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Germany's energy transition: Status quo and Challenges.

2nd Session Group of Experts on Renewable Energy, UNECE, Geneva

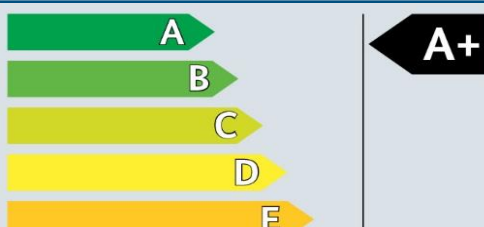
Agenda.

- Energy transition: Status quo and official goals.
- German RES policy and regulation, new EEG.
- Challenges of the energy transition in Germany.
- Conclusion: Most important challenges.



Energy transition: Status quo and official goals.

Two pillars of the energy transition.




Energy Efficiency

Key legislation:
Energy Saving Ordinance
Heating Cost Ordinance

- Reduce energy consumption
- Cost-efficient

Supporting fields of action

Renewable Energy

Key legislation:
Renewable Energy Sources Act
Renewable Energy Heat Act

- Steady growth
- Environmentally friendly

Source: BMWi 2015

- The energy transition's foundation are renewables and reduced energy consumption.

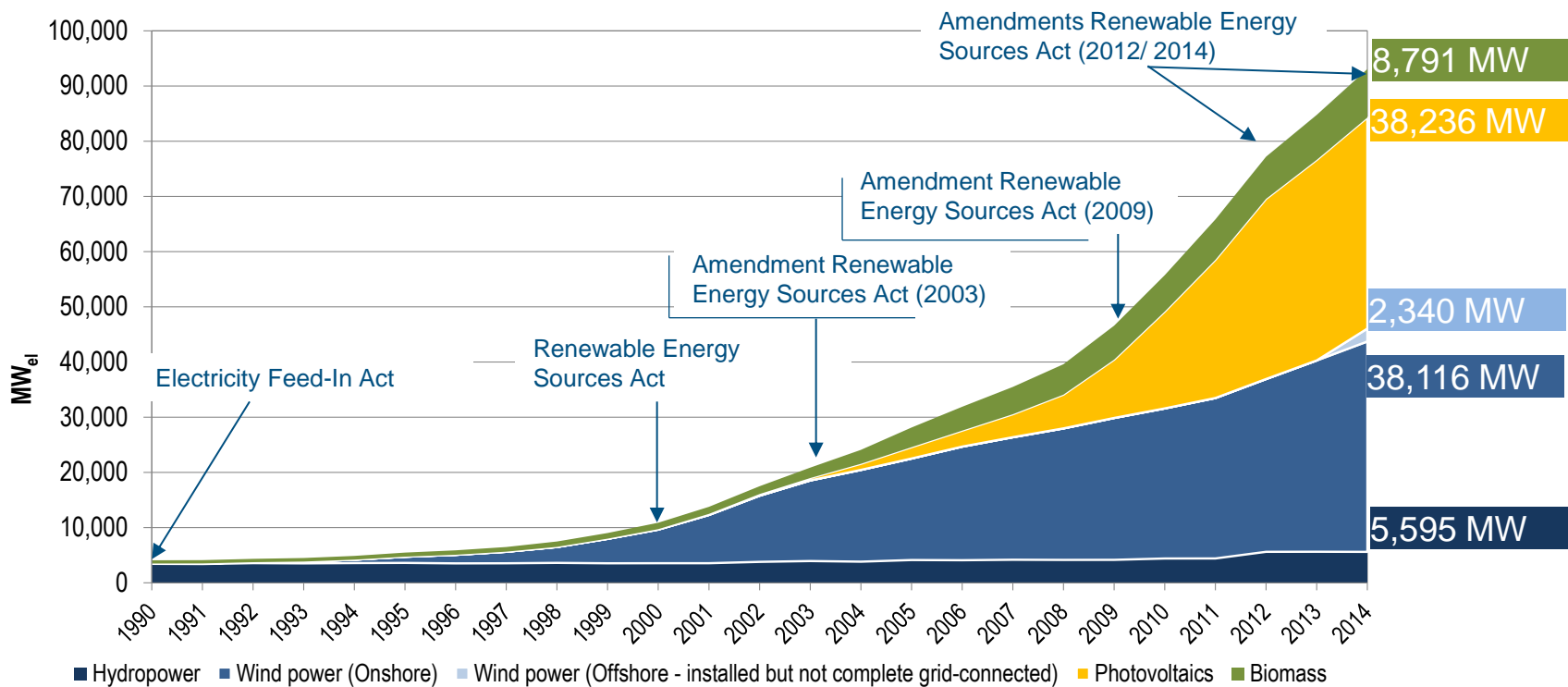
Status quo and goals of the German energy transition two pillars of the energy transition.

	2013	2020
Reduction in CO ₂ emissions (base year 1990)	- 22.6% (2014~ 27%)	- 40%
Renewable energies as a proportion of gross final consumption of energy	12%	18%
Renewable energies as a proportion of electricity consumption	27.7% (2014)	35%
Renewable energies as a proportion of heat consumption	9.1%	14%
Renewable energies as a proportion of fuel consumption	5.5%	-
Increasing Energy Productivity	0.2% p.a. (2008-2013)	2.1% p.a. (2008-2050)
Energy efficiency: target primary energy consumption (base year 2008)	- 8.9% (2014)	- 20%
Energy efficiency: target electricity consumption (base year 2008)	- 3.2%	- 10%
Energy efficiency: target consumption in buildings (heat – base year 2008)	+ 0.8%	- 20%

Recently issued Instruments to face challenges concerning energy efficiency:

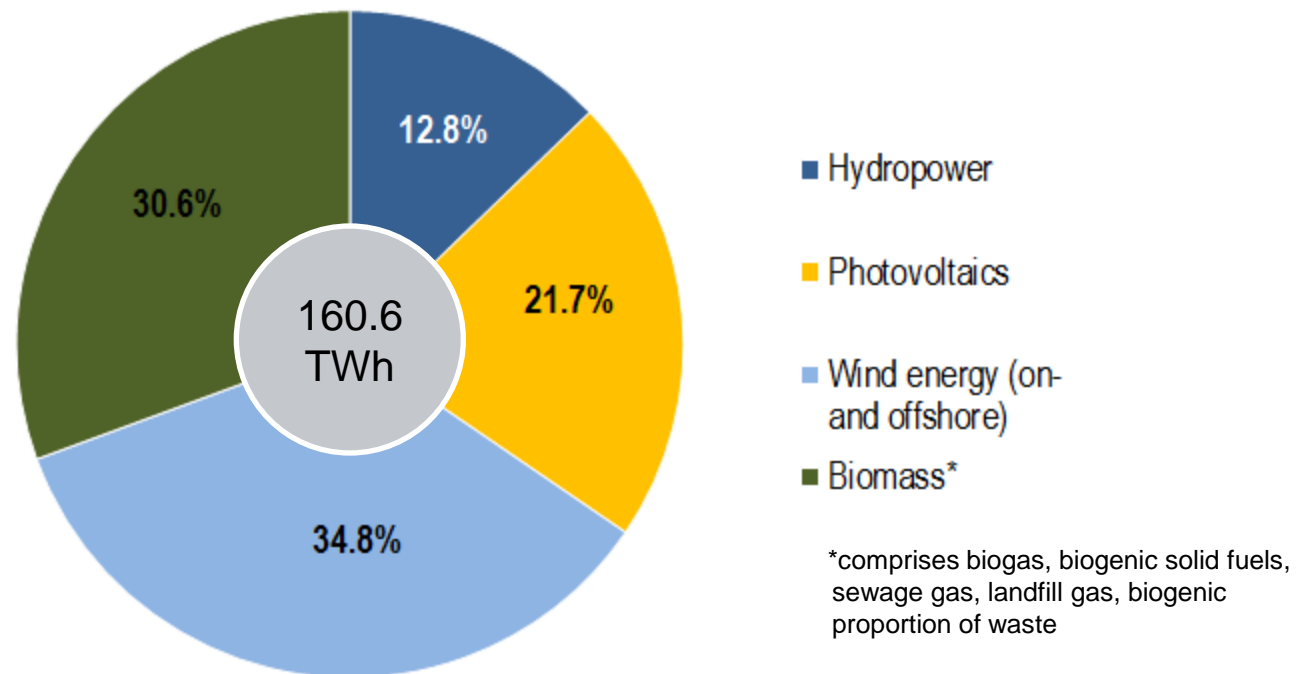
- Action Plan - Climate Protection
- National Action Plan for Energy Efficiency (NAPE)

Previous successes: Historical development of renewable energies in Germany



Source: BMWi 2015

Renewable shares in the electricity sector (2014).

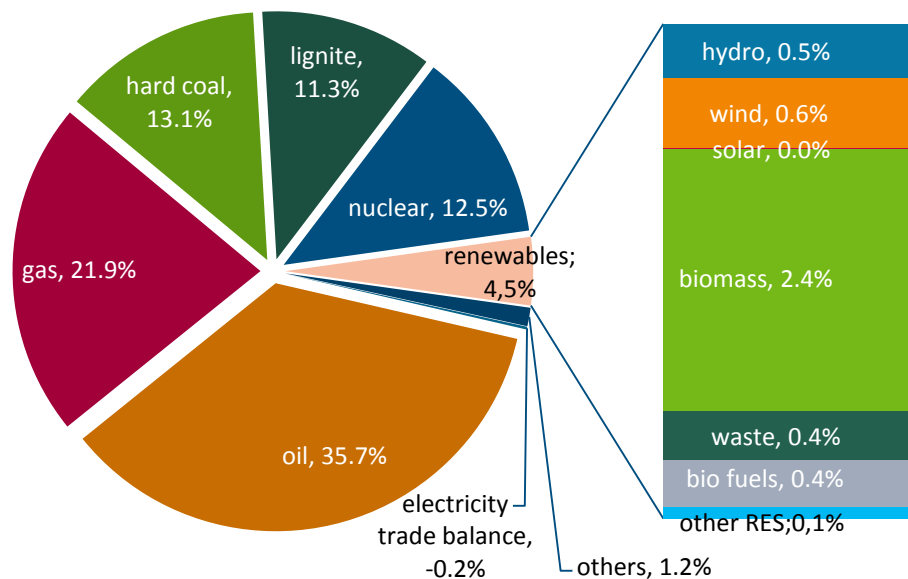


Geothermal energy accounted for 0.1% in 2014.

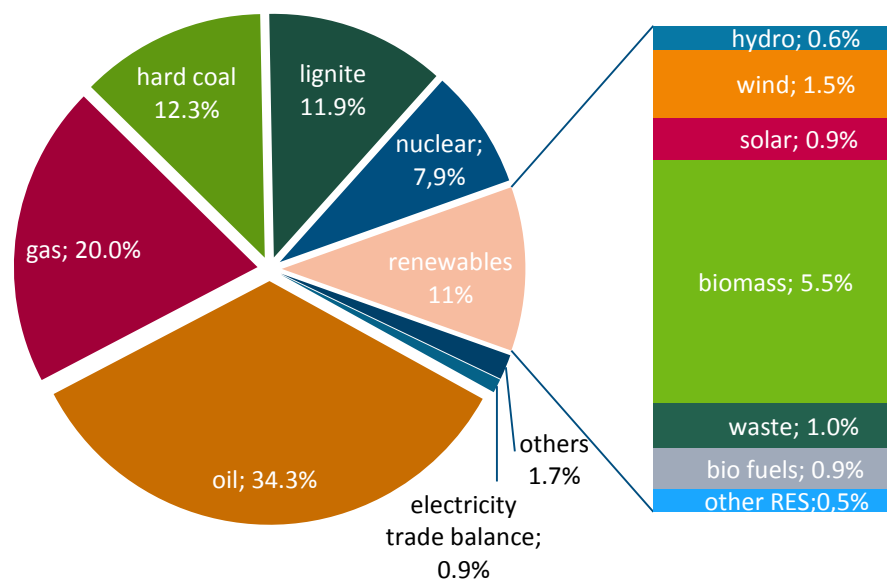
- In 2014, renewable energies produced 160.6 TWh of electricity in Germany. This corresponds to a share of 27.8 of total electricity consumption.

German primary energy consumption.

2004 total: 14,591 PJ



2014 total: 13,095 PJ



The renewables' share tripled within ten years.



German RES policy and regulation, new EEG.

Cornerstones of the Renewable Energy Sources Act (EEG).

- Guaranteed grid access; priority transmission and distribution.
- Fixed price (tariff or premium) for every kWh produced.
- Tariffs are set for each type of technology and with regard to further provisions (e.g. site and size).
 - Minimum: 3.5 ct/kWh (Hydropower)
 - Maximum: 25.2 ct/kWh (Geothermal)
- Additional costs for renewable energy production are offset through the EEG levy (2015: ~ 6.17 ct/kWh), with reductions for energy-intensive industries.
- Additional costs are offset via grid operators and independent of the public budget.
- Regular monitoring and evaluation; accompanying research
 - Past and future amendments of the act.

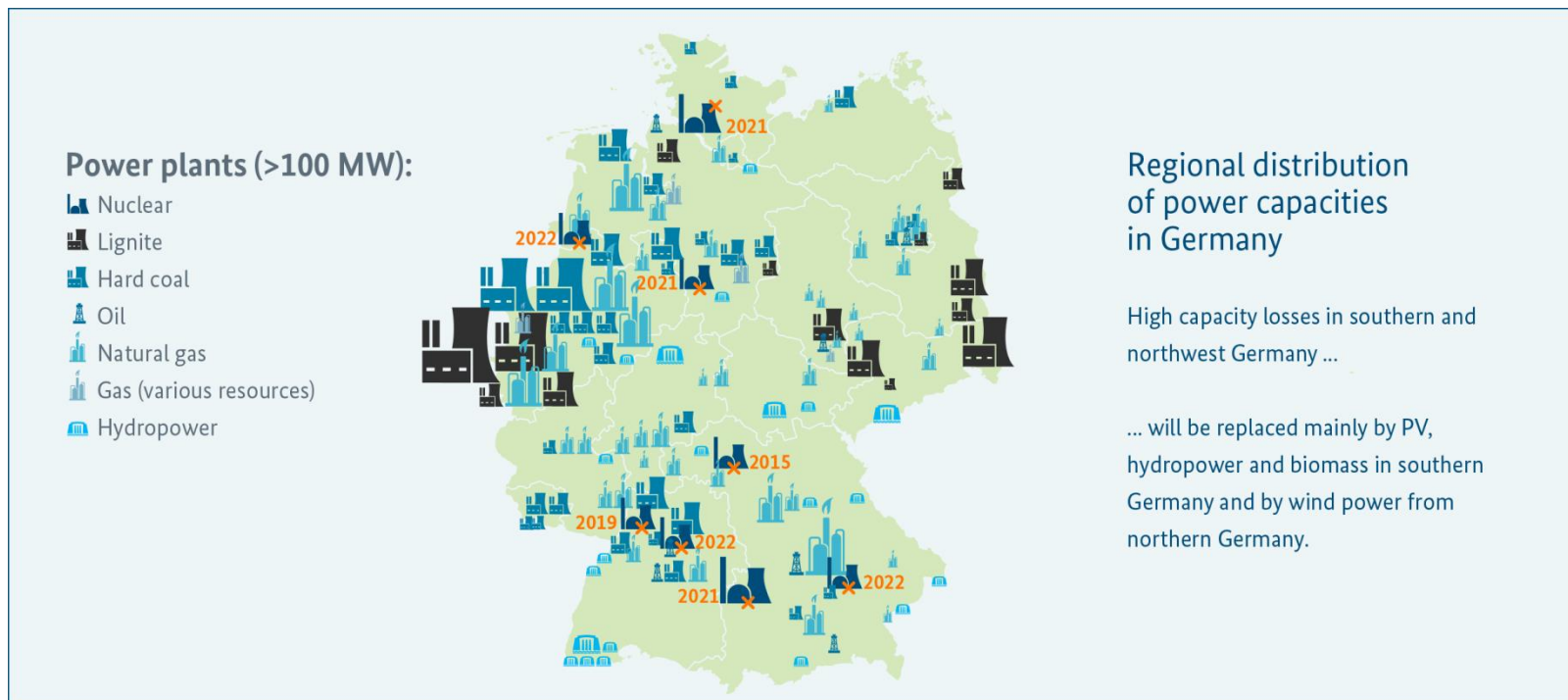
2014: Amendment of the EEG – focal points.

- Binding target corridors for RES deployment.
- Introducing quantity control mechanisms – breathing cap.
- Increase market integration through premium system.
- Introduction of tendering schemes:
 - For ground-mounted PV (pilot auctions in 2015).
 - General intention: determine support levels through tenders for all renewable technologies by 2017.
 - Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway, or Bundesnetzagentur as executing body.
- EEG surcharge on self-supply.
- Adjusted exemptions for the industry.



4: Challenges and options of Energy transition.

German power generation capacities by region.



Source: BMWi 2015 / UBA, BNetzA 2013

- Nuclear phase-out until 2022 will affect regions to a different extent.

Climate Action Programme 2020.

- The action programme (December 2014) comprises nine central components (including the National Action Plan for energy efficiency).
- In total, the action programme will lead to a reduction of around 62 to 78 million tonnes CO₂ equivalent in 2020 compared with the current projection for 2020.

National Energy Efficiency Action Plan (NAPE).

Strategy on climate-friendly building and housing.

Climate action measures in the transport sector:
Strengthening green modes of transport.

Reducing non-energy-related emissions:
Industry, commerce, trade, services, waste management and agriculture.

Reforming European emissions trading.

Expansion of renewable energies in the energy sector.

Foster model function of the state: e.g. public procurement.

Research and development:
Decarbonisation of the economy.

Consultation, awareness raising and initiatives at all level:
Cross-sectoral projects and programmes, role of the federal states.

Energy Efficiency: NAPE 2014: Some measures at a glance.

1. Energy efficiency in buildings

- Quality assurance and optimizing current energy consulting
- Tax incentives for energy-efficient renovations
- Heating check
- Energy Consulting for municipalities
- Energy saving legislation
- Upgrading the Market Incentive Program (MAP)
- Establishment of new technical standards

2. Energy conservation: a business and earnings model

- Introduction of tendering scheme for energy efficiency
- Contracting funding
- Upgrading the KfW energy efficiency programs
- Waste Heat Use Initiative
- Improving the Framework for energy efficiency services
- New financing schemes

3. Empowerment for energy efficiency: Measure - Understand - Act – Save

- Energy Efficiency Network Initiatives
- Sectoral energy efficiency campaigns
- EU energy efficiency labeling & eco-design
- National Top Runner Initiative
- Developing indicators and benchmarks in businesses and for households
- Energy efficiency in information and communication technology (ICT)

4. Transport

- Motor vehicle taxation
- Fuel taxes
- Federal fuel strategy
- (Measures by Deutsche Bahn)

Improving the energy system – options.

Grids

Expand grids for large-scale power exchange

- Construction of new grid (3,500 km of new power lines required according to scenario A2024 (GDP))
- Grid management at EU level

Production

**Flexible thermal power plants
Lower ‘must-run’ capacity
Limit wind and PV in event of excess**

- Upgrading of existing power plants (retrofitting)
- Controlled capacity from more flexible power plants
- System services independent of power plant
- Feed-in management for wind & PV systems

Consumption

Expand load management and flexible demand

- Increase flexibility of demand (load management) in the private sector and Industry

Storage

Expand R&D and implementation of Storage-Systems

- Pumped storage Germany/Alps/Scandinavia
- Use of electricity for gas production (power-to-gas)
- Use/storage of electricity in heat (power-to-heat)
- Use of super-conducting coils, capacitors etc.

Source: dena 2015



Conclusion.

Conclusion: Most important challenges.

- The EEG has stimulated a significant growth of RES in Germany for more than ten years.
- The German government announced ambitious goals for the reduction of GHG and growth of RES, especially after the decision to shut down nuclear power plants by 2022.
- Current challenges on EU-level:
 - Economical and technical integration of energy markets
- On national level:
 - Limitation of costs including review of the promotion system, efficient integration of RES in the energy system
 - Expansion of electricity grids (security of supply)
 - Acceptance: Cost issues, infrastructure and landscape changes
 - Enhance flexibility of the system: Demand side management, storage solutions, flexible thermal power plants
 - Increase energy efficiency: Ambitious goals, funding
 - Foster climate protection: Recent debate on coal plants



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Technology specific support levels EEG 2014.

Technology	Corridor p. a.	Remuneration in ct/kWh	Degression
Hydropower	-	3.50 – 12.52	-0.5 %/a from 2016
Landfill, sewage and mine gas	-	3.80 – 8.42	-1.5 %/a from 2016
Biomass	100 MW (gross)	5.85 – 23.73 (dependent on fuel and size)	-0.5 % every three months from 2016
Geothermal		25.20	- 5.0 %/a from 2018
Wind energy onshore	2,400 – 2,600 MW (net)	Standard tariff: 8.90, for at least 5 years; Minimum 4.95	-0.4% every quarter from 2016
Wind energy offshore	-	Initial tariff: 15.40 for min.12 years; Option: 19.40 for min. 8 years if installed before 2020 Minimum 3.90	Standard tariff: - 0.5 ct/kWh in 2018, 1 ct/kWh in 2020 - 0.5 ct/kWh/a 2021; Option: - 1 ct/kWh in 2018
Solar energy (PV)	2,400 – 2,600 MW (gross)	8.53 – 12.70 (and tenders for ground-mounted PV) (Sept. 2015)	-0.25 % per month

Source: Renewable Energy Act 2014

