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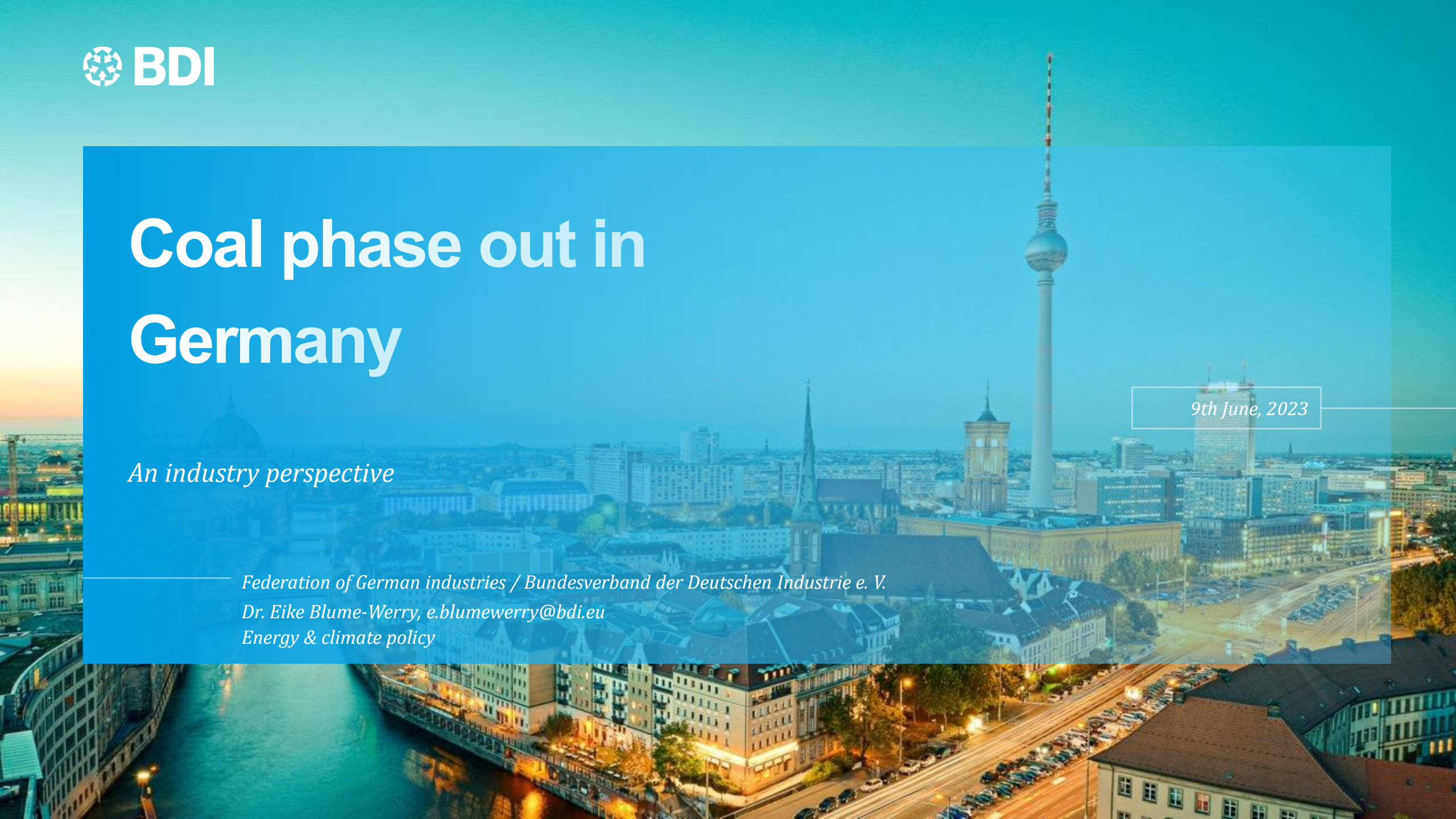
Coal phase out in Germany

An industry perspective

9th June, 2023

Federation of German industries / Bundesverband der Deutschen Industrie e. V.
Dr. Eike Blume-Werry, e.blumewerry@bdi.eu
Energy & climate policy



OUR ROLE

We work for a modern, sustainable and successful industry

- The BDI conveys the interests of German industry to those with political responsibility in Germany, Europe and worldwide. Vice versa, it evaluates current political decisions for and with its member associations.
- The BDI perceives itself not only as the political representative of the interests of German industry, but also as a discussion partner and center of competence for economic policy.

We work for a modern, sustainable and successful industry in Germany, Europe and the world.

OUR MANDATE

Together with industry-related services providers, industry drives the engine behind Germany's economic growth

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Industry associations

The BDI is the umbrella organization of German industry and industry-related service providers.

+100.000

Companies

With more than 100.000 large, medium and small companies, the success of German industry is built on its deep industrial value chains.

+8.000.000

Employees

The represented companies have more than eight million employees in total.

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AGENDA

Content

Germany´s electricity sector
A brief history of energy policy
The merit order & price setting mechanism
Current energy crisis
Climate Change Act & next steps

Germany‘s electricity sector

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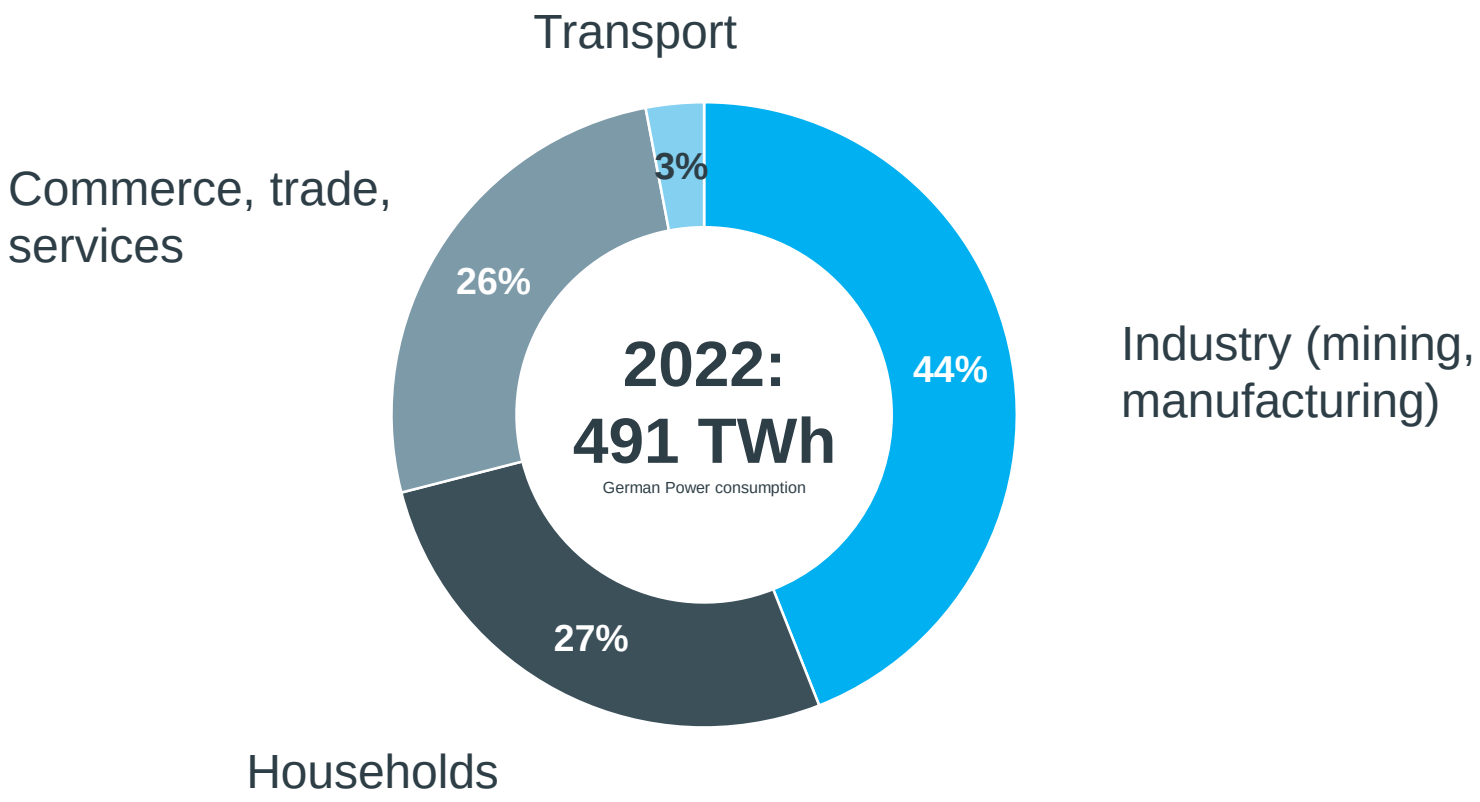
Demand & generation structures

Germany‘s power demand by sector

Industry is by far the largest consumer of electricity in Germany



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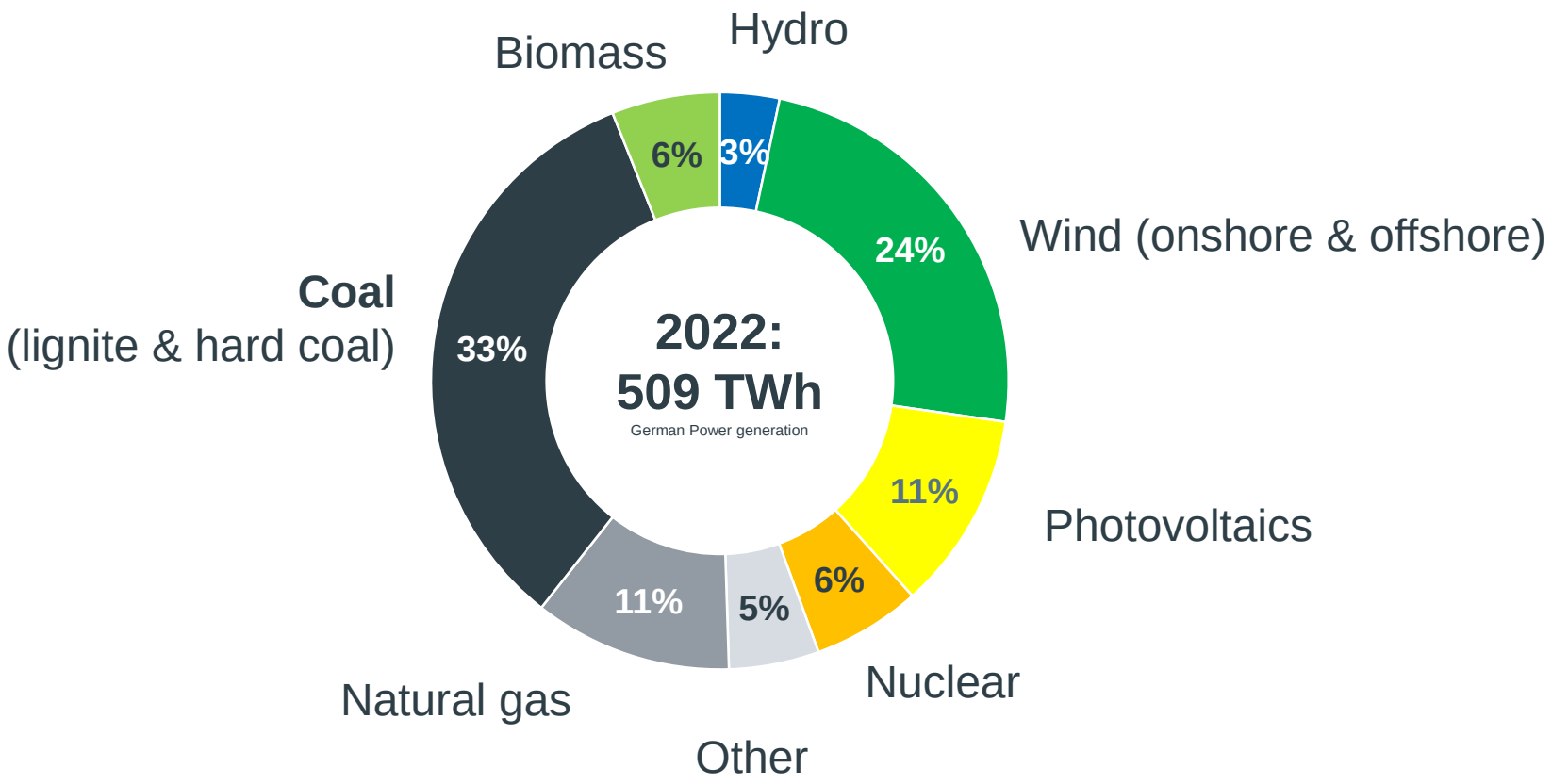
Source: BDEW 2023

Germany‘s power generation mix

is characterised by a wide technology mix, increasing renewable generation and still a lot of coal-fired generation



Source: Statistisches Bundesamt 2023

A brief history of energy policy

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Objectives of energy policy – The energy policy objective triangle

Three (plus one) objectives for the German energy policy

*«A fundamental transformation of the energy system is necessary to generate **sustainable** energy. The conversion must be **affordable** and ensure **security of supply** at the same time.»*

(Umweltbundesamt 2014)

Energy policy objectives

1. Climate protection
2. Security of supply
3. Competitiveness

+1 Abandoning nuclear

Different options for reaching given climate targets

Direct steering

Direct steering through “pricing” and internalization of greenhouse gas emission costs (emissions trading)

- Introduction CO_2 tax
- Introduction of emissions trading

Direct steering - Taxation of emissions (CO_2 tax)

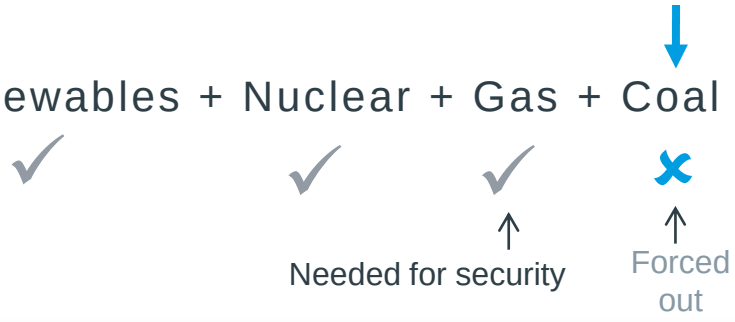
Description & effects

Description

- Introduction CO_2 tax
- Introduction of emissions trading

Effects

Renewables + Nuclear + Gas + Coal



Economic implications

- Electricity prices rise due to (high) CO_2 prices
- Indirect promotion of renewables through higher electricity prices
- Negative effects on competitiveness of industry

1. Sustainability ✓
2. Security of supply ✓
3. Competitiveness ✗

Climate policy objectives

different options for reaching given climate targets

Direct steering

Direct steering through “pricing” and internalization of greenhouse gas emission costs (emissions trading)

- Introduction CO_2 tax
- Introduction of emissions trading

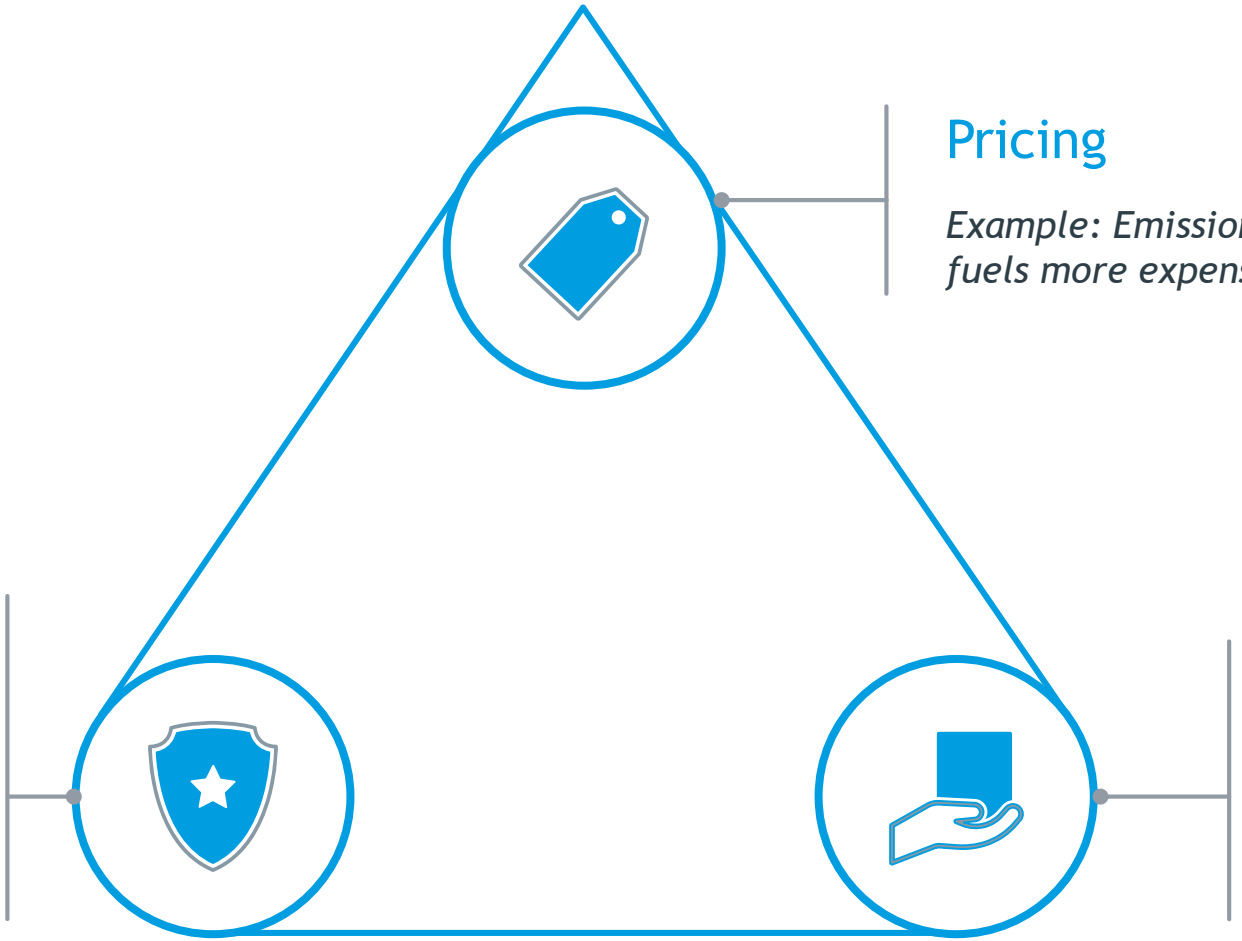
Multiple steering

A hybrid system using “pricing” mechanisms parallel to subsidies and promotion strategies

- Introduction CO_2 tax
- Introduction of emissions trading
- Promotion of renewables
- Promotion of energy efficiency
- …

Multiple steering concept

Concepts combines different climate policy approaches



Pricing

Example: Emissions trading to make fossil fuels more expensive

Regulatory law

Example: demand closures of coal-fired power plants by law

Subsidies

Example: feed-in tariffs for renewable energy sources

Regulatory law

Subsidies

Multiple steering concept

Taxation of emissions & subsidies for renewables

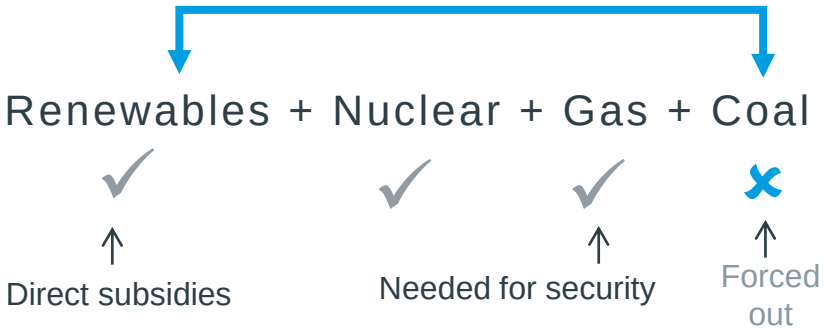
Implemented in EU and Germany

Description & effects

Description

- Introduction CO_2 tax & emissions trading
- Promotion of renewables (subsidies)

Effects



Economic implications

- Direct promotion (subsidies) increases expansion of renewables and lowers necessary CO_2 price
- Electricity prices rise slower than with direct steering
- Negative effects on competitiveness of industry is lower than under direct steering (with exemptions from renewable levy)

1. Sustainability ✓
2. Security of supply ✓
3. Competitiveness ✓

...but then Fukushima...

fundamentally changed the political environment

Implemented in Germany

Description & effects

Description

- Introduction CO_2 tax & emissions trading
- Promotion of renewables (subsidies)
- Nuclear phase-out until 2022

Effects

Renewables + Nuclear + Gas + Coal

✓ ✗ ✓ ✓

↑ Direct subsidies

↑ Forced out

↑ Needed for security

Economic implications

- Coal capacity is partially required to secure supply of energy
- CO_2 prices increase as a result of a higher utilization of coal
- Nuclear phase out increases CO_2 price
- Electricity prices rise and influence the competitiveness negatively

1	Sustainability	✗
2	Security of supply	?
3	Competitiveness	?
+1	Nuclear phase-out	✓

...and the economic crisis...

Decreased gas and coal prices and electricity demand

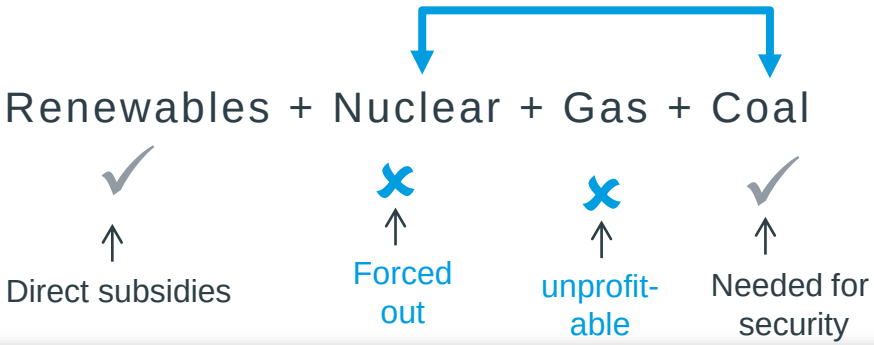
Implemented in Germany

Description & effects

Description

- Introduction CO_2 tax & emissions trading
- Promotion of renewables (subsidies)
- Nuclear phase-out until 2022
- Economic crisis

Effects



Economic implications

- Coal capacity displaces gas; CO_2 increases further as a result of higher utilization
- Electricity prices fall due to lower primary energy and CO_2 prices
- Positive effects on competitiveness in relation to other economies but low demand

1	Sustainability	✗
2	Security of supply	?
3	Competitiveness	✓
+1	Nuclear phase-out	✓

The merit order and price-setting on electricity markets

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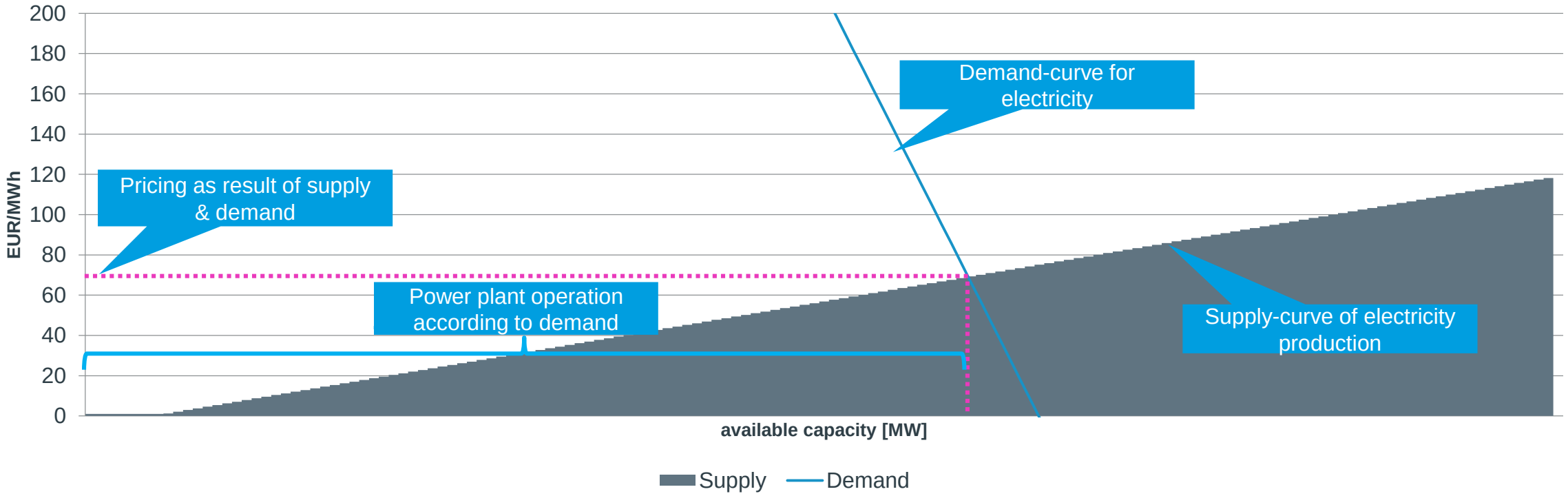
Principles of electricity markets

Supply & Demand

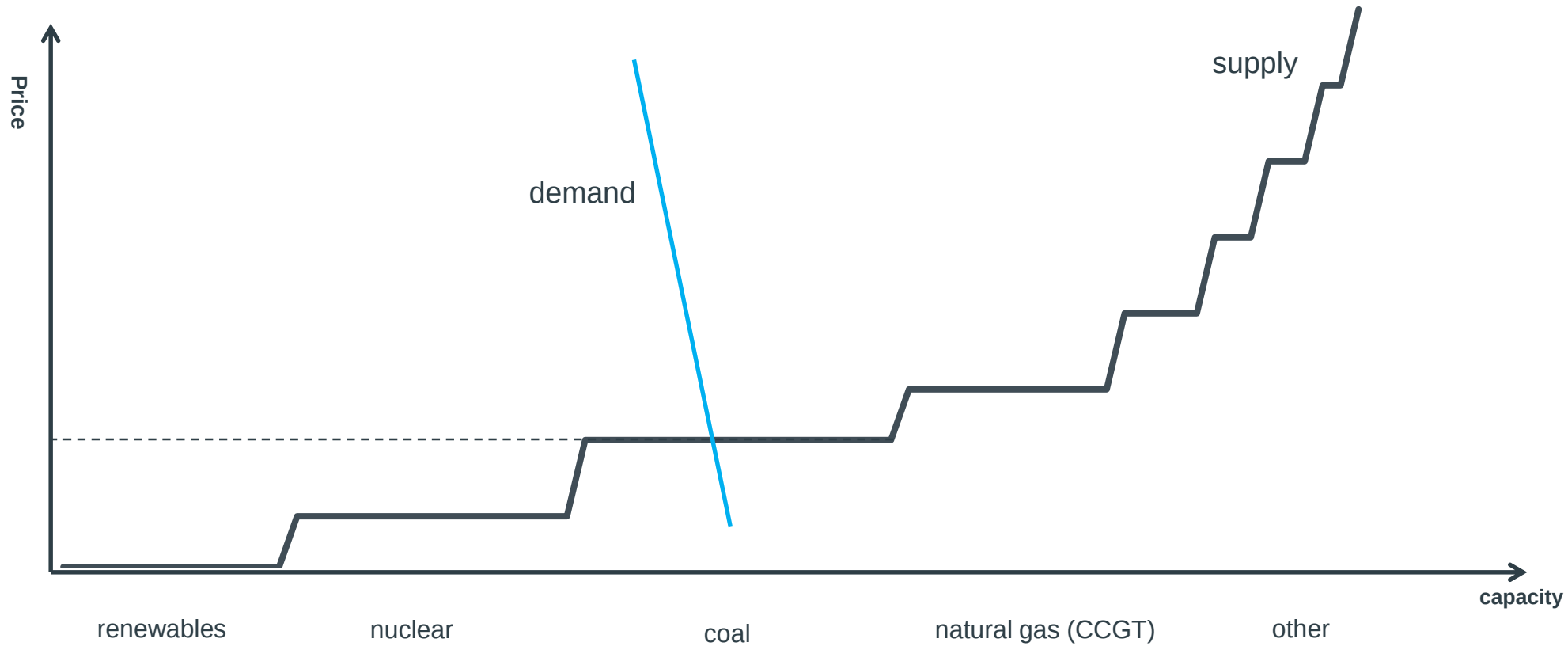
The interception of the supply- and demand-curve sets the market price



Marginal costs (i.e. costs for an additional unit of electricity) are key for pricing and dispatching

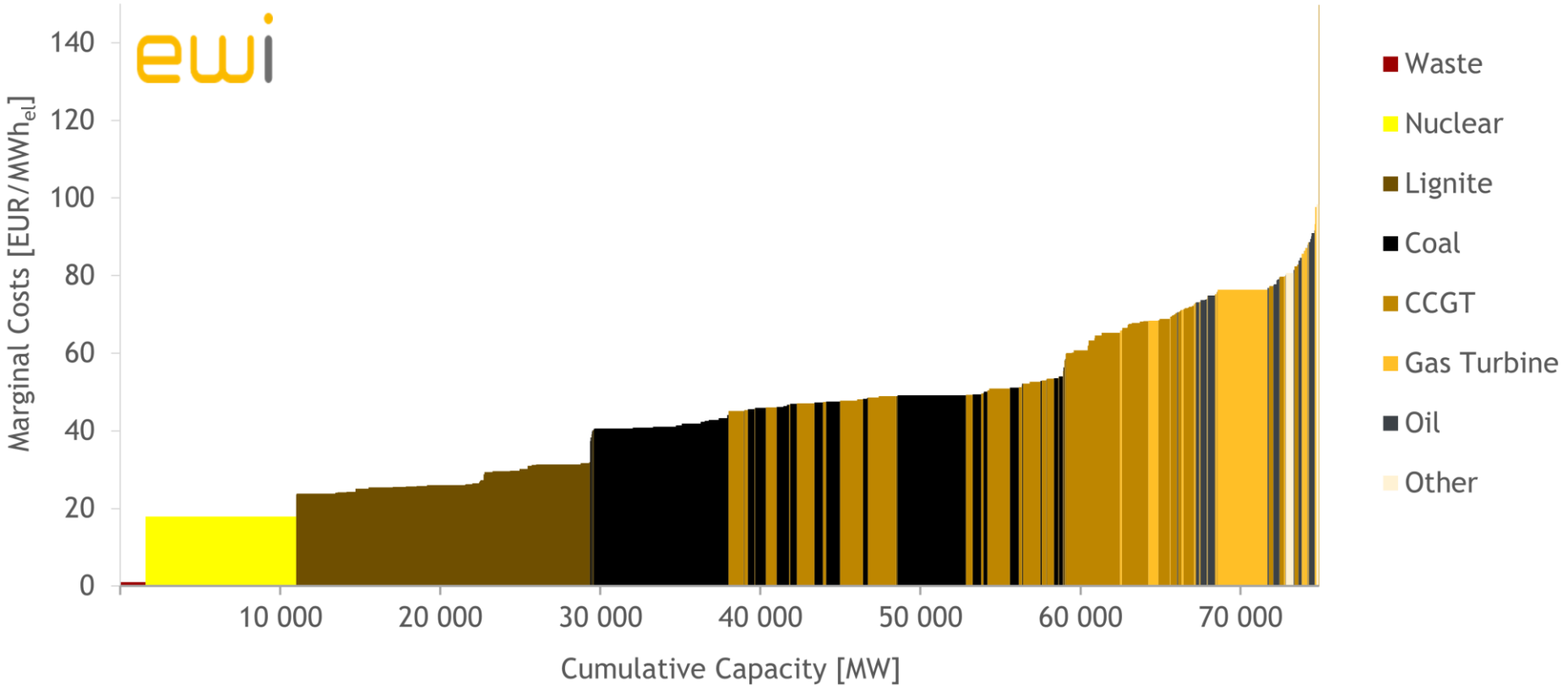
This supply curve is referred to as «merit order»

supply according to marginal costs, demand is relative inelastic



Merit order in practice (1/2)

German merit order in 2018…



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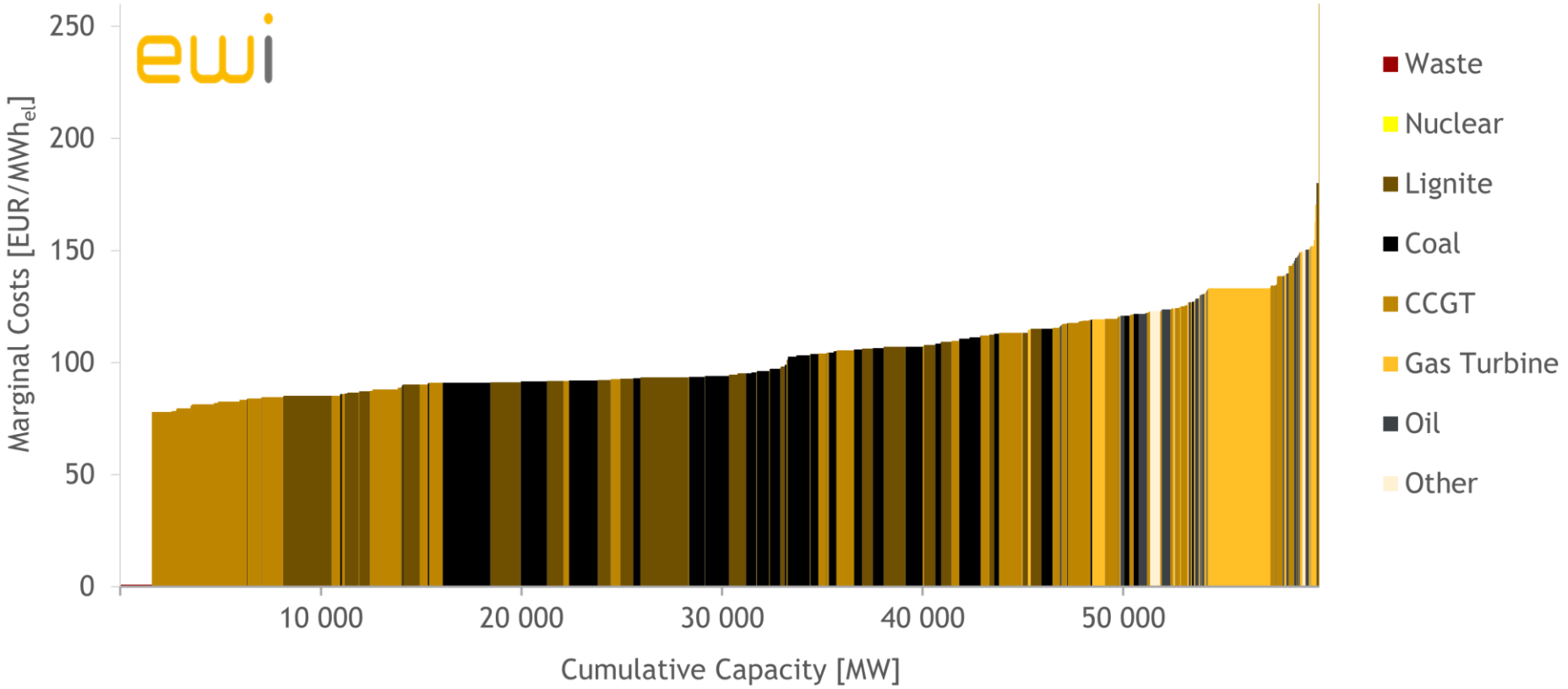
Displaying only dispatchable capacity
Source: EWI 2021

Merit order in practice (2/2)

… and today (2023)



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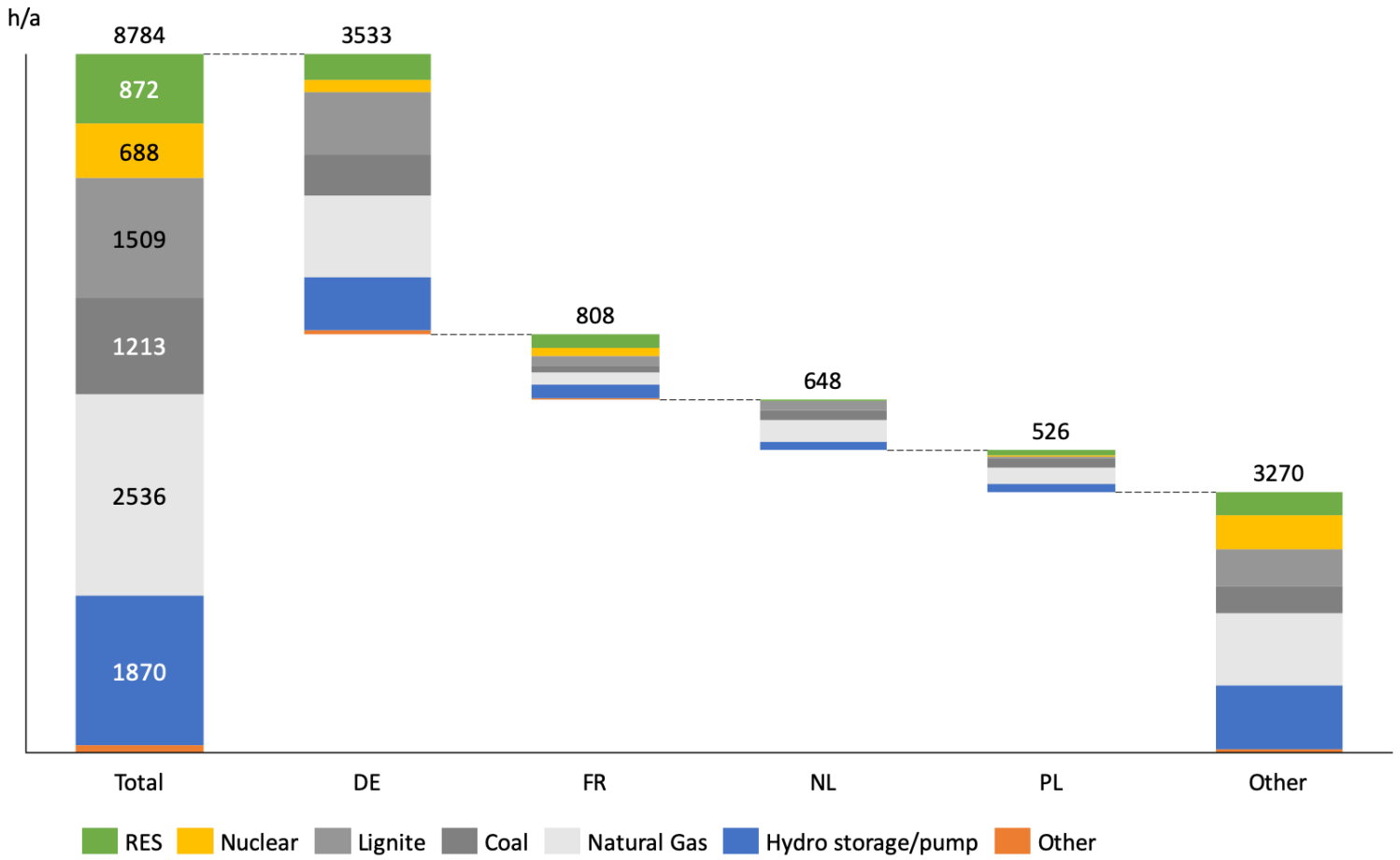
Displaying only dispatchable capacity
Source: EWI 2021

Price setting technologies Germany 2020

Coal-, lignite- and gas-fired power plants set the price for about 60% of hours



Source: Blume-Werry, et al, 2020

Current energy crisis – bye bye coal phase-out?

The Russian invasion of Ukraine sent energy markets into turmoil

Bloomberg

Germany Revives Coal as Energy Security Trumps Climate Goals

Tough choices for Germany as coal power stations return to keep people warm this winter

sky news

DW

Germany's energy U-turn: Coal instead of gas

The Guardian

Germany puts coal power plant back on network after gas supply cut

Mothballed facility in Lower Saxony gets emergency permission to run until April

The New York Times

Germany will fire up coal plants again in an effort to save natural gas.

Current energy crisis – natural gas prices

High volatility and skyrocketing prices in 2022

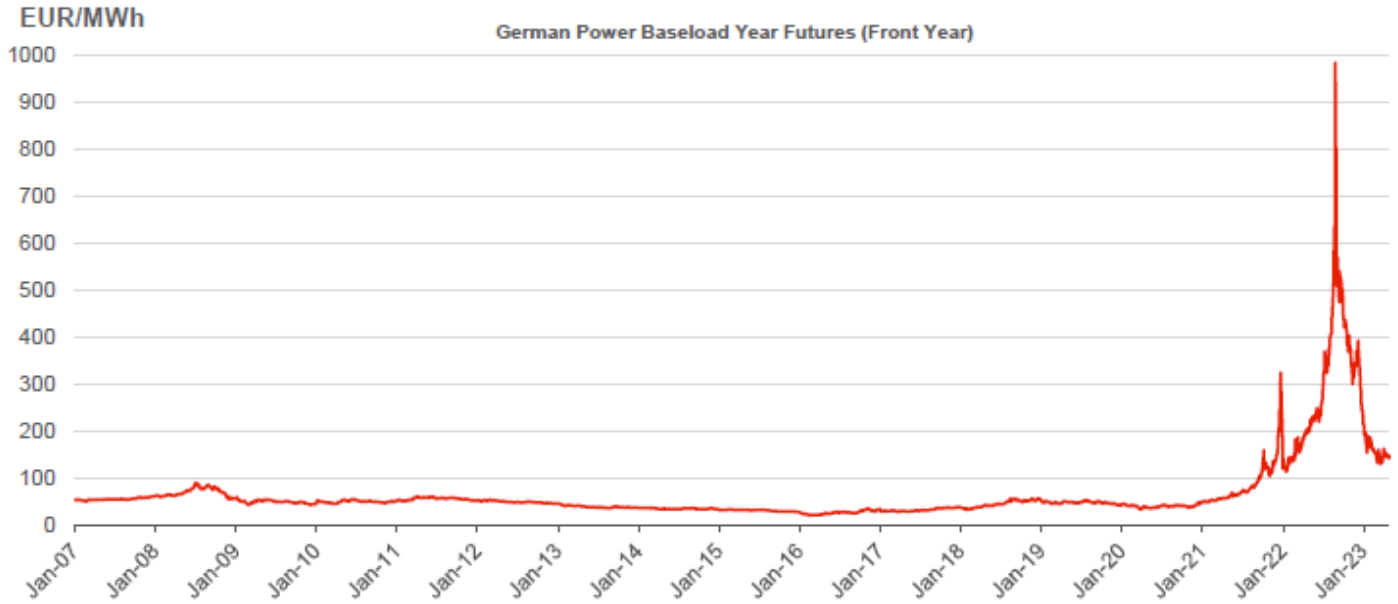
- Q4 2023 currently at 40 EUR/MWh
- Doubling of prices compared to the 2010-2020 average of 19 EUR/MWh

Source: ICE (Intercontinental Exchange), Q4 2023 ahead natural gas delivery, daily average future prices

Current energy crisis - power prices

High volatility and skyrocketing prices in 2022

- Front year currently at 126 EUR/MWh
- Threefold increase compared to the 2010-2020 average of 41,1 EUR/MWh



Soruce: EEX, 2023

Current energy crisis – hard coal prices

High volatility and skyrocketing prices in 2022

- Q4 2023 currently at $100 tonne
- Return to somewhat normal levels in recent weeks

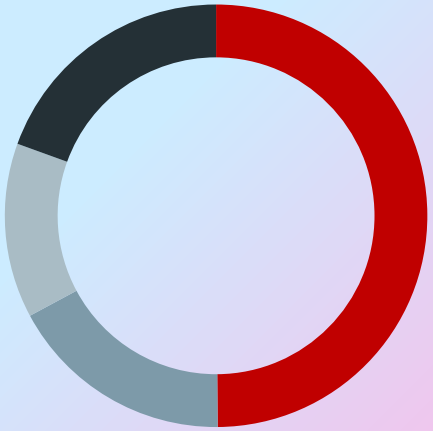
Source: ICE (Intercontinental Exchange), Q4 2023 ahead API2 Rotterdam coal futures, daily average future prices

Current energy crisis – primary energy

German dependency on energy imports from Russia in 2021

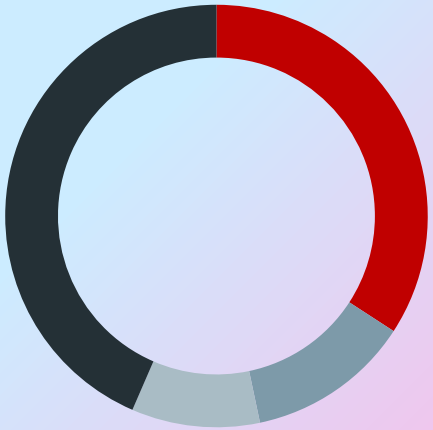
Hard coal

- About 50% Russian imports
- Even larger share for coal used in power plants (70%)



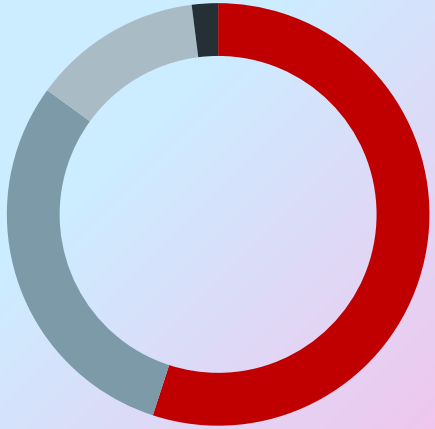
Oil

- About 34% Russian imports
- Particular reliance for east-German refineries



Natural Gas

- About 55% Russian imports
- Most important energy carrier for German industries



Sources: VDKi, 2022; BGR 2022; BMWK 2022

Current energy crisis – Main use cases and measures

Guiding question – what can be done to secure supplies and reduce import dependency?

	Hard coal	Oil	Natural Gas
Main use cases	▪ Power plants (53%) ▪ Steel production (41%)	▪ Predominantly transport ▪ Heating fuel ▪ Industry	▪ Heating of households & offices (50%) ▪ Industry (36%) ▪ Electricity generation (12%)
Measures	▪ Globally traded commodity on liquid world markets ▪ Import ban on Russian coal since August 2022	▪ Globally traded commodity on liquid world markets ▪ Import ban on Russian crude oil since December 2022 (tanker) and January 2023 (pipeline) ▪ Import ban on Russian oil products since February 2023	▪ Construction of LNG import terminals ▪ Ramp-up of alternative supplies ▪ Fuel-Switch in industry ▪ High prices demand destruction ▪ Lifetime extension for nukes & re-activation of coal-fired power plants

Reactivation of coal-fired power plants

Bye bye coal-phase out?

Summer 2022: Plan to **reactivate** (mothballed) **coal-fired power plants in reserves** and **delay closures** that were part of the phase-out plan

- About 6 GW hard coal-fired capacity
- About 2 GW of lignite-fired capacity
- **BUT** current legislation only allows operation of these power plants until 31/03/2024 (hard coal) and 31/06/2023 (lignite)
- Operating licence also linked to „alert level“ of the „gas emergency plan“

Winter 2022: New plan on coal-phase out in West Germany by 2030

- 1,2 GW lignite-fired capacity that was supposed close in 2022 to be operated until 2024

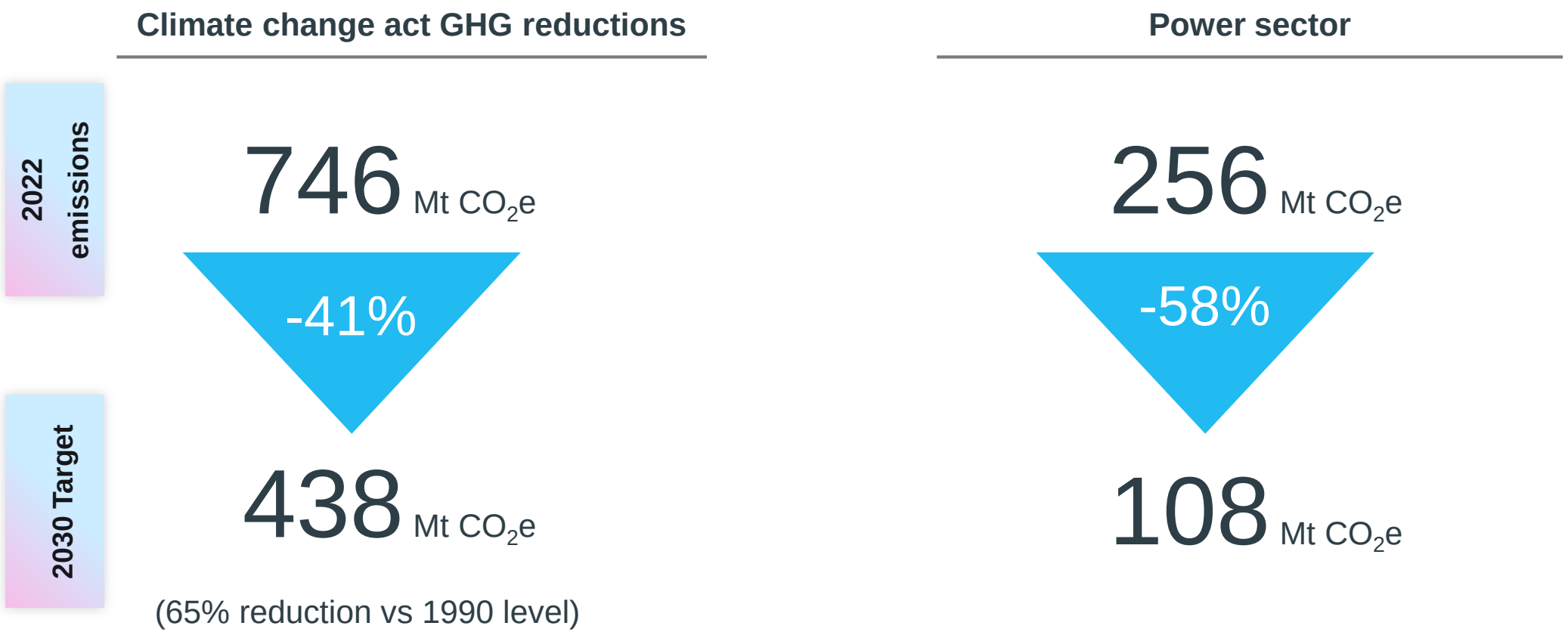
Despite headlines suggesting a revival of coal an earlier phase-out is more likely than a delayed coal-exit

Germany´s Climate Change Act and next steps

Ambitious targets to transform the economy

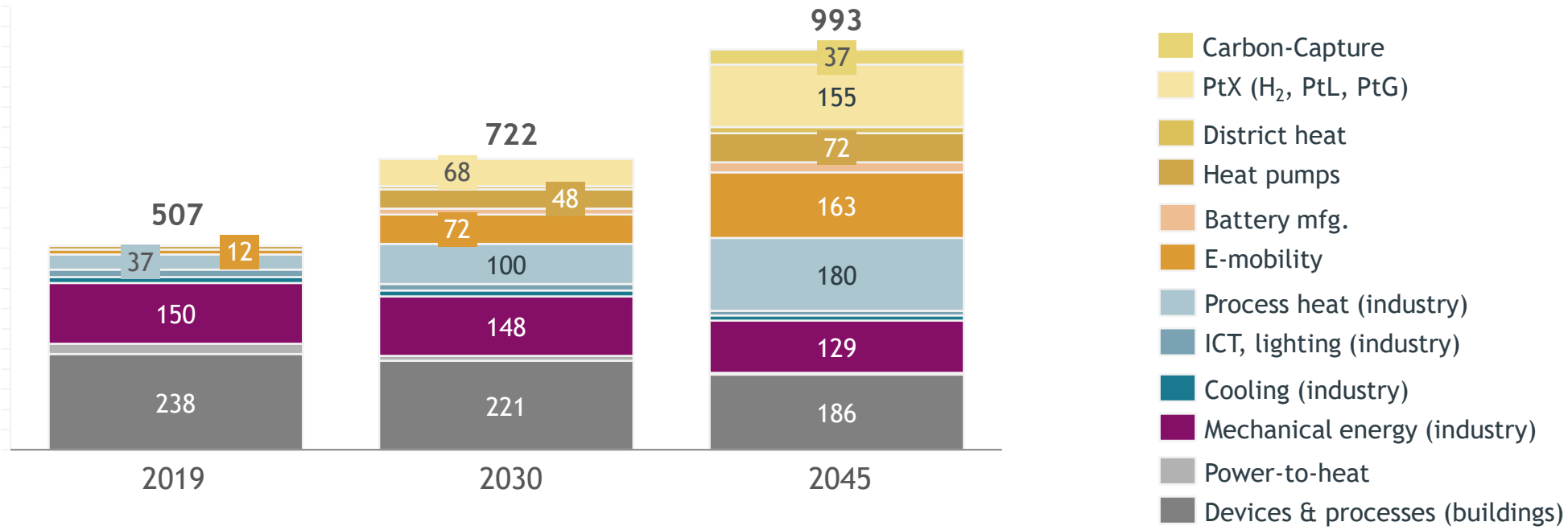
Germany´s Climate Change Act 2021 (Klimaschutzgesetz)

introduces ambitious sector targets and greenhouse gas neutrality in 2045



Net power demand by application 2019 – 2045

Electrification of other sectrrs increase electricity demand by over 40% in climate neutrality studies



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Note: Net demand describes the cross-sector sum of domestic consumption without considering grid losses, power plants' own consumption, storage losses, imports, exports
Source: BDI Klimapfade 2.0

Core industry demands going forward

Bring down prices

- Increase supply on the market
- Speed up deployment of renewables by faster planning & approval procedures and allocated spaces
- Quickly present power plant strategy to build H2-ready gas-fired power plants
- A coal phase-out 2030 can only materialise with sufficient alternative supply
- Introduce a short-term instrument to support electricity-intensive industries facing international competition
- Reduce state-induced price components on electricity such as taxes & levies
- Ensure electricity becomes more not less affordable for all

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Many thanks