



Facilitating the Paradigm Shift: System Transformation towards Renewables Energy

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BEE - German Renewable Energy Federation

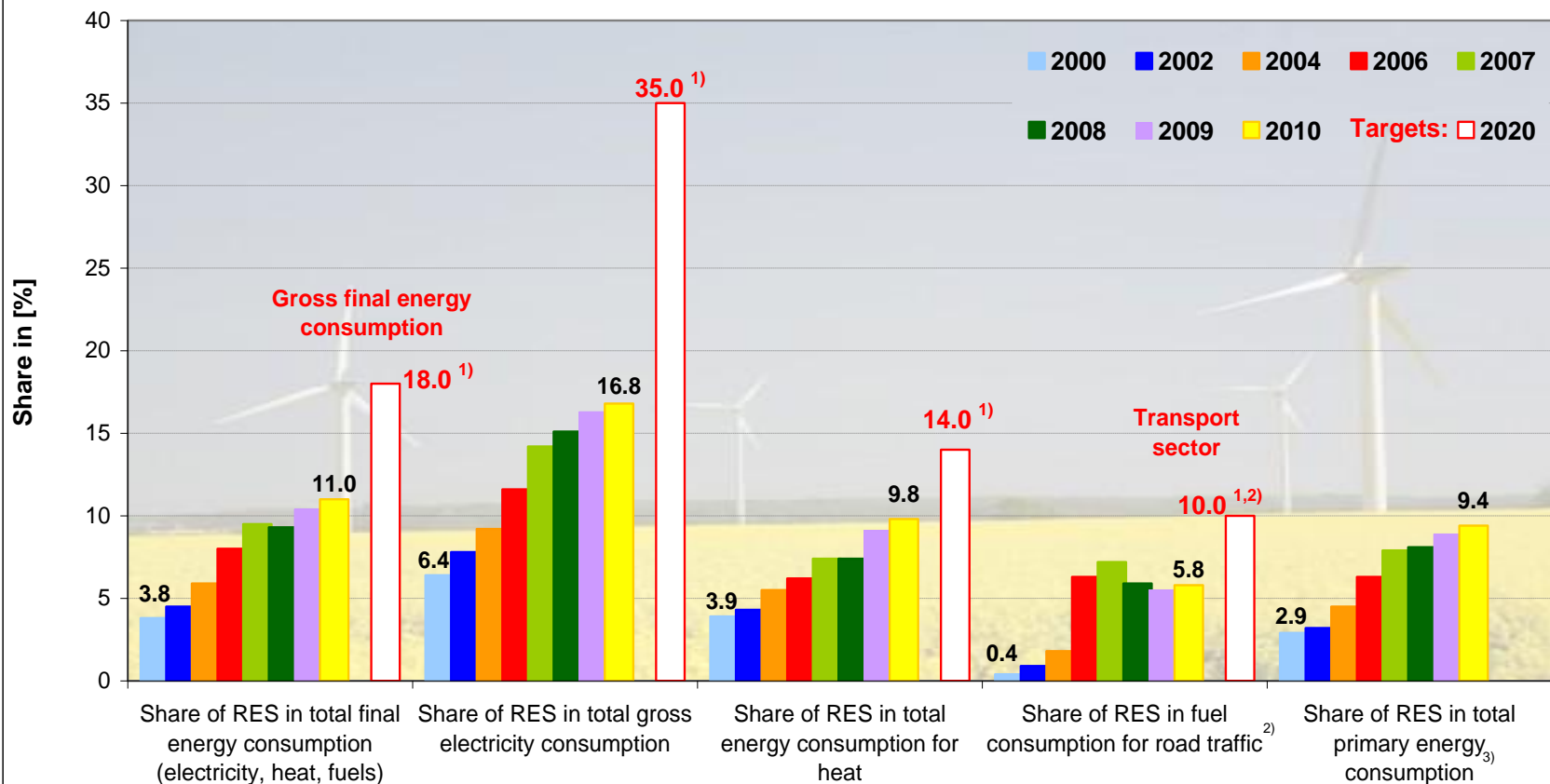
REN21 – GSR-Outreach-Event – Bonn, 7th of October 2011

BEE - the German Renewable Energy Federation is the umbrella organization of renewable energy in Germany, with 24 member associations and organizations representing 30.000 members, including 5.000 enterprises. Our target: 100 % of renewable energy.





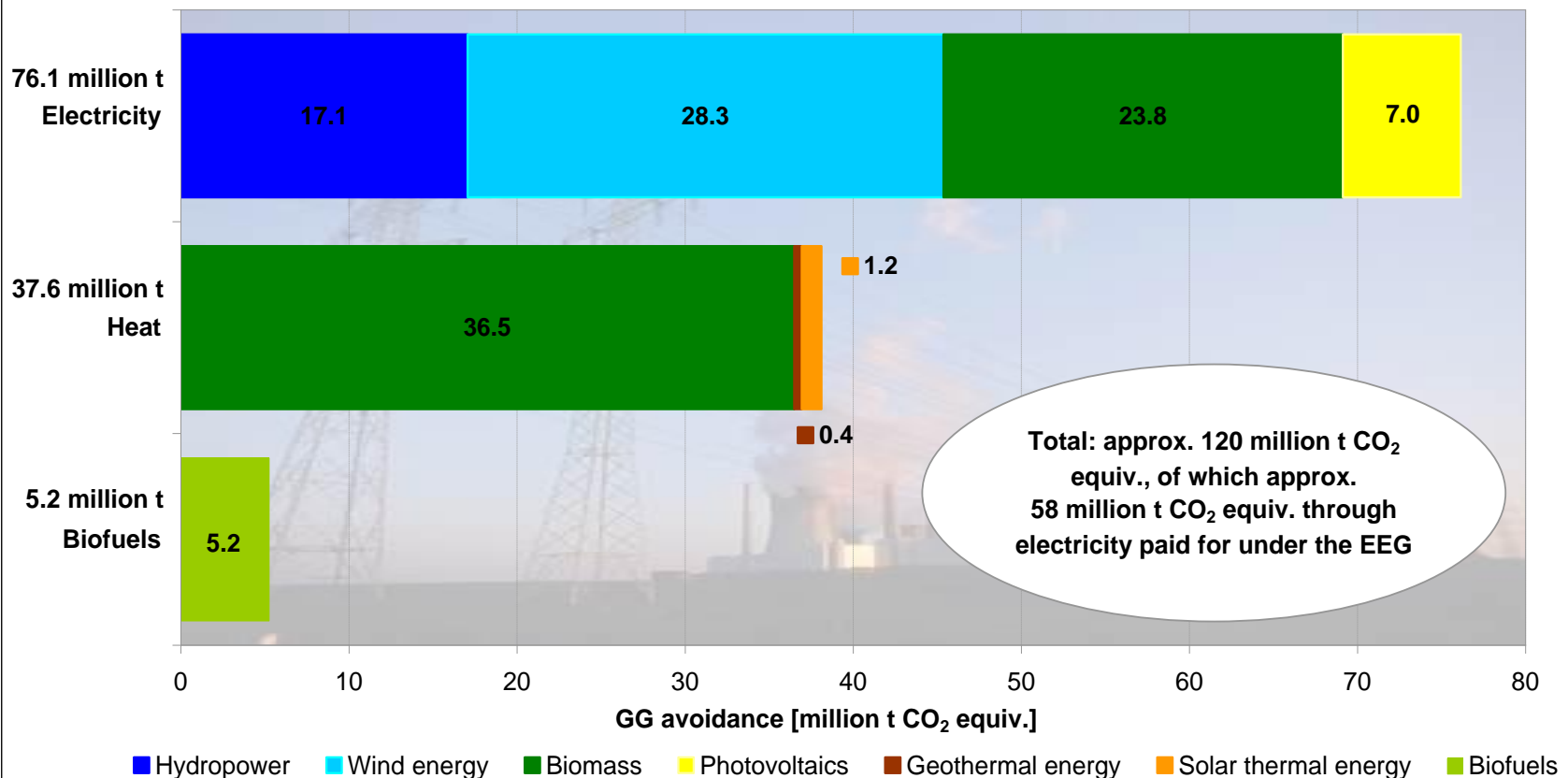
Renewable energy sources as a share of energy supply in Germany



RES: Renewable Energy Sources; 1) Sources: Targets of the German Government according to Energy Concept, Renewable Energy Sources Heat Act (EEWärmeG) and 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); Source: BMU-KI III 1 according to Working Group on Renewable Energy Sources-Statistics (AGEE-Stat); image: BMU / Brigitte Hiss; as at: March 2011; all figures provisional

Industry forecast: 287 million tons CO₂eq in 2020

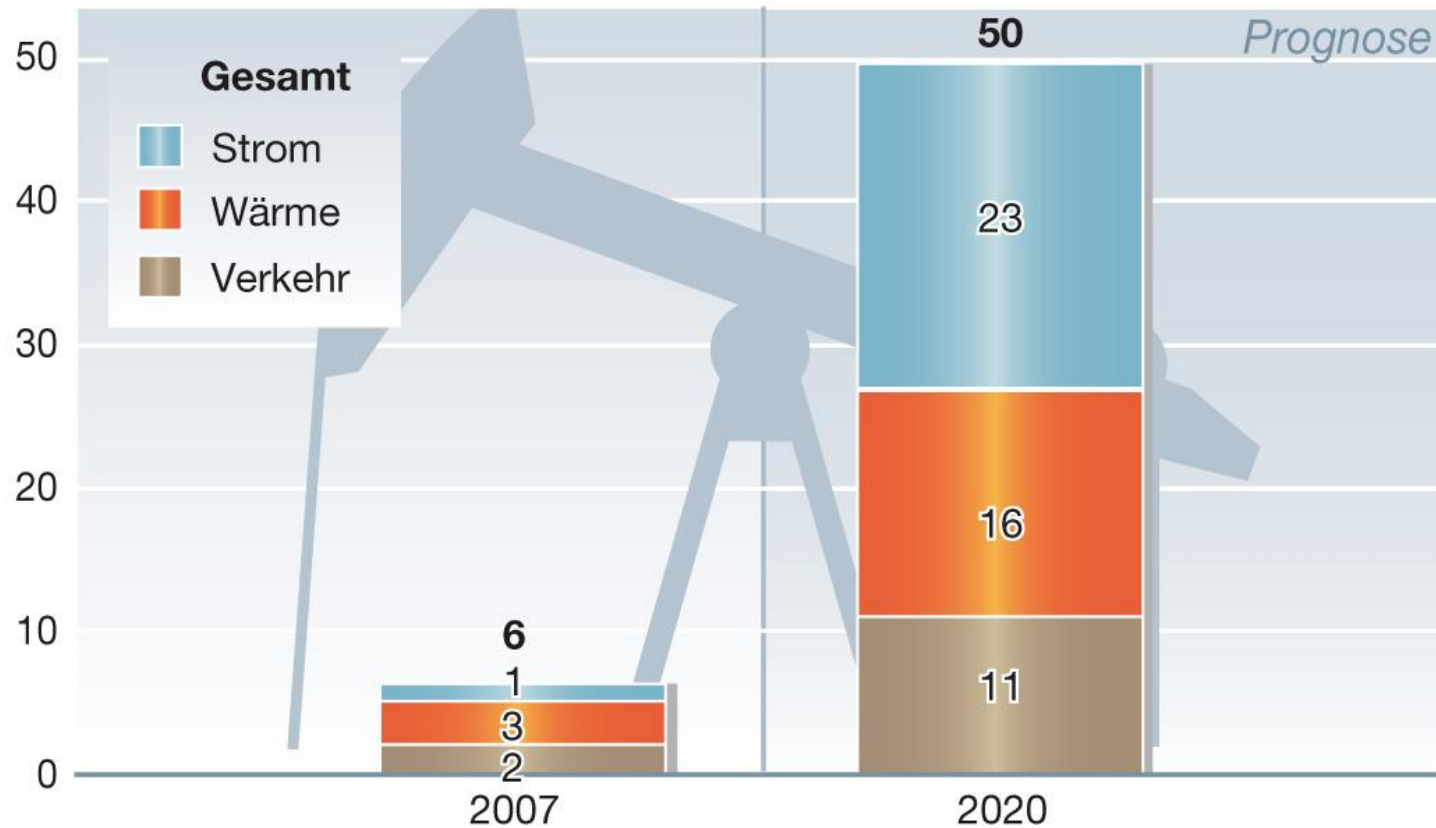
Total Greenhouse-Gas (CO₂ equiv.) avoidance via the use of renewable energy sources in Germany 2010



GG: 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 Sources-Statistics (AGEE-Stat); image: H.G. Oed; as at: March 2011; all figures provisional

Avoided Costs for Fossil Fuel Imports due to the Use of Renewable Energy in Germany: 2007 / 2020

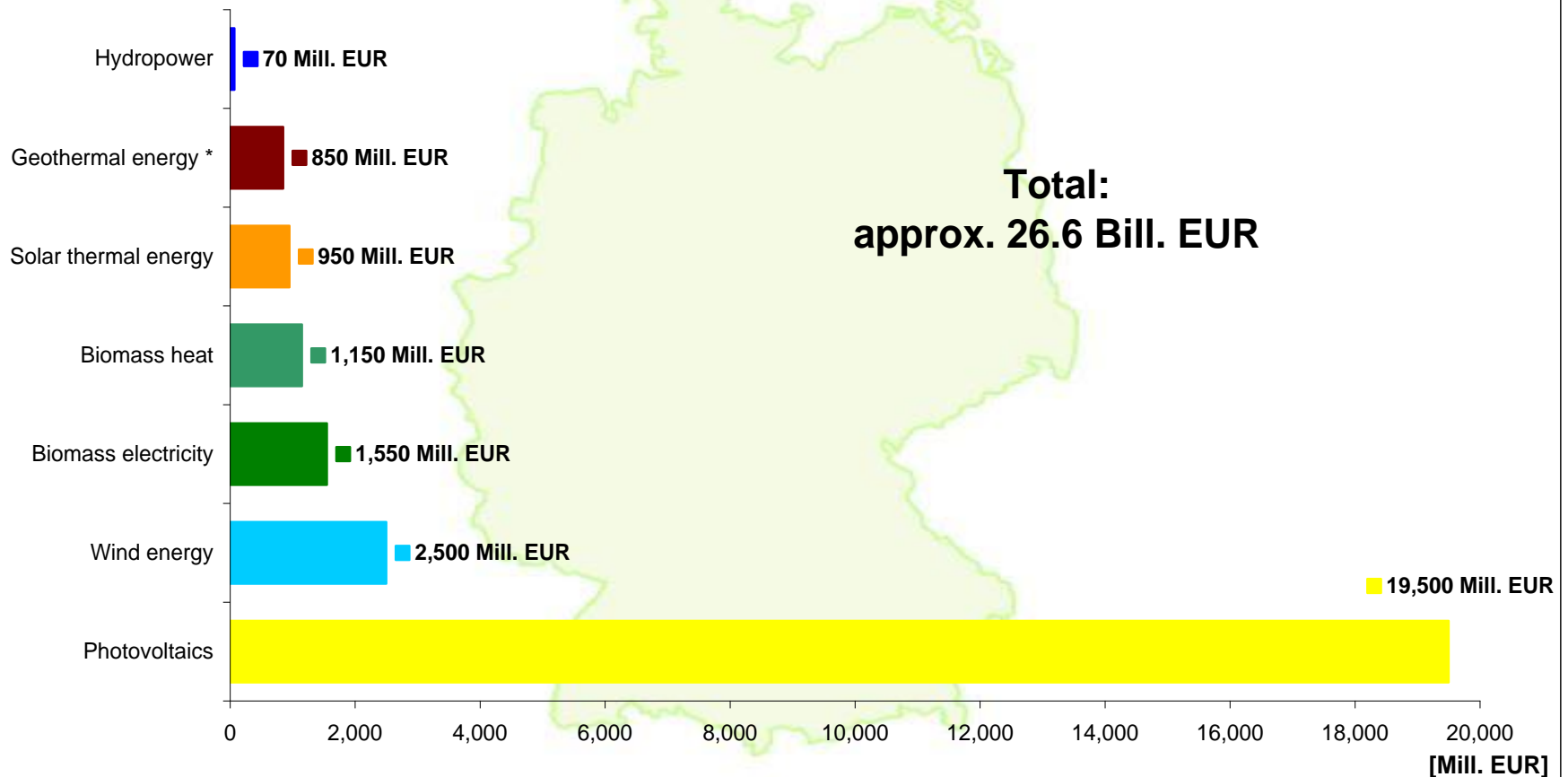
Mrd. Euro



Quelle: Branchenprognose (Stand: 10/2009)

Industry forecast: more than **200 bn. €** cumulative Investment 2005 - 2020

Investments in the construction of renewable energy installations in Germany 2010

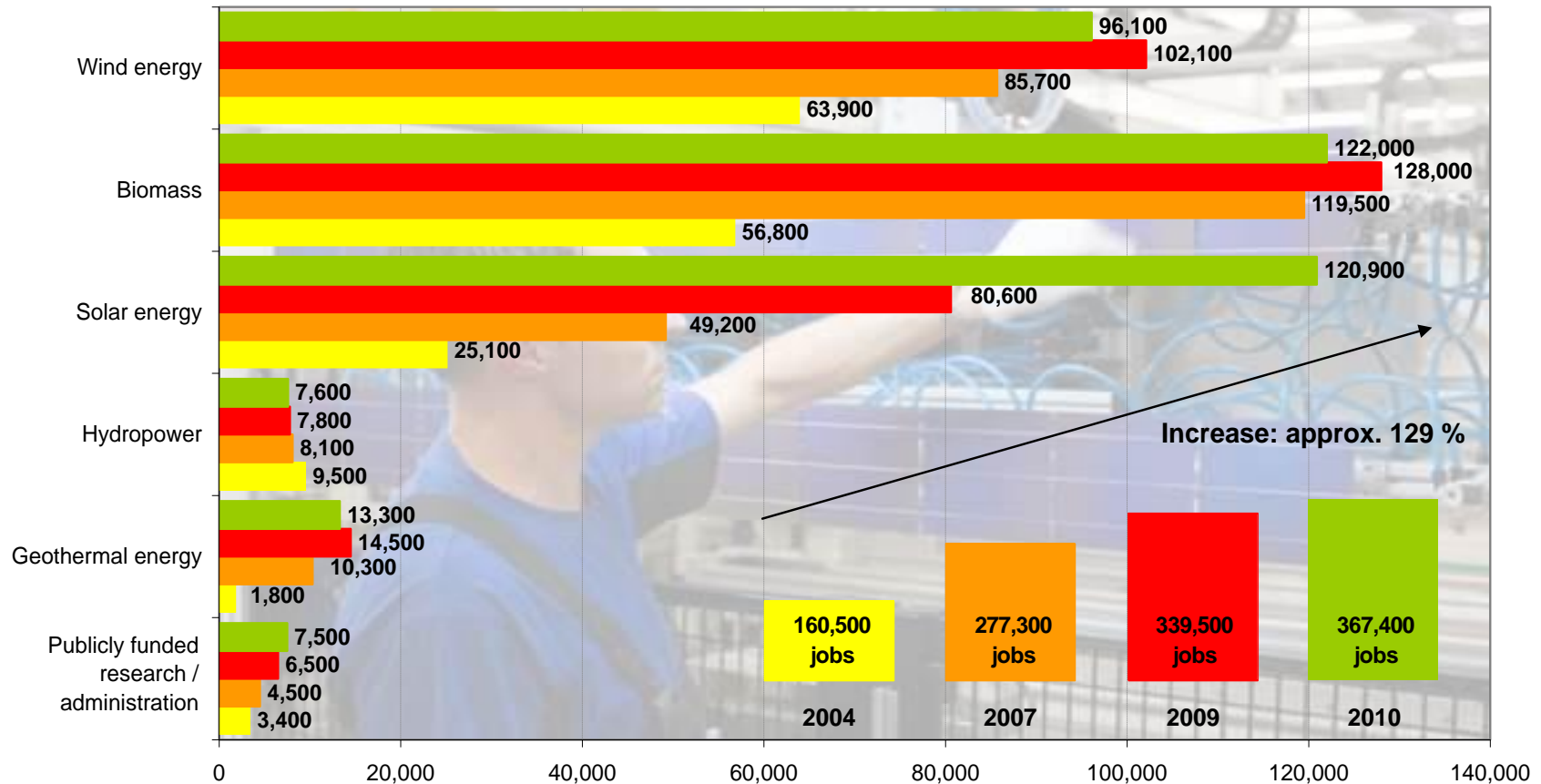


* Large plants and heat pumps; deviations in the totals are due to rounding;

Source: BMU-KI III 1 according to the Centre for Solar Energy and Hydrogen Research Baden-Wuerttemberg (ZSW); as at: March 2011; all figures provisional

Industry forecast: more than 500,000 jobs in 2020

Jobs in the renewable energy sources sector in Germany

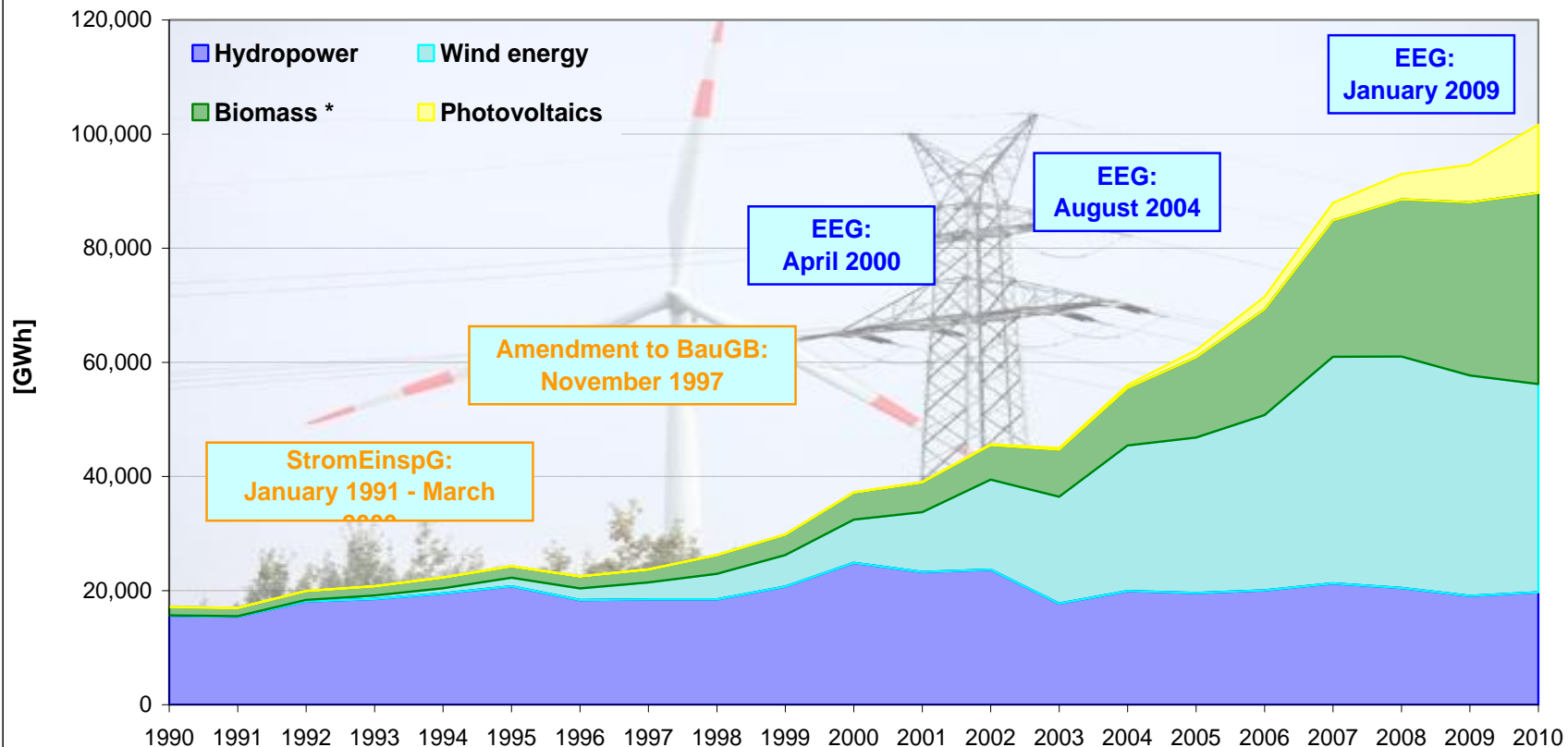


Figures for 2009 and 2010 are provisional estimate; deviations in totals are due to rounding;

Source: O'Sullivan/Edler/van Mark/Nieder/Lehr: "Bruttobeschäftigung durch erneuerbare Energien im Jahr 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: BMU / Christoph Busse / transit



Development of electricity generation from renewable energy sources in Germany



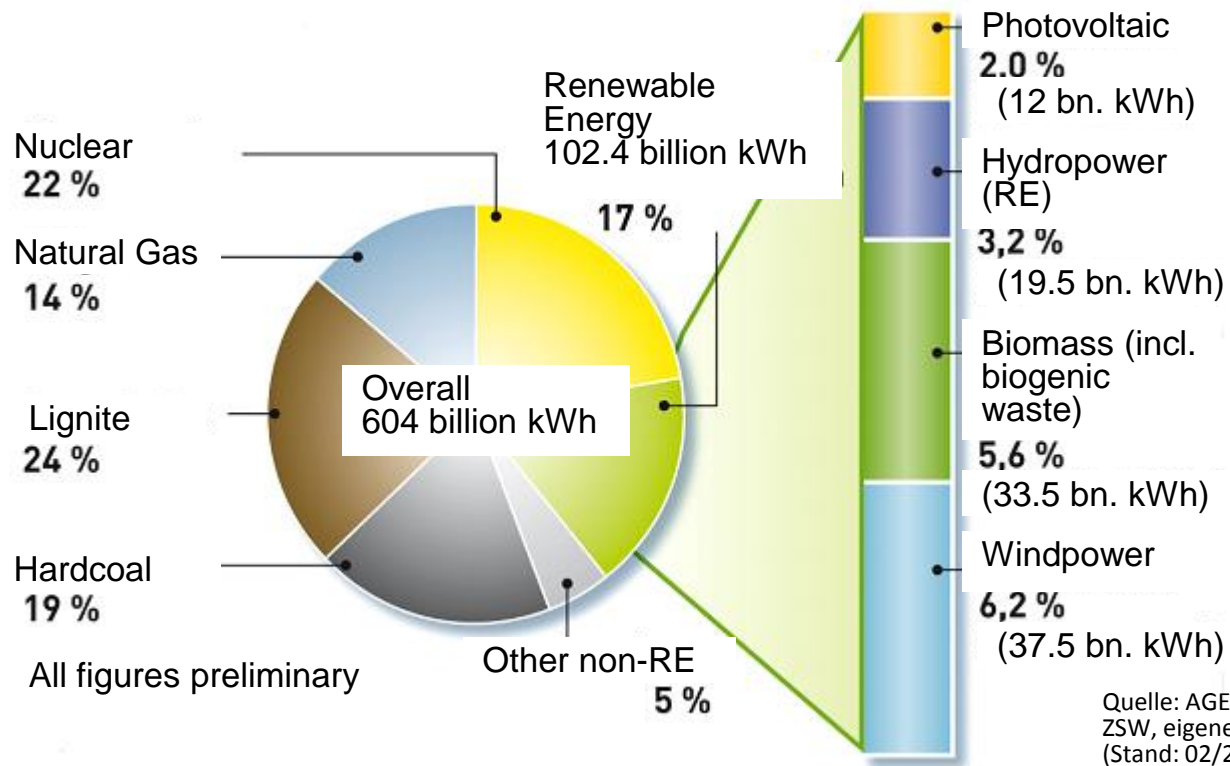
* Solid and liquid biomass, biogas, sewage and landfill gas, biogenic share of waste; electricity from geothermal energy not presented due to negligible quantities produced; 1 GWh = 1 Mill. kWh;

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 Sources-Statistics (AGEE-Stat); image: BMU / Christoph Edelhoff; as at: March 2011; all figures provisional

The German Electricity Mix

Renewable Energy Share in 2010: 17% of Electricity Consumption



➔ **Already today, Renewables are playing an important role!**

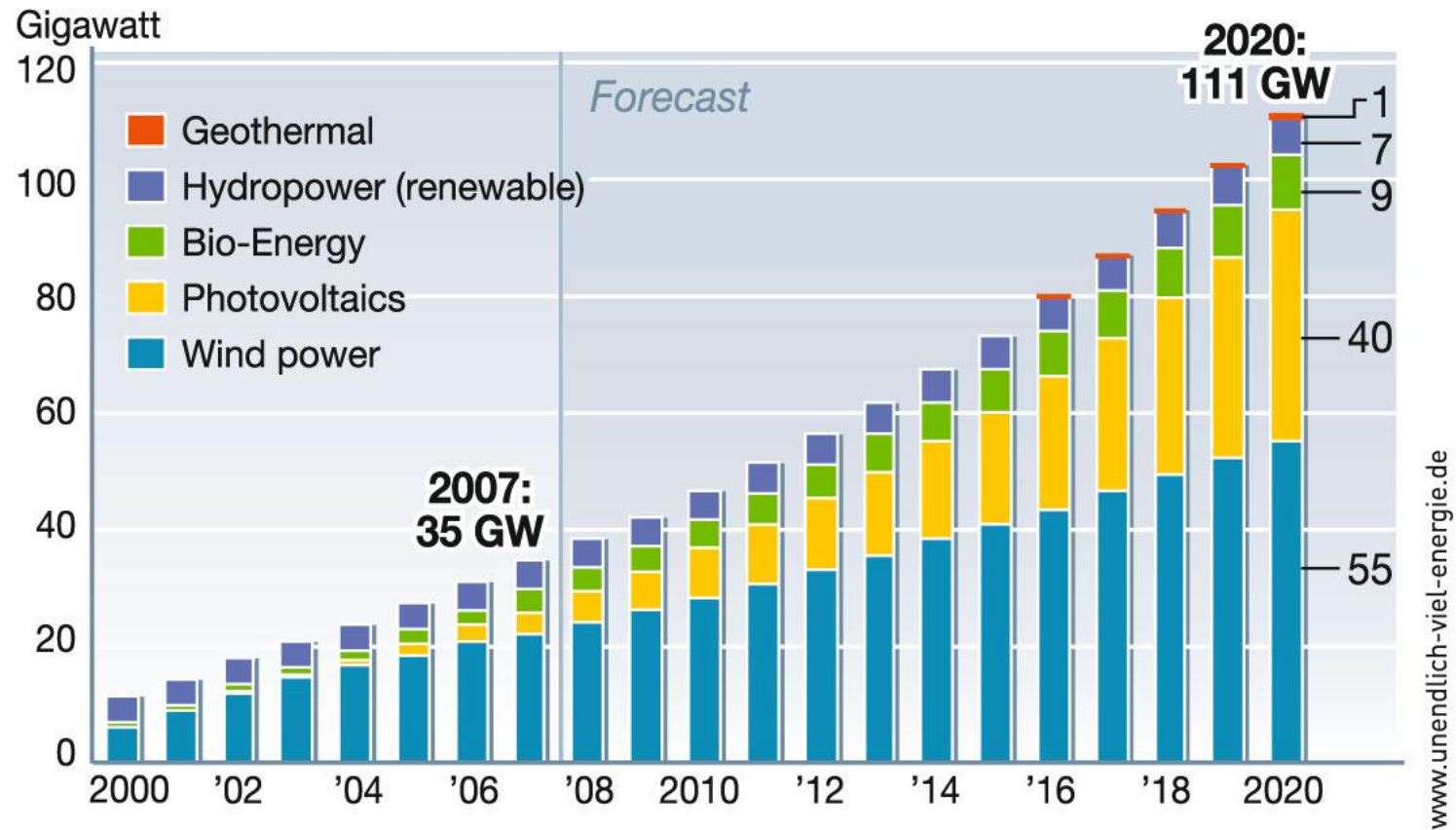
Future Oriented Growth

- Germany is widely considered as a **frontrunner in innovative green technologies**: now heading for Renewables as dominant sources of energy.
- **Billions of Euros were invested** in sustainable energy; this will continue, if a stable and reliable framework is maintained.
- **Costs for renewable energy technologies are decreasing** considerably: (Rooftop) PV will reach **grid parity** in Germany in a few years. Freestanding installations are down to 21 ct/kWh.
- **Tens of thousands of future oriented jobs** were created and/or secured all over the country – in manufacturing and in O & M; investment security will help to increase the benefits: more than 500,000 jobs in 2020.

How was this possible?

- In Germany, there is an overwhelming **consensus** in favour of renewable energy.
- Targets and policies for **all sectors**, Electricity, Heating, Transport.
- **Law granting priority to electricity from renewable energy sources** (Renewable Energy Law – “EEG”):
 - Targets for 2010 (12.5%) and 2020 (>35%) etc.
 - Priority access to the power grid
 - guaranteed remuneration for 20 years (feed-in tariffs)
 - Differentiation of support level (technology, size, site)
 - Regular degression + periodical review.

Installed Capacity for Electricity Production from Renewable Energies in Germany until 2020

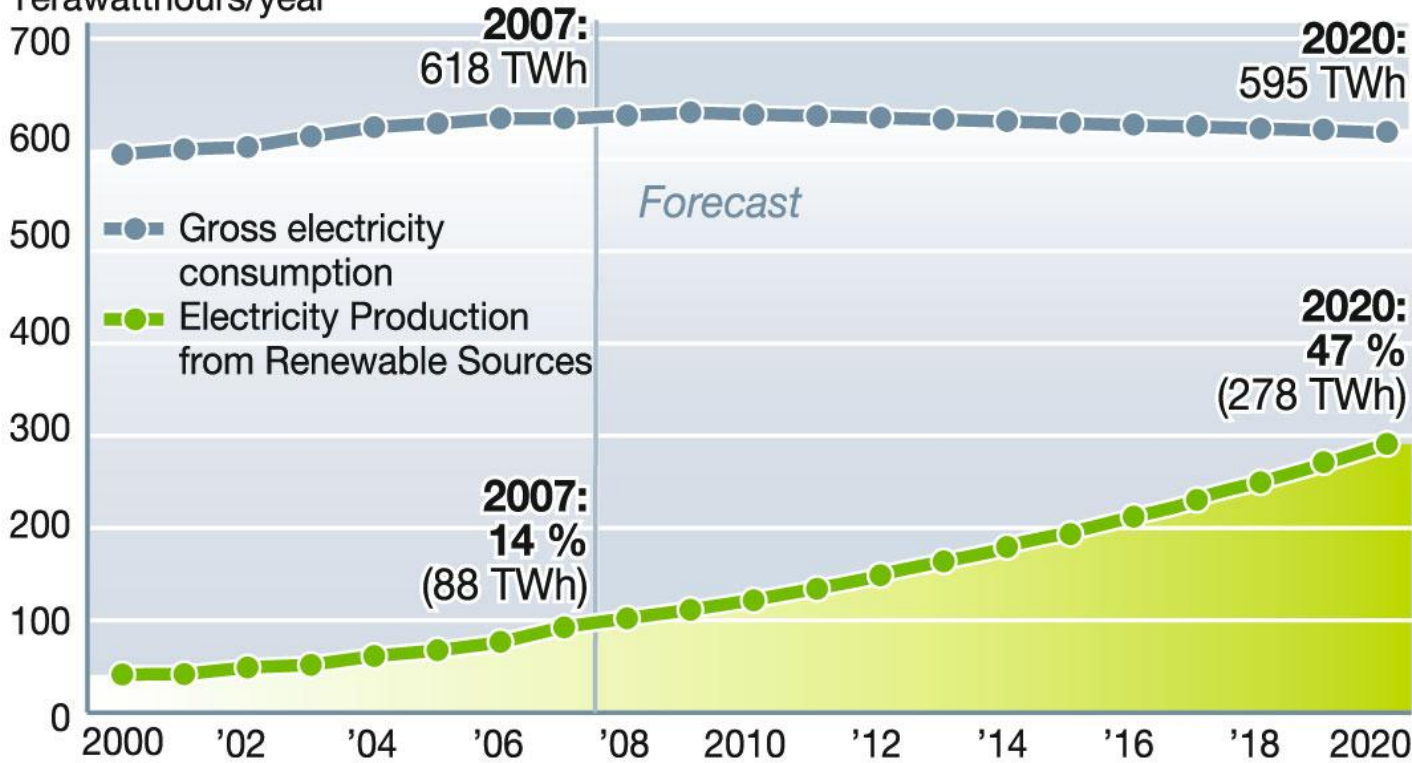


Source: Industry Forecast 2020; Status: 1/2009

Share of Renewable Energies in Germany's Electricity Consumption until 2020

Until 2020, the share of Renewable Energies will reach 47 %.

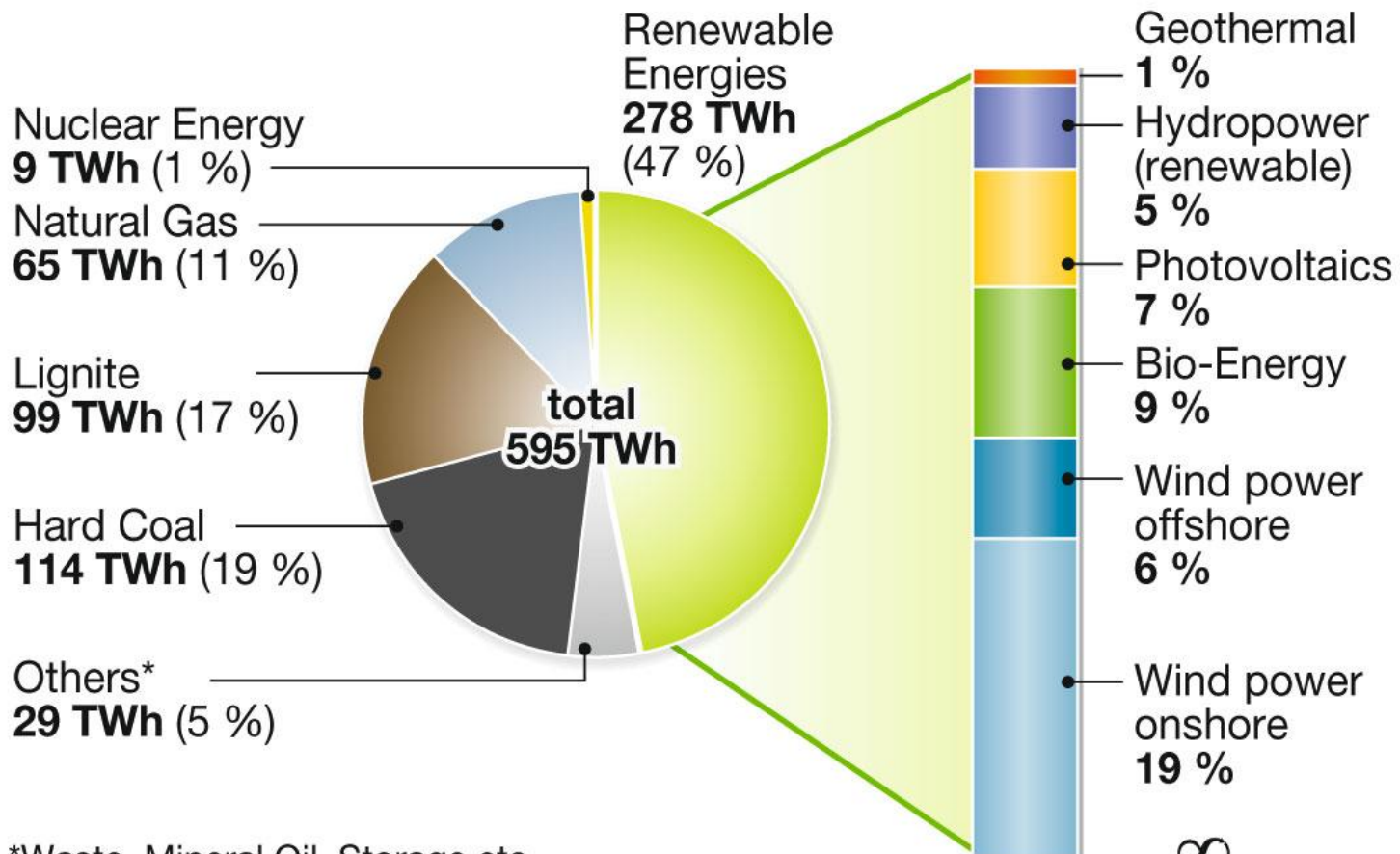
Terawatthours/year



www.unendlich-viel-energie.de

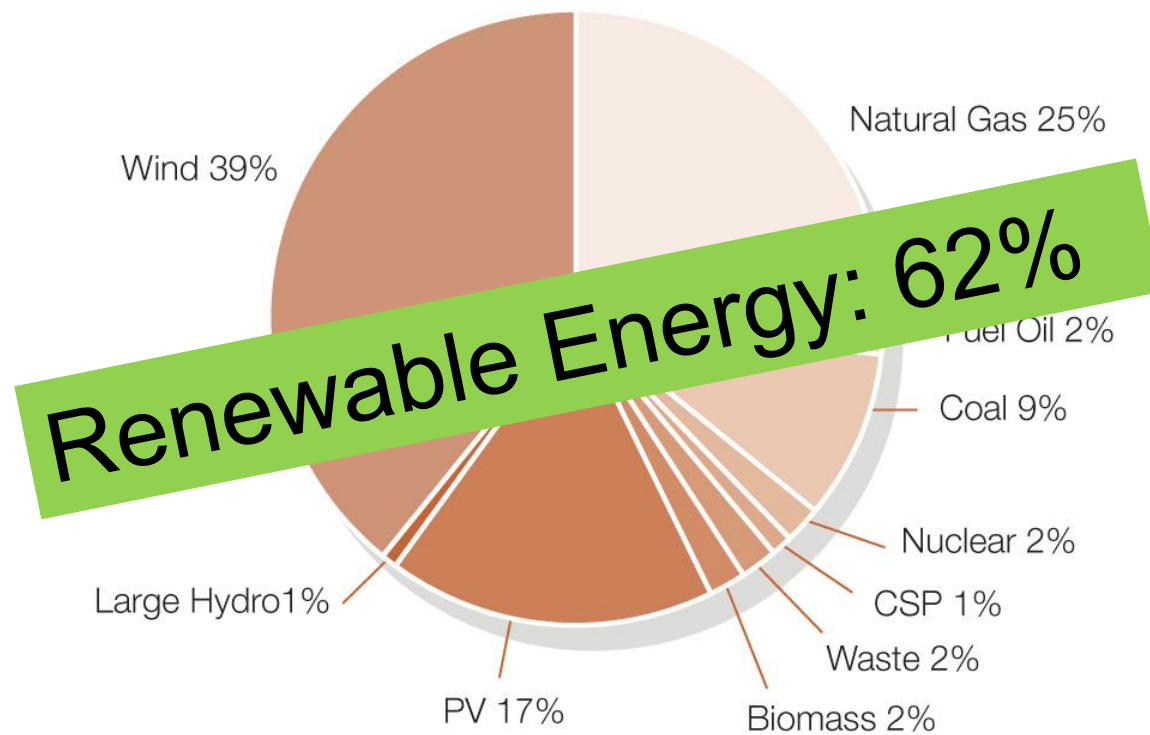
Source: Industry Forecast 2020; Status: 1/2009

The Electricity Mix in 2020: Renewable Energies Ensuring 47 % of Supply



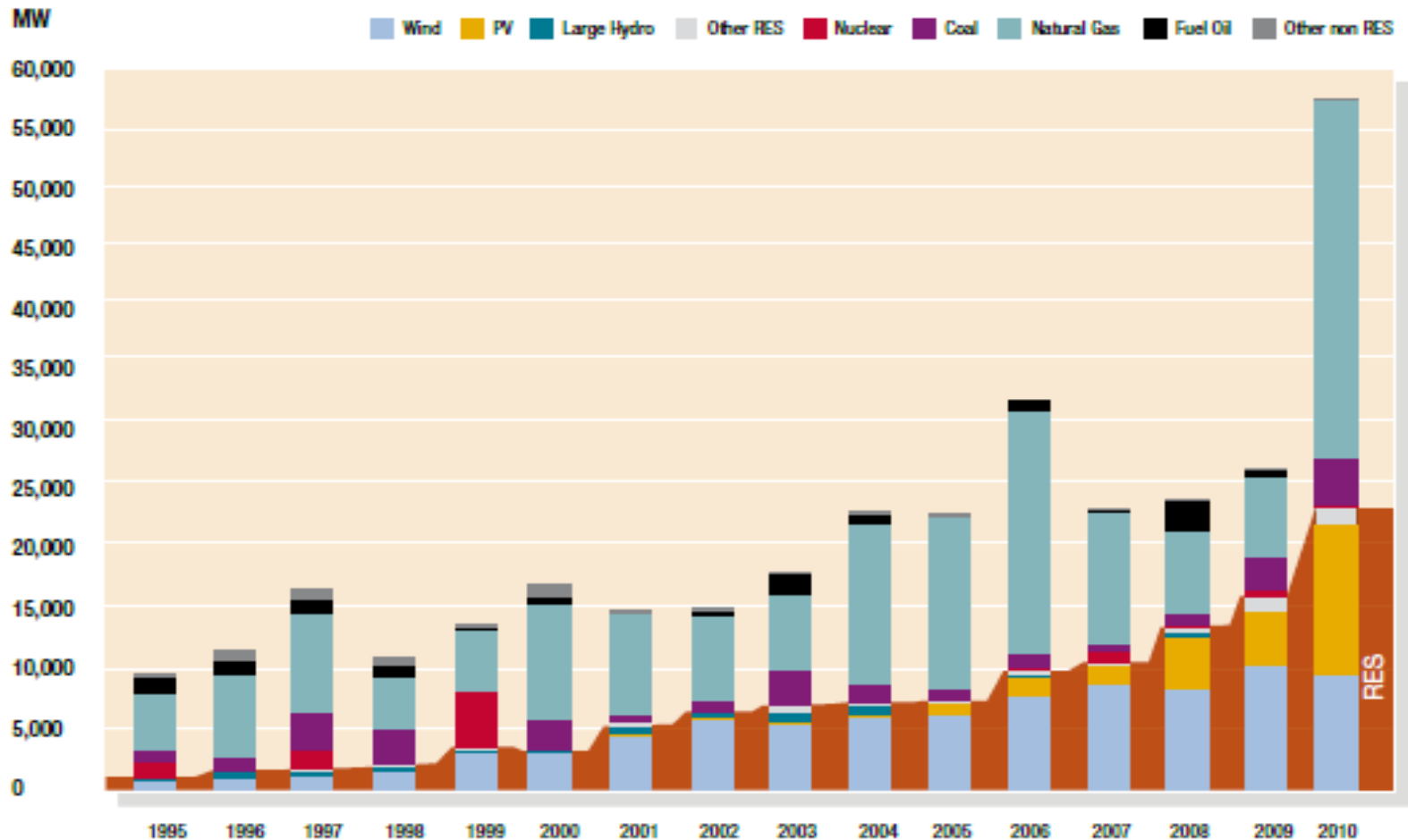
*Waste, Mineral Oil, Storage etc.
 Source: Industry Forecast 2020; Status: 1/2009

New power capacity installed, EU 2009



Source: EWEA, EPIA, ESTELA, EU-OEA and Platts Powervision

EU 1995 - 2010: New installed power capacity per year (MW)

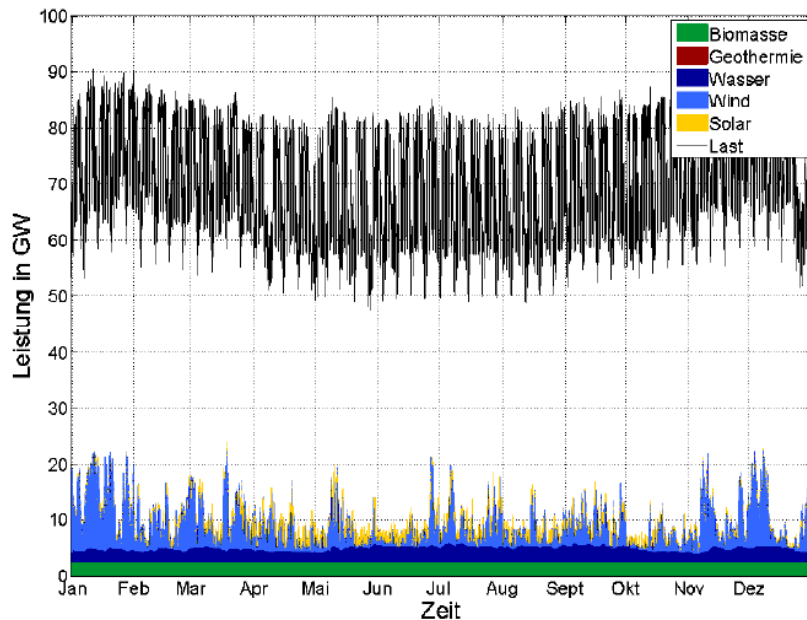


Source: EWEA (2011)

The Challenge and the Chance

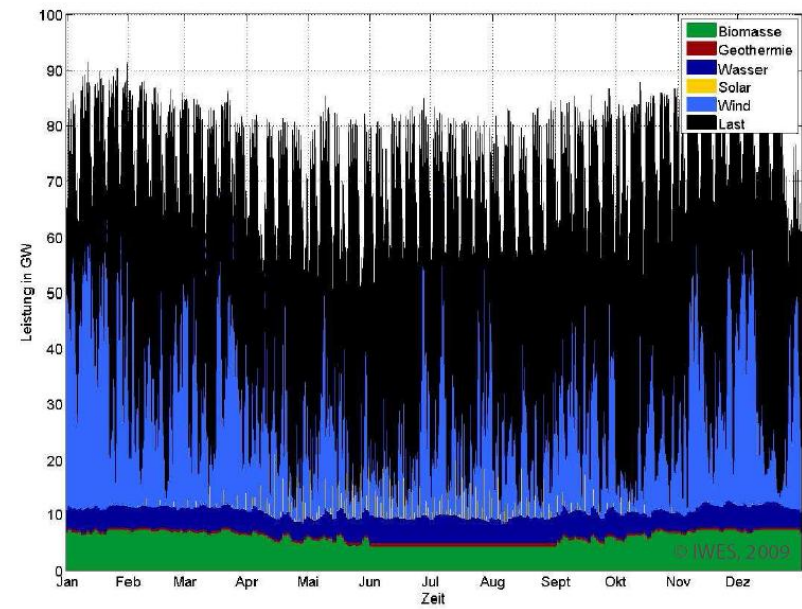
A comparison of load/demand with the amount of renewable electricity fed into the grid shows the contribution renewables can provide to supply security in 2007 and in 2020 and the related challenge for the grid system.

Simulation 2007:
15 % RE (hourly resolution)



Quelle: Sterner et al. 2010

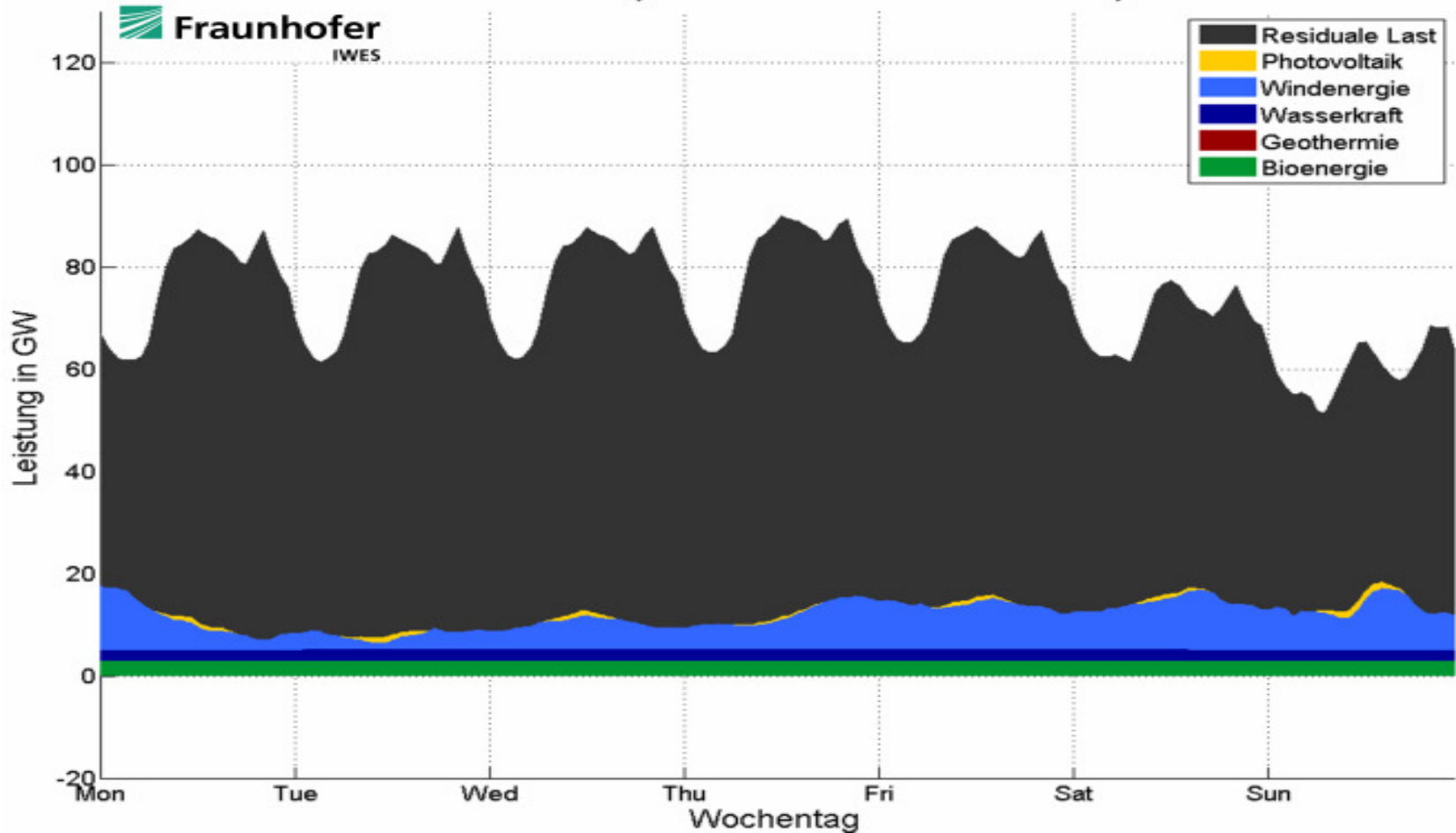
BEE-Szenario 2020:
47 % RE (hourly resolution)



Quelle: Saint-Drenan et al. 2009

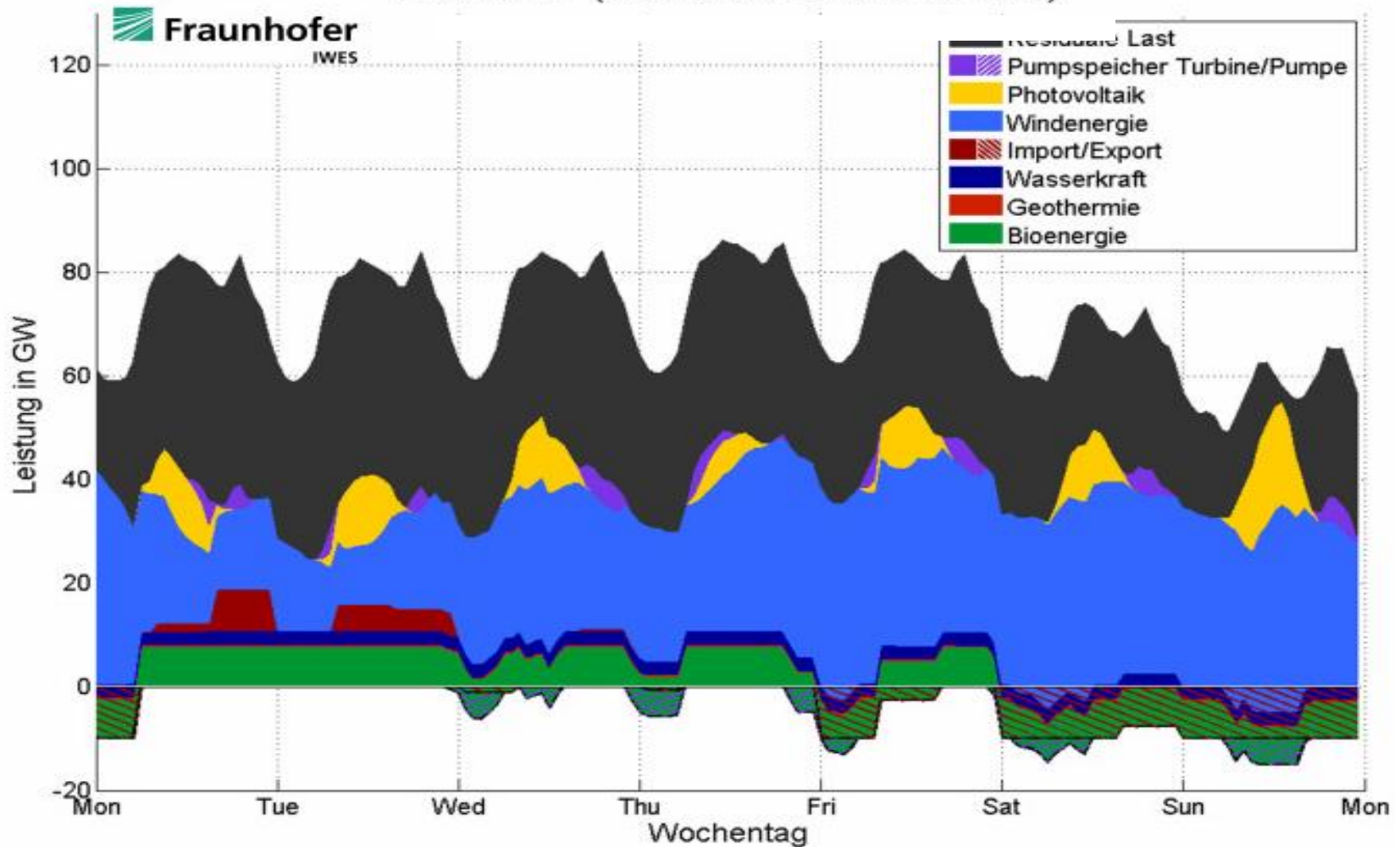
Paradigm Shift: Demand, Supply, Residual Load (2007)

Woche 12 (19/03/2007 bis 25/03/2007)

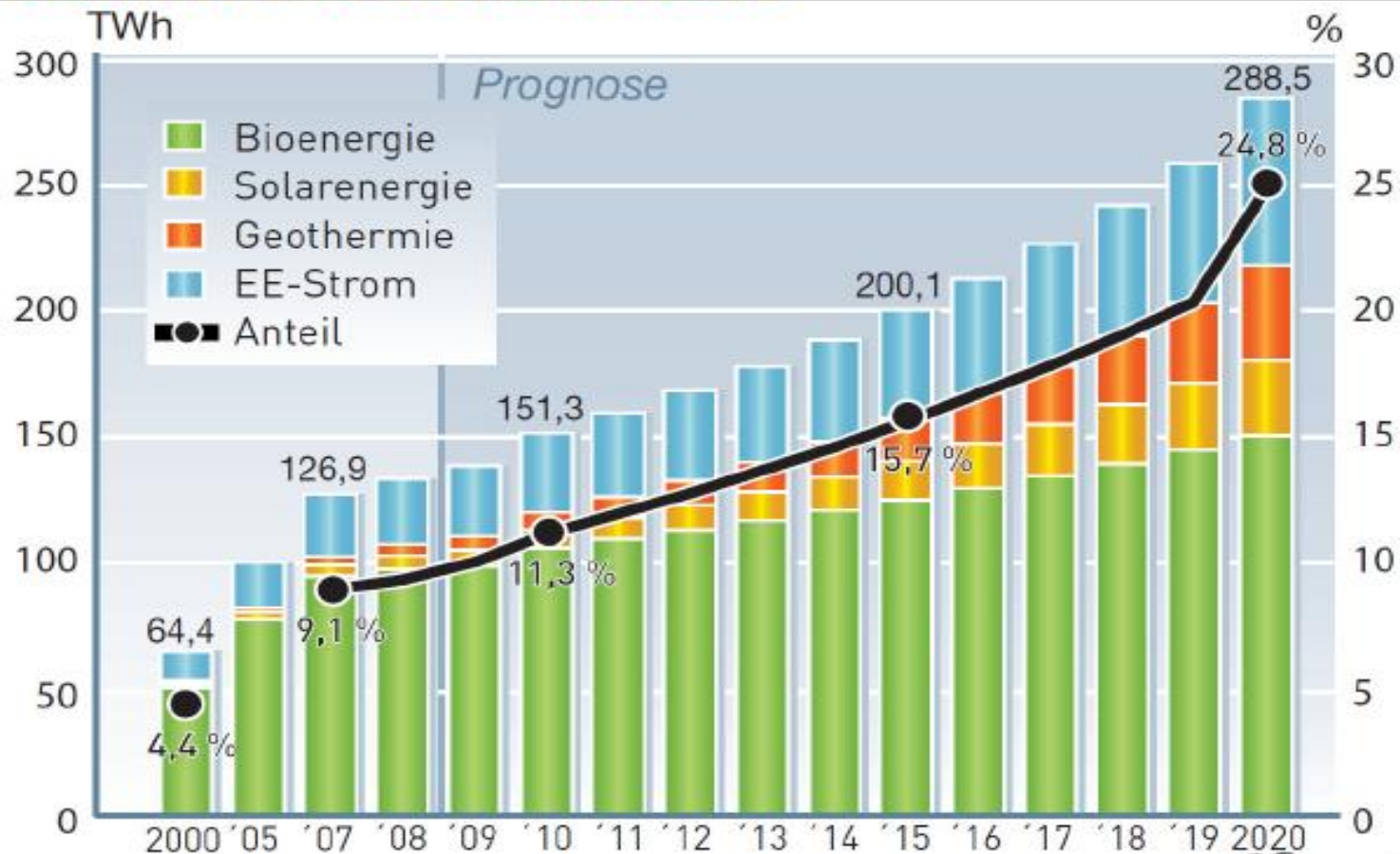


Towards 50% and more Renewables (2020)

Woche 12 (19/03/2007 bis 25/03/2007)

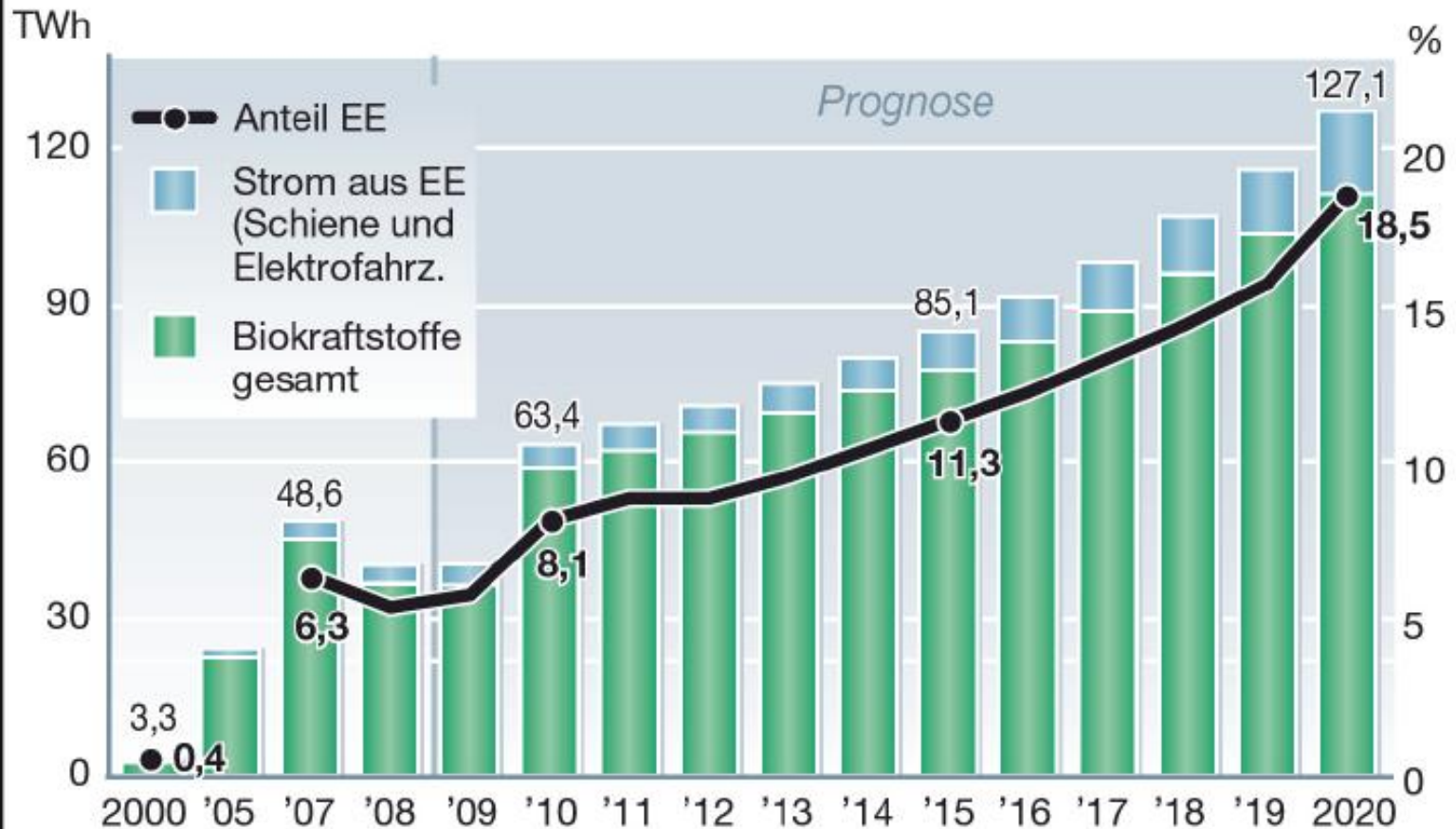


Heat from Renewables and Share of Heat Consumption



Quelle: Branchenprognose (Stand: 10/2009)

Development and Share of Renewable Energies in Transport



Quelle: Branchenprognose (Stand: 10/2009)

On track towards a Renewables based Energy System in Germany?

- After Fukushima, the important decision to phase out nuclear until 2022 was taken.
- Targets and policies for accelerated deployment of Renewables were hardly improved. Changes are leading in the wrong direction; important incentives missing.
 - Priority for RE is not improved but weakened.
 - Missing incentives for system integration and system services.
 - Insufficient incentives for development of storages capacities.
 - Grid development and enhancement: first steps, not enough.
 - Market integration: rather counter-productive decisions.
- No effective policies for heating & cooling and for the transport sector were introduced.

Recommendations (1 of 2)

- After the decision to phase out nuclear, ambitious **targets** and a stable and reliable **framework** for accelerated development and deployment of Renewables in all sectors are needed.
- Ambitious growth strategies and policies have to be implemented in **all sectors** – including heating & cooling and transport.
- Policy development should focus on the transformation towards an **energy system** fully relying on a broad mix of renewables.
- The **market design** has to be transformed to provide suitable incentives for a stable and secure energy supply fully relying on renewable energy, integration of various sources and all sectors.
- Continued support for **fossil and nuclear** energy is **detrimental** to the target of efficient and cost effective shift towards renewables.

Recommendations (2 of 2)

- **Unambiguous targets and policies** are necessary – old baseload (coal, nuclear) is neither technically nor economically compatible with an energy supply based on wind, solar, hydro, geothermal and sustainable biomass.
- **A stable and reliable framework for market and system integration of Renewables** must be developed, maintained and fine-tuned. Changes of targets and instruments have a negative impact on investment security and are hurdles for the smooth transition of the energy system.
- **A clear vision** is needed, not only in Germany – the European Union and the Member States should soon agree on targets beyond 2020 and related policies (long investment circles in the energy sector!) → at least 45% RE in FEC in the EU in 2030

Thank you for your attention!

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