

October 2023

# EnBW Factbook 2023 >



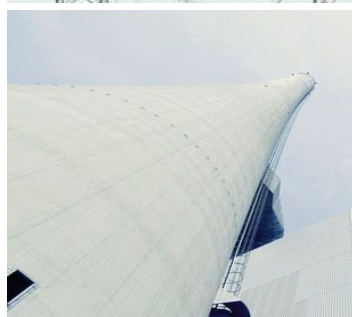
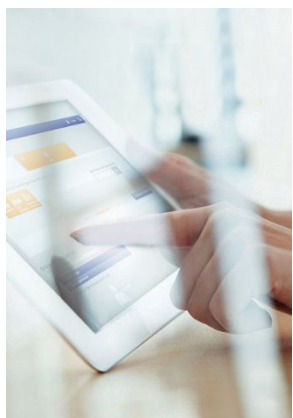


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- Key investment highlight
- EnBW at a glance
- Key financials and non-financials
- Important shareholdings and regional footprint beyond Germany



# Key investment highlights



Integrated utility with a diversified business portfolio



High share of stable, low-risk business



Hedging of merchant earnings for up to 3 years in advance



Ambitious climate action targets



Prudent financial policy



Stable government-related shareholder structure



# EnBW at a glance



## Figures 2022

€ m

|                       |        |
|-----------------------|--------|
| Total revenue         | 56,003 |
| Adj. EBITDA           | 3,286  |
| Adj. Group net profit | 973    |
| Retained cash flow    | 2,535  |
| Total investment      | 3,154  |
| Net debt              | 10,847 |

**Generation portfolio 13.1 GW**  
of which **5.4 GW** or **42%** renewable energies

**Debt repayment potential**  
**23.4%** RCF in relation to net debt



## Balanced risk-return profile

- **66%** EBITDA contribution from regulated grid business and renewable energies
- **Solid investment-grade ratings:** Moody's Baa1 stable, S&P A- stable
- Debt repayment potential 2021 - 2025: **≥12%**<sup>2</sup> RCF in relation to net debt
- **Highly ranked sustainability ratings**  
ISS ESG: B prime; MSCI: A average;  
CDP: B management; Sustainalytics: 28.5 medium risk



## Adjusted EBITDA 2022 per segment<sup>1</sup>

€ m

|                                       |              |
|---------------------------------------|--------------|
| Smart Infrastructure for Customers    | 510          |
| System-Critical Infrastructure        | 1,046        |
| Sustainable Generation Infrastructure | 1,935        |
| <b>Total</b>                          | <b>3,286</b> |



## Stable government-related shareholder structure

|  |  |                                       |              |
|--|--|---------------------------------------|--------------|
| <b>Federal state of Baden-Wuerttemberg</b> <sup>3</sup>  | Moody's<br>INVESTORS SERVICE<br>Aaa stable | S&P Global<br>Ratings<br>AA+ positive | <b>46.75</b> |
| <b>OEW Energie-Beteiligungs GmbH</b> <sup>4</sup>        |  |                                       | <b>46.75</b> |
| <b>Municipal shareholders' associations</b> <sup>5</sup> |  |                                       | <b>4.05</b>  |
| <b>EnBW Energie Baden-Württemberg AG</b>                 |  |                                       | <b>2.08</b>  |
| <b>Other shareholders</b>                                |  |                                       | <b>0.39</b>  |

<sup>1</sup> Excluding €205 m attributable to consolidation

<sup>2</sup> To maintain solid investment-grade ratings, EnBW regularly checks the target value of at least 12% for the debt repayment potential for managing its financial profile;

<sup>3</sup> Indirectly held by NECKARPRI-Beteiligungsgesellschaft mbH.

<sup>4</sup> 100% subsidiary of Zweckverband Oberschwäbische Elektrizitätswerke which is an association of 9 districts;

<sup>5</sup> Badische Energieaktionärs-Vereinigung (BEV) 2.45%; Gemeindeelektrizitätsverband Schwarzwald-Donau (G.S.D.) 0.97%; Neckar-Elektrizitätsverband (NEV) 0.63%

## Key financials

| KPI                      | Topic                          |      | 2022 | Target 2025            |
|--------------------------|--------------------------------|------|------|------------------------|
| Adjusted EBITDA          | Securing profitability         | € bn | 3.3  | 3.2                    |
| Debt repayment potential | Managing the financial profile | %    | 23.4 | ≥12 <sup>1</sup>       |
| ROCE                     | Increasing group value         | %    | 7.9  | - <sup>2</sup>         |
| Value spread             |                                |      | 1.1  | 0.5 - 1.5 <sup>2</sup> |

## Key non-financials

| KPI  | Topic                          |       | 2022 | Target 2025                                       |
|--|--------------------------------|-------|------|---|
| Installed RE output in GW and the share of the generation capacity accounted for by RE | Expand renewable energies (RE) | GW    | 5.4  | 6.5 - 7.5   |
|  |                                | %     | 41.7 | >50   |
| CO <sub>2</sub> intensity <sup>3</sup>   | Climate protection             | g/kWh | 491  | -15 to -30% <sup>4</sup><br>(reference year 2018) |
| LTIF for companies controlled by the Group <sup>5, 6</sup>                             | Occupational safety            |       | 2.6  | 2.1   |
| LTIF overall <sup>5</sup>  |                                | 4.1   | 3.5  |   |
| People Engagement Index (PEI) <sup>7</sup>   | Engagement of employees        |       | 81   | 77 - 83 <sup>8</sup>                              |

As of 31 December 2022

<sup>1</sup> Following the transition to the growth strategy, internal financing capability was replaced by the new key performance indicator debt repayment potential from 2021 onwards. To achieve the unchanged goal of maintaining solid investment grade ratings, EnBW regularly checks the 2025 target value for the debt repayment potential for managing its financial profile.

<sup>2</sup> We use value spread to measure the increase in the value of the company from 2022 onwards. This performance indicator is more meaningful and is independent of external market influences making it easier to control. It will also improve the comparability of the data. ROCE has thus been replaced by the new key performance indicator value spread.

<sup>3</sup> The calculation method for the key performance indicator CO<sub>2</sub> intensity will be restricted in future to include only factors that can be controlled by the company. The calculation of the ratio does not include the share of positive redispatch and nuclear generation that cannot be influenced by EnBW. If the share of positive redispatch that cannot be influenced is taken into account, the CO<sub>2</sub> intensity for the reporting year would be 508 g/kWh (previous year: 492 g/kWh). The CO<sub>2</sub> intensity including nuclear power generation for the reporting year was 401 g/kWh (previous year: 386 g/kWh).

<sup>4</sup> The reference year is 2018 because the 2020 reporting year cannot be considered representative for the coming years (due to, among other things, market effects and COVID-19).

<sup>5</sup> Variations in the group of consolidated companies (all companies with more than 100 employees, excluding external agency workers and contractors, are considered). Companies that were fully consolidated for the first time during the 2022 financial year were not included in the calculations for the LTIF performance indicators.

<sup>6</sup> Excluding companies in the area of waste management.

<sup>7</sup> Variations in the group of consolidated companies (all companies with more than 100 employees are generally considered [except ITOs]).

Companies that were fully consolidated for the first time in the fourth quarter of 2022 were not included in the employee surveys for the PEI.

<sup>8</sup> Due to the extraordinary effects relating to COVID-19 in the year this key performance indicator was introduced, we may need to adjust this target value during the strategy period.



# Important shareholdings and regional footprint beyond Germany

## Germany

- ① **Stadtwerke Düsseldorf AG, Düsseldorf**
  - 54.95% capital share
  - €71.4 m adjusted EBITDA
- ② **VNG AG, Leipzig**
  - 79.83% capital share
  - €596.4 m adjusted EBITDA

## Austria

- ③ **SMATRICS EnBW GmbH, Vienna**
  - 51.00% capital share

## Czech Republic

- ④ **Pražská energetika Holding a.s., Prague<sup>1</sup>**
  - 69.80% capital share<sup>2</sup>
  - €36.7 m adjusted EBITDA

## Denmark

- ⑤ **Connected Wind Services A/S, Skødstrup**
  - 100% capital share

## France

- ⑥ **Valeco SAS, Montpellier**
  - 100% capital share

## Great Britain

- Mona Offshore Wind Holdings Ltd., Sunbury-On-Thames**
  - 50.00% capital share
- ⑦ **Morgan Offshore Wind Holdings Ltd., Sunbury-On-Thames**
  - 50.00% capital share
- Morven Offshore Wind Holdings Ltd., Sunbury-On-Thames**
  - 50.00% capital share

## Sweden

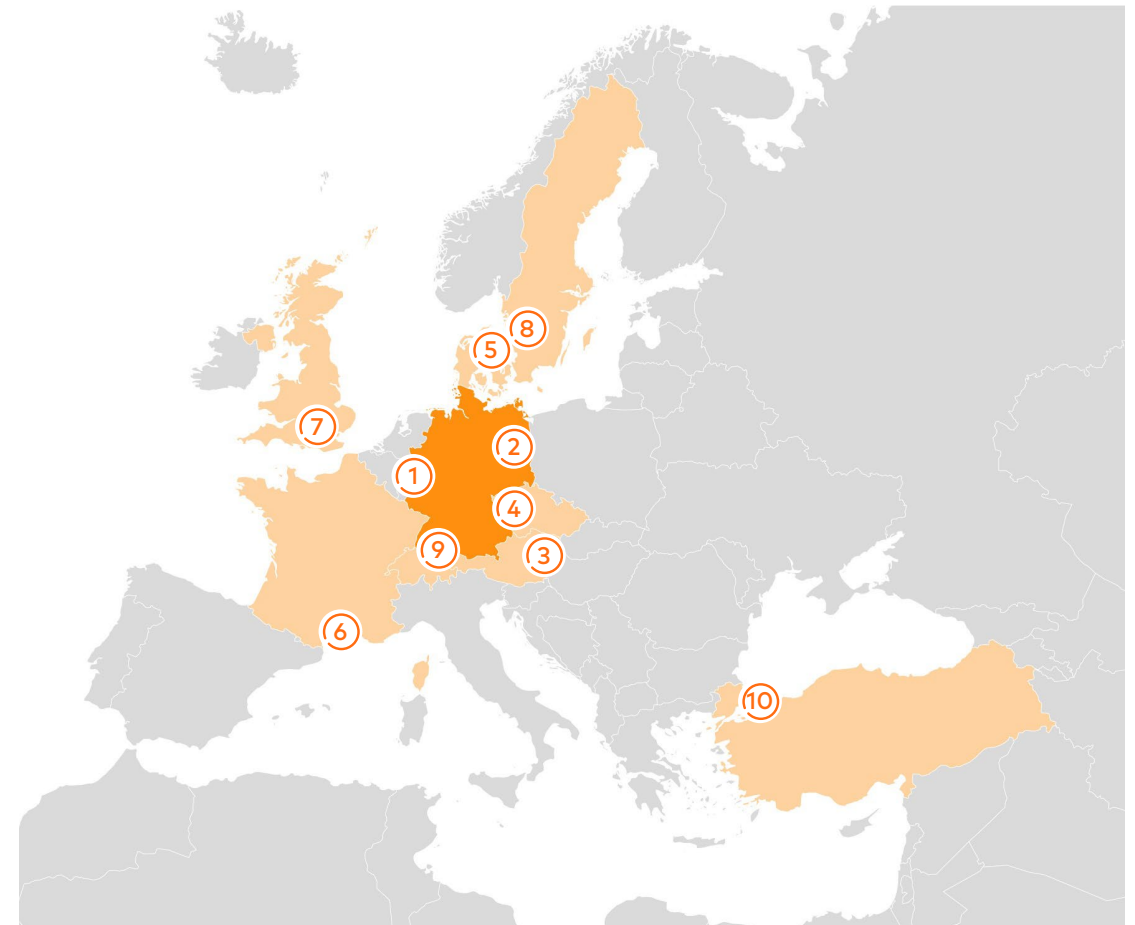
- ⑧ **EnBW Sverige AB, Falkenberg**
  - 100% capital share

## Switzerland

- ⑨ **Energiedienst Holding AG, Laufenburg**
  - 66.67% capital share
  - €30.7 m adjusted EBITDA

## Türkiye

- ⑩ **Borusan EnBW Enerji yatırımları ve Üretim A.Ş., Istanbul<sup>3</sup>**
  - 50.00% capital share



As of 31 December 2022

<sup>1</sup> Directly and indirectly held shares.

<sup>2</sup> Shares held directly and indirectly through Praszka Energetika Holding a.s.; PRE fully consolidated according to a consortium agreement with the City of Prague.

<sup>3</sup> Not fully consolidated, accounted for using the equity method

The full list of shareholdings can be found in the notes to the consolidated financial statements under (38) "Additional disclosures" [EnBW Integrated Annual Report 2022, page 267](#)



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- Corporate strategy
- Triangle of energy transition
- Sustainability

## System-Critical Infrastructure Power and gas grids

e-mobility  
smart grids  
volatile electricity generation  
HVDC  
**grid stability**  
transmission grids  
electricity distribution grid  
Baden-Württemberg  
hydrogen infrastructure  
higher demand

## Sustainable Generation Infrastructure Generation and trading

coal phase-out  
increased CO<sub>2</sub> prices  
**renewable energy**  
conventional power back-up  
solar and offshore wind in Germany  
high commodity prices  
increasing electricity demand  
fuel switch

## Smart Infrastructure for Customers Customers

energy prosumer  
connected home  
digital services  
autarchy  
sustainability  
heat transition  
eco-oriented providers  
price increases  
increasing customer expectations  
**energy management systems**  
upward trend in e-mobility  
Smart metering & dynamic tariffs

- **Technological developments:** More diversity, modularity and granularity in the energy system
- **New market participants:** More competition and fragmentation of the value chain
- **Regulatory framework:** Constant change following the transformation of the energy system





# Competitors along EnBW's business segments

## EnBW positioning

Further development from an integrated energy supplier to a sustainable and innovative infrastructure partner  
Focus on growth in renewable energies, grids and customer solutions (e-mobility, telecommunications and broadband)  
Active in Germany and selected foreign markets

## Selection of international, national and regional competitors

| National and international   | Regional  | Commodity suppliers, solution suppliers, start-ups  | Renewable energies   | E-mobility, telecommunications and broadband   | Financial investors   |
|--|---|---|--|--|---|
| ALPIQ, EDF, EDPR, Enel, Engie, E.ON, Equinor, EVN, Fortum, Iberdrola, Ørsted, RWE, Vattenfall, Verbund | Badenova, Entega, EWE, Mainova, MVV, NErgie, SWM, Thüga | 1komma5°, enpal, Lichtblick, NEXT Kraftwerke, octopus energy, ostrom, Sonnen, Thermondo, Tibber | BayWa r.e., bp, Encavis, ENERTRAG, PNE Wind, Shell, theolia, Total Energies, wpd | 1&1, Allego, aral pulse, Deutsche Glasfaser, Deutsche Telekom, Ecotel, Fastned, Google, Ionity, Shell, Tesla, VW | Private equity, infrastructure and pension funds as well as insurance companies |

## Challenges

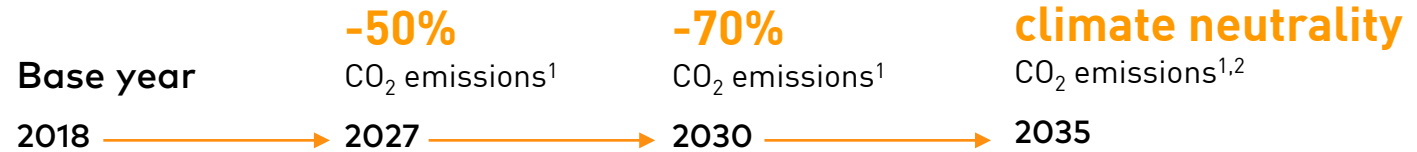
- Increasing competition due to entry of new market participants in the core business
- New competition due to market entry of EnBW in new business fields
- Optimal positioning with respect to the regulatory environment and highly competitive market



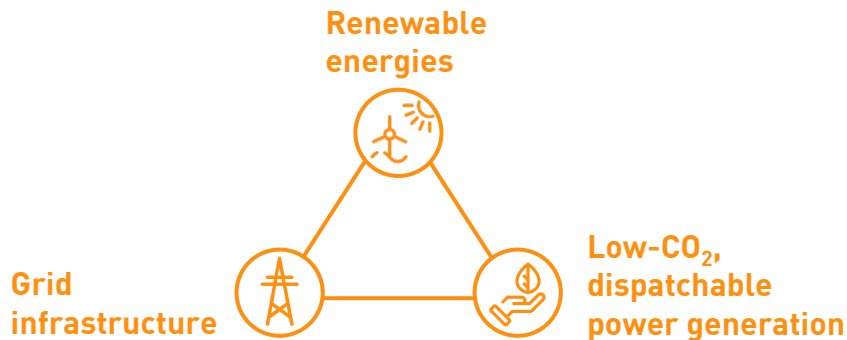
# Triangle of energy transition a prerequisite for successful transition to CO<sub>2</sub>-free energy supply



## Climate neutral EnBW 2035



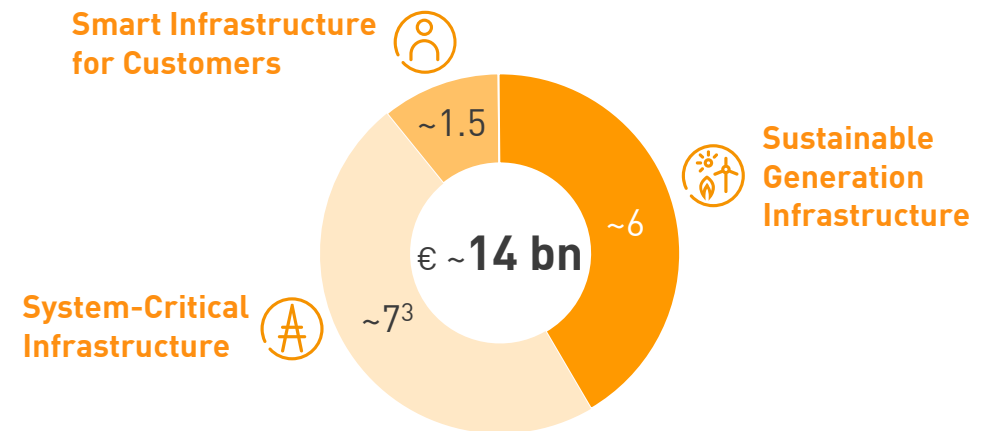
## Triangle of energy transition



- Significant progress has to be made in all three fields simultaneously – rather than sequentially – to realize the energy transition in Germany within the contemplated time frame

## Total investment volume 2023 - 2025

in € bn



- Being the only fully integrated utility in Germany, EnBW implements major projects in all dimensions
- EnBW has a holistic view of the energy transition in all its facets

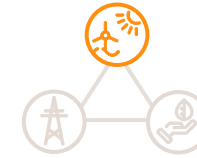
<sup>1</sup> EnBW's climate neutrality target relates to own emissions (Scope 1 and 2). Target relates to CO<sub>2</sub>eq (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and SF<sub>6</sub>). Base year 2018.

<sup>2</sup> Includes some offsetting of remaining residual emissions by purchase of recognized offsetting certificates.

<sup>3</sup> Investments in transmission grids, distribution grids, water grid and grids services



# Renewables and flexible power plants complement each other



## Renewable Energies

### In operation 2022

- Offshore wind 1 GW
- Onshore wind 1 GW
- Solar 0.8 GW

### Targets 2025

- Share of generation capacity >50%
- Renewable Energies 6.5 – 7.5 GW

### Climate neutral gases

- Exclusive offtake rights for green ammonia
- Hydrogen from beginning of 2030s

 **Investments RE 2023 - 2025** €~4 bn

## Thermal Generation

### Coal exit 2028

- Coal 33% of generation capacity (2022)
- Share adjusted EBITDA <5% (2022)
- Share external revenue <5% (2022)

### Nuclear exit 15 April 2023<sup>1</sup>

- 9% of generation capacity (2022)

### Reserve power plants

- 1.7 GW<sup>2</sup>

### Fuel switch projects: H<sub>2</sub>-ready

- 1.5 GW (COD 2025/26)

## Energy Trading

### Hedging policy

- Hedging generation and sales position against high volatility
- Contracts are closed on a back-to-back basis
  - Hedge levels<sup>3</sup>: 80 – 100% for 2024, 40 – 70% for 2025; 0 – 30% for 2026

### Strategic dimensions

- Further growing LNG sourcing
- Further diversification of gas and coal procurement
- Regional expansion into CWE/Nordics

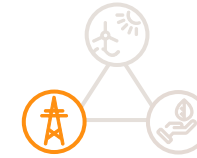
<sup>1</sup> Limited extension for three German nuclear power plants until 15 April 2023 including EnBW's power plant Neckarwestheim 2

<sup>2</sup> Not included in EnBW's generation portfolio

<sup>3</sup> As of 30 June 2023



# Grid investments are the backbone of the energy transition



## Electricity transmission grids: 3,100 km<sup>1</sup>

€2.8 bn<sup>2</sup>

- SuedLink largest energy transition project, 2 x 2 GW, >600 km, investments of €10 bn (TransnetBW, TenneT)
- ULTRANET 2 GW, 340 km, 40 km under TransnetBW (TransnetBW, Amprion)

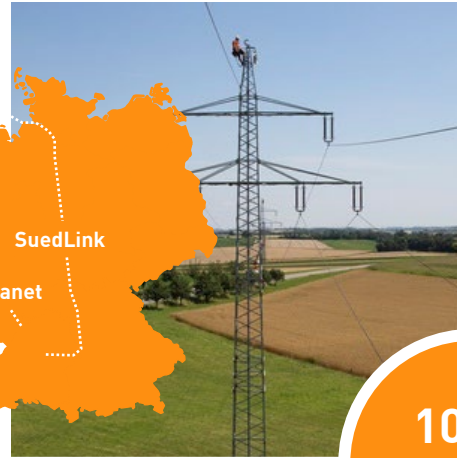
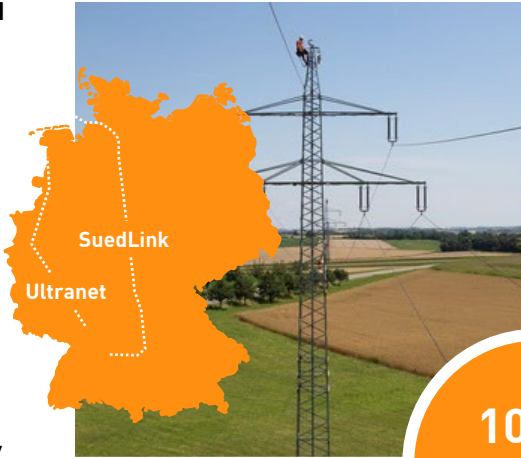
### Execution of capital partnership (completion expected in near future):

- 24.95% stake sold to Südwest Konsortium<sup>2</sup> in May 2023; German state owned KfW with option to acquire additional 24.95% stake on same terms as best bidder

## Electricity distribution grids: 144,000 km<sup>1</sup>

€2.3 bn<sup>2</sup>

- Integration of renewables and e-mobility
  - 40,000 PV feed-in applications in 2022
  - 20,000 wallbox applications in 2022



100% taxonomy-aligned



## Gas transmission grids: 9,800 km<sup>1</sup>

€1 bn<sup>2</sup>

- Neckarenztal pipeline (30 km) already H<sub>2</sub> ready
- ~250 km H<sub>2</sub> ready natural gas pipelines planned in South-Germany<sup>3</sup>

## Gas distribution grids: 16,900 km<sup>1</sup>

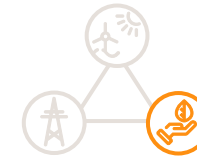
€0.2 bn<sup>2</sup>

- Oehringen H<sub>2</sub> island project already delivering climate-friendly gas

<sup>1</sup> 2022; <sup>2</sup> Gross investment 2023 - 2025; <sup>3</sup> terranets bw



# Transformation of gas business to become a top player in climate-neutral gases in Germany



- EnBW currently top 3 market player in natural gas business in Germany
- Gradual transformation towards business with climate-neutral gases like biomethane and hydrogen as contribution to climate neutrality targets
- Fuel switch at three power plants from coal to natural gas for dispatchable power and heat generation in Baden-Württemberg, conversion to climate-neutral hydrogen by 2035 at the latest
- Entry into the production of hydrogen in combination with renewable energies
- Transformation of existing natural gas infrastructure to hydrogen and thus enabler for the expansion of the hydrogen economy in Germany
- Many local and regional hydrogen projects already started, supporting their customers on their way to climate neutrality

## EnBW target vision: Stable market position along the hydrogen value chain



### Production

- We produce hydrogen in Germany and are continuously expanding our hydrogen production portfolio



### Import & Trading

- Looking ahead, we will import and trade hydrogen and its derivatives from abroad



### Storage

- We are planning to operate our first hydrogen storage facilities and to reconfigure our storage portfolio



### Infrastructure

- In the future, we are going to operate a pipeline network to transport hydrogen
- We are preparing distribution networks to carry hydrogen

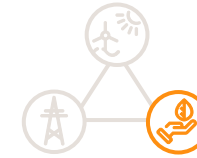


### Sales

- In the foreseeable future, we will offer our customers products such as climate-neutral hydrogen as a reliable partner on the path to climate neutrality



# Wide variety of hydrogen activities already in progress across the EnBW Group



## 1 Öhringen Hydrogen Island

- Up to 30% hydrogen blended into gas grid for heat supply
- Supply of operating site plus 26 households
- Operating buildings supplied from 2021



## 2 Fuel-switch power plants

- Conversion of three coal-fired heat and power plants to natural gas and subsequently hydrogen
- Total output 1,500 MW<sub>el</sub>, 829 MW<sub>th</sub>
- Planned start-up: COD 2025/26, conversion to H<sub>2</sub> from beginning of 2030



## 3 H<sub>2</sub> Whylen Real-World Lab

- Production of green hydrogen from run-of-river hydropower
- Utilises electrolysis waste heat
- Generating capacity: 6 MW<sub>el</sub>
- Planned start-up: 2025 (1 MW<sub>el</sub> already on stream)



## 4 Rostock hydrogen port

- Production of green hydrogen
- Consortium project (Port of Rostock, Rheinenergie, RWE)
- Generating capacity: 100 MW
- Electrolyser planned to start operating in 2026



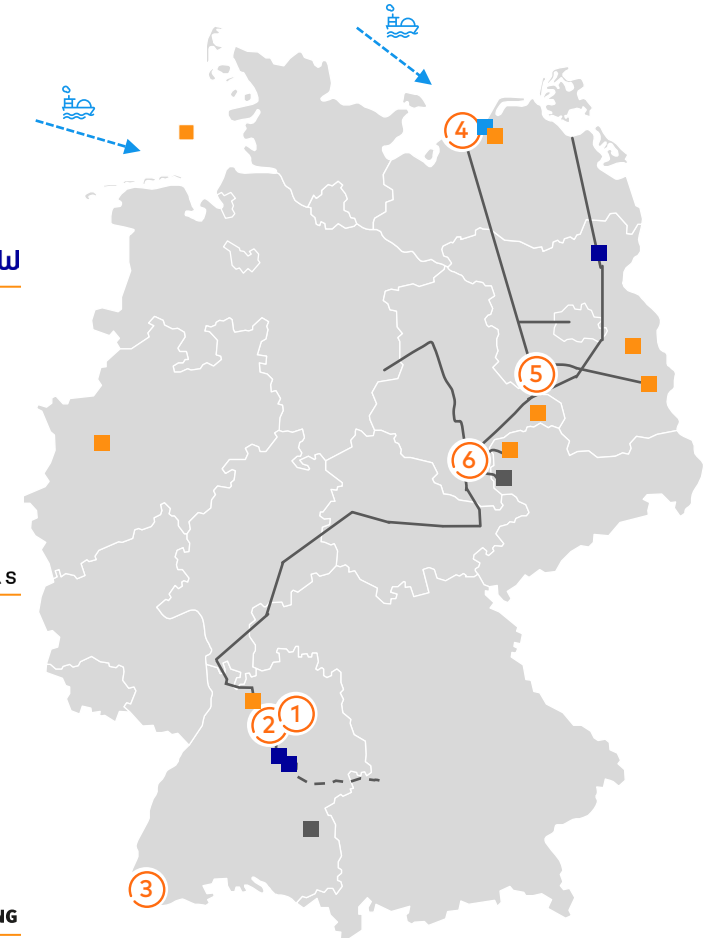
## 5 Doing Hydrogen & Green Octopus

- Conversion of natural gas pipelines and construction of additional hydrogen pipelines for total of 900 km (Rostock-Leipzig-Salzgitter axis)
- First sections of pipelines planned to start operating from 2027



## 6 Energy Park Bad Lauchstädt

- Integrated project along hydrogen value chain in project consortium (uniper, Terrawatt, DBI)
- Hydrogen produced used in industry
- Electrolyser generating capacity: 30 MW
- Wind farm, electrolyser and pipeline planned to start operating in 2025





# EnBW is focusing on four themes on its path to a sustainable, climate-neutral future



## New energy & climate neutrality

Focusing on climate neutrality and expansion of renewable energies

### 2022 highlight

- SBTi validation and coal phase-out 2028
- Activities in H<sub>2</sub> value chain lay foundation for climate-neutral power generation

## Infrastructure transition



Creation of innovative mobility and supply offerings

### 2022 highlight

- Climate-friendly fast-charging park and climate-neutral corporate mobility
- Internal four-week sustainability event: 1,500 participants in EnBW sustainability challenge



## Culture of sustainability

Sustainability as a benchmark for making business decisions

### 2022 highlight

- Successful application and expansion of EU taxonomy reporting
- Further development of the sustainability assessment as part of the investment approval process

## Protecting the natural environment



Protecting people and the environment

### 2022 highlight

- Publication of the EnBW human rights policy
- Release of pollutant emissions targets (SO<sub>2</sub>, NOx)





# EnBW accelerates climate targets for a renewable future

## Events confirm acceleration agenda

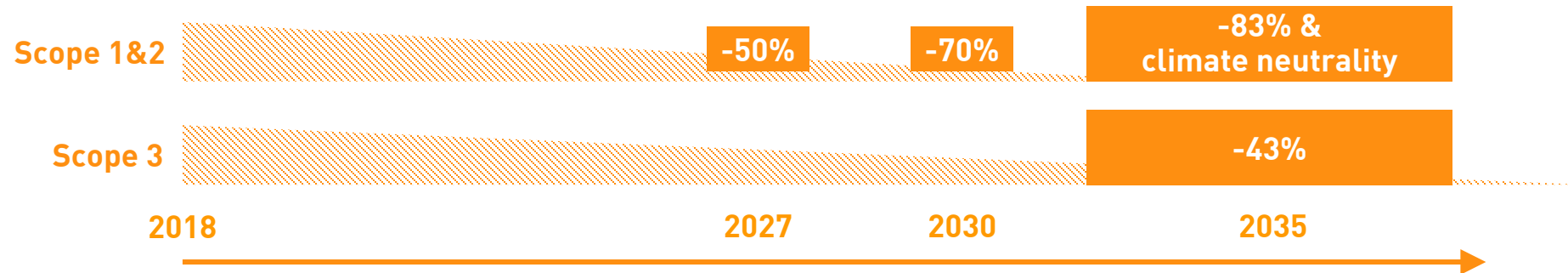
- Climate crisis escalating further with huge social and economic impacts
- Dependence on fossil resources a risk to secure energy supplies
- Investors and banks are focusing on sustainable infrastructure



## EnBW takes responsibility

- EnBW accelerates implementation of its climate targets
- Reduction targets validated as consistent with Paris Climate Agreement by the Science Based Targets initiative (SBTi)

## Specific and ambitious: EnBW's climate targets

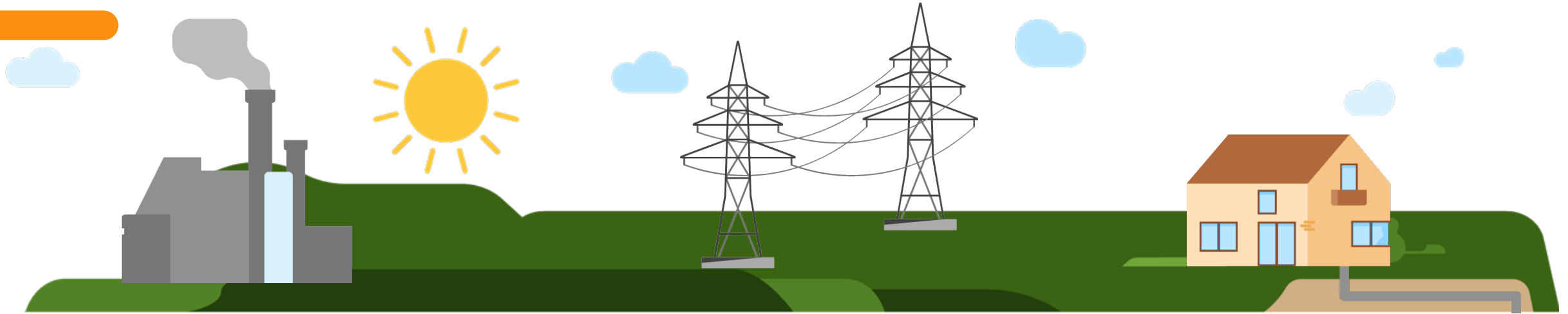


Necessary prerequisites include implementation of German government energy transition plans, such as the expansion of renewable energies, expansion of transport and distribution systems and development of gas infrastructure in Germany





# EnBW investments build sustainable and secure energy system of the future



## Scope 1

- Since 2012: €17 bn investment in renewable energies and grid expansion, additional €6 bn in next three years in sustainable generation infrastructure
- Since 2012: 31% coal capacity reduced
- Fuel switch from coal to natural gas at Heilbronn and Stuttgart-Münster and Altbach/Deizisau in 2026
- Coal phase-out in 2028
- Climate-neutral gases used in gas power plants from 2035

## Scope 2

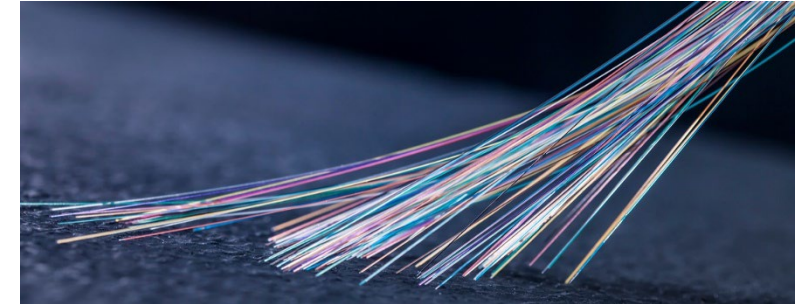
- Purchase of green electricity
- Reduction in electricity mix carbon emissions by RE expansion

## Scope 3

- Partner in electrification and green gas blending in heat sector
- Large share of green gases in sales portfolio



# Sustainable engagement for our customers



## Electricity and gas

Supply of ~5.5 m customers with electricity, gas, district heating, drinking water

- Green electricity as standard product – 620,000t CO<sub>2</sub> saved in 2022<sup>1</sup>
- Energy related services for B2B customers
- Energy supply & savings contracting
- SENEK among top 3 suppliers for home storage and solar systems in Germany
  - PV capacity sold doubled to ~220 MW in 2022 in Germany
  - Market share of 20% in Germany

## E-mobility

- Leading and award-winning charge point operator (CPO) with largest fast charging network in Germany
  - Currently >1,000 locations
  - Best German CPO<sup>2</sup>
  - Target 2030: 30,000 fast-charging points
- Leading e-mobility provider in Germany
  - Access to ~500,000 charging points in Europe
  - Access to largest charging net in DACH<sup>3</sup>
  - Best value for money of independent suppliers<sup>4</sup>
  - No.1 e-mobility app in Germany<sup>5</sup>
- Successful expansion to Austria
  - 25% of shares in SMATRICS acquired

## Broadband/Telecommunication

Fiber infrastructure combined with product and service portfolio

### **NetCom BW**

- ~87,000 customers
- ~21,700 km of fiber optic cable

### **Plusnet (telecommunications provider)**

- >25,000 business customers
- 100G core network based on 6,500 km fiber network with access to further 50,000 km fiber

<sup>1</sup> Excluding the provision of basic and reserve supplies;

<sup>2</sup> connect 11/2022 and 12/2021;

<sup>3</sup> AUTO BILD 22/2022 and 20/2021;

<sup>4</sup> AUTO BILD „eMobility Excellence Report 2023“: EnBW test winner for the third year in a row

<sup>5</sup> Stiftung Warentest 5/2022 GOOD, iOS: 2.1, Android: 2.2



# R&D projects: Building capabilities for future business

**Expenditure generation from renewables**  
2022: €8.0 m

**Expenditure hydrogen**  
2022: €3.5 m



## Offshore wind



## Photovoltaics



## Geothermal energy



## Green hydrogen



### Pilot projects facilitating offshore wind expansion

- New concepts for floating offshore wind turbines
- Transportation drones for easier servicing and maintenance
- Advanced environmental assessment for offshore installations



### Generating more electricity from the sun

- New photovoltaic cell design that, compared with today's mainstream, promises higher cell efficiency at lower manufacturing cost.
- Enable inverters to directly feed PV electricity to railroad power grids.



### Generating heat and electricity from deep geothermal energy

- Enabling sustainable district heating
- Extracting domestic lithium for car batteries from thermal water in geothermal facilities



### Providing hydrogen from renewable energy sources

- H<sub>2</sub>-Wyhlen: Expansion of a power-to-gas facility owned by Energiedienst
- Energiepark Bad Lauchstädt: Piloting the entire value chain from production, transport and storage to the application of green hydrogen (VNG)
- H<sub>2</sub>Mare to demonstrate offshore-wind-based on-site production of hydrogen

**Expenditure smart energy world, storage and e-mobility**  
2022: €3.9 m



## E-mobility



### Facilitating clean transport for customers

- Dynamic wireless charging both while stationary and driving (cars and trucks)



|  |     |
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- Environmental

- Overview and activities 2022
- Accelerated coal phase-out
- Environmental measures

- Social

- Responsibility for employees
- Supply chain

- Governance

- Sustainable investment process
- Corporate compliance
- Corporate governance
- Political engagement



# Strategy and business activities driven by our strong ESG focus



## **E** Environmental

- Reduction of CO<sub>2</sub> footprint
- Preservation of biodiversity
- Responsible use of resources
- Water and soil protection
- Energy efficiency
- Emission control

## **S** Social

- Responsibility for employees
- Coal phase out - just transition
- Supply chain

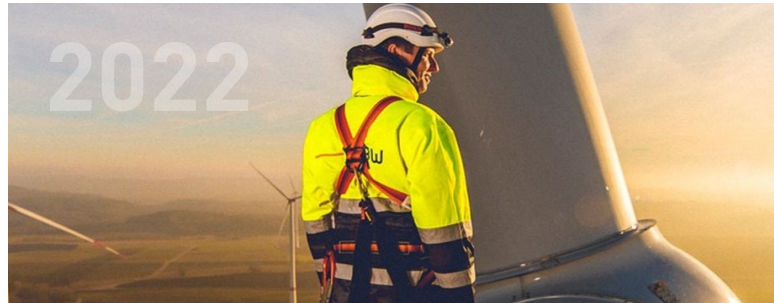
## **G** Governance

- ESG criteria integrated in investment approval process
- Corporate compliance
- Board of Management & Supervisory Board
- Remuneration system
- Political engagement

 [ESG indicators | EnBW](#)



# Snapshot of ESG activities in 2022



## **E** Environmental

- Climate protection: Coal phase-out 2028 and validation of our CO<sub>2</sub> reduction pathway by the Science Based Targets Initiative (SBTi)
- Emission control: Disclosure of SO<sub>2</sub> and NO<sub>x</sub> intensity targets

## **S** Social

- Human rights
  - Analysis of supply chain risks and expansion of compliance reporting processes in accordance with the German Supply Chain Due Diligence Act (LkSG)
  - Initiator of a multi-stakeholder energy industry dialog for human rights due diligence
- Diversity strategy: Diversity, equity and inclusion strategy with three focal points: Success and opportunities, inclusive culture and diverse eco-system

## **G** Governance

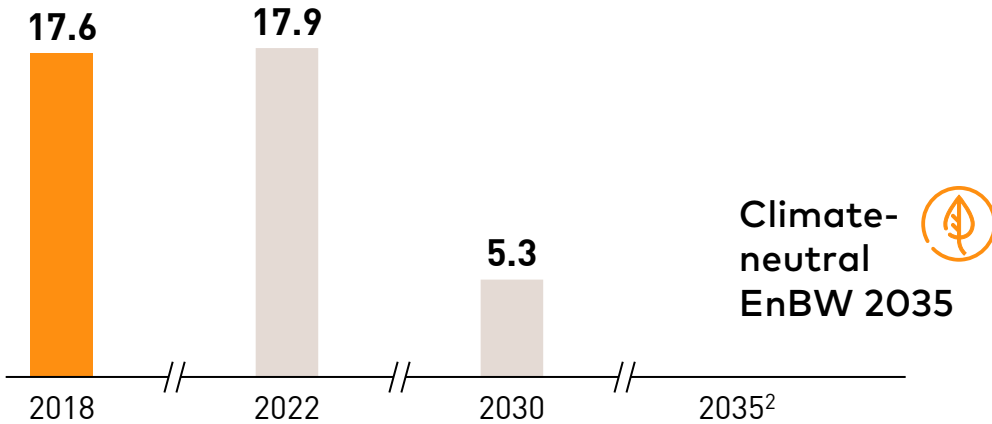
- ESG criteria integrated in investment approval process
- EU taxonomy: Taxonomy-aligned expanded capex
  - 83% Related to all group business activities
  - 99.9% Related to taxonomy-eligible activities



# Climate neutrality by 2035 and the remaining sustainability targets determine business activities

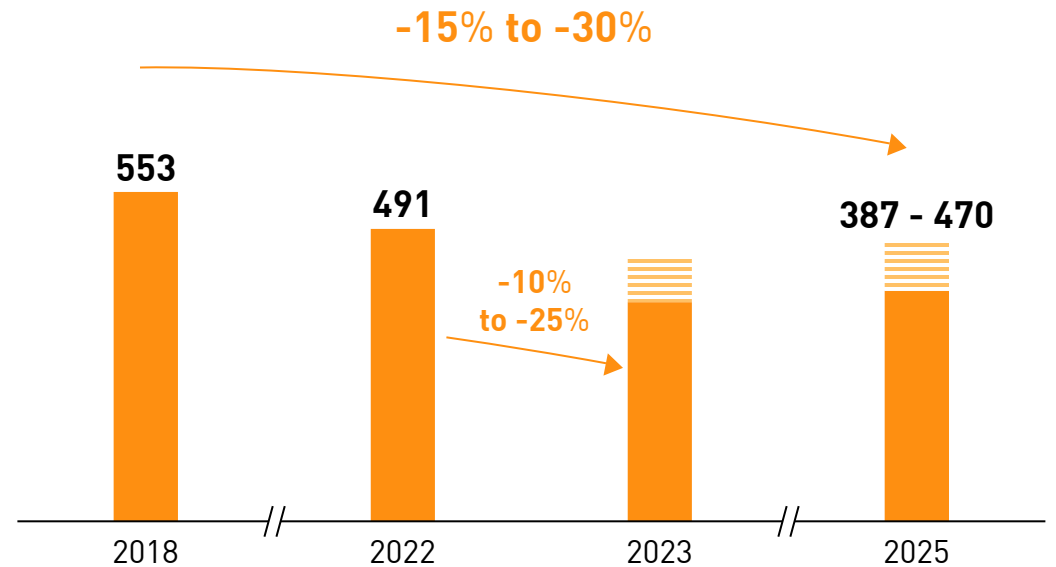
## EnBW Group carbon footprint<sup>1</sup>

mt CO<sub>2</sub>eq (excluding supply chain)



## Carbon intensity in own electricity generation

g/kWh (excluding nuclear power and redispatch)



<sup>1</sup> EnBW's climate neutrality target relates to its own emissions (Scope 1 and 2). The target relates to CO<sub>2</sub>eq (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and SF<sub>6</sub>). Base year 2018.

<sup>2</sup> Includes a portion of offsetting residual emissions by purchasing recognised offset allowances.



# Accelerated coal exit 2028 is a key milestone in EnBW's climate transition plan

## Our climate targets: Milestones



Fuel switch from coal to natural gas at 3 power plants by 2026

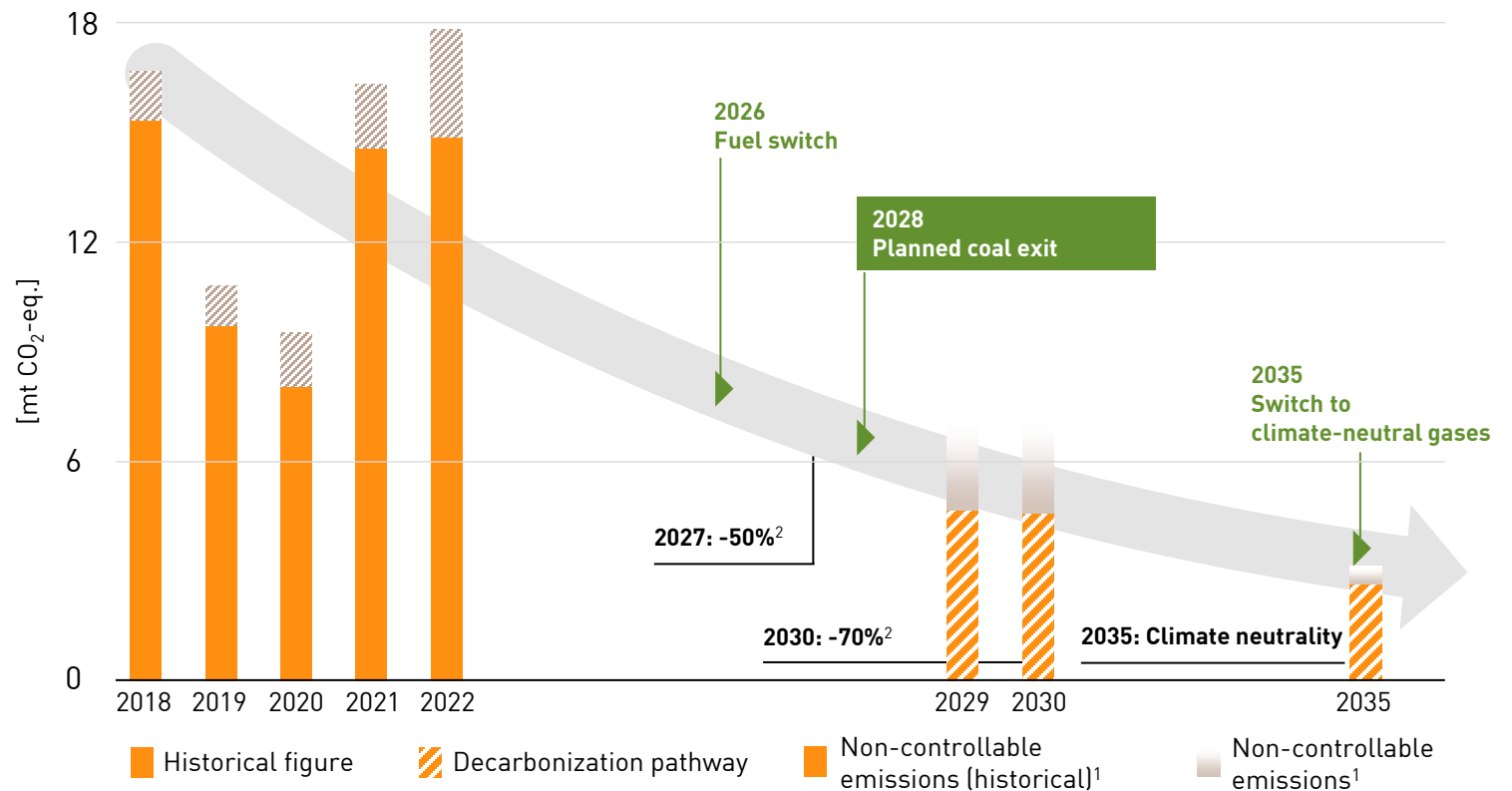


Planned coal phase-out in 2028



Climate-neutral gases used in gas power plants

## EnBW CO<sub>2</sub>-footprint (Scope 1)



<sup>1</sup> Non-controllable emissions: Emissions from reserve power plants and redispatch operations not controlled by EnBW

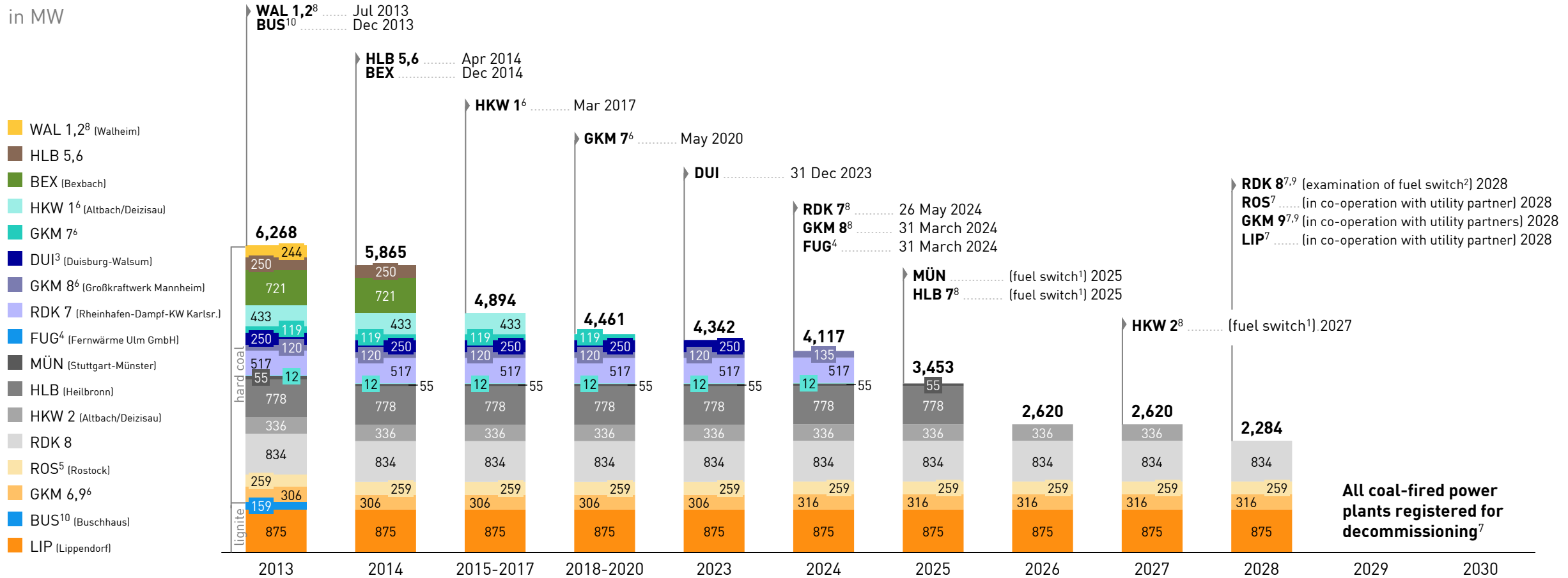
<sup>2</sup> Scope 1 & 2 compared to 2018





# EnBW follows a specific schedule to phase out coal by 2028

in MW



**All coal-fired power plants registered for decommissioning<sup>7</sup>**

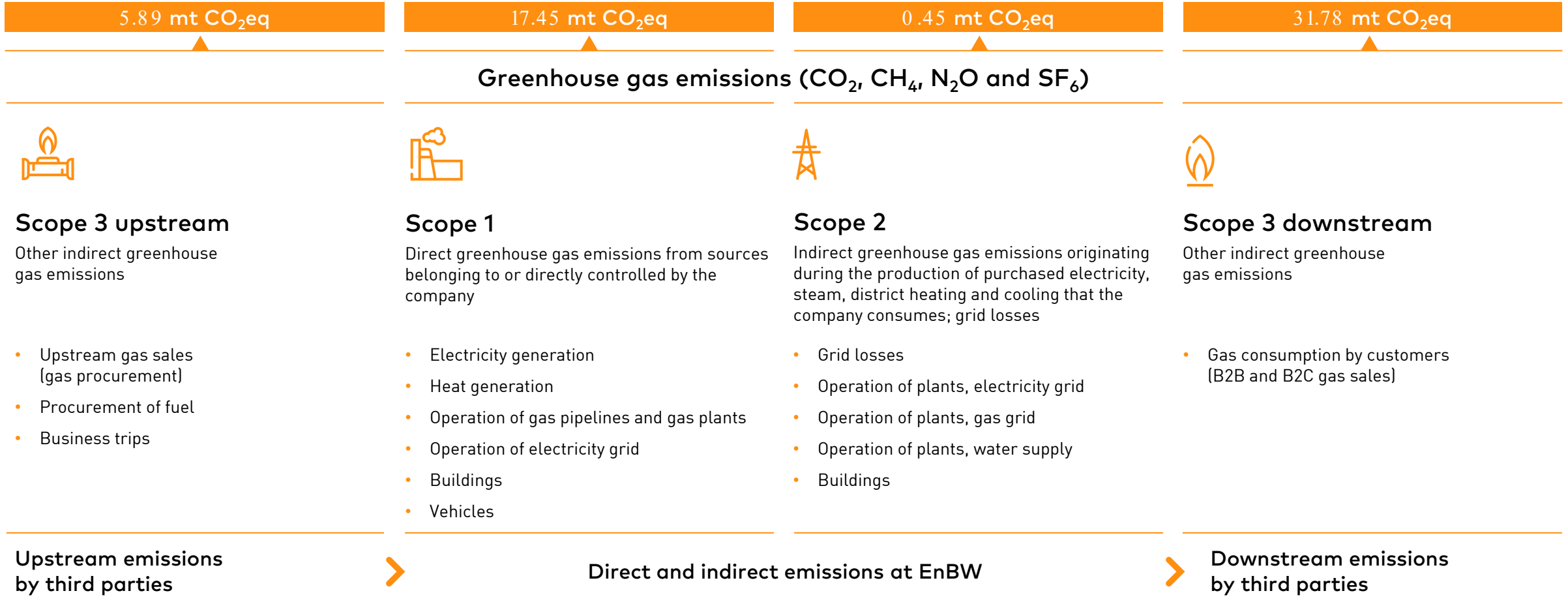
1 Fuel switch from coal to natural gas, until the mid-2030s switch to climate neutral gases like Green Hydrogen  
 2 Examination of options to switch to climate neutral dispatchable generation (fuel switch to climate neutral gases e.g. Green Hydrogen)  
 3 Duisburg-Walsum: Electricity supply contract with STEAG AG  
 4 Fernwärme Ulm GmbH: EnBW and Stadtwerke Ulm/Neu-Ulm GmbH (SWU) each have a 50% share in Fernwärme Ulm GmbH (FUG), temporary return of the coal fired units to the electricity market (max. March 2024)  
 5 Rostock: Joint power plant EnBW (50,38%), Rheinenergie (49,62%)

6 GKM: Joint power plant RWE Generation SE (40%), EnBW Energie Baden-Württemberg AG (32%) and MVV RHE GmbH (28%); from 2024, EnBW's share increases by 15 MW for GKM8 and by 10 MW for GKM6.  
 7 Provided the energy transition progress allows a coal exit by 2028  
 8 Market decommissioning as planned, transfer to grid reserve  
 9 Market decommissioning as planned, transfer to grid reserve expected  
 10 Power purchase agreement



# EnBW's carbon footprint

## Emissions 2022: Scope 1, 2 and 3





## Examples of implemented measures preserving biodiversity

### “Impulses for Diversity” funding program for native amphibians and reptiles and their habitats

#### Bird protection in electricity grid operations

- Member of the Vogelfundportal (birdstrike portal) project since 2020 (Netze BW)
- Bird protection measures on over 46,000 masts in medium-voltage overhead line network (length 30,000 km)

#### Flowering transformer stations

- Flower meadows covering an area of ~ 84,600 m<sup>2</sup> have been created at the 39 sites to promote biodiversity (Netze BW)
  - Hotspots for biodiversity with up to 60 different plant species per 10 m<sup>2</sup>, providing food, protection and a place of retreat for native insects

#### Preserving fish, fauna and microorganisms in waterways

- Building facilities that allow fish to ascend and descend rivers at the sites of hydropower plants





# Responsible use of resources: Procurement

## Origin of coal supplies to EnBW power plants

in mt

|              | 1.1 –<br>30.6.2023 | 1.1 –<br>30.6.2022 | Change<br>in % |
|--------------|--------------------|--------------------|----------------|
| Colombia     | 0.6                | 0.5                | 20.0           |
| USA          | 0.5                | 0.2                | 150.0          |
| South Africa | 0.1                | -                  | -              |
| Russia       | 0.1                | 1.5                | -93.3          |
| Others       | 0.0                | 0.1                | -100.0         |
| <b>Total</b> | 1.3                | 2.2                | -40.9          |

## Coal procurement

- 2021: EnBW had already started to diversify its procurement portfolio
- 2022: No new contracts with Russia, lost volumes of Russian coal mainly replaced by coal from Colombia and USA
- 6M 2023
  - Colombia and the USA remain main suppliers
  - Remaining Russian coal from residual volumes from older contracts before the sanctions stored in seaports to secure the supply of coal
  - Significant reduction in supplies due to the temporary shutdown of the Heilbronn power plant (damage), lower demand for electricity, higher production of solar electricity and lower gas prices

## Gas procurement (LNG or grid-based natural gas)

- Comprehensive business partner audit of all direct LNG suppliers before approval as business partners (internal AVB committee expanded to include all relevant specialist areas within the company)
- 2022
  - Natural gas mainly sourced via supply contracts with companies in Norway, Russia and via the European wholesale market
  - Expiry of two gas supply contracts between VNG and Russia at year-end
  - Two long-term purchase agreements for LNG signed in June to further strengthen EnBW's diversification efforts
- 6M 2023: Natural gas mainly sourced via supply contracts with companies in Norway and via the European wholesale market



# Responsible use of resources: Water, waste and others



## Water usage

- Burden on watercourses reduced by increased use of modern cooling towers, new and more efficient power plants and CCGT

## Waste management

- Waste reduction and recycling
  - Continuous improvement to reduce the different types of waste generated in the individual business activities along the value chain
- Waste incineration
  - Disposal of waste by using the energy contained in it, for example to generate electricity and heat (e.g. at the CCGT plant in Stuttgart-Münster)
- Co-incineration of sewage sludge
  - Mechanically dewatered and thermally dried sewage sludge can be co-incinerated with coal (complying with the Sewage Sludge Ordinance)
  - This waste has so far largely been deposited in landfills or used in agriculture and in recultivation measures in depleted lignite deposits



## Coal-fired power plant by-products

- More than 9 mt of building materials are used p.a. in the construction industry in the form of fly ash, boiler sand, smelting chamber granulate, FGD gypsum and others

## Mobility initiatives

- Environmental balance of travel activities improved by:
  - Avoiding business travel
  - Improving CO<sub>2</sub> emissions from the use of passenger cars
  - Significantly expanding the electric vehicle fleet
- Progress measured by calculating the CO<sub>2</sub> intensity of business trips and travel in g CO<sub>2</sub> eq/km both Scope 1 emissions from our own vehicles and Scope 3 emissions from air, train, taxi travel, etc.





# Emission control

Emission control includes all necessary measures to protect the environment from harmful effects of air pollutants, noise, vibration, heat, light or electromagnetic fields

## Reduction of pollutant emissions

SO<sub>2</sub> and NO<sub>x</sub> intensity from own generation of electricity to be reduced by 15% to 25% and 10% to 20% respectively by 2025 compared to the 2018 base year

Our fossil fuel power plants use three different methods of air quality control

- Denitrification
- Dedusting
- Desulphurization

By optimizing our denitrification and desulphurization plants, we have been able to improve their separation efficiency. Shutting down coal-fired power plants and substituting them with gas-fired power plants also contribute to the reduction of pollutants.

## Emission control in power grids

- Noise emissions of extra-high voltage overhead lines
- Physically induced electric and magnetic fields of overhead lines, underground cables and installations for the transformation of electrical energy

As an independent transport network operator, TransnetBW GmbH is responsible for all emission control measures and activities in the transmission grid

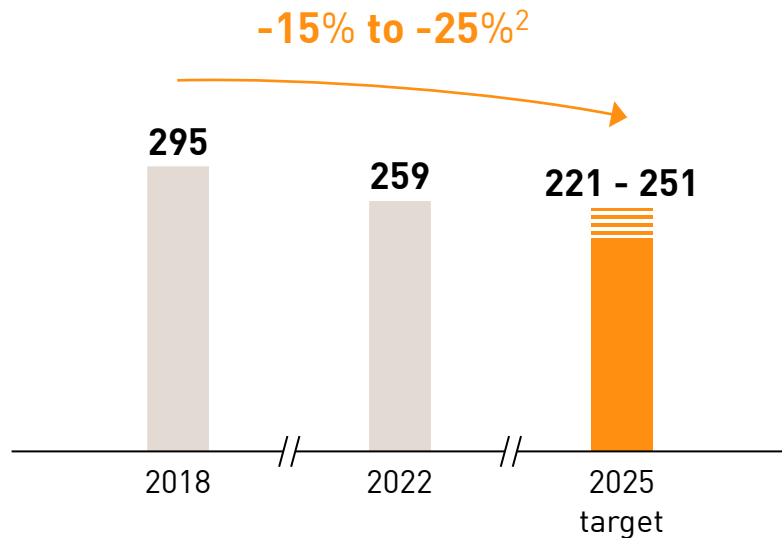




# Reduction of pollutant emissions: Reducing cooling water and wastewater discharge

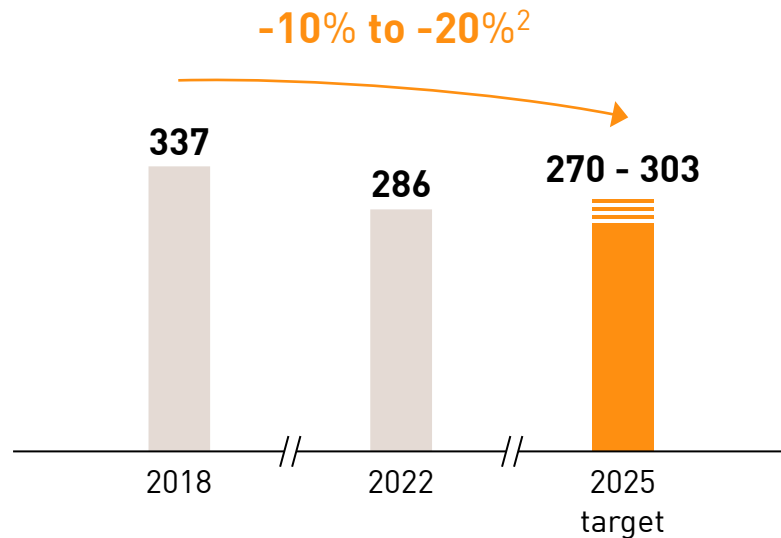
## Intensity of sulphur dioxide in own electricity generation

g/kWh (excluding nuclear power and redispatch)



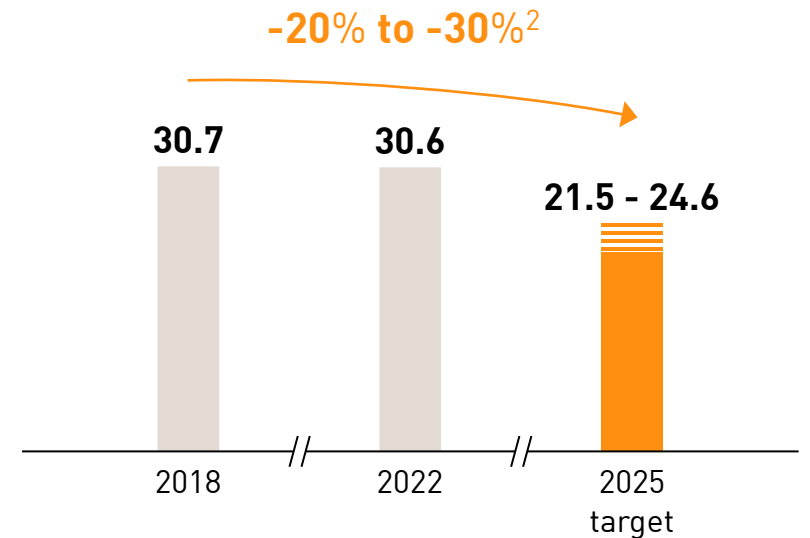
## Intensity of nitrogen oxides in own electricity generation

g/kWh (excluding nuclear power and redispatch)



## Cooling water/wastewater discharge intensity<sup>1</sup> in own electricity generation

l/kWh (excluding nuclear power and redispatch)



<sup>1</sup> Cooling water/wastewater discharge = total of cooling water and wastewater discharge to a surface waterbody

<sup>2</sup> Compared to the base year 2018



# Energy efficiency

## Network energy efficiency and climate protection

- EnBW Networks Energy Efficiency is a service to industrial customers which is used by more than 100 industrial companies
- EnBW also offers an online "Climate Management System Workshop", which helps companies to develop a climate protection strategy

## Energy efficiency in buildings

- 2020 targets for the property portfolio have been achieved: 20% lower energy consumption per employee relative to 2010
- New targets include reductions in carbon emissions and energy efficiency
  - 50% reduction in portfolio carbon emissions at the representative reference sites by 2025 and 75% by 2030 compared to 2018<sup>1</sup>
  - 10% reduction in energy consumption per employee at the representative reference sites by 2025 and 20% by 2030 compared to 2018<sup>1</sup>
- By 2022, reduction of 14% at the representative reference sites by technical and operational improvements and by digitalization (enhanced transparency)
- Procurement of green power and biogas to reduce carbon emissions by some 11,500 tonnes p.a.

## Energy efficiency in water supply

- At NETZE BW Wasser GmbH<sup>2</sup>, water supply produces more energy than it uses
- "Hydraulic potential" converted into electrical energy by means of backward running pumps before water is fed into the municipal distribution grid
- Offsetting electricity requirement of ~ 1.8 GWh p.a. by recovery of up to 3.7 GWh of electrical energy avoids ~2,200 tonnes of CO<sub>2</sub> p.a.
- By buying 100% green electricity, the purchase of each gigawatt-hour of electricity still required from the grid is CO<sub>2</sub>-neutral

## Green IT

- In the data center environment, energy consumption and energy efficiency are measured with power usage effectiveness (PUE)
  - PUE = total energy consumed in the data center divided by the energy consumption of the IT components
  - Significant reduction of energy consumption by, for example, using indirect free cooling and improving air flow management
- Significant consolidation of data center space based on high degree of virtualization and increasingly widespread use of cloud solutions
- Procurement of servers linked by one third to sustainable purchasing criteria
- Large number of processes and working methods digitized, leading to reduced paper consumption/number of car journeys

NETZWERK



<sup>1</sup> Base year

<sup>2</sup> Subsidiary of Netze BW GmbH operating in Stuttgart





# Responsibility for employees (1/2)

**Guided by the United Nations Guiding Principles on Business and Human Rights and by the ILO Core Labor Standards, EnBW takes its responsibility towards its employees seriously.**

## Occupational health and safety

- Group policy in place
- Occupational health and safety management system at Netze BW and other EnBW subsidiaries based on international standards. Major EnBW units, such as EnBW Offshore Service GmbH, also certified in accordance with OHSAS 18001 or ISO 45001.
- Clearly formulated responsibilities and processes to meet the requirements under the German Safety and Health at Work Act and accident prevention regulations.
- Prevention and training for accident avoidance
- The KPI for tracking lost-time injuries (LTIs) during working hours is the lost-time injury frequency (LTIF). The LTIF is the number of LTIs per million hours worked.
  - LTIF for companies controlled by the group 2022: 2.6      LTIF target 2025: 2.1
  - LTIF overall 2022: 4.1      LTIF target 2025: 3.5
- Occupational health management
  - Eight occupational health centers with around 40 team members
  - Medical checkups: ~28,000 (2022)
  - Vaccinations: ~8,000 p.a.
  - Physiotherapy treatments: ~2,000 p.a.
  - Psychological consultations: ~1,700 p.a.

## Diversity and anti-discrimination

- Part of EnBW Code of Conduct
- Member of UN Global Compact network since 2010 committed to complying with the 10 principles, including Principle 6 on the elimination of discrimination
- In both top management and upper management, the percentage of women is target to increase to at least 20%
  - Women in top management - 2022: 11.1% (2021: 7.7%)
  - Women in upper management - 2022: 23.1% (2021: 21.3%)
- Programs to promote diversity and engagement in networks





# Responsibility for employees (2/2)

## Further training and employee development

- Annual employee reviews to determine how each individual can quickly achieve their personal goals and unlock new perspectives
- Leadership development oriented to current development needs – in 2023, 53% of managers have participated as of 30 June 2023
- Support for individual further education/training in the amount of 80% of course and examination fees
- Group-wide employee satisfaction surveys on an annual basis
  - KPI People Engagement Index (PEI):  
Employee motivation and commitment to their work and employee satisfaction survey conducted twice annually
  - 2022: 81 (target 2025: 77 – 83)

## Work-life balance

- Flexible and trust-based working hours according to location and employment
- BestWork - Offer for employees of EnBW's core companies (~16,000 employees) to work on a mobile basis, taking into account operational needs
- Children's office in Karlsruhe, Stuttgart, Esslingen, Biberach, Tuttlingen and Neckarwestheim
- Support and advice: Parental leave, childcare, emergency situations, daycare for employees' children at the three biggest office locations

## Freedom of association/employee representation

- EnBW committed to 10 principles of the Global Compact, including Principle 3 on freedom of association and the right to collective bargaining
- EnBW and Works Council work together trustfully and in cooperation with the trade unions represented, complying with collective agreements
- Approximately 90% of EnBW Group employees are covered by collective agreements and negotiations

## Coal phase out – just transition

- Approximately 1,400 employees in conventional generation (excluding employees at nuclear power plants in the decommissioning process)
- EnBW delivers on its social responsibility: Suitable HR instruments (such as further training) and forward-looking HR planning
  - Fuel switch secures locations and jobs
  - Former conventional power generation employees are already contributing their technical expertise in other areas today, such as in offshore wind power





# Targeted management of supply chain risks relating to human rights and the environment (1/2)

## Performing human rights and environmental due diligence at EnBW



More information on our website

- EnBW has implemented the requirements of the German Act on Corporate Due Diligence Obligations in Supply Chains (LkSG) since 1 January 2023
- EnBW is fully compliant with the requirements of the German Supply Chain Act and has published its policy statement accordingly
- The EnBW Board of Management is responsible for the implementation of the Supply Chain Due Diligence Act and is regularly informed by a human rights committee. The implementation of corporate due diligence is carried out by an internal body (the Human Rights Steering Committee).
- EnBW has implemented a complaints procedure for reporting Infringements

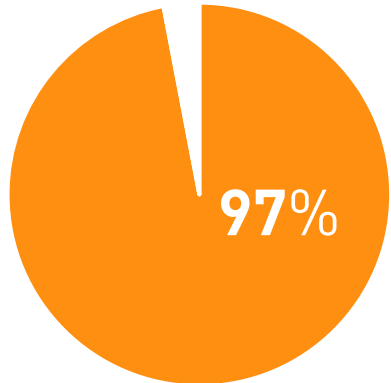
[EnBW Policy Statement](#)

[Compliance - Code of Conduct | EnBW](#)



# Targeted management of supply chain risks relating to human rights and the environment (2/2)

## Ensuring supplier commitment ...



97% of procurement volume is covered by suppliers who have signed the EnBW Supplier Code of Conduct, committing them to human rights, social standards, environmental protection, honesty, fairness and integrity both in their own activities and in their supply chains.

## ... by targeted human rights and environmental risk management



- Abstract risk analysis for procurement volume of approximately €5 bn
- Automated risk assessment integrated into supplier management
  - Supply chain analysis standardized and established for main components, commodities and source countries
  - Risks assessed and prioritized in major procurement categories



Detailed risk analysis for suppliers established; when fully implemented will cover 700 A and B suppliers with increased risk potential



Training and education program expanded to raise awareness among all EnBW employees

Independent grievance mechanism put in place via enhanced compliance reporting processes

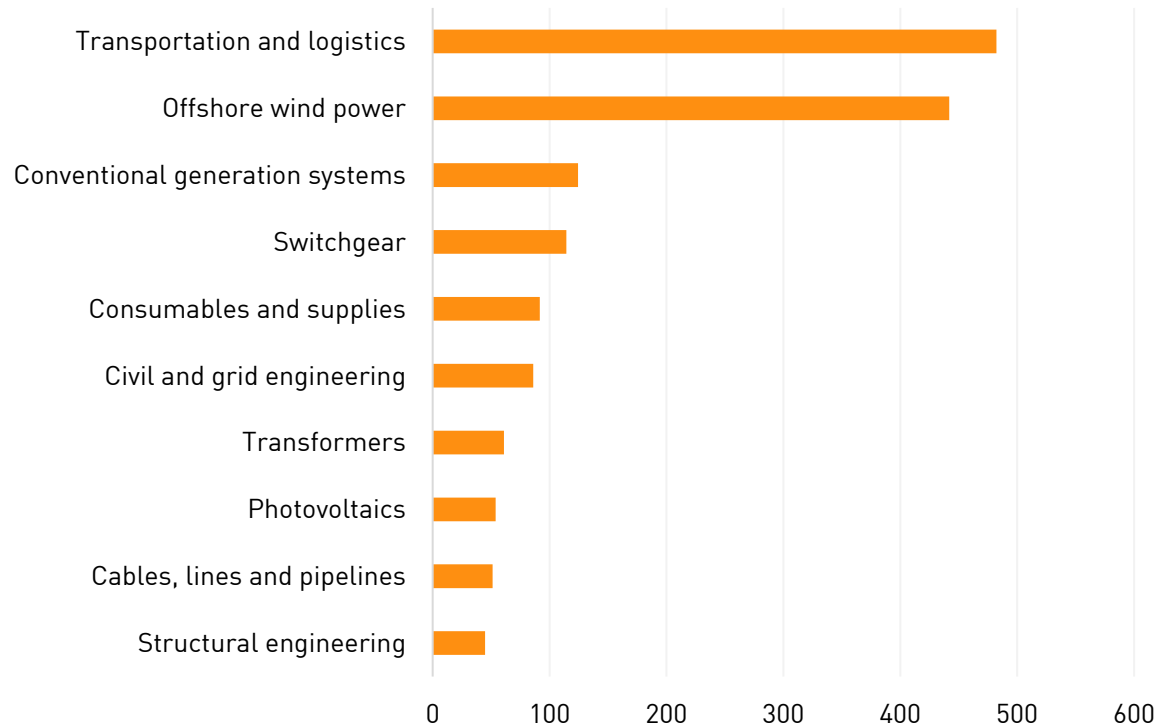
Human rights steering committee established



# Pathway for targeted carbon emission reductions in supply chains

## EnBW's supplier markets with the largest carbon emissions<sup>1</sup> ...

(kt)



## ... are the basis for activities to reduce supply chain emissions at EnBW



Digital carbon emission tracking tool established for transparency on supply chain emissions; hotspots identified to prioritize for in-depth analysis regarding reductions

Detailed analyses performed for individual goods and services; reduction measures – such as for electric vehicle charging sites – launched in collaboration with suppliers



Carbon emissions a significant award criterion in tenders, among other things with contractual requirement for suppliers to formulate and document clear carbon emission reduction goals covering both direct and indirect emissions in areas such as photovoltaics

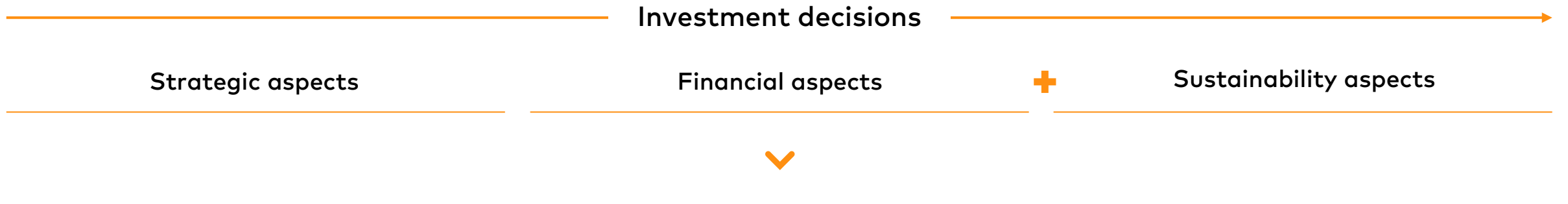


Targeted collaboration and partnering to achieve carbon emission reductions jointly with EnBW suppliers

<sup>1</sup> Based on contracts concluded in 2022; excluding coal and gas procurement



# Sustainability is an integral part of our investment decisions



## ① Enterprise valuation

(in an acquisition)

- Assessment, for example, of whether the company has a policy on compliance with ILO (International Labor Organization) core labor standards, has an environmental/energy management system and publishes its accident/fatality rates

## ② Project assessment

- Assessment of a proposed project from the sustainability perspective. This assesses the impact of the project category (such as wind power, solar, fuel switch or optical fiber) on our relevant top performance indicators, and also compliance with EU taxonomy requirements and contribution to selected topic areas under other sustainability standards and initiatives

## ③ Supplier evaluation

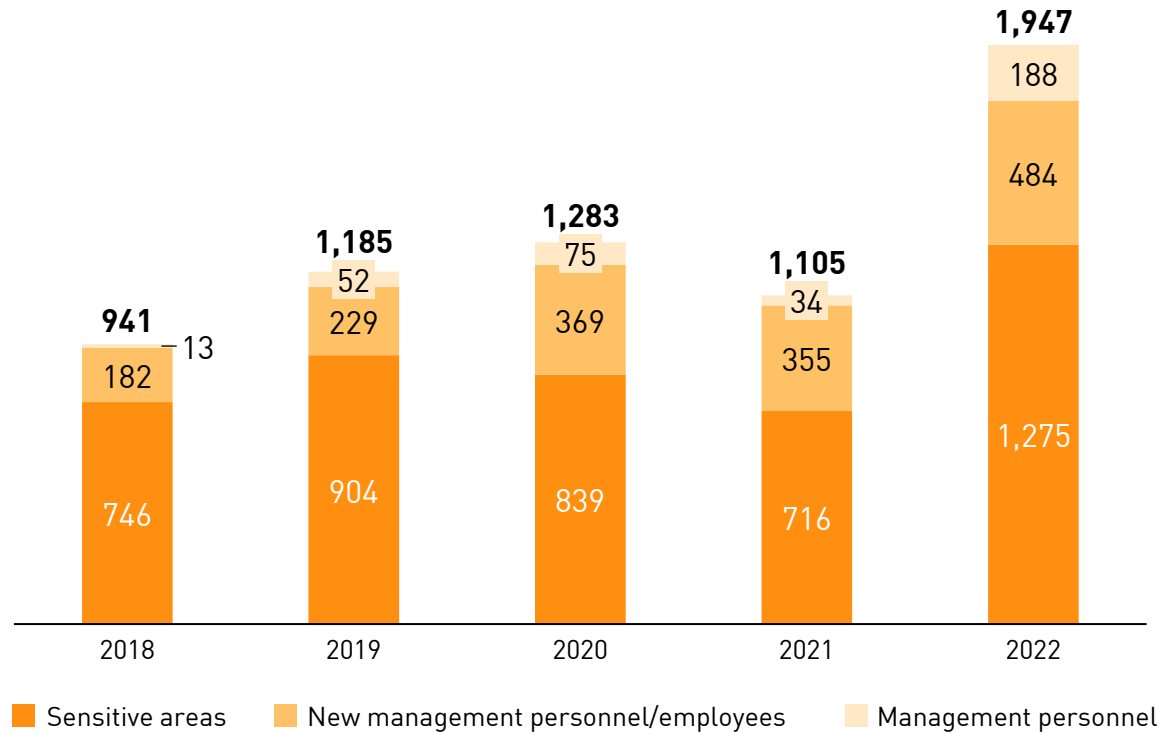
- Assessment of suppliers involved in a project with regard to their sustainability management. This assesses, for example, whether the supplier has an occupational safety and health management system and takes into account circular economy strategies for its product or product components

## ④ Controversy screening

- Screens a company (from enterprise valuation) and key suppliers (from supplier assessment) for sustainability controversies in the last five years



## Number of participants in compliance training events<sup>1</sup>



## Compliance management system

- Serves to minimize risks and avoid liability issues and loss of reputation
- Focuses on company- and sector-specific risks and priorities
- Encompasses all controlled companies with employees in the EnBW Group
- Various tools used e.g. training/workshops – focused on compliance attitude – Code of Conduct, Annual Compliance Risk Assessment and Ombudsman
- Number of compliance breaches in 2022:  
7 compliance breaches of which 1 material compliance breaches

<sup>1</sup> At EnBW AG and directly controlled companies with employees



# Responsible and transparent management

## Board of Management

- Responsible Group management
- Represents the company legally



**Andreas Schell**  
Chief Executive Officer  
With EnBW since 2022  
Appointed until 15.11.2025



**Dirk Gusewell**  
Chief Operating Officer  
Critical Infrastructure  
With EnBW since 1999  
Appointed until 31.5.2029



**Thomas Kusterer**  
Chief Financial Officer  
With EnBW 2004 to 2009,  
and since 2011  
Appointed until 31.3.2029



**Colette Rückert-Hennen**  
Chief Sales and Human  
Resources Officer  
With EnBW since 2019  
Appointed until 28.2.2027



**Dr. Georg Stamatelopoulos**  
Chief Operating Officer  
Sustainable Generation Infrastructure  
With EnBW since 2010  
Appointed until 31.5.2029



## Supervisory Board

- **20 members:** 10 shareholder representatives, 10 employee representatives, of which three union representatives
- Appoints members of Board of Management and defines their remuneration
- Supervises the Board of Management
- Advises them on management of the company



**Lutz Feldmann**  
Chairman of the Supervisory Board  
With EnBW since 2015





# Allocation of responsibilities within the Board of Management



**Andreas Schell**  
Chief Executive Officer

- Corporate development
- Sustainability
- Strategy and energy economy
- Communications / policy
- IT and Digital Office
- Corporate security



**Dirk Güsewell**  
Chief Operating Officer  
Critical Infrastructure

- DSO<sup>1</sup> electricity / gas
- TSO<sup>2</sup> electricity / gas
- Grid technology
- Telecommunications
- Gas value chain
- Innovation management and system critical infrastructure [development projects]



**Thomas Kusterer**  
Chief Financial Officer

- Accounting and tax
- Controlling
- Digital finance and transformation
- Finance
- Investor Relations
- M&A
- Risk management / ICS
- Equity investment management
- Performance in growth
- Purchasing
- Risk management for trading



**Colette Rückert-Hennen**  
Chief Sales and Human  
Resources Officer

- Personnel
- HR strategy
- Sales, marketing and operations
- Transformation (Next Level EnBW)
- Law
- Auditing
- Regulatory management
- Compliance management and data protection
- Boards and shareholder relationships
- Occupational medicine and health management
- Real estate management



**Dr. Georg Stamatelopoulos**  
Chief Operating Officer  
Sustainable Generation  
Infrastructure

- Conventional generation / nuclear
- Renewable generation
- Coordination technology
- Waste management / environmental services
- Decentralized energy services
- Occupational safety, environmental protection and crisis management
- Research and development
- Trading

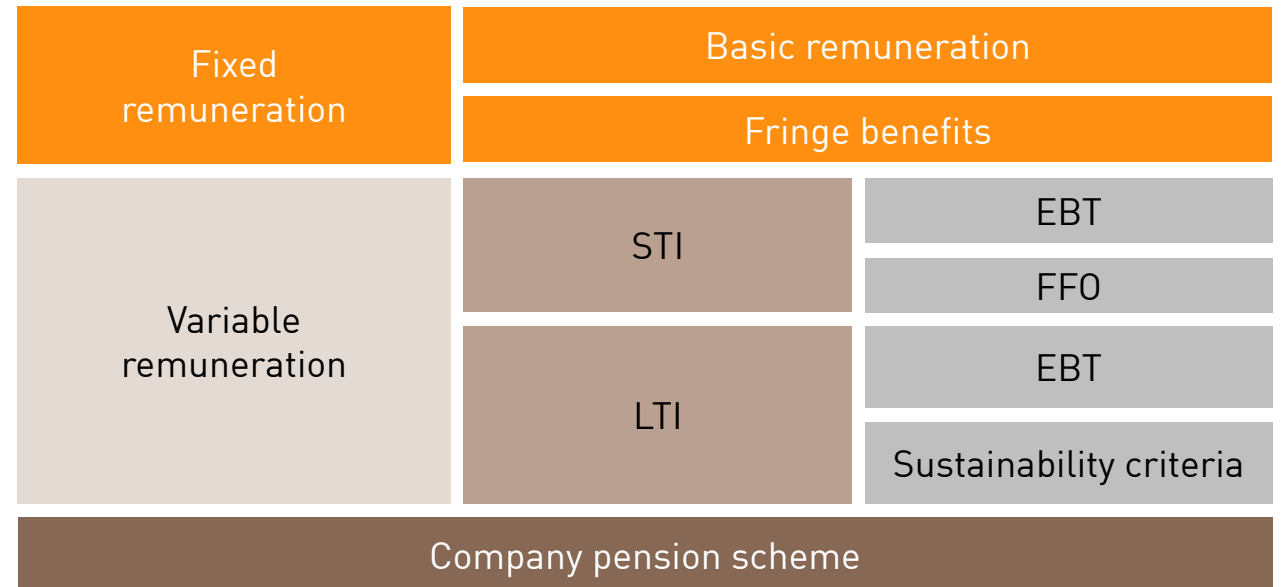


# Remuneration system for members of the Board of Management

The Supervisory Board passes resolutions on the remuneration system for members of the Board of Management, including the main contract elements, and reviews it on a regular basis

- The criteria for determining appropriate remuneration include
- Responsibilities and performance of the members of the Board of Management
  - Economic situation
  - Success and sustainable development of the company
  - Relationship between the remuneration of the Board of Management and the remuneration of senior management and the workforce as a whole

## Remuneration structure





# Remuneration system for members of the Supervisory Board

## Fixed remuneration (per financial year)

- Fixed basic remuneration of €44,000
- Reimbursement of expenses

## Remuneration for committee memberships (per financial year)

- Fixed remuneration of €7,500 per committee membership
  - Fixed remuneration for membership of the Supervisory Board Finance and Investment Committee and Audit Committee is €10,000
  - No additional fixed remuneration is paid for service on the Nomination or Mediation Committee
- Additional fixed remuneration for committee membership is only paid for maximum of two committee memberships
- Additional fixed remuneration is only paid if the committee concerned has been active at least once in the financial year
- The Chairperson of the Supervisory Board is paid 2.5 times the basic fixed remuneration and the Deputy Chairperson 1.5 times; the chairperson of one or more committees is paid twice the remuneration; the Chairperson of the Supervisory Board is paid 2.5 times the remuneration

## Attendance fee

- €750 for each meeting



[Remuneration report | EnBW](#)



# Political engagement<sup>1</sup>

## Lobbying activities at the EU level

in €

2022

|                             |                |
|-----------------------------|----------------|
| Personnel expenses          | 671,500        |
| Memberships                 | 166,500        |
| Other expenses <sup>2</sup> | 157,000        |
| <b>Total</b>                | <b>995,000</b> |

## Lobbying activities at the federal level

in €

2022

|                             |                  |
|-----------------------------|------------------|
| Personnel expenses          | 1,775,000        |
| Memberships                 | 190,000          |
| Other expenses <sup>2</sup> | 1,123,000        |
| <b>Total</b>                | <b>3,088,000</b> |

## Lobbying activities in Baden-Württemberg

Since 1 May 2021, our regional lobbying activities have been registered in the Baden-Württemberg Landtag (State Parliament) Transparency Register

in €

2022

|                             |                |
|-----------------------------|----------------|
| Personnel expenses          | 208,500        |
| Other expenses <sup>2</sup> | 115,000        |
| <b>Total</b>                | <b>323,500</b> |

<sup>1</sup> Rounded figures

<sup>2</sup> Including infrastructure costs, travel expenses, subscriptions to news services, etc.



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- Smart Infrastructure for Customers
- System-Critical Infrastructure
- Sustainable Generation Infrastructure



# Smart Infrastructure for Customers: Electricity and gas sales volumes

in bn kWh



## Total (without System Critical Infrastructure)

|   | 2022         | 2021 <sup>1</sup> | Change in % |
|---|--------------|-------------------|-------------|
| <b>Electricity sales volumes (without System Critical Infrastructure)</b> |              |                   |             |
| Retail and commercial customers (B2C)                                     | 14.1         | 14.4              | -2.1        |
| Business and industrial customers (B2B)                                   | 23.2         | 23.5              | -1.3        |
| Trade   | 68.6         | 69.6              | -1.4        |
| <b>Total</b>  | <b>105.9</b> | <b>107.5</b>      | <b>-1.5</b> |



## Total (without System Critical Infrastructure)

|   | 2022         | 2021         | Change in % |
|---|--------------|--------------|-------------|
| <b>Gas sales volumes (without System Critical Infrastructure)</b> |              |              |             |
| Retail and commercial customers (B2C)                             | 15.5         | 18.3         | -15.3       |
| Business and industrial customers (B2B)                           | 147.5        | 246.6        | -40.2       |
| Trade   | 345.6        | 230.1        | 50.2        |
| <b>Total</b>  | <b>508.6</b> | <b>495.0</b> | <b>2.7</b>  |

<sup>1</sup> The figures for the previous year have been restated



# Smart Infrastructure for Customers: E-mobility<sup>1</sup>

## Highlights<sup>2</sup>



over 1,000 EnBW fast-charging locations in Germany



appr. 30,000 EnBW fast-charging points by the year 2030



over 500,000 charging points in the EnBW HyperNetz



appr. €200 m annual invest

## Our range of services



## EnBW mobility+

- Is operating the biggest fast charging network in Germany with 100% renewable energy
- Offers the largest network coverage in DACH region (Germany, Austria and Switzerland)
- Is awarded multiple times by independent market experts:



## EnBW mobility+ app

- >2,000,000 downloads
- >500,000 charging points in seventeen countries
- of which >100,000 charging points in Germany
- Multiple award-winning, most downloaded and best rated electric mobility app in Germany



## Examples of partners and references



<sup>1</sup> As of 30 June 2023  
<sup>2</sup> As of 30 September 2023



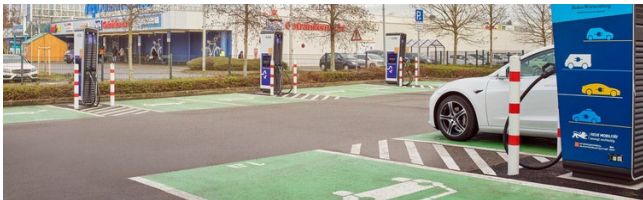
# Smart Infrastructure for Customers: EnBW HyperNetz

## Charge while you eat or shop



### Retail hubs

Convenient and time-saving quick charging while you eat or shop



- Supermarkets
  - Malls
  - Drugstores
  - Bakeries
  - Fast food outlets
- Typical provision: 2 - 12 chargers
- Typical capacity: 75 - 300 kW



### Urban hubs

Fast to very fast charging in urban hubs



- Cities over 100,000 population
  - Highly frequented locations for high capacity utilisation
  - Urban areas with above-average population density
- Typical provision: 8 - 12 charger
- Typical capacity: 75 - 300 kW

## Make a quick charging stop



### Long-distance hubs

Very fast range top-up on/near the Autobahn and major roads



- Interchanges
  - Slipways
  - Major axes/trunk roads
  - Rest stops/service stations
  - Greenfield sites
- Typical provision: 12 - 20 chargers
- Typical capacity: 150 - 300 kW

Anyone without a home charger saves time by building the perfect HPC charging experience into their everyday routine

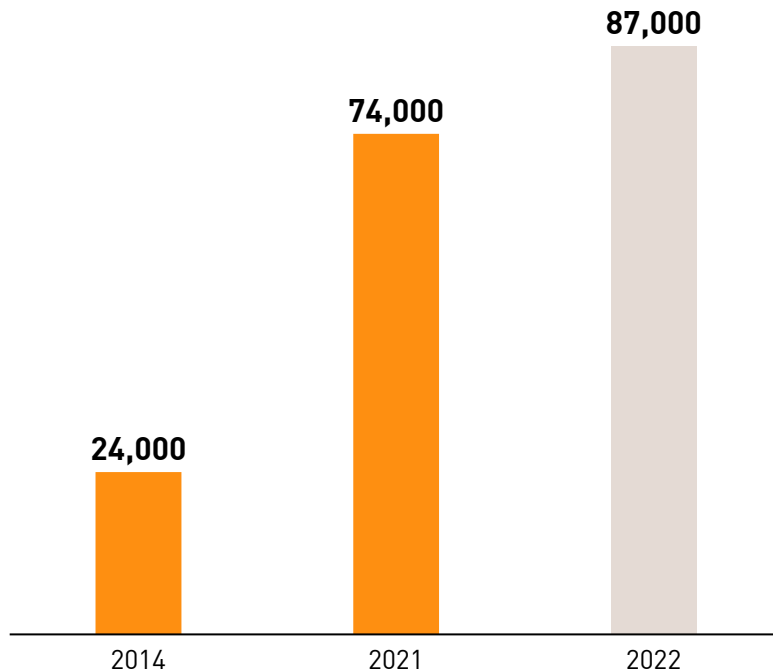




# Smart Infrastructure for Customers: Fiber broadband and services

## Total customer growth<sup>1</sup>

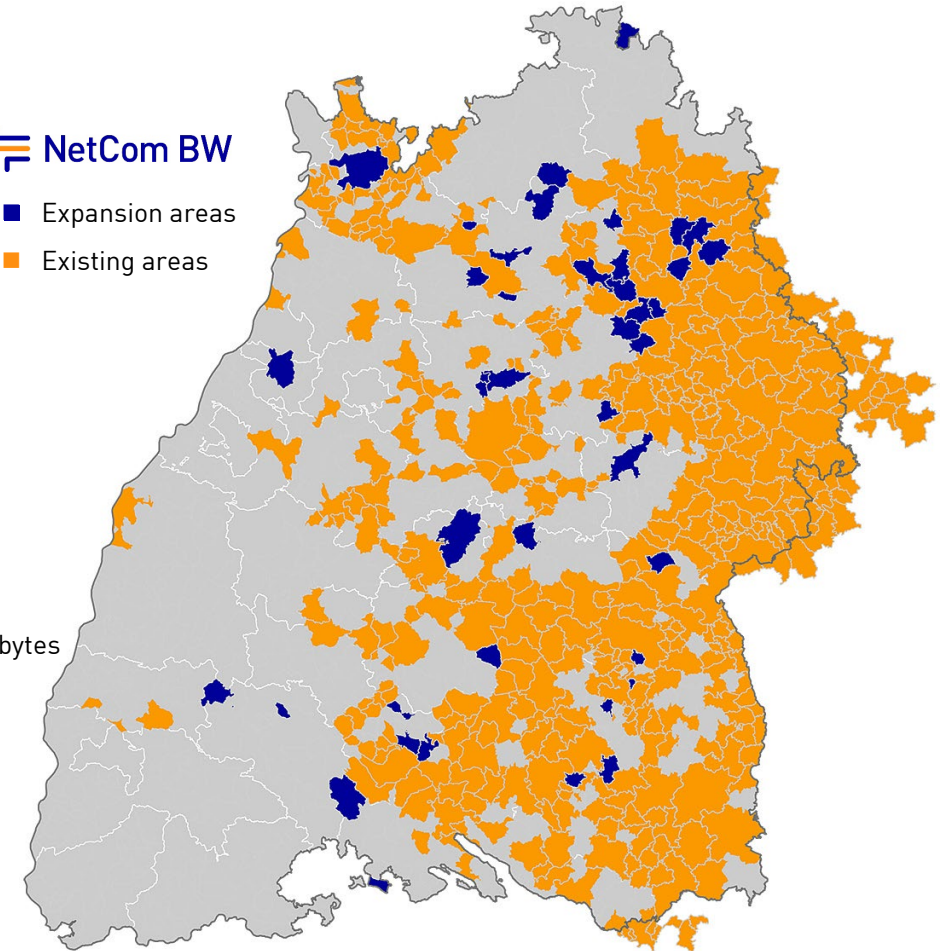
number of customers



- ~87,000 customers, of which 12,200 commercial and industrial
- ~21,700 km of fiber optic cable
- One of the largest fiber backbone networks in Baden-Württemberg
- Serves >40% of municipalities in Baden-Württemberg
- Transported data volume in 2022 ~355,000,000 Gigabytes

NetCom BW

- Expansion areas
- Existing areas



<sup>1</sup>As of 31 December 2022

As of 9 October 2023



# Smart Infrastructure for Customers: Energy-related services for utilities

## Business model

- EnBW utility services has provided energy-related services to utilities for over 10 years. The business focus is on the supplier and distribution network business (including as default meter operator). Today, the business has approximately 3 m metering points under management.
- The main energy-related services include the provision of IT platforms (SaaS), business process outsourcing (BPO) and implementing projects such as migrations for municipal utilities.

## Market development

- The business has changed noticeably in recent years, with changing customer behavior, higher legislative and regulatory requirements and new technologies. This path of change continues with growing rapidity and increases complexity for market players who make increasing use of outsourcing.
- Overall, the market is expected to grow by about 2.5% a year to a total volume of around €3.5 bn by 2030 (today<sup>1</sup>: €2.7 bn). Strongest growth and margins: Software/SaaS and metering point business



approx. **80** clients



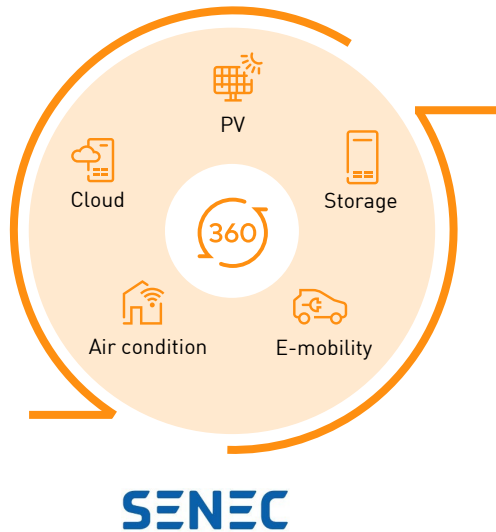
approx. **3 m** contracts  
under management



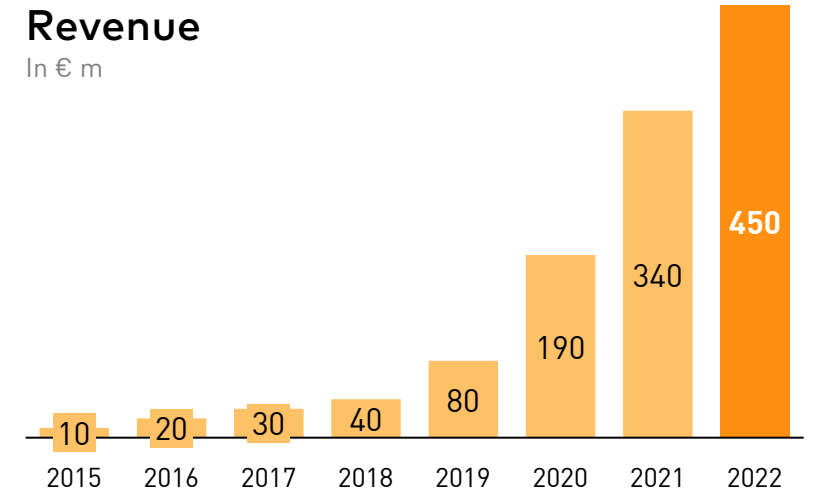
approx. **€120 m** revenue



# Smart Infrastructure for Customers: Senec decentralised energy solutions for homeowners



Revenue  
In € m



- Full solutions for self-supply solar power (SENEC.360)
- Full line up of electricity storage systems
- Distribution of own-brand PV systems and wallboxes
- SENECloud virtual electricity storage
- E-mobility:  
Solar-optimized charging via wallbox

- Distribution through over 1,200 certified installers
- Presence in major growth markets (Germany, Italy and Australia)

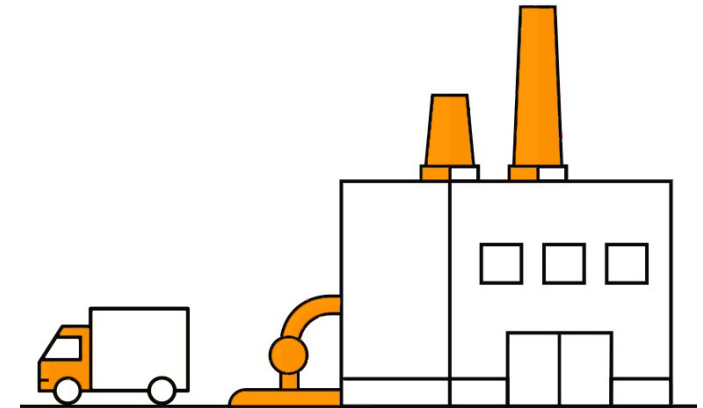
- Positioned in high-growth sweet spots of decentralised energy solutions
- Over 100,000 electricity storage systems sold
- Strongly scaling business:  
Tremendous growth since acquisition in 2018 to revenue well of €450 m in 2022



# Smart Infrastructure for Customers: Develop biomethane business

## Biomethane market development

- Biomethane opens up additional applications in the transport and buildings sector for rapid decarbonization
- Due to the ambitious climate protection targets for 2030 and 2045, demand for biomethane for power and heat generation and transport sector will increase strongly in the coming years
- Our subsidiaries support companies in switching to sustainable energy supplies with biomethane, bio-SNG and bio-LNG
  - Transport, mass balancing and supply of renewable gases
  - Trading for biomethane GHG quota and in future bio-LNG in transport sector
- Expansion of non-subsidised business (Germany) and internationalization by cross-border procurement and marketing activities
  - Some member states of the EU who have not yet established a biomethane market are currently examining the implementation of a biomethane quota





# System-Critical Infrastructure: Electricity and gas grids represent EnBW's core business



## EnBW has a thorough understanding of the grid business

- EnBW and its predecessor companies have been active in the grid business for more than 100 years
- Security of supply is our highest priority – which is why we employ modern and tested technologies and maintain an extensive network of service centers
- Efficiency benchmark from most recent regulatory period certifies generally best results for EnBW grids
- High regulatory competence and market competence

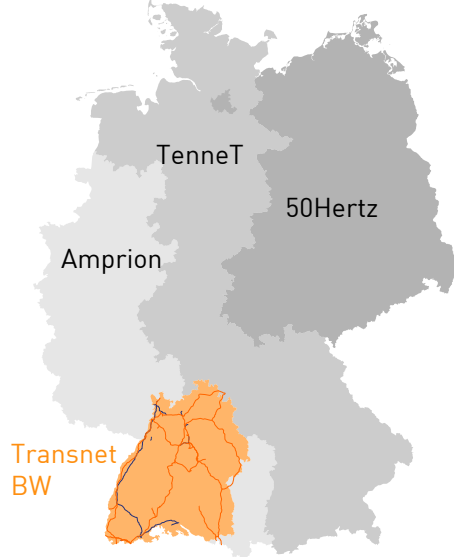
## Grid business has stabilizing effect on portfolio

- Electricity and gas grids are subject to regulation
- Stabilizing risk/return mix with stable cash flows



# System-Critical Infrastructure: Electricity grids

## Electricity transmission grids



**Overall length**  
Transmission & distribution

147,100  
km

**Efficiency**  
electricity transmission grids

100  
%

**Efficiency**  
electricity distribution grids

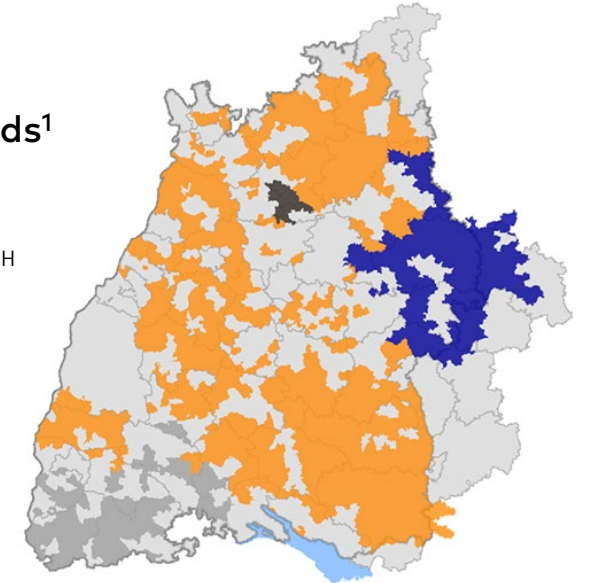
92 – 97  
%

| Transmission grids in km  | 2022  | 2021  |
|---------------------------|-------|-------|
| Extra-high voltage 380 kV | 2,200 | 2,200 |
| Extra-high voltage 220 kV | 900   | 900   |

| Transmission grids Efficiency in % |     |
|------------------------------------|-----|
| TransnetBW GmbH                    | 100 |

## Electricity distribution grids<sup>1</sup>

- ED Netze GmbH
- NHF Netzgesellschaft Heilbronn-Franken mbH
- Netze BW GmbH
- Netze ODR GmbH



| Distribution grids in km   | 2022   | 2021   |
|----------------------------|--------|--------|
| High voltage 110 kV        | 8,500  | 8,500  |
| Medium voltage 30/20/10 kV | 43,800 | 43,300 |
| Low voltage 0.4 kV         | 91,700 | 90,900 |

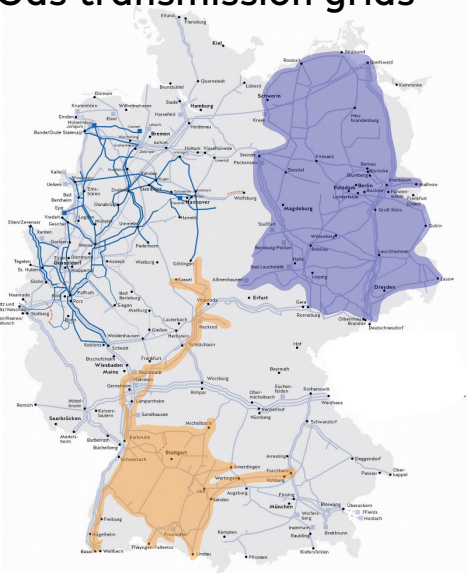
| Distribution grids <sup>1</sup> Efficiency in % |    |
|---|----|
| Netzgesellschaft Düsseldorf mbH                 | 97 |
| Netze BW GmbH                                   | 96 |
| ED Netze GmbH                                   | 95 |
| Netzgesellschaft Ostwürttemberg DonauRies GmbH  | 64 |
| NHF Netzgesellschaft Heilbronn-Franken mbH      | 92 |

<sup>1</sup> Excluding PRE



# System-Critical Infrastructure: Gas grids

## Gas transmission grids



**Overall length**  
Transmission & distribution

26,700  
km

**Efficiency**  
gas transmission grids

94 – 100  
%

**Efficiency**  
gas distribution grids

85 – 100  
%

| Transmission grids in km | 2022  | 2021  |
|--------------------------|-------|-------|
| High pressure            | 9,800 | 9,800 |

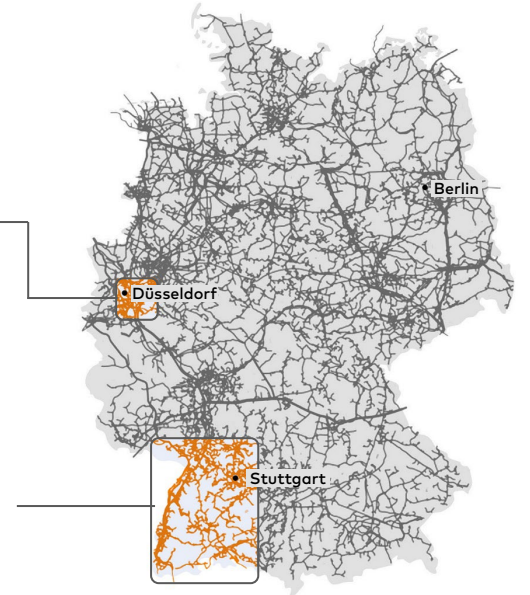
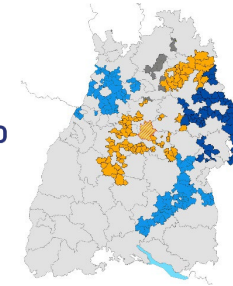
### Transmission grids Efficiency in %

|                          |     |
|--------------------------|-----|
| Ontras Gastransport GmbH | 100 |
| terranets bw GmbH        | 94  |

## Gas distribution grids

Netzgesellschaft  
Düsseldorf mbH

- Netze BW
  - Netze Südwest
  - Netze NGO
  - Netzgesellschaft Heilbronn Franken
- 



| Distribution grids in km | 2022  | 2021  |
|--------------------------|-------|-------|
| High pressure            | 2,400 | 2,400 |
| Medium pressure          | 9,200 | 9,100 |
| Low pressure             | 5,300 | 4,700 |

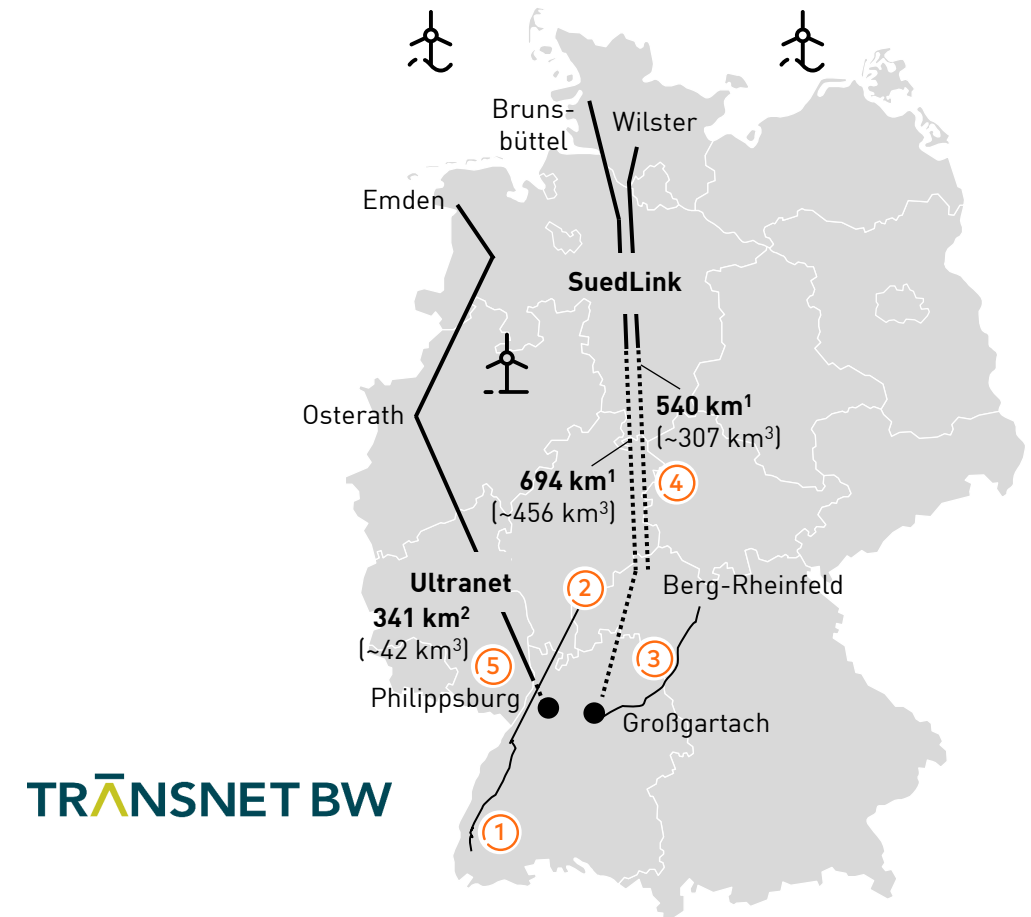
### Distribution grids Efficiency in %

|  |     |
|--|-----|
| Netzgesellschaft Ostwürttemberg DonauRies GmbH | 100 |
| Netzgesellschaft Düsseldorf mbH                | 93  |
| NHF Netzgesellschaft Heilbronn-Franken mbH     | 93  |
| Netze BW GmbH                                  | 86  |
| Netze-Gesellschaft Südwest mbH                 | 85  |



# System-Critical Infrastructure: Expansion of electricity transmission grids to ensure security of supply

|   | Grids section        | Scheduled completion |
|---|----------------------|----------------------|
| <b>AC grids reinforcement</b>   |                      |                      |
| ① Rhine river area in Baden   | ~121 km              | 2029                 |
| ② North Baden-Württemberg   | ~82 km               | 2031                 |
| ③ North-east Baden-Württemberg  | ~99 km               | 2026                 |
| <b>DC expansion</b>   |                      |                      |
| ④ "SuedLink" 4 GW corridor<br>TransnetBW contribution: Converter, power lines                           | ~763 km <sup>1</sup> | 2028                 |
| ⑤ "Ultranet" 2 GW corridor<br>EnBW/TransnetBW contribution: Converter, power lines in Baden-Württemberg | ~42 km <sup>2</sup>  | 2026                 |



TRANSNET BW

Source: BNetzA, EnBW, Net Development Plan (NEP) 2035 2. Draft 2021; [www.netzausbau.de/en](http://www.netzausbau.de/en)

<sup>1</sup> In cooperation with TenneT

<sup>2</sup> In cooperation with Amprion

<sup>3</sup> Share belonging to TransnetBW

AC: Alternating current

DC: Direct current

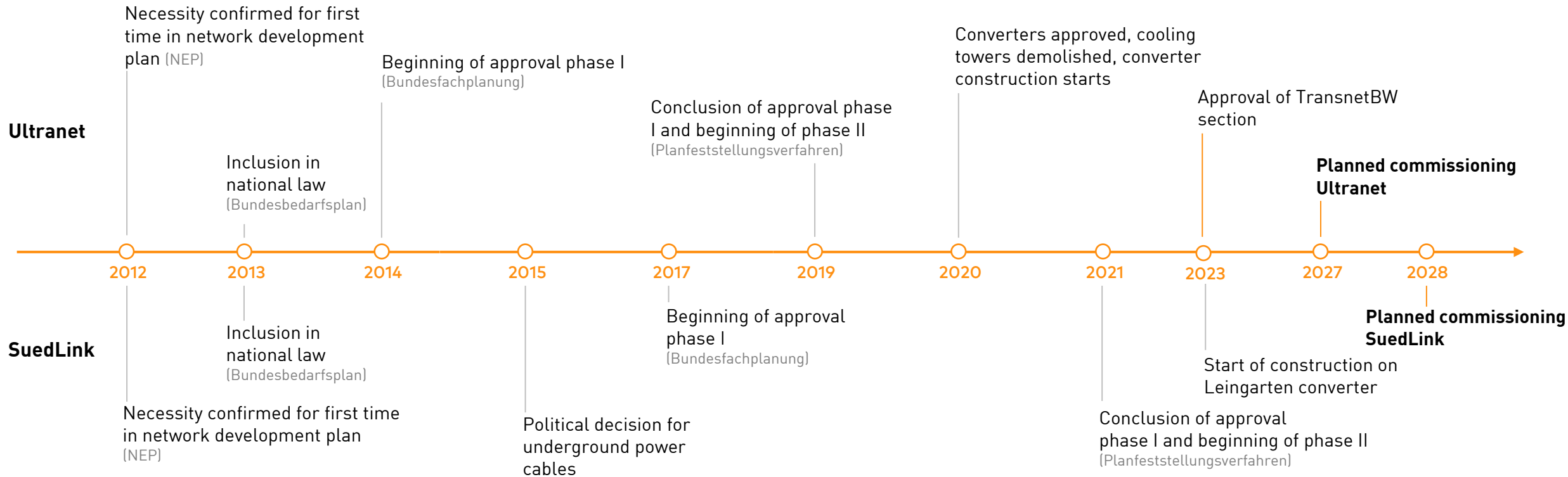


# System-Critical Infrastructure: Our challenges - extensive and long approval procedures

## Schedule for HVDC projects at TransnetBW

TRANSNET BW

Milestones





# System-Critical Infrastructure: Facts about SuedLink<sup>1</sup>

## Key facts

- 2 x 2 GW, ~763 km
- Together with Federal Minister Habeck start of construction on 27 July
- Major subprojects: Laying the cables through a mine near Heilbronn, tunneling under the river Elbe

## Financials

- Investment volume: €10 bn
- Costs for planning and approval: €0.5 bn

## Project complexity

- 6 states, 39 counties, 50,000 land parcels and 10,000 owners
- 20 freeways, 30 railroad lines, 60 water bodies
- Handball sized diameter cable weighing 41 kg/m



## Studies conducted

- 106 animal species studied
- 4,500 km route kilometers examined
- Assessed study area nearly three times the area of Switzerland<sup>2</sup>

## Regulatory

- At least 8,000 transport permits
- Out of about ~763 km, a section of 17.6 km has been approved so far
- 700 events, 19,000 planning-relevant comments, >30,000 processed objections
- More than 14,000 standards, laws and regulations
- 1,000,000 A4 pages, 12,000 folders, 6,000 USB sticks

TRÄNSNET BW

<sup>1</sup> TransnetBW and Tennet each hold 50%

<sup>2</sup> Area studies is 110,000 km<sup>2</sup>



# System-Critical Infrastructure: Facts about Ultranet

## Key facts

- Joint project by TransnetBW and Amprion
- Length: ~340 km, ~42 km TransnetBW's responsibility  
Rated power: 2000 MW, voltage level:  $\pm 380$  kV DC
- Line route largely on existing routes: Implementation as a hybrid line with 380 kV-AC / 380 kV-DC circuits on one route
- Construction of DC converters
  - In Philippsburg starting 2020 – completion expected in 2024
  - In Osterath starting May 2023

## Regulatory

- Two sections approved by Federal Network Agency, construction phase to start in October 2023
  - Amprion: Section A1 (Ried to Wallstadt, ~28 km)
  - Transnet BW: Section B1 (~42 km long, Mannheim-Wallstadt to Philippsburg network connection point)

## Investments<sup>1</sup>

- Total: €1,640 m
  - Line: €240 m
  - 2 converters: €1,400 m



TRÄNSNET BW

## Studies conducted in TransnetBW's section B1

- >10 species groups with numerous subspecies mapped
- ~20 km<sup>2</sup> in section B1 examined
- Number of documents: ~7,000 A4 pages and ~800 plans, 45 folders in total
- >80 official events and numerous viewings of the converter in Philippsburg with different stakeholders

## Project complexity of TransnetBW's section B1

- Additional hang-up rope: ~21 km
  - Addition of Ultranet circuit to existing transmission system
- Replacement: ~16 km
  - Existing overhead line systems to be dismantled and replaced with new ones
- New construction: ~5 km, divided into smaller sections
  - In the area of the Philippsburg power plant site and Neurott substation
  - Parallel in the Mannheim-Wallstadt transmission line area

<sup>1</sup> Whole project



# System-Critical Infrastructure: Contemplated sale of minority stake in TransnetBW

## Expansion of grid infrastructure as one component of the energy transition triangle

- Huge amount of investment opportunities
- Transmission grid is an attractive asset class for financial investors
- Supporting the expansion of EnBW's overall well-balanced portfolio

## Contemplated minority disposal

- February 2022
  - EnBW considers selling up to 2x 24.95% in TransnetBW to long-term investment partners
  - Majority of 50.1% in TransnetBW to be retained by EnBW
- May 2023
  - EnBW is selling a stake of 24.95% in TransnetBW to a consortium comprising more than 30 banks, insurance companies and pension funds from Baden-Württemberg
  - German state-owned KfW with an option to acquire another 24.95% stake on the same terms as those offered by the consortium
- Completion of process expected in near future



# System-Critical Infrastructure: Integration of renewables and e-mobility in distribution grids

## Challenges and activities

### Challenges of the distribution grids in Baden-Württemberg

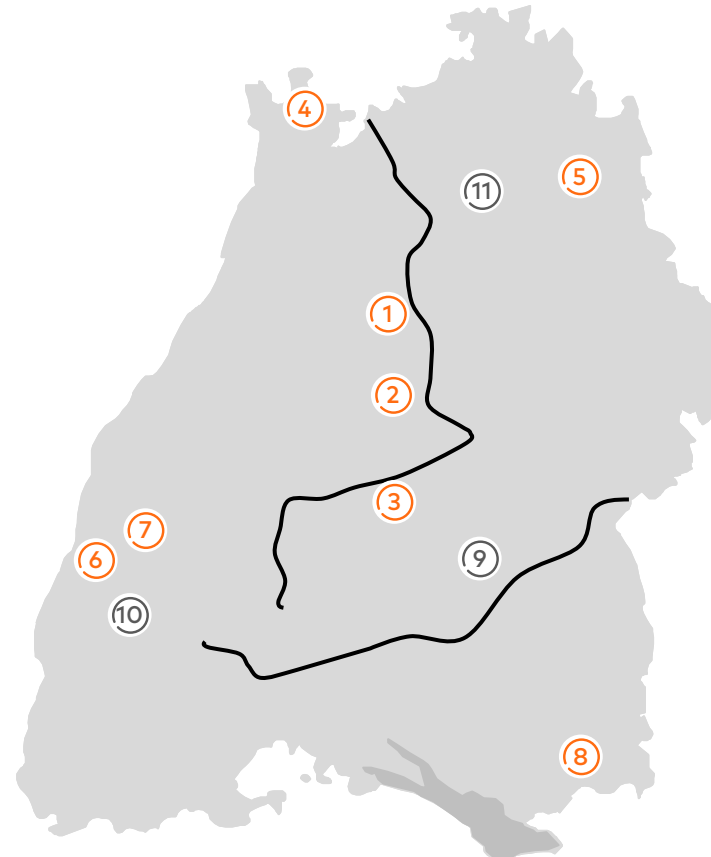
- Widespread use of photovoltaics
- High expansion targets for wind power
- Growing prevalence of electric cars and electric heating systems

Smart technologies (e.g. controllable distribution substations) potentially reduce the extent of grid expansion

In addition to the expansion of distribution grids, EnBW is investigating smart distribution grids together with partners in several "grid laboratories"

Until 2025, investment of €~2.5 bn necessary to develop the electricity distribution grids infrastructure in Baden-Württemberg

## EnBW grid laboratories and grid innovations



### E-mobility

- ① **E-mobility-Carré Tamm**  
Integration of e-mobility in apartment buildings in urban areas
- ② **E-mobility-Allee Ostfildern**  
Integration of e-mobility in family homes in suburban areas
- ③ **E-mobility-Chaussee Kusterdingen**  
Integration of e-mobility in family homes in rural areas
- ④-⑧ **Intelligent home-charging**  
Remote controlled charging at home

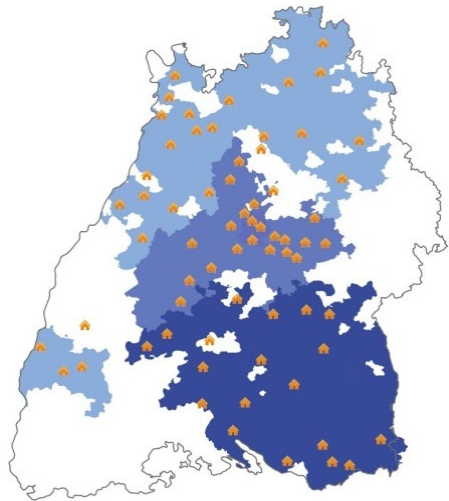
### Smart grids and others

- ⑨ **Sonderbuch**  
Interactive smart grids demonstrator
- ⑩ **Freiamt - flexQgrid**  
The grid as distributed power plant; implementation of grids traffic light
- ⑪ **Hydrogen-Island Öhringen**  
Renewable energies stored as hydrogen in the natural gas grids



# System-Critical Infrastructure: Local authorities and municipal utilities

## Concessions



- Netze BW locations
- North grids region
- Centre grids region
- South grids region

With investment, research activities, state-of-the-art technology and our highly dedicated workforce, we make a major contribution in terms of security of supply and future-ready energy supply, especially in rural regions

- 754 electricity concessions
- 168 gas concessions
- 2,374 m electricity customer
- 247,500 gas customer

**Our ambition:**  
Secure and win concessions

## Shareholdings in local services



Alongside our own activities, our shareholdings in local services are a key pillar of our regional business. We place great importance on close teamwork

- ~100 shareholdings, numerous network providers and municipal utilities
- €~3 bn revenue
- 20% electricity and gas market volume share in Baden-Württemberg

**Our ambition:**  
Long-term and durable partnerships with municipal shareholders and services

## Local sale and distribution



Broad portfolio of products and services serving >1,400 municipalities across Baden-Württemberg and beyond

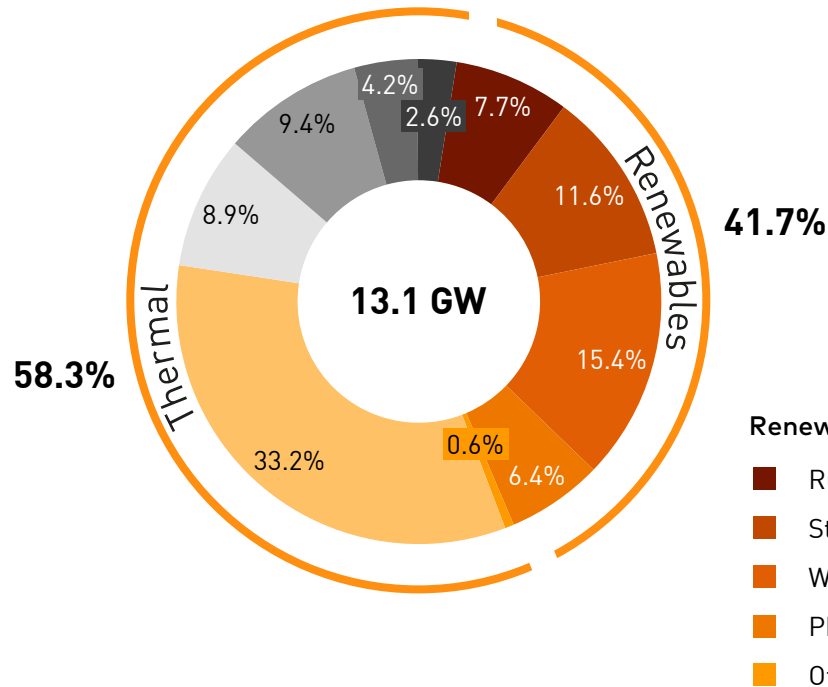
- With a strong regional footprint, we work closely with municipal and district councils to deliver tailored solutions
- Our portfolio focuses on innovative mobility, connected infrastructure, sustainable energy, reliable security and digital services
- Total order value 2022 more than €300 m

**Our ambition:**  
Work together to deliver smart infrastructure for all generations

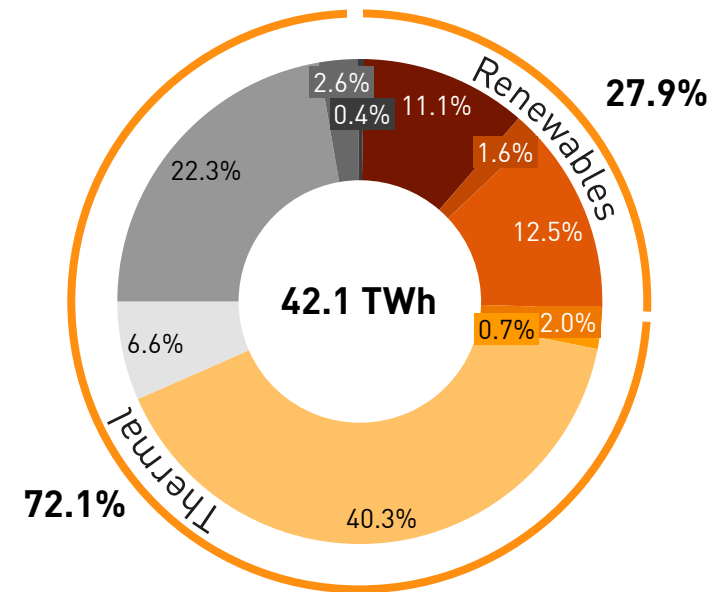


# Sustainable Generation Infrastructure: Generation portfolio and own generation

Generation portfolio 2022<sup>2, 4</sup>



Own generation 2022<sup>2, 3</sup>



<sup>1</sup> Renewables storage/pumped storage (using natural flow of water) and pumped storage (not using natural flow of water)

<sup>2</sup> Own generation also includes long-term procurement contracts and partly owned power plants

<sup>3</sup> The generation quantities are shown without the quantities from positive redispatch that cannot be influenced. Own generation including positive redispatch in 2022 amounts to 44,690 GWh

<sup>4</sup> In addition, plants with an installed capacity of 1,706 MW have been registered for final decommissioning. However, these have been classified by the Federal Network Agency and TransnetBW as system-relevant and therefore serve TransnetBW as grid reserve capacity



# Sustainable Generation Infrastructure: Generation portfolio and own generation<sup>1</sup>

|   | Generation portfolio<br>in MW |              | Own generation<br>in GWh |              |
|---|-------------------------------|--------------|--------------------------|--------------|
|   | 2022                          | share        | 2022                     | share        |
| <b>Renewable Energies</b>   | <b>5,444</b>                  | <b>41.7%</b> | <b>11,744</b>            | <b>27.9%</b> |
| Run-of-river  | 1,008                         | 7.7%         | 4,676                    | 11.1%        |
| Storage/pumped storage (using natural flow of water) <sup>2</sup> | 1,513                         | 11.6%        | 687                      | 1.6%         |
| Onshore wind  | 1,031                         | 7.9%         | 1,927                    | 4.6%         |
| Offshore wind   | 976                           | 7.5%         | 3,331                    | 7.9%         |
| Photovoltaics   | 832                           | 6.4%         | 825                      | 2.0%         |
| Other renewable energies  | 84                            | 0.6%         | 298                      | 0.7%         |
| <b>Thermal power plants<sup>3</sup></b>                           | <b>7,622</b>                  | <b>58.3%</b> | <b>30,340</b>            | <b>72.1%</b> |
| Lignite   | 875                           | 6.7%         | 6,348                    | 15.1%        |
| Hard coal   | 3,467                         | 26.5%        | 10,606                   | 25.2%        |
| Gas   | 1,166                         | 8.9%         | 2,764                    | 6.6%         |
| Other   | 346                           | 2.6%         | 151                      | 0.4%         |
| Pumped storage (not using natural flow of water) <sup>2</sup>     | 545                           | 4.2%         | 1,081                    | 2.6%         |
| Nuclear   | 1,223                         | 9.4%         | 9,390                    | 22.3%        |
| <b>Total</b>  | <b>13,066</b>                 | <b>100%</b>  | <b>42,084</b>            | <b>100%</b>  |

<sup>1</sup> As of 31 December 2022. The generation portfolio includes long-term procurement agreements and generation from partly owned power plants

<sup>2</sup> Output values irrespective of marketing channel, for storage: generation capacity

<sup>3</sup> Including pumped storage power plants that do not use the natural flow of water  
Divergence from 100% possible due to rounding effects





# Sustainable Generation Infrastructure: Offshore wind portfolio and pipeline

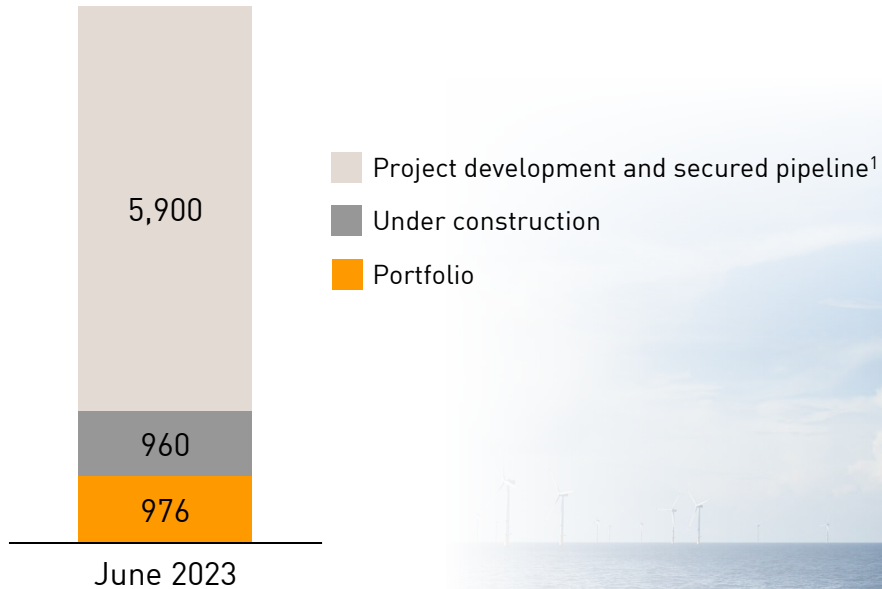
## Portfolio and pipeline in MW

## Germany

## United Kingdom<sup>1</sup>

|                             |                  |
|-----------------------------|------------------|
| Installed total power in MW | 976              |
| Under construction in MW    | 960 <sup>2</sup> |

|                           |       |
|---------------------------|-------|
| Project development in MW | 5,900 |
|---------------------------|-------|



<sup>1</sup> 5,900 MW secured pipeline in United Kingdom: 50% EnBW and 50% bp

<sup>2</sup> Installed capacity will be 960 MW, grid connection 900 MW



# Sustainable Generation Infrastructure: Offshore wind in Germany – portfolio and pipeline



|                             | Baltic 1                                      | Baltic 2                          | Hohe See                                  | Albatros                                  |
|-----------------------------|---|-----------------------------------|---|---|
| <b>Country</b>              | Germany                                       | Germany                           | Germany                                   | Germany                                   |
| <b>Technology</b>           | Offshore                                      | Offshore                          | Offshore                                  | Offshore                                  |
| <b>Type of turbine</b>      | 21 x Siemens SWT 2.3-93                       | 80 x Siemens SWT 3.6-120          | 71 x SWT 7.35-154-HWRT                    | 16 x SWT 7.35-154-HWRT                    |
| <b>Total capacity in MW</b> | 48.3  | 288                               | 521.9                                     | 117.6                                     |
| <b>Shareholders</b>         | ~50.3% EnBW; ~49.7%<br>19 municipal utilities | ~50.1% EnBW<br>~49.9% PGGM & ÄVWL | ~50.1% EnBW<br>~49.9% Enbridge Inc./CPPIB | ~50.1% EnBW<br>~49.9% Enbridge Inc./CPPIB |
| <b>Operation date</b>       | Apr 2011                                      | Sep 2015                          | Oct 2019                                  | Jan 2020                                  |
| <b>Feed-in system</b>       | EEG 2009                                      | EEG 2014                          | EEG 2014                                  | EEG 2014                                  |

As of 30 June 2023

¹ Installed capacity will be 960 MW, grid connection 900 MW

CPPIB: Canada Pension Plan Investment Board

EEG: Erneuerbare Energien-Gesetz (Renewable Energy Act)

PGGM: Stichting Depository PGGM Infrastructure Funds

ÄVWL: ÄrzteVersorgung Westfalen-Lippe



# Sustainable Generation Infrastructure: Offshore wind in Germany – He Dreiht

## He Dreiht



|                            |   |
|----------------------------|---|
| <b>Location</b>            | Germany, German Bight (North Sea)   |
| <b>Foundation</b>          | Bottom-fixed monopiles  |
| <b>Type of turbine</b>     | 64 x Vestas V236 15 MW (incl. overplanting)   |
| <b>Total grid capacity</b> | 900 MW grid connection<br>(960 MW installed)  |
| <b>Shareholders</b>        | EnBW 50.1%; consortium of Allianz Capital Partners, AIP and Norges Bank Investment Management 49.9% |
| <b>Commissioning</b>       | 2025  |
| <b>Feed-in tariff</b>      | Without EEG funding   |

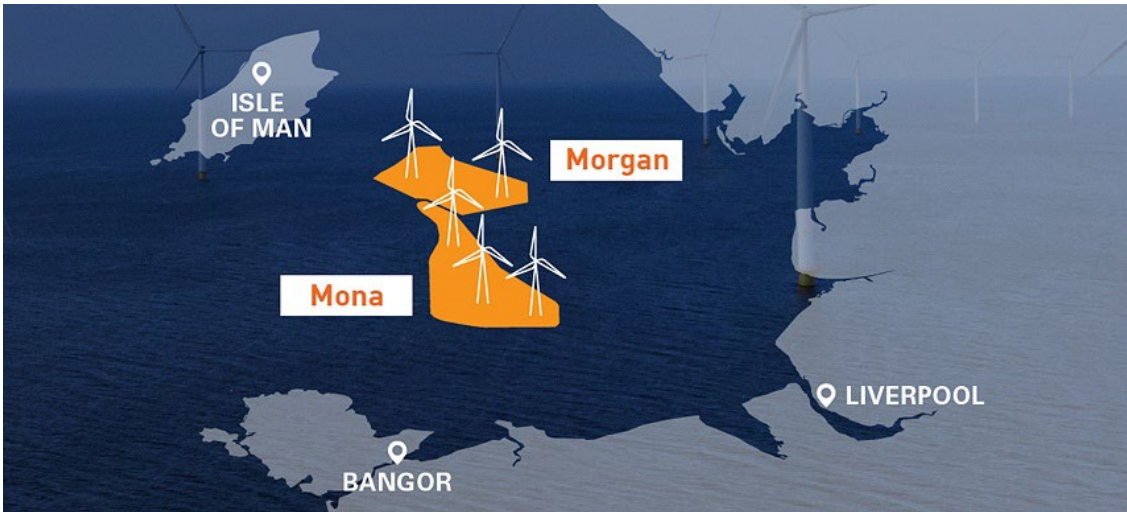
- One of the first offshore wind projects worldwide that committed to be delivered on zero subsidy in an auction in 2017
- Positive Plan Approval Decision (“permit”) received from the Authorities in December 2022
- Final investment decision for 960 MW taken in March 2023, investment volume of €2.4 bn
  - Equity contribution supplemented through a €600 m long-term loan by EIB and a €500 m long-term loan by EIFO
- 66 kV direct connection of inner array grid to AC/DC converter eliminates the need for a costly offshore substation
- Construction to start in 2024, 2-year offshore installation campaign
  - 2024: Foundation installation
  - 2025: Inner Array Grid and Turbine installation
  - 10 December 2025: Guaranteed date for connection to onshore grid; connection provided by transmission system operator (TSO)
  - Late 2025: Start of operation expected
- Strong operational synergies with neighboring EnBW wind farms Hohe See and Albatros

AC: Alternating current  
DC: Direct current  
EEG: Erneuerbare Energien-Gesetz (Renewable Energy Act)



# Sustainable Generation Infrastructure: Offshore wind development in United Kingdom (1/2)

## Mona and Morgan



- Development of two offshore wind projects Mona and Morgan with a total potential capacity of 3,000 MW in the Irish Sea
- EnBW's offshore wind expertise combined with bp's experience, especially in consenting and procurement
- Relatively close to shore and radial grid connections with potential to be online by 2029
- Presently the wind farms are under development, statutory public consultation just completed for Morgan wind farm plus for Mona wind farm plus grid connection
- Extensive geotechnical campaign in summer 2023, checking on every potential turbine and substation location
- Actively pursuing cooperation with regional developers, ports, businesses and authorities to support early grid connection and consenting activities

|                       |   |
|-----------------------|---|
| <b>Location</b>       | 30 km from the coast of Britain, 22 km from Isle of Man     |
| <b>Potential</b>      | Potential of 3 GW leases – powering c. 3.4 million UK homes |
| <b>Area</b>           | Morgan: ~300 km <sup>2</sup> Mona: ~500 km <sup>2</sup>     |
| <b>Water-depth</b>    | 35 m  |
| <b>Shareholders</b>   | 50% EnBW, 50% bp  |
| <b>Commissioning</b>  | Depending on grid connection, aiming at 2028/29             |
| <b>Feed-in tariff</b> | CfD, PPA and/or merchant offtake in 55 years operation time |



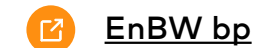
# Sustainable Generation Infrastructure: Offshore wind development in United Kingdom (2/2)

## Morven



- Development of the Morven offshore wind project with a total potential capacity of 2,900 MW - on a lease by Crown Estate Scotland in the Scottish North Sea
- Third UK project with bp - Mona, Morgan and Morven organized under single program approach in order to capture synergies, learning effects and increase efficiencies
- Morven is located approximately 60km from the coast of Aberdeen with an area of approximately 860 km<sup>2</sup> and planned installed capacity of 2.9 GW
- Various development activities ongoing regarding grid connection, approval, supply chain and engineering
- Actively pursuing cooperation with regional ports, suppliers and authorities to support localization commitments

|                                  |   |
|----------------------------------|---|
| <b>Location</b>                  | ~60 km off the coast from Aberdeen                          |
| <b>Generation capacity in GW</b> | ~2.9  |
| <b>Area</b>                      | ~860 km <sup>2</sup>  |
| <b>Water-depth</b>               | 65 - 75 m   |
| <b>Shareholders</b>              | 50% EnBW, 50% bp  |
| <b>Commissioning</b>             | Depending on grid connection, aiming at 2030                |
| <b>Feed-in tariff</b>            | CfD, PPA and/or merchant offtake in 55 years operation time |

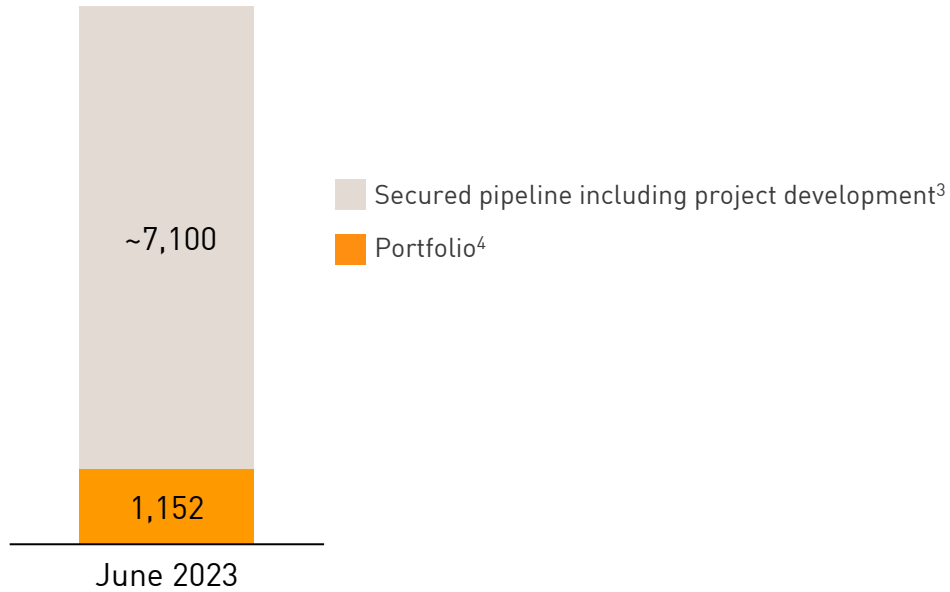




# Sustainable Generation Infrastructure: Onshore wind portfolio and pipeline

## Portfolio and pipeline<sup>1</sup>

in MW



<sup>1</sup> Germany and abroad

<sup>2</sup> Germany

<sup>3</sup> Projects at an early stage: ~2.8 GW; project development: 4,286 MW

<sup>4</sup> Portfolio consists of 799 MW Germany, 229 MW France, 120 MW Sweden, 4 MW Czech Republic

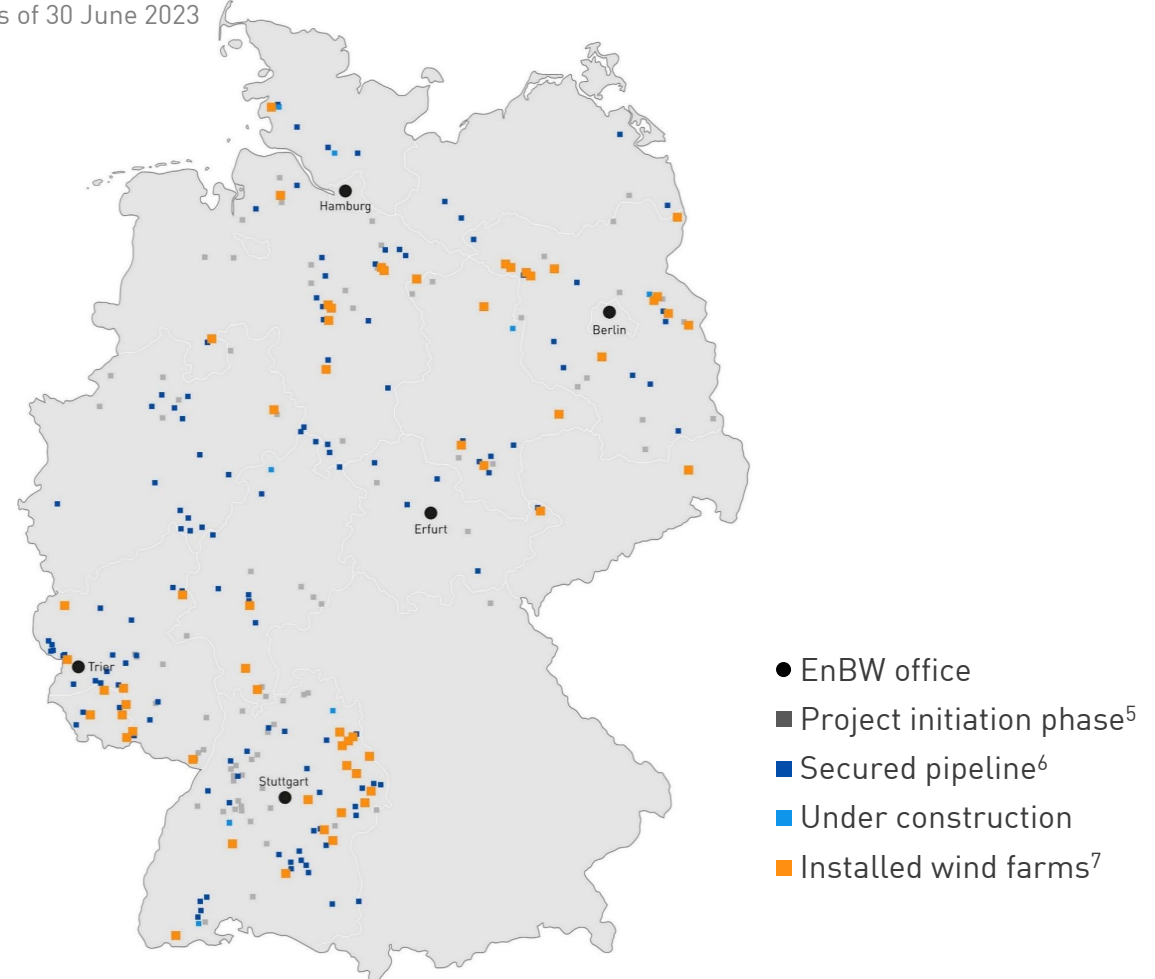
<sup>5</sup> Negotiations for land contracts

<sup>6</sup> At least land contracts concluded

<sup>7</sup> Wind parks in operation with EnBW majority shareholding

## Regional distribution of portfolio and pipeline<sup>2</sup>

as of 30 June 2023





# Sustainable Generation Infrastructure: Onshore wind portfolio and development

## Portfolio in Germany



### Installed wind farms

|                             |     |
|-----------------------------|-----|
| Installed total power in MW | 799 |
| Number of turbines          | 330 |
| Number of locations         | 71  |



### Development

|                           |       |
|---------------------------|-------|
| Under construction in MW  | 136   |
| Project development in MW | 3,858 |
| Number of turbines        | >650  |
| Number of locations       | >150  |

## Portfolio in France



### Installed wind farms

|                             |     |
|-----------------------------|-----|
| Installed total power in MW | 229 |
| Number of turbines          | 98  |
| Number of locations         | 17  |



### Development

|                           |       |
|---------------------------|-------|
| Under construction in MW  | 120   |
| Project development in MW | 2,769 |

## Portfolio in Sweden



### Installed wind farms

|                             |     |
|-----------------------------|-----|
| Installed total power in MW | 120 |
| Number of turbines          | 55  |
| Number of locations         | 8   |



### Development

|                           |     |
|---------------------------|-----|
| Under construction in MW  | -   |
| Project development in MW | 428 |

## Portfolio in Czech Republic



### Installed wind farms

|                             |   |
|-----------------------------|---|
| Installed total power in MW | 4 |
| Number of turbines          | 2 |
| Number of locations         | 1 |



### Development

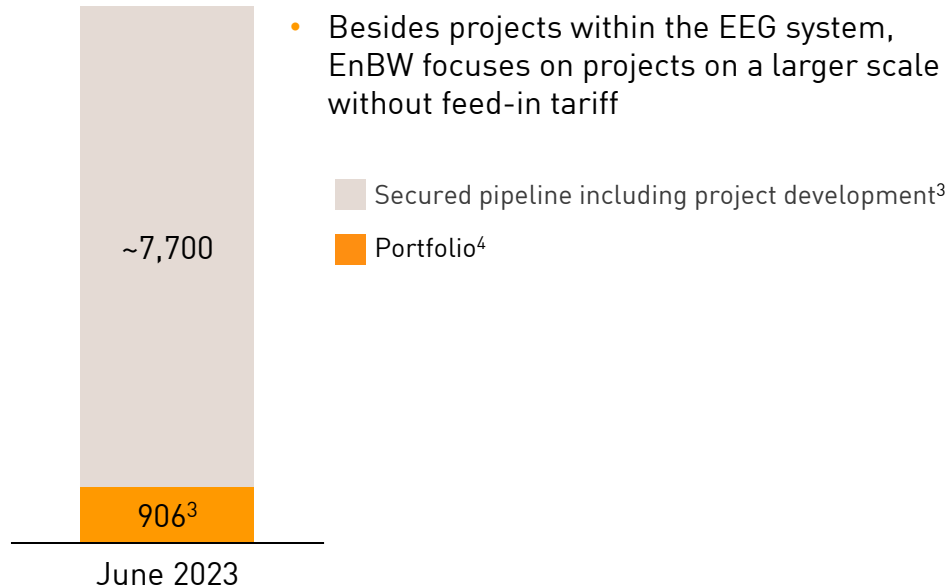
|                           |   |
|---------------------------|---|
| Under construction in MW  | - |
| Project development in MW | - |



# Sustainable Generation Infrastructure: Photovoltaics portfolio and pipeline

## Portfolio and pipeline<sup>1</sup>

in MWp



<sup>1</sup> Germany and abroad

<sup>2</sup> Germany

<sup>3</sup> Projects at an early stage: ~4.3 GW; project development: 3,410 MW

<sup>4</sup> Portfolio consists of 707 MWp Germany, 169 MWp France, 26 MWp Czech Republic, 4 MWp Switzerland

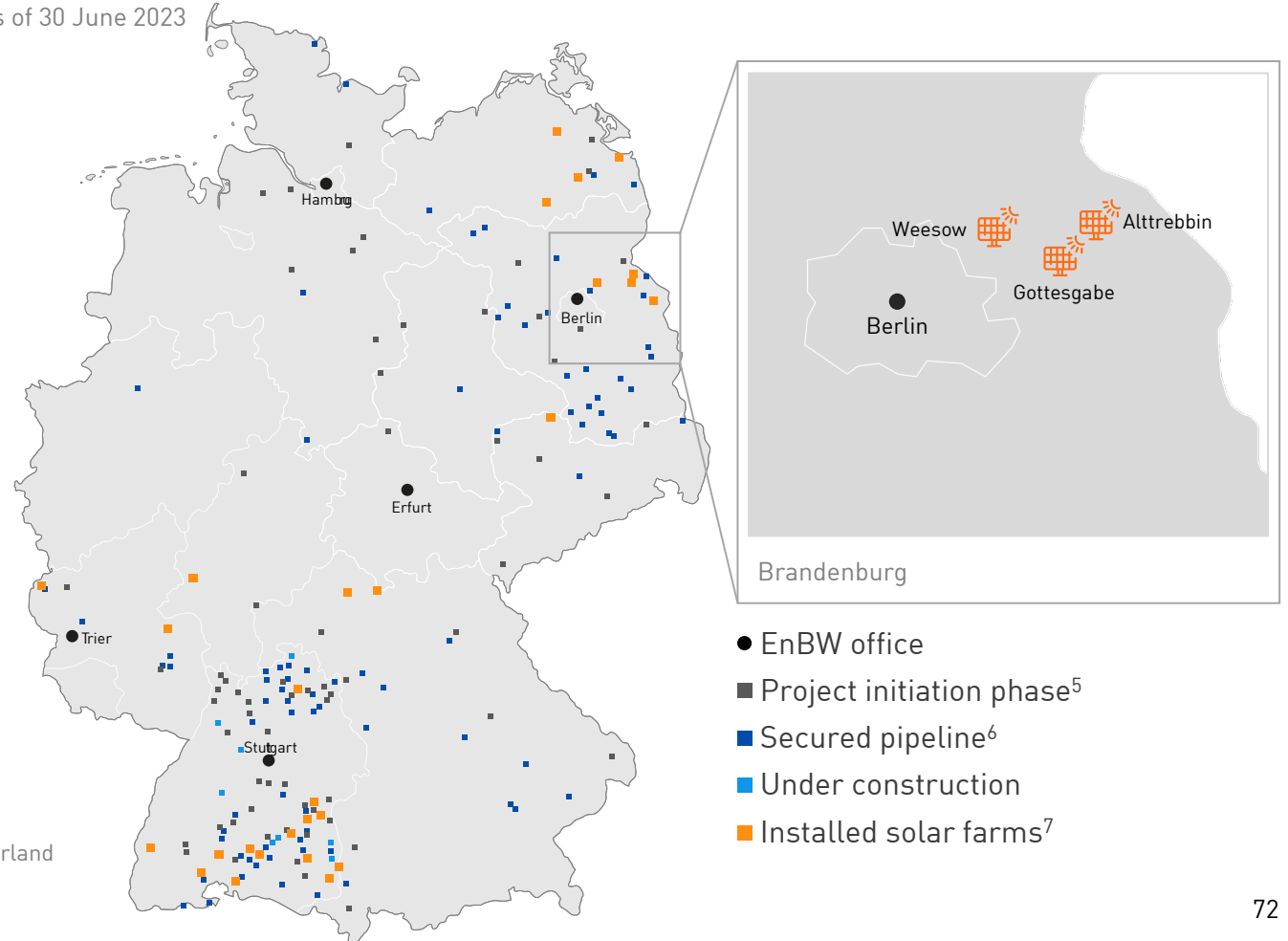
<sup>5</sup> Negotiations for land contracts

<sup>6</sup> At least land contracts concluded

<sup>7</sup> PV parks in operation with EnBW majority shareholding

## Regional distribution of portfolio and pipeline<sup>2</sup>

as of 30 June 2023







# Sustainable Generation Infrastructure: Photovoltaics portfolio and development

## Portfolio in Germany



### Installed solar parks

|   |      |
|---|------|
| Installed total power in MWp <sup>1</sup> | 707  |
| Number of locations <sup>1</sup>          | >100 |



### Development

|                            |       |
|----------------------------|-------|
| Under construction in MWp  | 191   |
| Project development in MWp | 2,526 |
| Number of solar parks      | >100  |

## Portfolio in France



### Installed solar parks

|                              |     |
|------------------------------|-----|
| Installed total power in MWp | 169 |
| Number of locations          | 19  |



### Development

|                            |       |
|----------------------------|-------|
| Under construction in MWp  | 9     |
| Project development in MWp | 4,625 |

## Portfolio in Sweden



### Installed solar parks

|                              |   |
|------------------------------|---|
| Installed total power in MWp | - |
| Number of locations          | - |



### Development

|                            |     |
|----------------------------|-----|
| Under construction in MWp  | -   |
| Project development in MWp | 731 |

## Portfolio in Czech Republic



### Installed solar parks

|                              |    |
|------------------------------|----|
| Installed total power in MWp | 26 |
| Number of locations          | 14 |



### Development

|                            |     |
|----------------------------|-----|
| Under construction in MWp  | 5   |
| Project development in MWp | 153 |



# Sustainable Generation Infrastructure: Hydropower plants

## Run-of-river



in MW

|   |     |
|---|-----|
| Rhine power plants  | 527 |
| Neckar, Donau, Murg, Nagold, Enz, Glatt, Jagst, Kocher, Argen | 151 |
| Iller power plants  | 51  |
| EnAlpin   | 278 |



Iffezheim

## Pumped storage



in MW

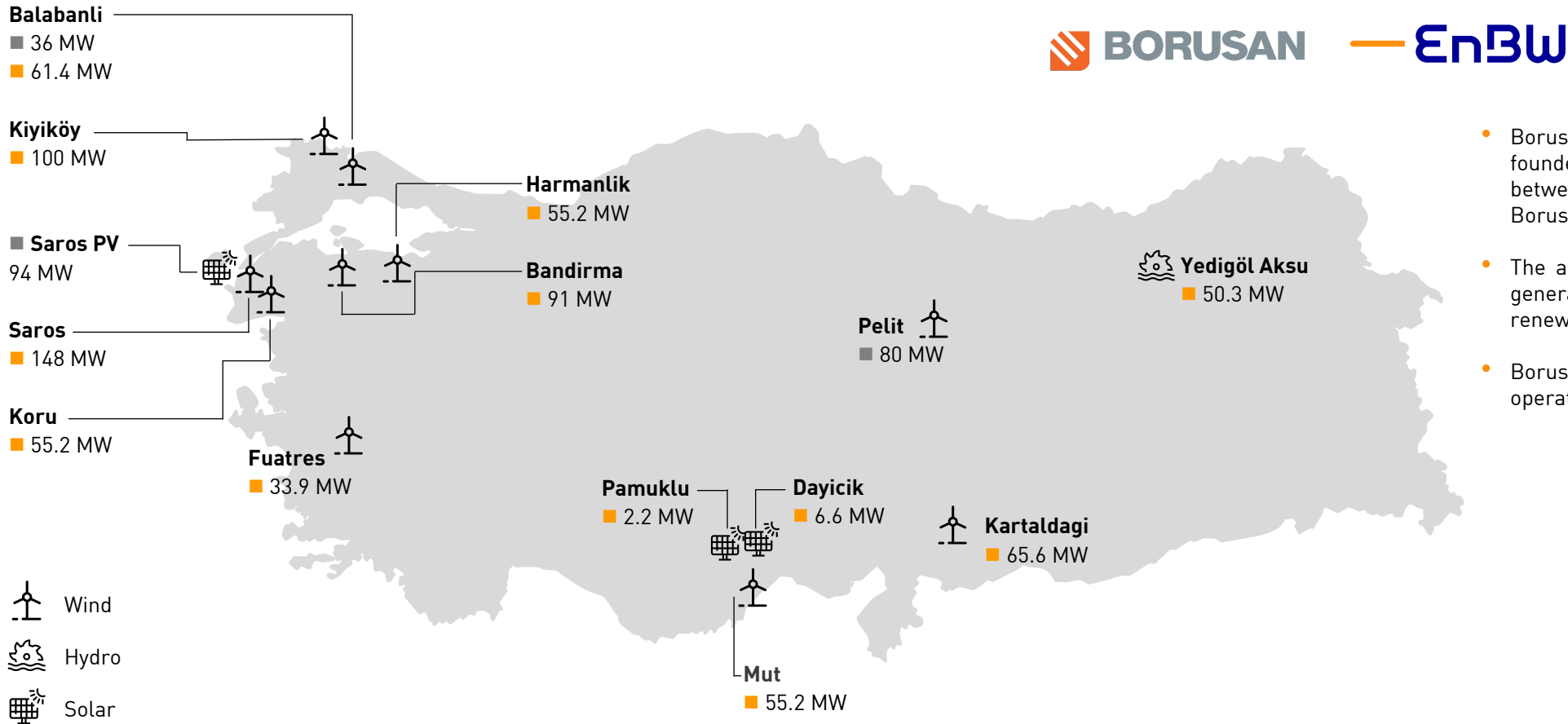
|                              |       |
|------------------------------|-------|
| Schluchsee power plants      | 870   |
| Vorarlberger Illwerke        | 1,059 |
| Glems                        | 90    |
| Rudolf-Fettweis-Werk Forbach | 39    |



Forbach



# Sustainable Generation Infrastructure: Activities in Türkiye - Borusan EnBW Enerji portfolio and projects<sup>1</sup>



- Borusan EnBW Enerji, based in Istanbul, was founded in summer 2009 as a joint venture between EnBW and the Turkish company Borusan.
- The aim of the joint venture is to build up generation capacities in the field of renewable energies in Türkiye.
- Borusan EnBW Enerji is one of the leading operators of onshore wind farms in Türkiye.

<sup>1</sup> Generation capacity not consolidated, as of 31 December 2022



# Sustainable Generation Infrastructure: Thermal power plants<sup>1</sup>

## Conventional power plants

in MW



|                    | Hard coal    | Lignite    | Gas          | Oil        | Waste     |              |
|--------------------|--------------|------------|--------------|------------|-----------|--------------|
| Karlsruhe          | 1,351        |            |              |            |           | <b>1,351</b> |
| Düsseldorf         |              |            | 829          | 86         | 27        | <b>942</b>   |
| Lippendorf         |              | 875        |              |            |           | <b>875</b>   |
| Heilbronn          | 778          |            |              |            |           | <b>778</b>   |
| Altbach/Deizisau   | 336          |            | 253          |            |           | <b>589</b>   |
| Mannheim           | 426          |            |              |            |           | <b>426</b>   |
| Rostock            | 259          |            |              |            |           | <b>259</b>   |
| Walsum             | 250          |            |              |            |           | <b>250</b>   |
| Stuttgart          | 55           |            | 29           | 70         | 27        | <b>181</b>   |
| Walheim            |              |            |              | 136        |           | <b>136</b>   |
| Ulm                | 12           |            |              |            |           | <b>12</b>    |
| Other <sup>3</sup> |              |            | 55           |            |           | <b>55</b>    |
| <b>Total</b>       | <b>3,467</b> | <b>875</b> | <b>1,166</b> | <b>292</b> | <b>54</b> | <b>5,854</b> |

## Nuclear<sup>2</sup>

in MW



|                |       |
|----------------|-------|
| Neckarwestheim | 1,096 |
|----------------|-------|

## Grid reserve power plants<sup>4</sup>

in MW



|              |              |
|--------------|--------------|
| Marbach      | 426          |
| Heilbronn    | 250          |
| Walheim      | 244          |
| Karlsruhe    | 353          |
| Altbach      | 433          |
| <b>Total</b> | <b>1,706</b> |

<sup>1</sup> Major power plants in Germany, as of 31 December 2022

<sup>2</sup> Limited extension for three German nuclear power plants until 15 Apr 2023 including EnBW's Neckarwestheim power plant; no extension beyond that and no procurement of new fuel rods

<sup>3</sup> Sum of various small plants mainly contracting

<sup>4</sup> Continued temporary operation of 9 power plant units due to system relevance: HLB 5/6 , MAR DT III, MAR GT II, MAR GT III, WAL1/2, RDK4s and ALT HKW1



# Sustainable Generation Infrastructure: Dispatchable power from fuel switch projects

Gas instead of coal – H<sub>2</sub> ready fuel switch plants as an intermediate step on the road to climate neutrality



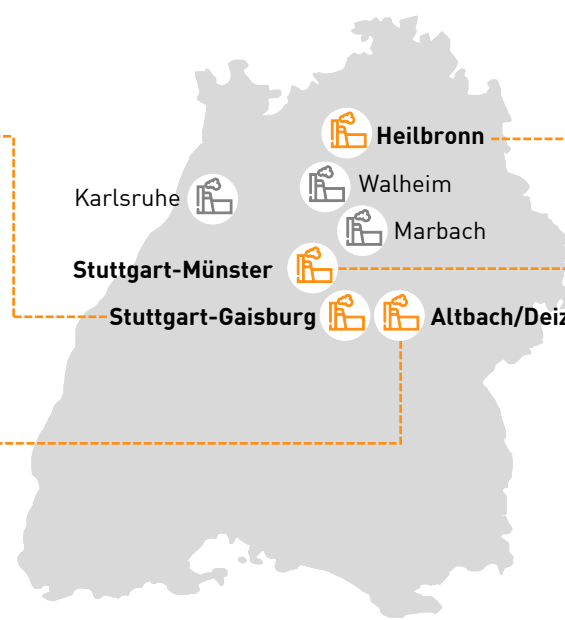
## Stuttgart Gaisburg

- CHP plant with 30 MW<sub>el</sub> and thermal output of ~30 MW
- Heating plant 175 MW
- Commissioning 2018



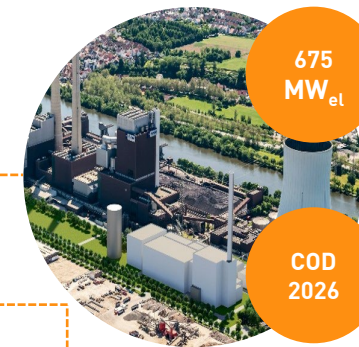
## Altbach/Deizisau

- CCGT plant with 665 MW<sub>el</sub> and up to 180 MW heat extraction  
Decommissioning of combined block HKW 2 with 401 MW<sub>el</sub>
- Commissioning 2026



## Heilbronn

- CCGT plant with 675 MW<sub>el</sub> and up to 190 MW heat extraction  
Decommissioning of coal block HLB7 with 778 MW<sub>el</sub>
- Commissioning 2026



## Stuttgart-Münster

- Gas turbine plant with 124 MW<sub>el</sub> and heat recovery steam generator  
Decommissioning of coal boilers and gas turbines
- Commissioning 2025



The fuel switch contributes to a balanced portfolio of renewable and dispatchable power and is in line with the EnBW climate neutrality target 2035. Taxonomy-compliance confirmed



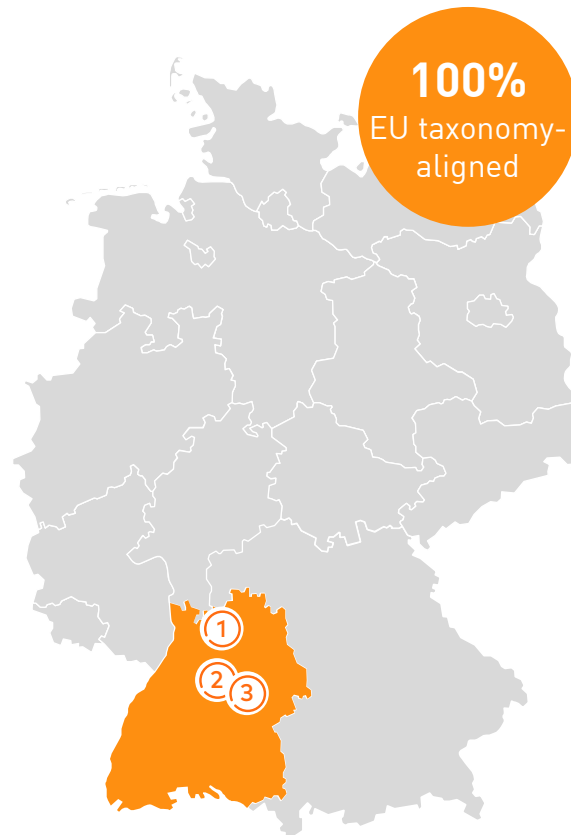
# Sustainable Generation Infrastructure: Fuel switch from coal to natural gas to climate neutral gases reduces CO<sub>2</sub>


## 3 major fuel switch projects from coal to natural gas


- FID March 2022
- Investment volume of €~1.6 bn


### Rationale for fuel switch

- Cuts carbon emissions immediately by 55%
- Dispatchable power CCGT plants pave the way to exit coal
- Driven by heat energy transition, priority on locations with integrated district heat provision
- Keeps locations economically viable and contributes to security of supply



①  **Heilbronn (CCGT plant, 675 MW)**  
COD expected 2026

②  **Stuttgart-Münster (GT plant, 124 MW)**  
COD expected 2025

③  **Altbach/Deizisau (CCGT plant, 665 MW)**  
COD expected 2026

### Fuel switch plants H<sub>2</sub>-ready

- Deployment of gas turbines allows admixture of 10% - 25% H<sub>2</sub> from the beginning
- Conversion to 100% H<sub>2</sub> combustion already reflected
- Operation with climate-neutral gases from beginning of 2030s



# Sustainable Generation Infrastructure: Expand biogas production

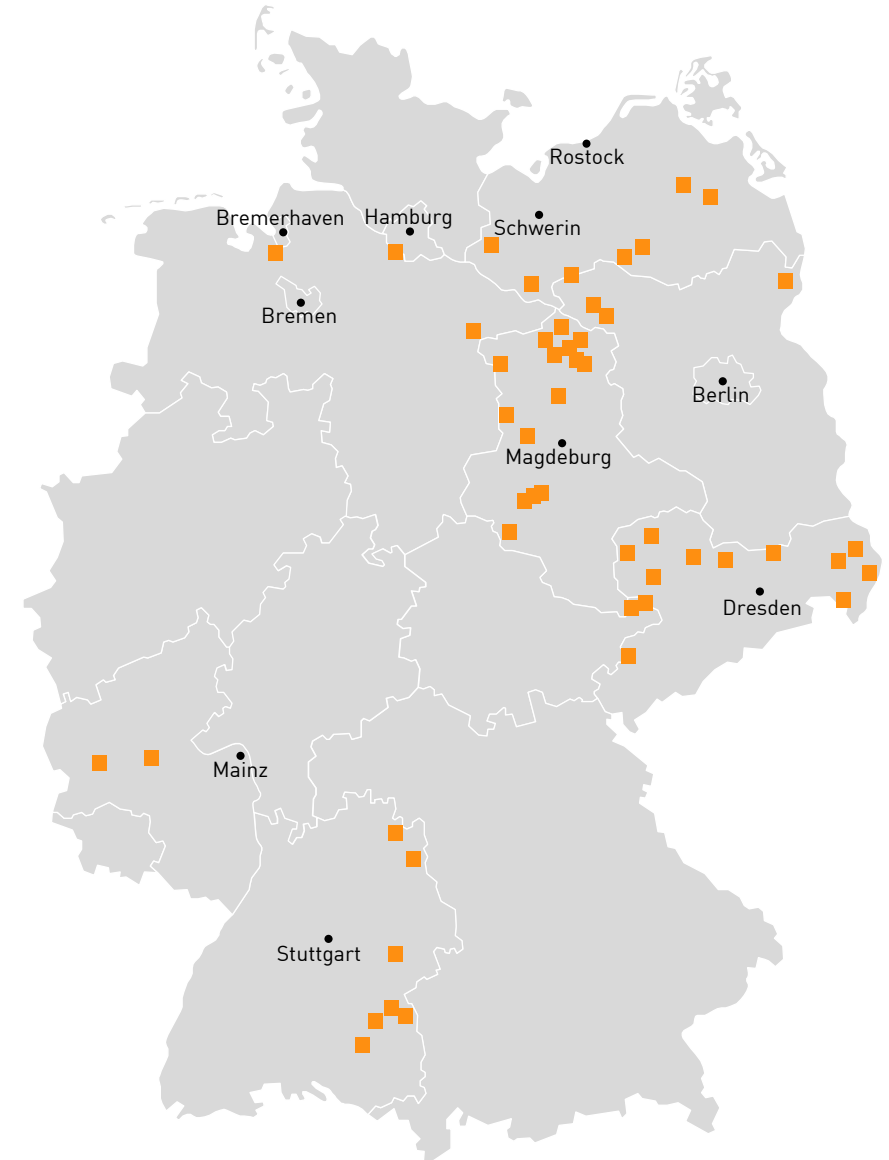
## Sustainable production of biogas, biomethane and Bio-LNG



- Strong growth in biogas plant portfolio from 10 MW rated thermal input in 2017 to 217 MW in 2022; further growth planned
- Options for site development and reuse safeguard plant asset value when subsidies expire, increasingly with upgrading of biogas to biomethane and future prospects for the CO<sub>2</sub> from the biogas installation to be used in industry
- EnBW to become market leader in biogas production in Germany



- Biogas and biomethane plant operators
- Investment in and further development of plant design proposals (BALANCE Erneuerbare Energien)
- Conventional biogas to electricity generation, such as combined heat and power
- Sale of proprietary biomethane quantities
- New markets: JV to produce bio-LNG near Berlin and Fulda by liquefying biomethane from the gas grid. Target market: Fuel for transport sector

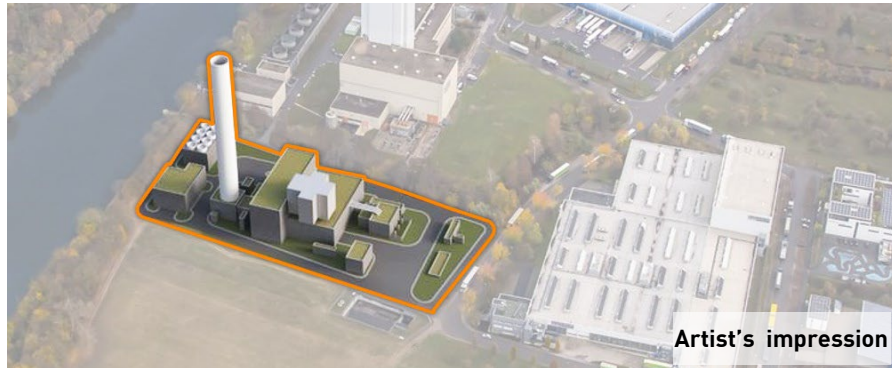




# Sustainable Generation Infrastructure: New-built gas turbine power plant for grid stability purposes

## Additional capacity needed for grid stability in South Germany

- In 2017, the federal regulatory agency approved 1.2 GW additional power generation capacity in southern Germany to maintain grid stability in the context of the energy transition
- August 2019: Award of contract for design and installation of 300 MW gas turbine power plant at existing EnBW site Marbach a.N.



## Timeline and next steps

- Construction works on site started mid 2020
- Delivery of the rotating equipment mid 2021
- Commercial operation originally planned for October 2022, due to pandemic consequences and transformer defect, delay expected until Q3 2024





# Sustainable Generation Infrastructure: Trading – adapting to energy market changes

## Diversified activities and managing market risks



- Buying and selling electricity and gas on wholesale markets from intraday to 10+ years
- Fuel procurement (including emissions) and logistics
- Dispatching of EnBW assets

- Origination activities for electricity and gas to substitute conventional generation assets by contracts
  - LNG trading activities
  - Renewables PPA business (e.g. intermediary for production and demand)
- Active in various markets
  - Targeted internationalization: Central Western Europe, Nordics and beyond (e.g. virtual PPA with Swedish industrial Rottneros AB for offshore Malarberget Windfarm in Sweden)

## Supporting the energy transition and decarbonization



### Partner for project developers and investors in managing market risks

- Tailored power purchase agreements for merchant renewables assets



### Offering carbon free electricity to corporates to reach their sustainability targets

- Corporate PPA and Power Sales Agreements based on renewable projects enable companies (large, medium or small) to realize their sustainability strategies and decarbonization efforts



### Direct marketing

- Marketing of renewable energy assets during and after their support period with various pricing models as market premium model, spot or fixed prices



### Management of merchant risks in own renewables capacity

- EnBW is considering PPAs for PV (e.g. Weesow Willmersdorf) and offshore wind projects (e.g. He Dreiht)
- Industry leading companies as offtakers: Bosch, Covestro, Evonik, Fraport, Salzgitter, DB



### Smart and digital

- Enhancement of automated trading and improved forecasting

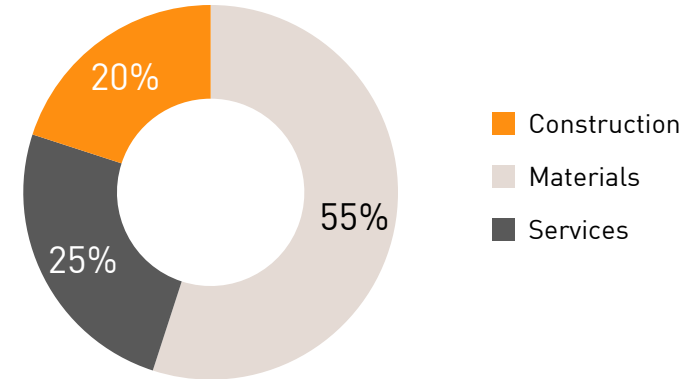


# Procurement sources facilities and equipment for the energy transition – a major and growing responsibility

## Breakdown by order volume 2022<sup>1</sup>

The continuous increase in materials procurement as a percentage of order volume reflects EnBW’s ambitious renewable energy expansion plans

EnBW procurement works together with suppliers to cut supply chain emissions and thus reduce the share of carbon emissions primarily caused by materials procurement (2022: 1.6 mt)<sup>1</sup>  
(EnBW total emissions by comparison: 75 mt CO<sub>2</sub>)



### Construction

#### Specifics

This very local market is the basis of the energy transition. In times of skills shortages, safeguarding construction activities is a strategic priority

#### EnBW procurement ...

... safeguards the implementation of the energy transition with close and long-term supplier relationships

### Materials

#### Specifics

Procurement above all of large-scale equipment for renewable energy generation and electrotechnical components for the distribution grid of the future

Securing the energy infrastructure of tomorrow together with outstanding engineering suppliers

#### EnBW procurement ...

... has vast supply chain expertise and contributes significantly to ensuring security of supply and the success of the energy transition

### Services

#### Specifics

Procurement of know-how and implementation power for the energy transition of the future

#### EnBW procurement ...

... makes sure that EnBW can draw on the best available skills

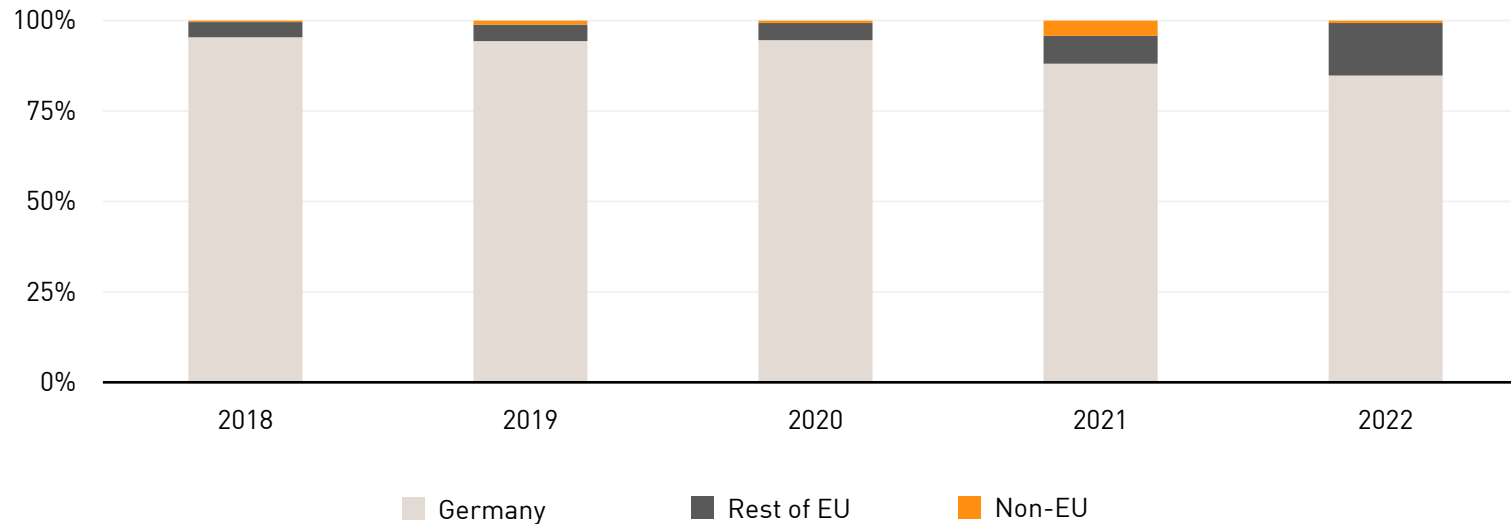
<sup>1</sup> Excluding coal and gas procurement



# Diversification of supply chains in a complex market environment

## Supplier origin

(by percentage of order volume)



Procurement works with some 13,000 suppliers from 62 countries

EnBW procurement is making supply chains increasingly international and diverse

- Risk mitigation
- Ensuring that the energy transition remains affordable



|  |     |
|--|-----|
| 1. EnBW at a glance .....                  | 2   |
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| 3. ESG .....                               | 20  |
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| 6. Key financials and non-financials ..... | 101 |
| 7. Market environment .....                | 114 |

- Financial management and strategy
- Financing instruments
- EnBW's bonds
- Sustainable finance activities
- Asset Liability Management Model
- Financial asset management
- Liquidity management
- EnBW share
- Ratings



# Financial management and strategy: EnBW has further diversified funding sources and broadened the investor base



## EnBW's financial objectives

- Flexible access to capital markets
- Well-diversified portfolio of financing sources
- Solid investment grade ratings
- Management of credit metrics by KPI debt repayment potential
- Close integration of corporate and financing strategy

**Long-term financing in the capital markets**  
**€~2.0 bn p.a.**



## EnBW's financing strategy

- Separate management of operating financing needs and long-term obligations
- Diversified market and investor approach
- Funding mix complemented by ESG linked instruments
- Well-balanced maturity profile
- Subordinated capital to support senior debt holders

## Successful financing activities in 2022 & 2023

- €500 m promissory notes across 3 - 10 years
- \$850 m equiv. US private placement in USD, GBP and EUR and 3 - 12 years
- €2.25 bn senior bond issuances (thereof €1.0 bn Green Bonds)
- €2.0 bn bilateral credit lines added, total of €7.4 bn<sup>1</sup>
- €600 m loan contract for He Dreiht signed with European Investment Bank
- €500 m loan with a consortium of banks secured by EIFO
- CHF410 m senior bond issuances

<sup>1</sup> Syndicated and bilateral bank lines available



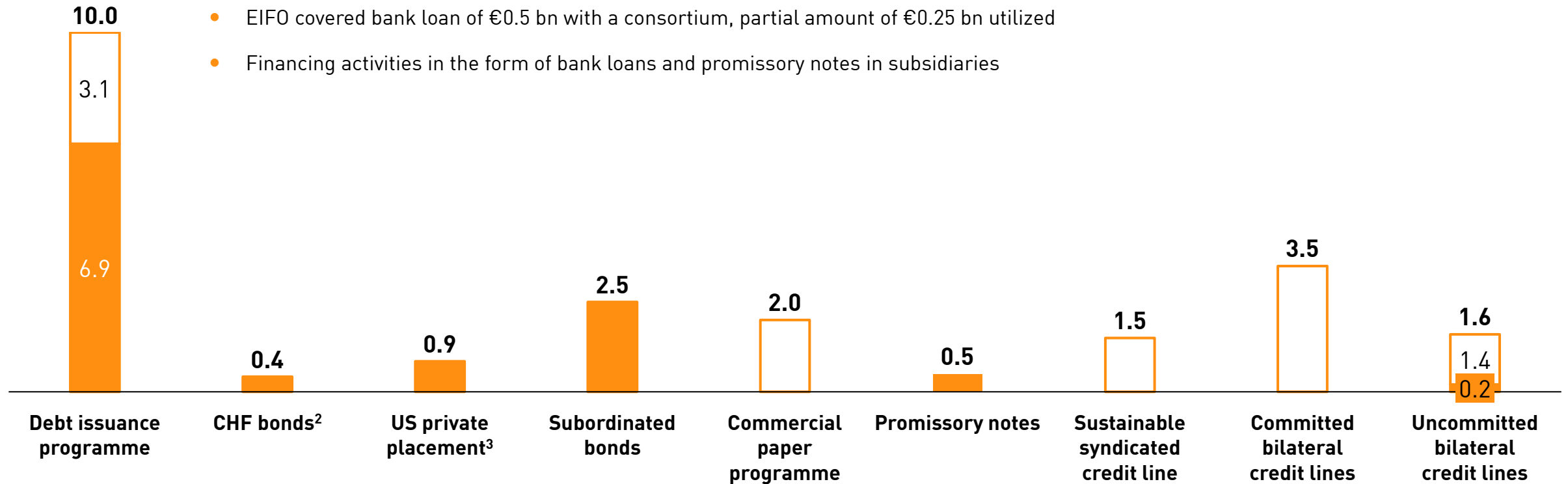
# EnBW has flexible access to various financing sources<sup>1</sup>

in € bn

## Other sources

- Project financing and EIB loans, including a €0.6 bn EIB loan to finance our He Dreiht offshore wind farm
- EIFO covered bank loan of €0.5 bn with a consortium, partial amount of €0.25 bn utilized
- Financing activities in the form of bank loans and promissory notes in subsidiaries

□ undrawn ■ utilized



Maturity date: 2027<sup>4</sup>

<sup>1</sup> Rounded figures as of 30 June 2023

<sup>2</sup> CHF 410 m, converted as of the reporting date of 30 June 2023


<sup>3</sup> Issued 9 November 2022; €860.95 m equivalent (€400 m, US\$270 m, £168 m, converted as of the reference date of 9 November 2022)

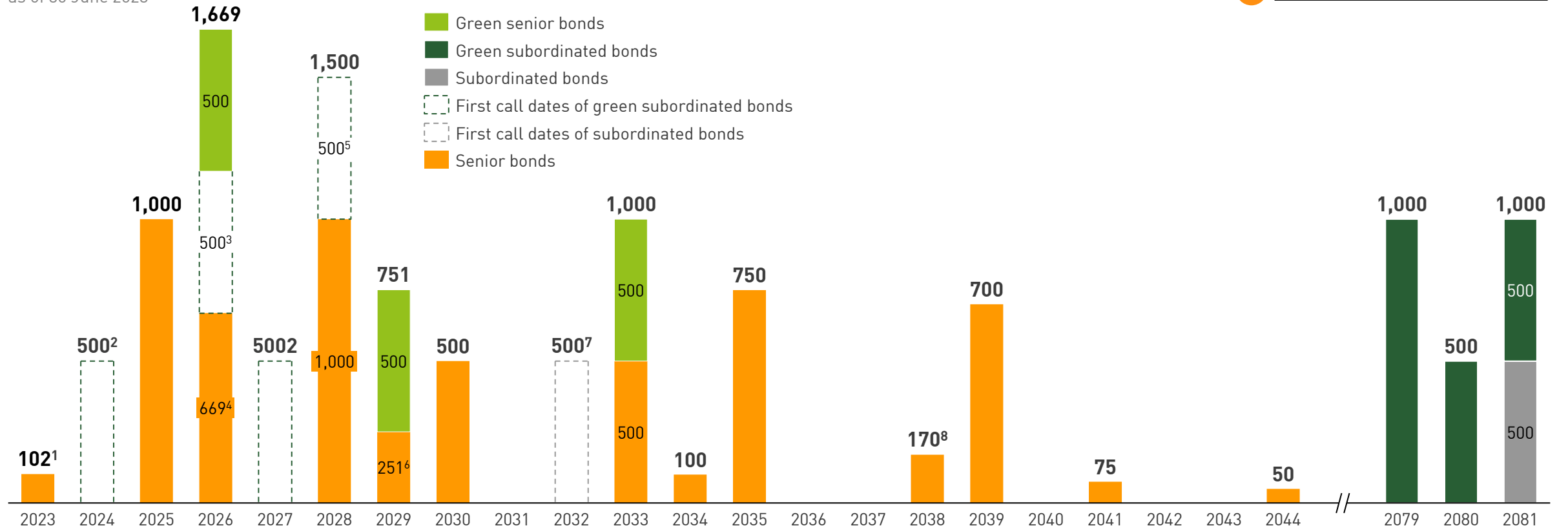
<sup>4</sup> Term until the end of June 2027 after exercise of the second extension option for a further year



# Maturities of EnBW's bonds

in € m  
as of 30 June 2023

 **Overview of EnBW's bonds**



<sup>1</sup> CHF 100 m, converted as of the reporting date of 30 June 2023

<sup>2</sup> First call date: green subordinated maturing in 2079

<sup>3</sup> First call date: green subordinated maturing in 2080

<sup>4</sup> Includes CHF 165 m, converted as of the reporting date of 30 June 2023

<sup>5</sup> First call date: green subordinated maturing in 2081

<sup>6</sup> CHF 245 m, converted as of the reporting date of 30 June 2023

<sup>7</sup> First call date: subordinated maturing in 2081

<sup>8</sup> JPY 20 bn (swap in €), coupon after swap 5.460



# Sustainable finance activities

## Green bonds

- **€3.5 bn green bonds**
- **Green senior bonds**
  - 2\* €500 m, total issue size €1 bn, November 2022
  - Issue size €500 m, October 2018
- **Four green subordinated bonds**  
First German green subordinated bond issuer
  - Issue size €500 m, August 2021
  - Issue size €500 m, June 2020
  - 2\* €500 m, total issue size €1 bn, July 2019

## Sustainable syndicated credit line

- **First sustainability-linked syndicated credit facility in June 2020**
  - Credit facility amount of €1.5 bn
  - Borrowing costs are reduced or increased according to target attainment on selected sustainability indicators:
    - CO<sub>2</sub> intensity
    - Share of renewables capacity
    - Grid supply reliability (SAIDI)

## Green promissory note

- **First green promissory note loan in February 2020**
  - Total volume of €100 m
  - Issued by our subsidiary VNG AG in four tranches

## EU taxonomy alignment

- **First mover: Publication of Taxonomy-aligned business activities in March 2021 as one of the first companies in Europe**
- **Activities examined for the EU Taxonomy Regulation**
  - 2021: E-mobility, electricity distribution/transmission grids, water grids/supply, onshore/offshore wind, solar, run-of-river, biomass, pumped storage
  - 2022: Additional activities such as gas  
Gas distribution/transmission grids, district heating, gas power generation, combined heat and power
- **Environmentally sustainable activities in 2022**
  - Revenue: 14%
  - Expanded capex
    - 83% taxonomy-aligned business activities
    - 99.9% taxonomy aligned of taxonomy eligible business activities
  - Opex: 23%
  - Adjusted EBITDA: 74%





# Allocation of EnBW's green bond proceeds

in ~%

## Renewable energy

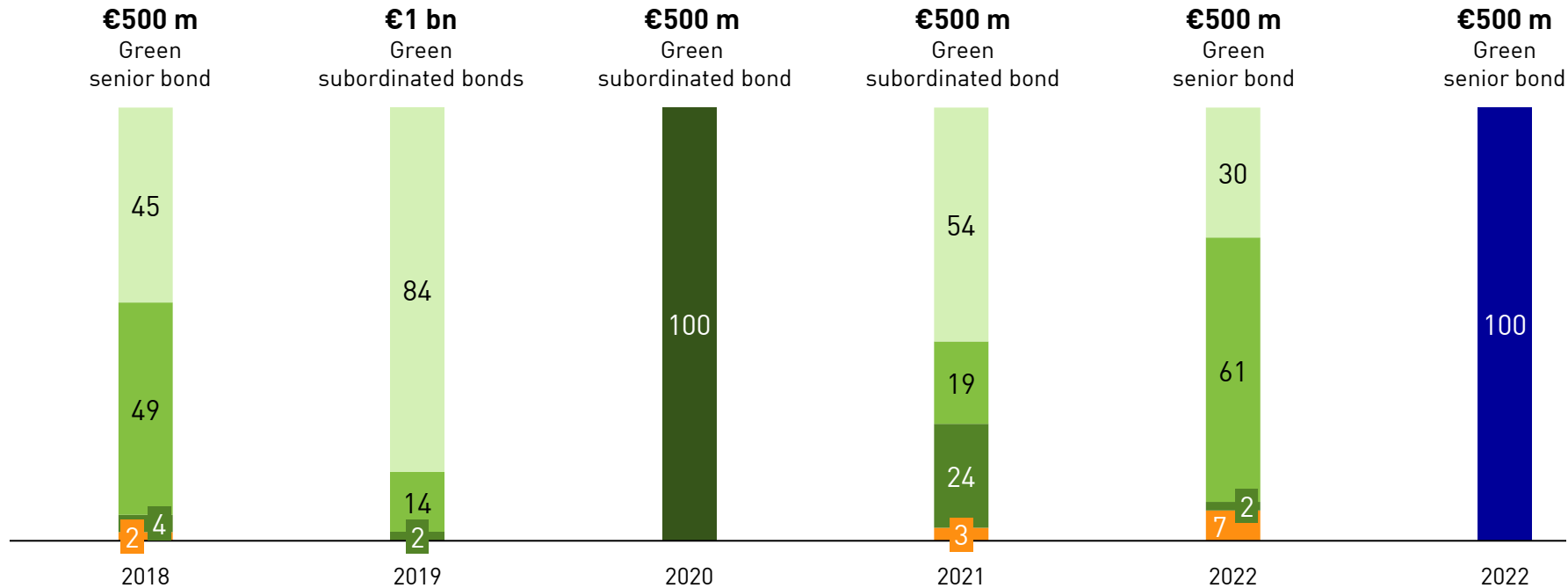
- Offshore
- Onshore
- PV
- Acquisition of Valeco

## Electricity grids

- Electricity distribution grids

## Clean transportation

- Charging infrastructure e-mobility



[Green Bond Impact Report 2022](#)



# Sustainability-linked syndicated credit facility increasing importance of sustainability for financial strategy

## EnBW's selected sustainability key performance indicators

- System-relevant social and environmental KPIs reinforce our 2025 strategy of becoming a sustainable and innovative infrastructure partner
- Borrowing costs are reduced or increased according to target attainment on selected sustainability indicators

## Margin adjustment mechanism

- ✓ Margin discount applies if at least 2 out of the 3 KPIs meet their achievement values
- ✗ Margin premium applies if at least 2 out of the 3 KPIs meet their non-achievement values
- No impact otherwise

| Target dimension  | Topic                           | Selected sustainability KPI                                 |
|---|---------------------------------|---|
|  <b>1. Environment</b>  | Climate protection              | CO <sub>2</sub> intensity in g/kWh                          |
|  <b>2. Environment</b> | Expansion of renewable energies | Share of renewable energies in the generation capacity in % |
|  <b>3. Society</b>     | Reliability of supply           | SAIDI Electricity in min./year                              |




## Illustrative scenarios

|              | 3 KPIs met | 2 KPIs met & 1 missed | 1 KPI met & 2 neither met nor met | 2 KPIs neither met nor met & 1 missed | 1 KPI met & 2 missed | 3 KPIs missed |
|--------------|------------|-----------------------|-----------------------------------|---------------------------------------|----------------------|---------------|
| <b>KPI 1</b> | ✓          | ✓                     | ✓                                 | -                                     | ✓                    | x             |
| <b>KPI 2</b> | ✓          | ✓                     | -                                 | -                                     | x                    | x             |
| <b>KPI 3</b> | ✓          | x                     | -                                 | x                                     | x                    | x             |
|              | Discount   | Discount              | No adjust.                        | No adjust.                            | Premium              | Premium       |



# EU taxonomy-aligned activities

## Activities examined for the EU taxonomy regulation

| <br><b>Smart Infrastructure for Customers</b> | <br><b>System Critical Infrastructure</b> | <br><b>Sustainable Generation Infrastructure</b>            |
|---|--|--|
|   | <ul style="list-style-type: none"> <li>Electricity distribution grids</li> <li>Electricity transmission grids</li> </ul>   | <ul style="list-style-type: none"> <li>Onshore wind</li> <li>Offshore wind</li> <li>Solar</li> <li>Run-of-river</li> </ul>                   |
| <ul style="list-style-type: none"> <li>E-mobility</li> </ul>  | <ul style="list-style-type: none"> <li>Water grids</li> <li>Water supply</li> </ul>  | <ul style="list-style-type: none"> <li>Biomass</li> <li>Pumped storage</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Gas distribution grids</li> <li>Gas transmission grids</li> </ul>                   | <ul style="list-style-type: none"> <li>District heating</li> <li>Electricity generation from gas</li> <li>Combined heat and power</li> </ul> |

2020  
 2021  
 2022

## Proportion of taxonomy-aligned economic activities of the EnBW Group

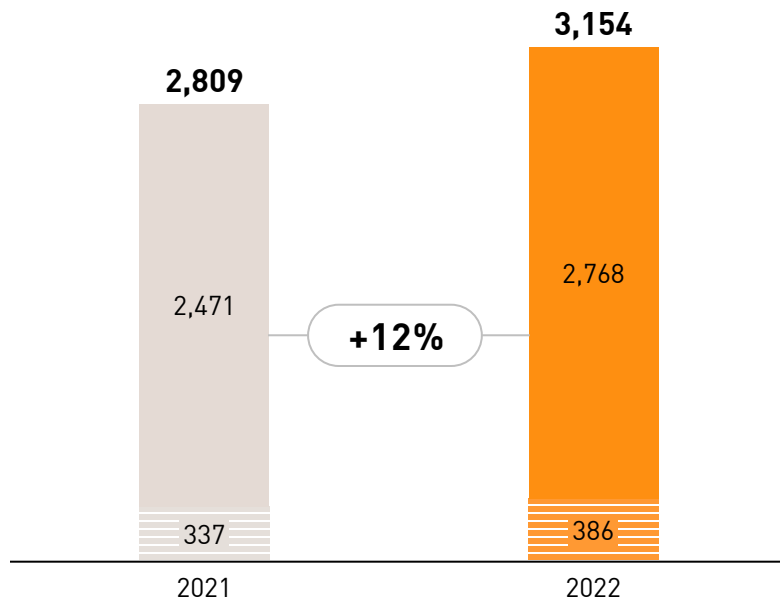
| in %  | 2022 | 2021 | 2020 |
|---|------|------|------|
| <b>Adjusted EBITDA</b>                                      | 73.7 | 62.6 | 68.0 |
| <b>Capex</b>  | 82.3 | 68.2 | 70.0 |
| <b>Expanded Capex</b> taxonomy-aligned                      | 82.8 | 71.2 | 70.0 |
| <b>Expanded Capex</b> taxonomy-aligned of taxonomy-eligible | 99.9 | 100  | 100  |
| <b>Revenue</b>  | 13.5 | 14.6 | 20.3 |
| <b>Opex</b>   | 22.9 | 29.3 | 37.1 |



# Investments focused on energy transition

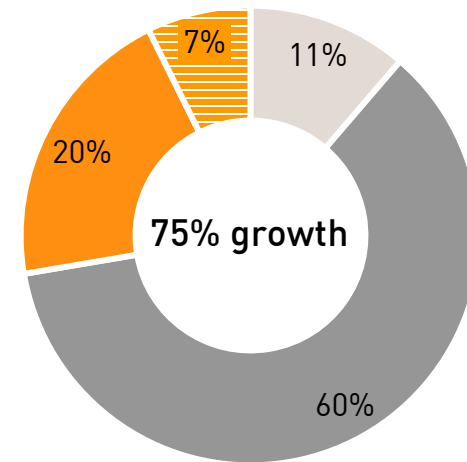
## Total investments

in € m



- Net cash investments
- Divestments

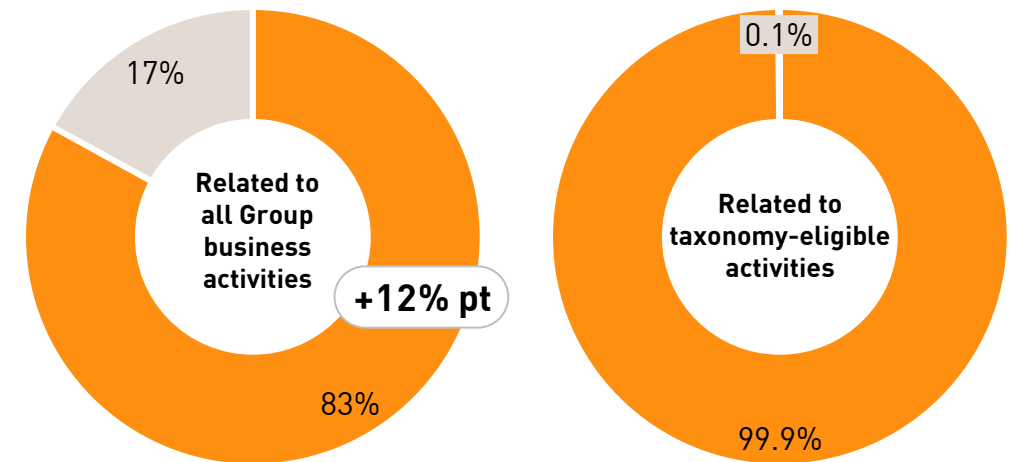
## Investment by segments<sup>1</sup>



- Sustainable Generation Infrastructure
- Smart Infrastructure for Customers
- System-Critical Infrastructure

## Taxonomy-aligned investments<sup>2</sup>

Expanded capex<sup>2</sup>



- EU taxonomy-aligned business activities

<sup>1</sup> May not add up to 100% due to others.

<sup>2</sup> For our taxonomy-compliant business activities, in addition to capex according to the EU taxonomy definition, we also report expanded capex including the share of companies accounted for using the equity method.



# EnBW's ambitious transition plan reflects all CSRD/ESRS elements

## ESRS E1-1 requirements<sup>1</sup>



## How EnBW implements ESRS E1-1 requirements



### GHG emission reduction targets

- Paris-aligned targets for 2035 with 1.5°C path for emissions approved by SBTi (Scope 1-2, Scope 3 well below 2°C)



### Decarbonization levers and key actions

- Renewables, coal power phase out, fuel switch coal to natural gas to carbon neutral gases/hydrogen, procuring green electricity



### Financial resources for implementing transition plan

- €14 bn of investments between 2023 and 2025



### Locked-in GHG emissions

- Fuel switch 2026, accelerated coal power phase out in 2028



### EU Taxonomy alignment

- EnBW wants to remain at a high capex level - expanded capex taxonomy-aligned in 2022: 83.0%, expanded capex taxonomy-aligned of taxonomy-eligible in 2022: 99.9%



### EU Paris-Aligned Benchmarks (PAB)

- EnBW's ambition is to meet the requirements of the PAB benchmarks in the medium-term following EnBW's accelerated coal exit



### Alignment with overall business strategy

- Sustainability an integral component of EnBW strategy since 2012



### Update on progress in implementing transition plan

- EnBW monitors and reports progress annually

<sup>1</sup> Draft European Sustainability Reporting Standard (ESRS) E1-1, EFRAG, November 2022

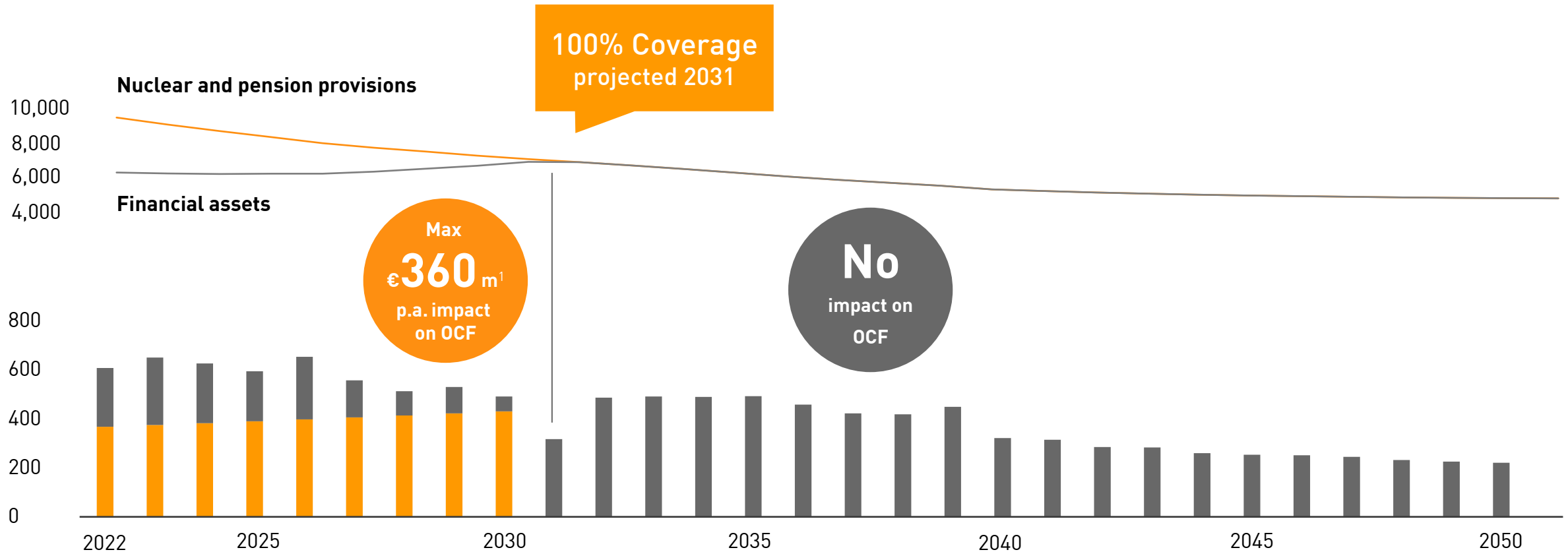


# Asset Liability Management Model

## Management of financing needs for pension and nuclear obligations

### EnBW's cash flow-based model

in € m



As of 30 June 2022

<sup>1</sup> Adjusted for inflation

OCF: Operating cash flow



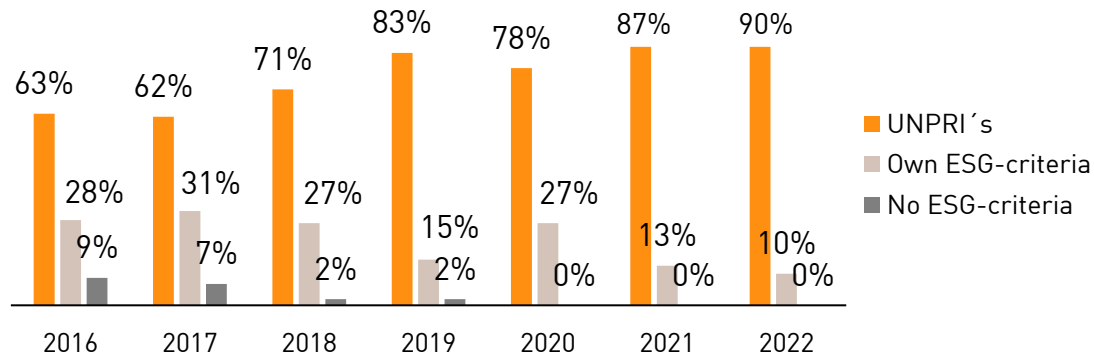
# Financial asset management: Providing for group pension and nuclear provisions while meeting ESG criteria

## Investment targets



- Risk-optimized investments with performance in line with market trends
- Comply with the framework given by EnBW's Asset Liability Management Model

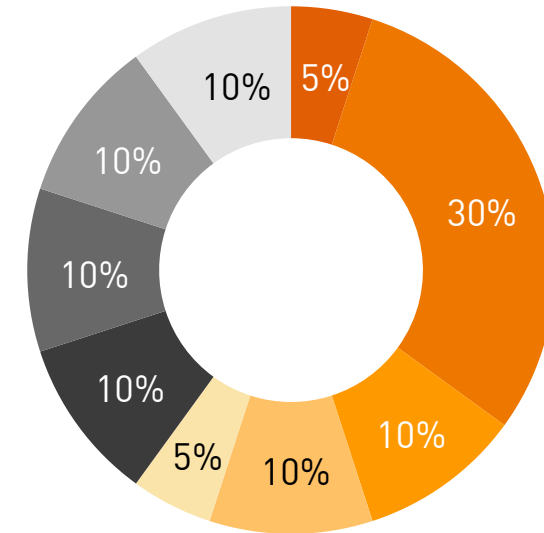
## Rising number of EnBW's asset managers incorporate ESG criteria in their investment decisions



ESG criteria are linked to EnBW's overall UN-SDG strategy:

- Improvements in climate protection
- Risk minimization through the governance factor (e.g. reputation, fraud, corruption)
- Ensure diversity to avoid undesired risk concentration

## Strategic asset allocation



- Euro government bonds
- Euro corporate bonds investment grade
- Euro corporate bonds high yield
- USD corporate bonds investment grade
- Equities Eurozone
- Global Equities
- Real Estate
- Private equity
- Infrastructure



# Financial asset management: ESG progress and integration

## ESG score overall versus benchmark

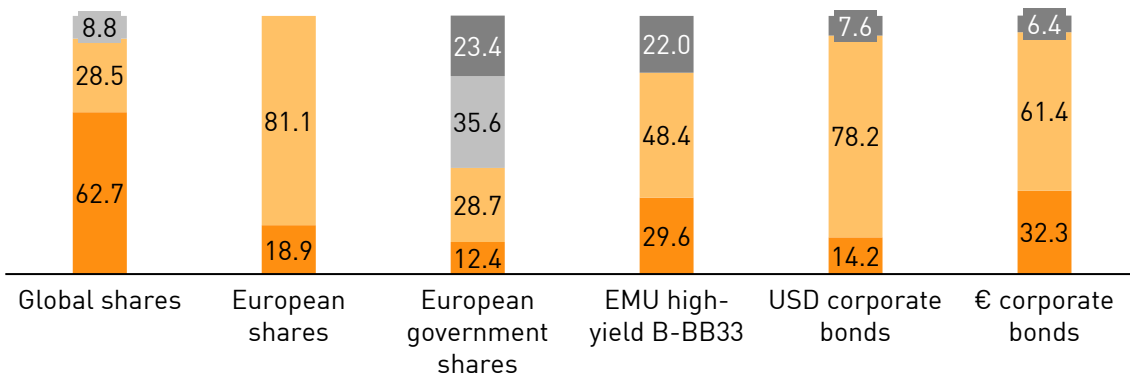
by asset class

2022 survey of the mandated asset managers and strategies with regard to ESG data in the area of liquid assets

- ~31% of the strategies have a better ESG score than the reference figure (based on the evaluation carried out and extrapolation to the entire portfolio)
- ~56% are at benchmark level, a total of almost 87% of the EnBW portfolio is at or above the benchmark from an aggregated ESG perspective (based on ESG data)

Starting in 2022, EnBW's ESG philosophy increasingly applied in mandated portfolios

- Improvement in data availability and relative ESG positioning expected in 2023
  - Managers are placing stronger focus on ESG
  - EnBW's ESG strategy will be further intensified



As of 30 June 2023

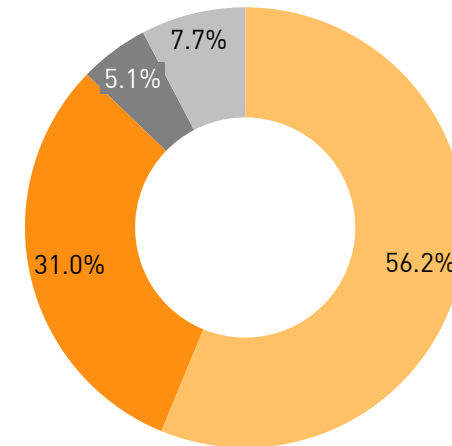
■ No data  
■ Lower than benchmark range

## Relative governance score versus benchmark

EnBW portfolio

Governance (the "G" in ESG) plays an important role in EnBW's ESG philosophy

- Particular focus of mandated asset managers
- ~31% of the managers are ahead of the benchmark, 55% are within the benchmark range and only 7% miss the benchmark G score (evaluating the individual strategies in terms of the relative governance score)



■ Score in benchmark range (±5%)  
■ Higher than benchmark range





# Liquidity management at EnBW: Risk-based approach to allow efficient and forward-looking financing decisions

## Integrated planning process

- System-based inhouse bank approach (“EnBW cash pool”)
- Defined group of liquidity drivers represents all relevant EnBW activities
- Subsidiaries without stand-alone financing included
- Integrated view on historical and planning data

**Efficient inhouse bank approach to cover all liquidity needs**

## Rolling time horizon and risk based

- 12 months rolling time horizon with daily forecast for the first 3 months a monthly forecast for the following 9 months
- Secured CFs for most of the liquidity drivers
- Risk based approach for certain liquidity drivers
- Risk assessment with focus on working capital movements
- Scenario analysis complementing risk-based approach

**Combination of expected and unexpected cash flows**



## Funding

- Different type of funding sources for specified time periods (cash, bank lines, etc.)
- Calculation of short term (1 and 7 days) and medium term (3 and 12 months) liquidity based on current account balance
- Consumption ratio for cumulative time periods (needs vs. sources)
- Escalation mechanism implemented

**Entire short term and long term funding basis**



|   |                  | 2022    | 2021    | 2020    | 2019    | 2018    |
|---|------------------|---------|---------|---------|---------|---------|
| <b>Annual high</b>  | €                | 119.50  | 85.40   | 58.00   | 61.00   | 34.00   |
| <b>Annual low</b>   | €                | 64.60   | 55.00   | 32.00   | 29.00   | 25.40   |
| <b>Closing price</b>  | €                | 87.00   | 76.00   | 56.00   | 50.50   | 29.20   |
| <b>Number of shares outstanding as of 31 December<sup>2</sup></b> | Thousand shares  | 270,855 | 270,855 | 270,855 | 270,855 | 270,855 |
| <b>Market capitalisation as of 31 December<sup>2</sup></b>        | € bn             | 24.1    | 21.0    | 15.2    | 13.7    | 7.8     |
| <b>Stock exchange trade (total)</b>                               | Number of shares | 104,490 | 108,231 | 152,206 | 106,543 | 86,190  |
| <b>Stock exchange trade (daily average)</b>                       | Number of shares | 410     | 447     | 611     | 424     | 435     |
| <b>Earnings per share from Group net profit/loss</b>              | €                | 6.42    | 1.34    | 2.20    | 2.71    | 1.23    |
| <b>Dividend distribution<sup>3</sup></b>                          | € m              | 297.9   | 298     | 271     | 190     | 176     |
| <b>Dividend per share</b>   | €                | 1.10    | 1.10    | 1.00    | 0.70    | 0.65    |

## Stock exchange information

|                                    |  |
|------------------------------------|--|
| <b>ISIN no.</b>                    | DE0005220008   |
| <b>Share identification no.</b>    | 522000   |
| <b>Stock exchange abbreviation</b> | Bloomberg: EBK GY<br>Reuters: EBKG.DE  |
| <b>Transparency level</b>          | General standard   |
| <b>Index</b>                       | DAXsector All Utilities  |
| <b>Number of shares</b>            | 276,604,704 no par value shares (voting shares)  |
| <b>Markets</b>                     | Listed on the stock exchanges in Frankfurt a. M. and Stuttgart in the regulated market |

## Shareholder structure<sup>4</sup>

|   | MOODY'S<br>INVESTORS SERVICE | S&P Global<br>Ratings | %            |
|---|------------------------------|-----------------------|--------------|
| <b>Federal state of Baden-Wuerttemberg<sup>5</sup></b>  | Aaa stable                   | AA+ positive          | <b>46.75</b> |
| <b>OEW Energie-Beteiligungs GmbH<sup>6</sup></b>        |                              |                       | <b>46.75</b> |
| <b>Municipal shareholders' associations<sup>7</sup></b> |                              |                       | <b>4.05</b>  |
| <b>EnBW Energie Baden-Württemberg AG</b>                |                              |                       | <b>2.08</b>  |
| <b>Other shareholders</b>                               |                              |                       | <b>0.39</b>  |

<sup>1</sup> Share value based on closing price trading the EnBW share in XETRA

<sup>2</sup> Total number of shares: 276,604,704 million shares

<sup>3</sup> Distribution in terms of shares entitled as of year-end

<sup>4</sup> May not add up to 100% due to rounding; figures as of 30 June 2023

<sup>5</sup> Indirectly held by NECKARPRI-Beteiligungsgesellschaft mbH

<sup>6</sup> 100% subsidiary of Zweckverband Oberschwäbische Elektrizitätswerke which is an association of 9 districts

<sup>7</sup> Badische Energieaktionärs-Vereinigung (BEV) 2.45%; Gemeindeelektrizitätsverband Schwarzwald-Donau (G.S.D.) 0.97%; Neckar-Elektrizitätsverband (NEV) 0.63%

Capital stock: € 708,108,042.24, divided into 276,604,704 no par value bearer shares with an imputed value of € 2.56 each



# Fixed income: Credit ratings

MOODY'S  
INVESTORS SERVICE

**Baa1** / stable  
Latest update  
6 January 2023

- Leadership position as vertically integrated utility within Baden-Württemberg
- High share of regulated earnings (transmission and distribution grid)
- Growing share of renewable assets under contracts
- Track record of measures to defend credit quality
- Supportive stance of shareholders
- 2022 EBITDA limited by its exposure to Russian gas supply
- Continued evolution of generation markets
- Execution risks from a large capital spending programme, which will constrain credit metrics
- Increasingly competitive environment for renewable assets
- Stable rating outlook reflects expectation that EnBW will record solid earnings growth in 2023-24 and maintain a prudent financial policy

S&P Global  
Ratings

**A-** / stable  
Latest update  
30 March 2023

- EnBW's diversified and integrated position should continue to prove it is more resilient than non-integrated peers to changing conditions
- High share of regulated EBITDA and expanding share of renewable generation provides predictability to earnings and cash flow
- Investment strategy with focus on regulated infrastructure and renewable capacity deployment provides a long-term earnings base
- Financial policy, including shareholder support, geared toward protecting the 'A-' rating
- EnBW is expected to post exceptionally robust credit metrics over the next two to three years, mostly because of locked-in margins at its power generation and trading business, despite the implementation of windfall taxes on its submarginal generation, which mitigates S&P's previous concerns about pressure on the credit metrics



# Major sustainability ratings



CDP<sup>1</sup>

Climate Rating

Status quo

B

Management



Sustainalytics<sup>2</sup>

ESG Risk Rating

28.5

Medium Risk



ISS ESG<sup>3</sup>

ESG Rating

B

Prime Status



MSCI<sup>4</sup>

ESG Rating

A

Average

<sup>1</sup> CDP Scale: A to D (Leadership A/A-; Management B/B-; Awareness C/C-; Disclosure D/D-; Failure F)

<sup>2</sup> Sustainalytics Scale: 0 to 40+ (Risk Score: negligible (0-10); low (10-20); medium (20-30); high (30-40); severe (40+))

<sup>3</sup> ISS ESG Scale: A+ to D- (absolute best-in-class basis; Prime Status awarded)

<sup>4</sup> MSCI Scale: AAA to CCC (Leader AAA – AA; Average A – BB, Laggard B – CCC)



|  |     |
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- Financial and non-financial KPIs and targets 2025
- First six months 2023
- Fiscal year 2022
- Multi-year overview



# Financial and non-financial KPIs and targets: Finance and strategy dimensions

| Dimension  | KPI   | 2022       | Forecast 2023       | Target 2025            |
|--|---|------------|---------------------|------------------------|
| <b>Finance</b>   |   |            |                     |                        |
| Securing profitability   | Adjusted EBITDA in € bn                         | 3.3        | 4.7 – 5.2           | 3.2                    |
| Managing the financial profile   | Debt repayment potential in %                   | 23.4       | 18 - 21             | >12 <sup>1</sup>       |
| Increasing Group value   | ROCE in %                                       | 7.9        | -                   | - <sup>2</sup>         |
|  | Value spread in %                               | 1.1        | 2.5 - 3.5           | 0.5 – 1.5 <sup>2</sup> |
| <b>Strategy<sup>3</sup></b>  |   |            |                     |                        |
| Share of result accounted for by Smart Infrastructure for Customers    | Share of overall adjusted EBITDA in € bn / in % | 0.5 / 15.5 | 0.4 - 0.5 / 5 -15   | 0.6 / 20.0             |
| Share of result accounted for by System-Critical Infrastructure        | Share of overall adjusted EBITDA in € bn / in % | 1.0 / 31.8 | 1.6 - 1.9 / 30 - 45 | 1.3 / 40.0             |
| Share of result accounted for by Sustainable Generation Infrastructure | Share of overall adjusted EBITDA in € bn / in % | 1.9 / 58.9 | 2.9 – 3.2 / 55 - 70 | 1.3 / 40.0             |

<sup>1</sup> Following the transition to the growth strategy, internal financing capability was replaced by the new key performance indicator debt repayment potential from 2021 onwards. To achieve the unchanged goal of maintaining solid investment-grade ratings, EnBW regularly checks the 2025 target value for the debt repayment potential for managing its financial profile.

<sup>2</sup> We use value spread to measure the increase in the value of the company from 2022 onwards. This performance indicator is more meaningful and is independent of external market influences making it easier to control. It will also improve the comparability of the data. ROCE has thus been replaced by the new key performance indicator value spread.

<sup>3</sup> The sum of the three segments does not correspond to the adjusted EBITDA for the EnBW Group. €-205.3 m [-6.2%] is attributable to Other/Consolidation in the 2022 financial year.



# Financial and non-financial KPIs and targets: Other dimensions

| Dimension                      | KPI  | 2022       | Forecast 2023             | Target 2025  |
|--------------------------------|--|------------|---------------------------|--|
| <b>Customers and society</b>   |  |            |                           |  |
| Reputation                     | Reputation Index   | 58         | 57 - 60                   | 58 - 62  |
| Customer proximity             | EnBW / Yello Customer Satisfaction Index   | 139 / 166  | 127 - 139 / 150 - 161     | 125 - 136 / 148 - 159                              |
| Supply reliability             | SAIDI Electricity in min. / year   | 16.6       | 15 - 20                   | <20  |
| <b>Employees</b>               |  |            |                           |  |
| Employee engagement            | People Engagement Index (PEI) <sup>1</sup>   | 81         | ≥78                       | 77 - 83 <sup>2</sup>                               |
| Occupational safety            | LTIF for companies controlled by the Group <sup>3,4</sup>                                      | 2.6        | 2.1 - 2.3                 | 2.1  |
|                                | LTIF overall <sup>3</sup>  | 4.1        | 3.5 - 3.7                 | 3.5  |
| <b>Environment</b>             |  |            |                           |  |
| Expand renewable energies (RE) | Installed output of RE in GW and the share of the generation capacity accounted for by RE in % | 5.4 / 41.7 | 5.8 - 6.0 / 47.0 - 48.0   | 6.5 - 7.5 / >50                                    |
| Climate protection             | CO <sub>2</sub> intensity in g/kWh <sup>5</sup>  | 491        | -10% to -25% <sup>6</sup> | -15% to -30% <sup>7</sup><br>(reference year 2018) |

LTIF: Lost Time Injury Frequency    SAIDI: System Average Interruption Duration Index

<sup>1</sup> Variations in the group of consolidated companies (all companies with more than 100 employees are generally included [except ITOs]).

Companies that were fully consolidated for the first time in the fourth quarter of 2022 were not included in the employee surveys for the PEI.

<sup>2</sup> Due to the extraordinary effects relating to COVID-19 in the year this key performance indicator was introduced, we may need to adjust this target value during the strategy period.

<sup>3</sup> Variations in the group of consolidated companies (all companies with more than 100 employees, excluding external agency workers and contractors, are included). Companies that were fully consolidated for the first time during the 2022 financial year were not included in the calculations for the LTIF performance indicators.

<sup>4</sup> Excluding companies in the area of waste management

<sup>5</sup> The calculation method for the key performance indicator CO<sub>2</sub> intensity will be restricted in future to include only factors that can be controlled by the company. The calculation of the ratio does not include the share of positive redispatch and nuclear generation that cannot be influenced by EnBW. If the share of positive redispatch that cannot be influenced is taken into account, the CO<sub>2</sub> intensity for the reporting year would be 508 g/kWh (previous year: 492 g/kWh). The CO<sub>2</sub> intensity including nuclear power generation for the reporting year was 401 g/kWh (previous year: 386 g/kWh).

<sup>6</sup> We now expect CO<sub>2</sub> intensity to fall more sharply than our originally forecasted range for 2023 and anticipate that the CO<sub>2</sub> intensity for the whole of 2023 will decrease by between 10% and 25% in comparison to 2022.

<sup>7</sup> The reference year is 2018 because the 2020 reporting year cannot be considered representative for the coming years (due, among other things, to market effects and COVID-19).



# Environmental targets

| Dimension  | KPI  | 2022       | 2021       | Target 2025               |
|--|--|------------|------------|---------------------------|
| Expand renewable energies (RE)   | <b>TOP</b> installed RE capacity in GW and share of RE in generation capacity in % | 5.4 / 41.7 | 5.1 / 40.1 | 6.5 to 7.5 / > 50         |
| Implement climate protection / reduction potential of greenhouse gases | <b>TOP</b> CO <sub>2</sub> -intensity in g/kWh <sup>1</sup>                        | 491        | 478        | -15% to -30% <sup>2</sup> |
| Reduction of pollutant emissions                                       | SO <sub>2</sub> -intensity in mg/kWh   | 259        | 233        | -15% to -25% <sup>2</sup> |
|  | NO <sub>x</sub> -intensity in mg/kWh   | 286        | 269        | -10% to -20% <sup>2</sup> |

<sup>1</sup> The calculation for this performance indicator does not include nuclear generation and the share of positive redispatch that cannot be controlled by EnBW.

<sup>2</sup> Base year 2018





# First six months 2023: Financial key performance figures

## Financial and strategic performance indicators

|  |     | 1.1. – 30.6.2023 | 1.1. – 30.6.2022 | Change in % |
|--|-----|------------------|------------------|-------------|
| Adjusted EBITDA <sup>1</sup>   | € m | 3,498.3          | 2,123.9          | 64.7        |
| Share of adjusted EBITDA accounted for by Smart Infrastructure for Customers <sup>1</sup>    | € m | 20.9             | 103.1            | -79.7       |
|  | %   | 0.6              | 4.9              | -           |
| Share of adjusted EBITDA accounted for by System-Critical Infrastructure <sup>1</sup>        | € m | 1,021.2          | 599.5            | 70.3        |
|  | %   | 29.2             | 28.2             | -           |
| Share of adjusted EBITDA accounted for by Sustainable Generation Infrastructure <sup>1</sup> | € m | 2,607.0          | 1,551.5          | 68.0        |
|  | %   | 74.5             | 73.0             | -           |
| Share of adjusted EBITDA accounted for by Other/Consolidation                                | € m | -150.8           | -130.2           | -15.8       |
|  | %   | -4.3             | -6.1             | -           |
| Adjusted Group net profit <sup>1,2</sup>   | € m | 1,653.4          | 806.1            | 105.1       |
| Group net profit <sup>2</sup>  | € m | 2,525.8          | 563.9            | -           |
| Earnings per share from Group net profit <sup>2</sup>  | €   | 9.33             | 2.08             | -           |
| Retained cash flow <sup>1</sup>  | € m | 2,238.0          | 1,451.6          | 54.2        |
| Net cash investment  | € m | 1,602.3          | 1,092.9          | 46.6        |

<sup>1</sup> Previous year's figures restated

<sup>2</sup> Attributable to the shareholders of EnBW AG



# First six months 2023: Non-financial performance indicators<sup>1</sup>

## Customers and society dimension

|  | 1.1. – 30.6.2023 | 1.1. – 30.6.2022 | Change in % |
|--|------------------|------------------|-------------|
| EnBW/Yello Customer Satisfaction Index | 127 / 170        | 139 / 166        | -8.6 / 2.4  |
| SAIDI (electricity) in min./year       | 5.6              | 9.2              | -39.1       |

## Employees dimension

|  |           |           |               |
|--|-----------|-----------|---------------|
| LTIF for companies controlled by the group <sup>2,3</sup> /LTIF overall <sup>2</sup> | 2.2 / 3.1 | 2.6 / 3.7 | -15.4 / -16.2 |
|--|-----------|-----------|---------------|

## Employees EnBW Group<sup>4,5</sup>

|                                   |        |        |     |
|-----------------------------------|--------|--------|-----|
| Employees                         | 27,575 | 26,312 | 4.8 |
| Employee equivalents <sup>6</sup> | 25,932 | 24,710 | 4.9 |

LTIF: Lost Time Injury Frequency    SAIDI: System Average Interruption Duration Index

<sup>1</sup> The values for the key performance indicators Reputation Index, People Engagement Index (PEI)

“Installed capacity of renewable energies (RE) in GW and the share of the generation capacity accounted for by RE in %” and CO<sub>2</sub> intensity are exclusively collected at the end of the year

<sup>2</sup> Variations in the group of consolidated companies (all companies with more than 100 employees are generally included except external agency workers and contractors).

<sup>3</sup> Companies fully consolidated for the first time in the course of the respective financial year are not included in the LTIF figures. Except for companies in the area of waste management.

<sup>4</sup> Number of employees excluding apprentices/trainees and inactive employees.

<sup>5</sup> The number of employees for the ITOs (ONTRAS Gastransport, terranets bw and TransnetBW) is only updated at the end of the year; for intervals of less than a year, the number of employees from 31 December 2022 is carried forward.

<sup>6</sup> Converted into full-time equivalents



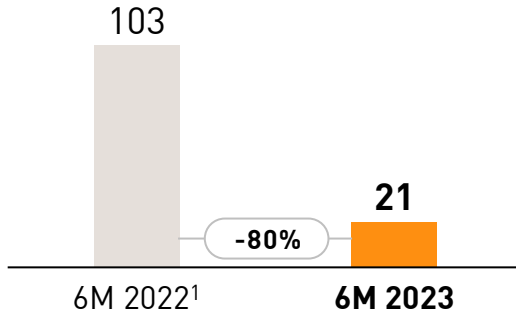
# First six months 2023: Adjusted EBITDA



## Smart Infrastructure for Customers

### Adjusted EBITDA

in € m



#### Customer business

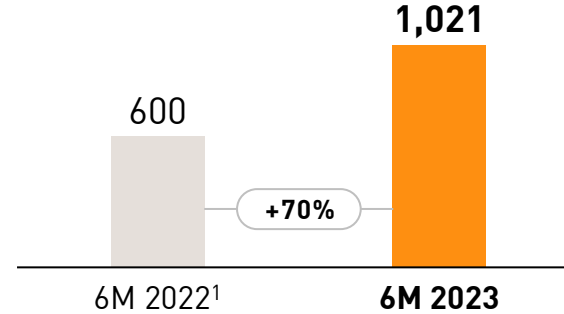
- Charges of €251 m from deconsolidation of an indirect gas supply company and associated write-downs of receivables
- Lower gas sales volumes due to milder weather and savings behavior (B2C -5%; B2B -30%)
- Lower seasonality in procurement prices than in the previous year
- Churn rates in electricity and gas sales below previous year's level



## System-Critical Infrastructure

### Adjusted EBITDA

in € m

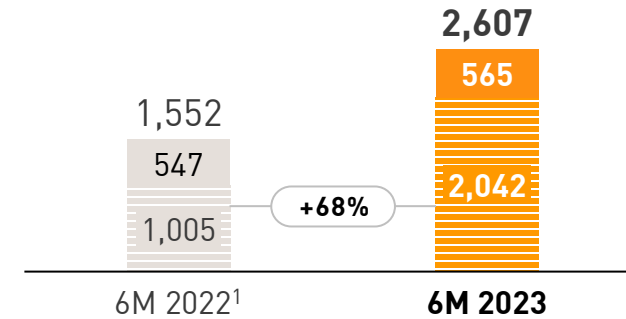


#### Transmission and distribution grids

- Significant growth in revenues from grid usage as a result of increased investments in grid expansion
- Higher grid usage revenue compared with 2022 due to higher revenue caps in 2023, as the planned expenses for grid reserve and redispatch in 2023 are fully priced into the revenue cap



## Sustainable Generation Infrastructure



#### Renewable Energies

- Positive earnings trend for run-of-river electricity generation
- 200 MW expansion of wind farms and photovoltaics portfolio
- Falling prices in the direct marketing of volumes generated from wind and photovoltaic

#### Thermal Generation and Trading

- Significantly higher prices for generation sold in advance
- Negative effects from the curtailment and termination of gas supplies in 2022 as a result of the Russia-Ukraine war no longer apply
- Less electricity produced at nuclear power station GKN II due to final shutdown as of 15 April 2023

<sup>1</sup> Previous year's figures restated



# Fiscal year 2022: Financial key performance figures

## Financial and strategic performance indicators

|  |          | 2022            | 2021            | Change in % |
|--|----------|-----------------|-----------------|-------------|
| <b>TOP</b> Adjusted EBITDA   | € m      | 3,285.7         | 2,959.3         | 11.0        |
| <b>TOP</b> Share of adjusted EBITDA accounted for by Smart Infrastructure for Customers    | € m<br>% | 510.2<br>15.5   | 344.0<br>11.6   | 48.3<br>-   |
| <b>TOP</b> Share of adjusted EBITDA accounted for by System-Critical Infrastructure        | € m<br>% | 1,046.0<br>31.8 | 1,263.0<br>42.7 | -17.2<br>-  |
| <b>TOP</b> Share of adjusted EBITDA accounted for by Sustainable Generation Infrastructure | € m<br>% | 1,934.8<br>58.9 | 1,539.7<br>52.0 | 25.7<br>-   |
| Share of adjusted EBITDA accounted for by Other/Consolidation                              | € m<br>% | -205.3<br>-6.2  | -187.4<br>-6.3  | 9.6<br>-    |
| Adjusted Group net profit <sup>1</sup>   | € m      | 972.6           | 1,203.2         | -19.2       |
| Group net profit <sup>1</sup>  | € m      | 1,738.0         | 363.2           | -           |
| Earnings per share from Group net profit <sup>1</sup>                                      | €        | 6.42            | 1.34            | -           |
| <b>TOP</b> Debt repayment potential  | %        | 23.4            | 17.2            | -           |
| <b>TOP</b> Return On Capital Employed (ROCE)   | %        | 7.9             | 6.9             | -           |

## External revenue / adjusted EBITDA accounted for by coal-fired generation

|   |     | 2022     |
|---|-----|----------|
| External revenue accounted for by coal-fired generation | %   | < 5      |
| External revenue  | € m | 56,002.6 |
| Adjusted EBITDA accounted for by coal-fired generation  | %   | < 5      |
| Adjusted EBITDA   | € m | 3,285.7  |

<sup>1</sup> In relation to the profit/loss attributable to the shareholders of EnBW AG.



# Fiscal year 2022: Non-financial key performance figures

## Customers and society goal dimension

|   | 2022      | 2021      | Change in % |
|---|-----------|-----------|-------------|
| <b>TOP</b> Reputation Index                       | 58        | 55        | 5.5         |
| <b>TOP</b> EnBW/Yello Customer Satisfaction Index | 139 / 166 | 127 / 159 | 9.4 / 4.4   |
| <b>TOP</b> SAIDI (electricity) in min./year       | 16.6      | 15.8      | 5.1         |

## Environment goal dimension

|   |            |            |           |
|---|------------|------------|-----------|
| <b>TOP</b> Installed output of renewable energies in GW and the share of the generation capacity accounted for by renewable energies in % | 5.4 / 41.7 | 5.1 / 40.1 | 5.9 / 4.0 |
| <b>TOP</b> CO <sub>2</sub> intensity in g/kWh <sup>1</sup>  | 491        | 478        | 2.6       |

## Employees goal dimension

|   |           |           |             |
|---|-----------|-----------|-------------|
| <b>TOP</b> People Engagement Index (PEI) <sup>2</sup>   | 81        | 82        | -1.2        |
| <b>TOP</b> LTIF for companies controlled by the group <sup>3,4</sup> /LTIF overall <sup>3</sup> | 2.6 / 4.1 | 2.3 / 3.3 | 13.0 / 24.2 |

## Employees of the EnBW Group<sup>6</sup>

|                                   | 31.12.2022 | 31.12.2021 | Change in % |
|-----------------------------------|------------|------------|-------------|
| Employees                         | 26,980     | 26,064     | 3.5         |
| Employee equivalents <sup>7</sup> | 25,339     | 24,519     | 3.3         |

LTIF: Lost Time Injury Frequency    SAIDI: System Average Interruption Duration Index

<sup>1</sup> The calculation method for the key performance indicator CO<sub>2</sub> intensity will be restricted in future to include only factors that can be controlled by the company. The calculation of the ratio does not include the share of positive redispatch and nuclear generation that cannot be influenced by EnBW. If the share of positive redispatch that cannot be influenced is taken into account, the CO<sub>2</sub> intensity for the reporting year would be 508 g/kWh [previous year: 492 g/kWh]. The CO<sub>2</sub> intensity including nuclear power generation for the reporting year was 401 g/kWh (previous year: 386 g/kWh).

<sup>2</sup> Variations in the group of consolidated companies (all companies with more than 100 employees are generally included [except ITOs]).

Companies that were fully consolidated for the first time in the fourth quarter of 2022 were not included in the employee surveys for the PEI.

<sup>3</sup> Variations in the group of consolidated companies. Companies that were fully consolidated for the first time during the 2022 financial year were not included in the calculations for the LTIF performance indicators.

<sup>4</sup> Except for companies in the area of waste management.

<sup>6</sup> Number of employees excluding apprentices/trainees and inactive employees.

<sup>7</sup> Converted into full-time equivalents.








# Fiscal year 2022: ROCE and value spread

## Group level

- ROCE at 7.9% compared to 6.9% in the prior year
- Increase in average capital employed

in € m





|   |     | <br>Smart<br>Infrastructure<br>for Customers |         | <br>System-<br>Critical<br>Infrastructure |          | <br>Sustainable<br>Generation<br>Infrastructure |         | <br>Other/<br>Consolidation |        | <br>Total |          |
|---|-----|---|---------|--|----------|--|---------|--|--------|--|----------|
|   |     | 2022  | 2021    | 2022   | 2021     | 2022   | 2021    | 2022   | 2021   | 2022   | 2021     |
| Value spread EnBW Group by segment <sup>1</sup> |     |   |         |  |          |  |         |  |        |  |          |
| Adjusted EBIT incl. adjusted investment result  | € m | 352.6   | 199.1   | 424.8  | 694.2    | 1,279.4  | 868.4   | -263.4   | -233.6 | 1,793.4  | 1,528.1  |
| Average capital employed                        | € m | 1,565.5   | 1,602.9 | 12,359.7   | 11,165.3 | 8,178.4  | 8,967.0 | 586.9  | 514.7  | 22,690.5   | 22,249.9 |
| Return On Capital Employed (ROCE)               | %   | 22.5  | 12.4    | 3.4  | 6.2      | 15.6   | 9.7     | -  | -      | 7.9  | 6.9      |
| Weighted Average Cost of Capital (WACC)         | %   | 9.2   | 7.6     | 6.2  | 4.0      | 7.3  | 5.4     | -  | -      | 6.8  | 4.9      |
| Value spread                                    | %   | 13.3  | 4.8     | -2.8   | 2.2      | 8.3  | 4.3     | -  | -      | 1.1  | 2.0      |

<sup>1</sup> The figures for the previous year have been restated

<sup>2</sup> 2022: Amended adjusted investment result of €86.4 m, adjusted for taxes (investment result/0.703 - investment result; with 0.703 = 1 - tax rate 29.7%).  
2021: Amended adjusted investment result of €88.4 m, adjusted for taxes (investment result/0.706 - investment result; with 0.706 = 1 - tax rate 29.4%).



# Fiscal year 2022: Segment reporting<sup>1</sup>

| in € m           | <br><b>Smart Infrastructure for Customers</b> |          | <br><b>System-Critical Infrastructure</b> |         | <br><b>Sustainable Generation Infrastructure</b> |          | <b>+</b><br><b>Other/Consolidation</b> |          | <br><b>Total</b> |          |
|------------------|--|----------|--|---------|---|----------|--|----------|---|----------|
|                  | 2022   | 2021     | 2022   | 2021    | 2022  | 2021     | 2022                                   | 2021     | 2022  | 2021     |
| <b>Revenue</b>   |  |          |  |         |   |          |  |          |   |          |
| External revenue | 18,772.8   | 13,923.6 | 6,679.1  | 4,412.6 | 30,543.2  | 13,804.8 | 7.5                                    | 7.7      | 56,002.6  | 32,147.9 |
| Internal revenue | 1,436.4  | 1,111.9  | 2,326.7  | 1,470.4 | 6,688.6   | 5,501.5  | -10,451.7                              | -8,083.8 | 0.0   | 0.0      |
| Total revenue    | 20,209.2   | 15,035.5 | 9,005.8  | 5,883.0 | 37,231.8  | 19,305.5 | -10,444.2                              | -8,076.1 | 56,002.6  | 32,147.9 |

## Earnings indicators

|   |        |        |         |         |         |          |        |        |          |          |
|---|--------|--------|---------|---------|---------|----------|--------|--------|----------|----------|
| Adjusted EBITDA   | 510.2  | 344.0  | 1,046.0 | 1,263.0 | 1,934.8 | 1,539.7  | -205.3 | -187.4 | 3,285.7  | 2,959.3  |
| EBITDA  | 232.8  | 278.7  | 1,157.8 | 1,148.7 | 3,087.7 | 1,375.2  | -5.1   | 0.9    | 4,473.2  | 2,803.5  |
| Scheduled amortization and depreciation                             | -173.4 | -157.6 | -642.2  | -601.9  | -747.9  | -744.8   | -51.7  | -52.1  | -1,615.2 | -1,556.4 |
| Impairment losses   | -17.3  | -2.6   | -177.3  | -3.3    | -517.4  | -1,082.3 | -4.8   | 0.0    | -716.8   | -1,088.3 |
| Net profit/loss from entities accounted for using the equity method | 8.7    | 7.5    | 3.8     | 15.9    | 11.4    | 35.6     | 0.0    | 0.0    | 23.9     | 59.0     |
| Significant non-cash-relevant items                                 | -107.9 | -94.2  | -60.8   | -27.3   | -309.3  | 25.9     | -21.6  | -20.8  | -499.6   | -116.4   |

<sup>1</sup> The figures for the previous year have been restated



# Multi-year overview (1/2)

|   |       | 2022    | 2021    | 2020    | 2019    | 2018    |
|---|-------|---------|---------|---------|---------|---------|
| <b>Earnings</b>                                       |       |         |         |         |         |         |
| External revenue                                      | € m   | 56,003  | 32,148  | 19,694  | 19,436  | 20,815  |
| Adjusted EBITDA                                       | € m   | 3,286   | 2,959   | 2,781   | 2,433   | 2,158   |
| Adjusted Group net profit/loss <sup>1</sup>           | € m   | 973     | 1,203   | 683     | 787     | 438     |
| Earnings per share <sup>1</sup>                       | €     | 6.42    | 1.34    | 2.20    | 2.71    | 1.23    |
| Dividend per share/dividend payout ratio <sup>4</sup> | € / % | 1.10/31 | 1.10/36 | 1.00/40 | 0.70/40 | 0.65/40 |
| <b>Balance sheet</b>                                  |       |         |         |         |         |         |
| Equity  | € m   | 12,769  | 8,499   | 7,769   | 7,445   | 6,273   |
| Net debt  | € m   | 10,847  | 10,351  | 14,407  | 12,852  | 9,587   |
| Net financial debt                                    | € m   | 7,214   | 4,466   | 7,232   | 6,022   | 3,738   |
| <b>Cash flow</b>                                      |       |         |         |         |         |         |
| Retained cash flow                                    | € m   | 2,535   | 1,784   | 1,639   | 1,241   | 999     |
| Debt repayment potential <sup>2,3</sup>               | %     | 23.4    | 17.2    | 11.4    | -       | -       |
| Internal financing capability <sup>3</sup>            | %     | -       | -       | 102.8   | 90.0    | 92.2    |
| <b>Profitability</b>                                  |       |         |         |         |         |         |
| ROCE  | %     | 7.9     | 6.9     | 6.3     | 5.2     | 6.5     |
| Value spread  | %     | 1.1     | 2.0     | -       | -       | -       |

<sup>1</sup> In relation to the profit/loss attributable to the shareholders of EnBW AG

<sup>2</sup> For the calculation of the adjusted net debt and adjusted debt repayment potential, please refer to the section "Corporate situation of the EnBW Group" [EnBW Integrated Annual Report 2022, page 74](#)

<sup>3</sup> Debt repayment potential replaced the internal financing capacity as a key performance indicator in 2021

<sup>4</sup> Adjusted for the valuation effects of IFRS 9 in 2021 and 2019





# Multi-year overview (2/2)

|  |        | 2022   | 2021   | 2020  | 2019  | 2018   |
|--|--------|--------|--------|-------|-------|--------|
| <b>Energy sales</b>                          |        |        |        |       |       |        |
| Electricity                                  | bn kWh | 106    | 108    | 107   | 153   | 137    |
| Gas  | bn kWh | 509    | 495    | 442   | 362   | 329    |
| <b>Smart Infrastructure for Customers</b>    |        |        |        |       |       |        |
| External revenue                             | € m    | 18,773 | 13,924 | 9,965 | 9,350 | 7,348  |
| Adjusted EBITDA                              | € m    | 510    | 344    | 335   | 326   | 268    |
| <b>System Critical Infrastructure</b>        |        |        |        |       |       |        |
| External revenue                             | € m    | 6,679  | 4,413  | 3,657 | 3,460 | 3,215  |
| Adjusted EBITDA                              | € m    | 1,046  | 1,263  | 1,347 | 1,355 | 1,177  |
| <b>Sustainable Generation Infrastructure</b> |        |        |        |       |       |        |
| External revenue                             | € m    | 30,543 | 13,804 | 6,064 | 6,623 | 10,246 |
| Adjusted EBITDA                              | € m    | 1,935  | 1,540  | 1,278 | 925   | 729    |



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- Decarbonisation: Regulatory environment
  - EU
  - Germany
- Energy market Germany
  - Electricity market
  - Gas market
- Regulated grids business Germany
  - Electricity grids
  - Gas grids



# Decarbonization EU: Regulatory framework

## Paris Agreement

### EU 2050 goals

- Well below +2°C pre-industrial average efforts to limit to +1.5°C in 2100
- Climate neutrality by 2050
- Zero pollution, nature protection

## EU

### 2030 goals

- -55.0% GHG emissions
- 42.5% RE in final energy consumption
- 11.7% Energy efficiency target

## The European Green Deal<sup>1</sup>

### The European Union's core programme

#### Key goals

- Climate neutrality in Europe by 2050
- 2030 reduction target of -55% CO<sub>2</sub>
- Industrial policy to secure sustainable economy and industry in terms of sustainable products and access to natural resources
- Protect habitats

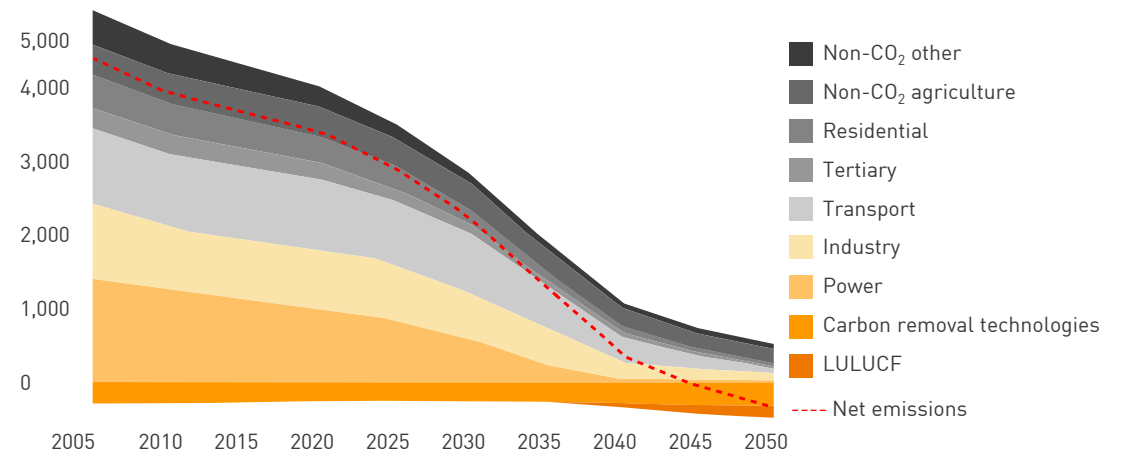
#### Key elements

- Clean, safe and affordable energy
- Mobilising research and innovation
- Sustainable mobility and food
- Zero pollution target and circular economy
- "Leave no one behind" and financing the transition
- Preserving and restoring ecosystems and biodiversity
- Strengthening EU industry and economic competitiveness as well as EU resilience regarding raw materials



## Emissions per sector in Green Deal scenario<sup>2</sup>

mt CO<sub>2</sub>-equivalent



The legislation to adapt the legal framework for the 2030 targets ("Fit for 55" Package) was endorsed, with the only exception of the Energy Taxation Directive which is currently being negotiated at the Council

<sup>1</sup> Commission Communication: The European Green Deal, COM(2019) 640 final, 11 December 2019

<sup>2</sup> Commission Communication: A Clean Planet for all, COM(2018) 773 final, 28 November 2018



# Decarbonization EU: Legislation 'Fit for 55' legislative files<sup>1</sup>



## 'Fit for 55'-Package I

### Main topics

- EU Emissions Trading System Directive
- Energy Efficiency Directive
- Alternative Fuels Infrastructure Regulation
- Renewable Energy Directive
- Effort Sharing Regulation

### Further

- Carbon Border Adjustment Mechanism
- Energy Taxation Directive
- RE Fuel Aviation & Maritime Regulations
- Regulation on Land Use, Land Use Change and Forestry
- CO<sub>2</sub> Emission Performance Standards Cars Regulation
- Social Climate Fund

### EU Emissions Trading System Directive

- More ambitious ETS to achieve emissions reductions of 62% by 2030, previously 43% (base 2005)
- Extension of the ETS to maritime shipping and strengthening of the ETS for aviation
- Introduction of a separate ETS for buildings and road transport from 2027 with a target of -43% by 2030 (base 2005)
- Changes to ETS affecting energy sector and industry lead to significant tightening of emission reduction requirements

### Energy Efficiency Directive

- EU-wide binding energy efficiency target of 11.7% by 2030 for final and primary energy consumption
- Obligation to annual savings in final energy consumption of 1.49% on average starting in 2024 (from 0.8%)
- Obligation of member states to renovate at least 3% of the total area of all public buildings annually
- New requirements for high-efficiency cogeneration
- Requirements for specific heating and cooling systems

### Alternative Fuels Infrastructure Regulation

- Set-up and operation of charging infrastructure in competition
- Precise requirements for the mandatory expansion of the publicly accessible e-infrastructure
- Distance- and power-based targets for the rollout of the electric infrastructure
- Payment systems for ad hoc charging
- Price differentiation between end customer (ad hoc) and e-mobility provider only with justification

### Renewable Energy Directive

- Renewables share of 42.5% of gross final energy consumption by 2030 (current legislation 32%)
- Higher targets for heating/cooling, district heating/cooling systems and change of target structure for transport sector
- New indicative target for renewables in the building sector of 49% of final energy consumption by 2030
- Indicative annual target increase of 1.6%-points for H<sub>2</sub> in industry + mandatory 42% of H<sub>2</sub> use in industry by 2030 via renewable fuels of non-biological origins (RFNBOs) 60% by 2035
- Criteria for renewable hydrogen
- Stricter sustainability criteria for biomass, also for biogas in electricity

### Effort Sharing Regulation

- Increase of GHG reduction target from 29% to 40% (base 2005), for Germany increase from 38% to 50%
- Breakdown on Member states by GDP and cost-efficiency considerations
- New: Establishment of reserve fund (emission contingent) for Member states that fail to achieve targets, only if overall target is secured
- Scope remains unchanged, which includes domestic transport, buildings, agriculture and waste management, yet an additional Emissions Trading System for buildings and transport was created and adopted

Legislative procedures for the files in the first "Fit for 55" package were adopted with exception of the Energy Taxation Directive<sup>2</sup>. The first consultation on the 2040 targets was conducted and work will be continued by the next Commission

<sup>1</sup> As of 15 July 2021 & REPowerEU proposals as of 18 May 2022  
<sup>2</sup> which might be endorsed by the Council at the end of 2023



# Decarbonization EU: Legislation 'Fit for 55 part 2 - gas & hydrogen package' <sup>1</sup>



## Proposals/under negotiation



### EU Gas Directive

- Inclusion of hydrogen into the internal European market for gases incl. hydrogen market design and regulation
- Regulation of future hydrogen infrastructure such as rules for operation of hydrogen pipelines
- Not yet clear differentiation of network levels between transmission network and distribution network for hydrogen
- Definition of "low-carbon hydrogen" and "low-carbon gases" incl. effective levels of greenhouse gas reduction.
- Range of tasks of gas system operators extended to include "decommissioning" and "repurposing"



### EU Gas Regulation

- Rules for tariff discounts for climate-neutral gas and hydrogen
- Regulations on the possibility of cross-financing between natural gas and hydrogen
- Determination of possible hydrogen admixture rates
- Several provisions trying to include a prioritisation of hydrogen use in so called "hard to abate" sectors
- Strengthening of the role of biomethane and proposal by EU Parliament for a collective EU goal of production and grid injection of 35 bcm of sustainable biomethane per year by the end of 2030



### Energy Performance of Buildings Directive

- Aim to make the entire EU building sector climate neutral by 2050 (life cycle approach incl. construction materials)
- Binding minimum standards for the private and public sector (gradual increase of energy efficiency classes)
- Proposals of banning fossil fuel-based heating/cooling systems in new buildings and complete phase-out for all buildings by 2035 or 2040 at latest
- Obligation to install rooftop PV systems in phased sequence for new buildings (>250m<sup>2</sup>) from January 2025 and by end of 2030 for all existing buildings
- Promotion of Electric mobility charging infrastructure with strict targets and requirements to reduce bureaucratic hurdles



### Regulation on methane emissions reduction in the energy sector

- Aim to reduce methane emissions in the energy sector – special focus on (natural) gas infrastructure
- Mandatory requirements for measurement and reporting, increased in comparison to technical standards
- Mandatory requirements for LDAR (Leak Detection and Repair) in terms of frequencies of inspections
- Possibility for the regulator to take costs into account in (network) charges
- Prohibition of "venting" and "routine flaring" with exemptions
- Efforts for transparency on CH<sub>4</sub> emissions from imports of fossil energy



EU gas package to significantly (re)shape gas and hydrogen sector and markets towards decarbonisation – legislative procedures approx. until end of 2023



# Decarbonization Germany: Political & regulatory environment

## German Climate & Energy Policy Goals

- -65% GHG emissions by 2030 (-88% by 2040)
- -50% primary energy consumption by 2050

### Climate Protection Act 2021 and 2023



- Establishes German climate protection targets by 2050 and sets a legal framework



- Climate neutrality by 2045 (instead of 2050) pursued as long-term target. Emission budgets specified through to 2030



- Monitoring process for target attainment by 2030: If emission targets are predicted to be missed twice in a row and in total across all sectors, an action program has to be submitted

### Climate protection programme



- Target of 80% renewables in 2030 and target ranges specified for specific technologies are now legislated within the Renewable Energy Act 2023 (EEG 2023)



- Coalition agreement: Coal phase-out ideally by 2030 as a target



- National emissions trading system for transport and heating from 2021, for coal from 2023 and waste from 2024 with fixed prices until 2025, followed by an auction design from 2026 (BEHG)

The Climate Protection Act 2021 stipulated that if the sectoral annual emission targets were missed in one sector, the responsible department had to submit an immediate action program. However, the 2023 amendment to the Climate Protection Act stipulates that if the emission targets are predicted to be missed twice in succession and overall across all sectors, an action program must be submitted.

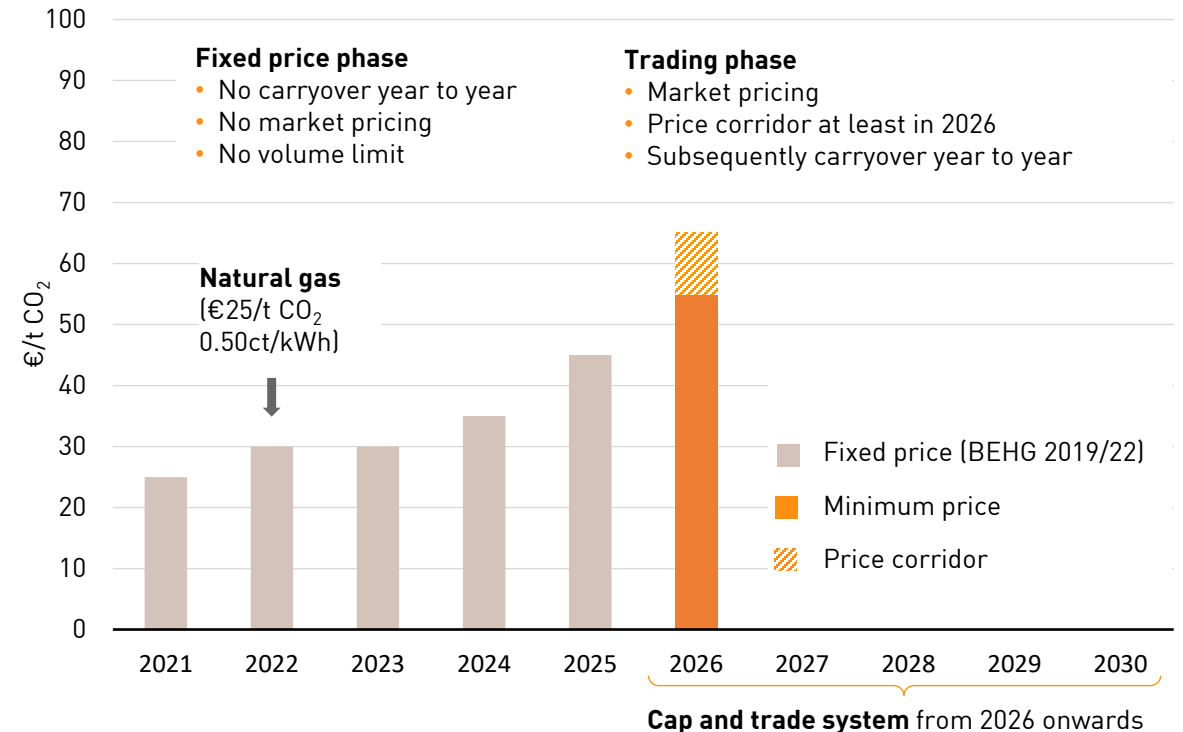


# Decarbonization Germany: CO<sub>2</sub> pricing in transport and heating sectors and for coal

## New installations and measures needed for 65% target

### Putting a price on CO<sub>2</sub> emissions in heating and transport sectors and for coal

- Act introducing national CO<sub>2</sub> pricing in transport and heating sectors was adopted in autumn 2019 (Fuel Emissions Trading Act, known by its German abbreviation BEHG) and entered into force on 1 January 2021
- In the 2022 amendment, it was decided to price further fuel emissions from coal (from 2023) and waste incineration (from 2024) under the BEHG. Due to the currently high energy price level, the increase in the CO<sub>2</sub> price actually due on 1 January 2023 was postponed by one year, and the further price path until 2025 was also lowered
- Parties placing fossil fuels on the market have to pay a fixed price per ton of CO<sub>2</sub> until 2025, after which certificate trading will be phased in with a price corridor and volume limit in 2026. For the time after, an evaluation will decide on the future way of pricing
- The revenues from the BEHG flow entirely into the Climate and Transformation Fund, from which, among other things, the complete abolition of the EEG surcharge from 1 July 2022 and thus the reduction in electricity costs will be refinanced
- EnBW supports introduction of cross-sectoral CO<sub>2</sub> pricing system and implementation of higher price path in the Act



National CO<sub>2</sub> pricing adds incentives for sector coupling by increasing price for fossil fuels while cutting cost of climate-friendly electricity applications



# Decarbonization Germany: Regulatory framework renewable energy

## Onshore wind Renewable Energy Sources Act, Federal Nature Conservation Act, Onshore Wind Energy Act



- Better economic conditions for low wind yield regions and bonus scheme for projects in the south
- German states must designate an average of 2% of territory for wind energy use
- Significant reduction in previous species conservation obstacles

## Photovoltaics Renewable Energy Sources Act



- Extension of eligible areas for ground-mounted solar
- Major improvements for small-scale solar and solar prosuming
- Introduction of new definition of storage and increased feed-in tariffs for full feed-in and surplus feed-in

## Offshore wind Offshore Wind Energy Act



- Different tendering conditions for auctions of sites that have and have not been subject to preliminary investigation
- Auction design requires uncapped payment by operator to state when bidding
- Project implementation deadlines are rigid and challenging as to time

Beyond adopted measures, further legislative adjustments needed to achieve renewables expansion targets





# Decarbonization Germany: Vision 2045 - climate neutrality requires a transformation of the energy system

## Renewable energy

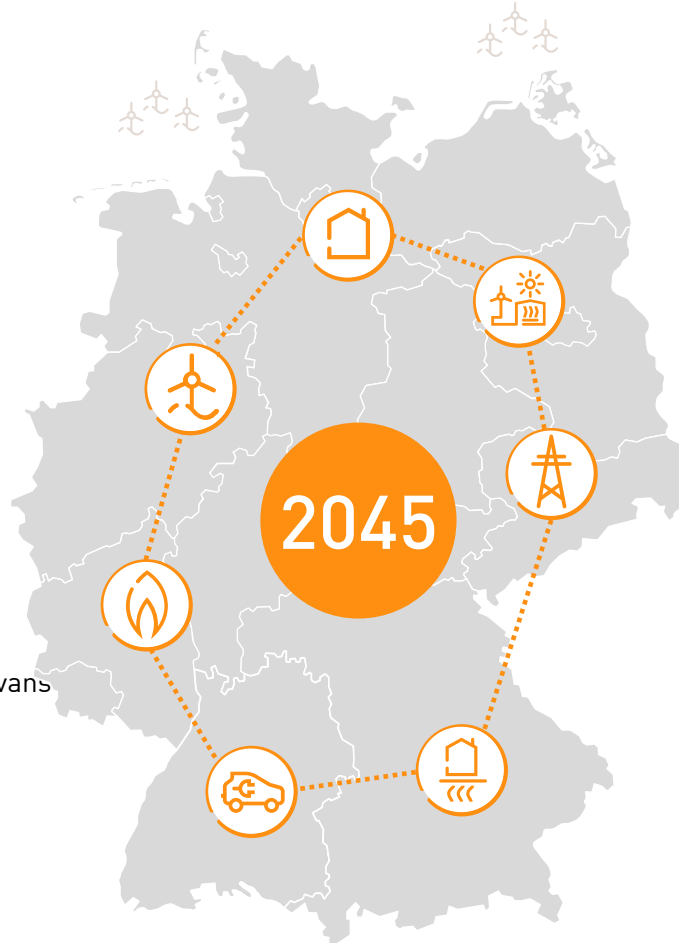
- ... provides almost 100% of climate-neutral power generation
- Installed RE capacity: approx. 500 GW (today approx. 145 GW)

## Security of supply

- ... enabled by gas-fired power plants running on hydrogen, battery storage and hydropower (pumped storage):
- 60 GW gas turbines and CCGT (2021: approx. 30 GW);  
15 GW battery storage: 30 GW hydrogen storage (salt caverns)

## E-mobility

- Electric propulsion standard for passenger cars, approx. 43 m electric vehicles, mainly passenger cars and delivery vans
- Heavy/long-distance transport powered by H<sub>2</sub>, biogenic fuels or battery electric



## Electricity demand

- ...increases to ~800 - 900 TWh due to high level of electrification (2021 ~500 TWh)
- Energy efficiency reducing conventional consumption to ~400 TWh
- New consumption due to sector coupling in industry, buildings and traffic

## Grids (electricity)

- Massive expansion by 2045
- €>400 bn in investment needed in the transmission grid, distribution grids and to connect offshore wind farms
- Extensive digitalization of transmission and distribution grids

## Heat supply

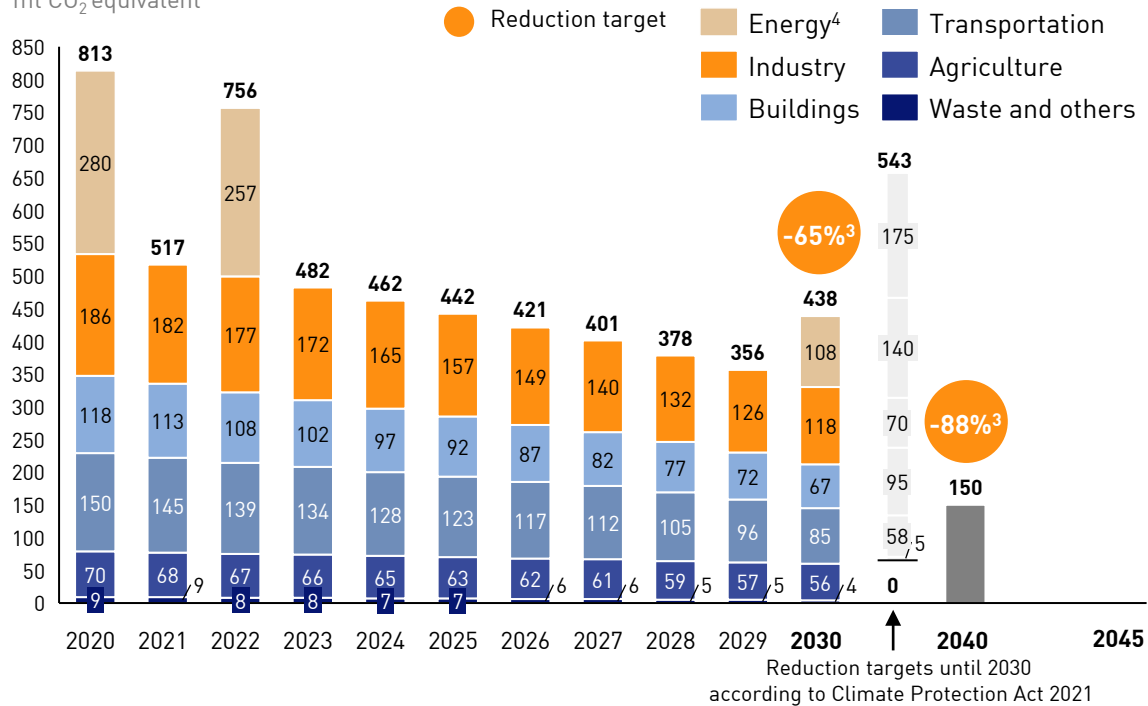
- ... predominantly electric or with green gases
- >13 m heat pumps in residential buildings (market share >60%)
- H<sub>2</sub> with ≤20% market share in residential buildings
- Heat demand to decrease by 15%



# Decarbonization Germany: GHG emissions and climate protection targets

## German GHG emissions and emission targets by sector

Maximum annual emissions  
mt CO<sub>2</sub> equivalent



## Sector targets for GHG emissions according to the Climate Protection Act 2021

| Sector                | 1990<br>(mt CO <sub>2</sub> -eq.) | 2020 <sup>1</sup><br>(mt CO <sub>2</sub> -eq.) | 2030<br>(mt CO <sub>2</sub> -eq.) | 2030<br>(reduction compared to 1990) |
|-----------------------|-----------------------------------|--|-----------------------------------|--------------------------------------|
| Energy                | 466                               | 280  | 108                               | 77%                                  |
| Industry <sup>2</sup> | 284                               | 186  | 118                               | 58%                                  |
| Buildings             | 210                               | 118  | 67                                | 68%                                  |
| Transportation        | 163                               | 150  | 85                                | 48%                                  |
| Agriculture           | 90                                | 70   | 56                                | 38%                                  |
| Subtotal              | 1,213                             | 804  | 433                               | 64%                                  |
| Waste and others      | 38                                | 9  | 5                                 | 87%                                  |
| <b>Total amount</b>   | <b>1,251</b>                      | <b>813</b>                                     | <b>438</b>                        | <b>65%</b>                           |

Energy industry must provide the largest share of GHG reductions (-77% to 1990), energy sector expected to be almost net carbon-neutral by 2040

An accelerated expansion of renewables and entry into an international hydrogen market is needed

<sup>1</sup> Estimation  
Source: German Federal Environmental Agency

<sup>2</sup> Manufacturing companies

<sup>3</sup> Base year 1990  
GHG: Greenhouse gas

<sup>4</sup> Emissions targets laid down for the energy industry for selected years only

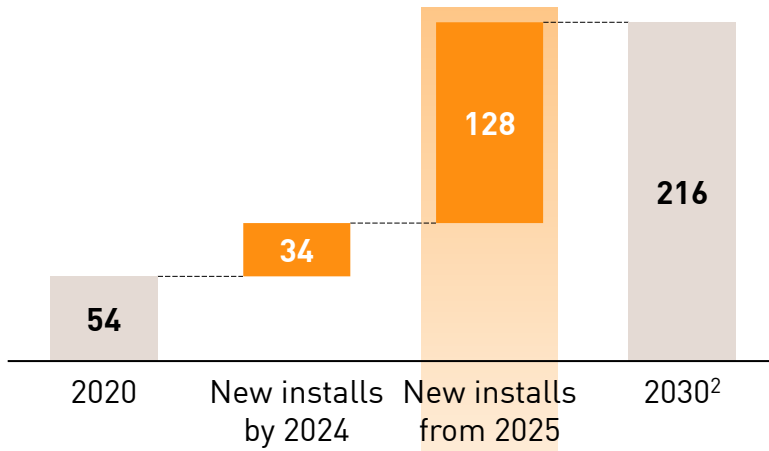


# Decarbonization Germany: Renewable expansion targets 2030



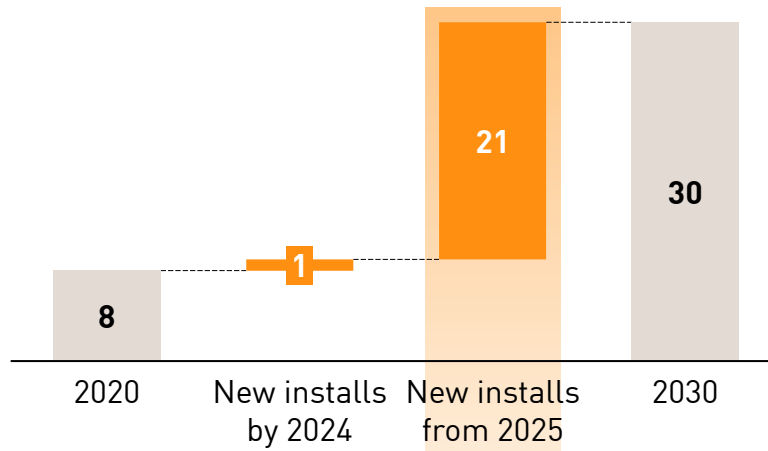
## Solar Installed capacity/new installs<sup>1</sup>

in GW



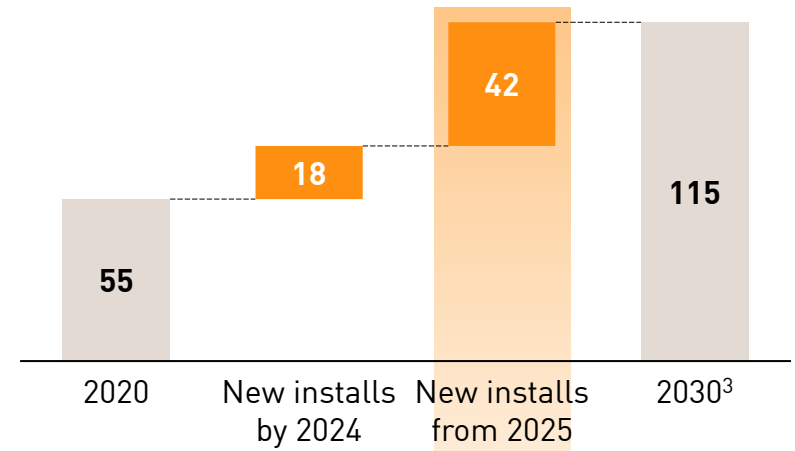
## Offshore wind Installed capacity/new installs<sup>1</sup>

in GW



## Onshore wind Installed capacity/new installs<sup>1</sup>

in GW



Required  
new installs per  
working day  
(from 2025)<sup>1</sup>

90 MW  
Solar

... approx. half the output  
of Weesow/day



15 MW  
Offshore

... a wind farm like  
He Dreiht approx. every  
two months



30 MW  
Onshore

... approx.  
7 turbines/day

<sup>1</sup> New installs from 2022 based on expansion targets for 2030 under German government's Easter package

<sup>2</sup> Originally 200 GWh under coalition agreement

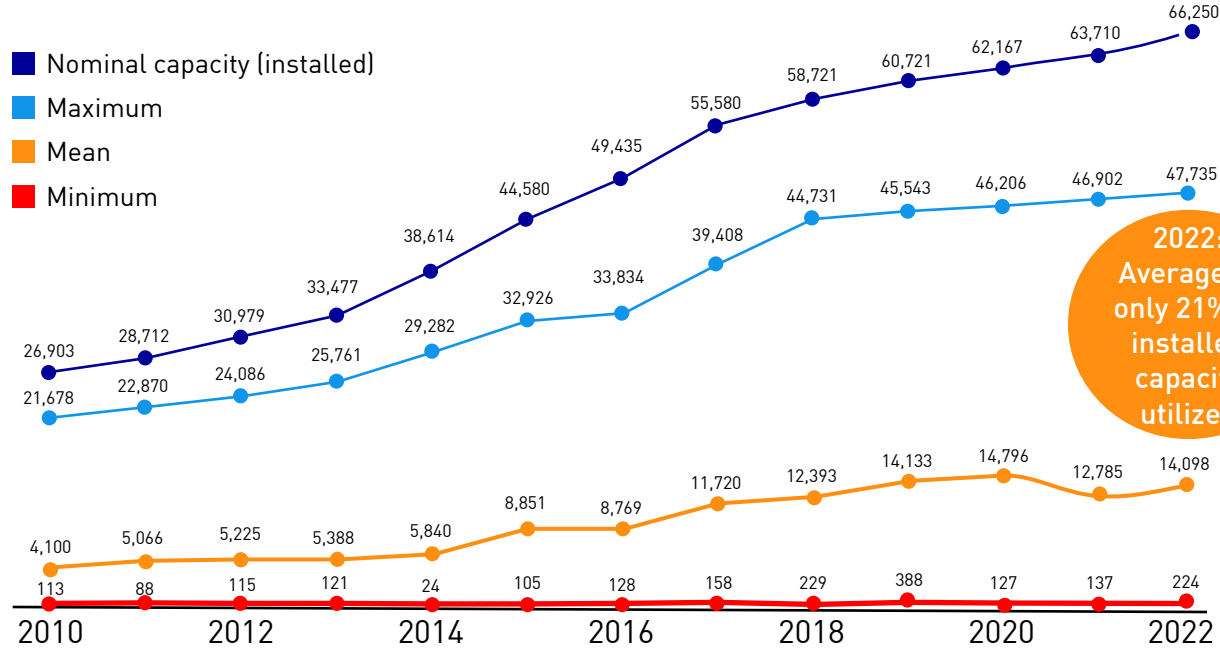
<sup>3</sup> Originally 100 GWh under coalition agreement



# Decarbonization Germany: Expansion of renewables increases demand for dispatchable power

## Wind power generation in Germany, 2010 to 2021

in MW



## Future options for dispatchable power generation



Conventional  
Coal Gas

Renewables Storage  
Biomass/biogas Bioenergy Green gases (H<sub>2</sub>) Pumped Battery

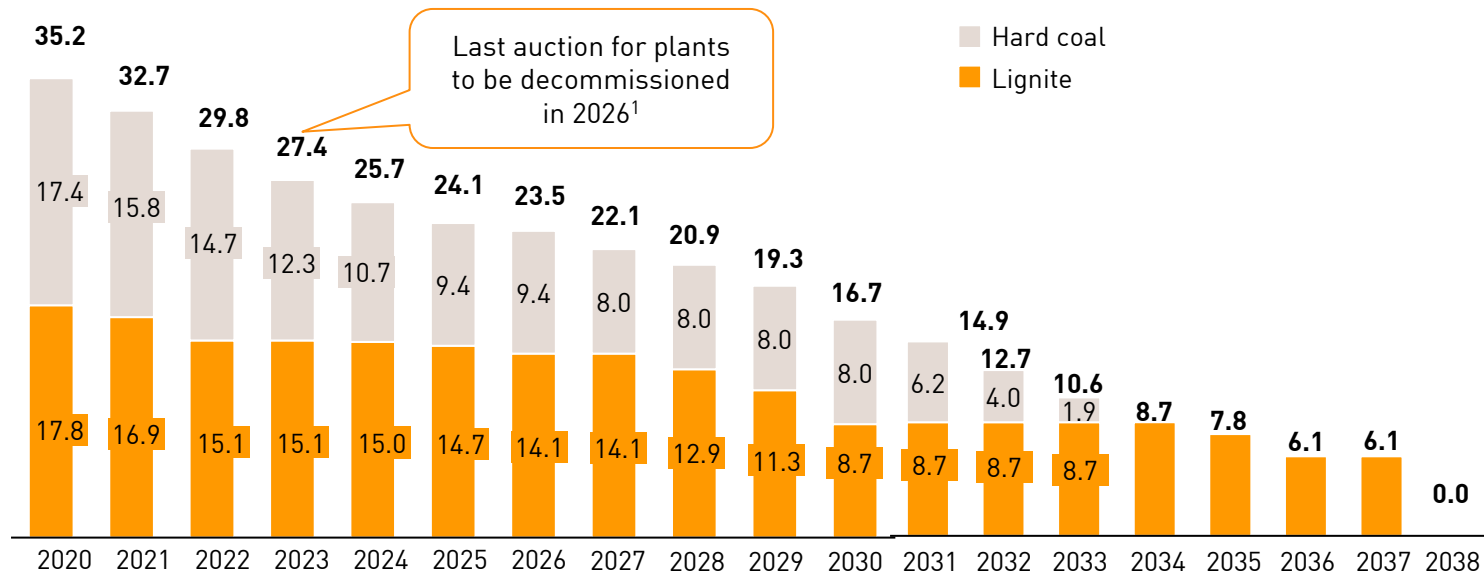


# Decarbonization Germany: Coal phase-out

## Exit paths for lignite and hard coal: Capacity targets in each target year

market capacity in GW

**Competitive bidding for plants to be decommissioned, followed by statutory reduction mostly without state compensation from 2027 onwards**



1. The new German government has announced that it will “bring forward, ideally to 2030” the current statutory provisions for phasing out coal-fired power generation (see left, completion by 2038)
2. No draft legislation has yet been published; the first step is a feasibility assessment for early coal phase-out
3. The governing coalition has agreed not to pay any new compensation to companies if coal phase-out plans are accelerated
4. However, in the wake of the gas supply crisis due to the Ukraine war, the legislated decommissioning of some plants has been temporarily postponed or suspended. Power plants that would come under a ban on coal-fired generation in 2022/2023 or are held in the grid reserve can temporarily come back onto the market until 31 March 2024

The governing coalition has announced a revision of the coal phase-out legislation to bring the phase-out forward, ideally to 2030

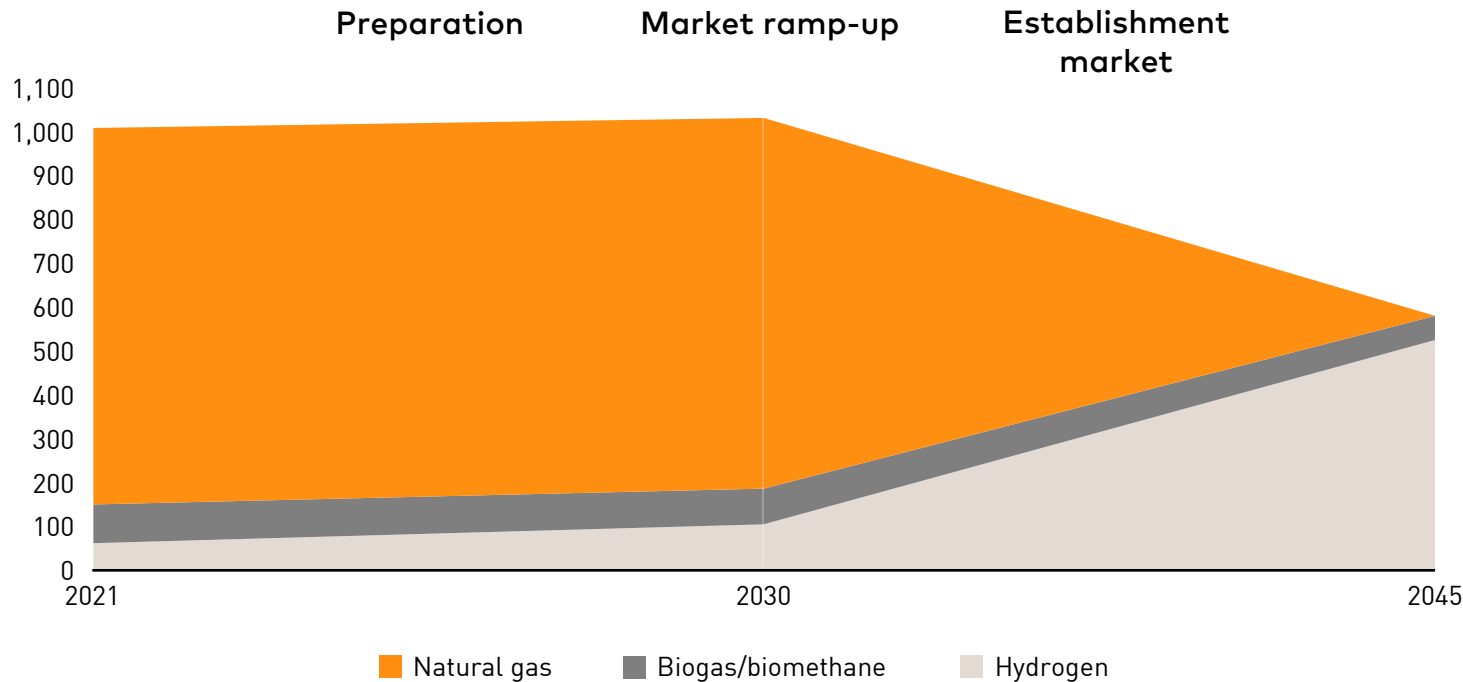
<sup>1</sup> However, if the defined phase-out path is not achieved by 2024, power plants will be shut down by law  
The same procedure will be followed for the closures that will have to be carried out from 2027 until the completion date, but then without financial compensation



# Decarbonization Germany: Natural gas gradually being replaced by climate-neutral gases

## Expected gas demand in Germany (incl. feedstock use)<sup>1</sup>

in TWh



## Explanatory notes

- EU climate neutrality requires fossil fuels to be replaced in all sectors by 2050<sup>1</sup>
- Time to 2030 to be used for establishing the market and improving the technologies
- Three aspects are particularly important
  - Rapid establishment of a universal hydrogen infrastructure
  - Creation of an appropriate market regulatory framework (such as certification of origin for green hydrogen)
  - Creation of incentives promoting demand for climate-neutral hydrogen

Conversion from natural gas to hydrogen will accelerate from 2030 onwards

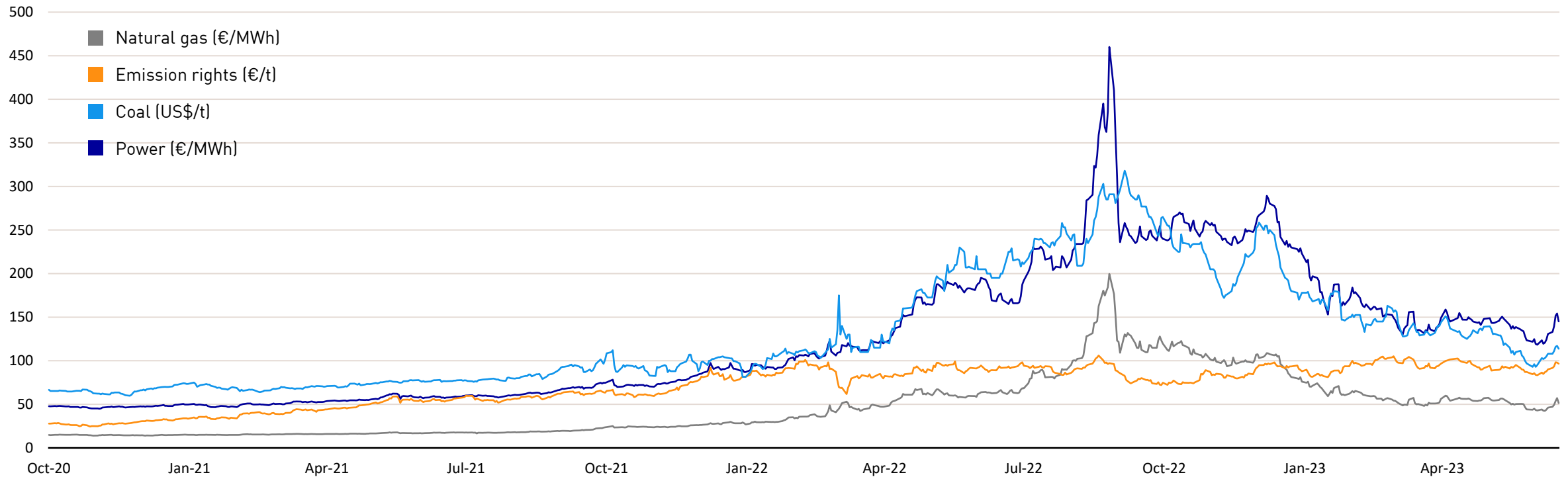
<sup>1</sup> Assumption: Green Deal consistently implemented by 2050



# Energy market Germany: Price development for 2024 over the last three years

## Prices for delivery 2024

(October 2020 vs. June 2023)



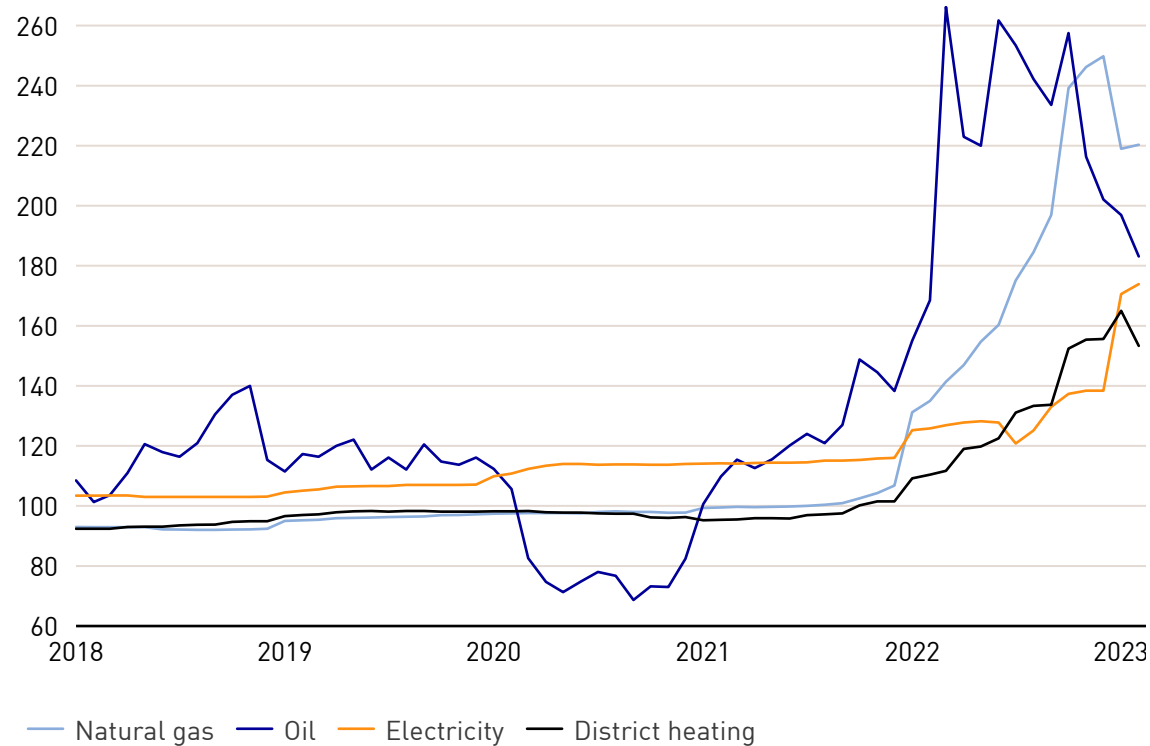
High uncertainty regarding security of supply for winter 2022/2023 in August 2023; calming of energy markets in the aftermath



# Energy market Germany: Development of private household energy prices and electricity consumption

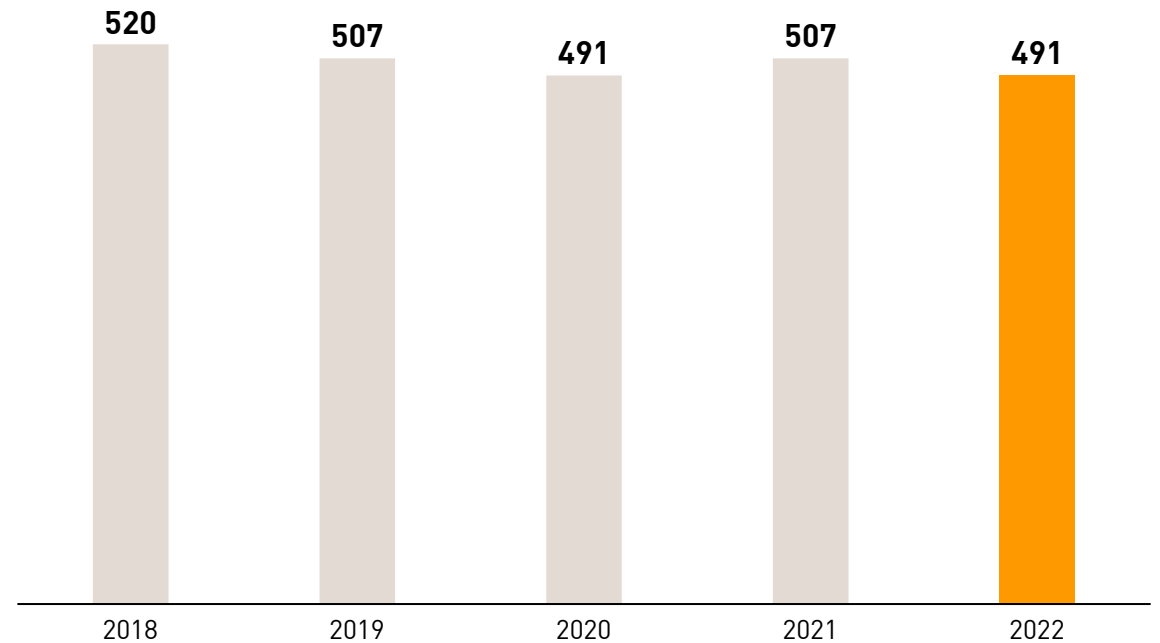
## Energy prices in Germany

Index 2015=100



## Electricity consumption in Germany

in TWh



High electricity costs in 2022 lead to a decline in net electricity consumption, especially in industry

Figures as of April 2023

Source: Federal Statistical Office (FS 17, R 2), BDEW (electricity 3,500 kWh/a)

The chart shows the development of prices (indexed rates of increase, not absolute fuel prices) for heating oil, gas, electricity and district heating for households since January 2015 relative to the 2015 base year (annual average).

Figures as of April 2023

Source: BDEW

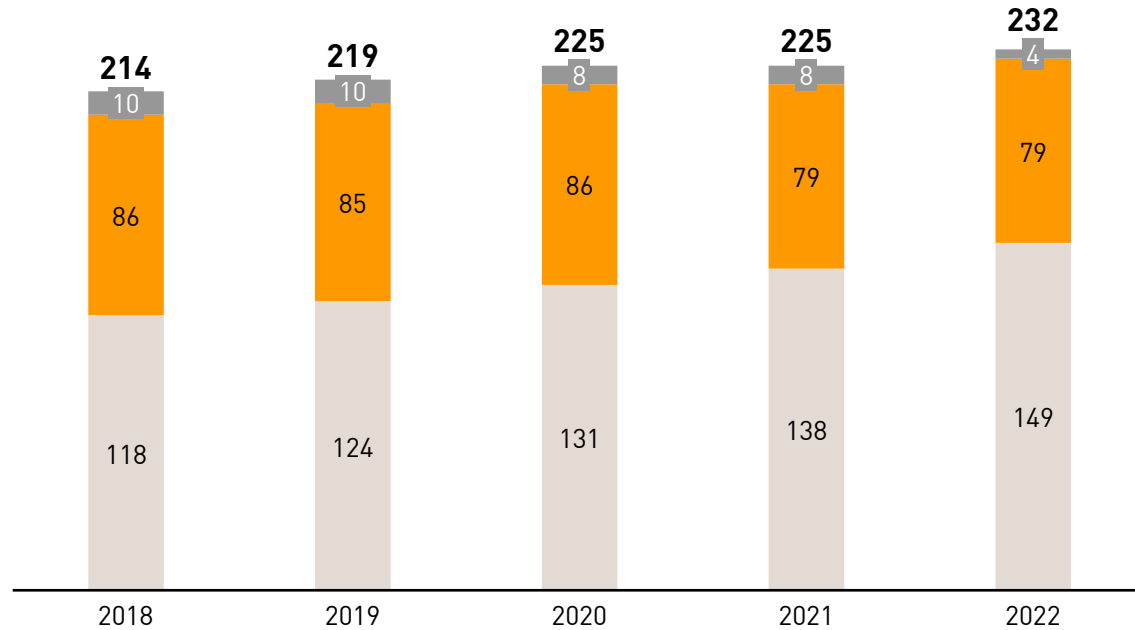




# Electricity market Germany: Installed capacity and generation

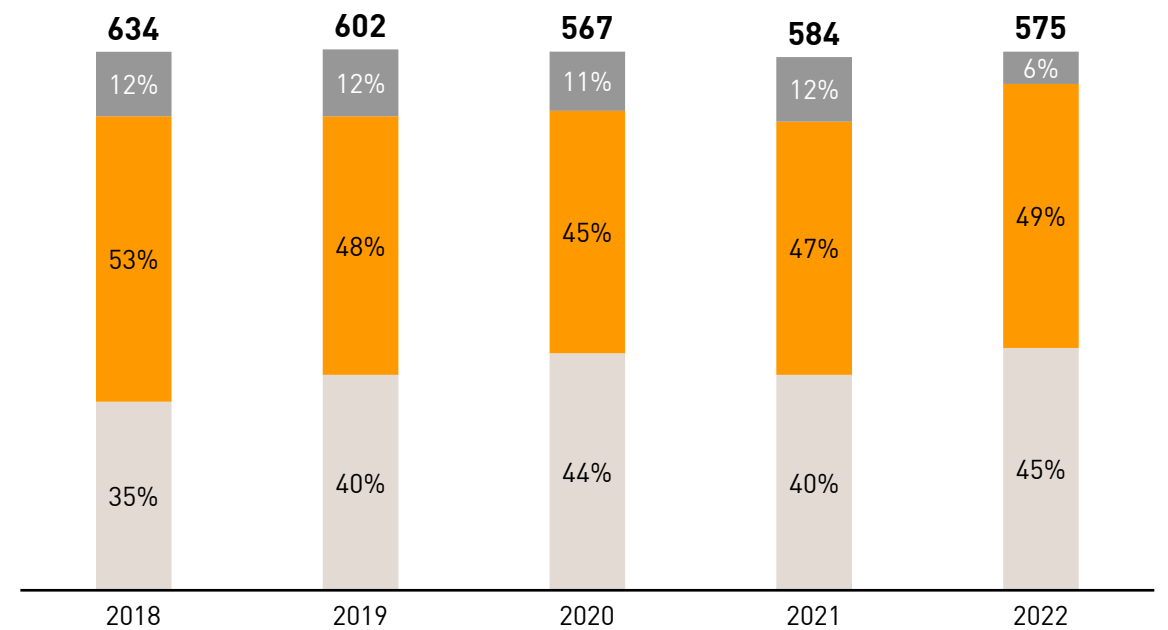
## Installed capacity

in GW



## Generation<sup>1</sup>

Gross power generation in TWh



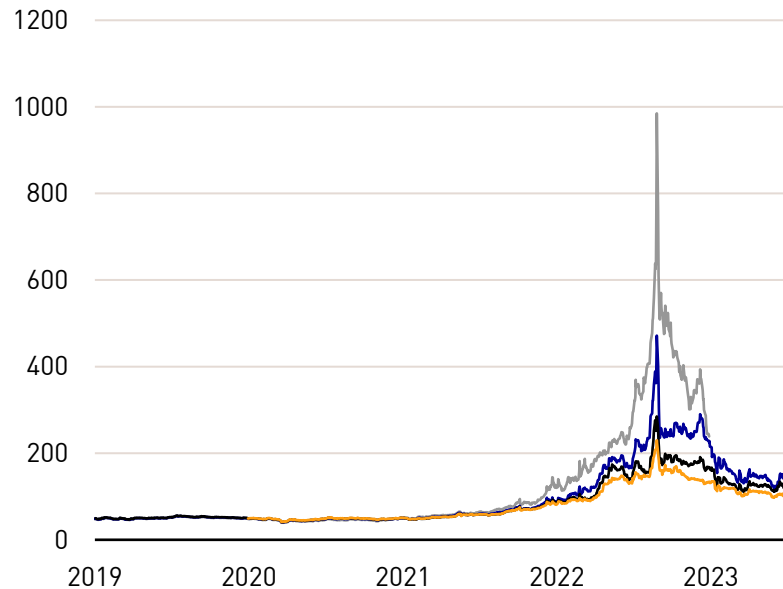
■ Nuclear power ■ Conventionals ■ Renewables



# Electricity market Germany: Front month price and spot market development

## Forward price for baseload electricity

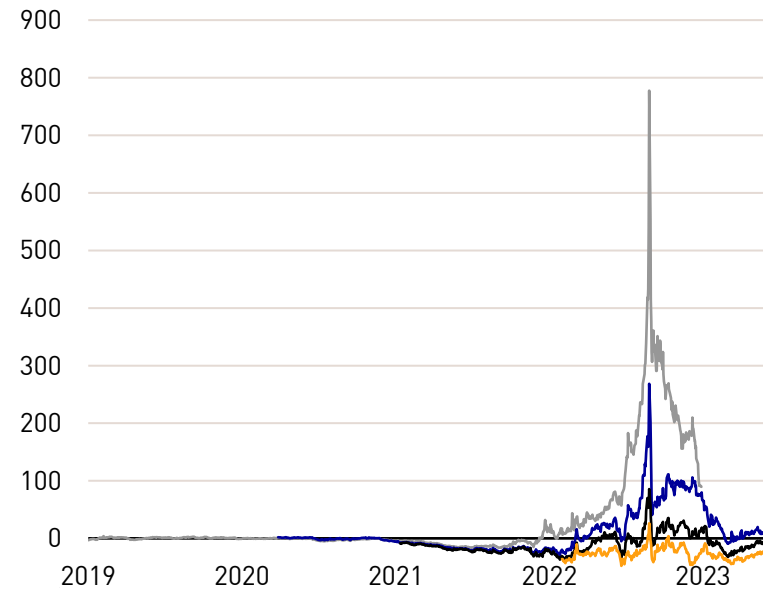
in €/MWh



## Clean-dark-spread base<sup>1</sup>

in €/MWh

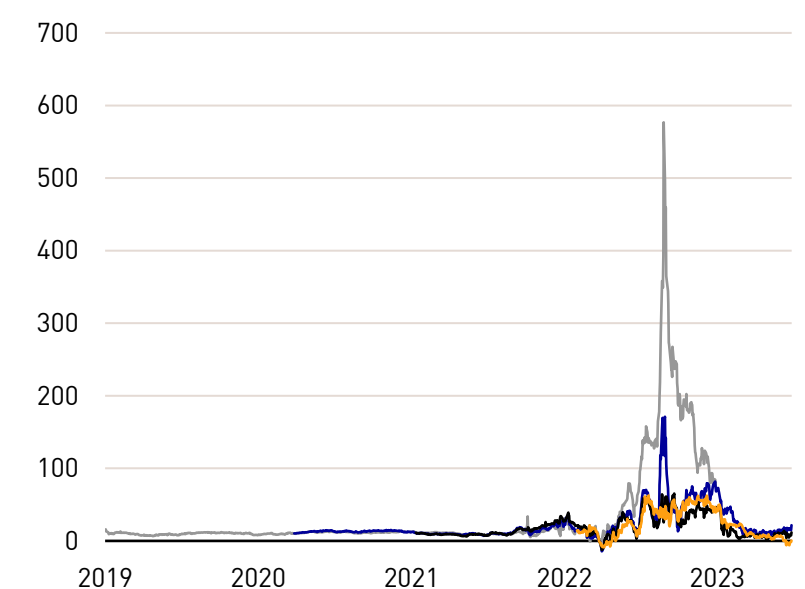
- Gross margin of a coal-fired power plant (plant efficiency: 36%)



## Clean-spark-spread peak<sup>2</sup>

in €/MWh

- Gross margin of a gas-fired power plant (plant efficiency: 50%)



■ 2023 ■ 2024 ■ 2025 ■ 2026

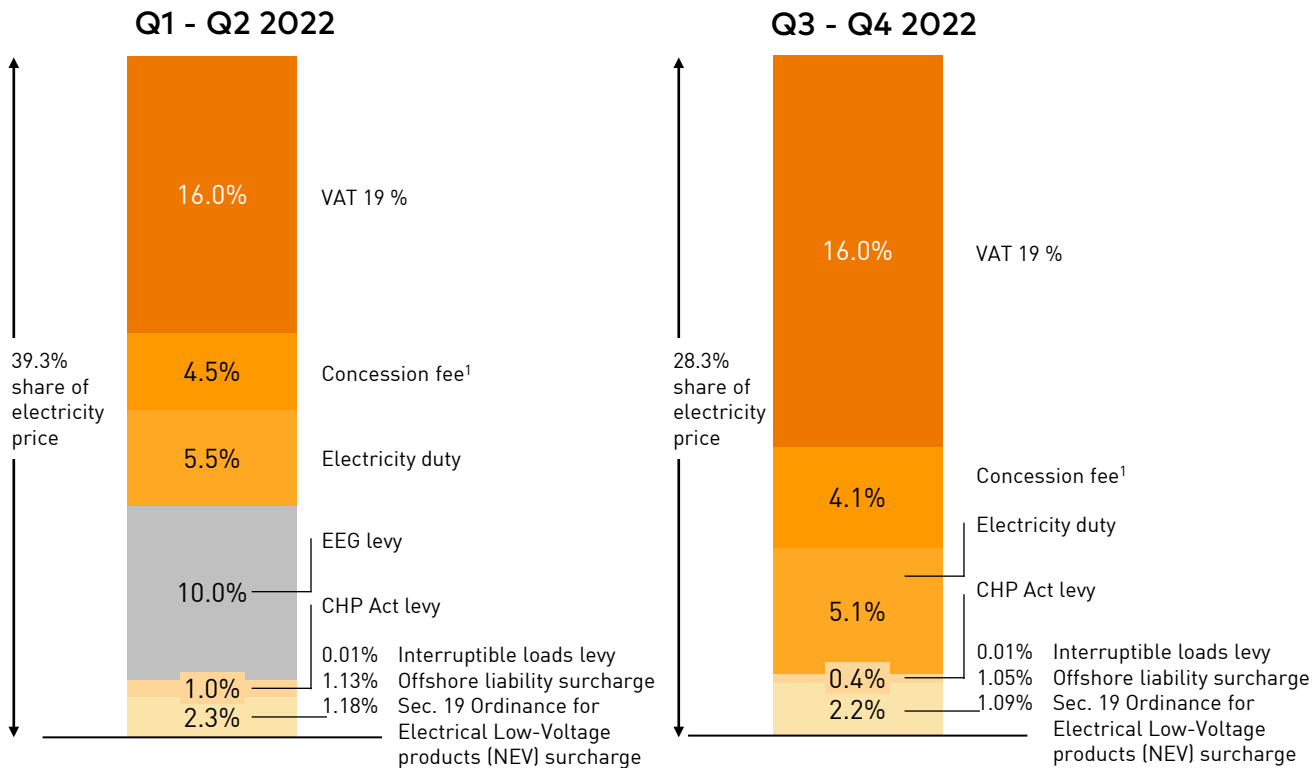
<sup>1</sup> Clean-dark-spread is the corresponding indicator for coal-fired generation of electricity

<sup>2</sup> Clean-spark-spread represents the net revenue a generator makes from selling power, having bought gas and the required number of carbon allowances



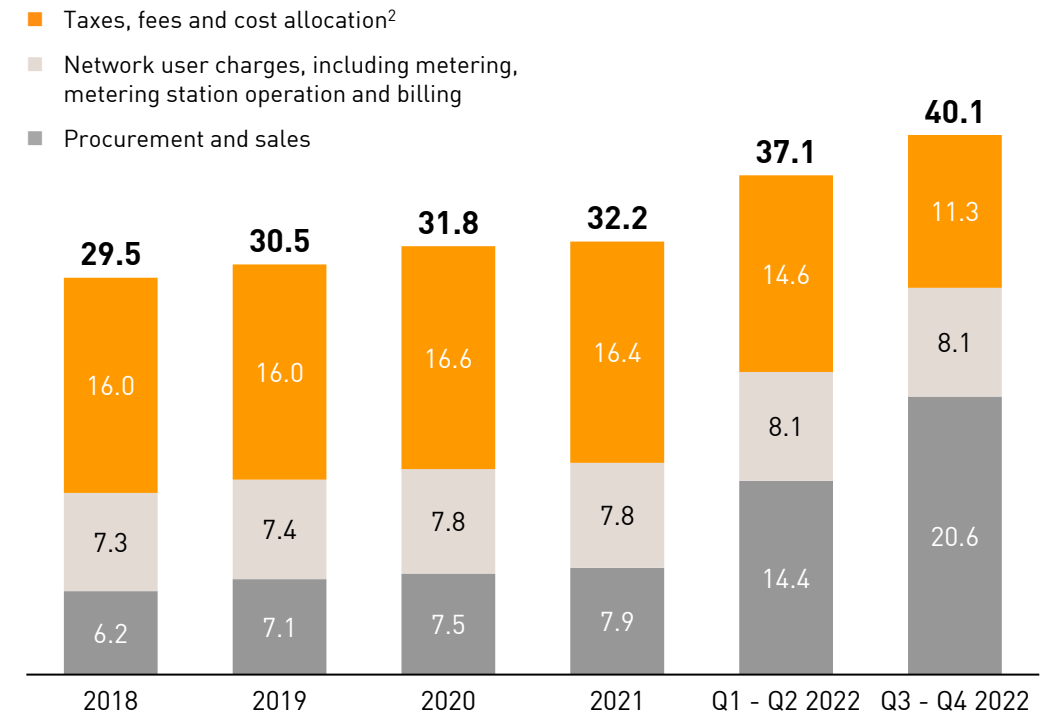
# Electricity market Germany: Private household price

## Taxes, fees and cost allocation for private households 2022



## Average electricity price for a 3-person household

Annual consumption of 3,500 kWh - € cents/kWh



Source: German Federal Association of Energy and Water Management (BDEW), figures as of April 2023

EEG: Erneuerbare Energien-Gesetz (Renewable Energy Act)

CHP: cogeneration combined heat and power

<sup>1</sup> Average concession fee; varies according to size of community

Figures as of April 2023

Source: BDEW

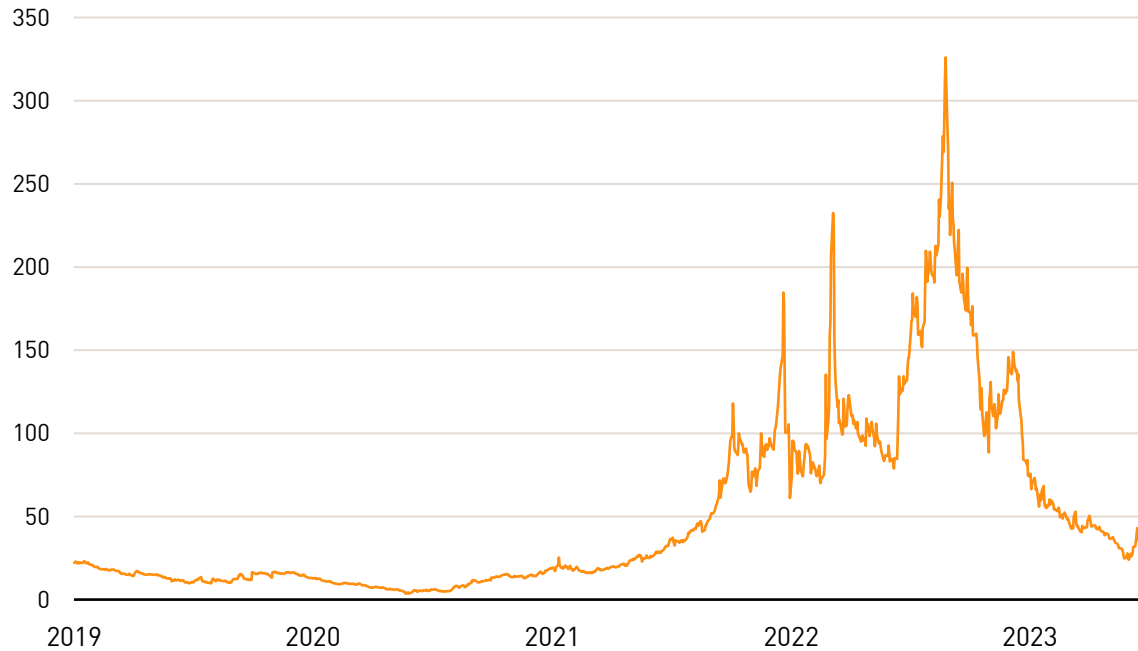
<sup>2</sup> German EEG surcharge not applicable as of July 2022



# Gas market Germany: Front month price and spot market development

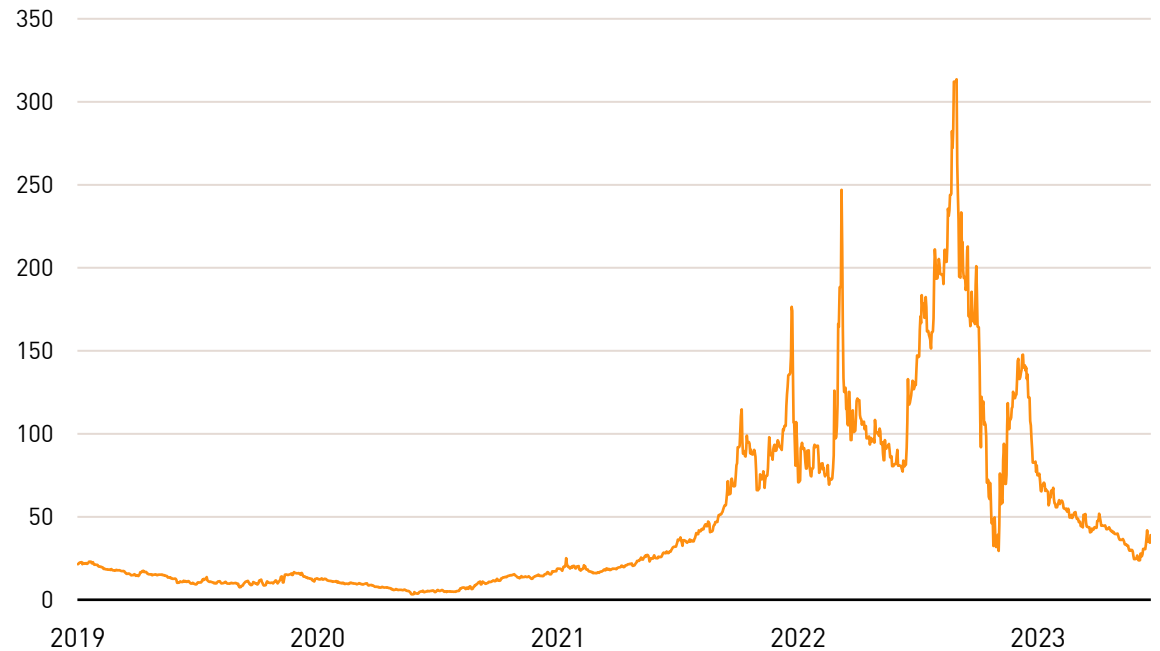
## Front month reference prices<sup>1</sup>

in €/MWh



## Spot market reference prices<sup>1</sup>

in €/MWh

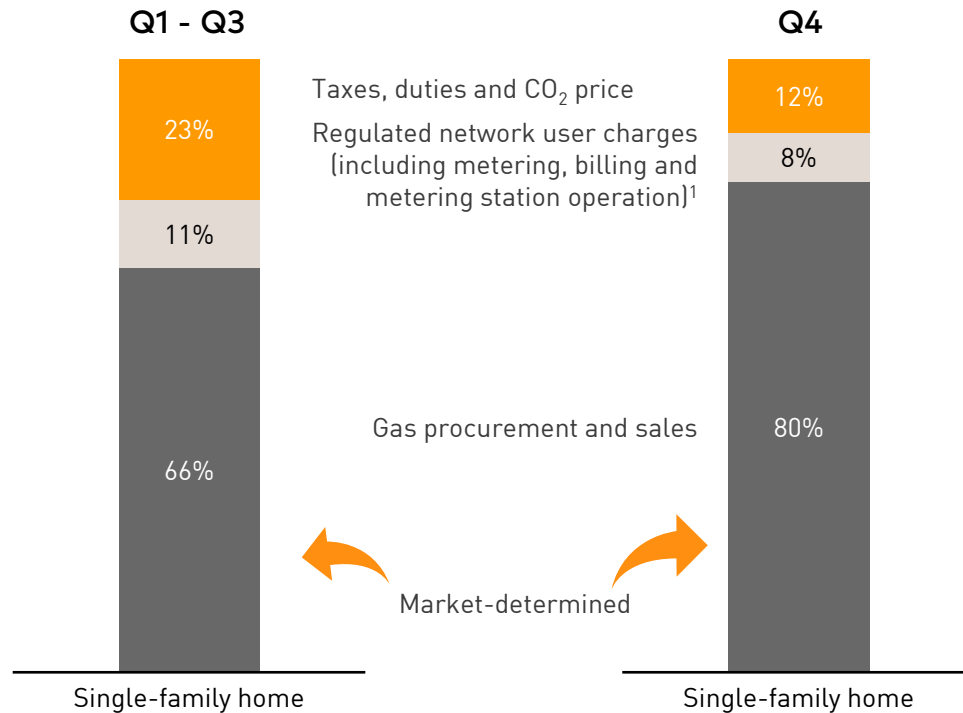


<sup>1</sup> Average of Gaspool and NetConnect Germany (NCG); starting 1 October 2021 Trading Hub Europe (THE)



# Gas market Germany: Private household price

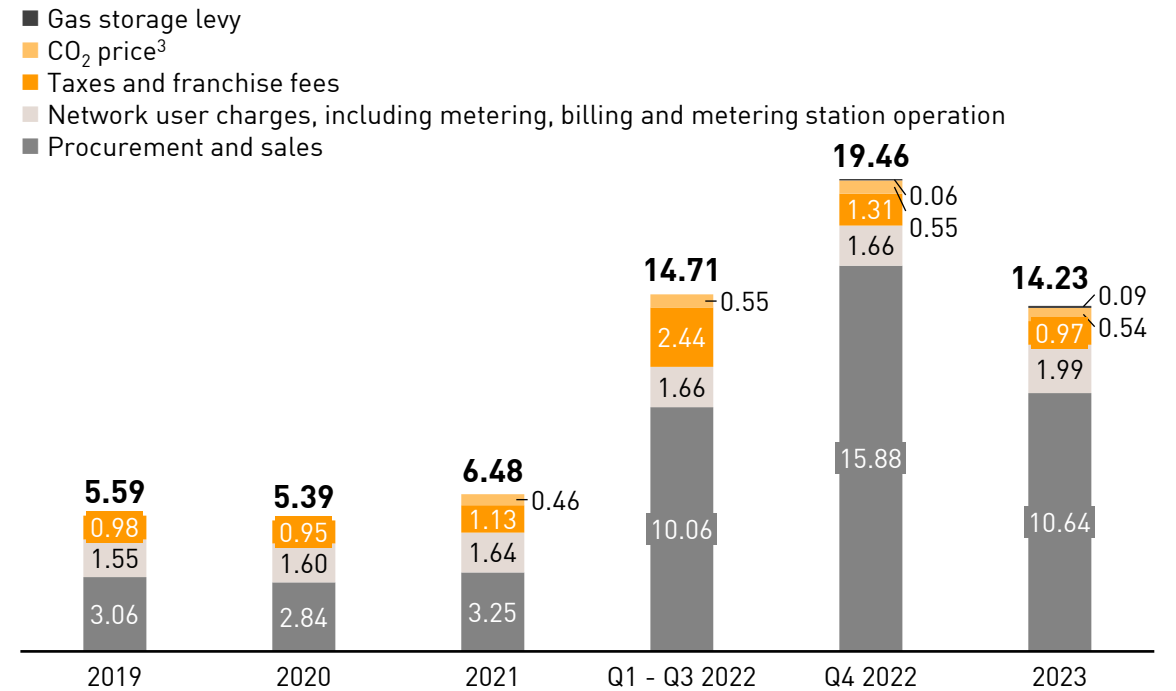
## Gas price for single-family home 2022



<sup>1</sup> Average net network user charge including charges for metering, metering station operation, subject to large regional variation, figures as of April 2023; Source: BDEW

## Single-family home, gas central heating

Single-family home, gas central heating including hot water, customer on contract with regional default supplier<sup>2</sup> (annual consumption 20,000 kWh)  
€ cents/kWh



<sup>2</sup> Most heating gas customers are customers on contract with the regional default supplier with a reduced concession fee (0.03 ct/kWh); figures as of April 2023; Source: BDEW

<sup>3</sup> The CO<sub>2</sub> price reflects the cost of purchasing CO<sub>2</sub> emission trading certificates in accordance with the Fuel Emissions Trading Act (BEHG) and is fixed by law until the end of 2025



# Regulated grids business: Framework of regulated grids business



## Regulatory environment

- Electricity and gas transmission as well as distribution grids remain regulated, including in the long term, as a natural monopoly
- Regulatory risks manageable due to the stability of the regulatory framework
- Revenue cap regulation enables grid revenues to remain independent of consumption fluctuations
- Inflation protection through link of revenue cap to consumer price index
- Ongoing pressure to be as efficient as possible due to regulation
- Diminishing investment conditions for transmission and distribution grids in the mid term
- In accordance with the Incentive Regulation Ordinance and electricity/gas Network Charges Ordinance, lower equity return rates will be set as of the fourth electricity regulatory period (from 2024) and gas (from 2023)
- Recent actions by the regulatory authority reflect increasing interest rates on the financial markets in the conditions for new grid investments within the fourth regulatory period



## Challenges for grids in Europe

### Main challenges for electricity and gas grids

- Electricity generation is becoming increasingly uneven – fluctuations have an impact on grid stability
- Connection of decentralized renewable electricity generation to the grid requires extensive grid expansion measures for the next decades
- The cessation of Russian gas imports and the integration of newly build LNG terminals will lead to altered gas flow directions and transport capacities to serve the stable gas demand in the mid term
- Germany as a transit country has a large proportion of cross-border trading

### EnBW's approaches to solutions

- **TSOs:** New electricity transmission lines can bridge the distance between focal points of production and consumption centers; use of HVDC transmission lines and underground cables. Expansion of the gas transport network to cover capacity requirements
- **DSOs:** Expansion of electricity grids to integrate renewable generation and newly generated demand by electric cars and electric heating system, smart grid components optimize the expansion of distribution grids. H<sub>2</sub> ready renewal measures in gas distribution grids

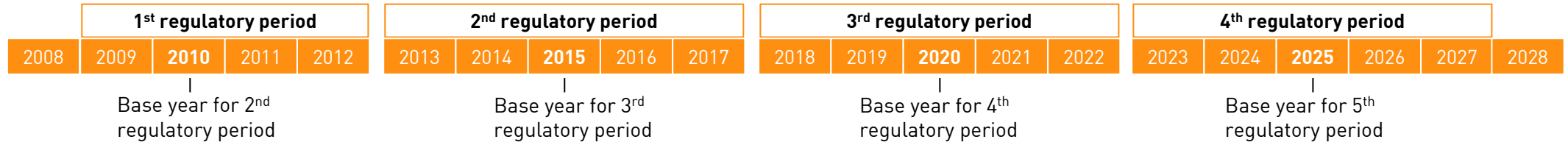


# Regulated grids business Germany: Incentive regulation

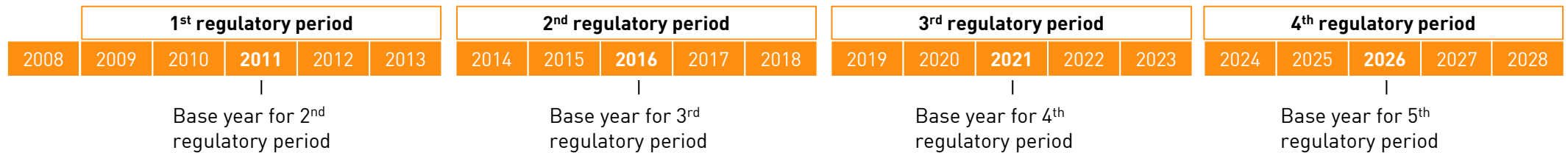
## Introduction of incentive regulation as of 1 January 2009



Gas



Electricity



- Following the introduction of incentive regulation in 2009, grid operators are called upon to continuously improve the efficiency and cost-effectiveness of grid investment and grid operation
- Key regulatory parameters such as return on equity and the costs recognized for a network operator are set for a five-year regulatory period
- The costs to be recognized for grid operators are determined in each base year for the following regulatory period



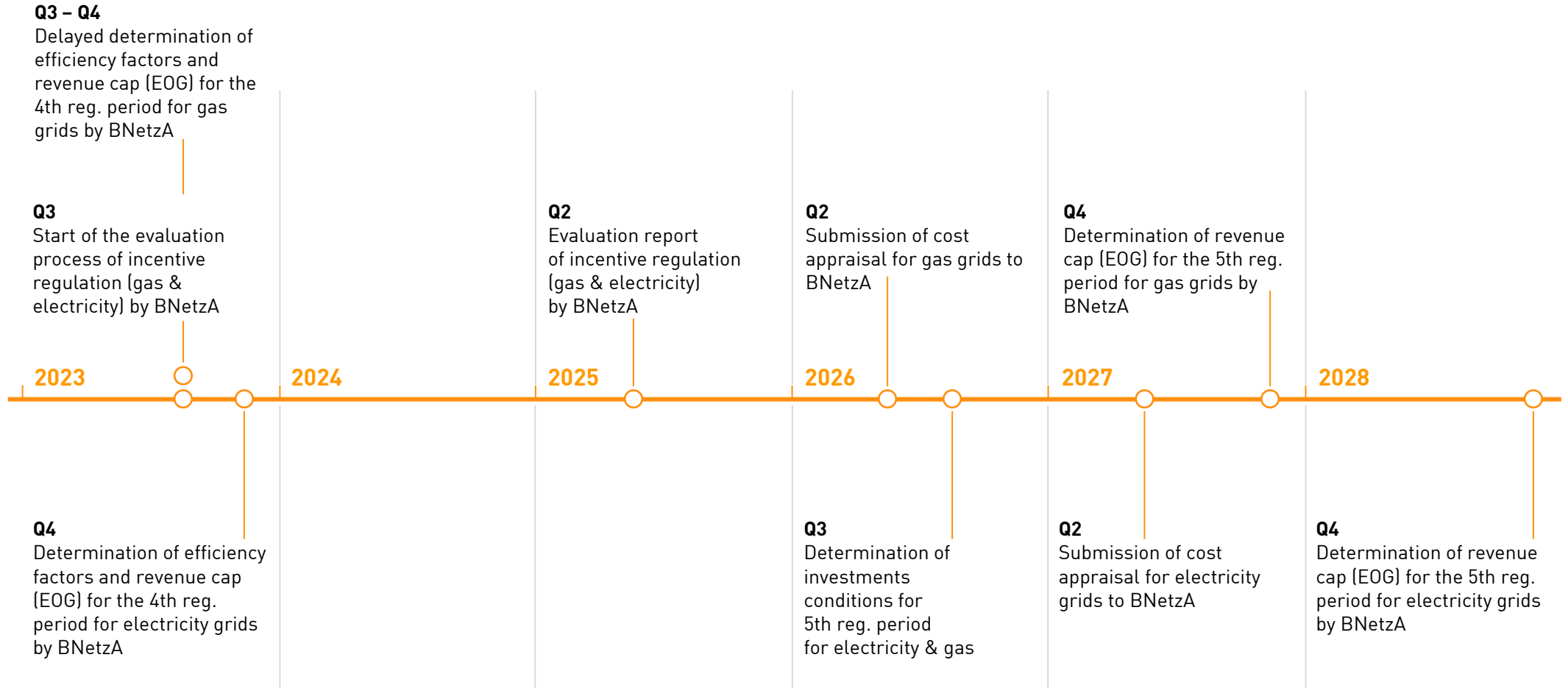
# Regulated grids business Germany: Regulatory events



Gas



Electricity

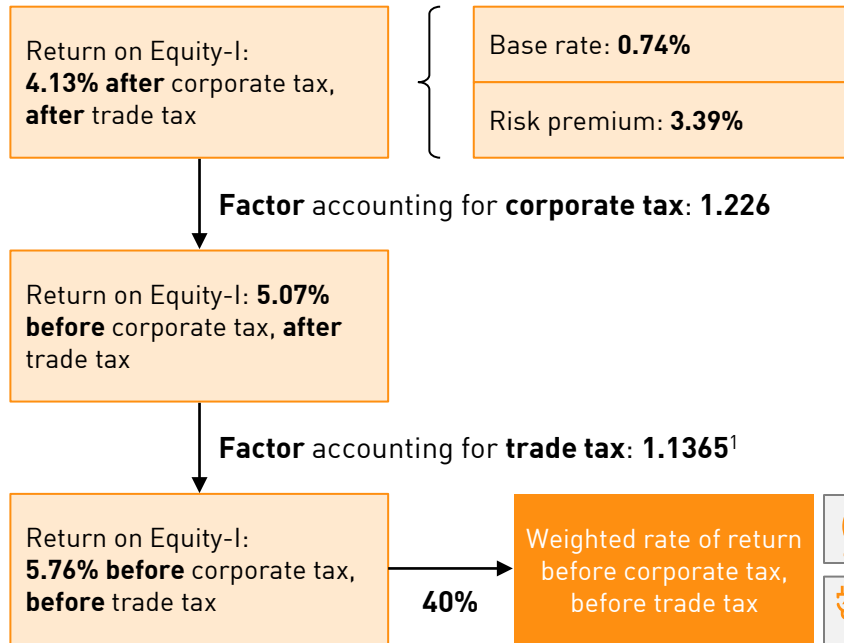




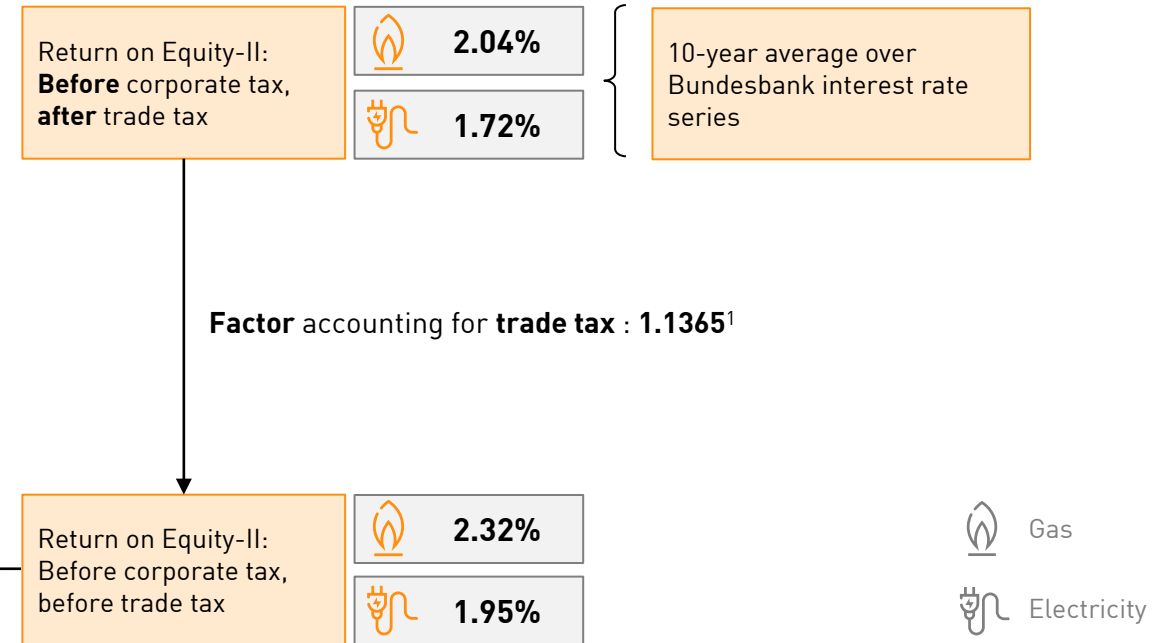


# Regulated grids business Germany: Return on existing investments for the 4<sup>th</sup> regulatory period

## Equity-I ≤40%



## Equity-II >40%



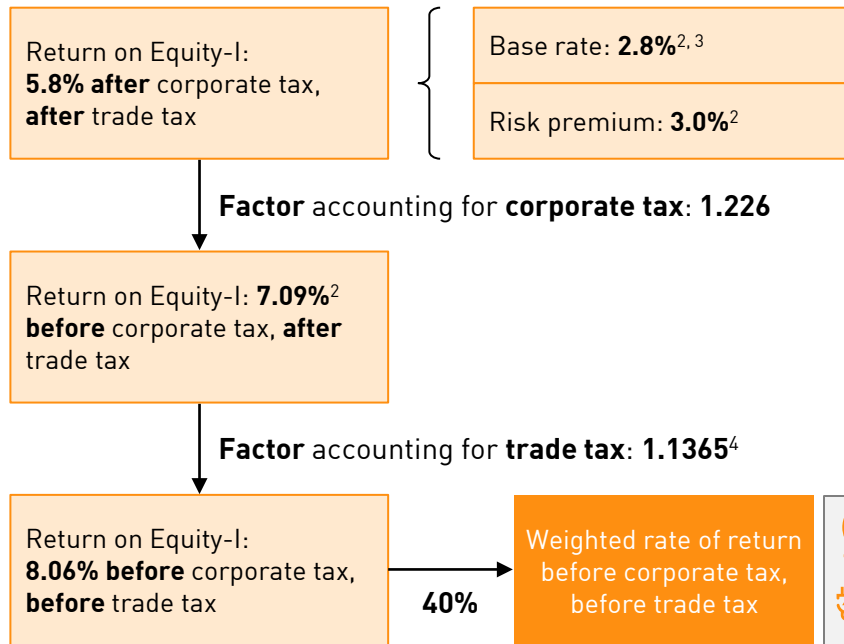
- Irrespective of the actual financing structure, a maximum of 40% of capital employed is subject to the Equity-I rate of return as this is capped at 40% of equity by law (Electricity/Gas Network Charges Ordinance)
- Capital employed in excess of this amount is subject to the Equity-II rate of return

<sup>1</sup> At tax rate 3.50% and multiplier 3.90%

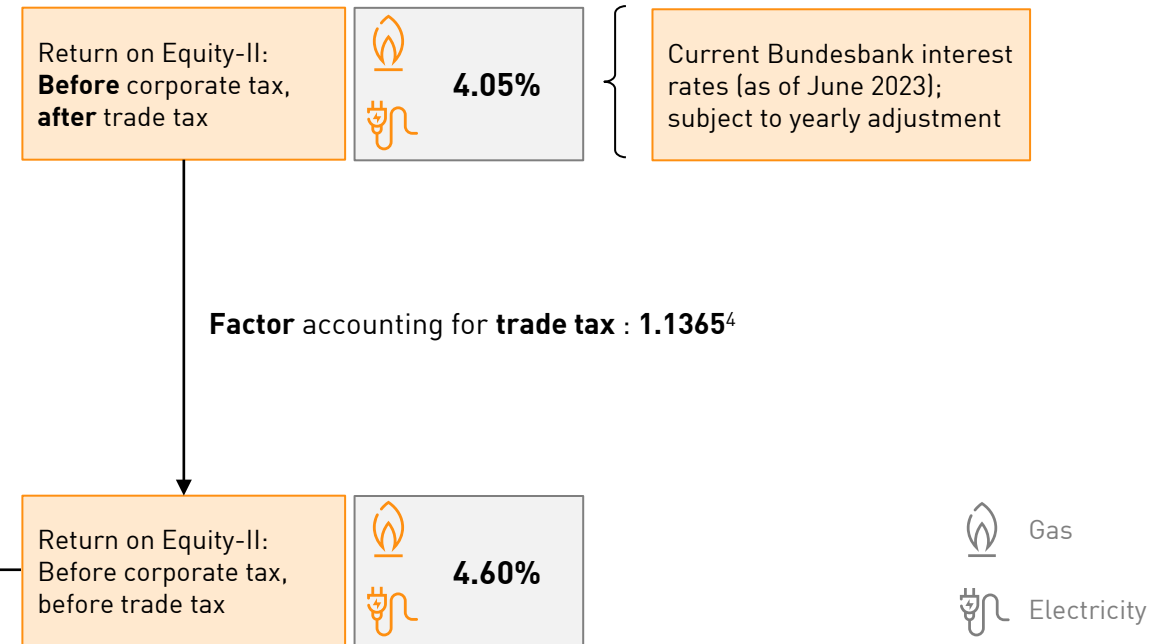


# Regulated grids business Germany: Return on new investments<sup>1</sup> within the 4<sup>th</sup> regulatory period

## Equity-I ≤40%



## Equity-II >40%



- Irrespective of the actual financing structure, a maximum of 40% of capital employed is subject to the Equity-I rate of return as this is capped at 40% of equity by law (Electricity/Gas Network Charges Ordinance)
- Capital employed in excess of this amount is subject to the Equity-II rate of return

<sup>1</sup> Accounted for in BNetzA capex true-up with capital expenditure mark-up <sup>2</sup> Proposal by BnetzA in June 2023 <sup>3</sup> Subject to yearly adjustment <sup>4</sup> At tax rate 3.50% and multiplier 3.90%



# Regulated grids business Germany: Time-lags between spending and remuneration are addressed



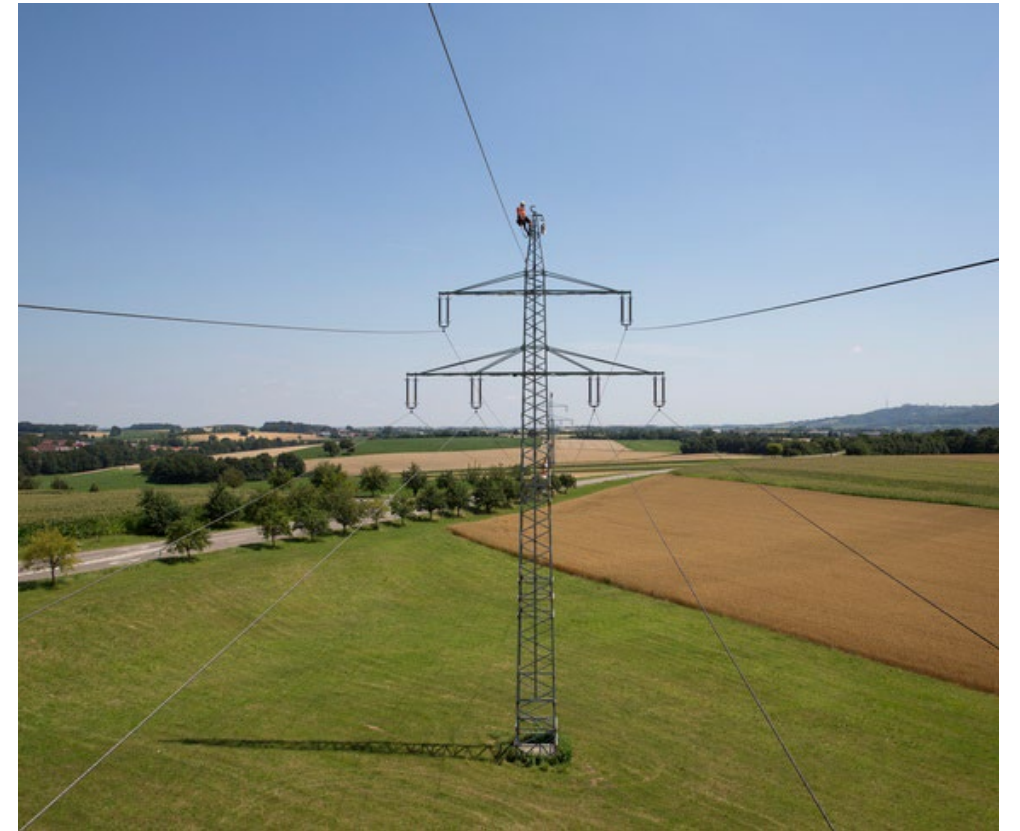
- Due to the base year concept, investments can be taken into account in the revenue cap with a three-year time-lag at best and a seven-year time-lag at worst

## **Investment measures (IMAs) will be phased out in the 5th regulatory period for transmission grid operators (TSOs)**

- Investment measures (IMAs) are a regulatory mechanism introduced to compensate TSOs for such time-lags and to avoid any investment barriers
- IMAs only apply to grid expansion investments and require approval by the BNetzA
- Capex approved by BNetzA on plan basis is recognised in the revenue cap without time-lag
- Commissioning of the respective grid expansion terminates the IMA phase and the investments are rolled over to the “regular” cost base and become subject to the general incentive regulation
- The regulator additionally allows for an opex lump sum on the capex during the IMA phase that flows directly through the revenue build-up

## **Capex true-up<sup>1</sup> is applicable to TSOs and distribution grid operators (DSOs)**

- The capex true-up covers the investments and depreciation after the base year and during the respective regulatory period and requires application by 30<sup>th</sup> June of year t-1
- Investments that come under the capex true-up comprise both replacement and expansion investments on a plan basis



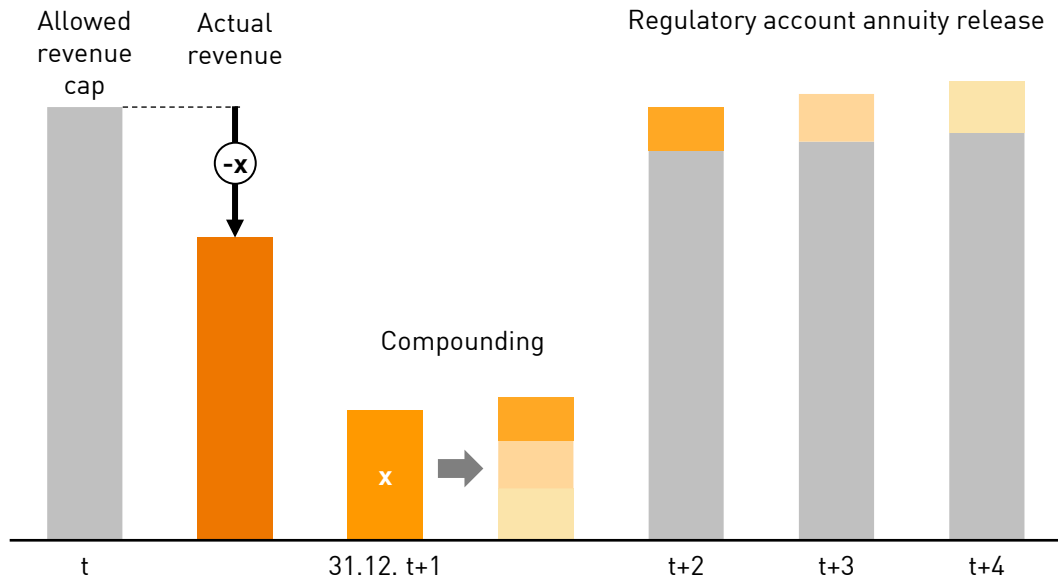
<sup>1</sup> “Kapitalkostenabgleich” (BNetzA)



# Regulated grids business Germany: Revenue risks due to reduced gas supply averted

- The currently reduced natural gas demand in Europe poses a volume risk to grid operators
- Grid tariffs are based on volume forecasts and adjusted on an annual basis
- In case of a gap between actual revenues and allowed revenue cap (i.e. due to delta in volumes), differences will be settled in upcoming periods
- The regulatory account ensures that volume risks pose no revenue risks to grid operators

## Regulatory account for electricity and gas grids



## Mechanism to settle differences between allowed and actual revenue

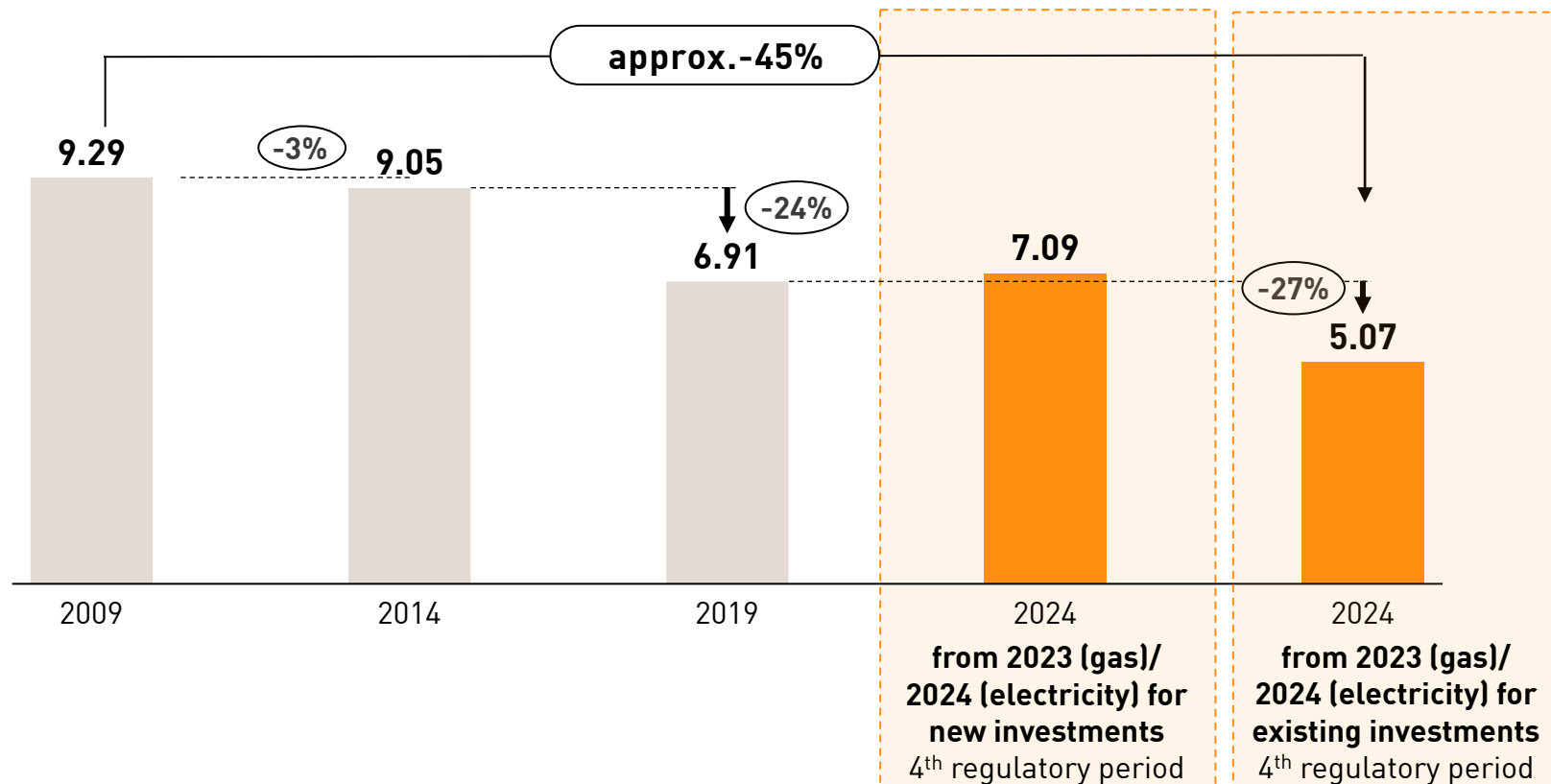
- The regulatory account is used to compensate for:
  - ① Deviations between allowed revenue cap and actual grid revenue
  - ② Actual vs. budgeted difference for certain cost components in the revenue cap
  - ③ Other deviations such as refunding the investment measures clawback
- The account balance is determined annually by the end of the following year (t+1) and is released on an annuity basis over 3 years with interest paid on the balance (interest rate determined based on ten-year trailing average of domestic bearer bonds)
- The regulatory account balance must be approved by Bundesnetzagentur and the release can lead to an increase or decrease of the revenue cap



# Regulated grids business Germany: Regulatory return needs to be revised from 2023/24

## Development of the regulated equity interest rate for electricity and gas in Germany (new installations)

in % (before corporate tax, after trade tax)



- Return on equity set at 5.07% by federal regulatory agency (Bundesnetzagentur<sup>1</sup>) for the 4<sup>th</sup> regulatory period – decreasing return on equity for investments in grids from 2023 (gas) and 2024 (electricity) respectively
- As reaction to current developments at the capital markets, BNetzA has proposed an increase in the return on equity, but only for new investments
- Proposal reflects BNetzA's quick - and as promised - reaction to the recent rising interest rate environment
- Further adjustments by BNetzA expected

<sup>1</sup> Abbreviation: BNetzA



# Electricity grids Germany: Comparison of transmission and distribution grids



## Transmission grids 380 kV, 220 kV (ultra high voltage)



## Distribution grids up to 110 kV (high/medium/low voltage)

### Organization

- 4 operators: 50Hertz, Amprion, TenneT, TransnetBW<sup>1</sup>
- Grid length: ~37,200 km<sup>2</sup>
- Grids owned by operators

- 865 operators<sup>1</sup>
- Grid length: ~1,896,900 km<sup>1</sup>
- Franchises issued by municipalities
- Competition for franchises

### Tasks

- Ensuring balance between generation and consumption
- Using balancing power

- Connecting consumers and local renewable generation
- Recording incidents and troubleshooting

### Challenge of the energy transition

- Transport of electricity generated by wind and PV between northern and southern Germany
- Building new high voltage direct current transmission lines using underground cables
- Connecting offshore wind farms

- Connection of decentralized renewables (e.g. photovoltaics, wind)
- Integration of charging infrastructure for electric cars and electric heating systems
- Use of smart grid tech and digitalisation of metering operation (e.g. smart meters)

### Unbundling regulations

- Ownership unbundling, independent system operator, independent transmission operator

- Functional and financial unbundling of the grid business and obligation as to non-discriminatory use of grid information

<sup>1</sup> TransnetBW is a 100% subsidiary of EnBW <sup>2</sup> Source: "Monitoringbericht 2022" as of 1 February 2023, BNetzA



# Electricity grids Germany: Backbone of the energy transition

## Electricity grids

### General

- The electricity grid business has become a growth business due to the transformation of the energy system to meet climate neutrality
- Changes in legislation have simplified reimbursement for costs of investment in grids: e.g. revision of the Incentive Regulation Ordinance (ARegV)

### Transmission grids

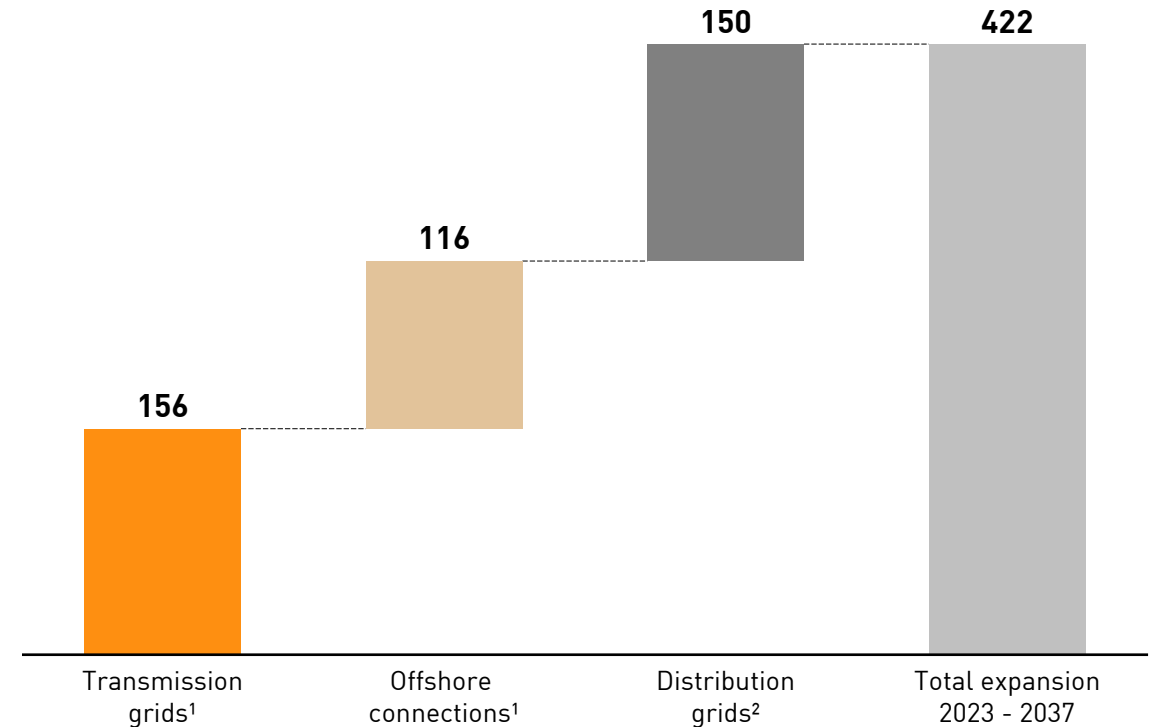
- Growing geographical imbalance between generation and consumption as main driver for transmission grids – primarily construction of high voltage direct current transmission lines and connection to offshore wind farms

### Distribution grids

- Feed-in growing due to local renewable generation
- Growing demand of electric cars and electric heating systems

## Capex for expansion of electricity grids 2023 - 2037

in € bn



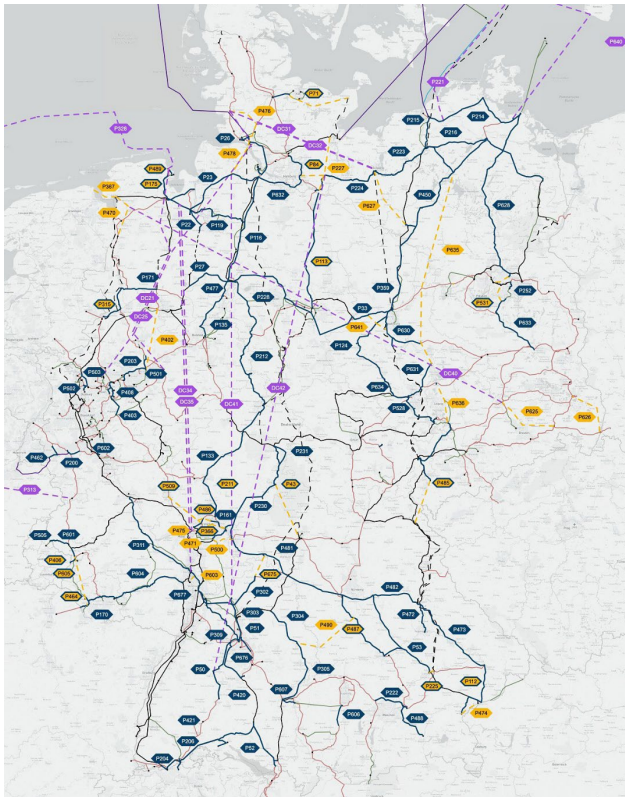
<sup>1</sup> Source "Netzentwicklungsplan Strom 2037 mit Ausblick 2045, Version 2023, Zweiter Entwurf der Übertragungsnetzbetreiber", Szenario B 2037, 12 June 2023

<sup>2</sup> Own Estimation



# Electricity grids Germany: Transmission grid expansion

## Proposed ultra high voltage new lines, rewiring and reinforcement 2023 - 2037<sup>1</sup>



### 10,185 km upgrading in existing line routes<sup>1</sup>

- AC – rewiring and reinforcement: 9,125 km
- DC – rewiring and reinforcement: 1,060 km

### 9,993 km grid expansion in new line routes<sup>1</sup>

- AC – new lines: 2,312 km
- AC – new interconnector lines: 290 km
- DC – new lines: 6,861 km
- DC – new interconnector lines: 530 km

**Existing transmission grid to be upgraded and expanded by over 50% (~20,200 km) by 2037 over current grid length (37,200 km)**

<sup>1</sup> Source "Netzentwicklungsplan Strom 2037 mit Ausblick 2045, Version 2023, Zweiter Entwurf der Übertragungsnetzbetreiber", Szenario B 2037, 12 June 2023  
AC: Alternating current      DC: Direct current





# Gas grids Germany: Comparison of transmission and distribution grids



## Transmission grids

### Organization

- 16 grid operators<sup>1</sup>
- Grid length: ~42,400 km<sup>1</sup>
- Grids owned by operators
- One market area

### Tasks

- Transport gas from import to export points (transit) and vice versa (DSOs and industry or other market areas)

### Challenge of the energy transition

- Long term: potential use of synthetic gas (i.e. hydrogen) as storage medium for fluctuating electricity generation

### Unbundling regulations

- Ownership unbundling, independent system operator, independent transmission operator



## Distribution grids

- 702 grid operators<sup>1</sup>
- Grid length: ~529,000 km<sup>1</sup>
- Franchises issued by municipalities
- Competition for franchises

- Connecting consumers and local providers
- Recording incidents and troubleshooting

- Integration of biogenic and synthetic gases
- Degree of utilization decreases if electric heating systems and district heating systems increase

- Functional and financial unbundling of the grid business and obligation as to non-discriminatory use of grid information

<sup>1</sup> Source: "Monitoringbericht 2022" as of 1<sup>st</sup> February 2023, BNetzA



# Gas grids Germany: Another major element of the energy transition

## Gas grids

### Transmission grids

- The reduction of Russian natural gas imports via pipeline and their substitution by LNG via ship have significant impact on transmission grid flow directions and capacities
- In March 2023, the transmission grid operators proposed their preferred gas transmission grid development scenario and corresponding CAPEX requirements

### Distribution grids

- Smaller scale of expansion compared to electricity grids
- Growth potential due to the connection of new gas fired power plants

### Hydrogen grids

- Hydrogen grids for at least industry as well as heat and power generation plants intended by the EU
- Regulatory framework and German core grid to be defined in 2023

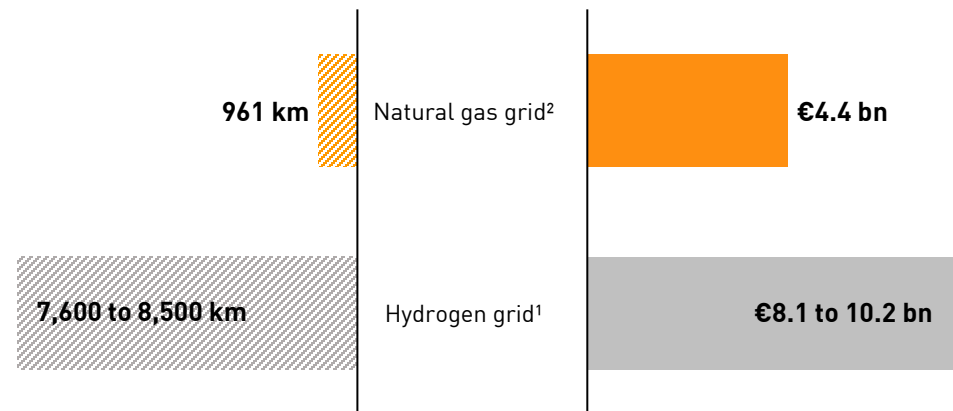
## Further development of German gas transmission grid

Transmission grid operators proposed grid development plans

- to integrate LNG supplies into the existing German transmission grid to partially substitute Russian gas imports
- to develop a hydrogen grid supplying up to 150 TWh to German demand clusters in 2032 predominantly from already existing natural gas pipelines

### Grid expansion 2022 - 2032<sup>1</sup>

### CAPEX requirements 2022 - 2032<sup>1</sup>



<sup>1</sup> "Netzentwicklungsplan Gas 2022-2032, Entwurf" as of 31 March 2023, German Transmission System Operators

<sup>2</sup> According to natural gas transmission grid development scenario "Versorgungssicherheitsvariante LNGplus C" in "Netzentwicklungsplan Gas 2022-2032, Entwurf"



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