

Aurora keynote:

Short term pain and long term gain?

Consequences of the Russian gas crisis for  
Germany's Net Zero transition



Jan-Lukas Bunsen

Head Of Research Central Europe, Aurora

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# Renewables Summit

Berlin 2022

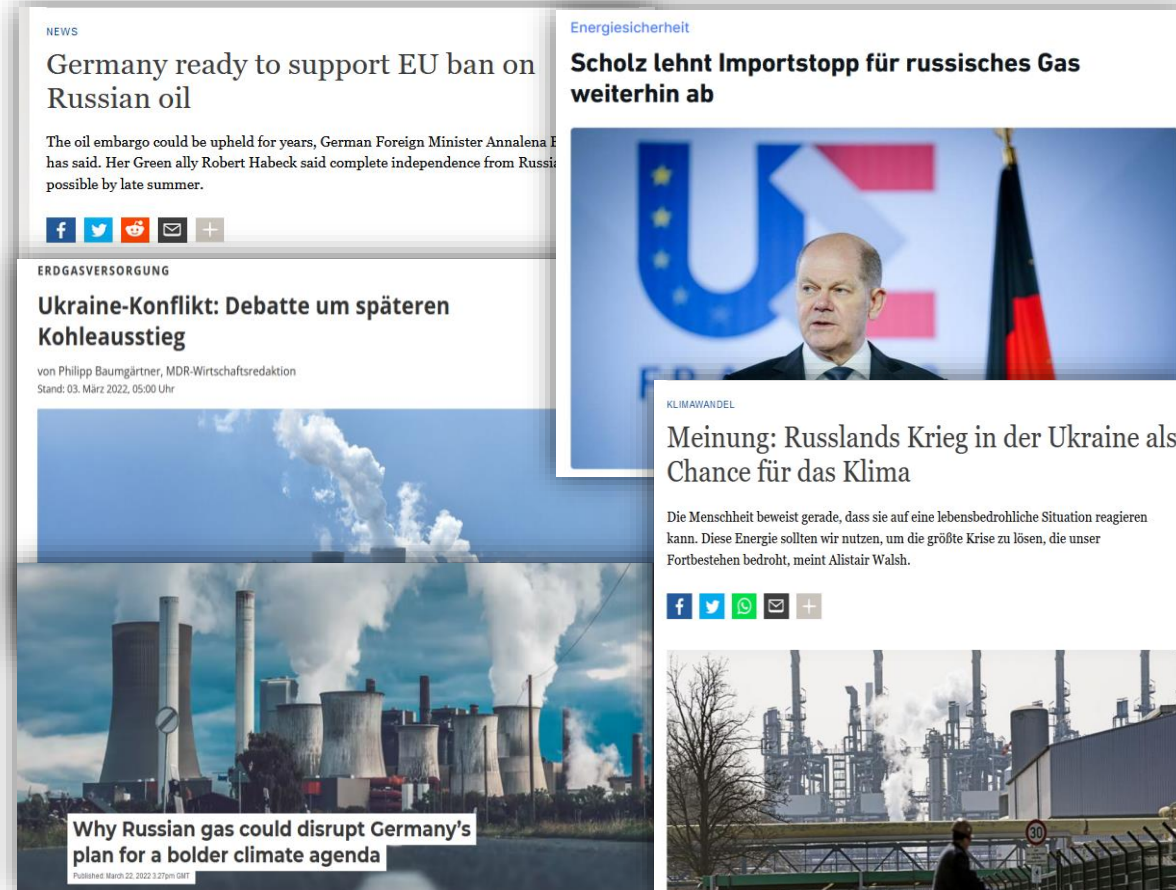
Premium Partner:



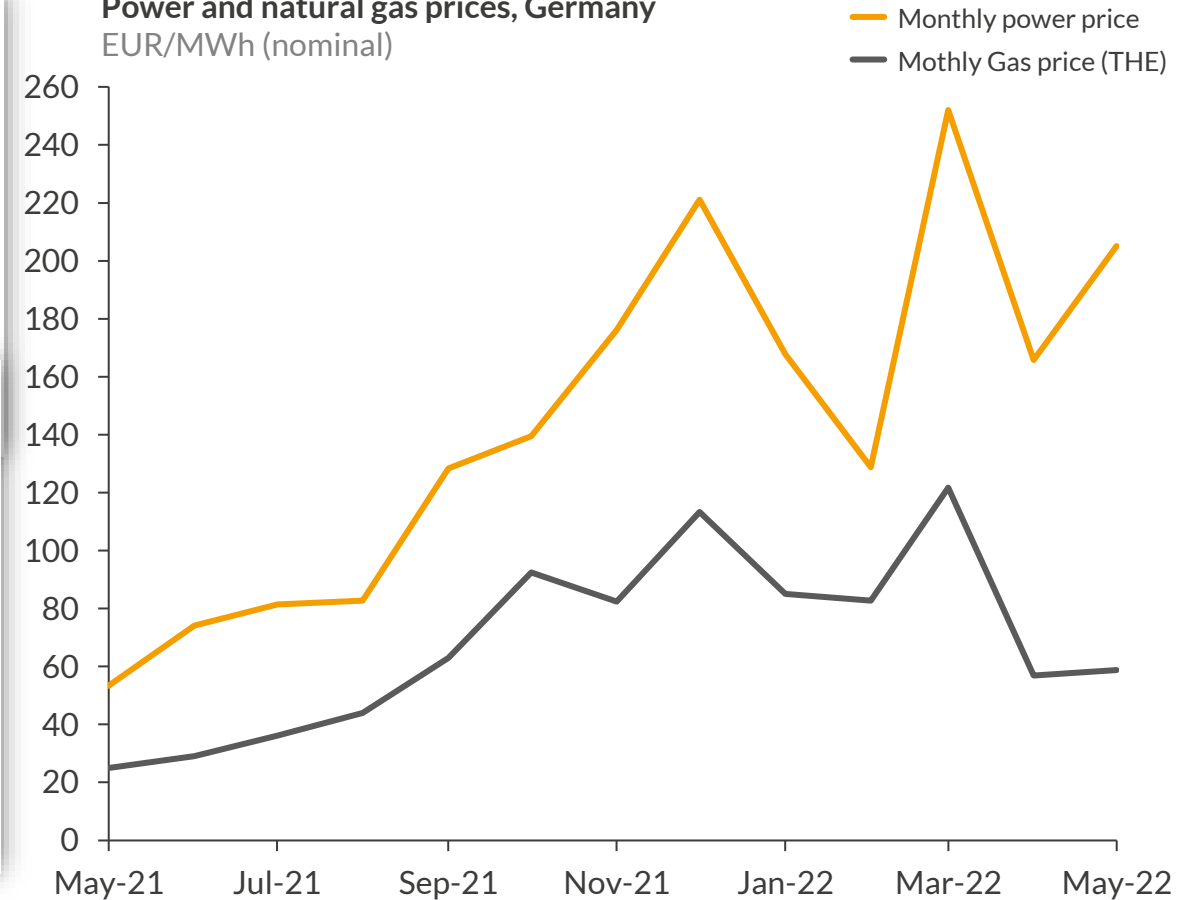
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**TAGESSPIEGEL**  
**BACKGROUND**  
ENERGIE & KLIMA

# The war in Ukraine urges Germany to address its dependency on Russian energy imports...



Power and natural gas prices, Germany  
EUR/MWh (nominal)



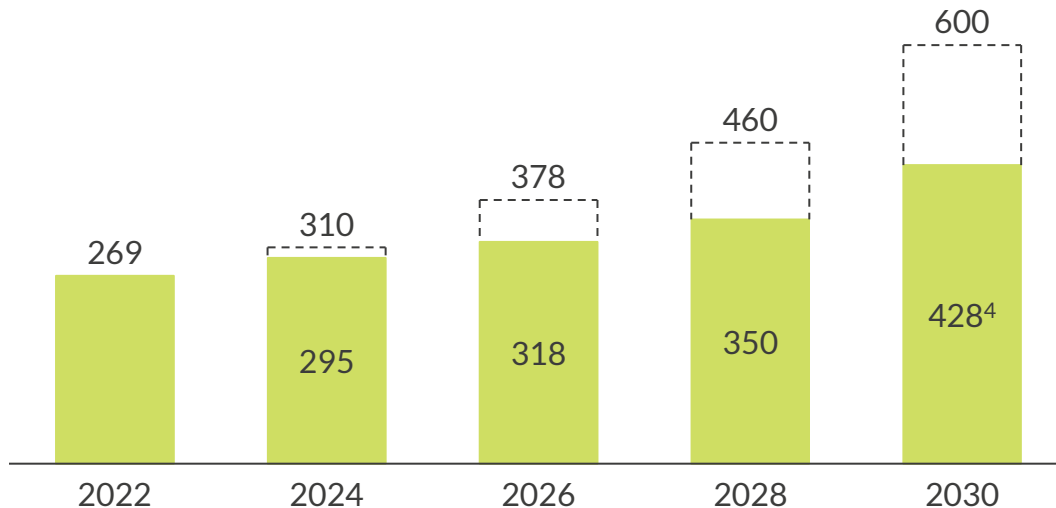
# ... while delivering on ambitious decarbonisation targets

## Government targets

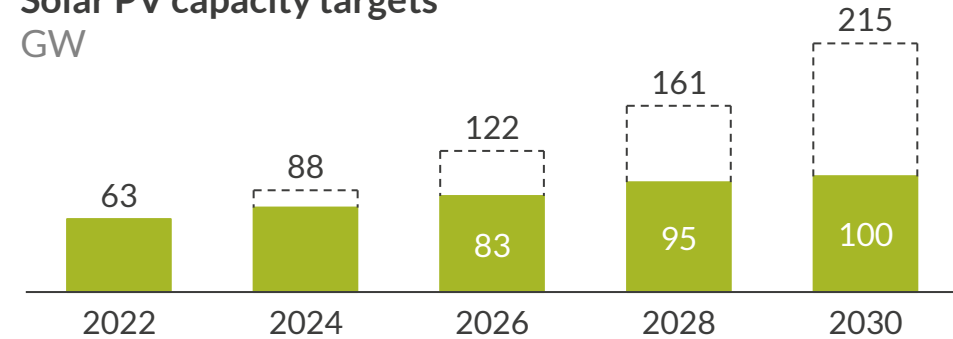
- 80% share of renewables with demand of 750 TWh by 2030
- 10 GW of electrolyser capacity by 2030
- Power supply almost entirely from renewables by 2035
- All sectors to be climate neutral by 2045

## Renewable generation targets TWh

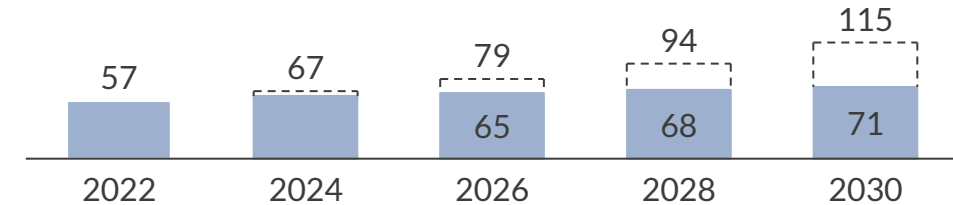
□ EEG 2023 government draft  
■ Current legislation (EEG 2021)



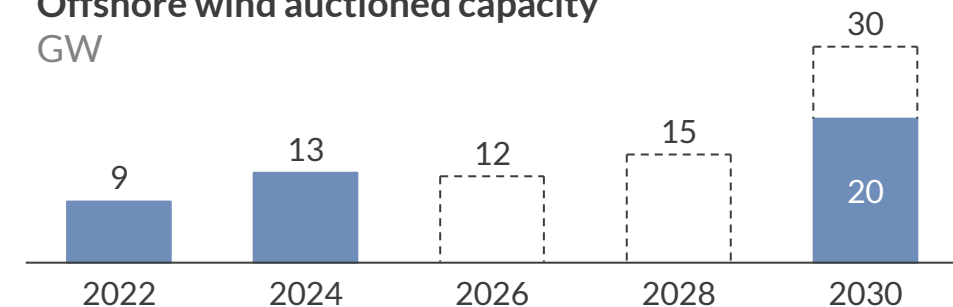
## Solar PV capacity targets GW



## Onshore wind capacity targets GW



## Offshore wind auctioned capacity GW

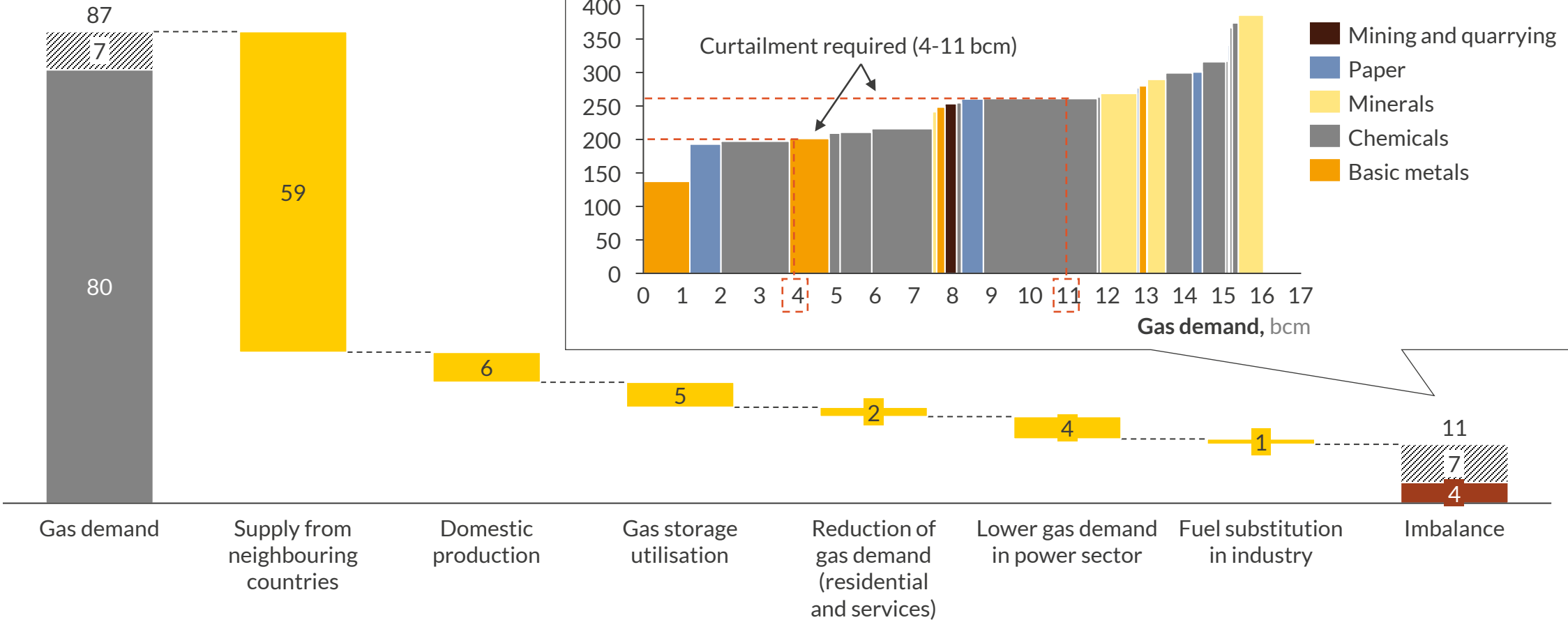


- 1 What would happen in case of a gas supply stop this month?
- 2 What are medium term scenarios for the Germany's gas supply?
- 3 What are the implications for renewables and hydrogen in Germany?

1

If Russian gas flows stop, supply falls short by 4-11 bcm in winter, leading to demand cuts in industry and prices above 200 EUR/MWh

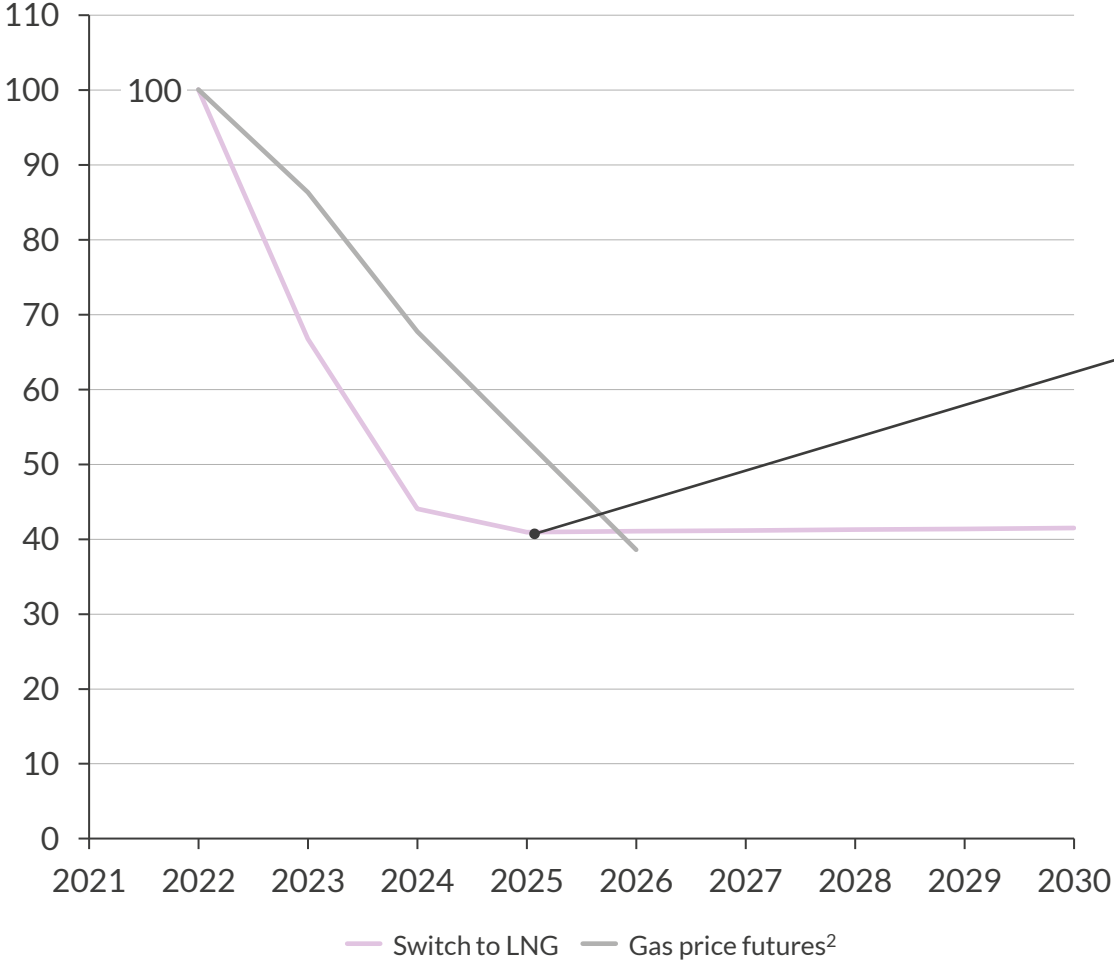
German natural gas demand and supply  
April 2022 to March 2023  
bcm



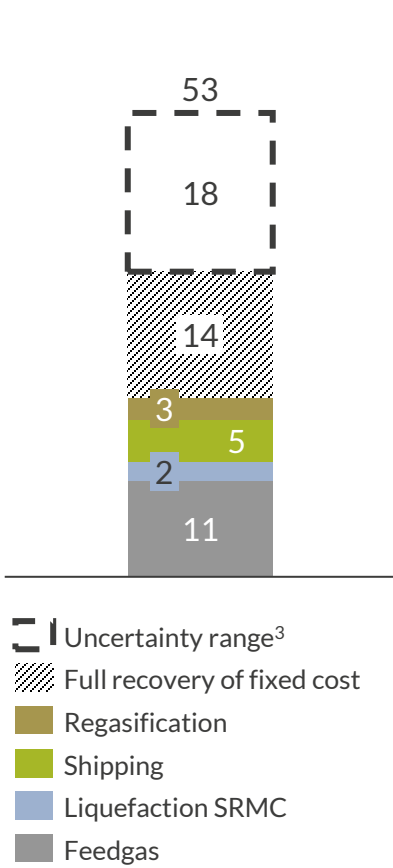
2

Germany can become independent of Russian gas by 2025, a switch to LNG as main source of supply would lead to gas price of 35–53 EUR/MWh

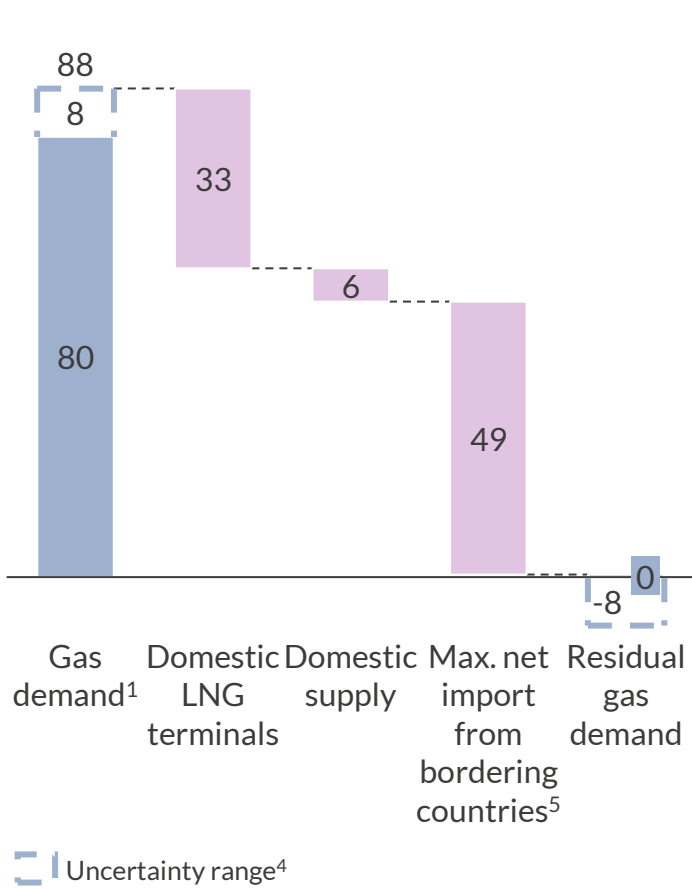
Natural gas price<sup>1</sup>  
EUR/MWh (real 2021)



LNG cost in 2025  
EUR/MWh (real 2021)



German gas demand and supply balance in 2025  
bcm



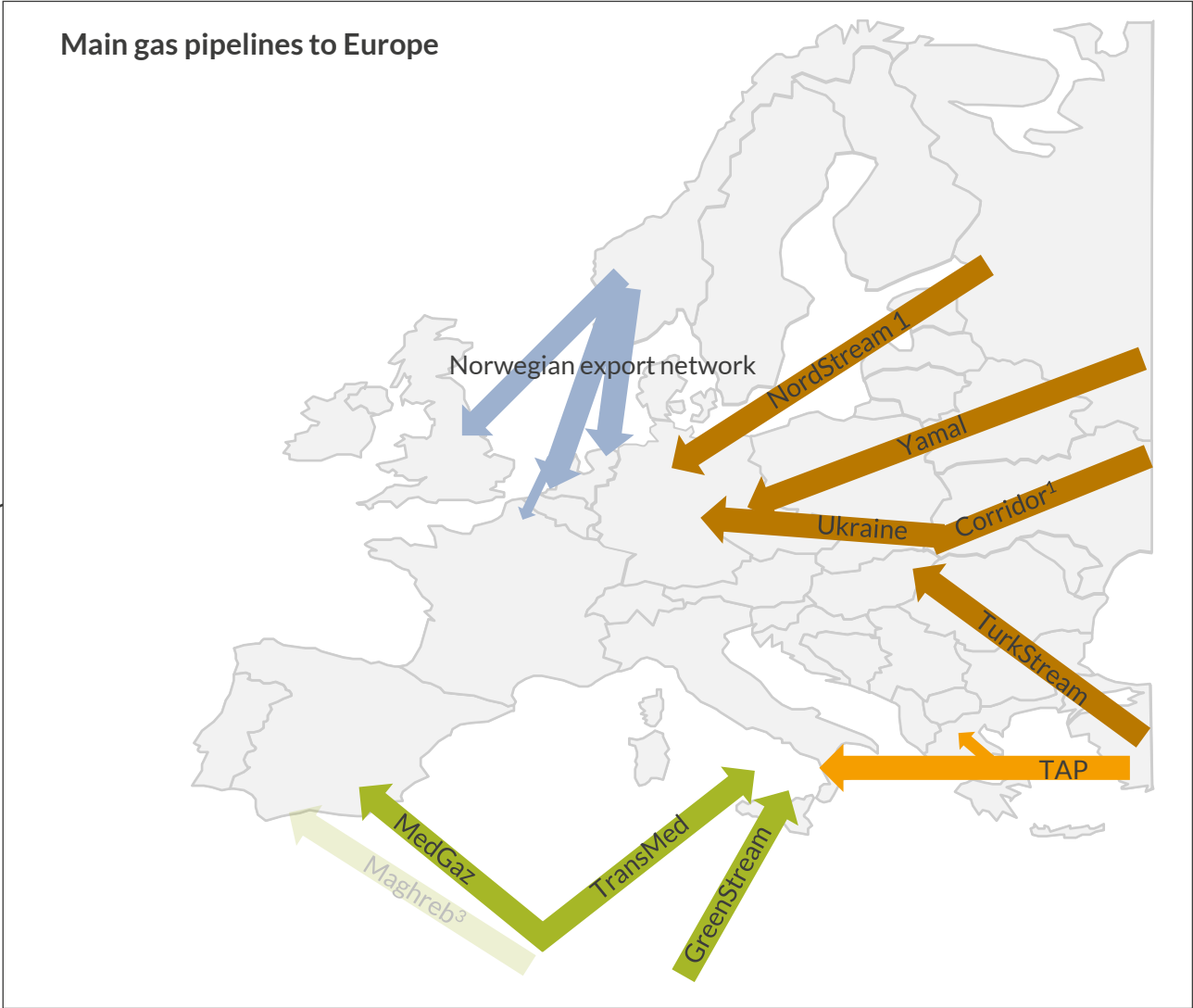
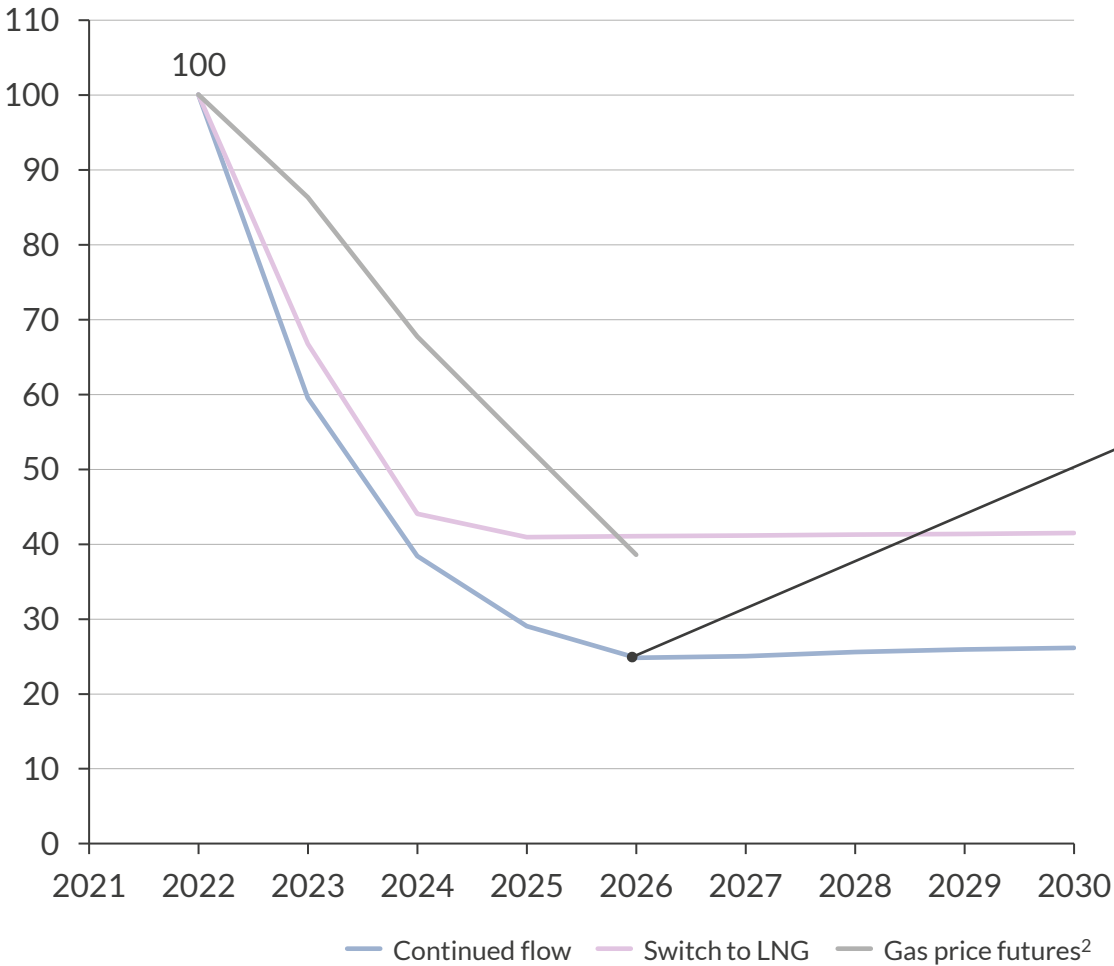
1) Gas price reflecting hub price at THE (Trading Hub Europe). 2) As of 19<sup>th</sup> May 2022. 3) Assuming LNG to be sourced solely from (a) the USA or (b) Algeria. 4) Assuming two scenarios: (a) gas demand lower compared to Continued flow due to higher gas prices and government actions and (b) gas demand at the same level as in Continued flow. 5) Based on Aurora's preliminary analysis.



2

But a full phase-out of Russian gas imports should not be taken for granted: A U R ☀ R A  
in a “continued flow” scenario, we expect gas prices at 25 EUR/MWh

Natural gas price<sup>1</sup>  
EUR/MWh (real 2021)



1) Gas price reflecting hub price at THE (Trading Hub Europe). 2) As of 19<sup>th</sup> May 2022.

3

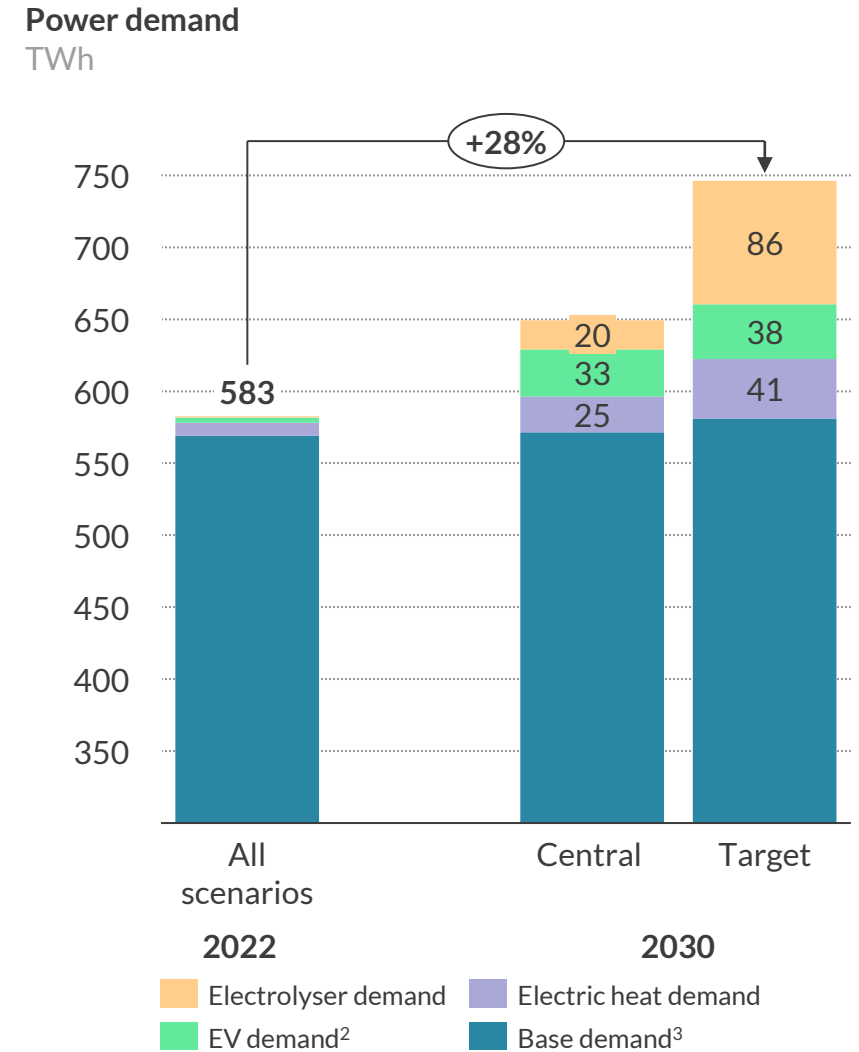
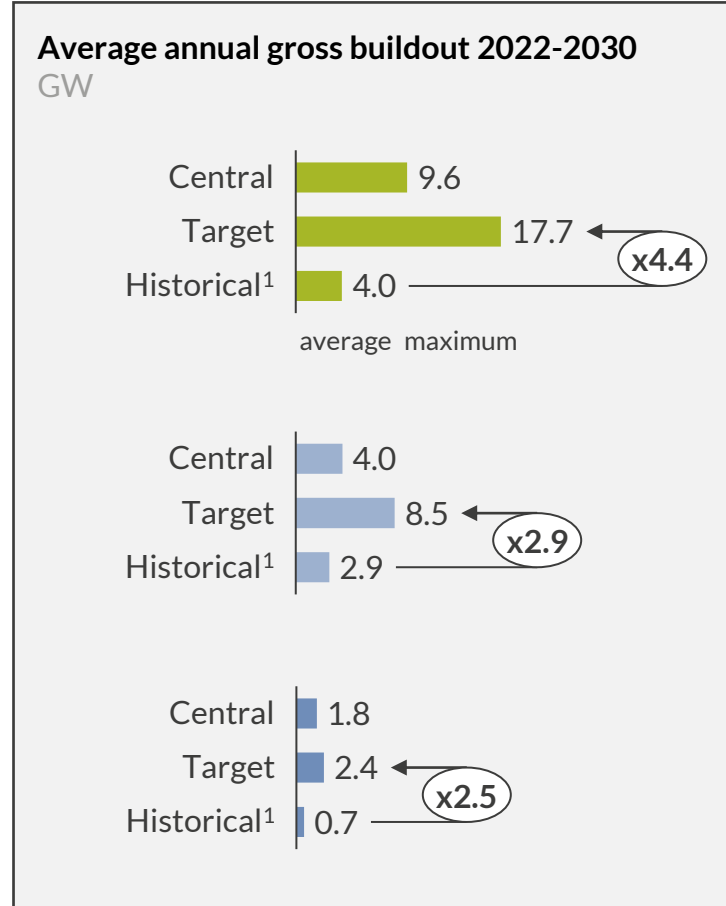
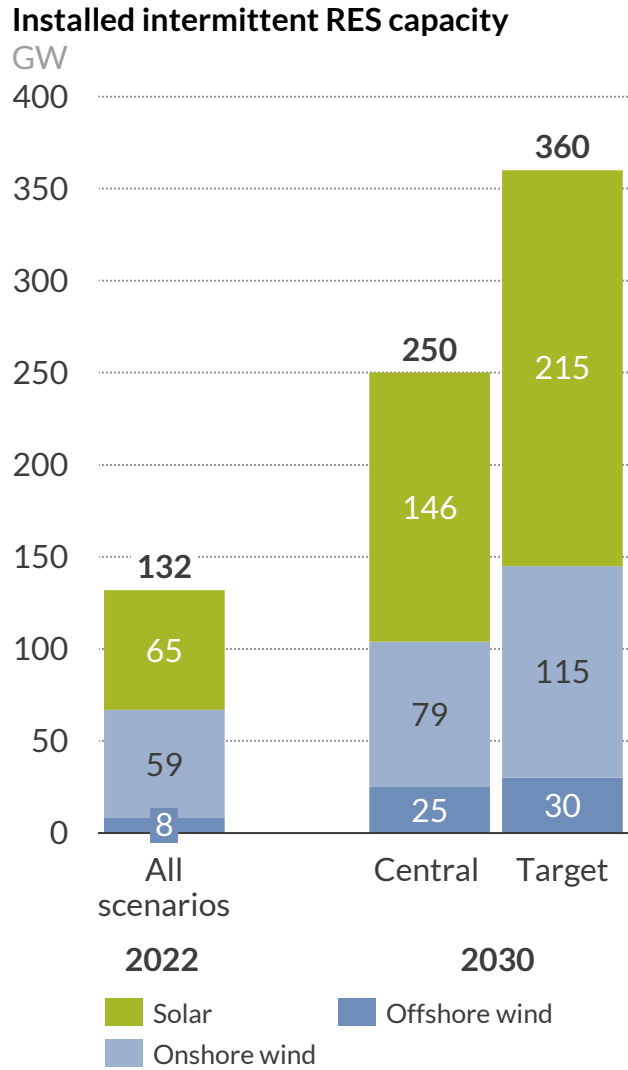
# Next to future supply of gas, speed of decarbonisation is a big swing factor in Germany's power market – we assess these uncertainties in 4 scenarios

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|                      |                              | Power market assumptions                                     |  |
|----------------------|------------------------------|--|--|
|                      |                              | Moderate decarbonisation by 2030                             | Ambitious decarbonisation by 2030                          |
| Gas demand reduction | High RES buildout            | ✗ Intermittent RES capacity reaches 250 GW                   | ✓ Intermittent RES capacity reaches 340 GW (+36%)          |
|                      | Fast electrification of heat | ✗ Power demand from electric heating reaches 25 TWh          | ✓ Power demand from electric heating reaches 41 TWh (+64%) |
|                      | Strong hydrogen uptake       | ✗ Hydrogen demand reaches 69 TWh                             | ✓ Hydrogen demand reaches 127 TWh (+84%)                   |
|                      | Delayed coal exit            | ✗ Coal exit by mid-2030s (i.e. ahead of government timeline) | ✗ Even earlier coal exit 2030s                             |
| Gas supply           | Continued flow               | Central<br>(cont'd flow)                                     | Target<br>(cont'd flow)                                    |
|                      | Switch to LNG                | Central<br>(LNG)   | Target<br>(LNG)  |



# 3 Reaching 2030 renewable targets requires tripling wind and quadrupling solar growth rates, while power demand rises by 28%

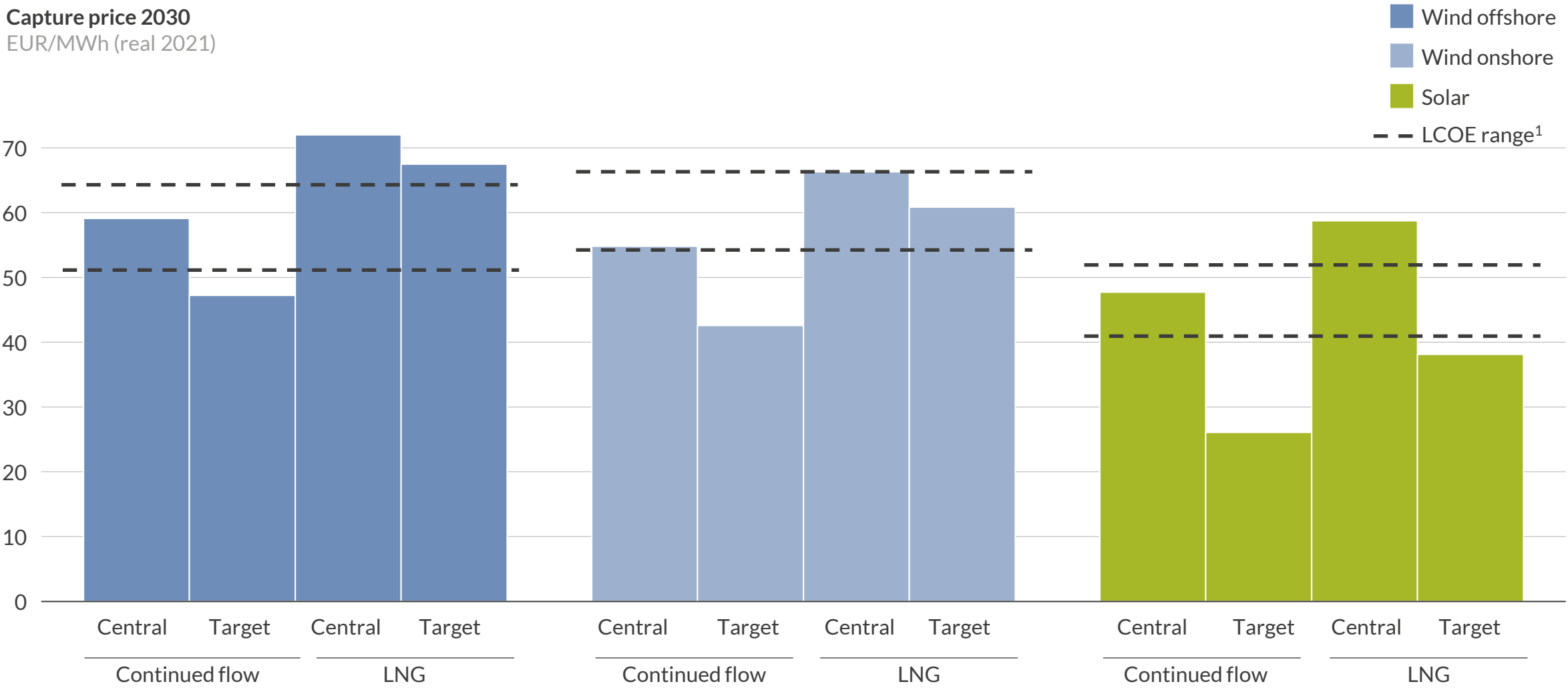


1) Historical average and maximum annual gross buildout from 2010 to 2020. 2) Only pure battery EVs, not including PHEVs. 3) Industry, commerce, households, transport other than EVs.

3

# Higher LNG prices and rising power demand mitigate cannibalisation of renewables capture prices and improve their economics

Capture price 2030  
EUR/MWh (real 2021)



1) WACC equals 8.5% for the upper limit and 5.0% for the lower limit.

### 3 Even in a decarbonised power market, prices are unlikely to crash, as high marginal cost flexible technologies will set the price

Hourly power generation<sup>1</sup> by technology in 2050 in Net Zero scenario  
% of demand



RES<sup>2</sup> Net imports and flexible technologies<sup>3</sup> CHP<sup>4</sup> H<sub>2</sub>-fuelled plants

1) Simplified by showing average generation for 16-hour intervals. 2) Includes all RES except biomass CHPs. 3) Flexible technologies include batteries, pumped storage, EV and heat pump demand as well as DSR. 4) Includes biomass CHP.

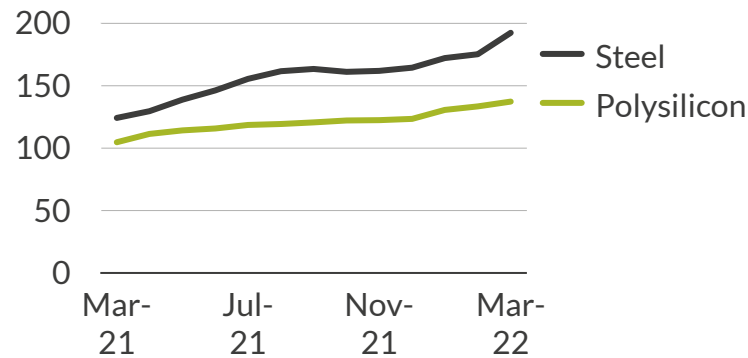
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# Main challenges to realise the renewable targets are a constrained supply chain, permitting and consenting, as well as grid extension

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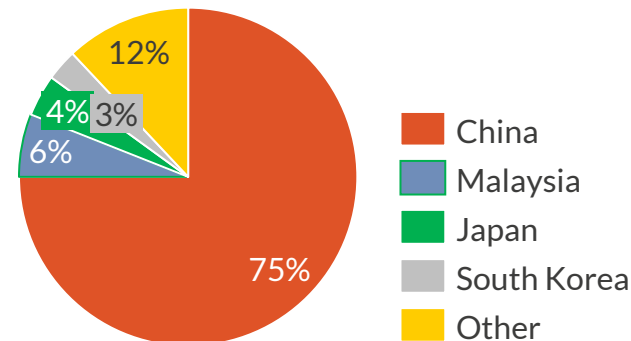
## Supply chain

German producer price index



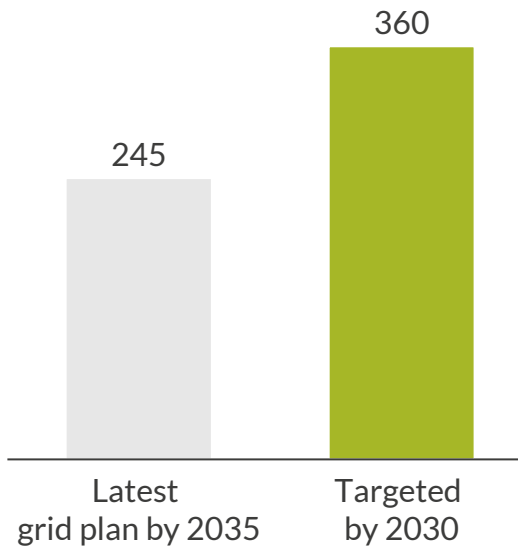
EU imports of solar panels in 2020

GW



## Grid extension

Renewable capacity  
GW



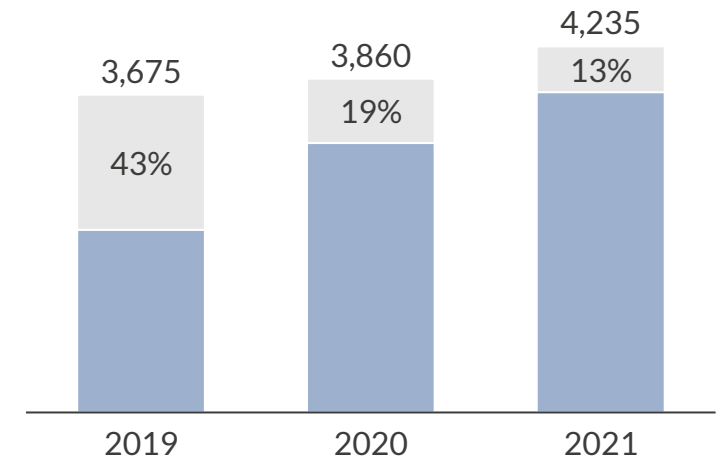
## Announced delays versus the latest plan

- Neuenhagen – Vierraden – Bertikow overhead line – 1-year delay
- Uthort – Osterath overhead line – 2-year delay
- Parchim/Süd – Perleberg extra-high voltage line – 4-year delay

## Permitting and consenting

Wind onshore auction

MW, % of unallocated volume

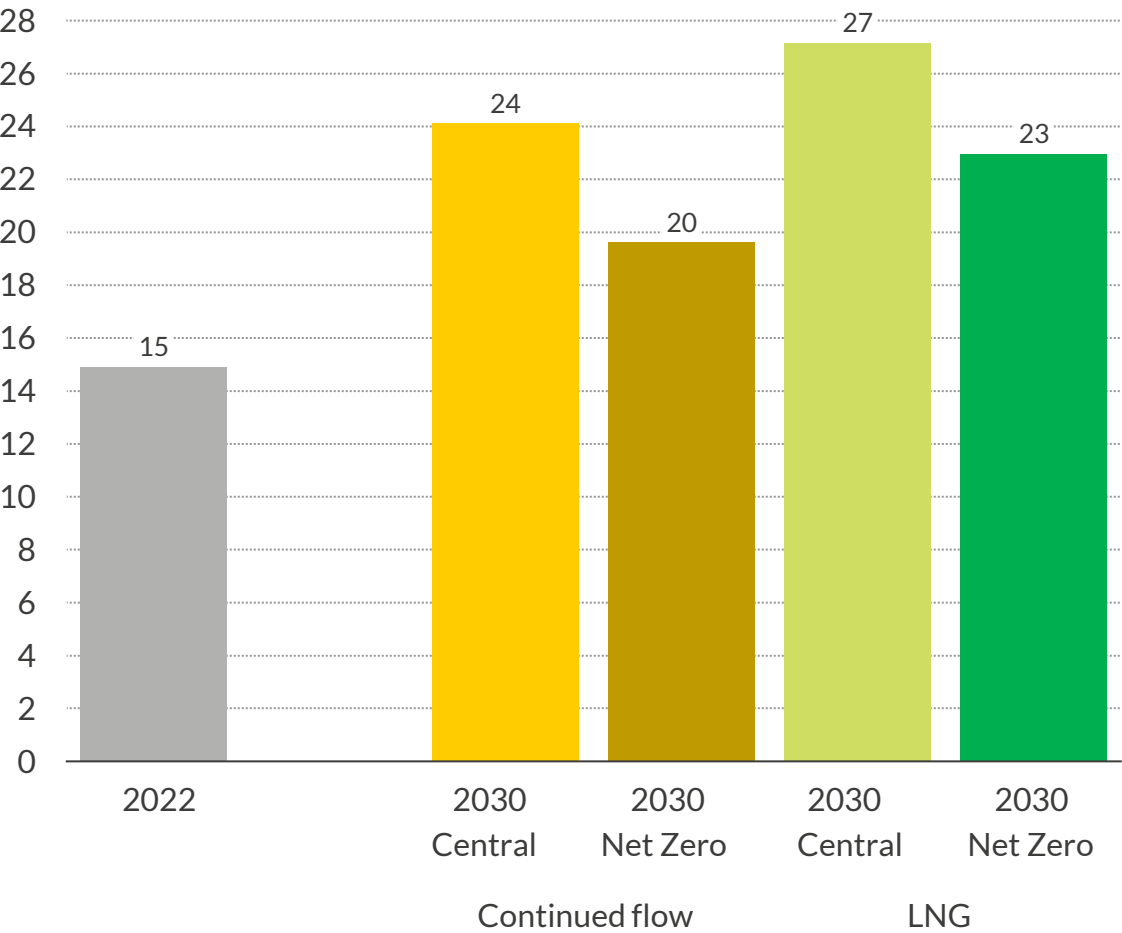


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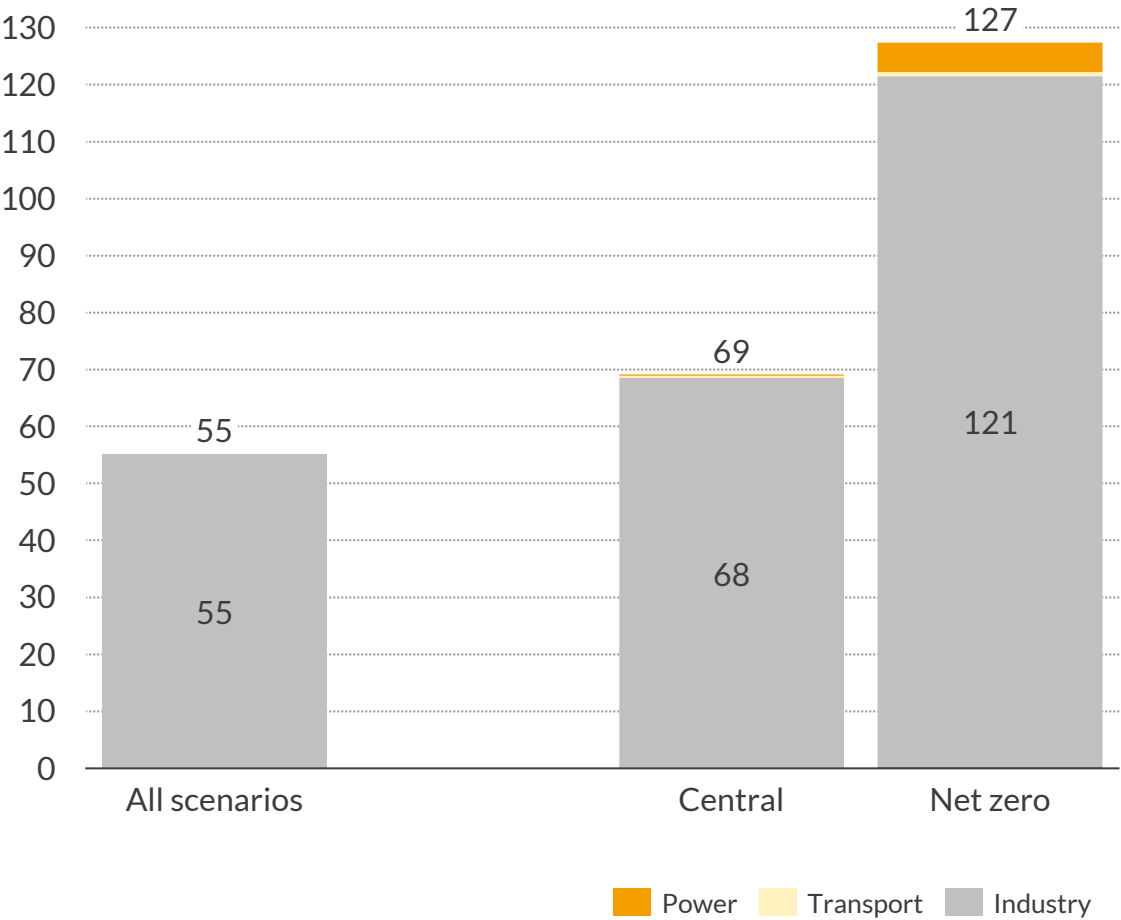
Over the next decade, natural gas will continue to play a key role in power as increased hydrogen use replaces fossil fuels in industry first

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Power sector natural gas demand  
bcm



Hydrogen demand across sectors  
TWh



## Details and disclaimer

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### Publication

Consequences of the Russia gas crisis for Germany's Net Zero transition

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### Prepared by

Ningzi Xia  
([ningzi.xia@auroraer.com](mailto:ningzi.xia@auroraer.com))

### Approved by

Manuel Köhler  
([manuel.koehler@auroraer.com](mailto:manuel.koehler@auroraer.com))

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