



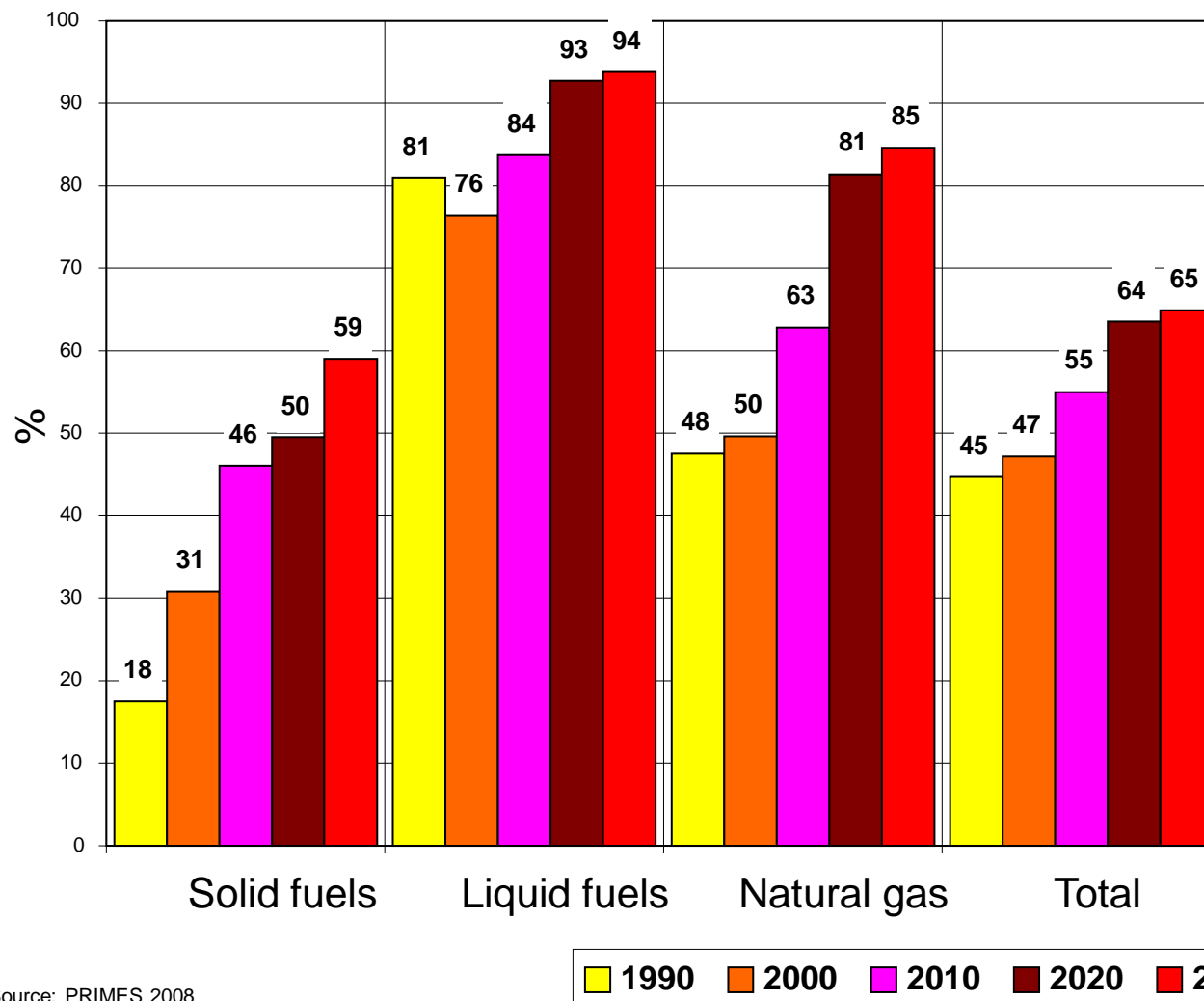
Renewable energy policy in Germany and the European Union

Dr. Martin Schöpe
German Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety

JREF Conference,
Tokyo, 9th March 2012



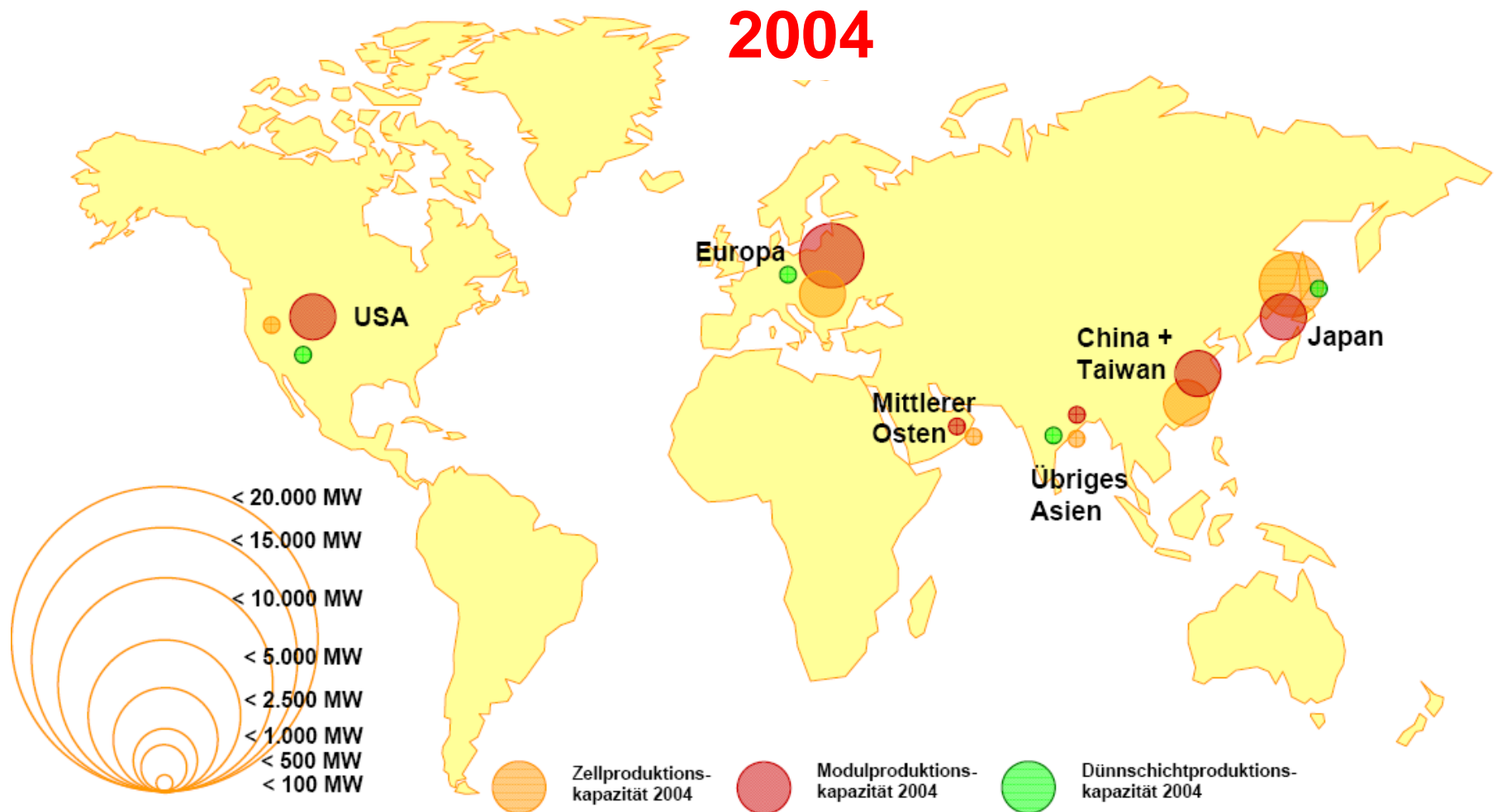
EU Energy Import Dependency



PV production capacity



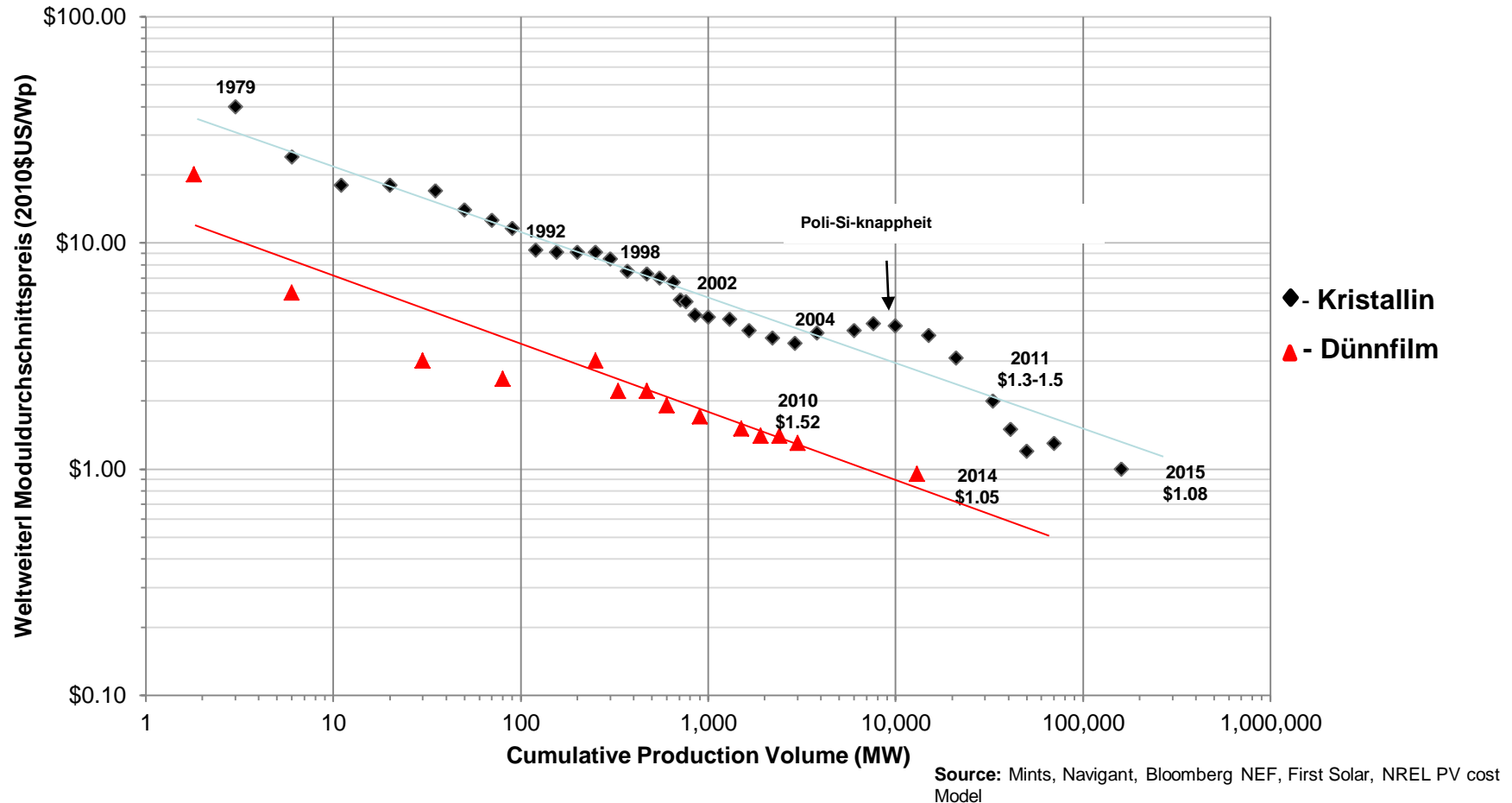
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22% cost reduction with every doubling of capacity

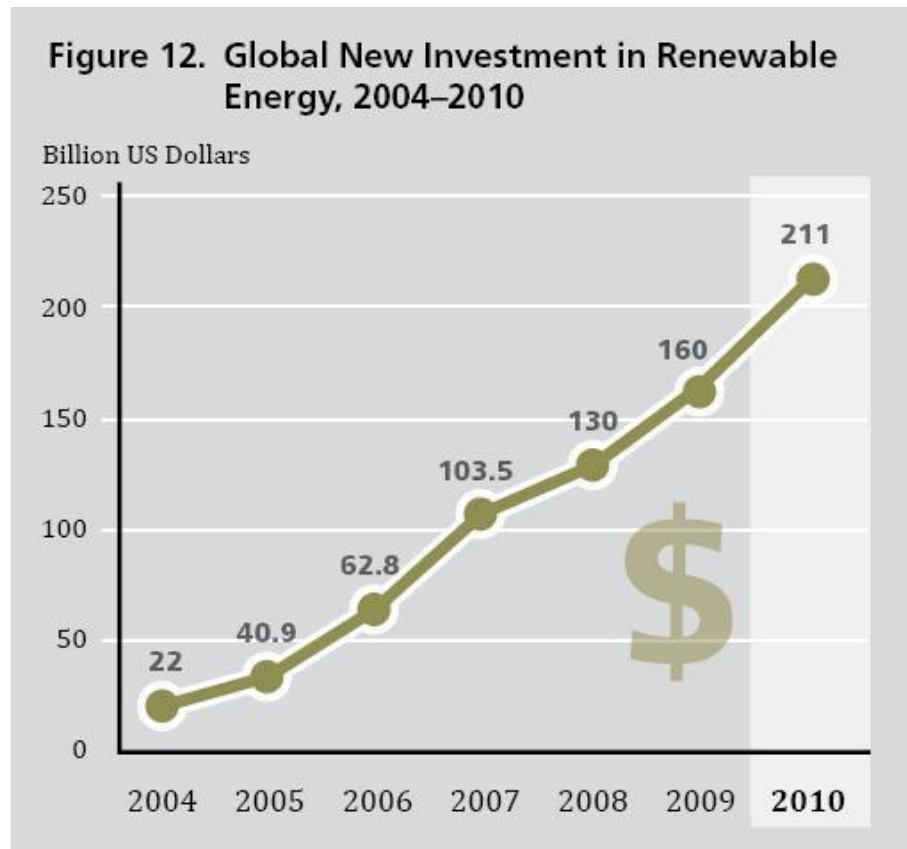


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Top 5 Countries for Renewable Energy Investment (2010)

1. China (\$50 billion)
2. Germany (\$41 billion)
3. USA (\$30 billion)
4. Italy (\$14 billion)
5. Brazil (\$7 billion)



Source: REN21 (2011)

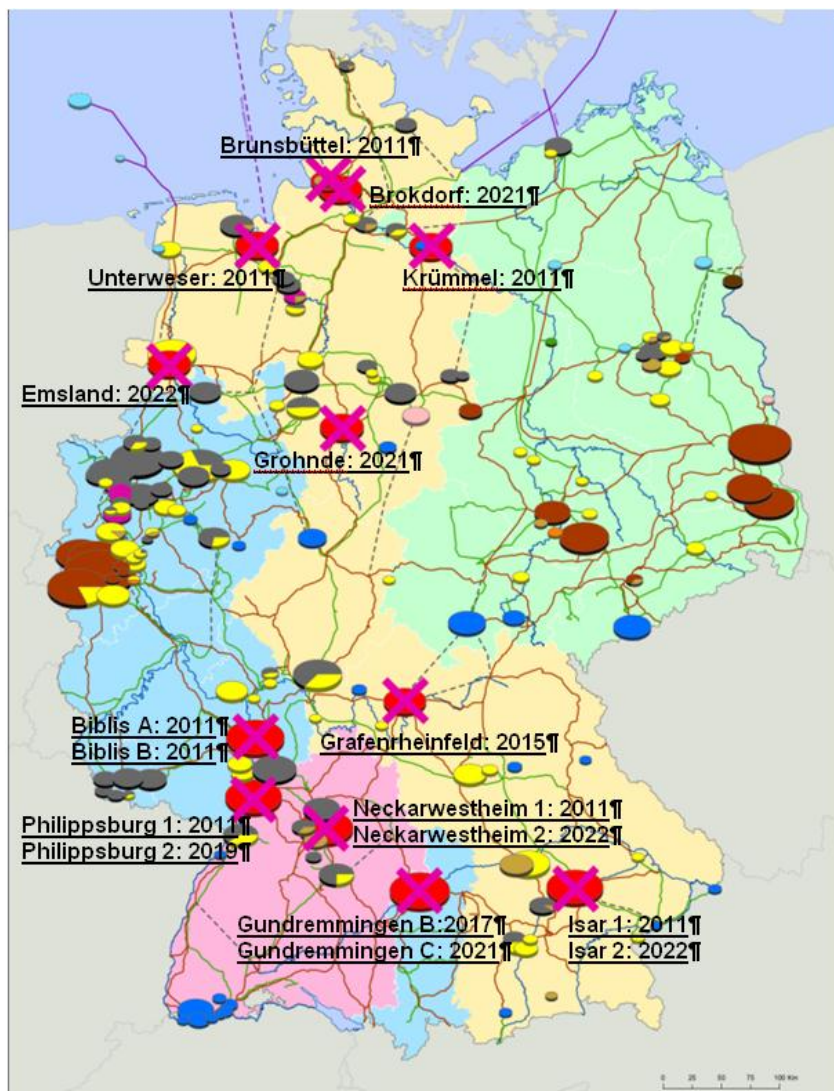
German Climate and Energy Goals



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	Climate	Renewable energies		Efficiency		
	Greenhouse gases (vs. 1990)	Share of elec.	Overall share (Gross final energy cons.)	Primary energy cons.	Energy productivity	Building modernisation
2020	- 40%	35%	18%	- 20%	Increase to 2.1%/a	Double the rate 1% -> 2%
2030	- 55%	50%	30%	...		
2040	- 70%	65%	45%	▼		
2050	- 80-95%	80%	60%	- 50%		

Phase out of Nuclear Energy



Source: UBA

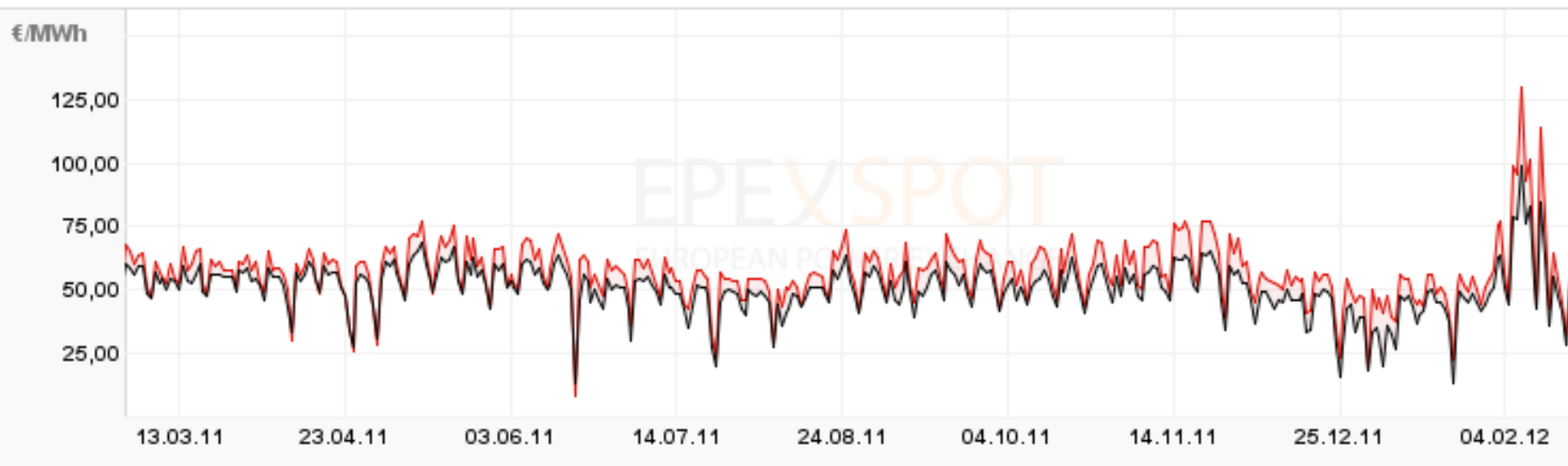
- 7 oldest plants + Krümmel:
Immediate decommissioning
- Gradual phasing out of
nuclear power by 2022
- Shutdown years:
2015, 2017, 2019, 2021, 2022

Source: EEX (phelix)



Price for whole sale electricity at the Energy Exchange

Preis

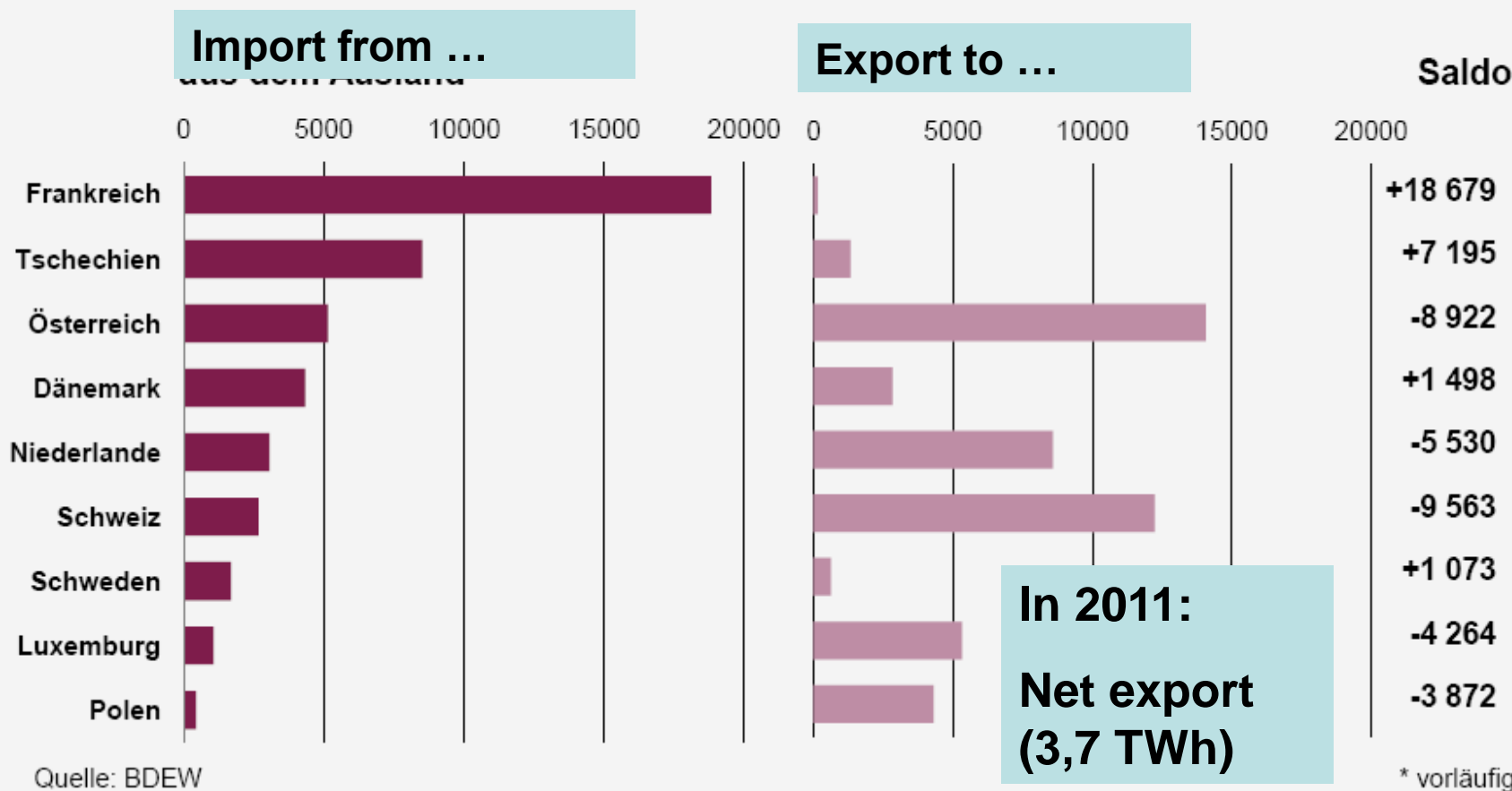


Source: EEX



Electricity imports/exports of Germany

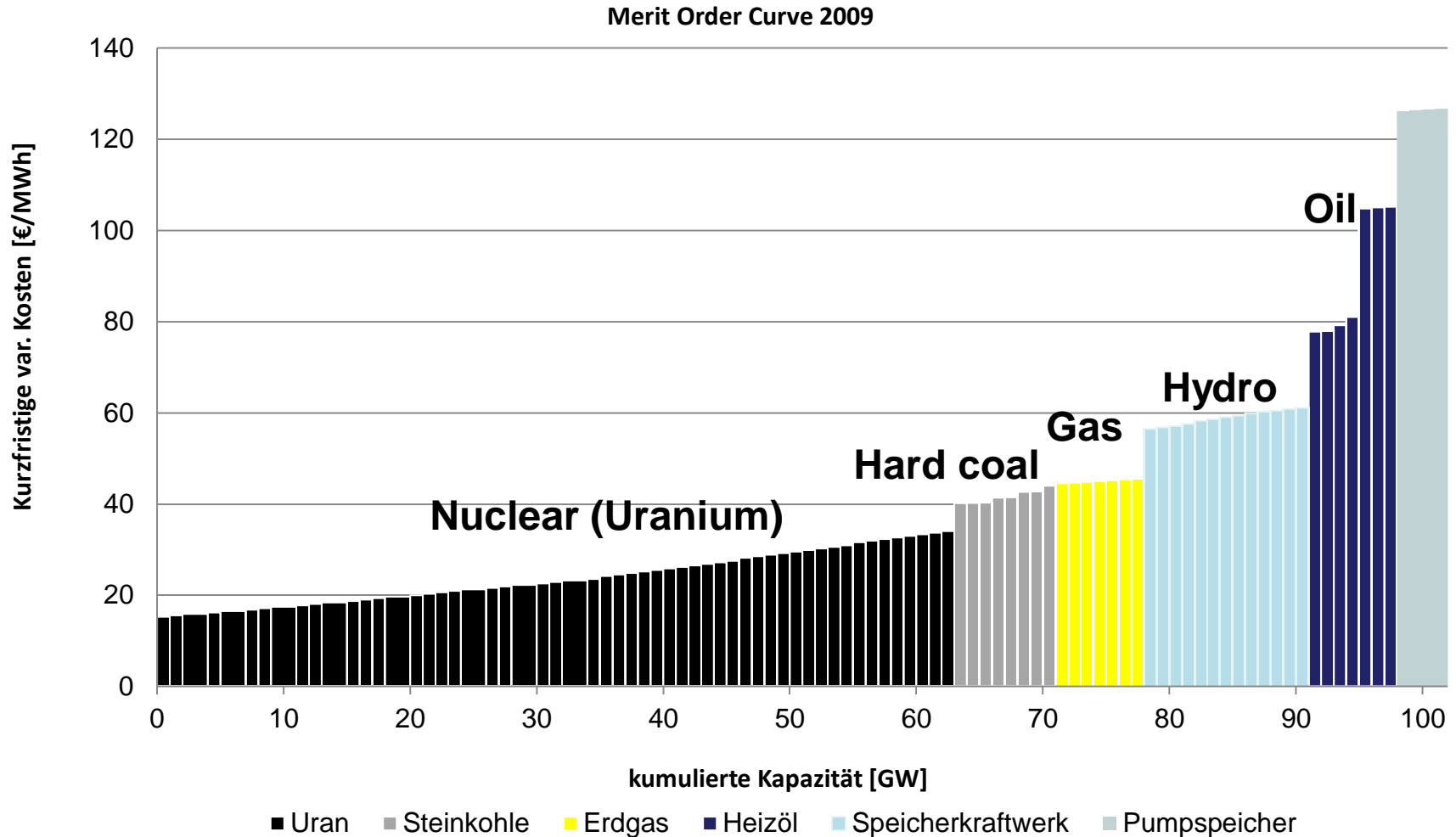
Januar bis November 2011* (Strommengen in Mio. Kilowattstunden)



Merit Order Curve in France

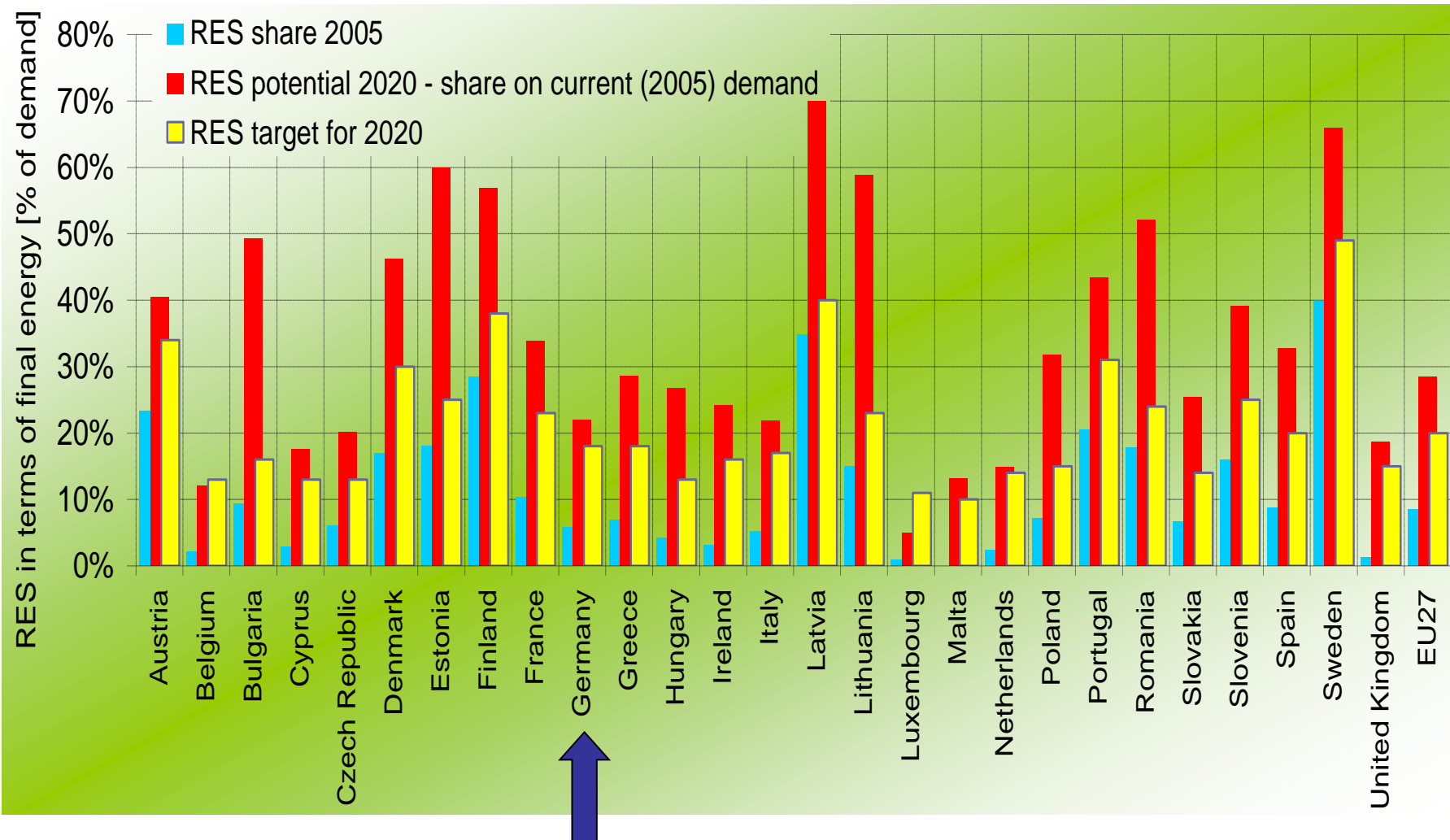


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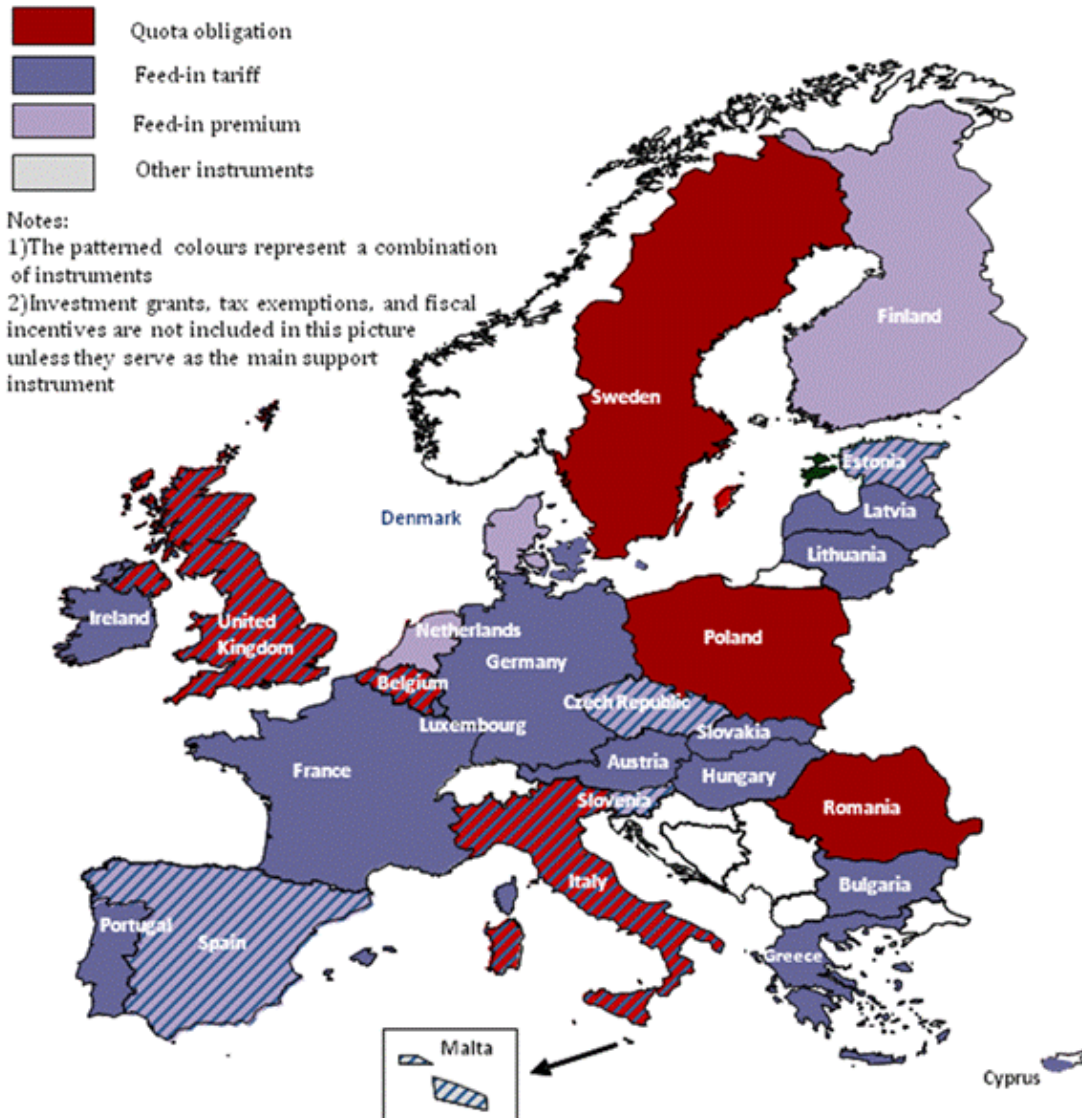
EU-wide RE targets for 2020 ...



EU RE policies



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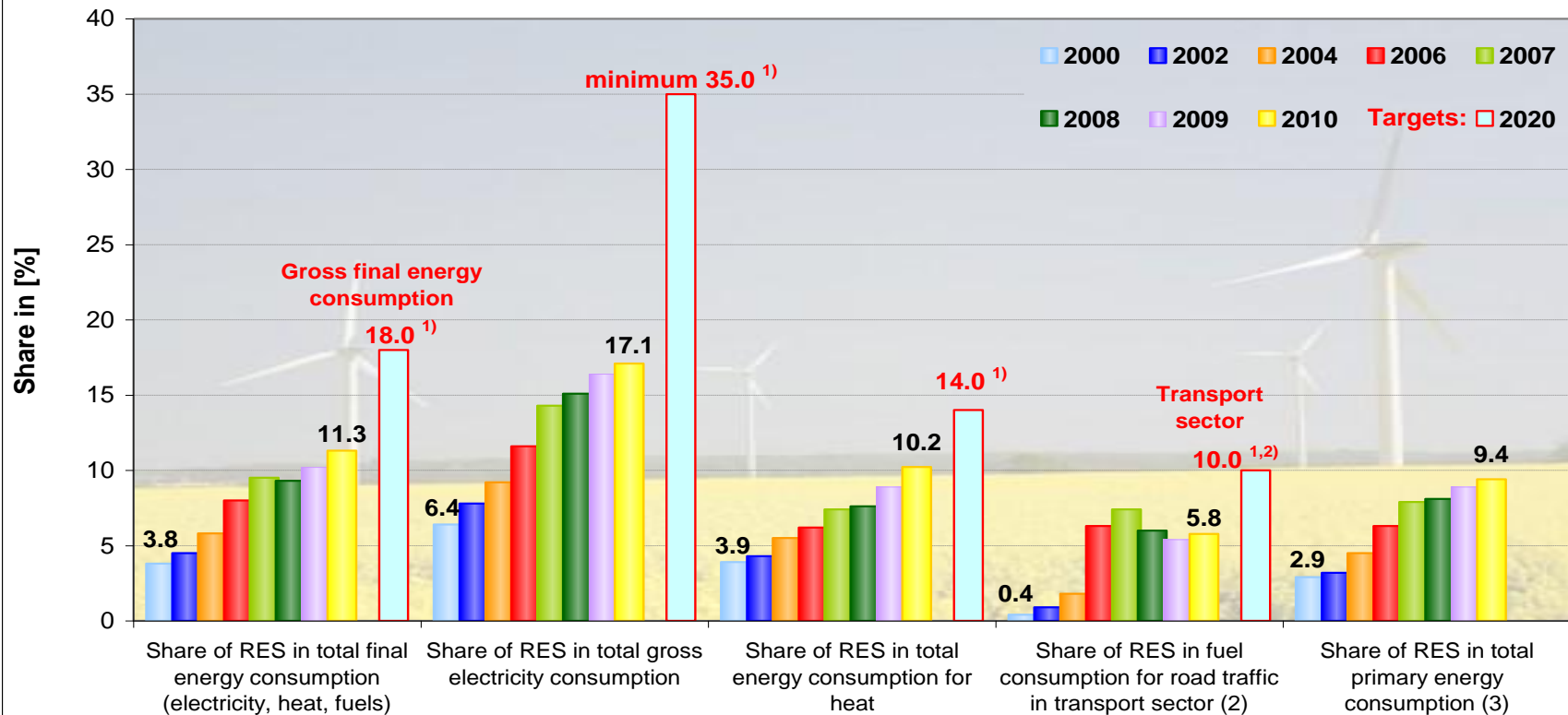


Current status of renewables in Germany



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Renewable energy sources as a share of energy consumption 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: December 2011; all figures provisional

Cornerstones of the EEG („FIT“)

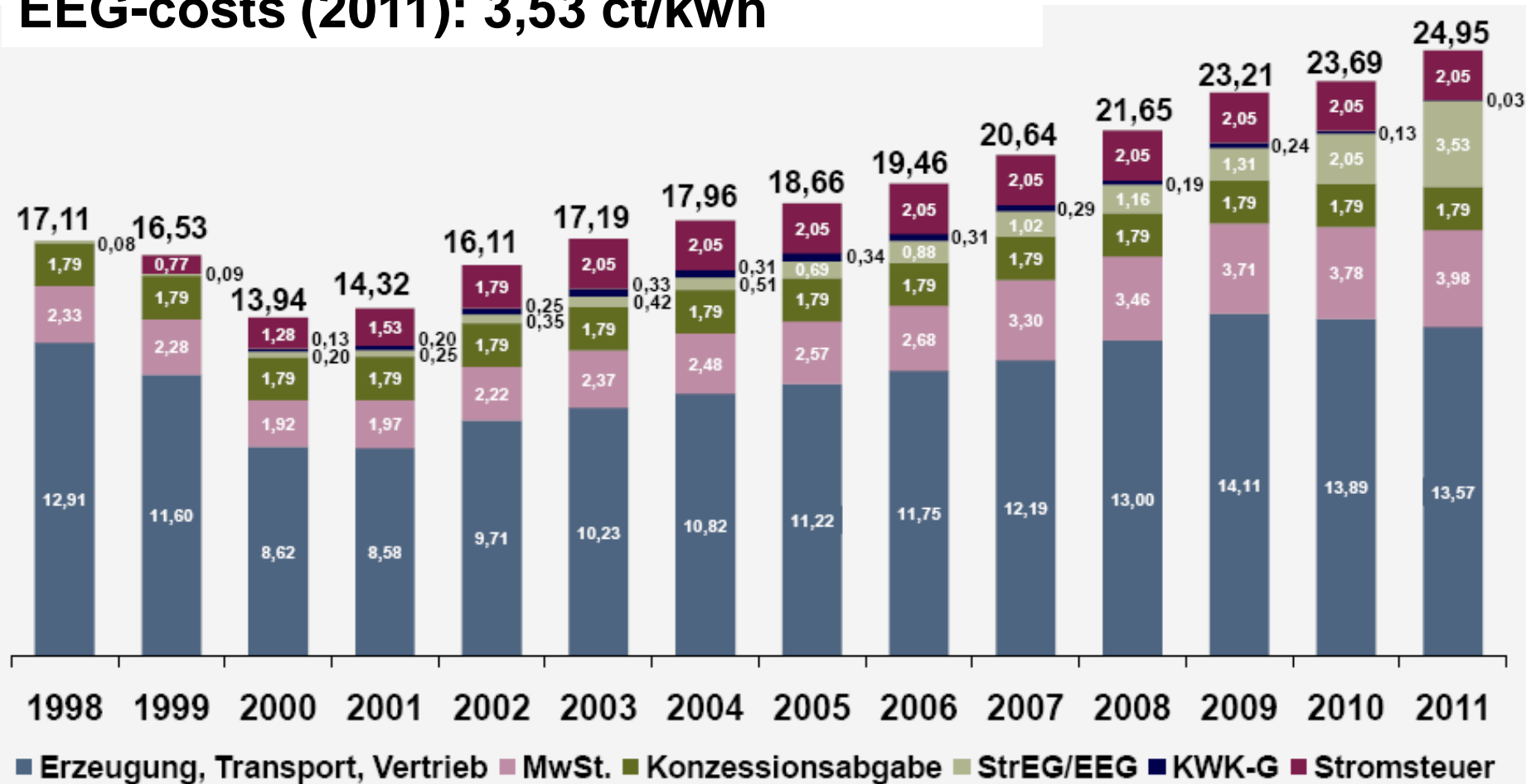
- **Guaranteed access** for RE to the power grid
- **Priority transmission** and distribution
- **Fixed price** („tariff“) for every kWh produced for 20 years.
- Tariffs are set **technology-specific** and specific with regard to further provisions (e.g. site, system services, ...)
- **Annual degression** of the tariffs due to technical development
- **Equalisation of additional costs** for electricity from RE between all grid operators and electricity suppliers (2011: about 3,5 ct/kWh); independence from public budget.
- Regular **monitoring and evaluation process**, comprehensive accompanying research and analysis.

Electricity Prices for Households



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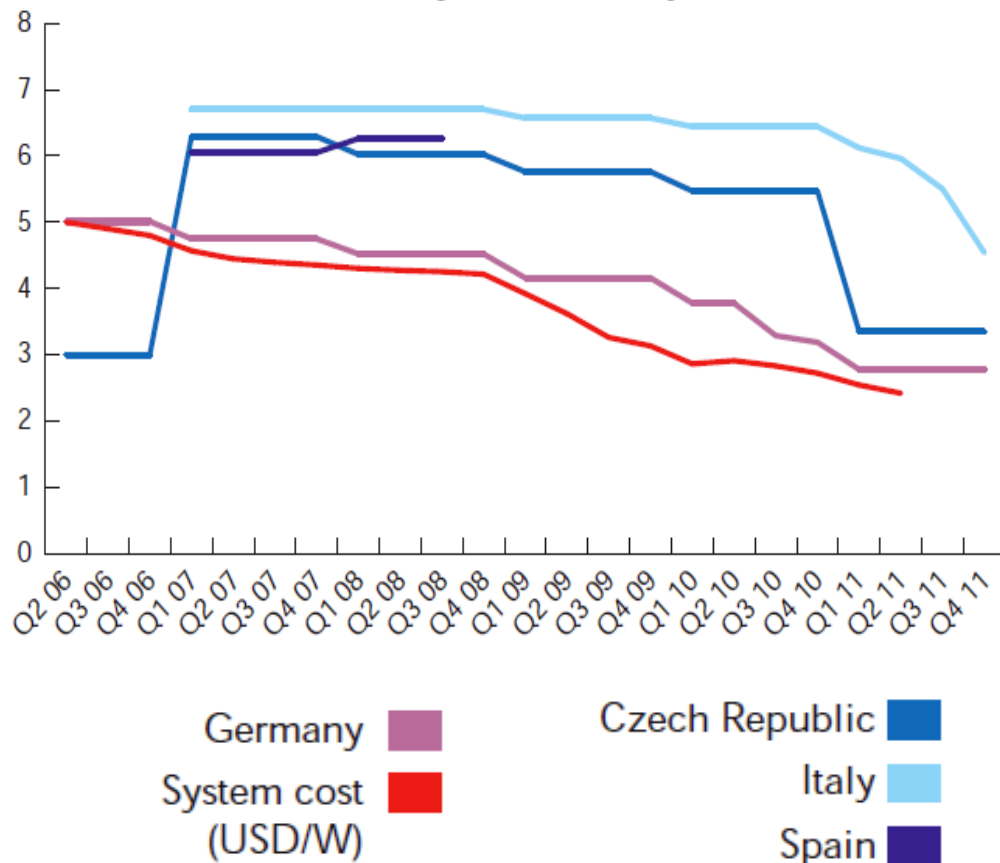
EEG-costs (2011): 3,53 ct/kwh





PV support and system costs

NPV of European feed-in tariffs for small PV systems
and average German small system cost



- The need for flexible policy reaction while keeping a transparent framework
- Keeping investors' confidence while adapting to market development
- Managing support costs while keeping economic momentum

PV tariffs (as of 1st January 2012, ct/kwh)

Newly added capacity in 2011	Degression for the year 2012	< 30 kW	> 30 kW	> 100 kW	> 1 MW
2.500- 3.500 MW	9 % (<i>basic degression</i>)	26,15	24,87	23,53	19,62
3.501-4.500 MW	12 % (9+3)	25,29	24,05	22,76	18,97
4.501- 5.500 MW	15 % (9+6)	24,43	23,23	21,98	18,33
5.501-6.500 MW	18 % (9+9)	23,57	22,41	21,21	17,68
6.501- 7.500 MW	21 % (9+12)	22,70	21,59	20,43	17,03
> 7.500 MW	24 % (9+15)	21,84	20,77	19,65	16,39



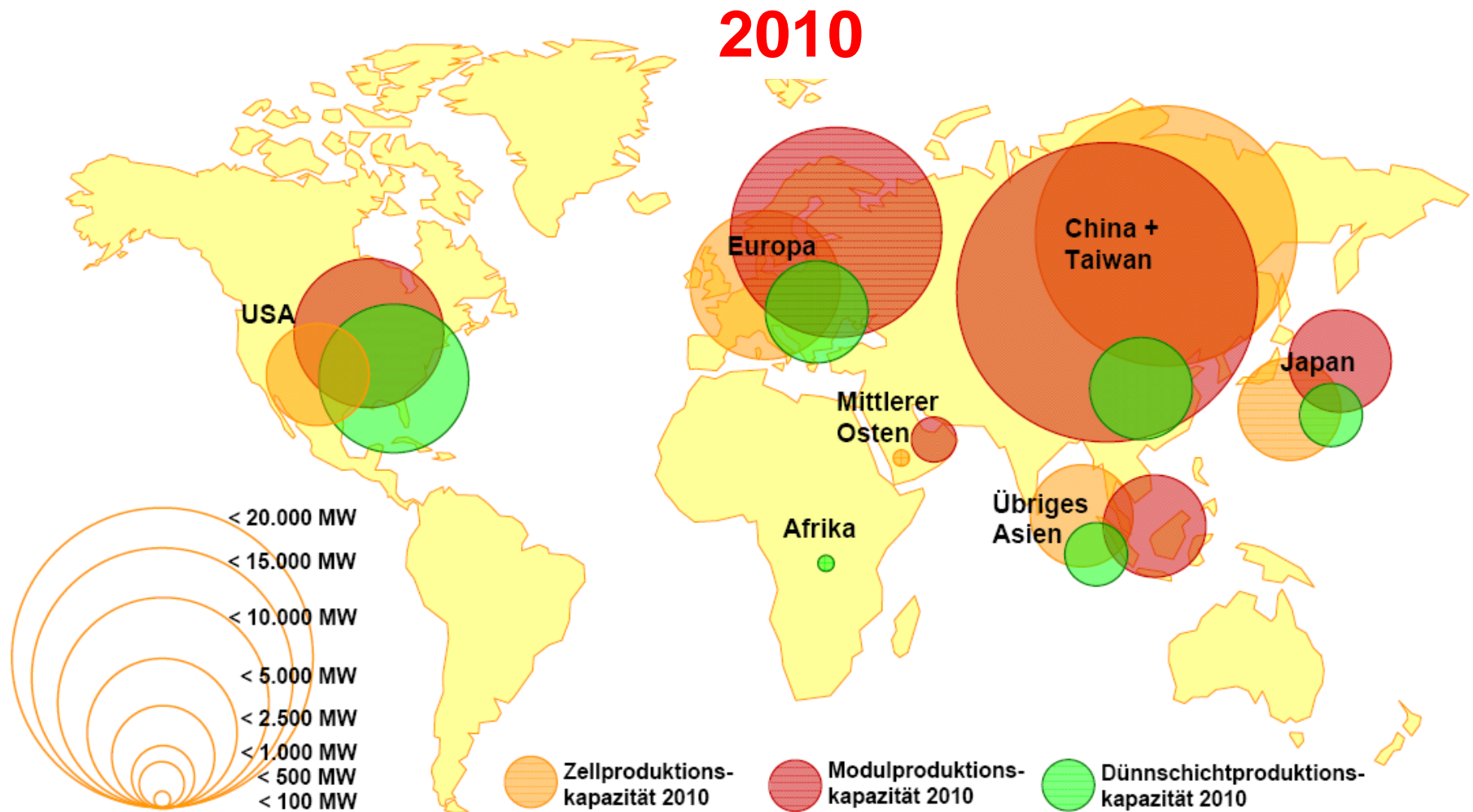
EEG 2012 – new proposal currently under discussion

Inbetriebnahme	Installierte Anlagenleistung Dachanlagen				Freifläche bis 10 MW
	NEU: bis 10 kW	bis 100 kW (entfällt)	bis 1.000 kW	über 1.000 kW bis 10 MW	
ab 01.01.2012	24,43	23,23	21,98	18,33	17,94
ab 09.03.2012	19,50	16,50	13,50	13,50	13,50
bedeutet Kürzung um	20,2%	29,0%	24,9%	26,4%	24,7%
Monatl. Degression in Cent	0,15				
ab 01.05.2012	19,35	16,35	13,35	13,35	13,35
ab 01.06.2012	19,20	16,20	13,20	13,20	13,20
ab 01.07.2012	19,05	16,05	13,05	13,05	13,05
ab 01.08.2012	18,90	15,90	12,90	12,90	12,90
ab 01.09.2012	18,75	15,75	12,75	12,75	12,75
ab 01.10.2012	18,60	15,60	12,60	12,60	12,60
ab 01.11.2012	18,45	15,45	12,45	12,45	12,45
ab 01.12.2012	18,30	15,30	12,30	12,30	12,30
ab 01.01.2013	18,15	15,15	12,15	12,15	12,15
bedeutet ggü 1.1.2012 Kürzung um	25,7%	31,1%	33,7%	32,3%	32,3%
ab 01.01.2014	16,35	13,35	10,35	10,35	10,35
bedeutet ggü 1.1.2013 Kürzung um	9,9%	11,9%	14,8%	14,8%	14,8%
ab 01.01.2015	14,55	11,55	8,55	8,55	8,55
bedeutet ggü 1.1.2014 Kürzung um	11,0%	13,5%	17,4%	17,4%	17,4%
ab 01.01.2016	12,75	9,75	6,75	6,75	6,75
bedeutet ggü 1.1.2015 Kürzung um	12,4%	15,6%	21,1%	21,1%	21,1%

PV production capacity



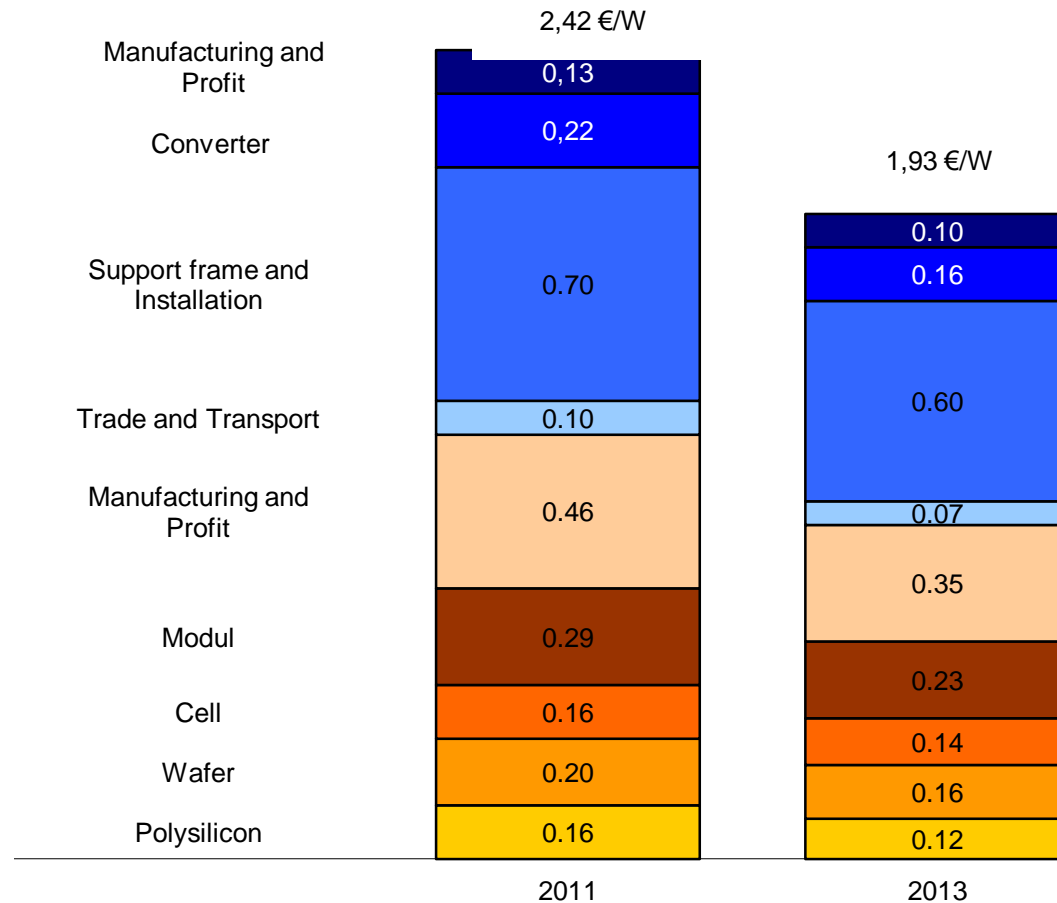
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Cost composition of a PV system



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Stacked bar chart showing electricity generation in MW over 24 hours for March 8, 2012. The chart includes three series: Wind energy (green), PV energy (yellow), and an unlabeled base load (grey). The y-axis ranges from 0 to 60,000 MW. The x-axis shows hours from 00 to 22. Wind energy is present throughout the day, peaking around 10,000 MW. PV energy starts at 08:00 and peaks at approximately 10,000 MW around 11:00. The base load starts at 40,000 MW, peaks at 55,000 MW around 18:00, and ends at 48,000 MW.

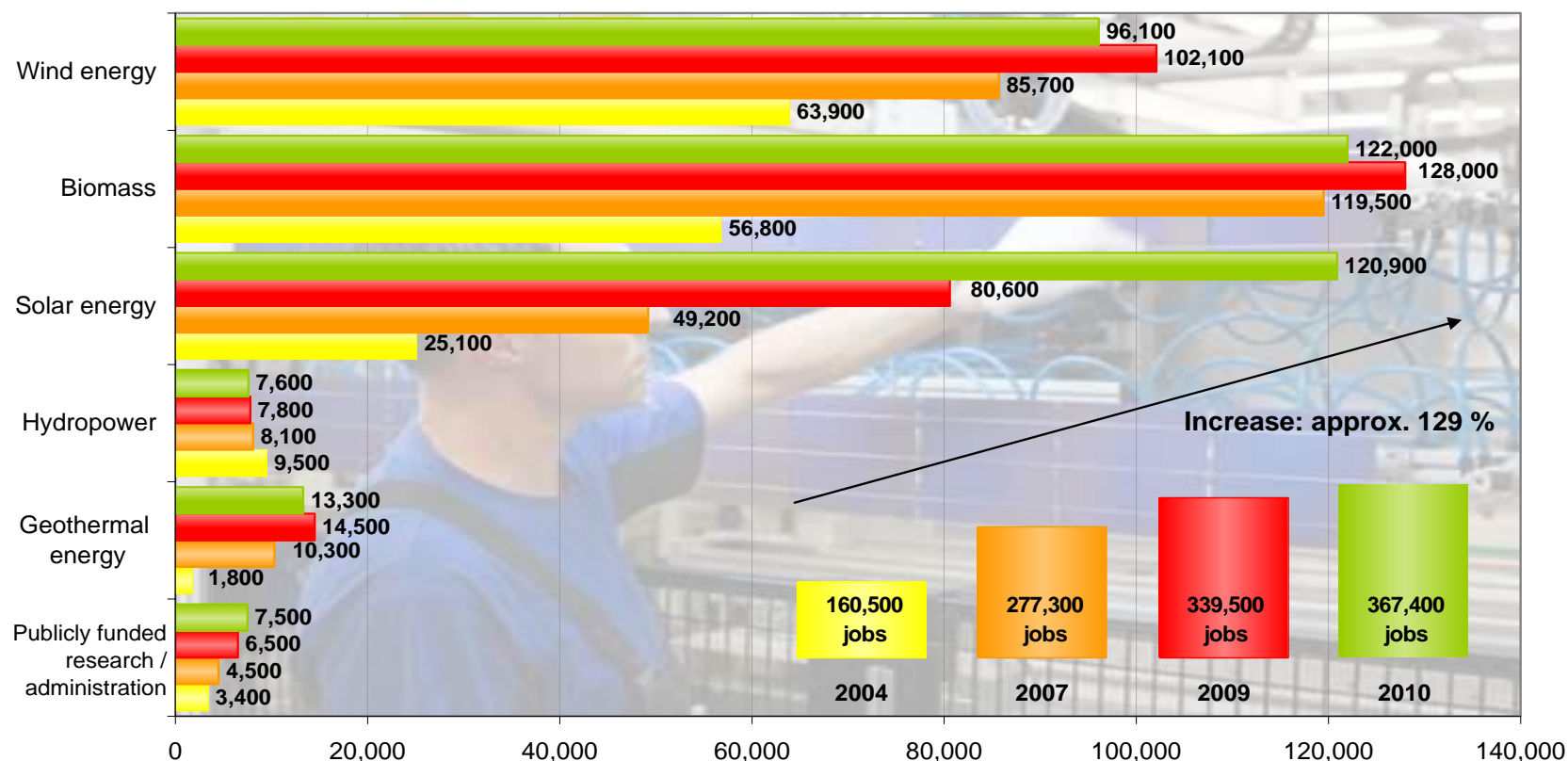
h	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Wind energy (MW)	8,000	8,000	8,000	8,000	8,000	9,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
PV energy (MW)	0	0	0	0	0	0	0	0	2,000	5,000	10,000	10,000	10,000	10,000	10,000	5,000	2,000	0	0	0	0	0	0
Base load (MW)	40,000	40,000	40,000	40,000	40,000	43,000	48,000	52,000	53,000	53,000	52,000	51,000	50,000	49,000	48,000	47,000	46,000	55,000	58,000	56,000	54,000	52,000	48,000

Employment in the German RE sector



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Jobs in the renewable energy sources sector in Germany



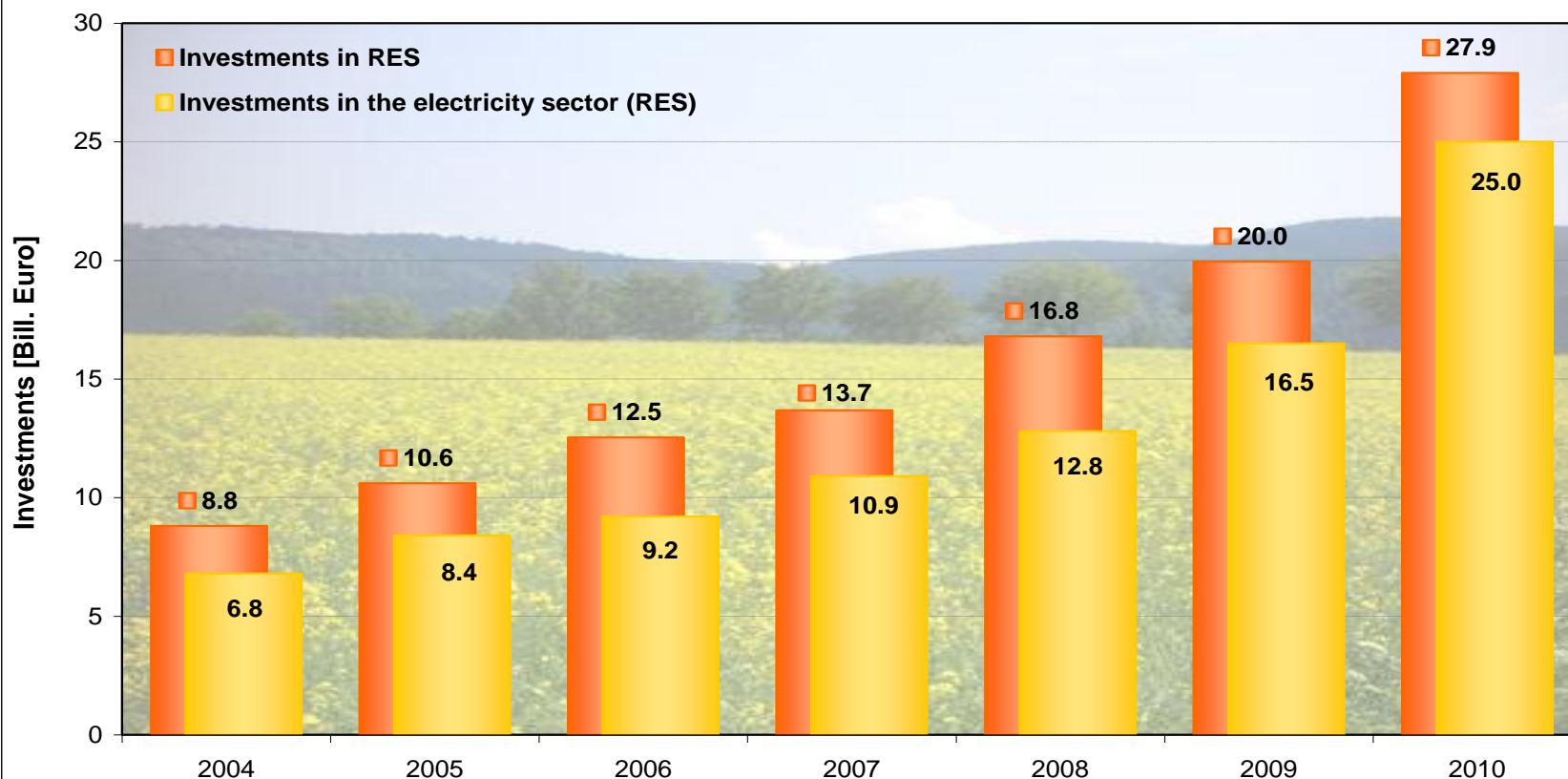
Figures for 2009 and 2010 are provisional estimate; deviations in totals are due to rounding;
Source: O'Sullivan/Edler/van Mark/Nieder/Lehr: "Bruttobeschäftigung durch erneuerbare Energien im Jahr 20010 – eine erste Abschätzung", as at: March 2011; interim report of research project „Kurz- und langfristige Auswirkungen des Ausbaus erneuerbarer Energien auf den deutschen Arbeitsmarkt“; image: BMU / Christoph Busse / transit

Investments in the German RE sector



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Investments in the construction of renewable energy installations in Germany 2010



Source: BMU-KI III 1 according to the Centre for Solar Energy and Hydrogen Research Baden-Wuerttemberg (ZSW); Years 2004 and 2005 estimated;
image: BMU / Dieter Böhme; as at: December 2011; all figures provisional





Thank you for your attention!



More Information:

www.bmu.de/english
www.erneuerbare-energien.de/english

Appendix

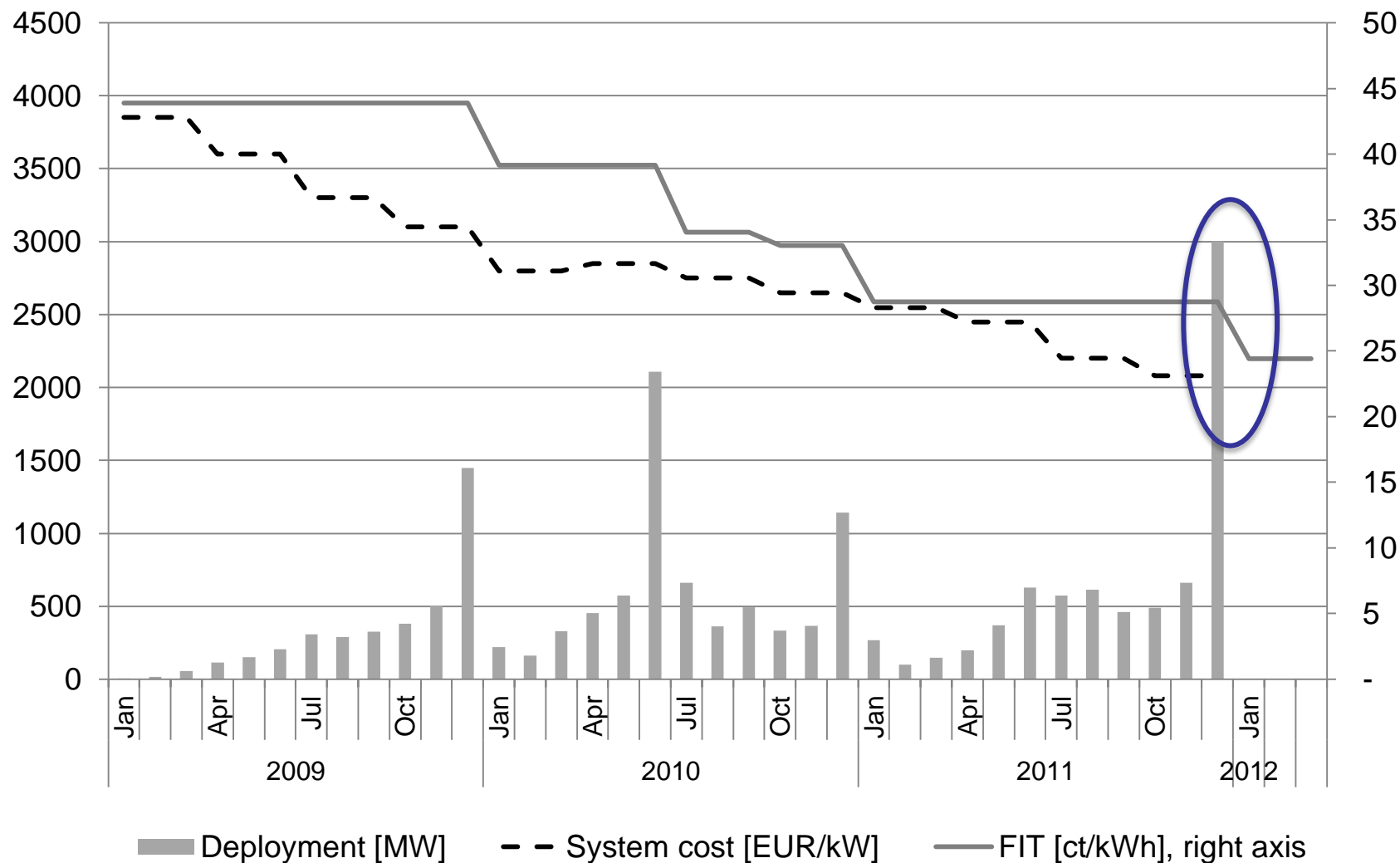


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PV Development in Germany



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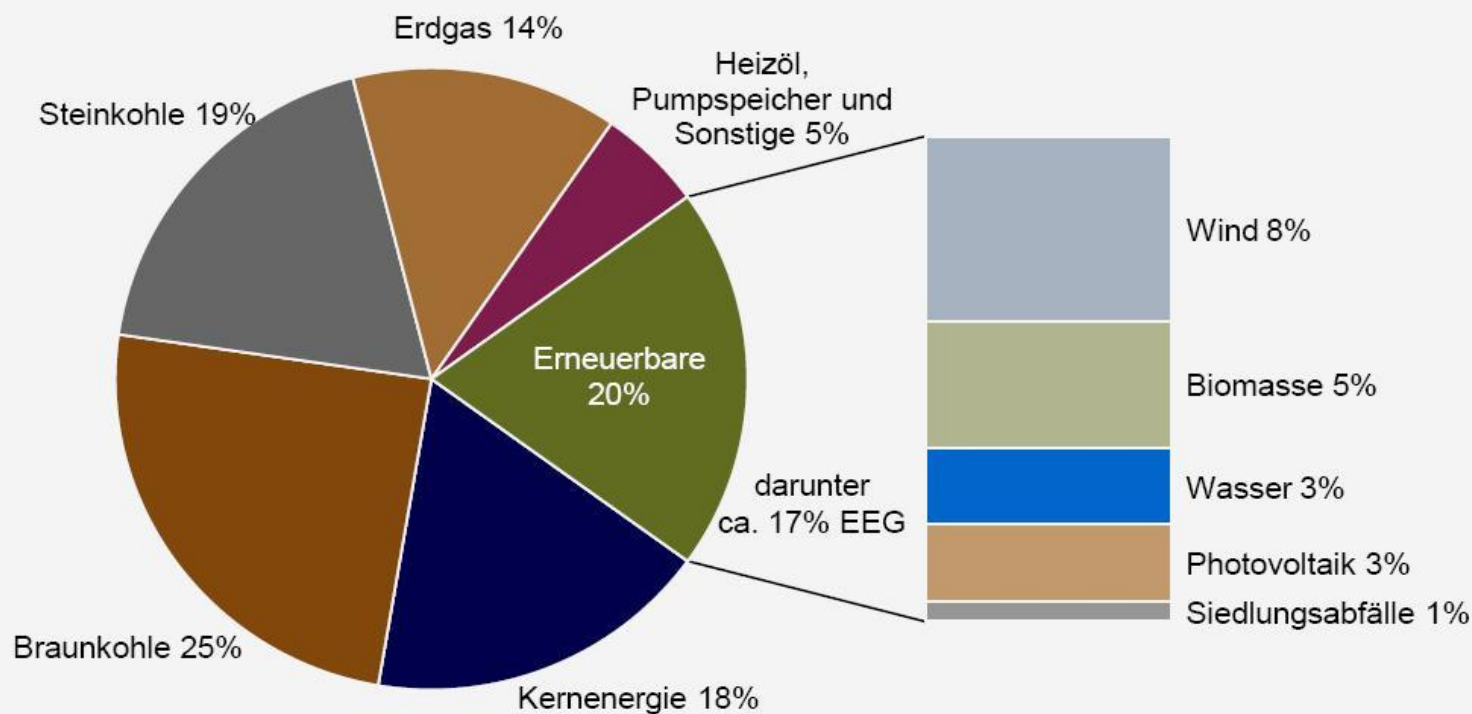


Share of Renewable Energy in Electricity Generation in Germany 2011

Brutto-Stromerzeugung nach Energieträgern 2011

bdeu
Energie. Wasser. Leben.

Brutto-Stromerzeugung 2011 in Deutschland: 612 Mrd. Kilowattstunden*



Quellen: BDEW, AG Energiebilanzen
Stand: 14. Dezember 2011

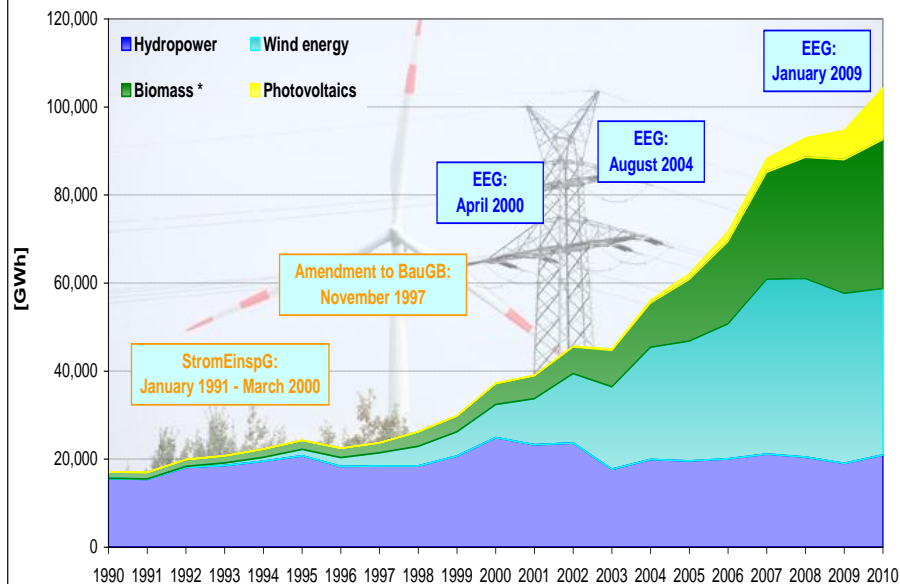
* vorläufig

Electricity



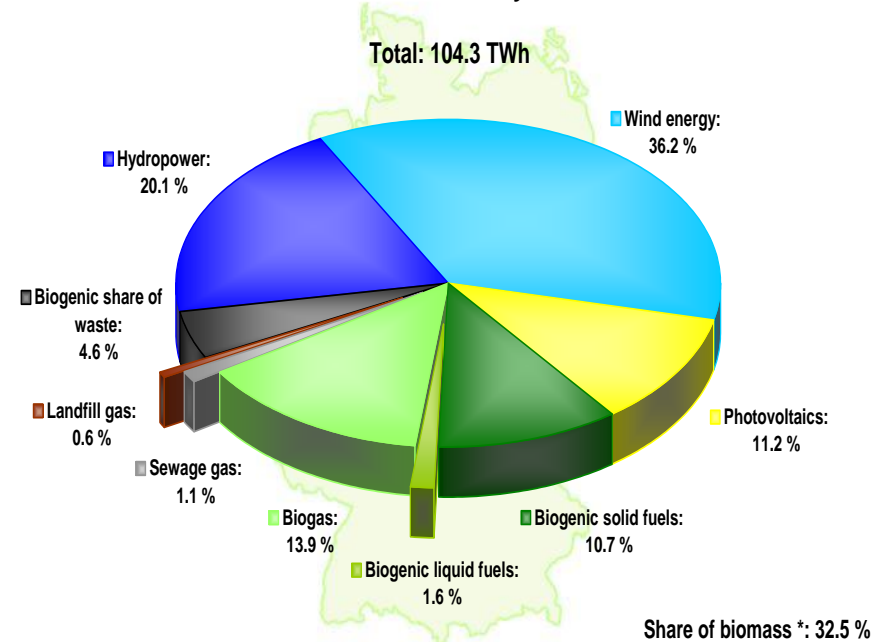
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Contribution of renewable energy sources to electricity supply in Germany



* 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: December 2011; all figures provisional

Structure of electricity supply from renewable energy sources in Germany 2010

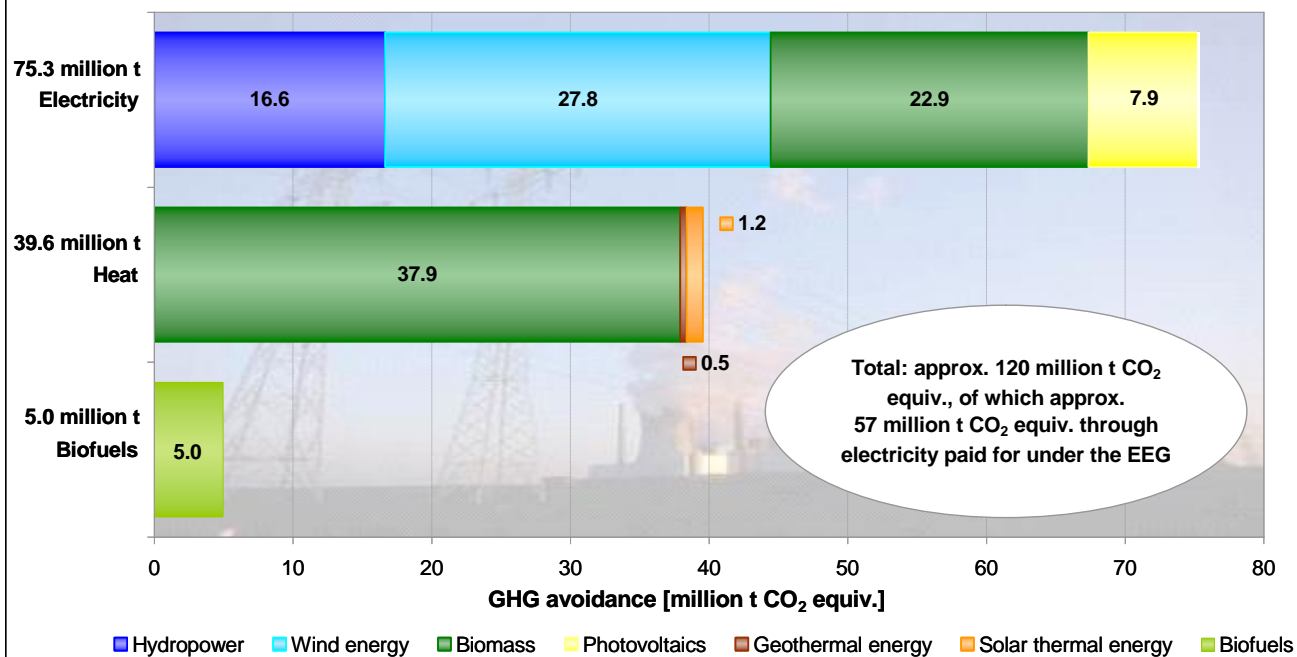


* Solid and liquid biomass, biogas, sewage and landfill gas, biogenic share of waste; electricity from geothermal energy not presented due to negligible quantities produced; deviations in the totals are due to rounding; 1 TWh = 1 Bill. kWh; Source: BMU-KI III 1 according to Working Group on Renewable Energy-Statistics (AGEE-Stat); as at: December 2011; all figures provisional

In 2011 ~ 20% of electricity from renewable energy sources



Total Greenhouse-Gas (CO₂ equiv.) avoidance via the use of renewable energy sources in Germany 2010

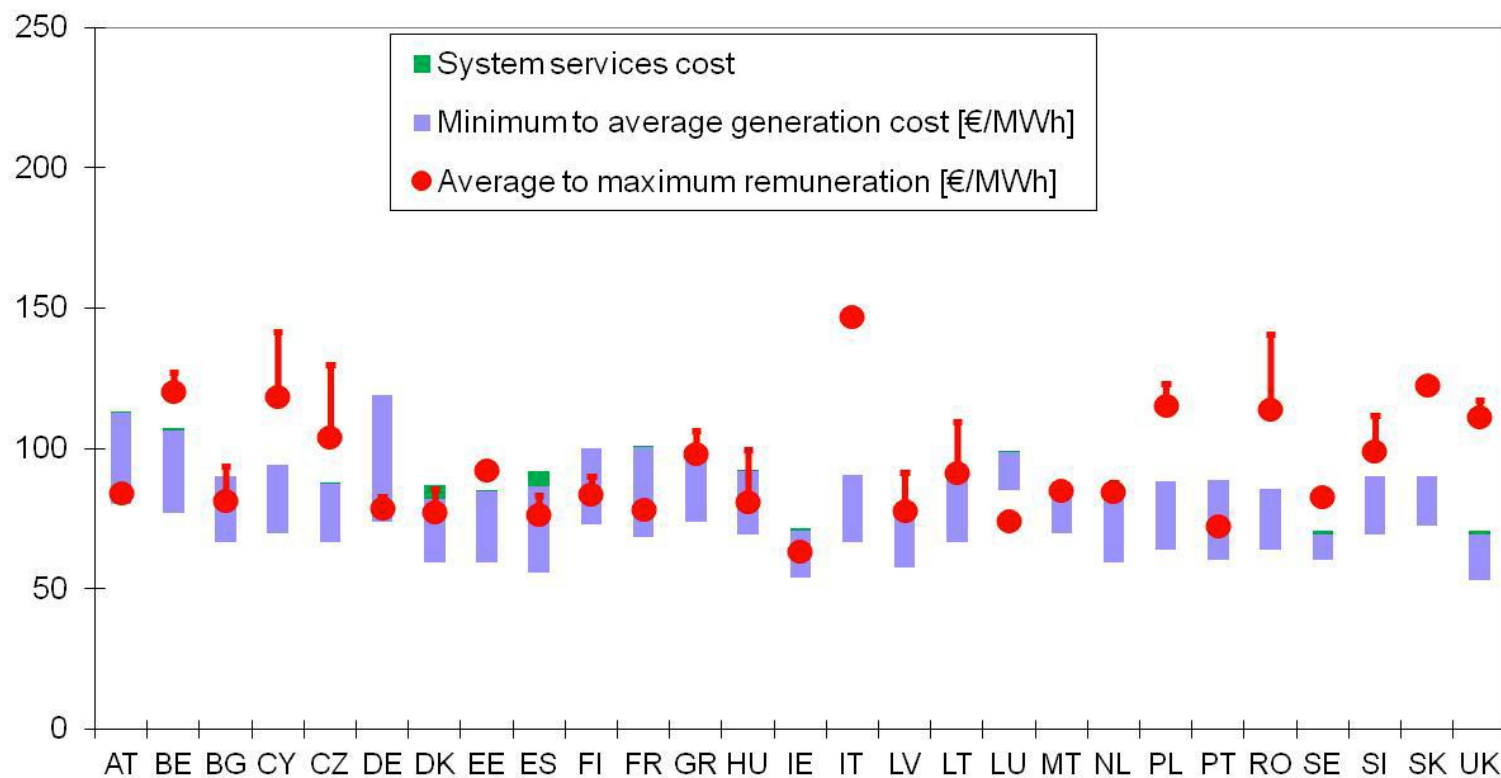


GHG: Greenhouse-Gas; deviations in the totals are due to rounding; geothermal energy not presented due to negligible quantities of electricity produced;
Source: UBA according to Working Group on Renewable Energy-Statistics (AGEE-Stat); image: H.G. Oed; as at: December 2011; all figures provisional



Policy Costs, EU-27:

Remuneration ranges (average to maximum remuneration) for Wind Onshore in the EU-27 MS in 2011 (average tariffs are indicative) compared to the long-term marginal generation costs (minimum to average costs)

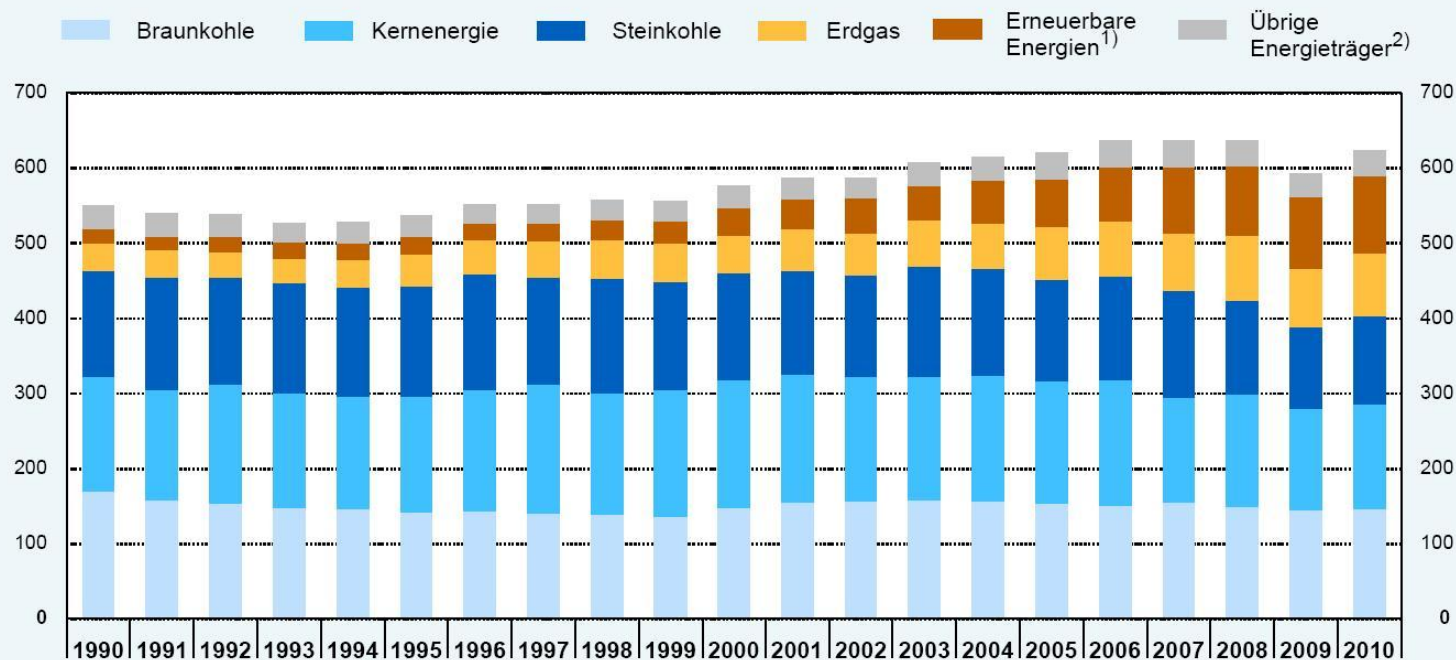




Gross Electricity Production in Germany, according to source:

Bruttostromerzeugung in Deutschland nach Energieträgern

Mrd kWh



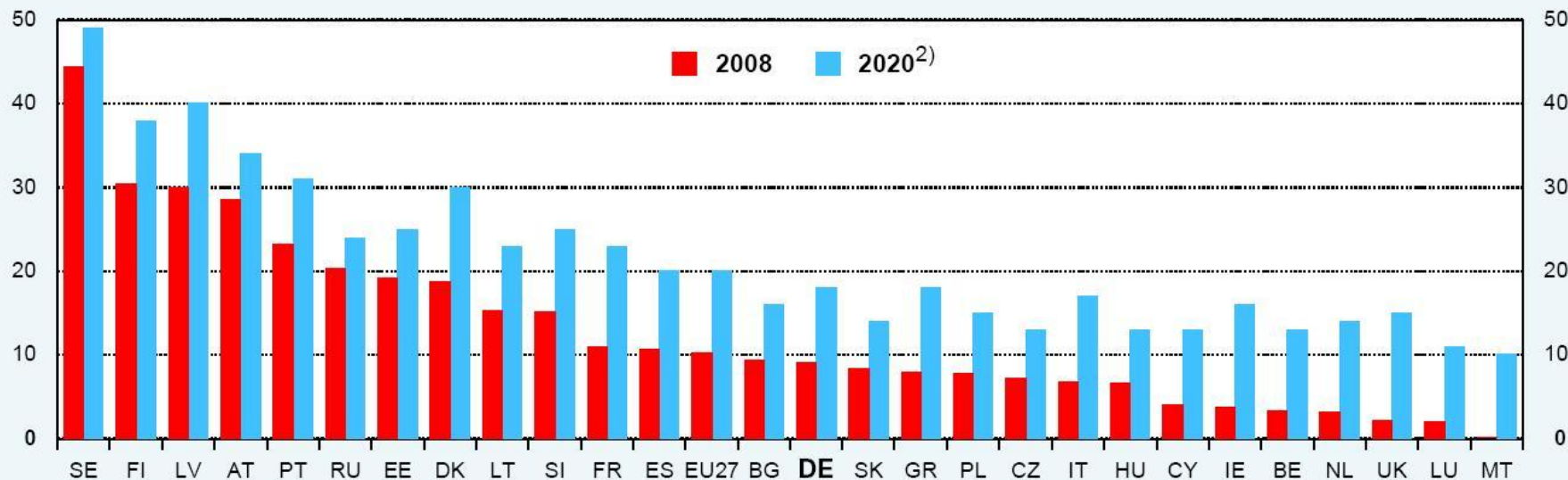
1) Wasserkraft, Windkraft, Biomasse, Photovoltaik, Geothermie (Erdwärme), Hausmüll.– 2) Übrige Energieträger einschließlich Mineralölprodukte.



Renewable Energy in the EU, 2008 and 2020 Goals:

Erneuerbare Energien in der Europäischen Union¹⁾

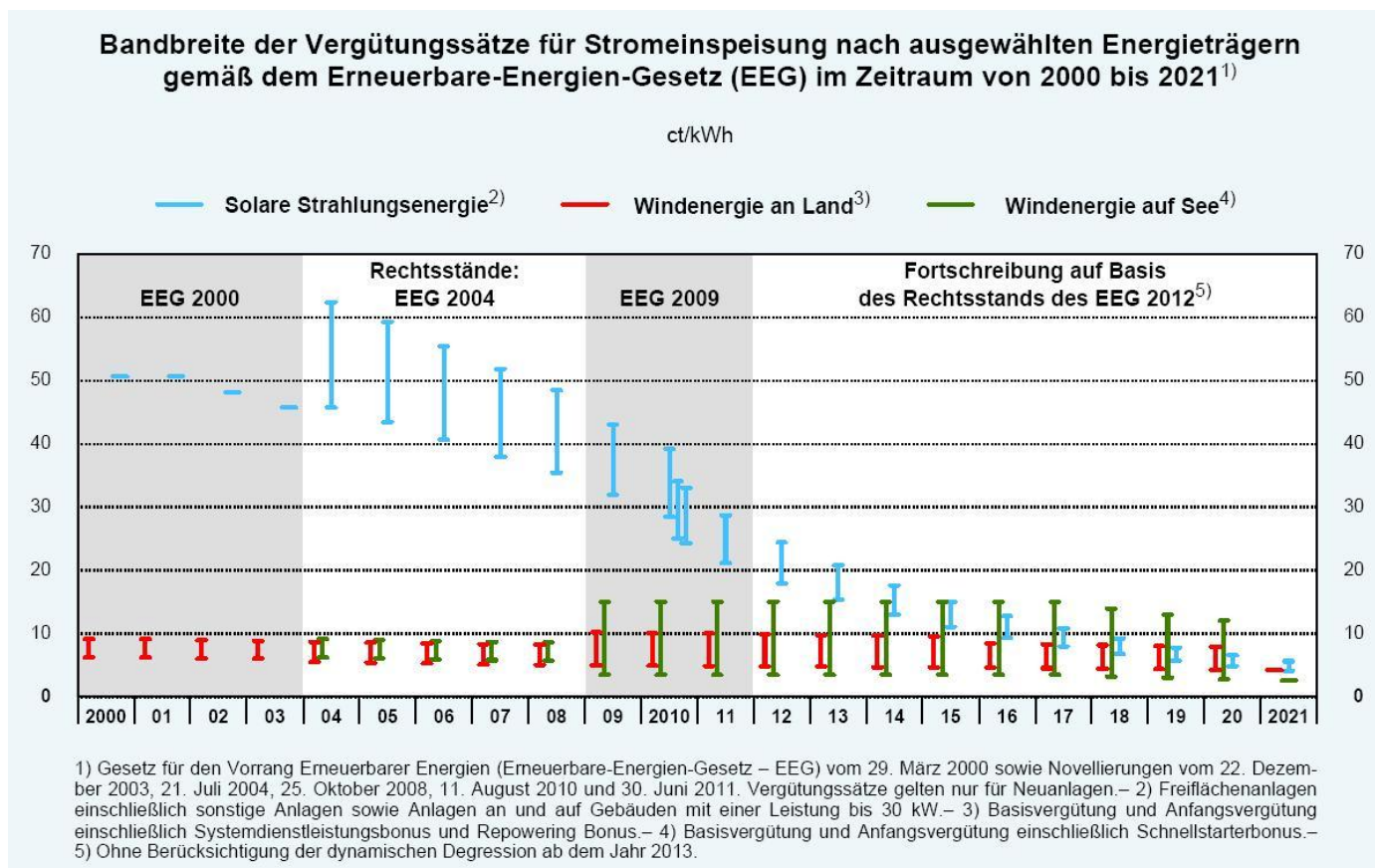
Anteil am Gesamtenergieverbrauch in vH



1) SE-Schweden, FI-Finnland, LV-Lettland, AT-Österreich, PT-Portugal, RU-Rumänien, EE-Estland, DK-Dänemark, LT-Litauen, SI-Slowenien, FR-Frankreich, ES-Spanien, EU27-Europäische Union, BG-Bulgarien, DE-Deutschland, SK-Slowakei, GR-Griechenland, PL-Polen, CZ-Tschechische Republik, IT-Italien, HU-Ungarn, CY-Zypern, IE-Irland, BE-Belgien, NL-Niederlande, UK-Vereinigtes Königreich, LU-Luxemburg, MT-Malta. – 2) Gemäß Klimakonzept der Europäischen Union.



Breadth of the Feed-In Tariff Scheme (EEG) for Electricity, according to source from 2000 to 2021:

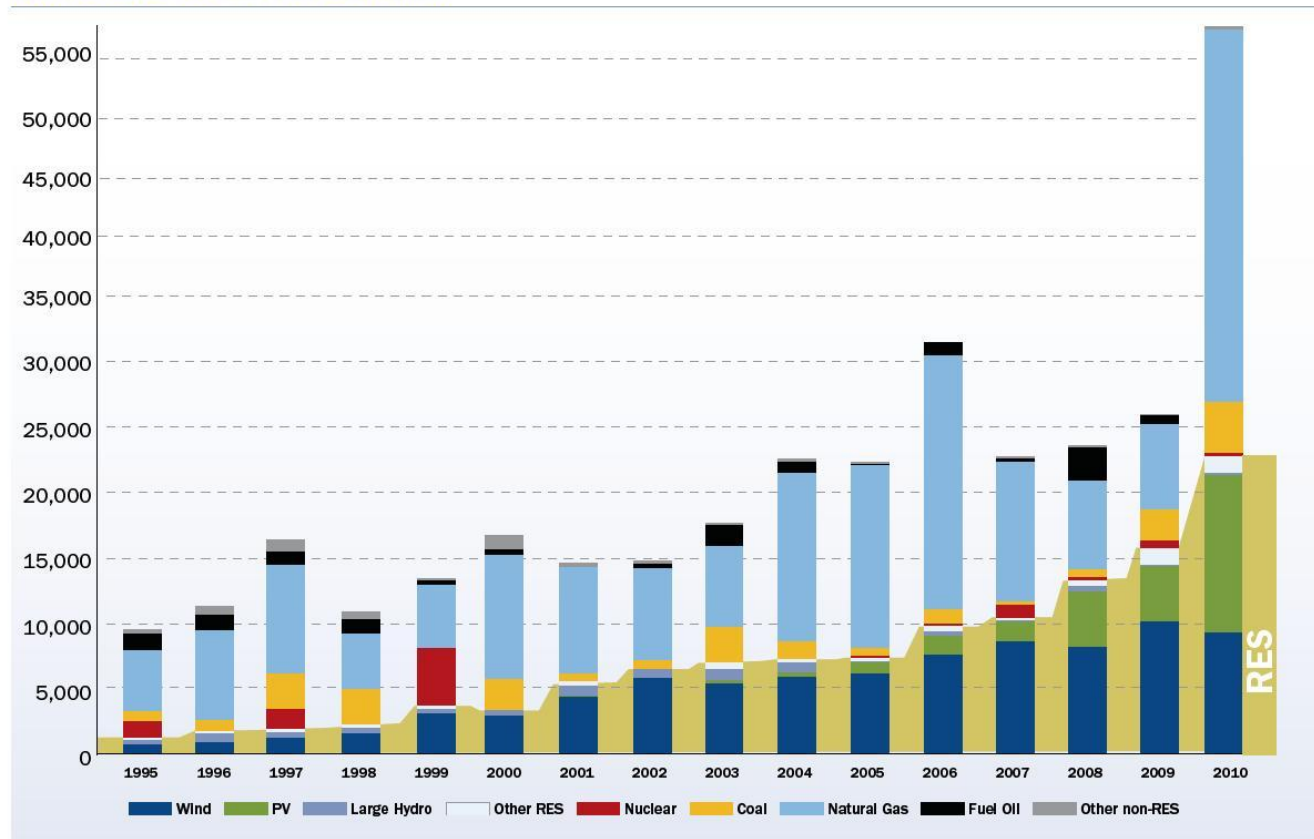




EU Renewable Share of New Installed Capacity:

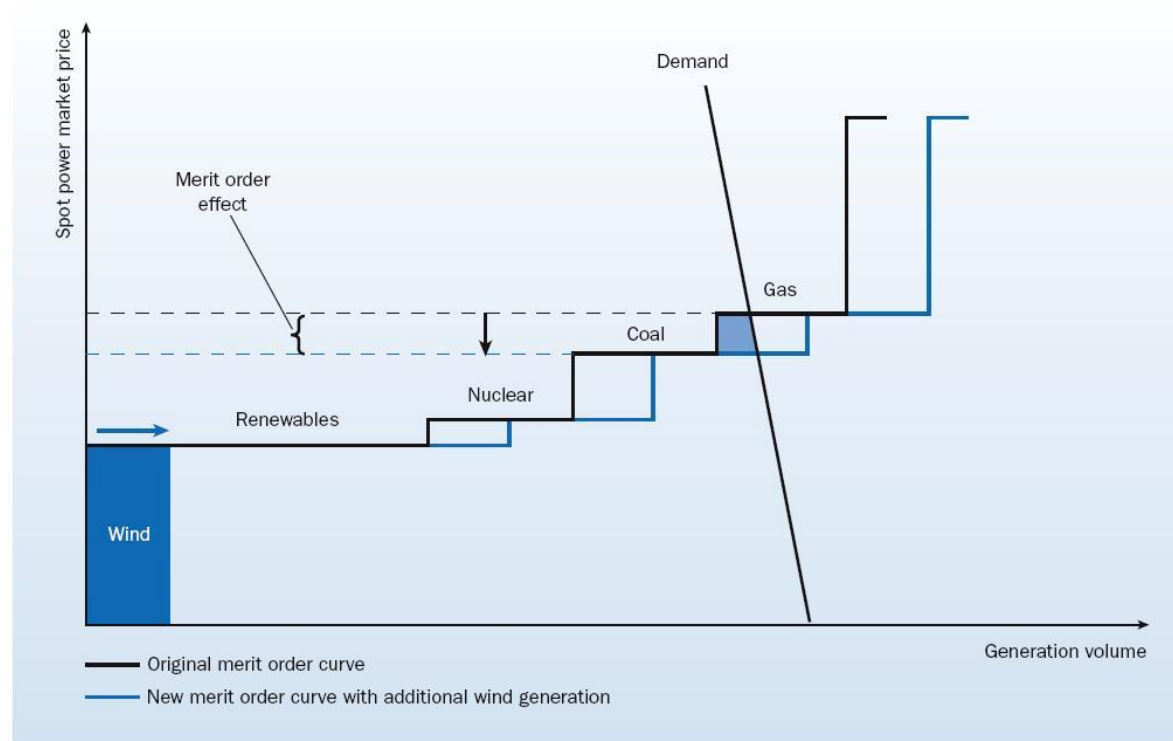
NEW INSTALLED CAPACITY PER YEAR IN MW

FIGURE 2.1



Merit Order Effect:

FIG 1: MERIT ORDER EFFECT OF WIND ELECTRICITY GENERATION

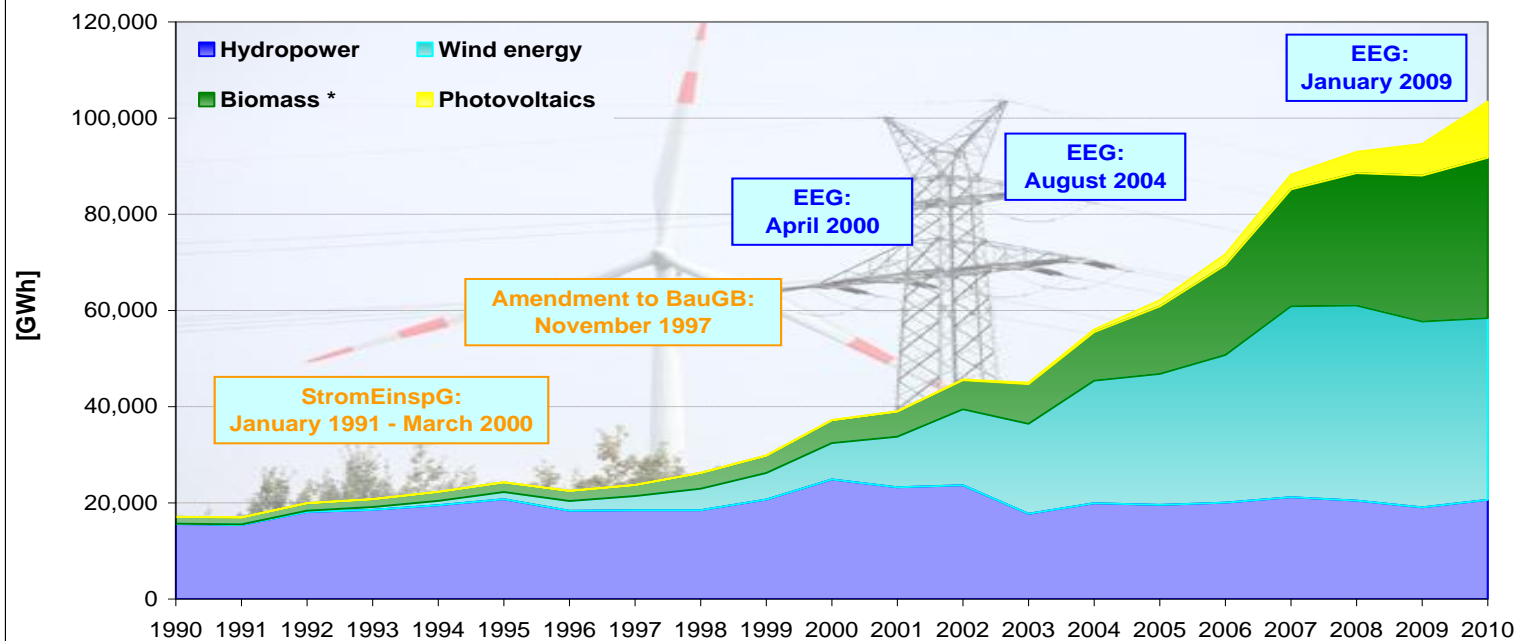


Source: EWEA, 2010, Powering Europe: wind energy and the electricity grid



Energiewende

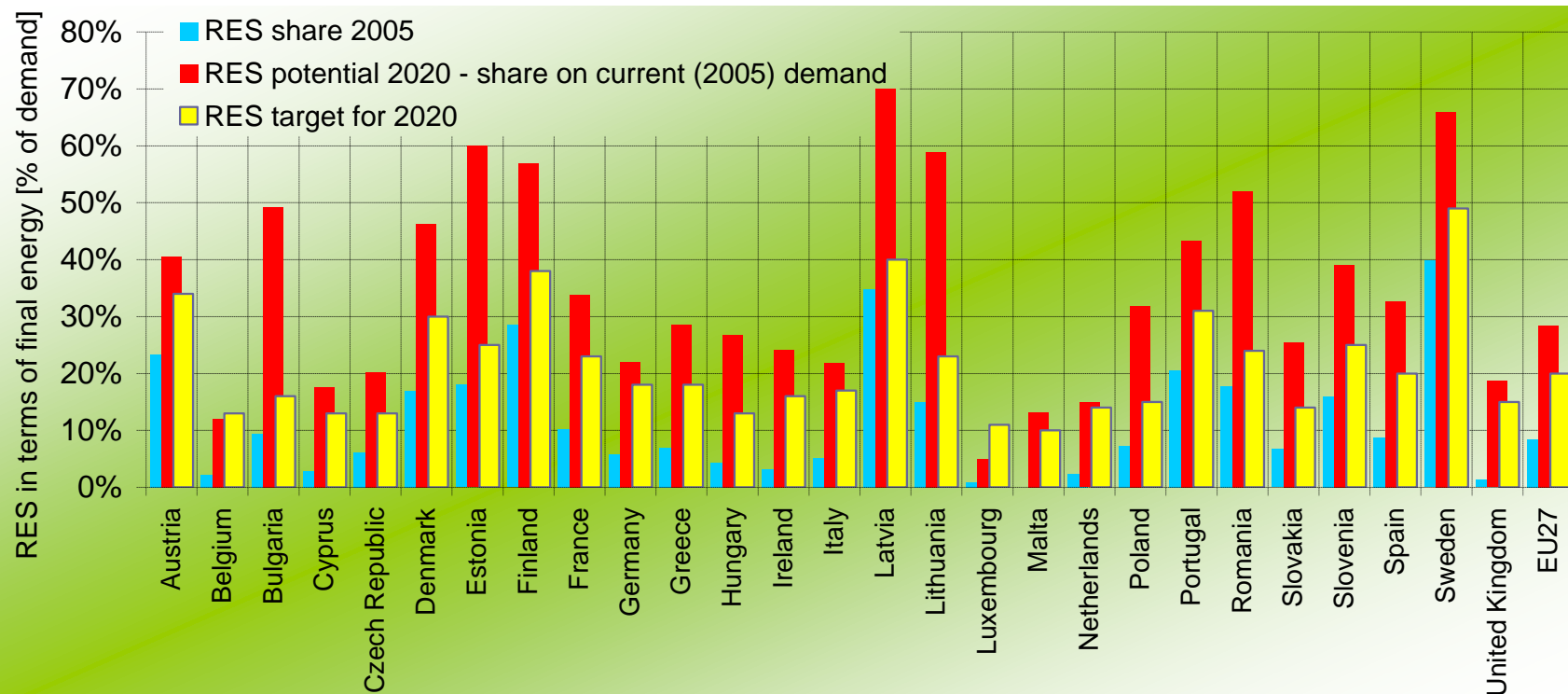
Contribution of renewable energy sources to electricity supply in Germany



* 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: July 2011; all figures provisional



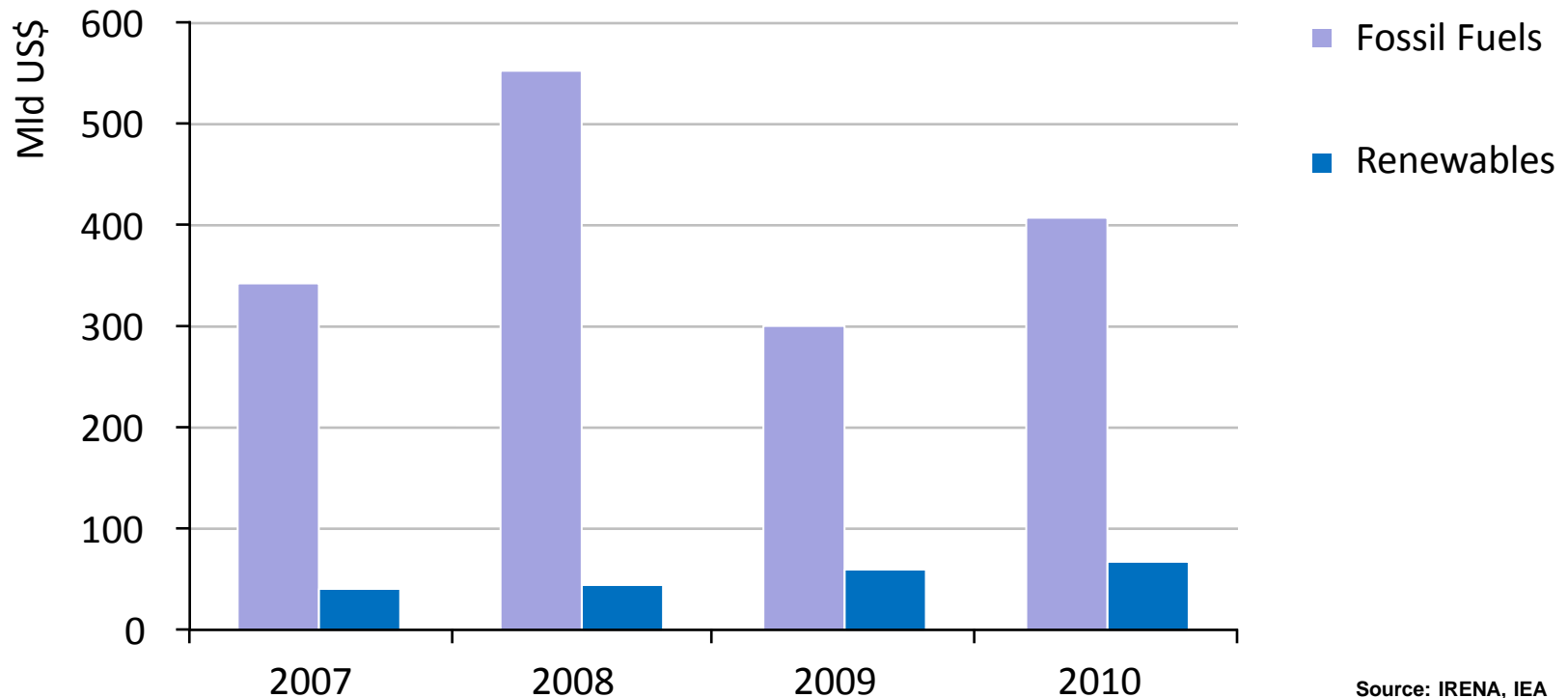
Renewable Energy in the EU: Targets





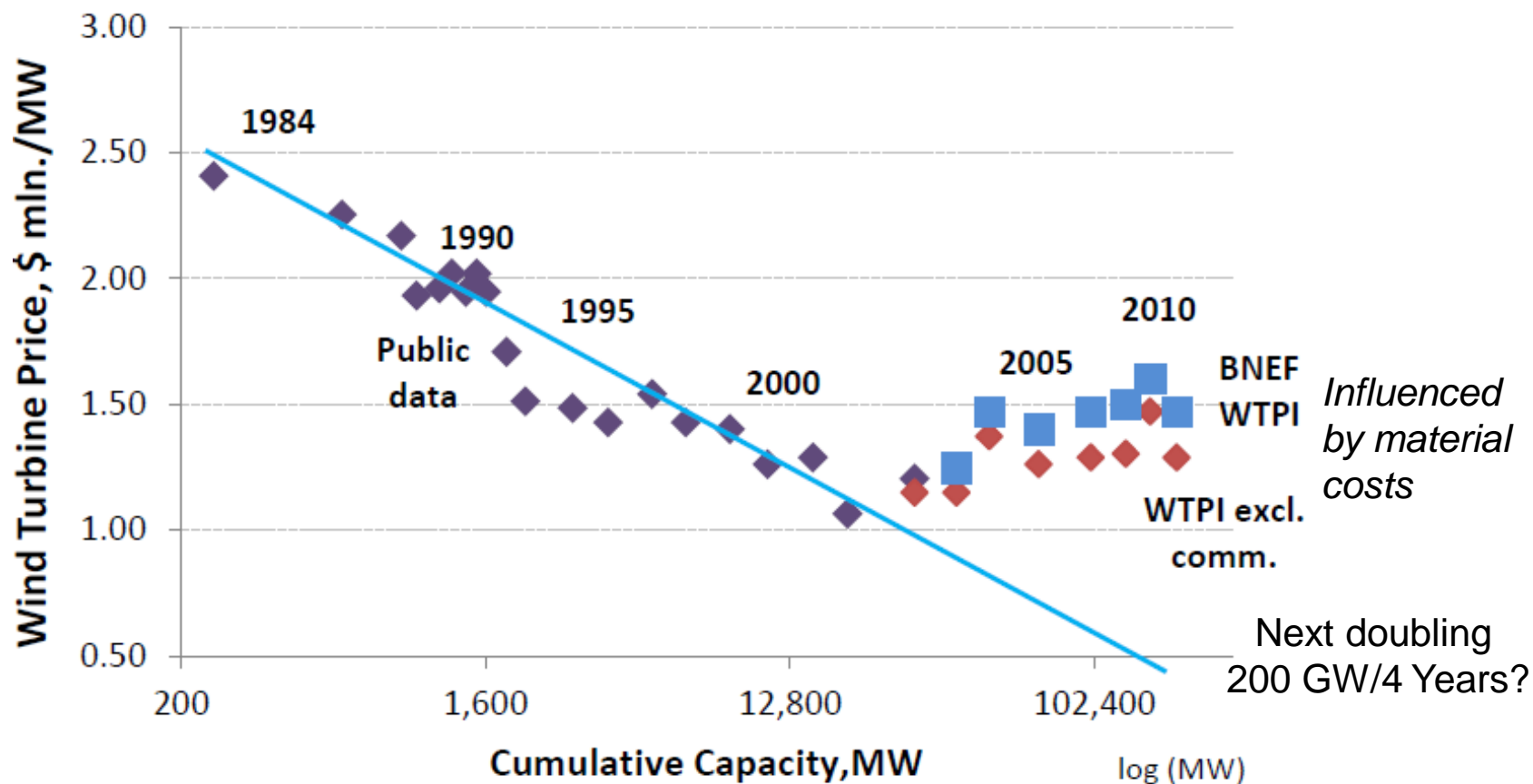
Global Energy Subsidies, 2007-2010

Worldwide Subsidies for Fossil Fuels and Renewables (in Billion US\$)





Onshore Wind Cost Reductions, 1984 – present:



Source: Bloomberg NEF Feb. 2011