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Realization of PV-systems in Germany

Approval procedure and interconnection conditions

European Workshop

"Production of Electricity with RES & CHP for Homeowners"

Prague, October 14th 2008

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Content

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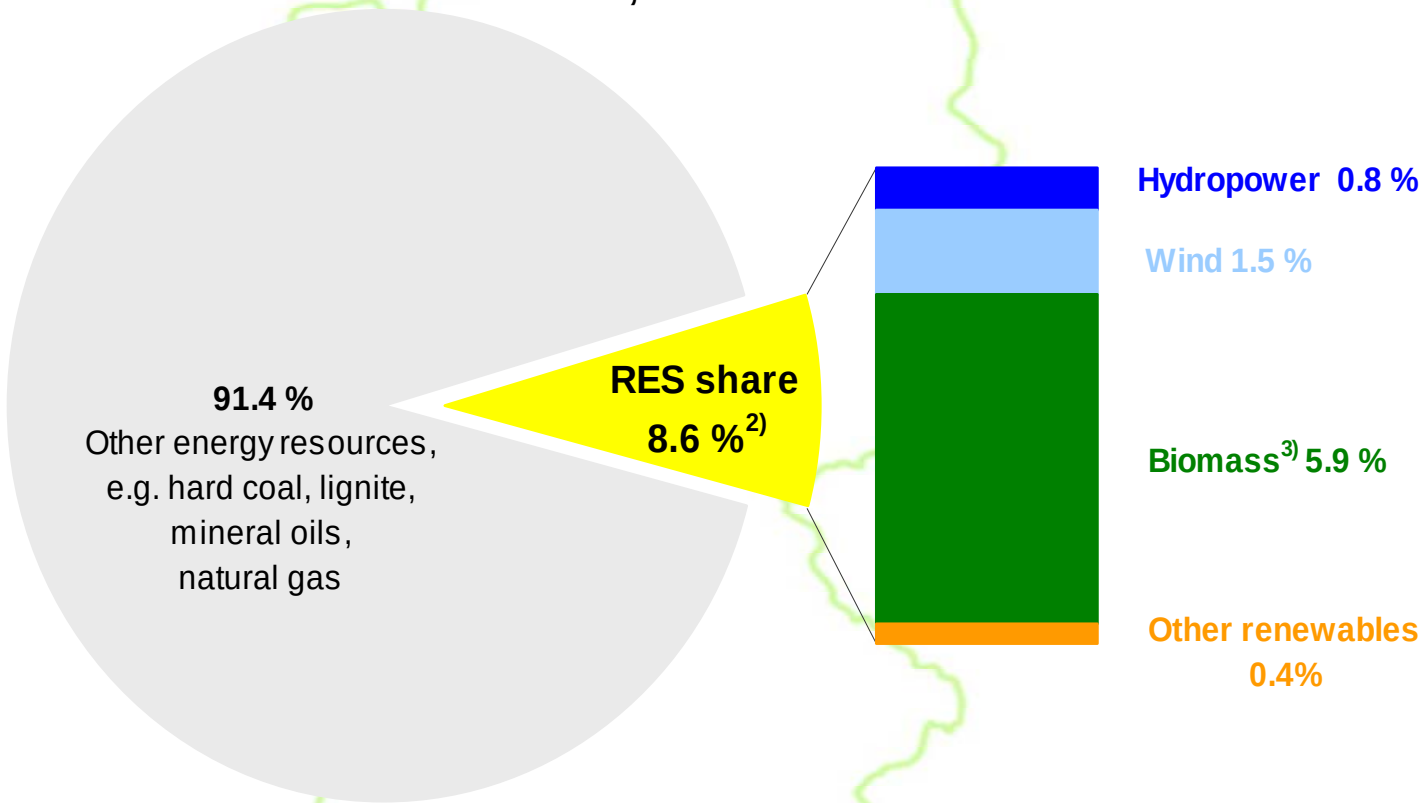
The German RES-Market

Shares of renewable energy sources among total final energy consumption in Germany, 2007

Total: 9,423 PJ[1)]



[1)] Final energy consumption as of 2006; [2)] Status: June 2008; [3)] solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas; RES - Renewable energy sources;
Source: BMU-KI III 1 based on AGEE-Stat and ZSW, according to Working Group on Energy Balances (AGEB); all figures provisional

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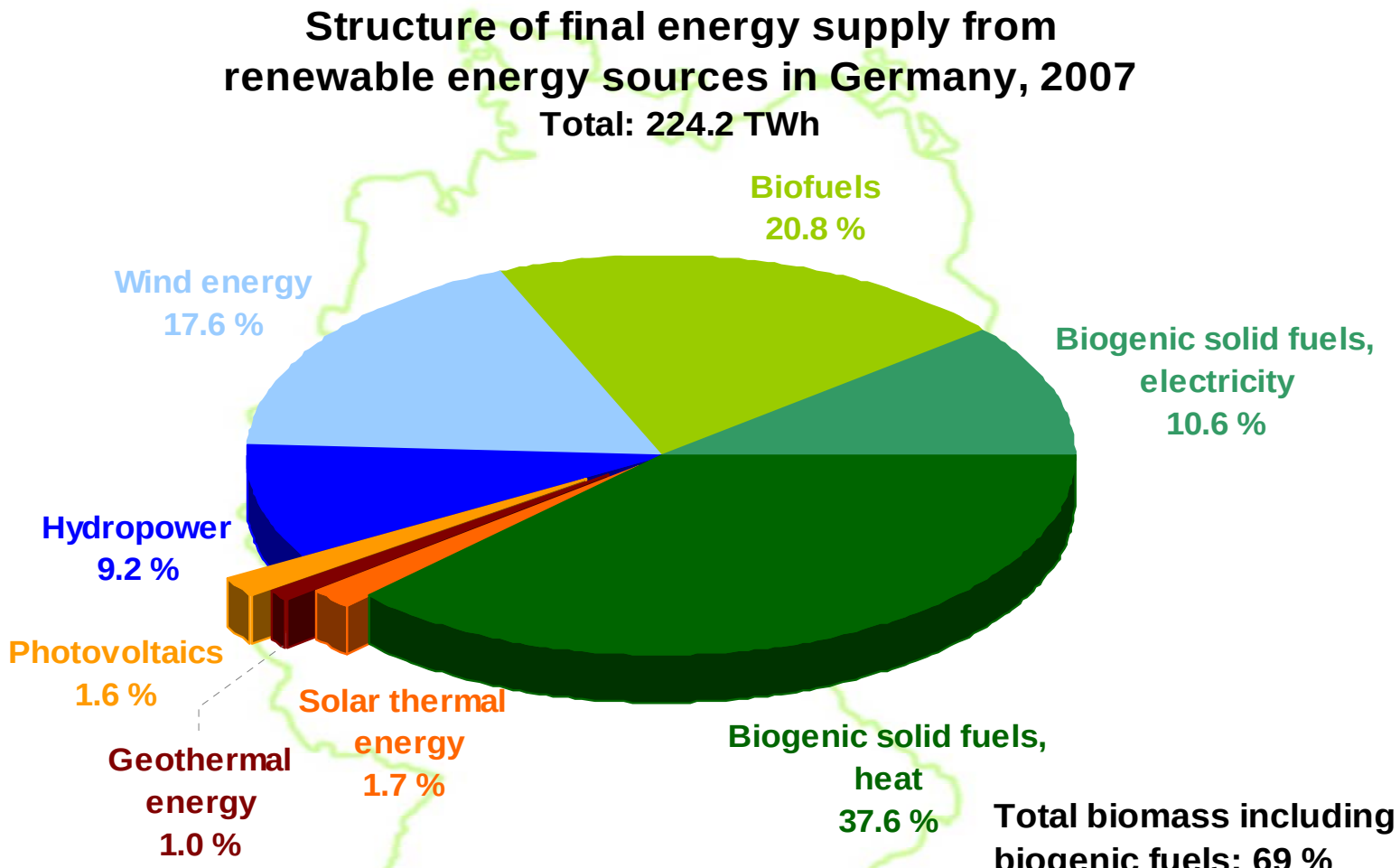

Source: BMU-Brochure: "Renew able energy sources in figures – national and international development", KI III 1; Version: June 2008; provisional figures

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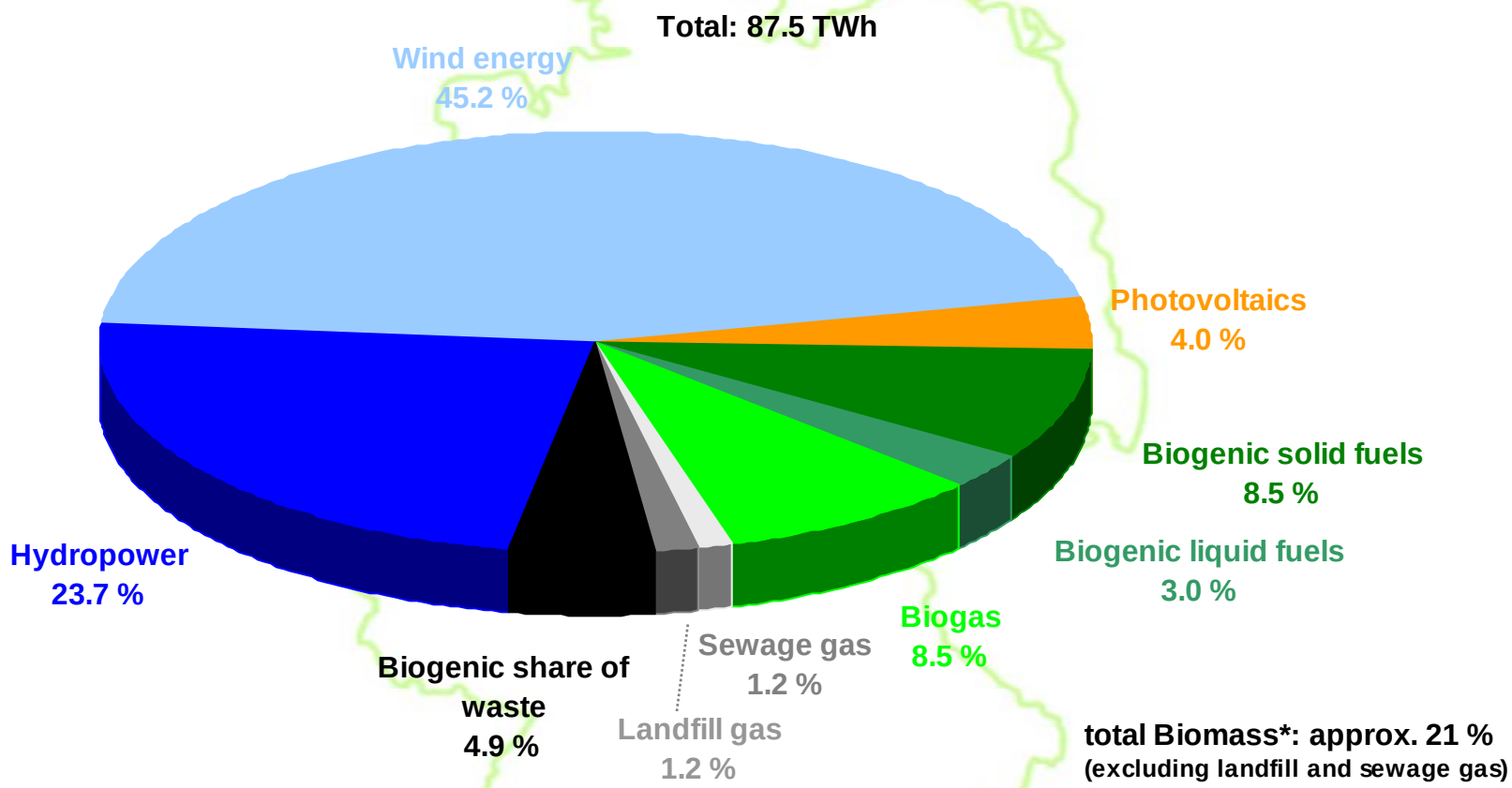

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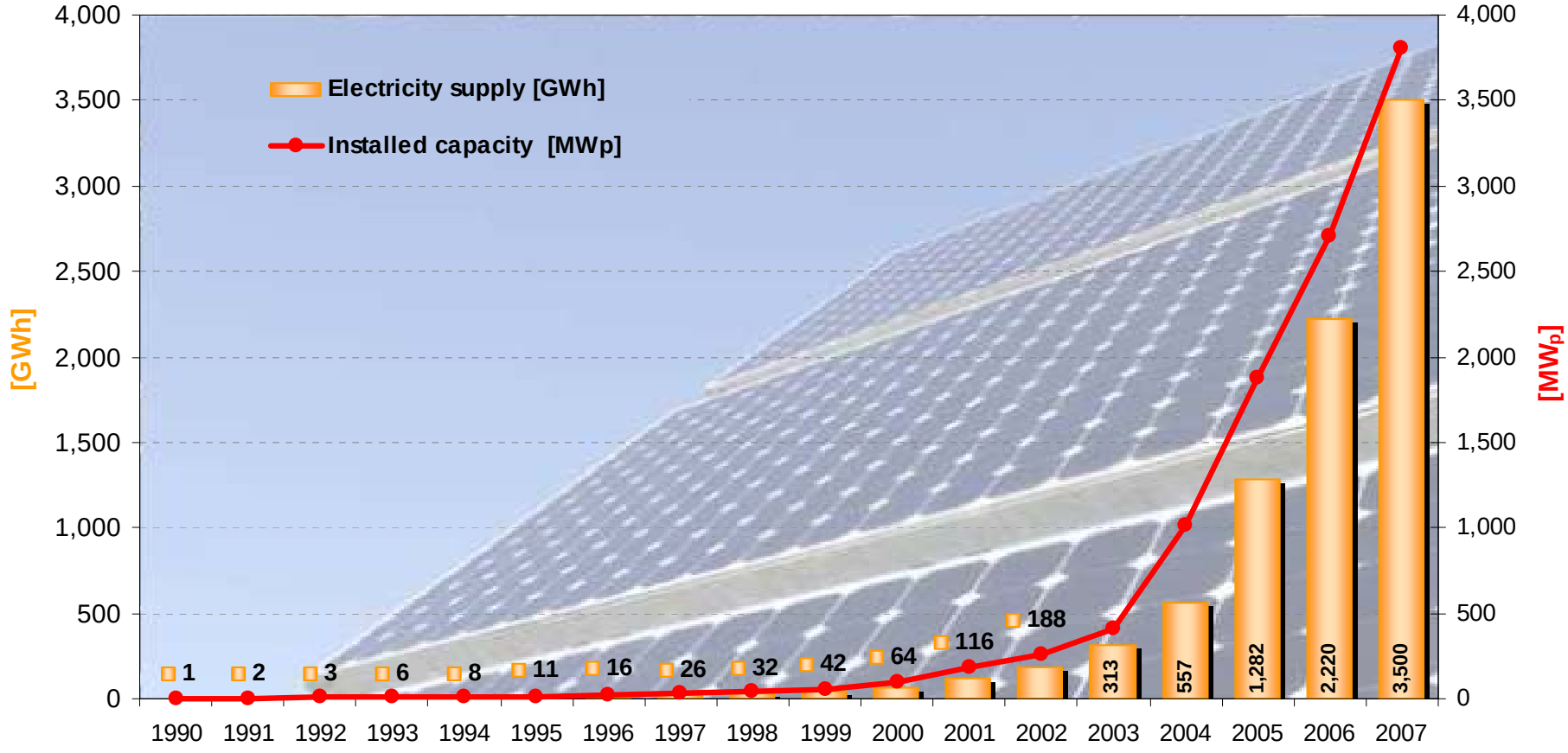
The German RES-Market

Installed capacity and energy supply from photovoltaic installations in Germany, 1990 - 2007



Source: BMU-Brochure: "Renew able energy sources in figures – national and international development", KI III 1; Version: June 2008; provisional figures

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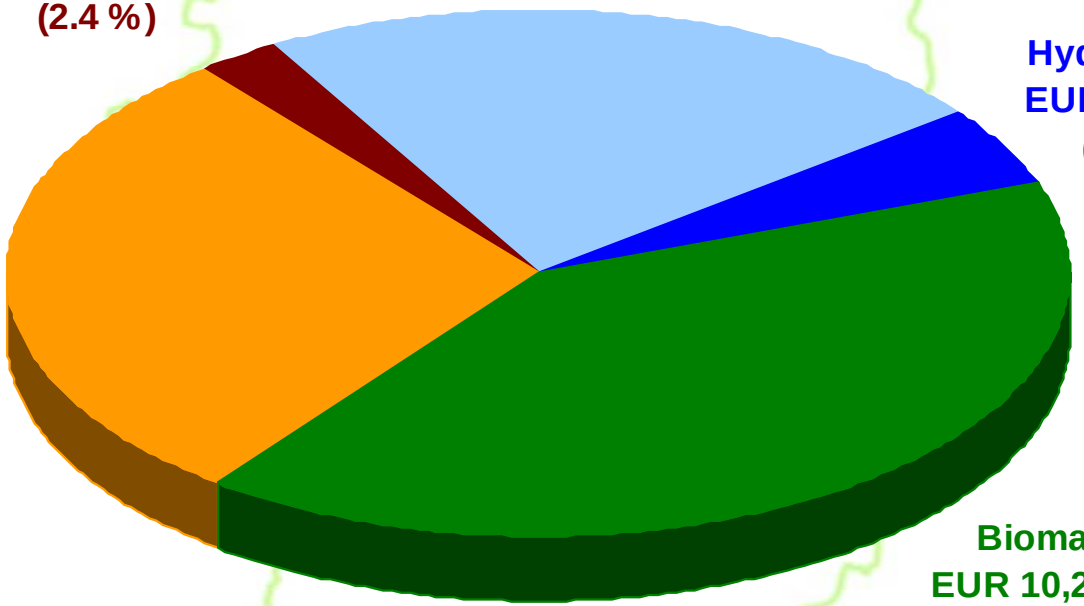
The German RES-Market

Total Turnover from Renewable Energy Sources in Germany, 2007

Total: approx. € 25 billion



[1)] Large plants an heat pumps

[2)] Photovoltaics and solar thermal energy; Version: June 2008; all figures provisional

Source: BMU-Brochure: "Renew able energy sources in figures – national and international development", KI III 1; Version: June 2008; provisional figures

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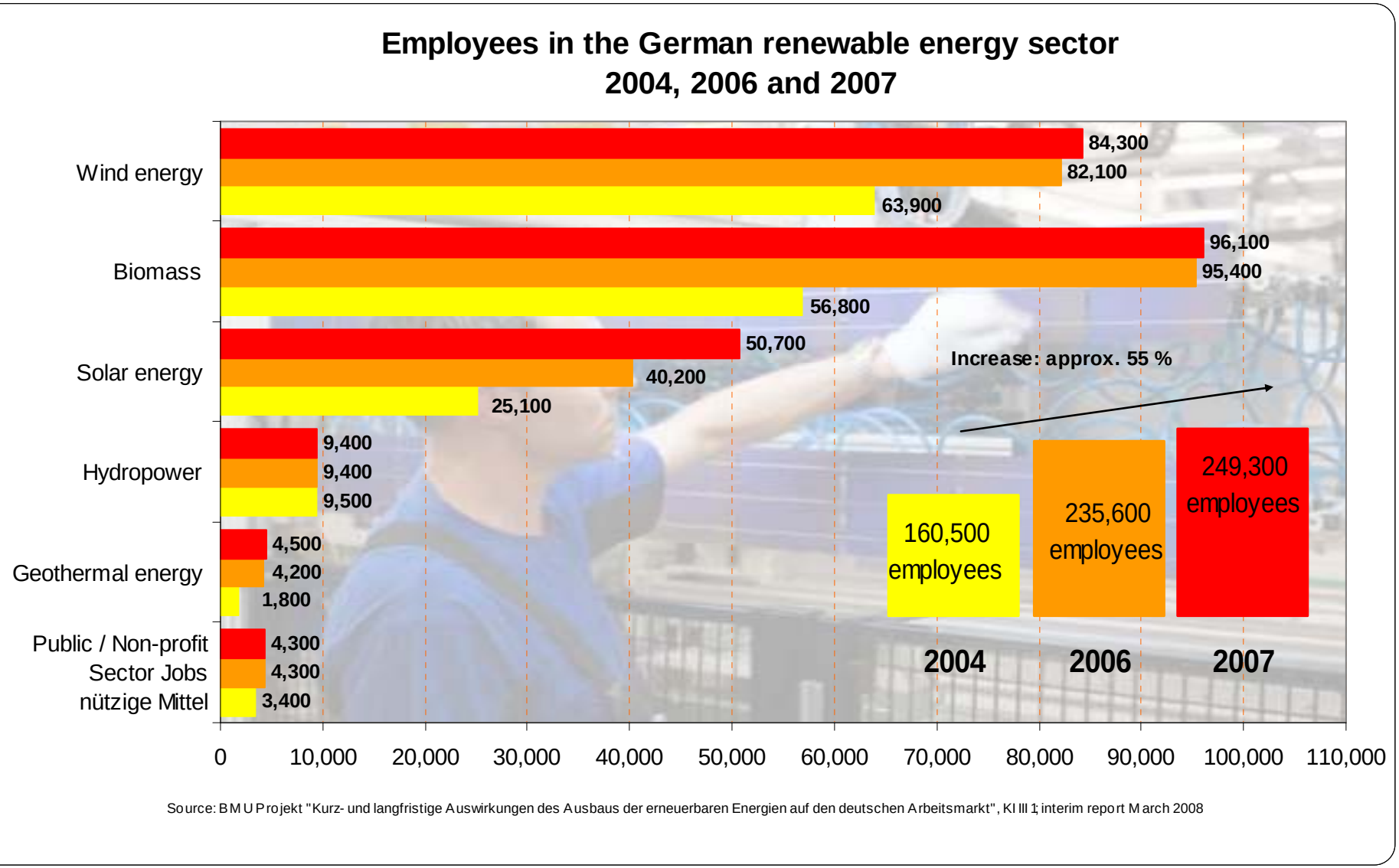

Source: BMU Projekt "Kurz- und langfristige Auswirkungen des Ausbaus der erneuerbaren Energien auf den deutschen Arbeitsmarkt", KI III 1; interim report March 2008

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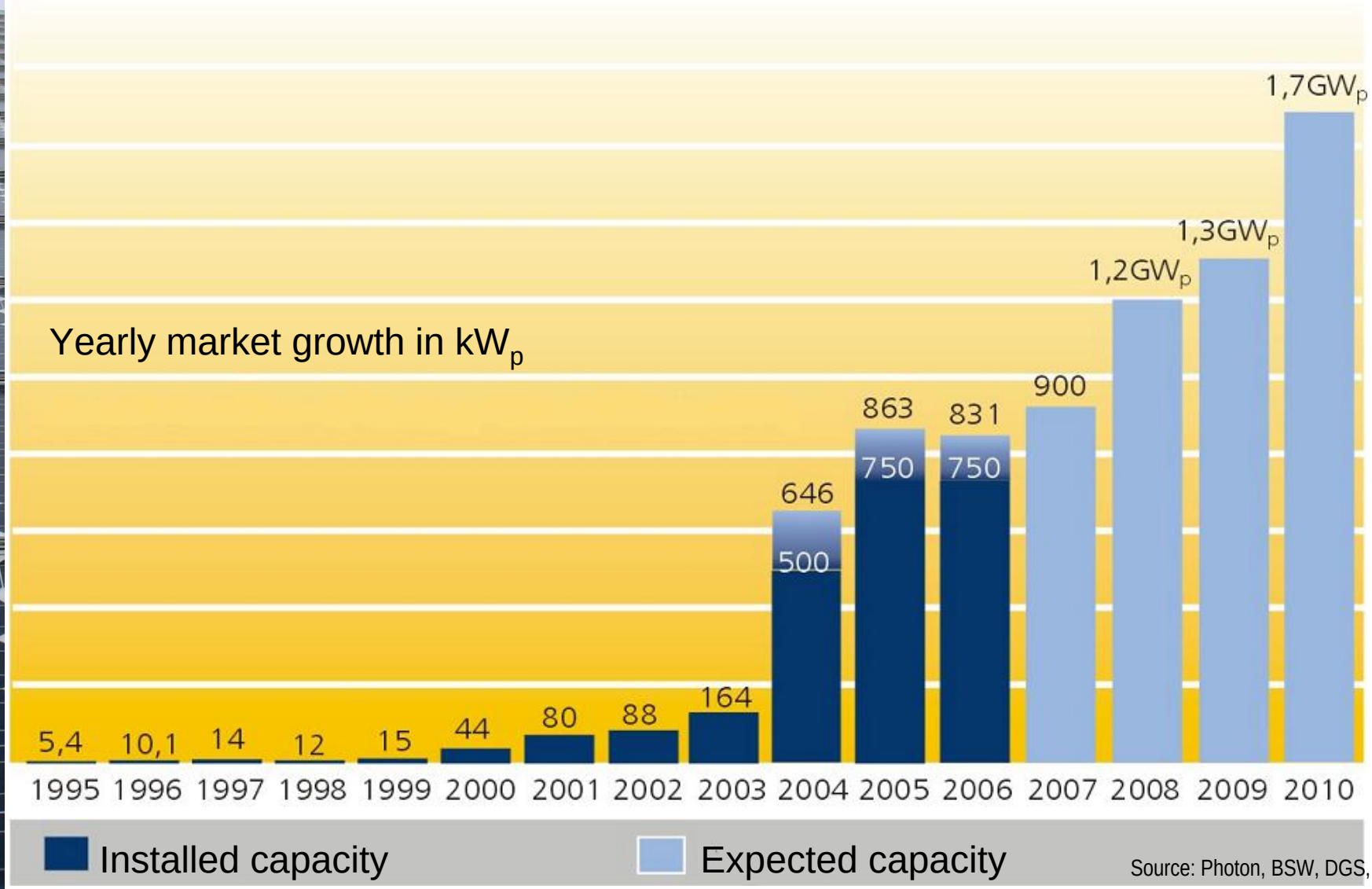
The German RES-Market

PV market development



Source: Photon, BSW, DGS, KfW

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The German Renewable Energy Law

History & Tasks

- First renewable energy law
  - The first renewable energy law came into effect on April the 1st 2000
  - Electricity from renewable energy sources has to be bought by grid provider
  - Guarantied and constant payment over 20 years
  - Yearly degression to put pressure on innovations and pricing
- The amendment of 2004
  - Adjustment of feed in tariffs (over funding of wind energy)
  - More exact definition of critical legal questions
- The Amendment of 2009
  - Adjustment of feed in tariffs (less for PV open area and large roof inst.)

➔ Economic sustainable and reasonable funding,
independent of the national budget

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The German Renewable Energy Law

Achievements

- 14.3 % of German electricity production from renewable energy source in 2007
- 0.5 % of German electricity production from PV in 2007
- Important factor of climate protection goals
- 150,000 sustainable jobs created since 2000
- International appreciation

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The German Renewable Energy Law

PV feed in tariffs in Cent /kWh from 2009

Year of commissioning		**2009**	**2010**	**2011**
PV-installations at or on buildings	Nominal power < 30 kW	43,01	39,57	36,01
	Nominal power 30 to 100 kW	40,91	37,64	34,25
	Nominal power 100 to 1000 kW	39,58	35,62	32,41
	Nominal power > 1000 kW	33,00	29,70	27,03
	PV own use (up to 30 kW)	25,01	23,01	20,94
Open area	PV-plants	31,94	28,75	26,16

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The German Renewable Energy Law

Financial impact

- Apportionment of 1 Cent/kWh
- For a reference household (3500 kWh/a) this means additional costs of 35 €/a in 2007
- with the expected increase of renewable energies it might go up to 1,5 Cent/kWh in 2015 before decreasing due to higher degresseions

	EEG costs	EEG apportionment
Year	[bn. EUR]	[Cent/kWh]
2000	1.0	0.2
2001	1.2	0.3
2002	1.8	0.4
2003	1.9	0.4
2004	2.5	0.6
2005	2.8	0.6
2006	3.3	0.8
2007[1)]	4.3	1.0

1) Provisional figures

Source: BMU Brochure “Renewable Energies in Figure” 07.2008

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Approval procedure for installations < 30 kW

- Grid provider are bound to take the energy independent of a contract
- Interconnection contracts are common
  (plant layout incl. technical specifications, description of protective devices, short circuit strength, description and declaration of conformity of inverter and description of the exact interconnection with the grid)
- The execution of the installation (especially security and protection devices) have to be in accordance with the applicable standards and regulations
  (DIN VDE, Directives of the association of the Energy and Water Industry)
- Each PV installation has to be reported to the Federal Network Agency
  (location and installed capacity)

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Interconnection conditions for installations

- Before the interconnection the installation has to be tested according to DIN VDE 0100 Part 610 and BGV A2
- The commissioning has to be done by approved electrician
- While commissioning the installation several measurements have to be recorded (a.o. ground resistance, insulation resistance, open circuit voltage, short circuit current and voltage drop at each fuse)
- After the commissioning a declaration of conformity has to be singed by the approved electrician

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Interconnection conditions for installations

- Installation of the meter by the grid provider
- The first interconnection has to be done by an approved electrician (and usually by a staff member of the grid provider)
- The following tests will be performed
  - general inspection of the plant
  - comparison with the plans
  - accessibility of all relevant parts (for the grid provider)
  - potential equation
  - execution of the measurement equipment
  - Testing of the meters
  - Testing of the protective devices for grid failures if no automation disconnection device (ADS, ENS) is used

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Thank you for your attention.