

# Energiewende in Germany

IGov Conference “Energy Governance: New ideas, new institutions, new people”

**Dr. Barbara Praetorius**

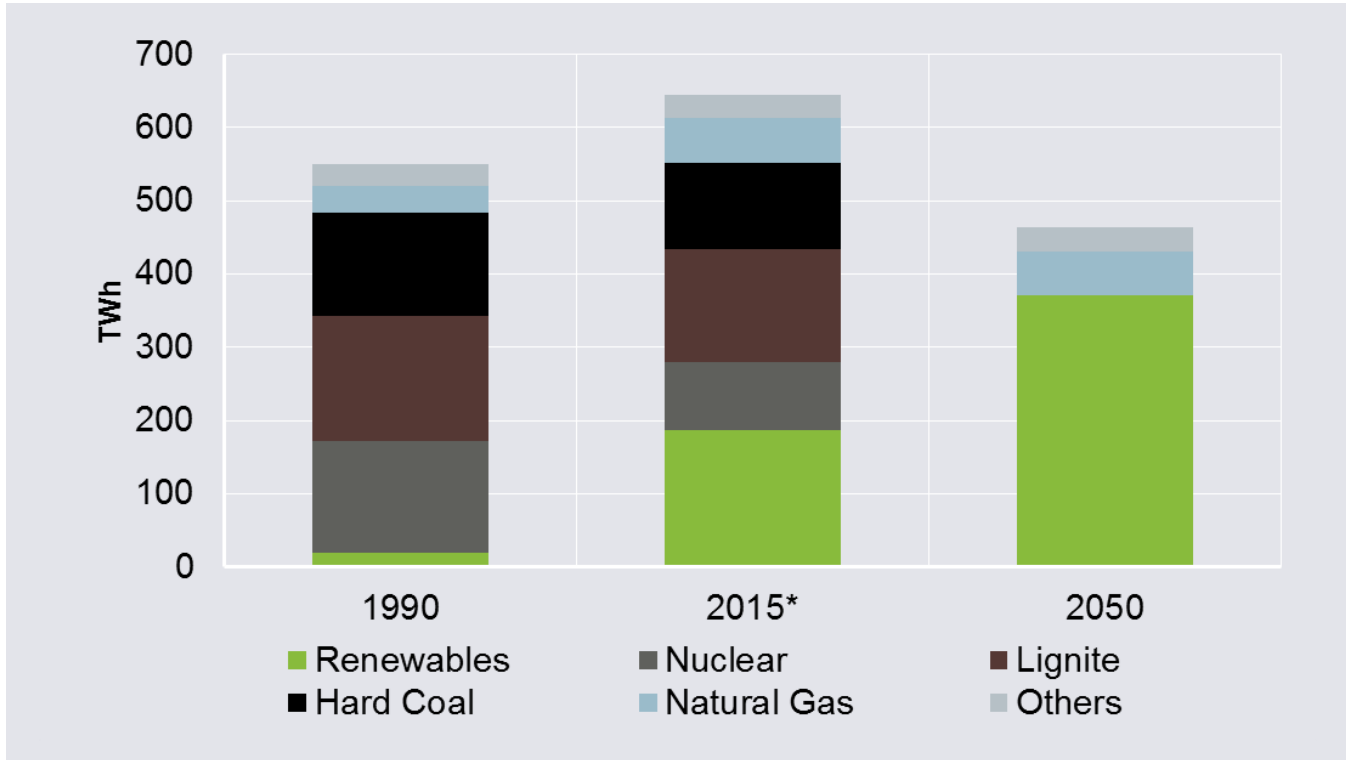
London, 6th December 2016



# Germany has a clear plan and some of the most ambitious climate protection targets of the world. More than 90% of public support the Energiewende.



Gross electricity generation 1990, 2016 and 2050



### Phase out of Nuclear Power

Gradual shut down of all nuclear power plants until 2022, following a clear plan per plant

### Reduction of Greenhouse Gas Emissions

Reduction targets below 1990 levels:  
 - 40% by 2020; - 55% by 2030; - 70% by 2040;  
 - 80% to - 95% by 2050

### Development of renewable energies

Share in power consumption to increase to:  
 40 - 45% in 2025; 55 - 60% in 2035; ≥ 80% in 2050

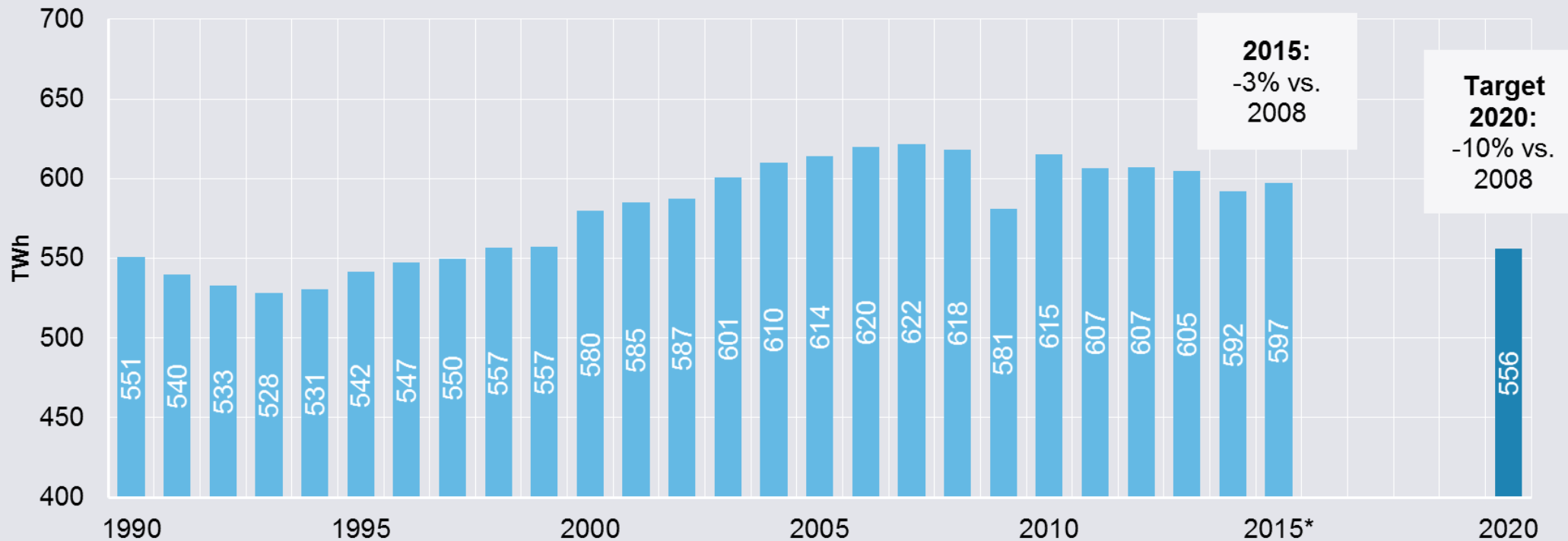
### Increase in efficiency

Reduction of power consumption compared to 2008 levels: - 10% in 2020; - 25% in 2050

AGEB (2016), BReg (2010), EEG (2014), own calculations \* preliminary

**Electricity consumption is decreasing and will continue to do so, although not enough to meet the ambitious targets. Main triggers are standards and support schemes (and prices).**

Gross electricity consumption 1990 - 2015



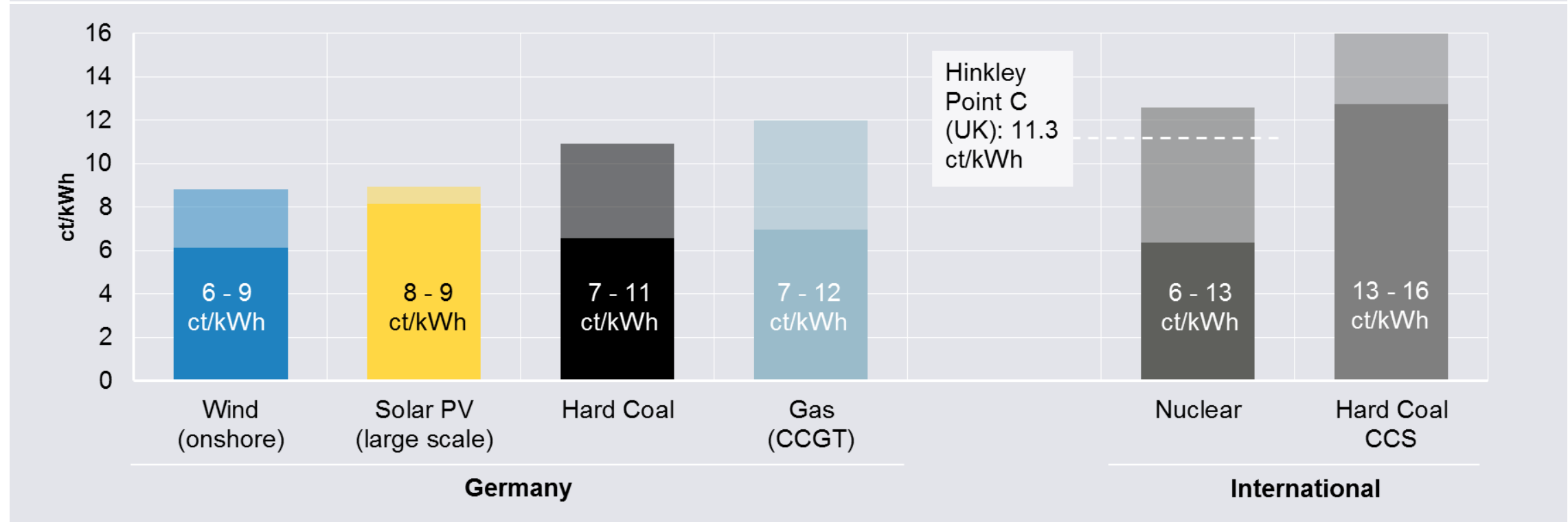
AGEB (2016)

\* preliminary

# Cost of renewables are decreasing steadily.

Today already, wind and solar are cost competitive to other decarbonisation options and new fossil fuel plants

Range\* of levelized cost of electricity (LCOE) 2015



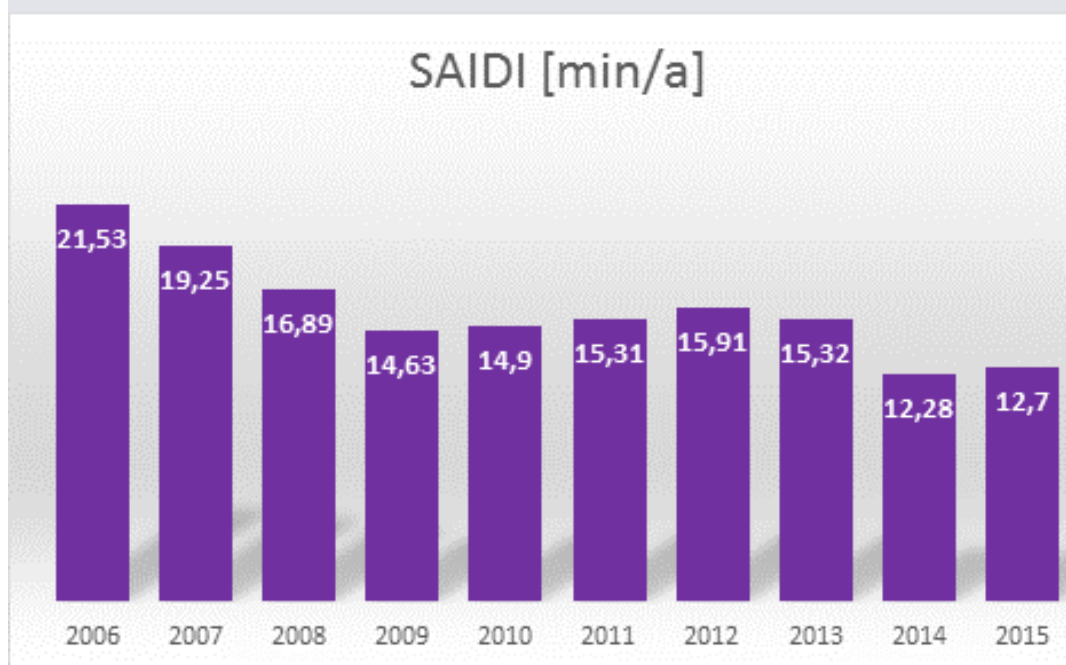
Agora Energiewende (2015e)

\* based on varying utilization, CO<sub>2</sub>-price and investment cost

Does this imply an increasingly unreliable supply system?  
No.

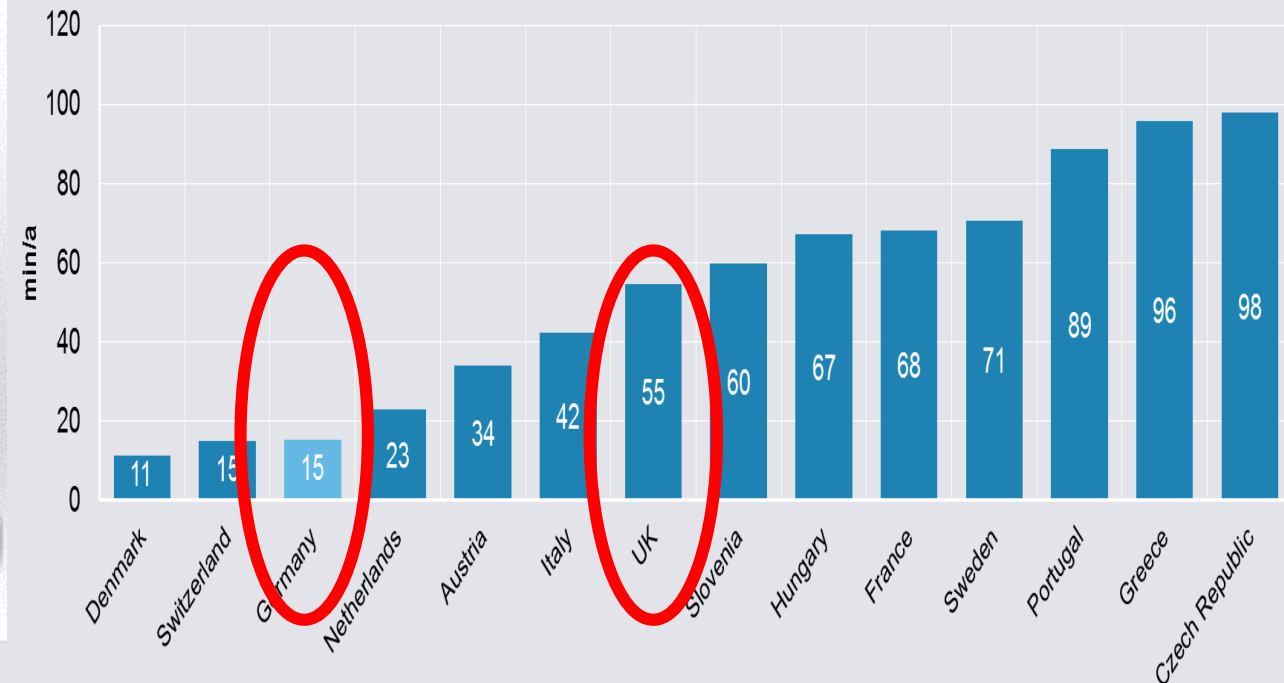
Security of supply has been increasing with the Energiewende.

System Average Interruption Duration Index (SAIDI)\*, Germany



CEER (2015)

SAIDI in Europe, 2013

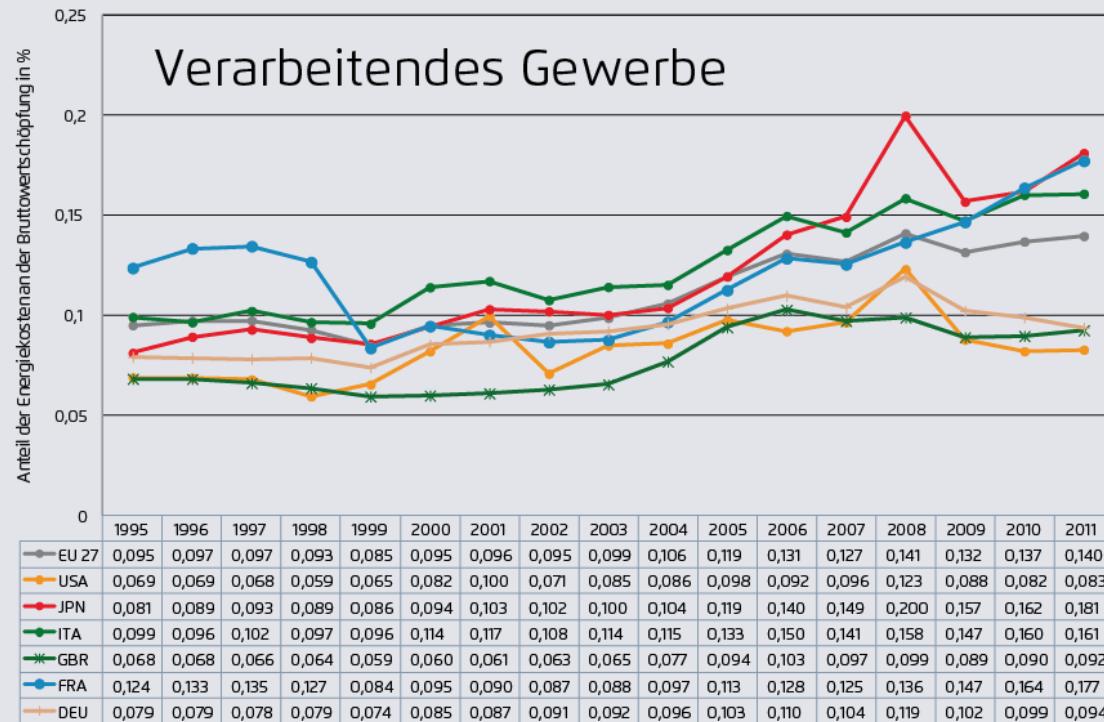


CEER (2015)

# Is this too expensive for the economy? No.

## Energy cost basically do not matter as much as other factors.

Energy cost per unit in international comparison



Energy cost per unit are in the lower middle of international competitors

The indicator shows energy cost compared to die **Bruttowertschöpfung**.

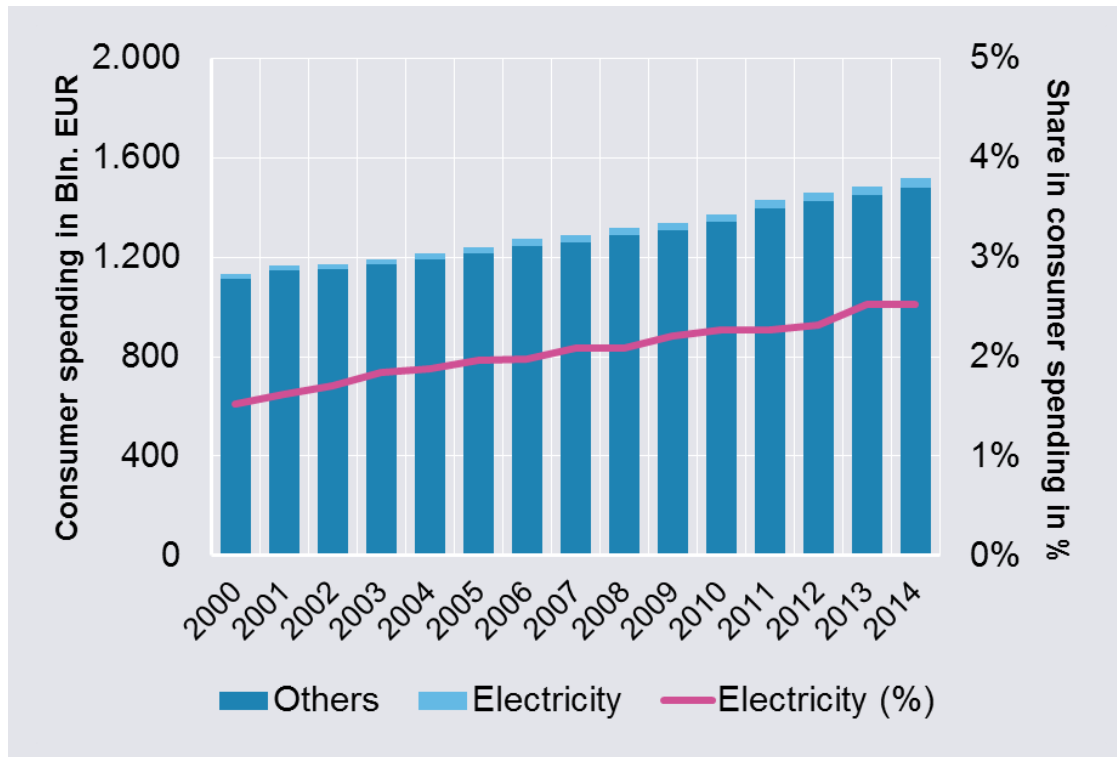
Wholesale electricity prices came down by more than 50% in the last few years.

Schlomann et al. 2016, Methoden- und Indikatorenentwicklung für Kenndaten zum Klimaschutz im Energiebereich, UBA-FB 002285, S. 191

Protect customers: well...

Private households spend about 2.5 percent of their total spendings on electricity. Due to higher efficiency, annual electricity bills are similar to those in other industrial countries

Private household spending 2000 - 2014



Destatis (2015a)

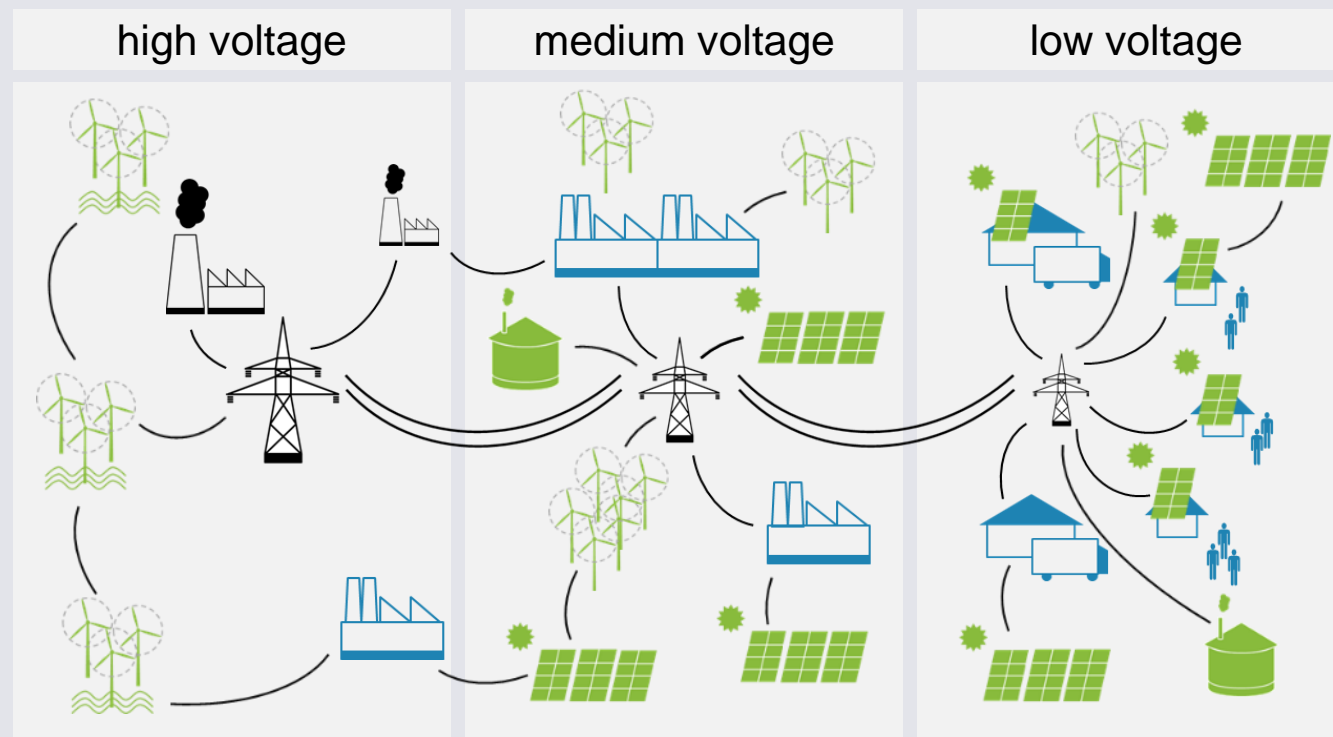
Annual electricity bills of private households 2014

	Annual Electricity Consumption	Electricity Price	Annual Electricity Bill
	<i>kWh</i>	<i>ct/kWh</i>	<i>EUR</i>
Denmark	3,820	29	1,121
USA	12,294	9	1,110
Germany	3,362	29	987
Japan	5,373	18	971
Spain	4,038	23	912
Canada	11,303	8	851
France	5,830	14	834
Great Britain	4,143	17	717
Italy	2,485	23	580
Poland	1,935	15	291

World Energy Council (2015), own calculations

**The Energiewende yet has a disruptive structural dimension:  
It implies a new energy world with even more distributed  
structures than today, and a variety of generation and demand-  
side actors on regional, local and household levels.**

Illustrative visualisation of the old and the new electricity system



Own illustration



# Coal phase-out is very likely to be an important focus of German politics after next Federal election (in Sept 2017)The German way of managing such issue: Stakeholder platforms, almost clear targets – and action.

Open lignite mine in Nochten, Germany



[www.markowski.de](http://www.markowski.de)

The **Germany's Climate Action Plan 2050**, adopted in 11.2016 after month of disputes, defines mid-term CO2 reduction targets in all sectors, including a CO2 reduction in the energy sector of about -60% by 2030 (against 1990's levels)

A commission "**Growth, Structural Change and Regional Development**" is designed to support the structural changes brought by the country's transformation. It will begin its work only in 2018.

The mining regions in NRW and Brandenburg, currently ruled by SPD coalitions, **put a damper on coal phase-out strategies**. But the new Berlin local government (Green-SPD-Linke) pledge to pull out of lignite power in 2017 and hard coal by 2030.

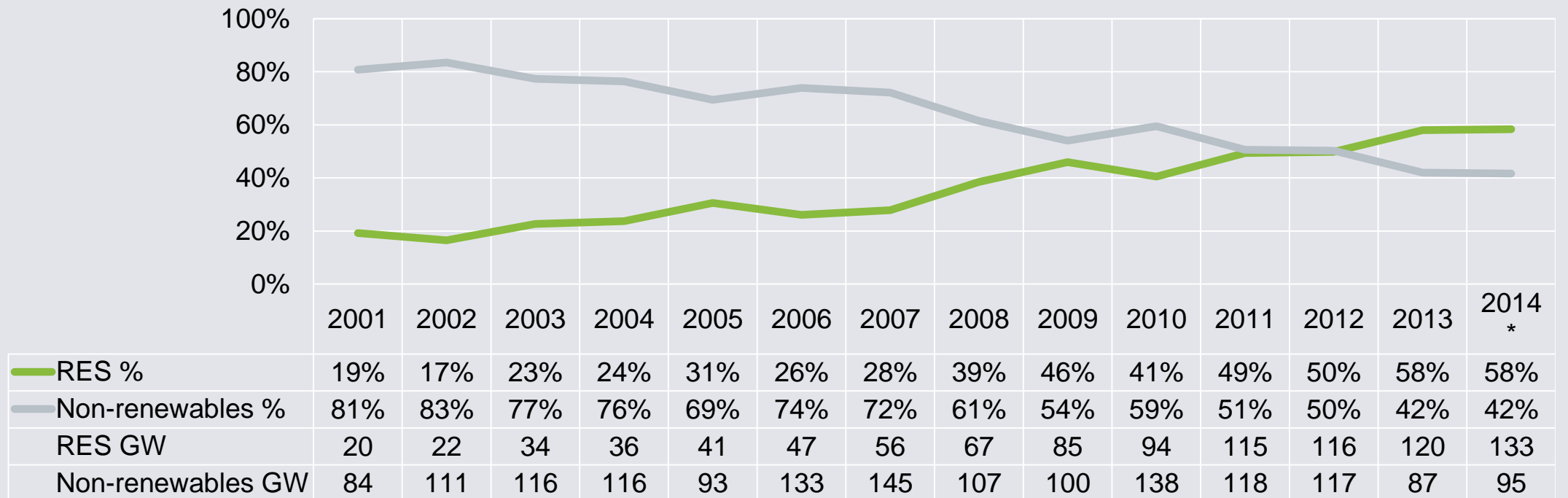
Coal phase-out is likely to be an **important focus of German politics after the federal election** (Fall 2017). The level of ambition and the pace of the transformation will depend on the ruling coalitions.

**This is a global trend! Make sure not to miss it.**



**Around 60% of newly installed capacities in the power sector are renewable energies.**

Global power capacity additions 2001-2014



IRENA 2014; \*own estimate on basis of IRENA 2015

## Risks and opportunities (and governance)

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- Incumbent industry & investors: clear and reliable framework, risk sharing tools (EEG ...)
- Citizens: affordability and security of supply
- Industry: Competitiveness, security of supply

### ... options to meet them:

- ❖ Talk! Shape & share the narratives, initiate stakeholder processes....
- ❖ Set clear targets (otherwise no investor will take action)
- ❖ Build more renewables (as they help to cut down wholesale prices and thus convince the public)
- ❖ Build more grids (but only as much as is needed in times of digitalisation)
- ❖ Talk transparently about cost and cost distribution and find ways into the future.

**Your Questions?**



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# Thank you for your attention!

Questions or Comments? Feel free to contact me:

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@BaraPraetorius

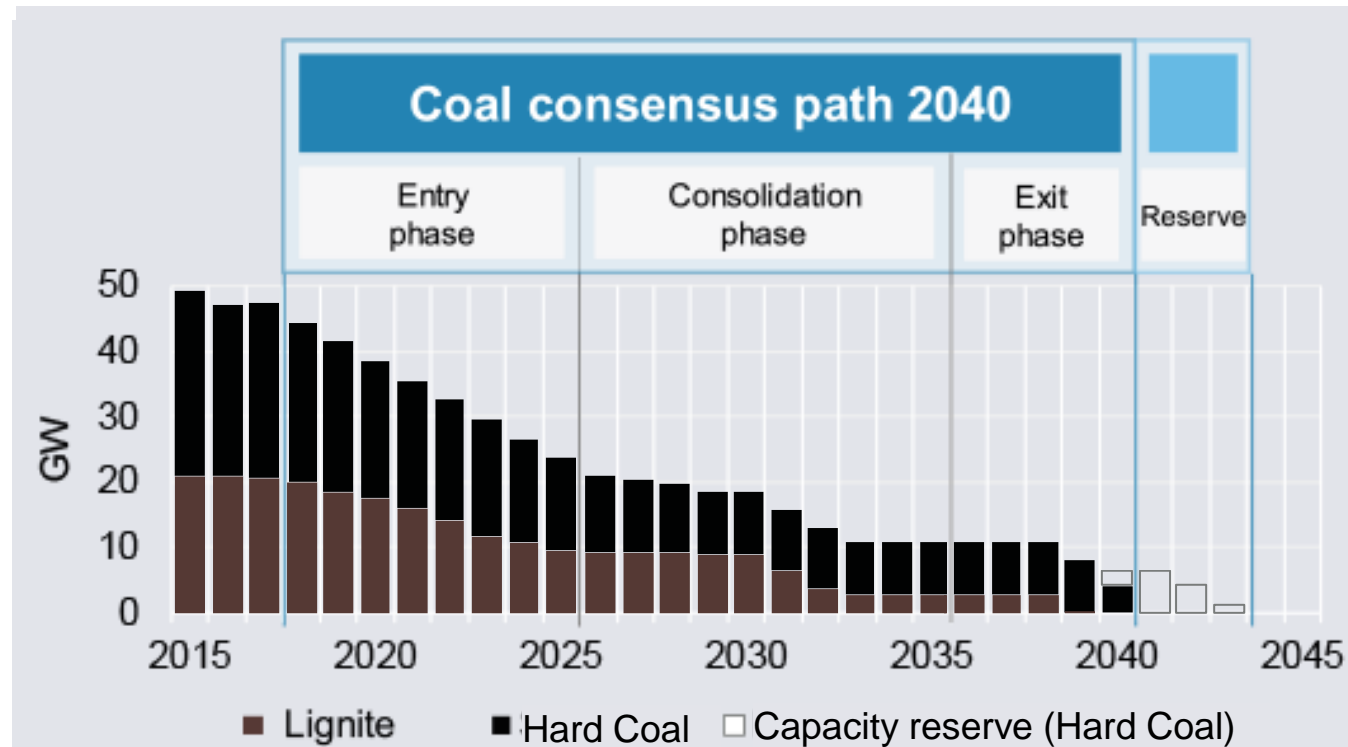
Agora Energiewende is a joint initiative of the Mercator Foundation and the European Climate Foundation.

## Take-aways



# Our suggestion: Determine a cost-efficient decommissioning plan for existing coal plants based on remaining lifespans, including structural support programmes for mining regions.

Installed capacity in the recommended coal consensus path 2040



Own presentation

- Adopt a binding plan for the decommissioning of existing coal-fired power plants
- Order of decommissioning follows the age of the power plant
- Sum of annual shut downs are capped at 3 GW per year (esp. relevant for the entry phase 2018 – 2025)
- To avoid domino effects, in lignite mining areas the transfer of remaining lifespans from one plant to another should be permitted

# Capacity additions of wind and solar PV have been systematically underestimated

Actual capacity of wind & solar and WEO projections in NPS scenarios

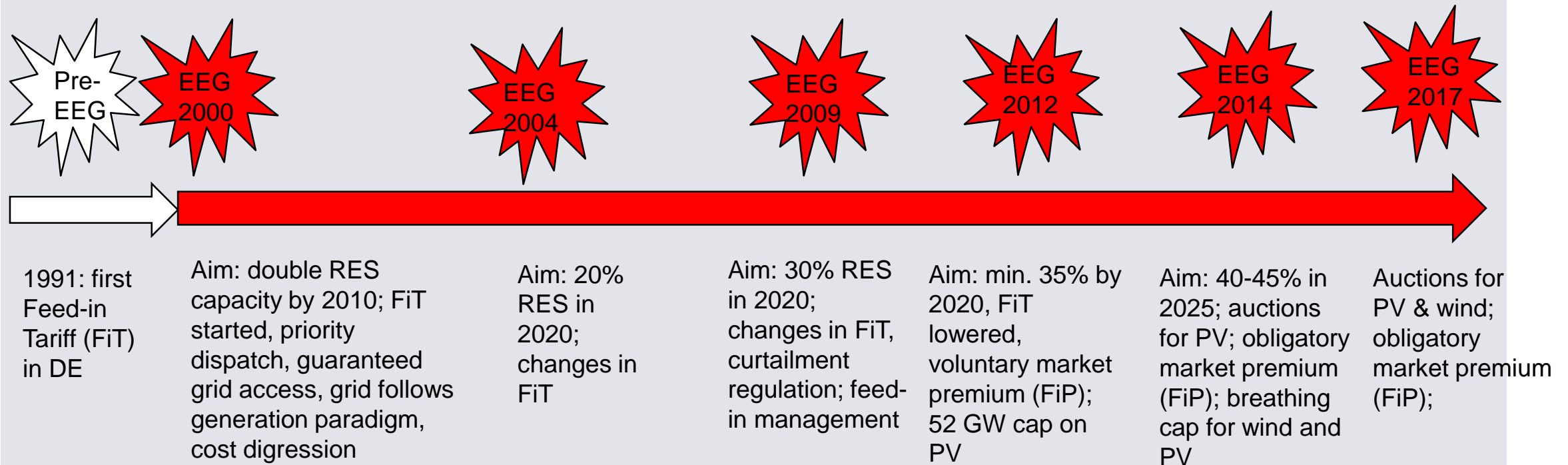


Metayer/Breyer/Fell (2015): The projections of the future of the WEO, IEA (2015): World Energy Outlook 2015



## RES support policies (called “EEG” in Germany) adjusted along the way considering investment risks

### Renewable Energy Law (EEG) – reform steps 2000 to 2014

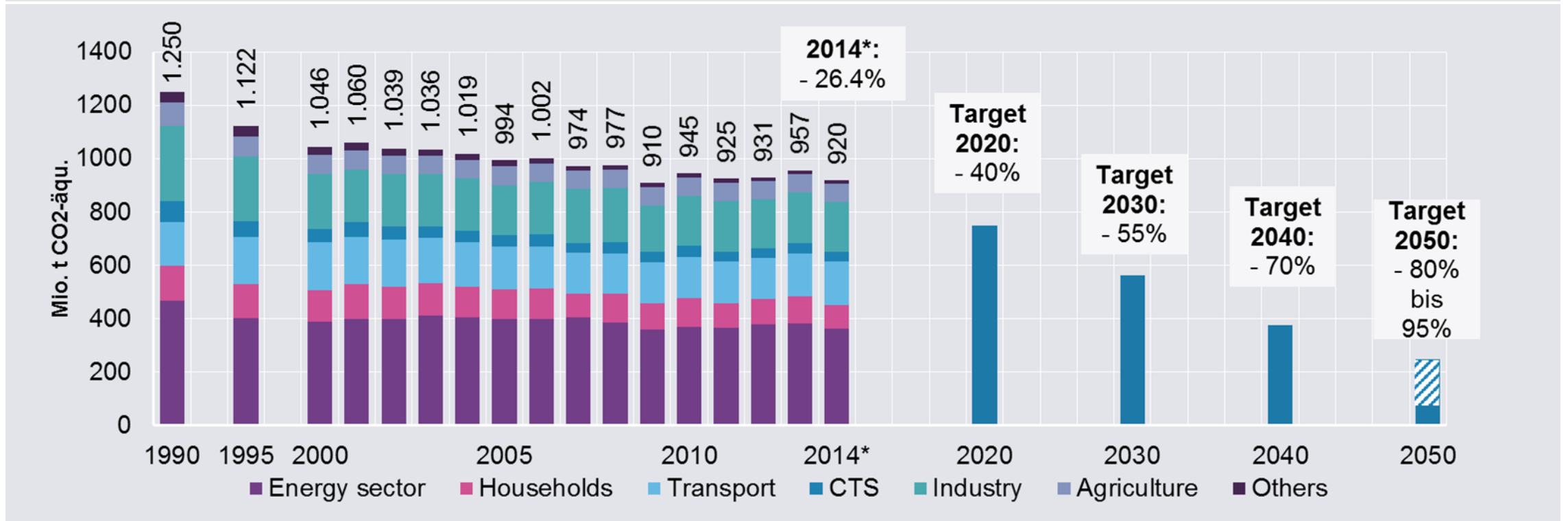


**Key challenges  
ahead towards a  
world with 50%  
renewable energies**



# Unfortunately, Germany will miss its climate targets without gradual reduction of coal use. In 2017, a “coal reserve” is planned, for 2030/2040 we need a “coal consensus”

Greenhouse gas emissions by sector 1990 - 2014 and climate targets 2020 - 2050

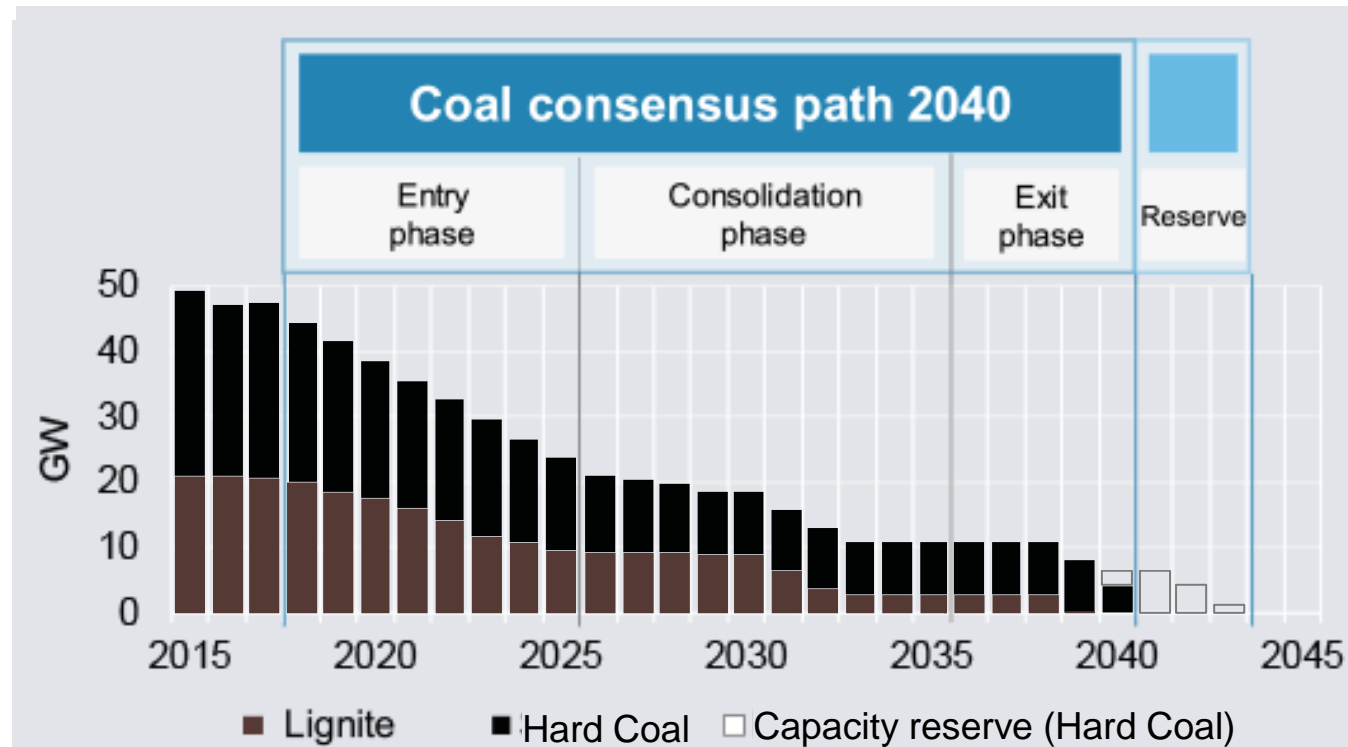


AGEB (2015a), UBA (2015), own calculations

\* preliminary

# Our suggestion: Determine a cost-efficient decommissioning plan for existing coal plants based on remaining lifespans, including flexibility options in lignite mining regions.

Installed capacity in the recommended coal consensus path 2040



Own presentation

- Adopt a binding plan for the decommissioning of existing coal-fired power plants
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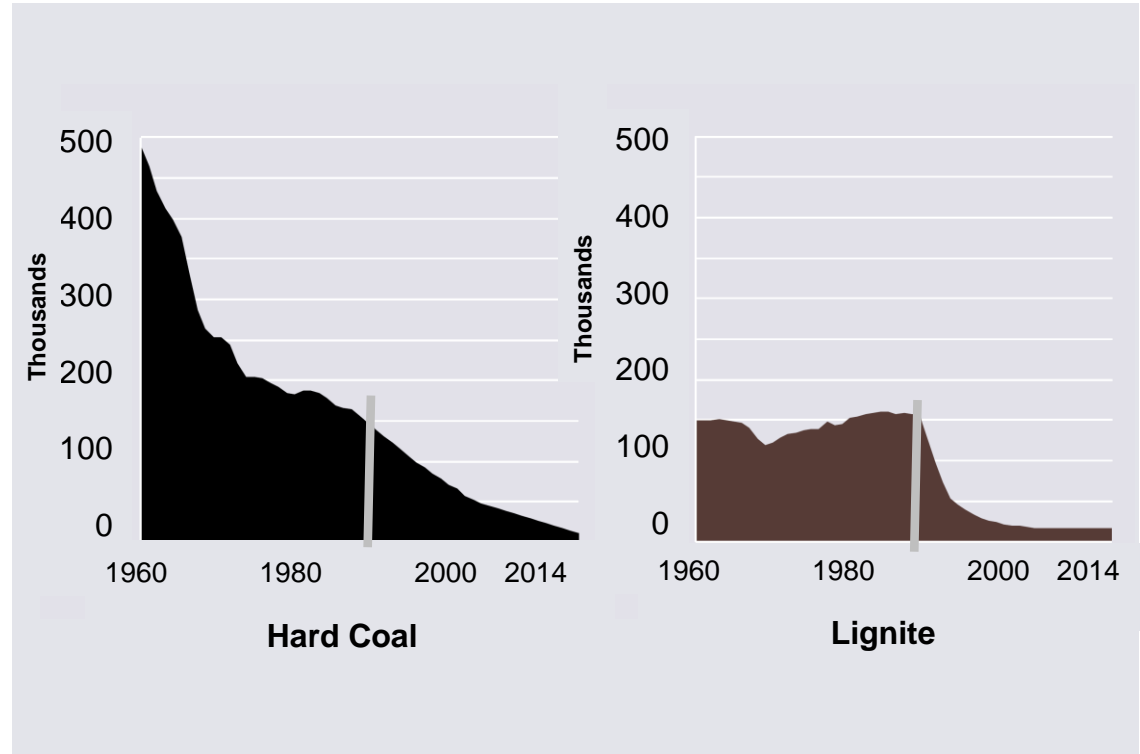
# Mining regions oppose the idea of a coal phase-out: The mining sector has already experienced a massive restructuring - but is still important in some regions.

Lignite mining areas in Germany



<http://cornerstonemag.net/wp-content/uploads/2015/09/Michel-figure-3.jpg>

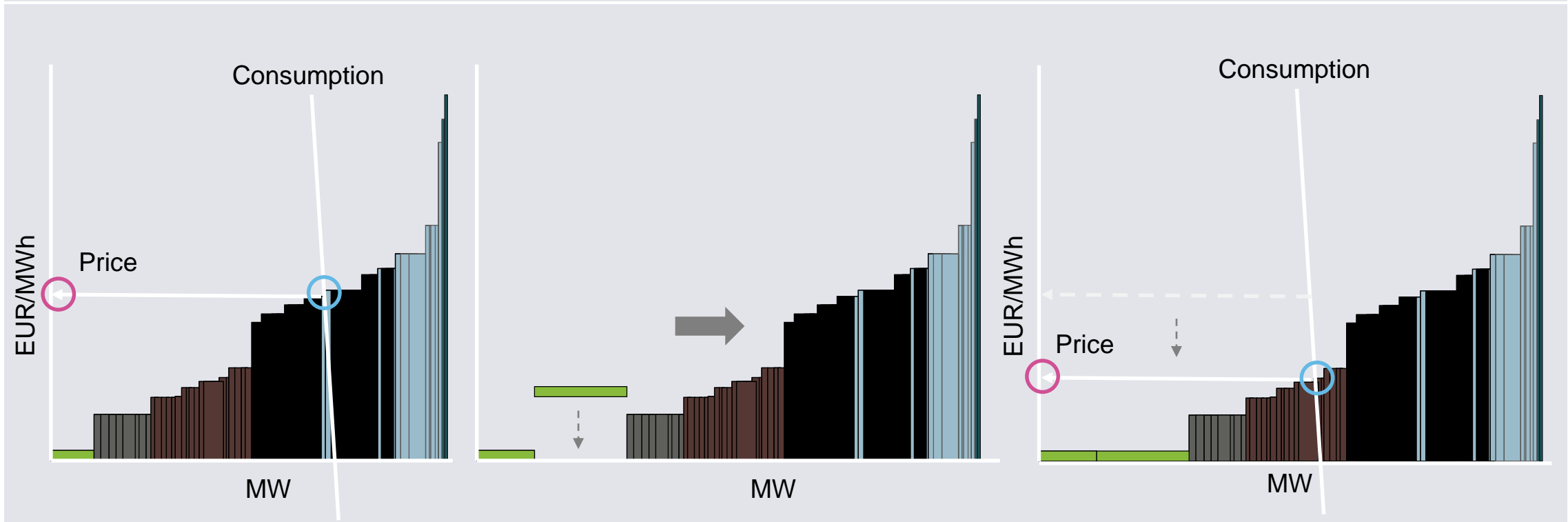
Employment in mining activities in Germany since 1960



Statistik der Kohlenwirtschaft (2015), own calculation

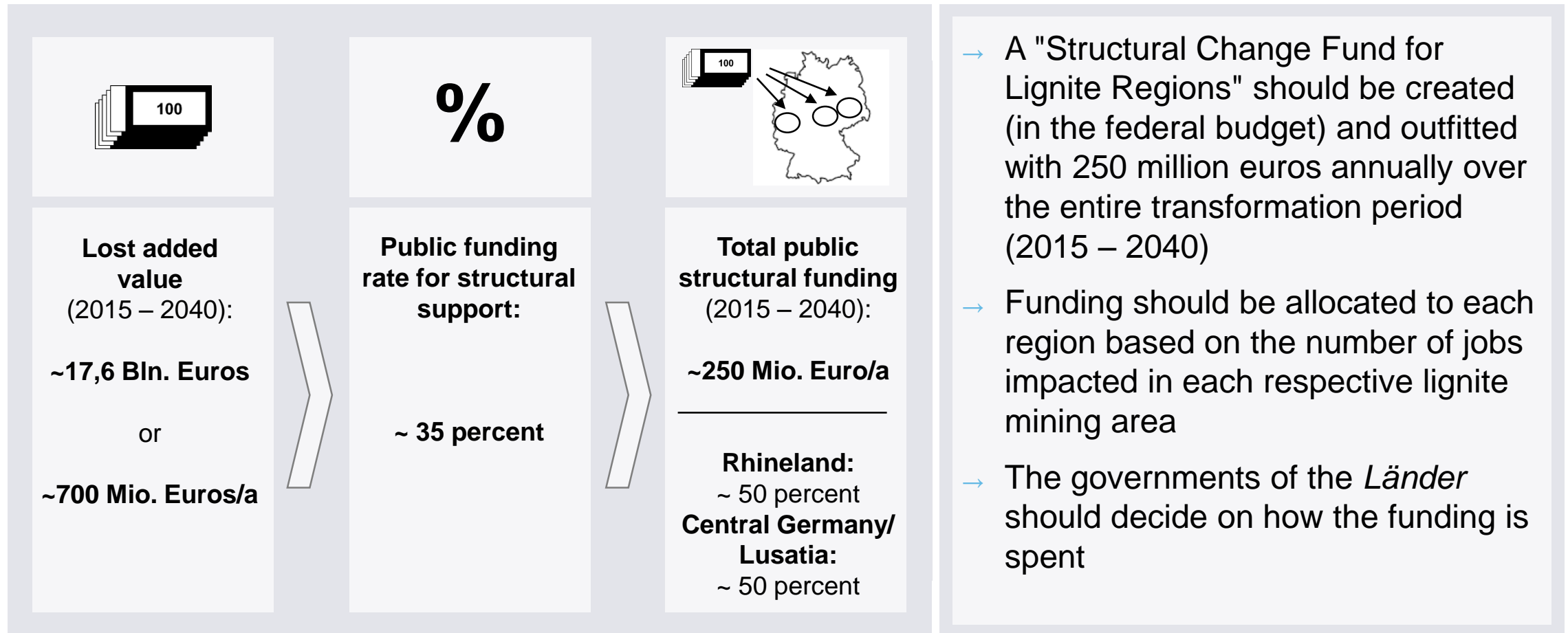
# Energy intensive industries and their unions fight this idea: With more renewables, power price comes down (good) – but phasing out coal would mean that gas sets the price (bad).

Schematic illustration of the Merit-Order-Effect



Own illustration

## Our suggestion: Create a 'Structural Change Fund' to ensure a sound financial basis for structural change in affected regions



- A "Structural Change Fund for Lignite Regions" should be created (in the federal budget) and outfitted with 250 million euros annually over the entire transformation period (2015 – 2040)
- Funding should be allocated to each region based on the number of jobs impacted in each respective lignite mining area
- The governments of the *Länder* should decide on how the funding is spent

# The idea: A long-term and consensual solution would provide reliable framework conditions

## The coal phase-out carries the potential of fundamental social conflict

### comparable to:

- Nuclear phase-out
- Phase-out of German hard coal mining

### potential side effects:

- Serious dispute and debate for years
- Delayed, but eventually more radical political decisions
- Bad investments
- Disruptive structural changes



## Long-term and consensual solutions provide planning certainty and allow for a just and stepwise transition

### for all affected stakeholders:



Employees and regions



Political decision makers



Power plant and mining operators

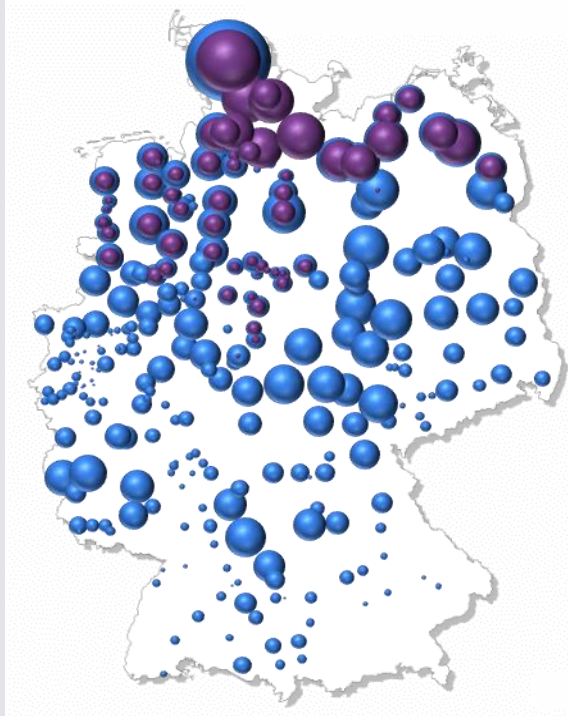


Investors



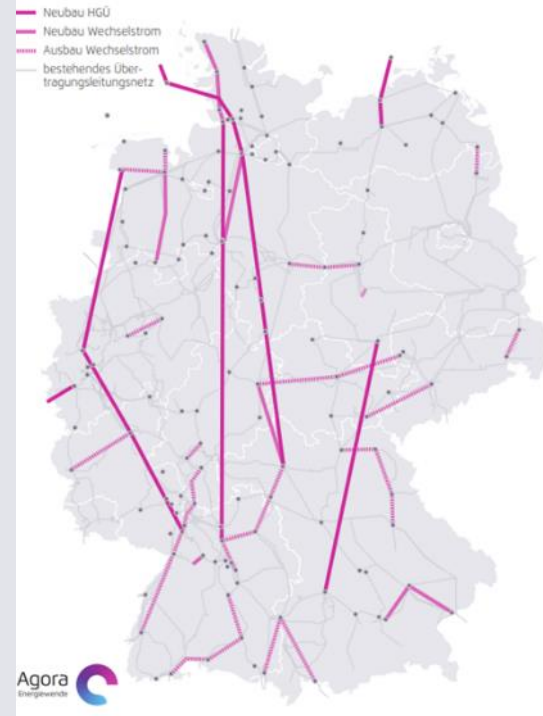
# A further challenge is to build more grids to transport wind energy to the south of Germany

Installed wind capacity (103 GW, Scenario „Best Sites“) 2033



Fraunhofer IWES (2013)

Planned transmission grid extensions until 2022



Bundesbedarfsplangesetz (2013)

Wind power will be installed mainly near the coast in the north of Germany, but key consumption centres are located in the south

Additional power lines are necessary to transport wind electricity from north to south

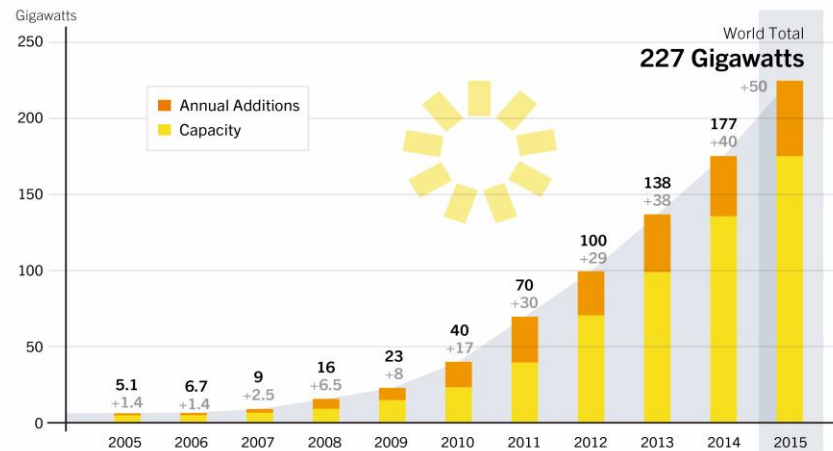
In 2016, the government will propose a new transmission power plan which will enable to use underground cable whenever necessary

Measures to reduce consternation and compensation for concerned parties need to be considered from the very beginning

# Solar PV is gaining speed with the global installation rate rising rapidly and the costs continuing to decline.

## Global Capacity of Solar PV 2005-2015

Solar PV Global Capacity and Annual Additions, 2005-2015

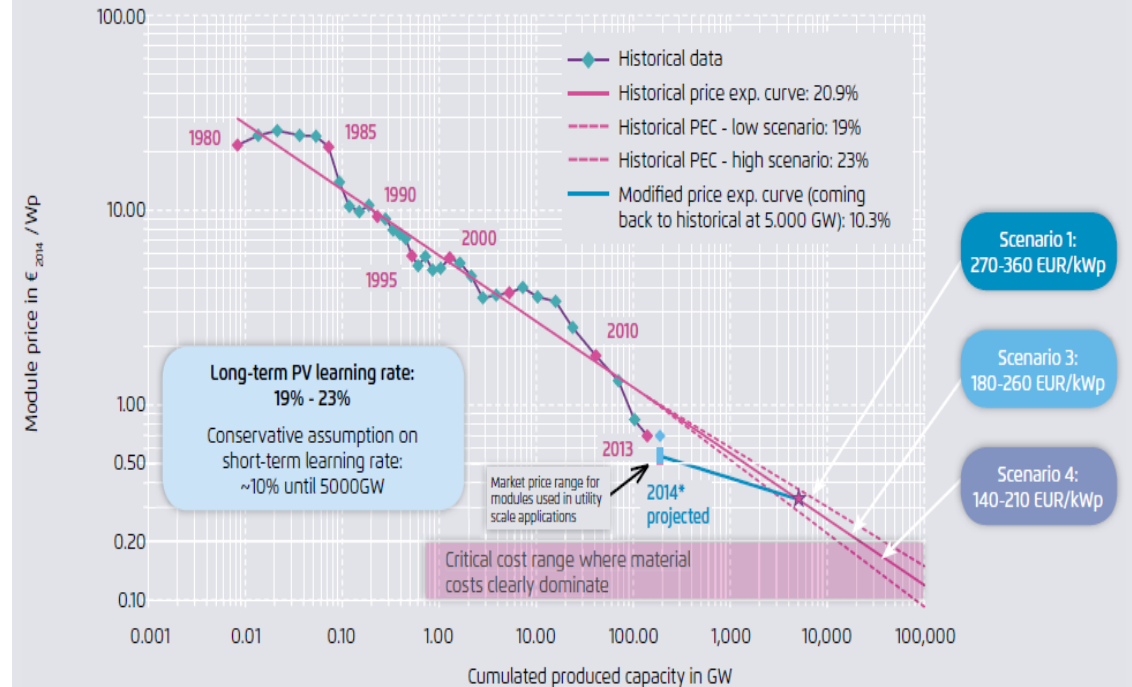


REN21 Renewables 2016 Global Status Report



REN 21 2016 Global Status Report

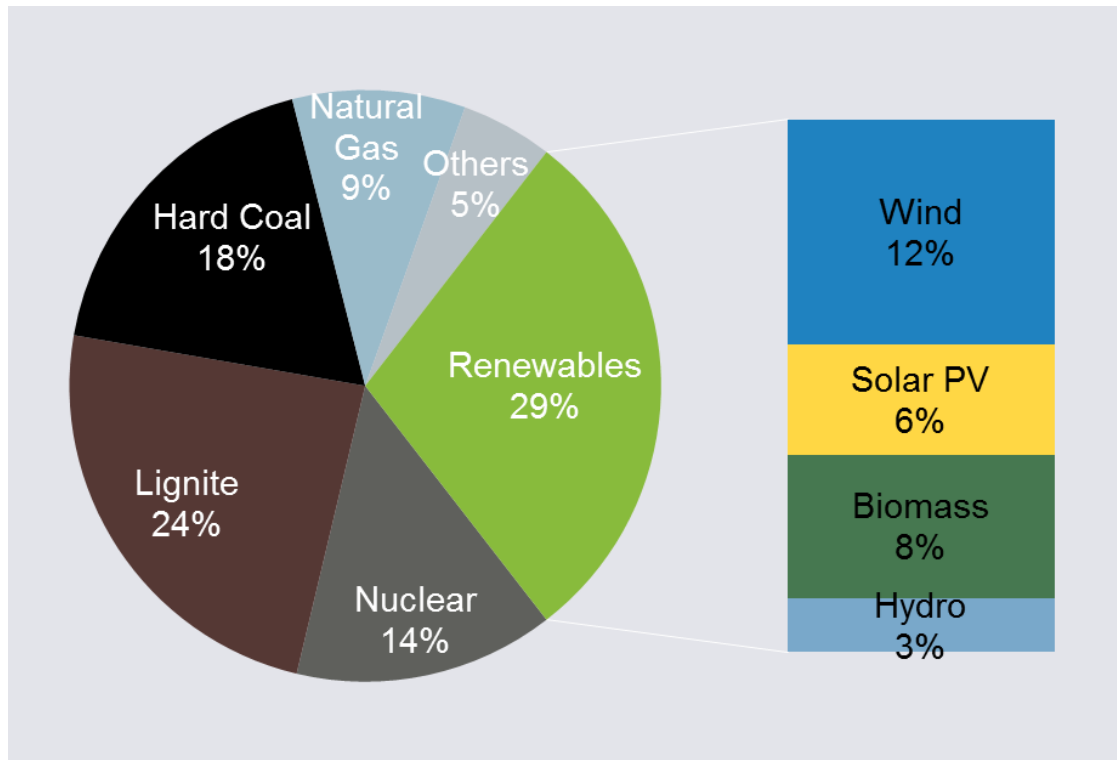
## The learning curve for PV modules



Fraunhofer ISE (2015): Current and future costs of photovoltaics

**Today, one third of electricity consumption is covered by REN. At the same time, Germany runs the world's 2nd largest lignite mining & burning sector.**

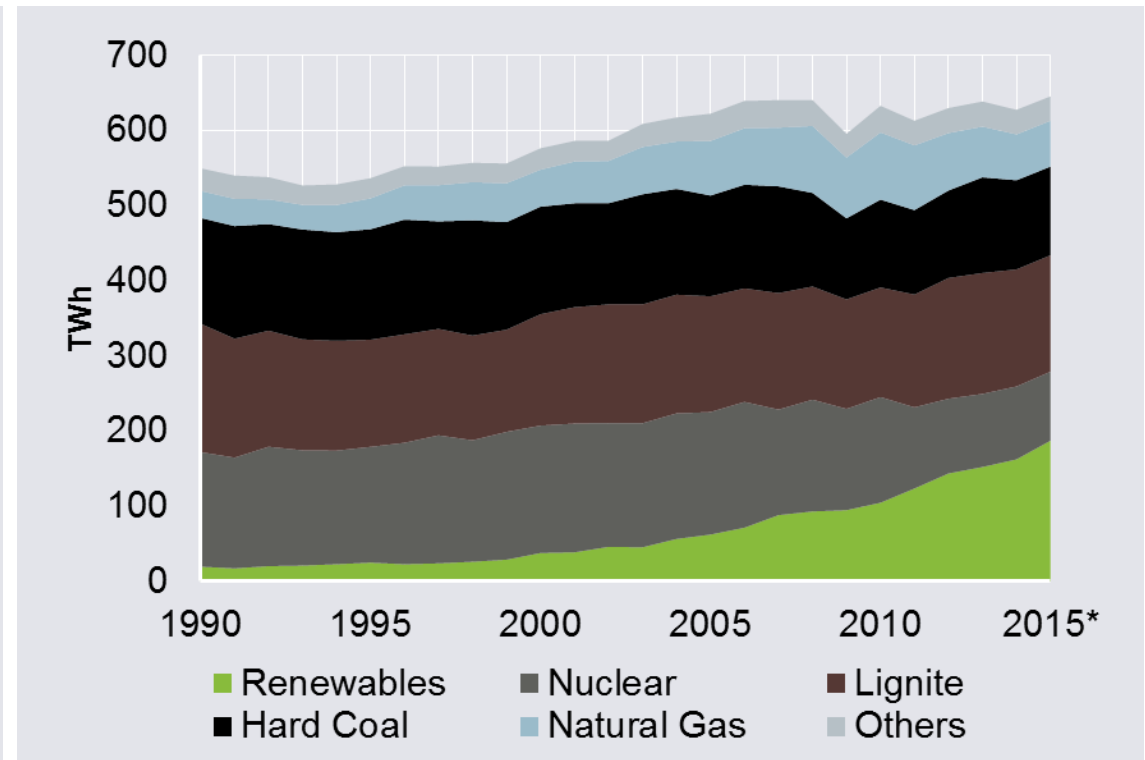
Share in gross electricity generation by fuel 2015



AGEB (2016)

\* preliminary

Gross electricity generation by fuel 1990 - 2015



AGEB (2016)

\* preliminary