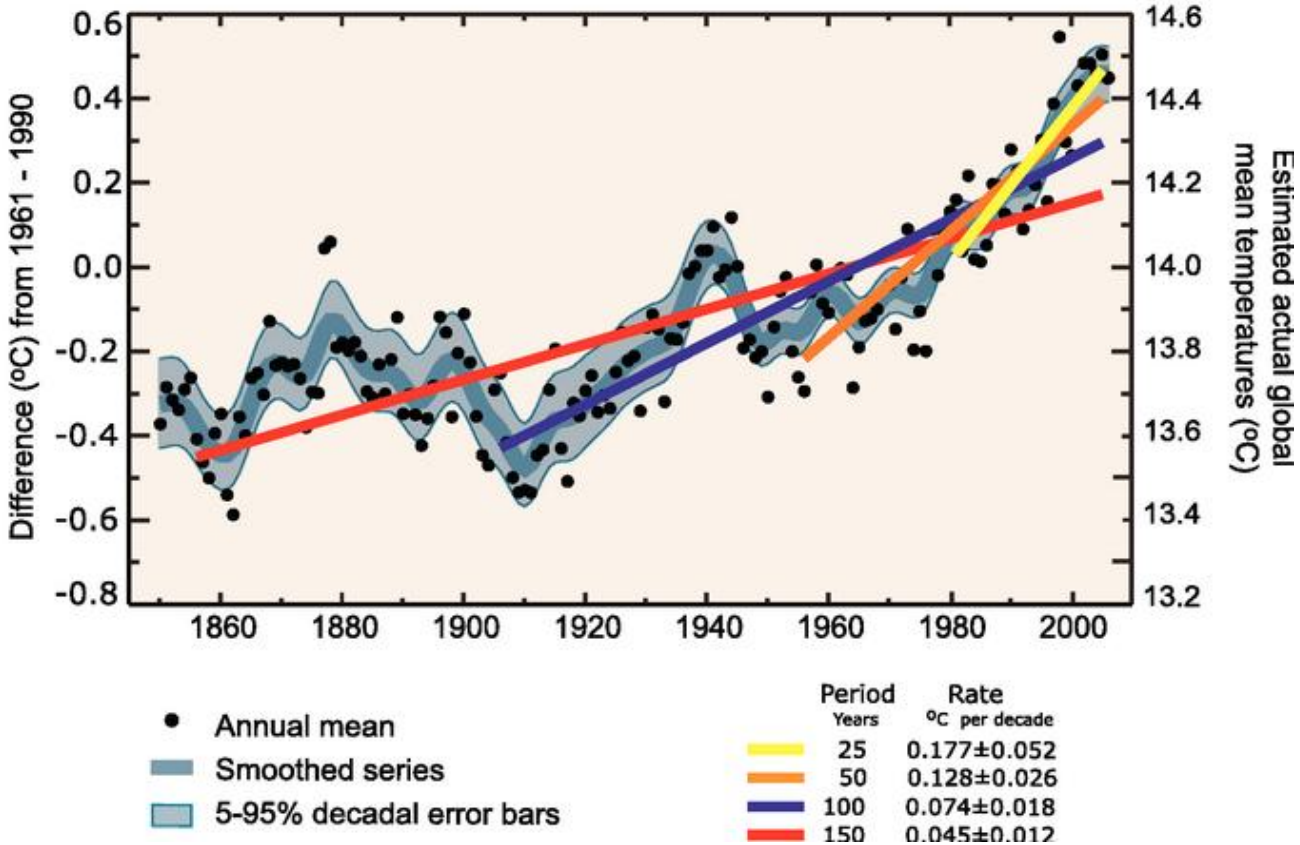
Top 5 Countries for Renewable Energy Investment, 2011:

1. China (52 bn $)
2. USA (51 bn $)
3. Germany (31 bn $)
4. Italy (29 bn $)
5. India (12 bn $)



Source: REN21, GSR 2012

Driver: Climate Protection



The three pillars of the German Energy Transition

Renewable Energies

- Increasing investment in RE
- Grid integration of RE

Grid expansion

- Additional transmission capacity
- Balancing demand and supply between regions
- Increasing storage capabilities

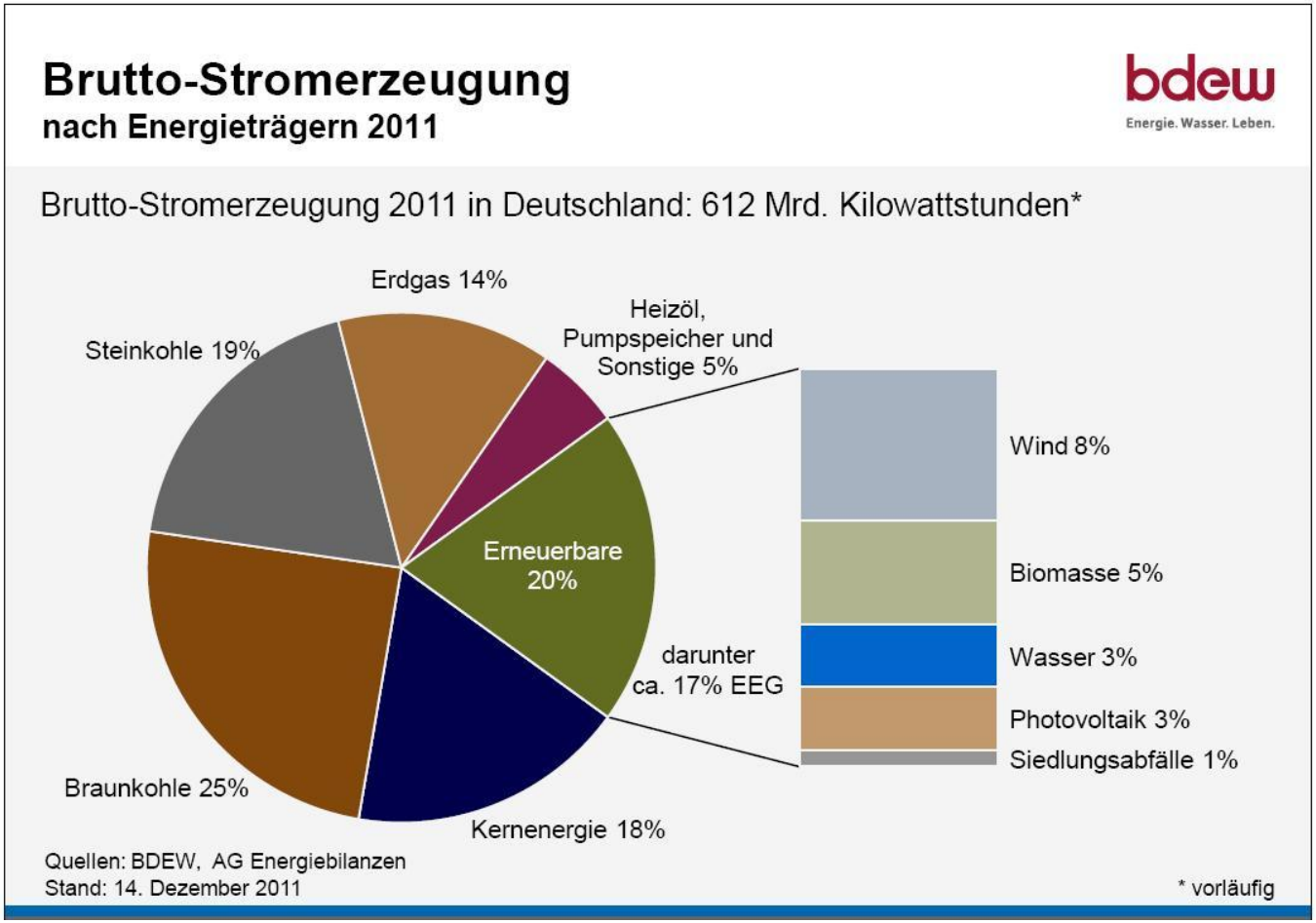
Energy efficiency

- Decreasing energy consumption
- Demand Side Management / Smart Grids

The *Energy Transition: Targets*

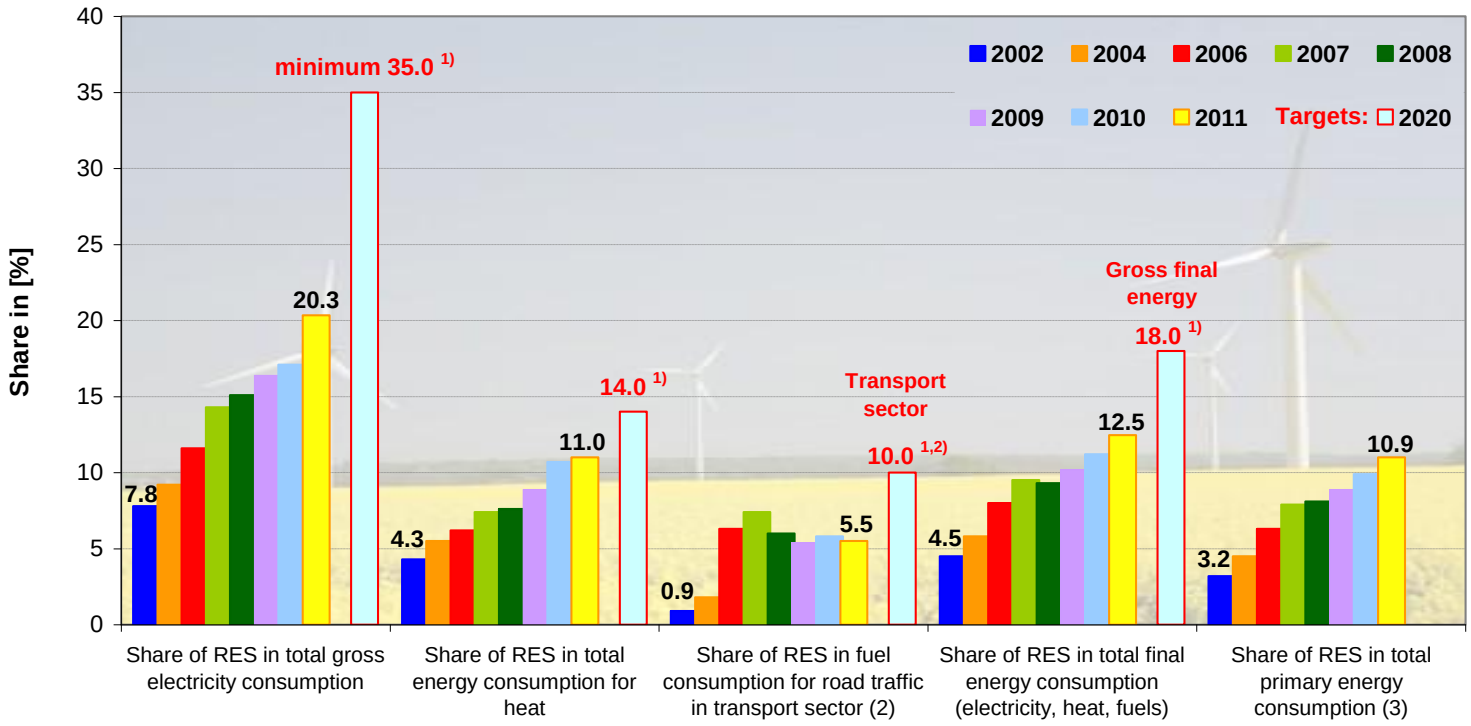
	Climate	Renewable energies		Efficiency		
	Greenhouse gases (vs. 1990)	Share of elec.	Overall share	Primary energy cons.	Energy produc-tivity	Building moderni-zation
2020	- 40%	35%	18%	- 20%	Increase to 2.1%/a	Double 1% → 2%
2030	- 55%	50%	30%			
2040	- 70%	65%	45%			
2050	- 80-95%	80%	60%	- 50%		

Share of Renewable Energy in Electricity Generation in Germany (2011)



RE current status – Targets and Deployment

Renewable energy sources and their share of the energy supply in Germany



1) Sources: Targets of the German Government, Renewable Energy Sources Act (EEG); Renewable Energy Sources Heat Act (EEWärmeG), EU-Directive 2009/28/EC;
2) Total consumption of engine fuels, excluding fuel in air traffic; 3) Calculated using efficiency method; source: Working Group on Energy Balances e.V. (AGEB); RES: Renewable Energy Sources;
Source: BMU-KI III 1 according to Working Group on Renewable Energy-Statistics (AGEE-Stat); image: BMU / Brigitte Hiss; as at: July 2012; all figures provisional

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German RE Policies - Electricity

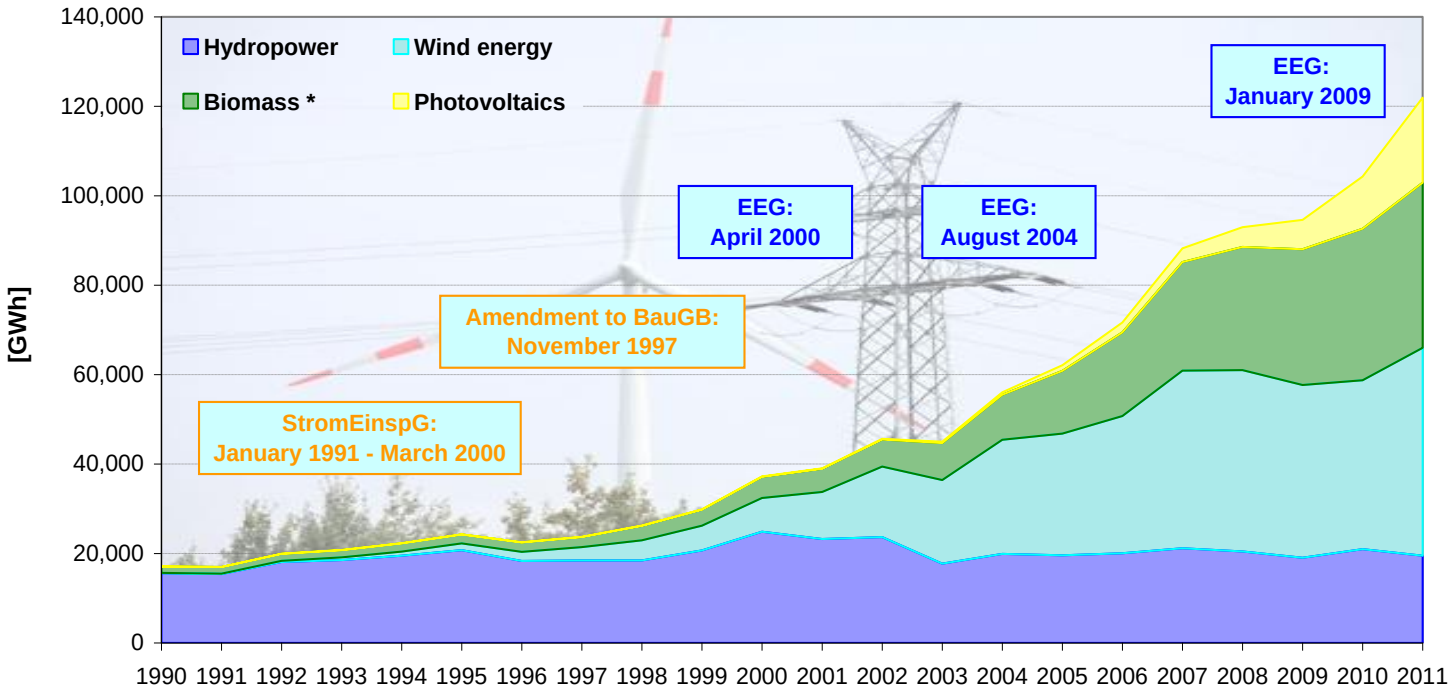
Cornerstones of the Renewable Energy Sources Act

- Guaranteed grid access for RE; priority transmission and distribution
- Fixed price ("tariff") for every kWh produced for 20 years.

  Tariffs are set technology-specific and specific with regard to further provisions (e.g. site, system services, ...)
- Annual degression of the tariffs
- Equalization of additional costs for electricity from RE between all grid operators and electricity suppliers (2011: ~ 3,5 ct/kWh); independence from public budget.
- Regular monitoring & evaluation; accompanying research.

German RE Policies - Electricity

Development of electricity generation from renewable energy sources in Germany since 1990



* Solid and liquid biomass, biogas, sewage and landfill gas, biogenic share of waste; electricity from geothermal energy not presented due to negligible quantities produced; 1 GWh = 1 Mill. kWh;
StromEinspG: Act on the Sale of Electricity to the Grid; BauGB: Construction Code; EEG: Renewable Energy Sources Act;
source: BMU-KI III 1 according to Working Group on Renewable Energy-Statistics (AGEE-Stat); image: BMU / Christoph Edelhoff; as at: March 2012; all figures provisional

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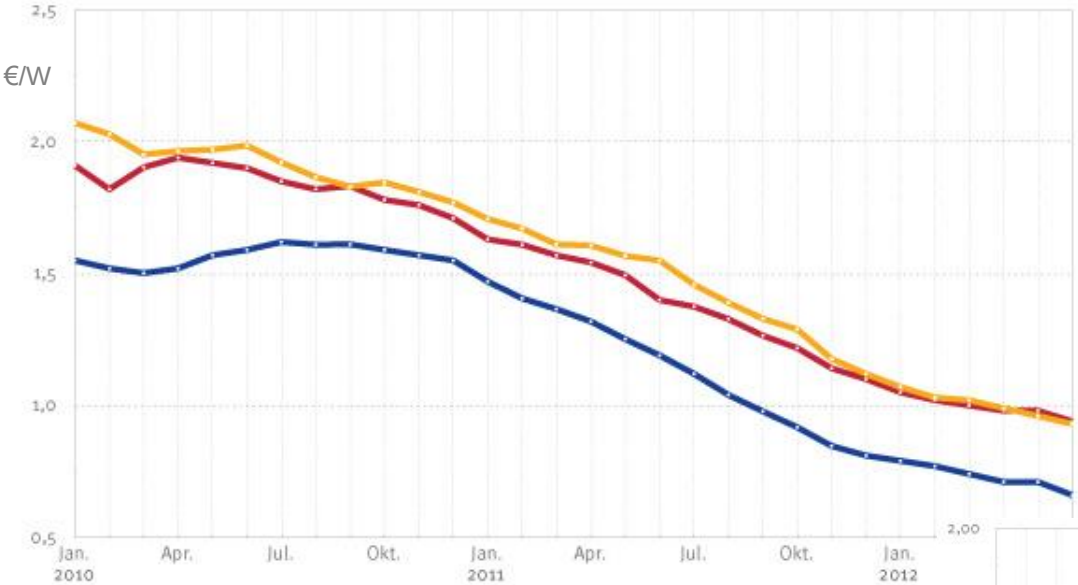
Price development of PV Modules

Kristallin

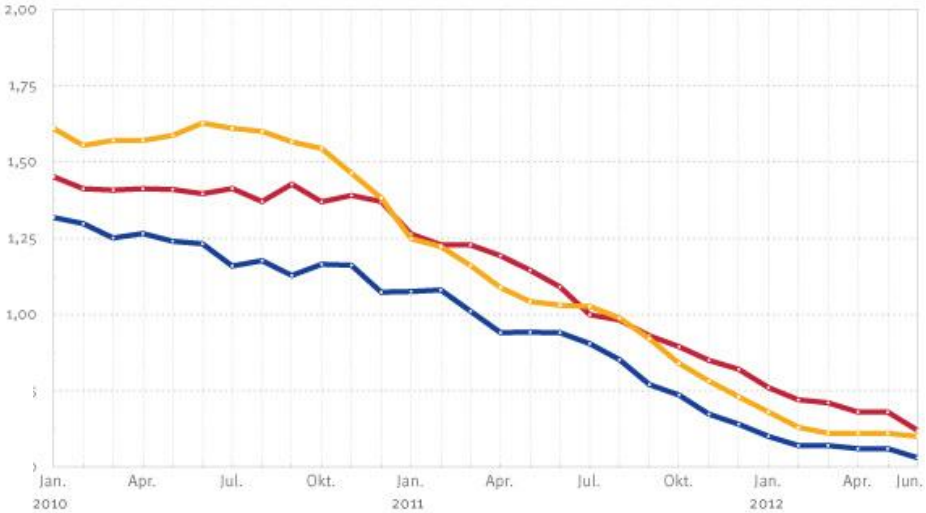


Legende

- Deutschland
- China
- Japan

Dünnschicht

Source PVexchange



- CdS/CdTe
- a-Si
- a-Si/μ-Si

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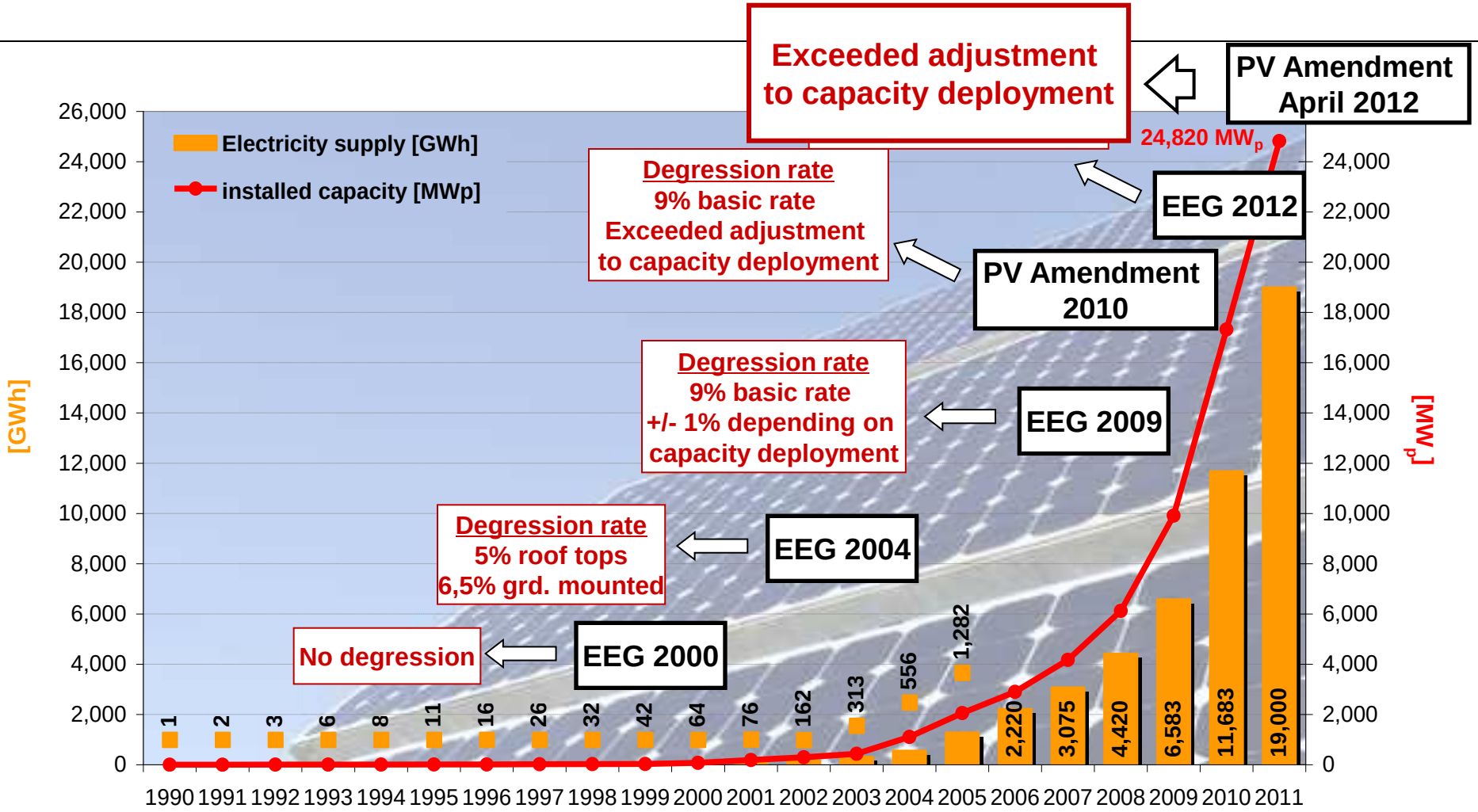
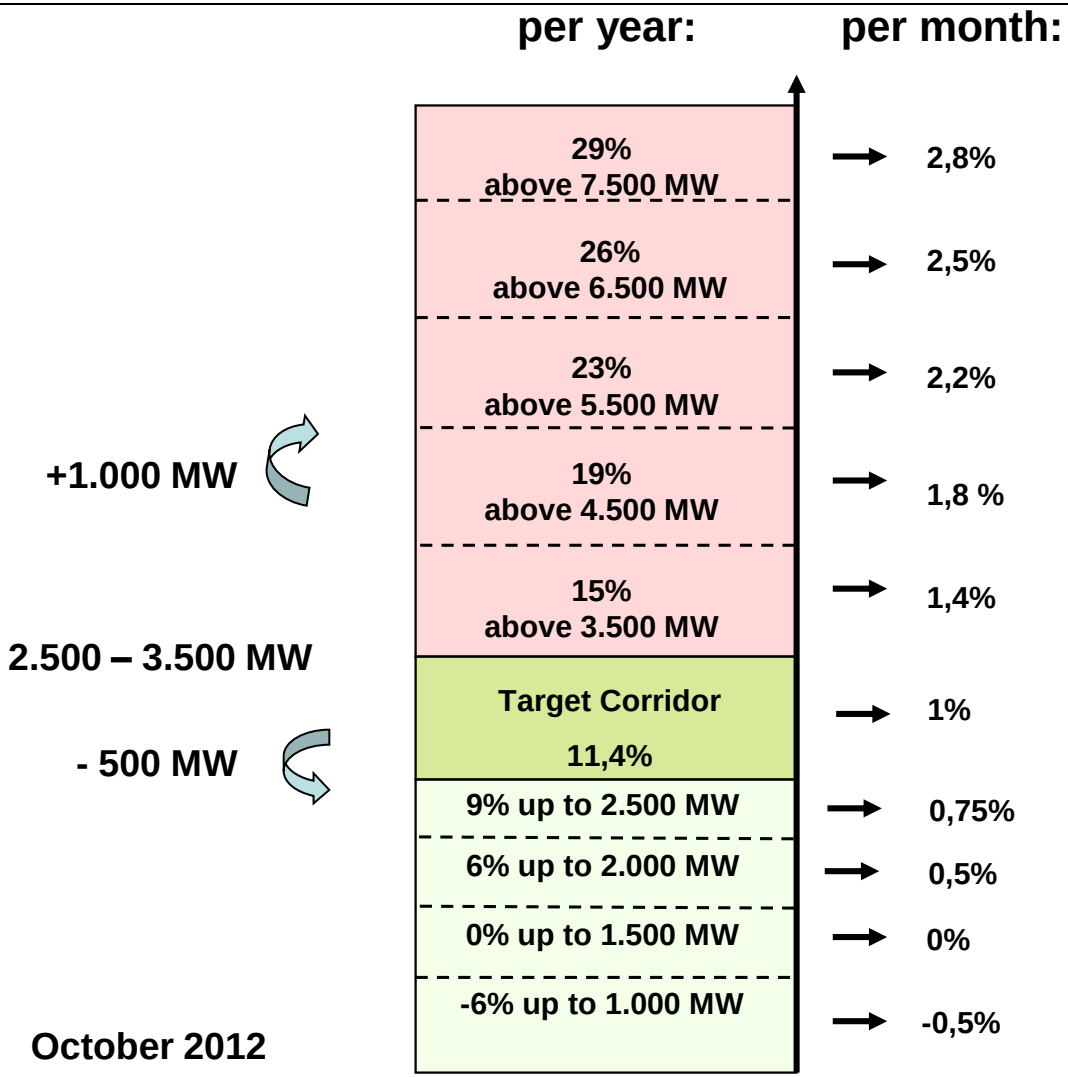
Photovoltaics in Germany - Development & EEG adjustments



EEG 2012 – new PV tariffs (€ct/kWh)

start of operation	Installed Capacity Roof-Top				Free-Field-Installations	
	up to 30 kW	up to 100 kW	up to 1.000 kW	above 1.000 kW	conversion areas	others
as of 1.1.2012	**24,43**	**23,23**	**21,98**	**18,33**	**18,76**	**17,94**
	up to 10 kW	**not applicable**	**up to 1.000 kW**	**above 1.000 kW, max 10 MW**	**all, max 10 MW**	
as of 1.4.2012	**19,50 (<10kW)**	**18,50 (< 40kW)**	**16,50**	**13,50 (up to 10MW)**	**13,50**	
New! Market integration model	tariffs paid for x% of annual production			not applicable	not applicable	
	100% (<10kW)	90% (>10kW)				

EEG 2012 – PV degression



- Overall cap of 52 GW Solar PV:
  Expiration of EEG PV support
- But: continuation of priority feed-in

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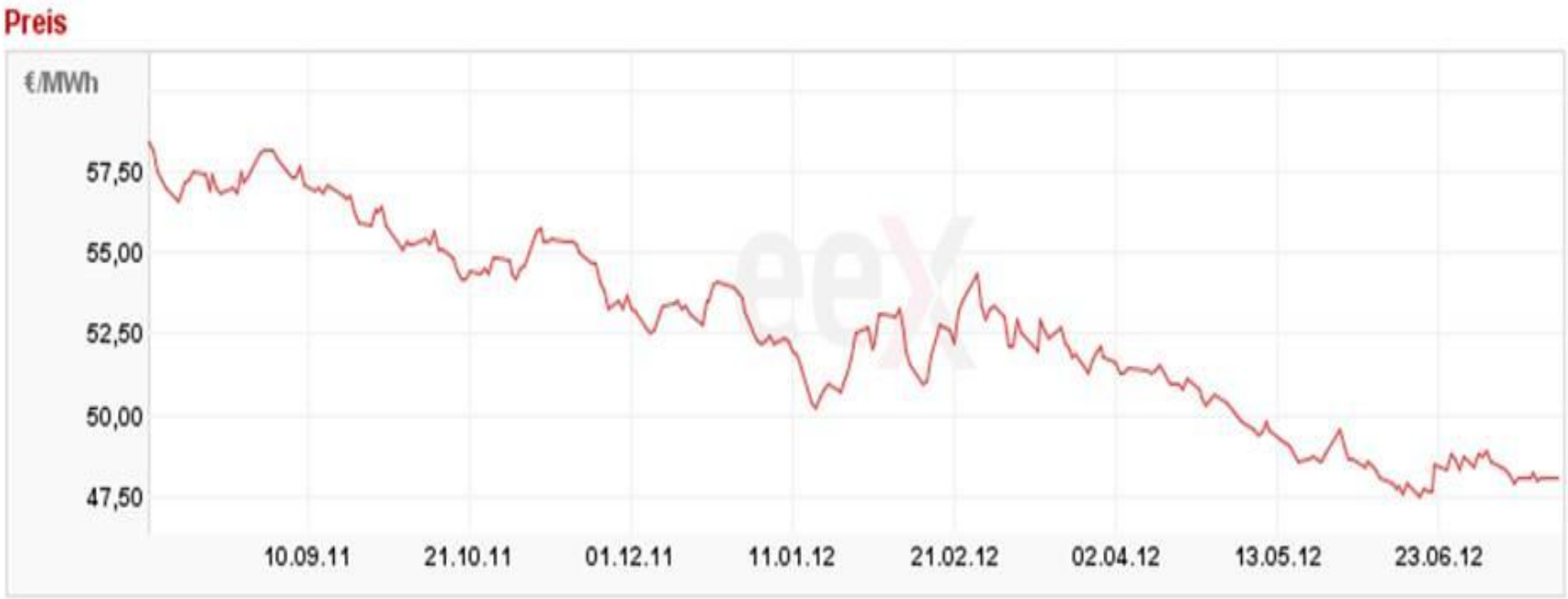
Electricity markets



Baseload futures market (delivery in 2013)

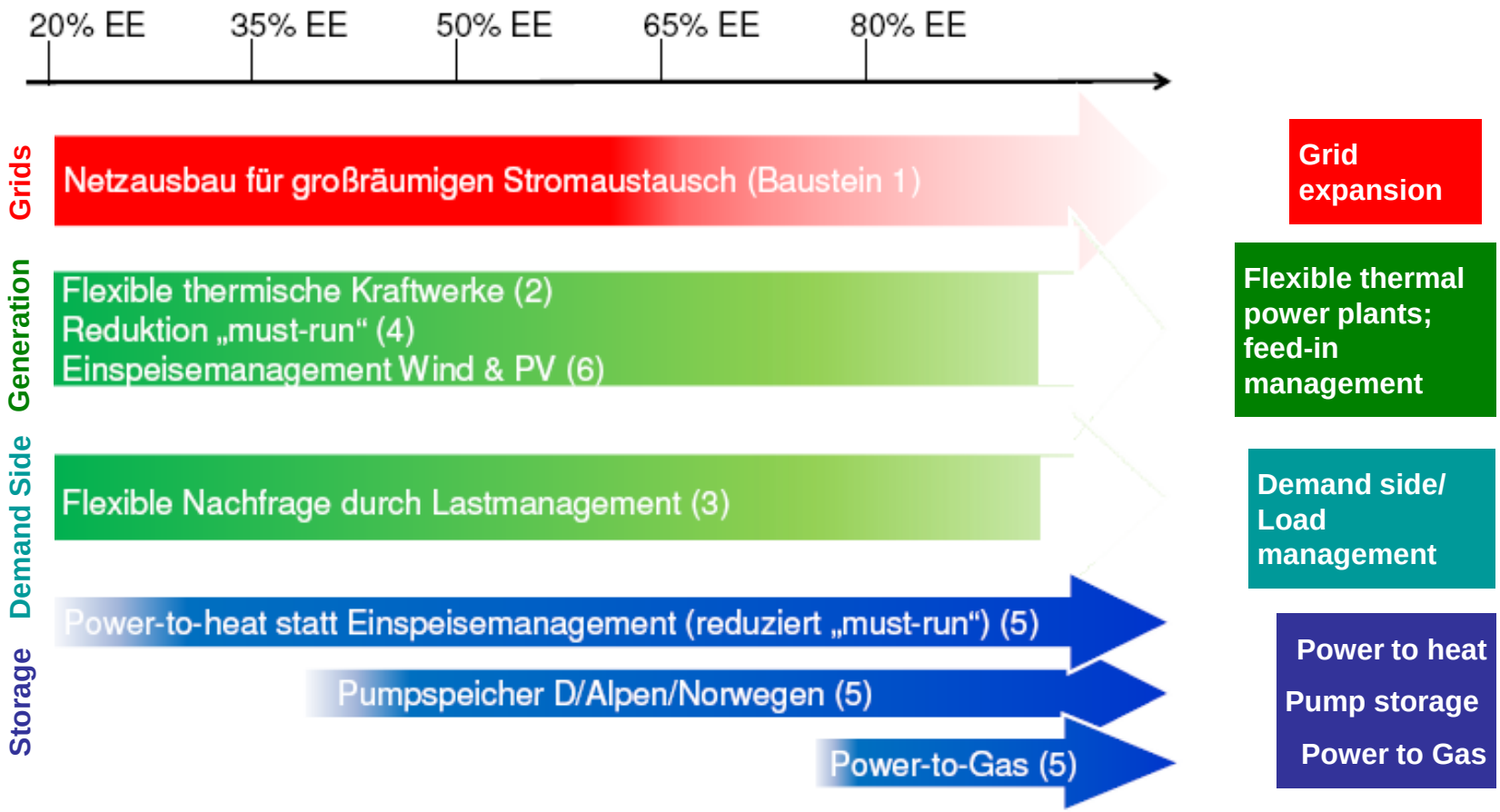
Grid expansion

Grid development plan 2012

NEP 2012, Stand:August 2012,
www.netzentwicklungsplan.de

Abb. 9/ Stromnetzübersicht Quelle: VDE Verband der Elektrotechnik Elektronik Informationstechnik e.V. | FNN/Übertragungsnetzbetreiber

Enhancing Flexibility



Challenges

To move the transition forward successfully, we…

- … enable the electricity system to cope with large amounts of intermittent supply
- … increase flexibility of supply and demand
- … ensure supply security during times of low RE through management measures
- … address the medium-term challenge of electricity market design (e.g. closer-to-real-time trading to reduce forecasting error)

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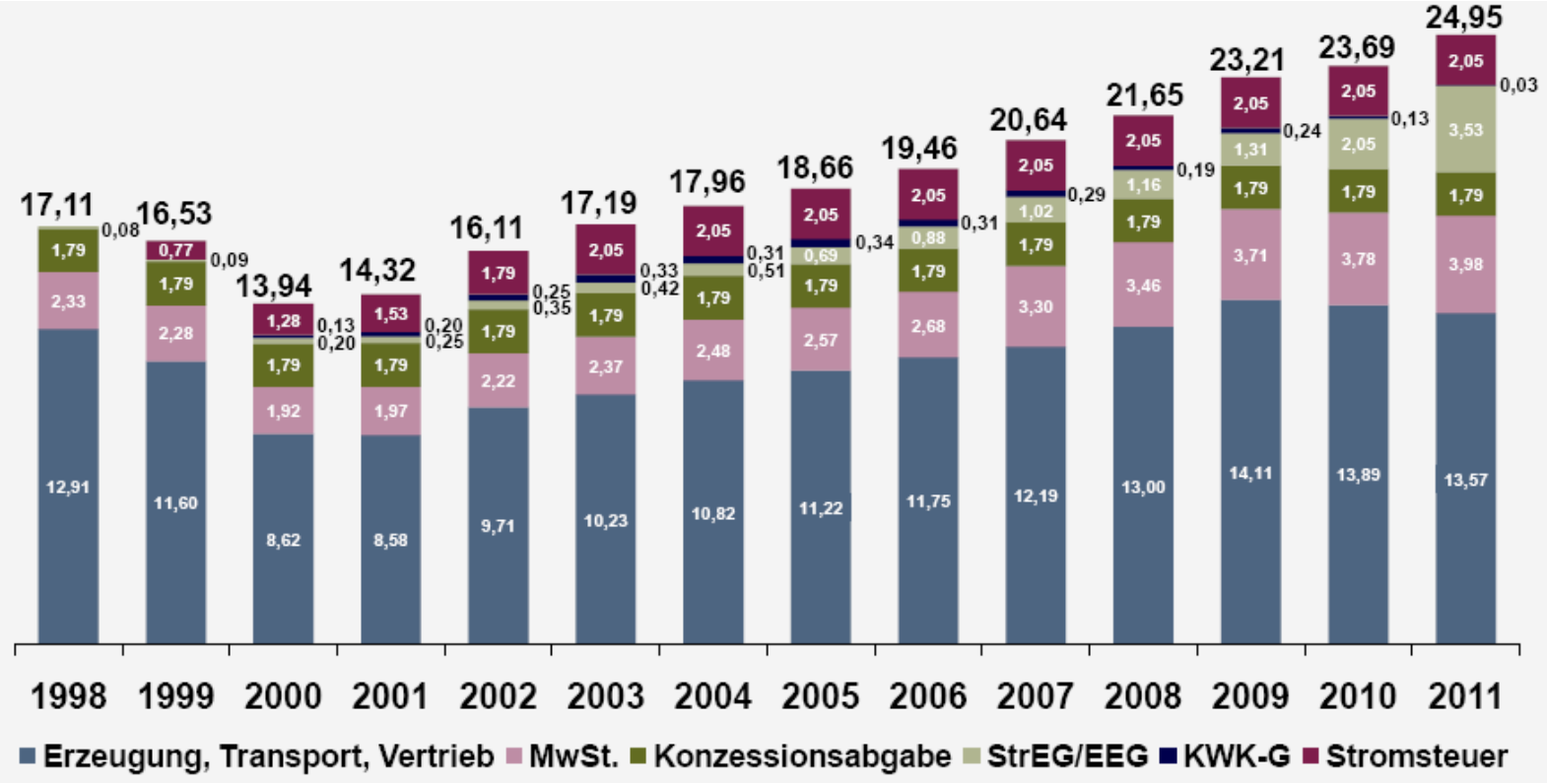
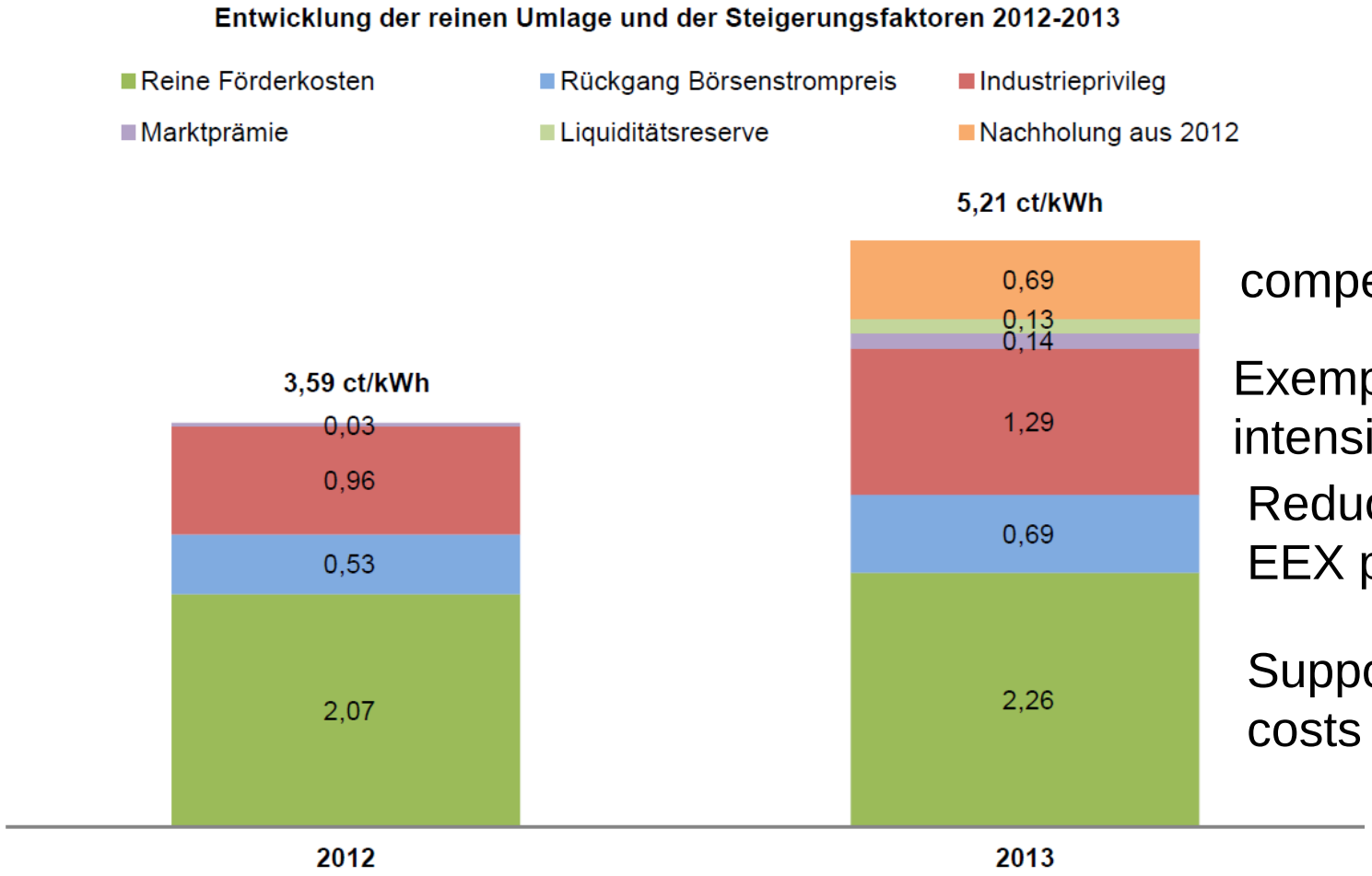
Electricity consumer price

EEG costs in 2011: 3,53 ct/kWh



Source: BDEW

Development of the EEG Surcharge 2012 and Expectation for 2013



compensation 2012

Exemption energy intensive industry

Reduction of EEX prices

Support costs

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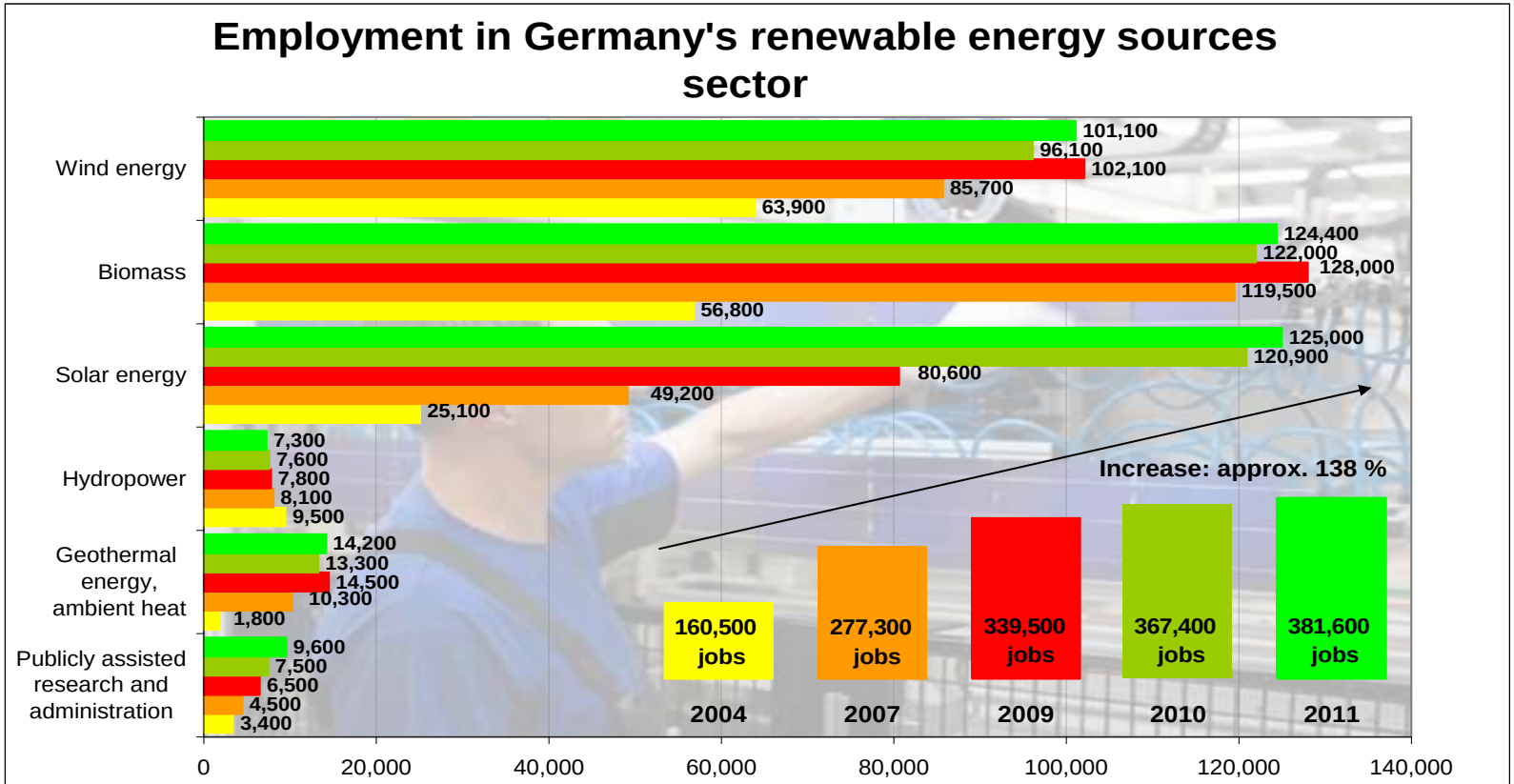
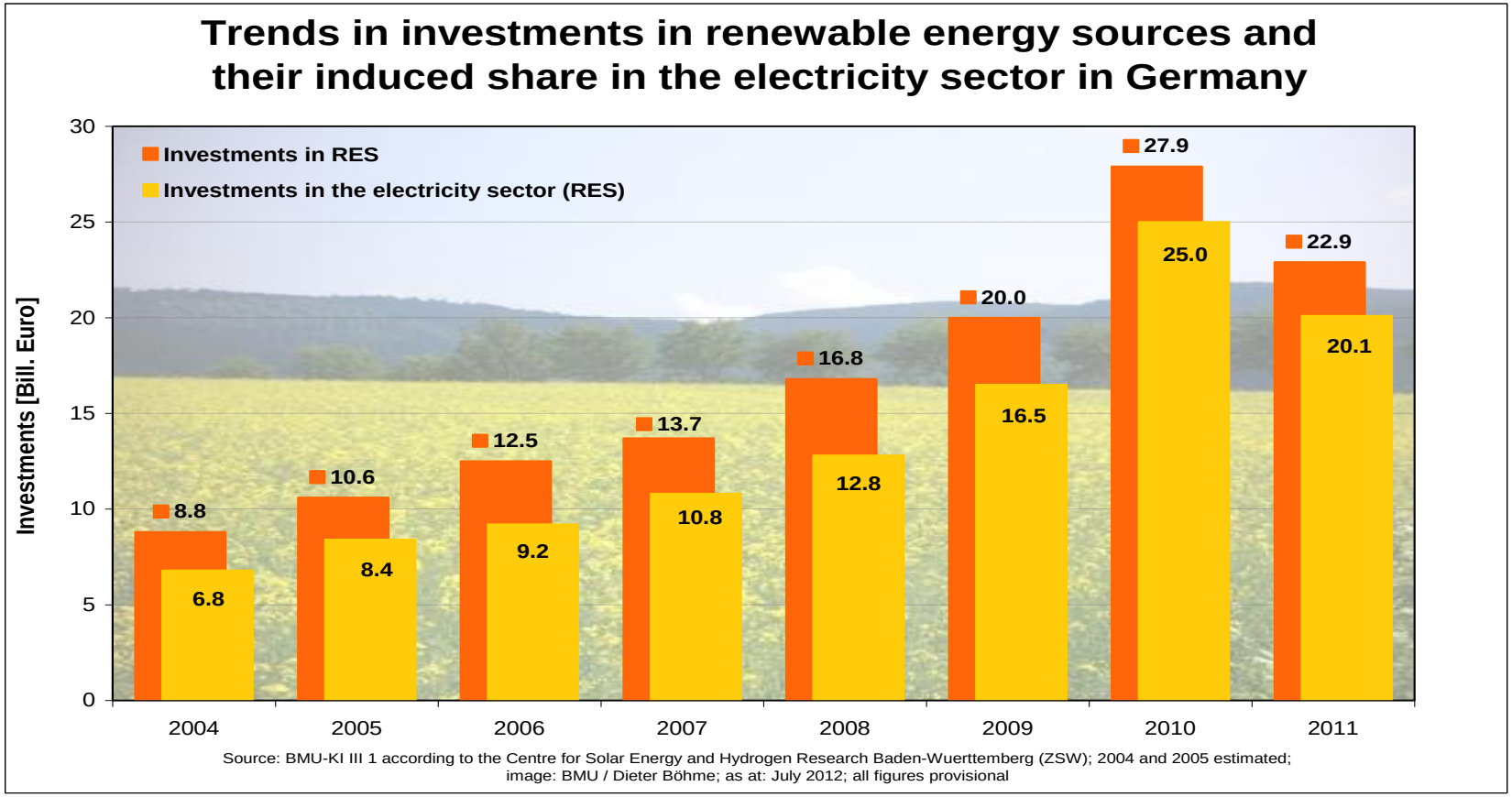
Benefits of RE Deployment



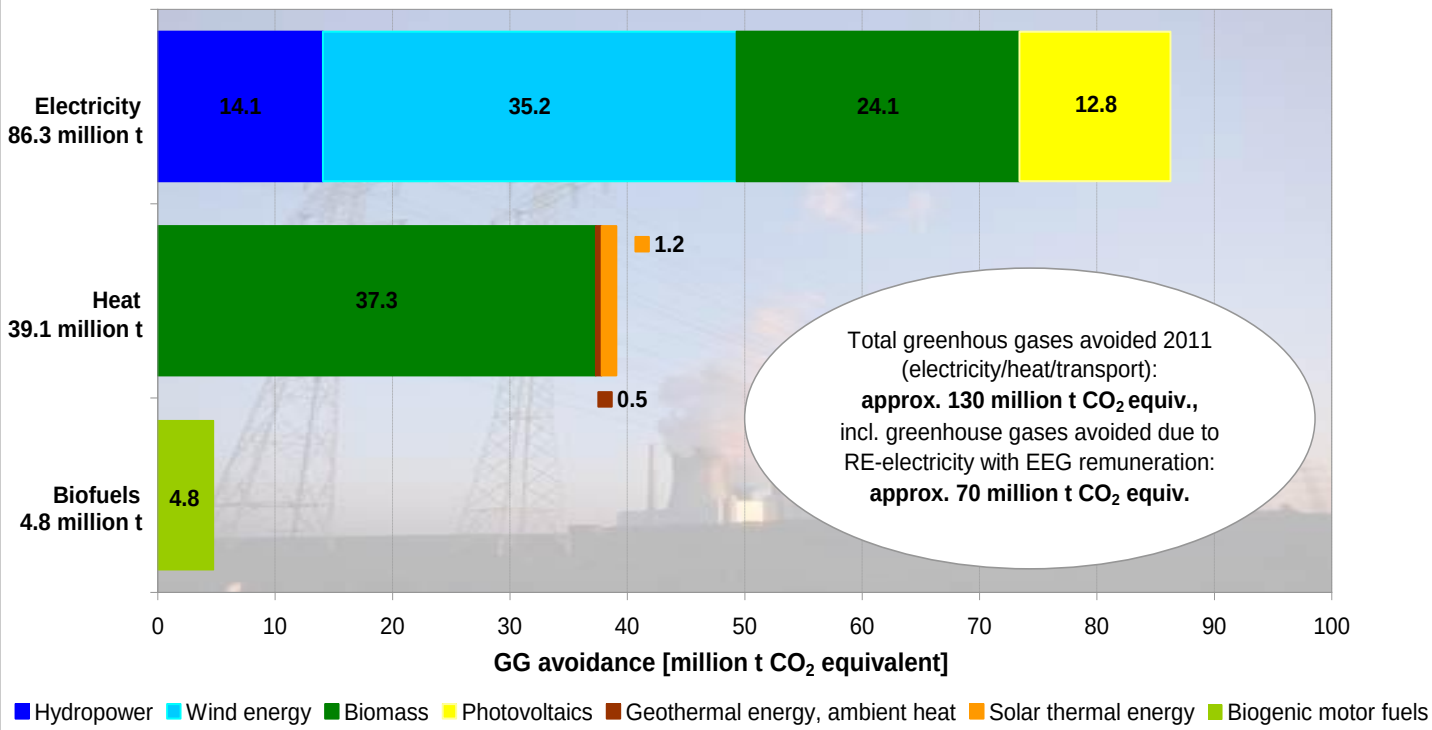
Figures for 2010 and 2011 are provisional estimate; deviations in totals are due to rounding;
Source: O'Sullivan (DLR), Edler (DIW), Nieder (ZSW), Rüther (ZSW), Lehr (GWS), Peter (Prognos): "Bruttobeschäftigung durch erneuerbare Energien im Jahr 2011 – eine erste Abschätzung", as at: March 2012; interim report of research project „Kurz- und langfristige Auswirkungen des Ausbaus erneuerbarer Energien auf den deutschen Arbeitsmarkt"; image: BMU / Christoph Busse / transit

Benefits of RE Deployment



Benefits of RE Deployment

Greenhouse gas emissions avoided via use of renewable energy sources in Germany 2011



GG: Greenhouse gas; RE: renewable energy; deviations in the totals are due to rounding; geothermal energy not presented due to negligible quantities of electricity produced;
Source: Federal Environment Agency (UBA) according to Working Group on Renewable Energy-Statistics (AGEE-Stat); image: H.G. Oed; as at: July 2012; all figures provisional

Conclusions

- Renewable energies have experienced a **strong growth**
- The reasons: **ambitious targets**, **efficient policies** and instruments, long-term planning security
- **Benefits** of renewable energies: **technological innovation,** climate protection, job creation, economic growth, avoided energy imports
- **Crucial next steps**:
  - cost efficiency, particularly regarding solar PV
  - market and grid integration of renewable energies
  - expand grid and storage capacities
  - sustainable and efficient use of bioenergy
  - cooperation among EU Member States and globally

Thank you for your attention!

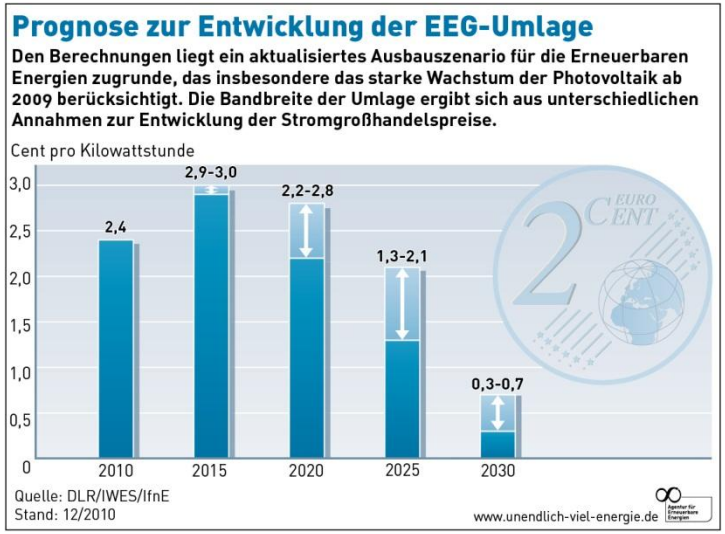
More Information:

www.bmu.de/english

www.erneuerbare-energien.de/english

RE cost estimations – A sensitive and open debate

- Prognosis of costs for RE expansion vary in a wide range (development curve, climax - height and year)

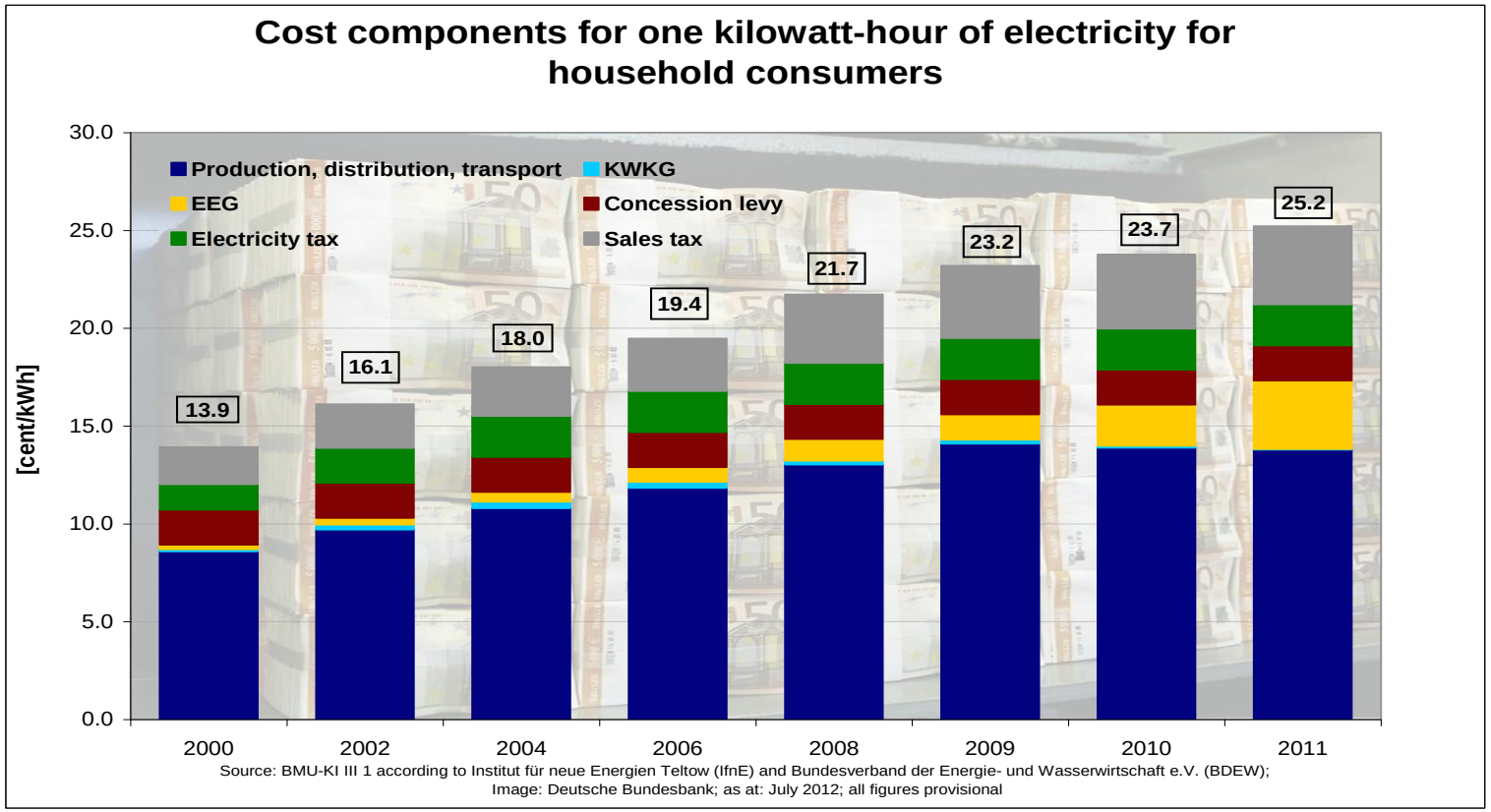


- Differences due to different assumptions: scenarios for RE expansion, development of spot market price for electricity, ..

- Additional influences on RE costs and electricity price: „compensation approach” for energy-intensive industries, future Feed-in-Tariffs and instruments, Merit-Order-Effect

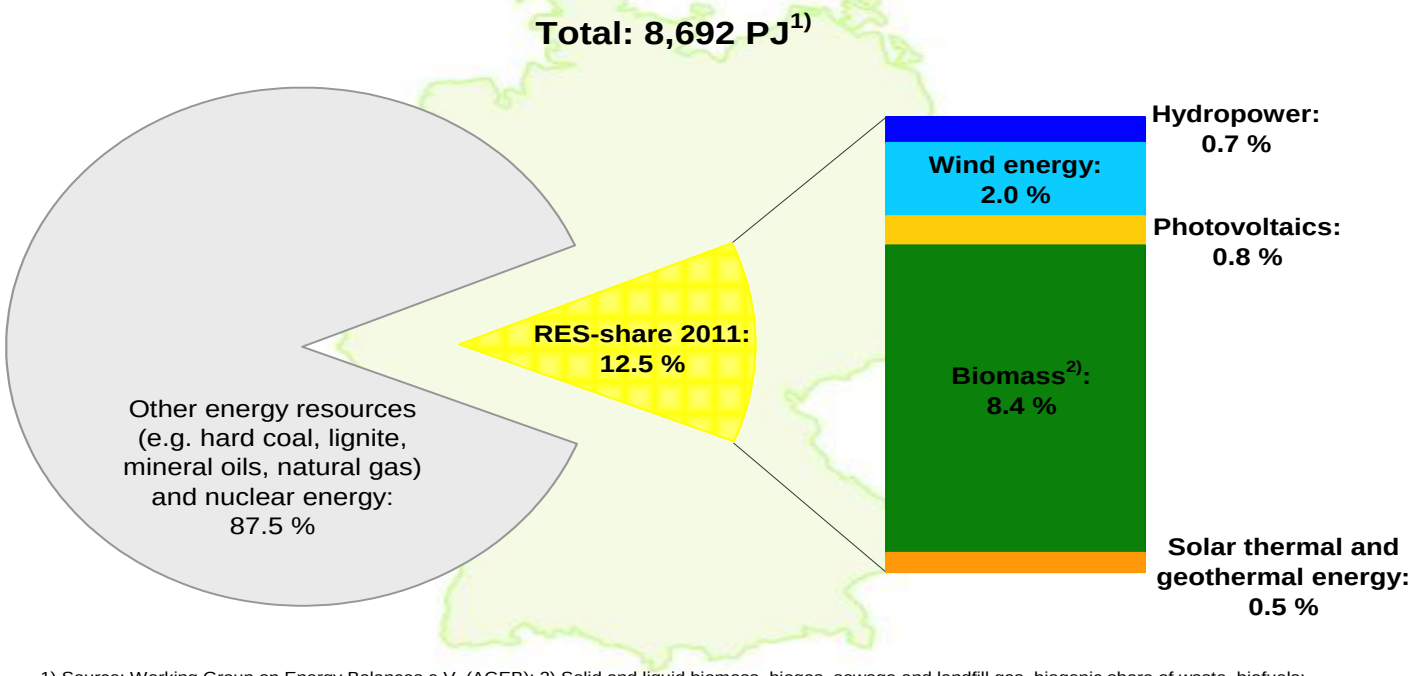
German RE Policies - Electricity

EEG costs in 2011: 3,53 ct/kWh



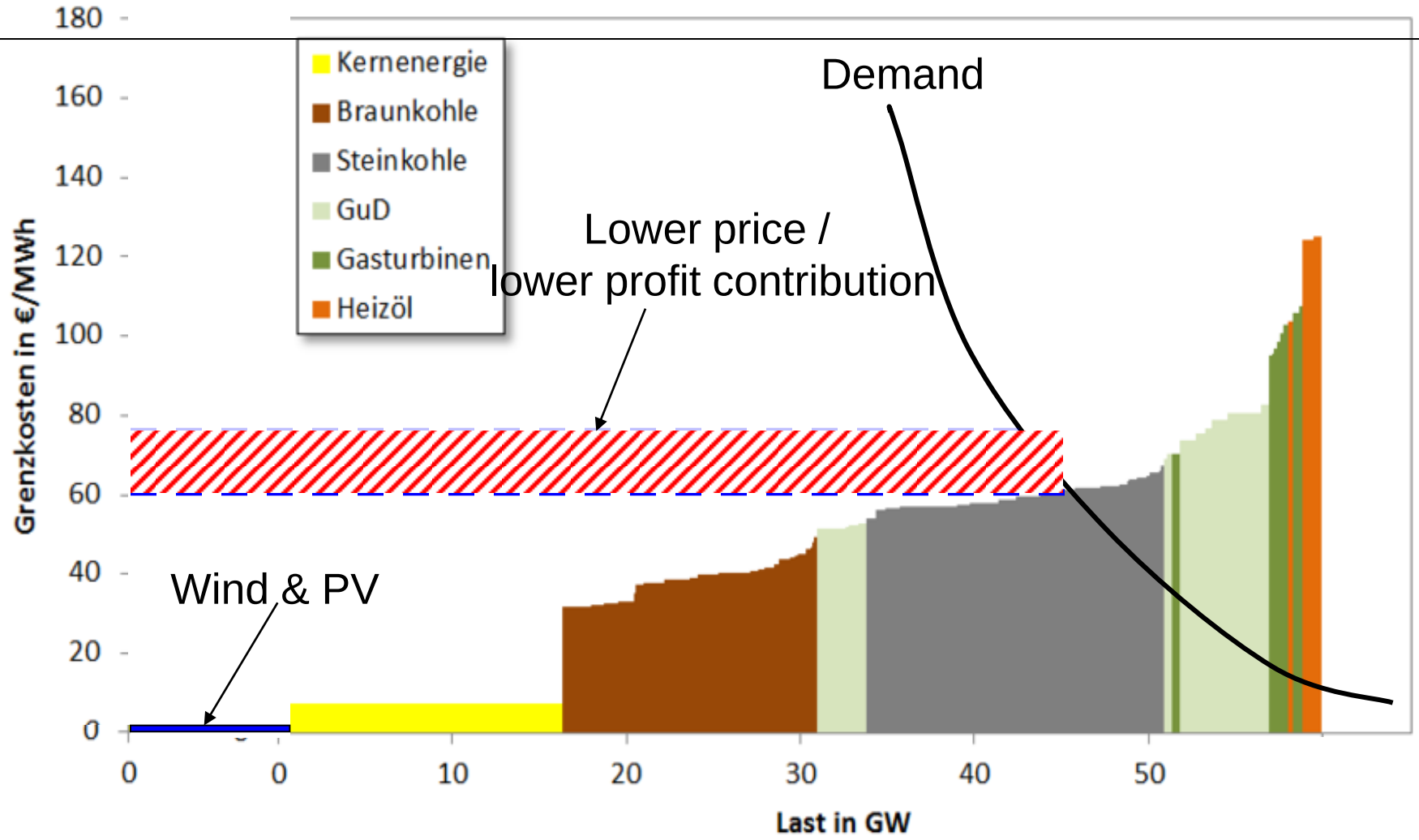
Current Status – RE Contribution to Energy Mix

Renewable energy shares of total final energy consumption in Germany 2011



1) Source: Working Group on Energy Balances e.V. (AGEB); 2) Solid and liquid biomass, biogas, sewage and landfill gas, biogenic share of waste, biofuels;
Source: BMU-KI III 1 based on Working Group on Renewable Energy-Statistics (AGEE-Stat) and Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW), according to AGEB;
RES: Renewable Energy Sources; deviations in the totals are due to rounding; 1 PJ = 10^{15} Joule; as at: July 2012; all figures provisional

Merit order curve (with wind & PV)



Merit order curve (conventional)