International conference:

Coal in the period of energy transformation

August 29, 2017; Katowice

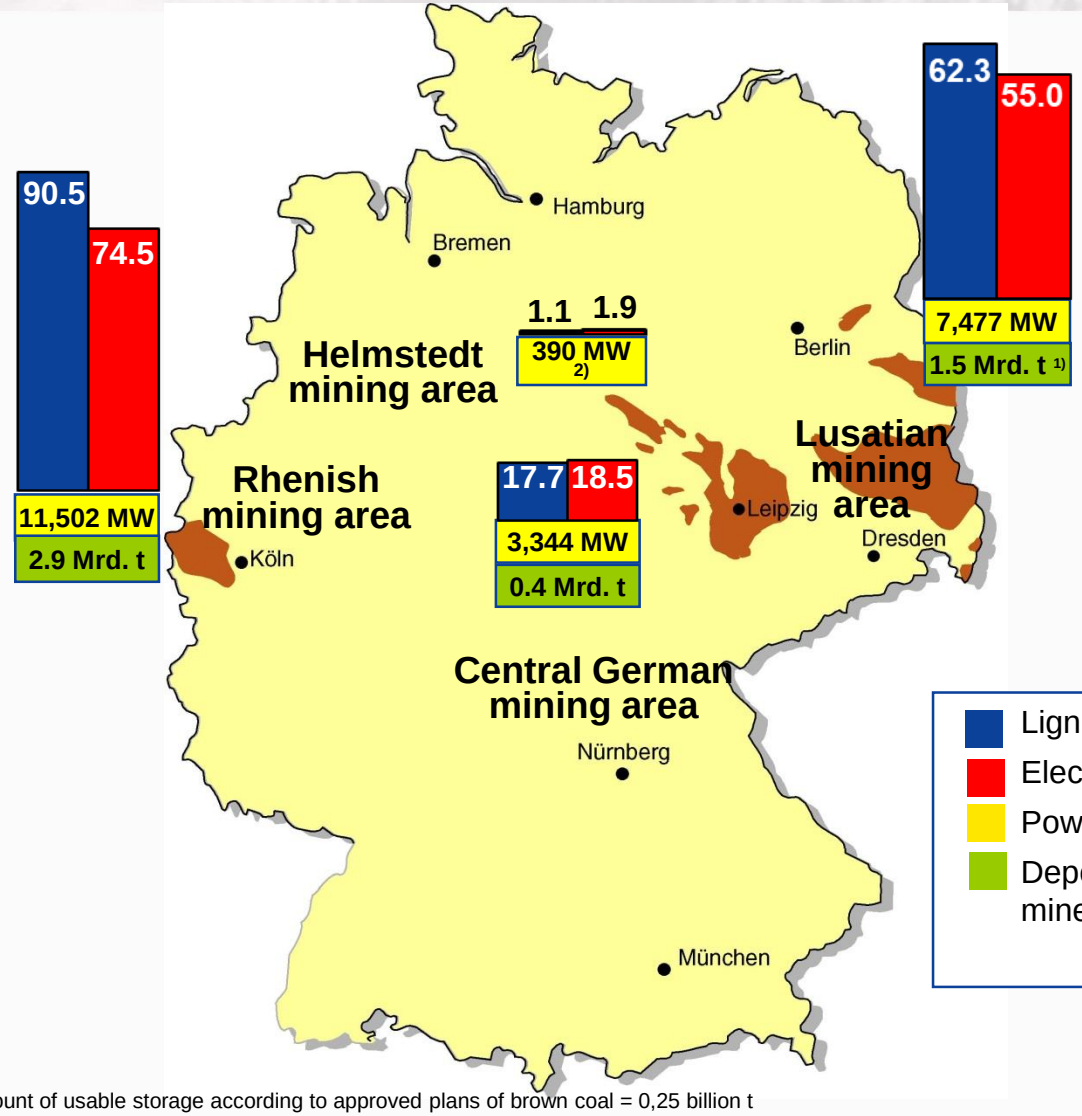
LIGNITE INDUSTRY IN GERMANY AND ITS LONG –TERM CONTRIBUTION TO A TRANSFORMATION OF THE ELECTRICITY SYSTEM

Dr. Thorsten Diercks

General Manager

DEBRIV – Bundesverband Braunkohle

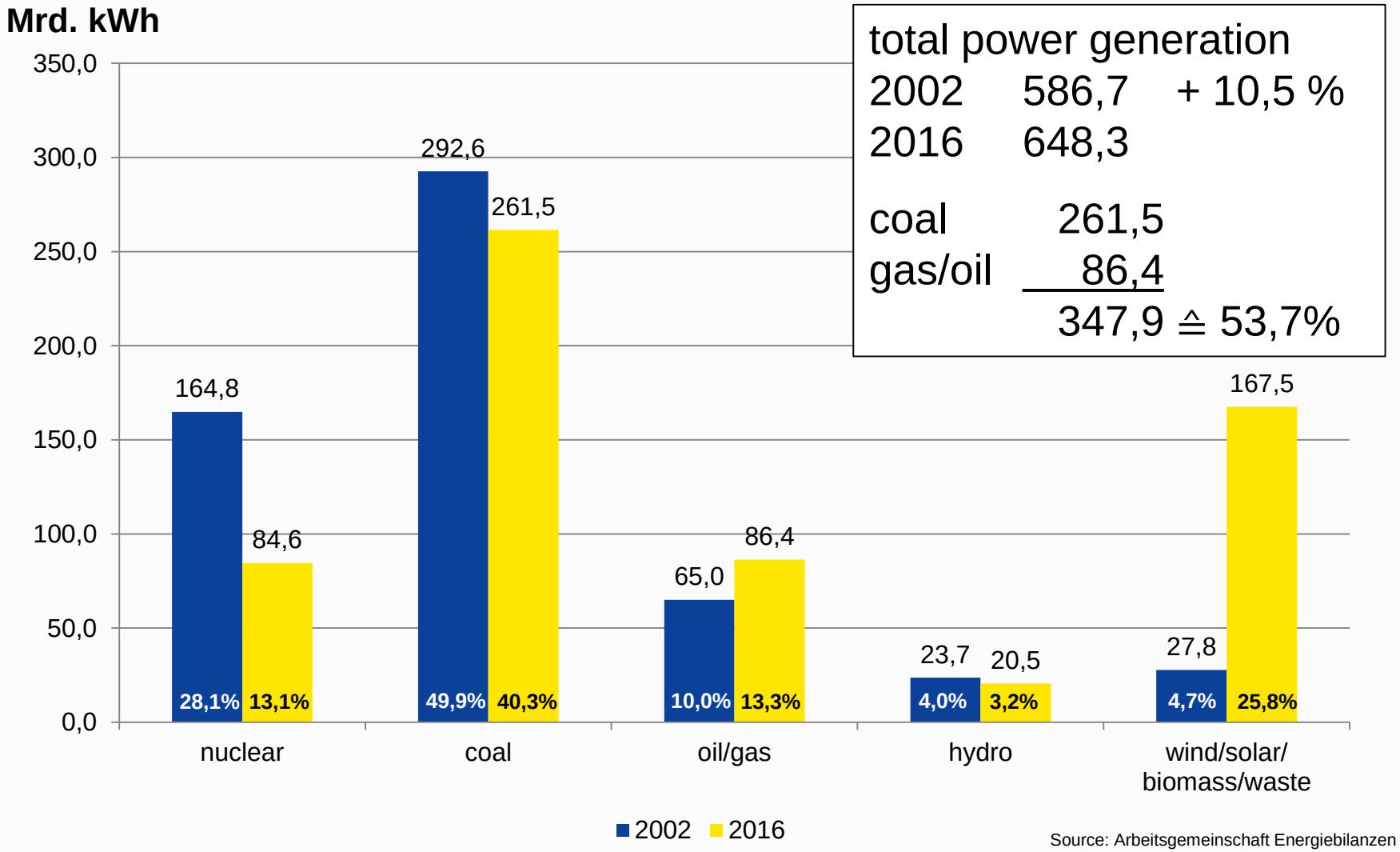
Domestic lignite: large resources, modern opencast mines and power plants in 2016



- Lignite output, in mill. t
- Electricity generation, in TWh
- Power plant capacity
- Deposits – apprived and developed opencast mines

[1] Amount of usable storage according to approved plans of brown coal = 0,25 billion t
[2] Power plant: Standby since 01 Oct 2016
Status: 02/2017 – data preliminary, partly estimated

Power generation Mix in Germany, 2002 and 2016



total power generation

2002	586,7	+ 10,5 %
2016	648,3	
coal	261,5	
gas/oil	86,4	
	347,9 ≙ 53,7%	

Source: Arbeitsgemeinschaft Energiebilanzen
Data: 15. August 2017

Energy policy targets of Germany

Issued 28. September 2010; addition June 2011, status August 2017

	2016 [1)]	2020	2030	2050
Primary energy consumption (2008)	- 6,5 %	- 20 %		- 50 %
Share of renewables in gross final energy consumption	15 %	18 %	30 %	60 %
Power consumption (2008)	- 3,8 %	- 10 %		- 25 %
Share of renewables in electricity consumption	31,7 %	35 %	50 %	80 %
Greenhouse gas emissions (1990)	- 27,6 %	- 40 %	- 55 %	- 80 – 95 %
Nuclear phase-out *		2022		
EEG levy *	6.354 ct/kWh	≤ 3.5 ct/kWh		

* Addition from June 2011; [1)] estimated, preliminary

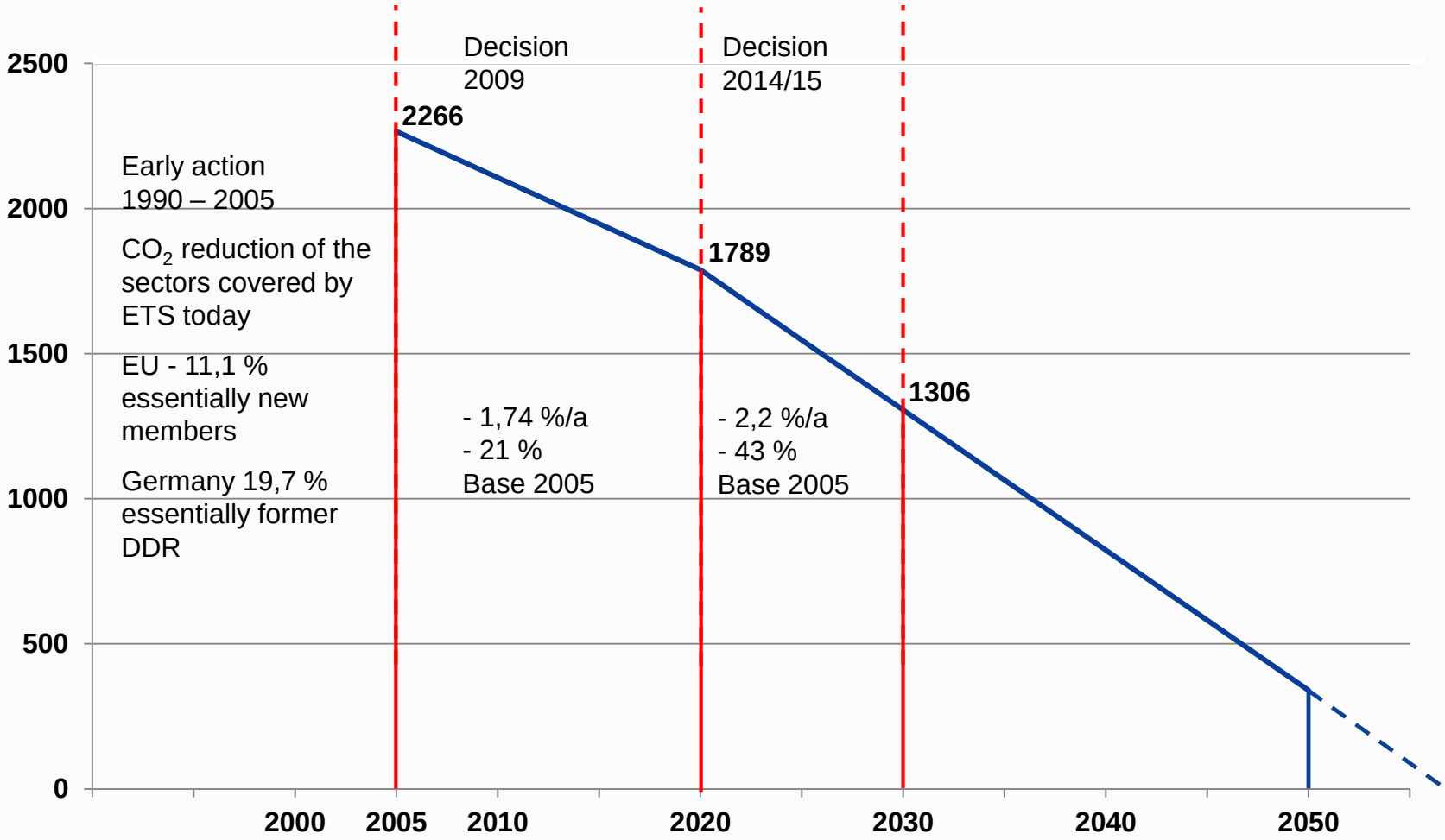
Status: 15. August 2017

Energy debate focussed on CO_2 and national targets

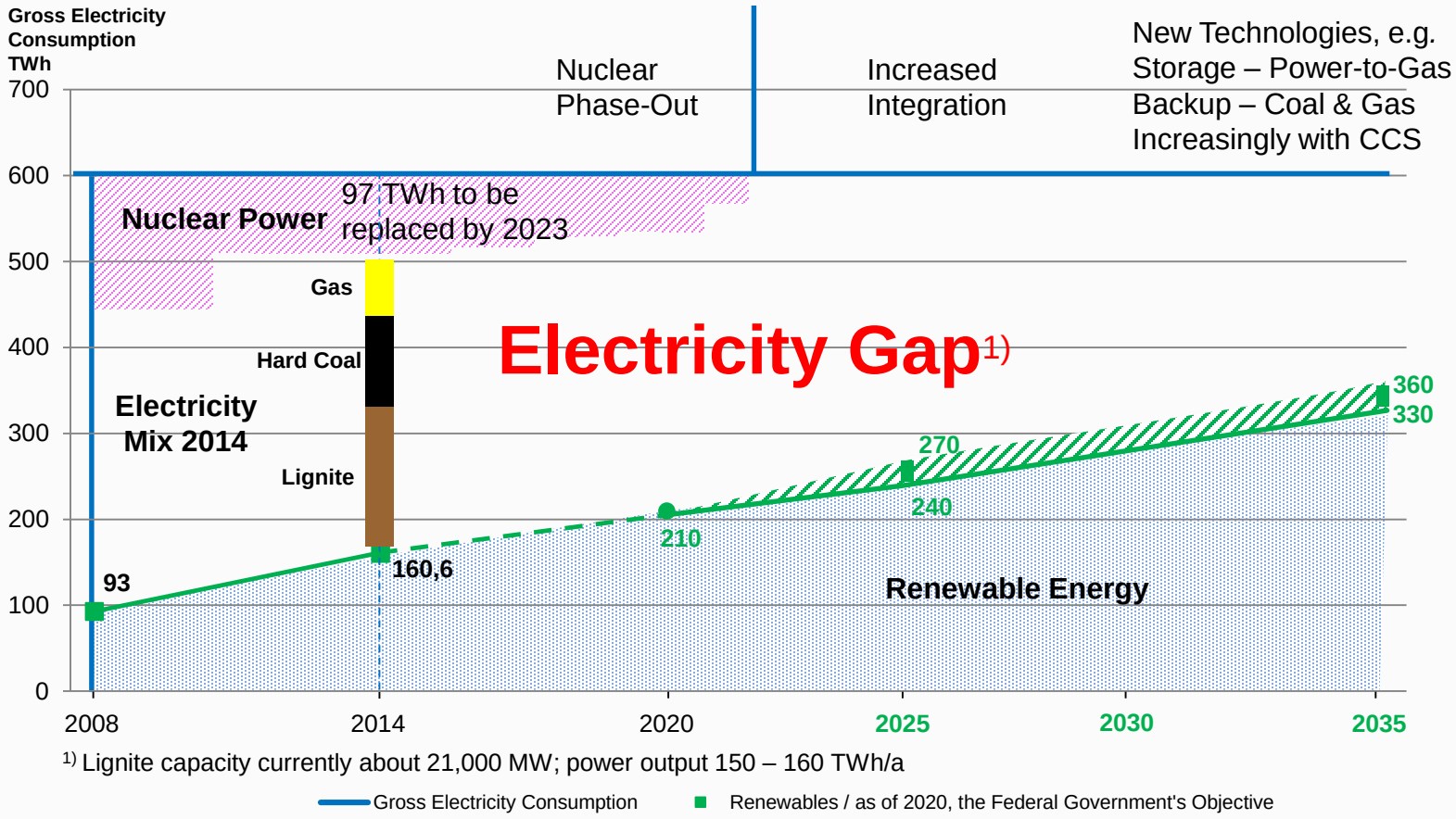
- **Action Programme Climate Protection 2020**
  - Ambition: THG emissions - 40 % 2020, Actual 2016 ≈ - 26 %
- **Climate Protection Plan 2050**
  - Ambition: THG emissions - 80/95 %
  - Interim stage 2030 - 55 % THG
  - Only archievable by massive interventions and if all sectors were included - energy, transport, industry, agriculture, buildings.

Comprehensive "anti-coal campaign" of NGO's, Greens and Gas Industries. But no majority against coal at CDU, SPD, FDP, who accept the coal in transition period.

EU-ETS: The key instrument designed for the long term



Economic Goals of Germany's Federal Government for the Electricity Industry

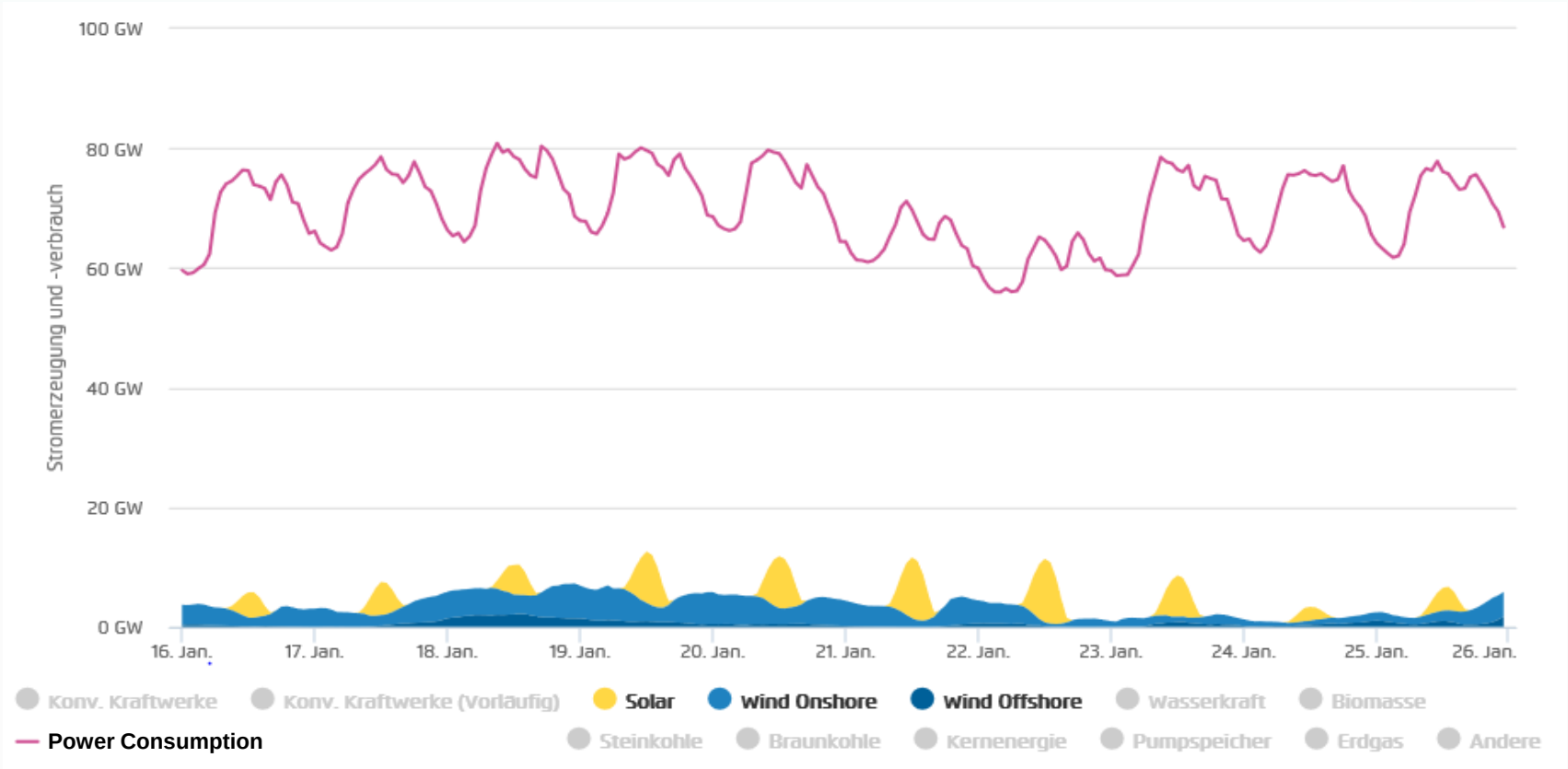


The Federal Government's Objectives under the Coalition Agreement:
Proportion of Renewables: In 2020: min. 35 %, in 2025: 40 % - 45 %; in 2035: 55 % - 60 %
Gross Electricity Consumption: Stable at 600 TWh

Power Generation from Solar Plants and Wind Turbines

16 - 26 January 2017

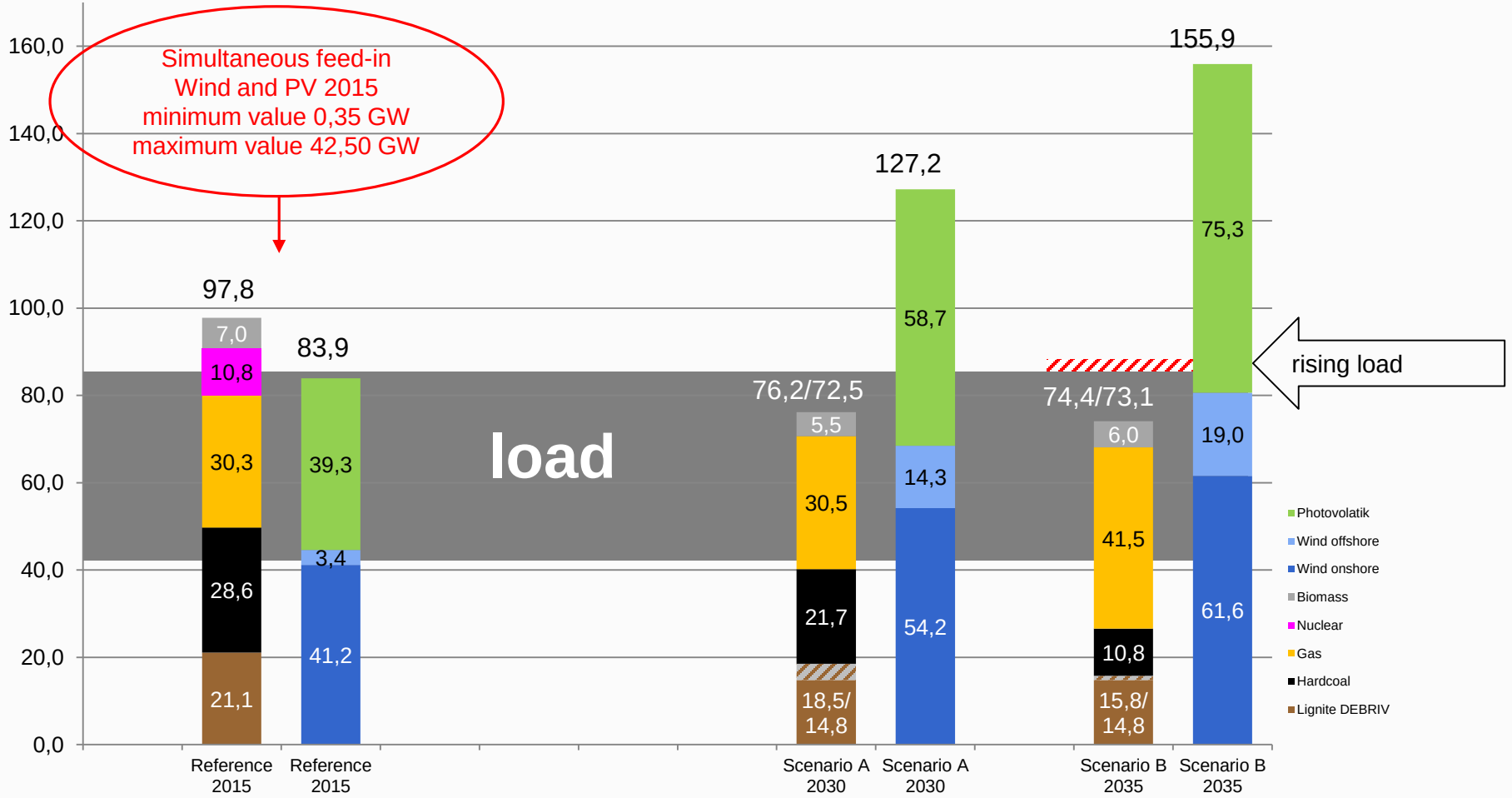
Power Generation and Consumption



One of the biggest challenges facing the energy sector became apparent in January 2017. There was a windless period with hardly any sun. The high installed capacity of wind onshore (approx. 46 GW), wind offshore (approx. 4 GW) and solar (approx. 42 GW) is not very useful without sufficient supply from renewable sources. Even if three times as much wind capacity had been installed, the plants would have produced almost no electricity in these weather conditions. Existing RES technologies can not guarantee a reliable, uninterrupted supply. As long as no solution to this problem is found, coal and gas power plants are still needed.

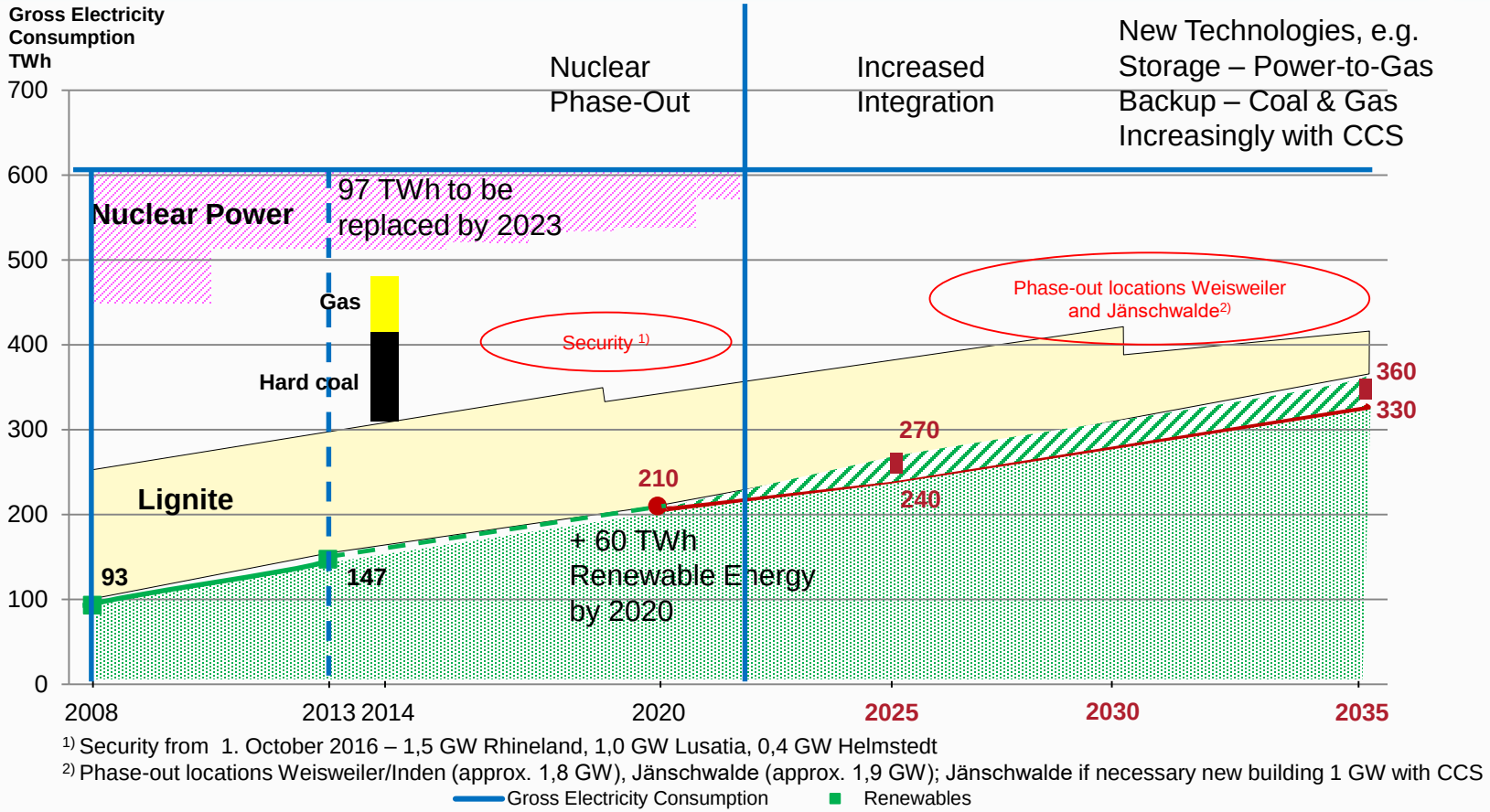
Reliable and available capacity power is becoming short

– Authorization scenario for network development plans 2017-2030 *



* Authorization scenario for network development plans 2017-2030, lignite DEBRIV; 2030 without security (2,7 GW) top value, without Weisweiler (1,8 GW) and Jänschwalde (1,9 GW) lower value; 2035 if necessary new building Jänschwalde if necessary in addition 1 GW - CCS

Economic Targets of Germany's Federal Government for the Electricity Sector



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Key messages of DEBRIV in the German energy debate

Security of supply is the most important question during transformation of the German power system. The decision to face out nuclear and to base the future generation system mostly on wind and photovoltaic leads toward the question how to maintain security of supply.

1. Wind and photovoltaic generation can stay over some month at very low levels and sometimes power input is close to zero. Security of supply can only be maintained in the next decades by two systems for one task. One side renewable capacity, the other side power plants which are available all year using gas, hard coal or lignite. This is the reasonable and economic pathway to maintain security of supply.

2. German lignite is the only energy carrier, which is long term available and competitive. This is essential for the whole industry. Lignite mining and power generation is very important for mining regions.

3. Power generation in Germany based on coal will decrease in a way that is fully compatible to the ambitious CO_2 targets in Germany and Europe. CO_2 emissions in Europe are regulated under the EU ETS. Interventions on national level have no influence on the CO_2 emissions in the Union and are of big disadvantage for Germanys competitive position.

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General Manager
DEBRIV – Bundesverband Braunkohle
Am Schillertheater 4
10125 Berlin