



9th November 2022

Prof. Dr. Peter Hennicke

German Co-Chair of the GJETC

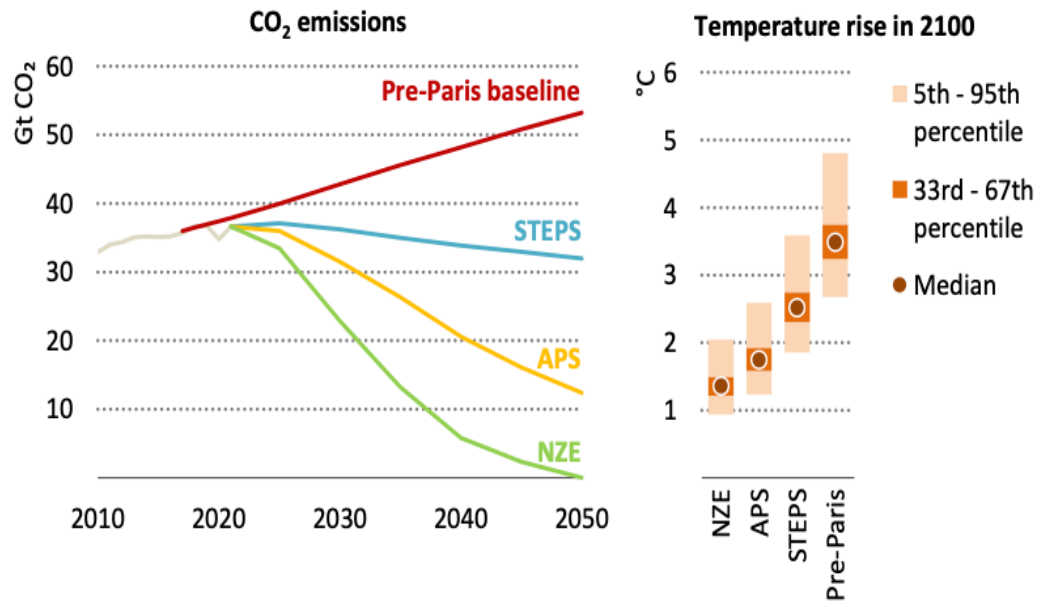
Supported by Frank Labunski and Anna Röttger

Securing Energy Sovereignty while Approaching Carbon Neutrality in Germany in Times of Crisis

Measures of the German Government and the EU

Three Key Messages from the IEA-NZE-Scenario (2022)

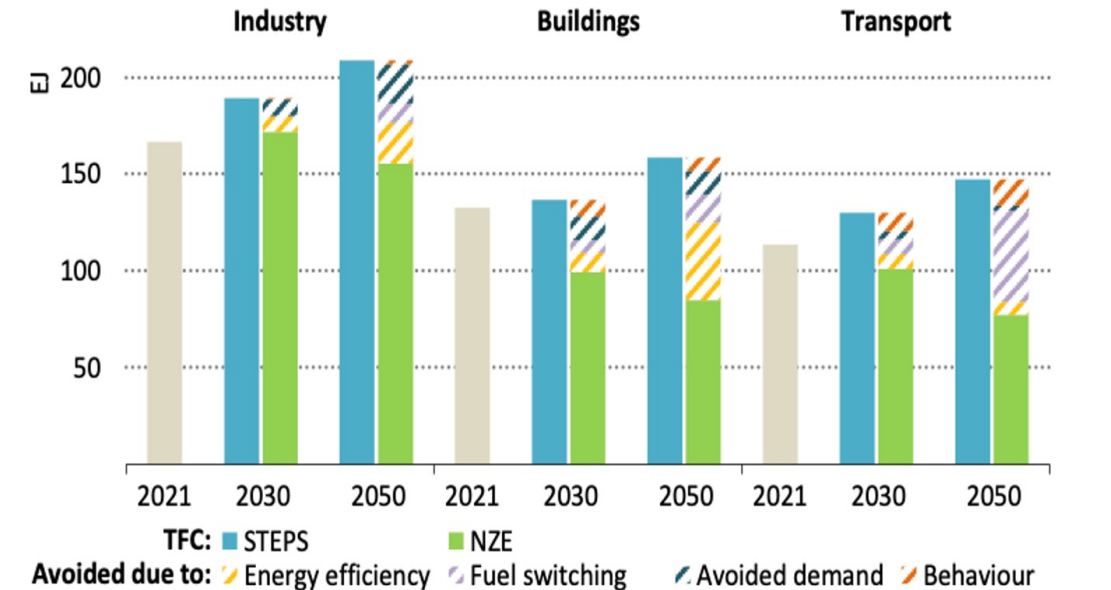
→ 1. Energy Efficiency Revolution („Efficiency First“)



IEA. CC BY 4.0.

Policy and technology advances since 2015 have shaved 1 °C off the temperature rise in 2100 but stated policies still lead to a temperature rise well above the Paris Agreement goals

Notes: Pre-Paris trajectory is based on the Current Policies Scenario from the WEO-2015 (IEA, 2015). Temperature rise estimates are relative to 1850-1900 and match the IPCC Sixth Assessment Report definition of warming of 0.85 °C between 1995-2014 (IPCC, 2022a).



IEA. CC BY 4.0.

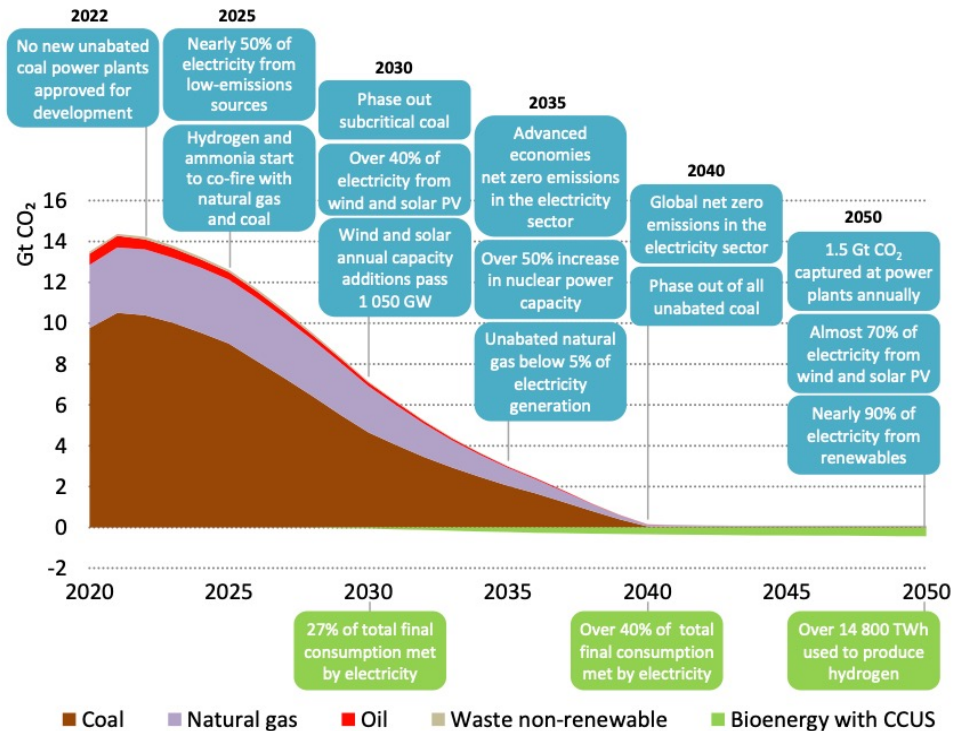
Energy efficiency, behavioural changes and other mitigation measures in the NZE Scenario cut total final energy demand by almost 40% compared to the STEPS in 2050

Notes: Fuel switching includes electrification. Avoided demand includes materials efficiency gains, circular economy effects, and structural and economic effects, such as the response of consumers to higher prices.

: IEA, WEO; NZE: Net Zero Scenario ; APS: Announced Pledges Scenario; STEPS: Stated Policies Scenario)

Three Key Messages of the IEA-NZE-Scenario (2022)

→ 2. Heading for Net Zero Electricity in 2040

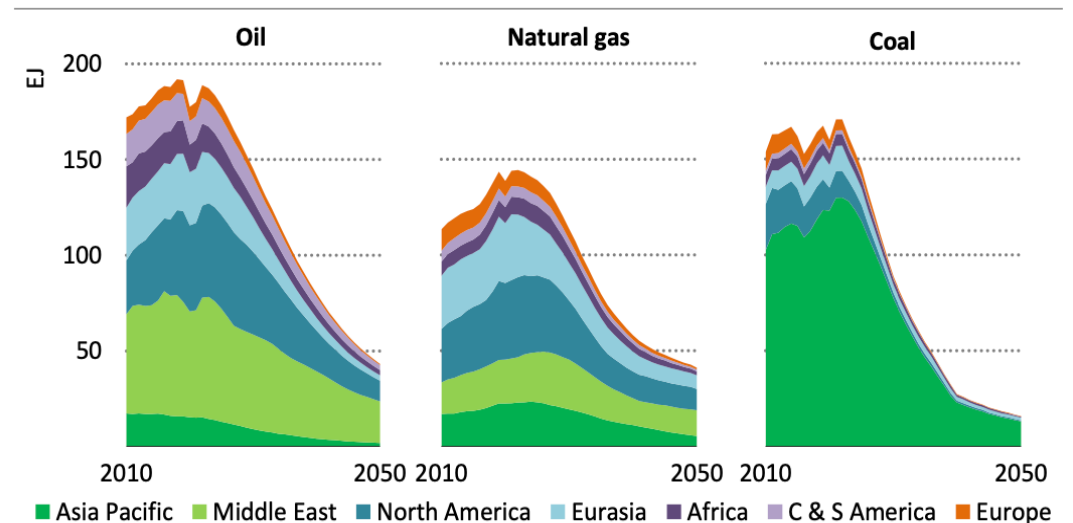


IEA. CC BY 4.0.

Electricity is the first sector to reach net zero emissions in 2040, tapping a wide set of low-emissions sources and enabling other sectors to cut emissions through electrification

Notes: TWh = terawatt-hour; CCUS = carbon capture, utilisation and storage. Waste non-renewable represents any non-biogenic waste combusted for energy purposes.

→ 3. No New Conventional Oil, Gas, Coal Projects and Mines



IEA. CC BY 4.0.

Declines in demand can be met without approving new long lead time upstream conventional oil and gas projects, new coal mines or mine lifetime extensions

Note: C & S America = Central and South America.

Overview: Germany's Short- vs. Longterm Reactions to the Crisis

Short term:

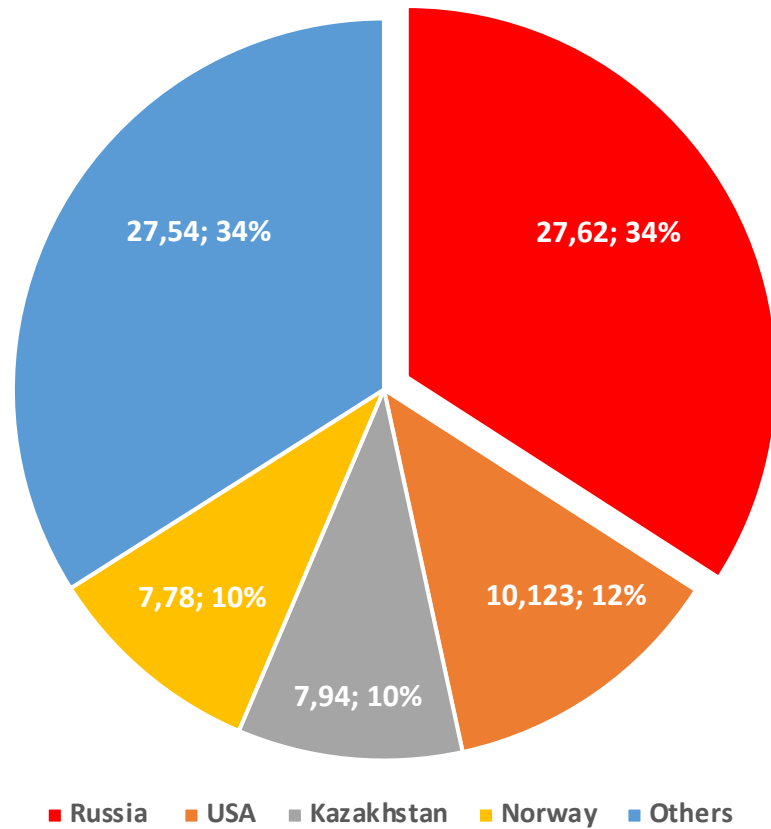
- Saving energy - 20% of gas, - 10% of electricity
- Filling gas storage to almost 100%, using more gas from Norway and LNG via Belgium and Netherlands
- Building floating LNG terminals – up to one third of pre-crisis gas demand by end of 2023
- Few GW of coal power plant reserve until spring 2024, and extend nuclear phase-out by 3.5 months (15 April 2023), cope with outage of half of France's nuclear power plant fleet
- Partial relief against energy price increases through subsidies, while preserving incentive

Mid term (2025 ff.) to long term (2030 ff.)

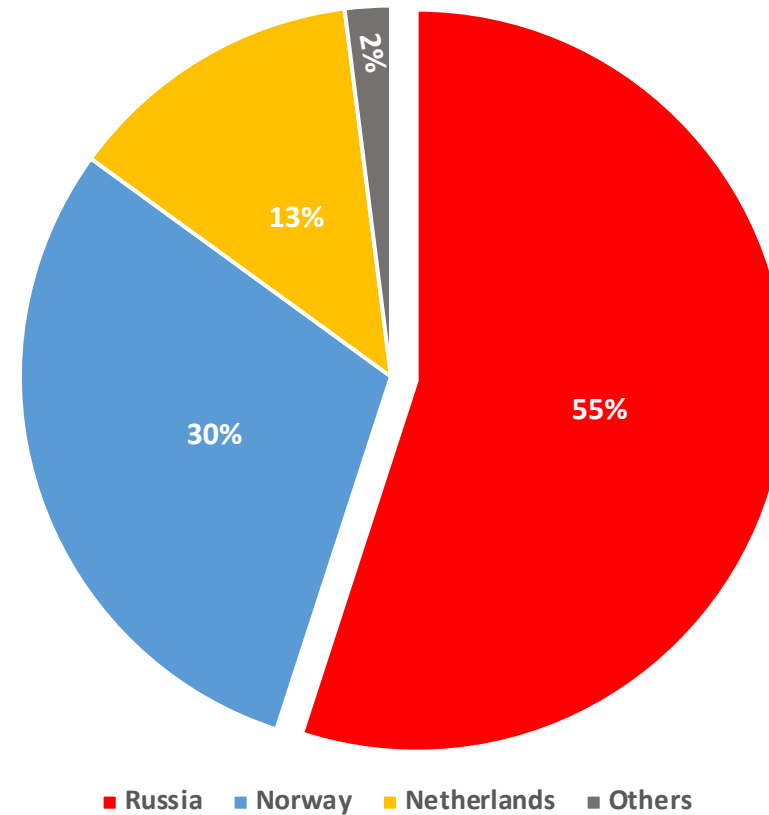
- **Accelerate energy efficiency and renewable energies, electrification**
- **Faster phase-out of coal power plants expected (2030 instead of 2038)**

Germany: Dependency on Russian Oil-/Gas-Imports

Germany: Imported Crude Oil 2021 (mil t; %)



Germany: Import gas (March 2022 in %)

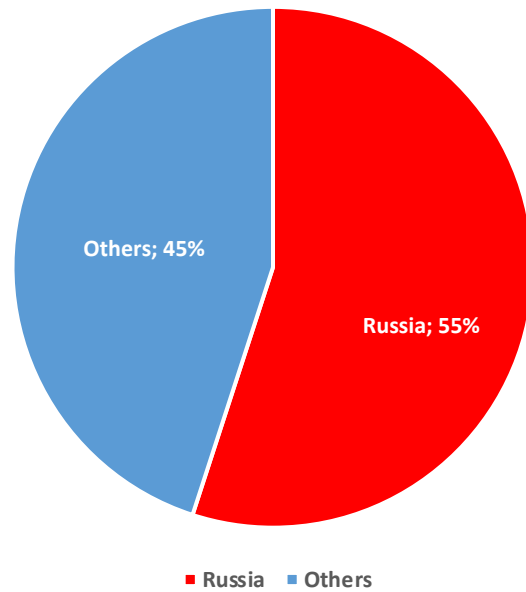


Source: [CLEW on European Fossil Fuel Imports \(March 14, 2022\)](#)

Fossil Imports: Comparison Japan and Germany

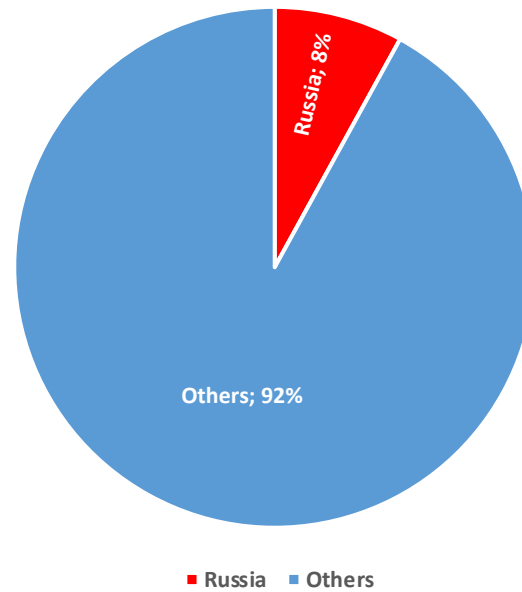
- Much higher dependency in Germany/EU before Russian aggression
- Almost complete stop of Russian fuels from 2023

Germany: Gas Imports (2022)



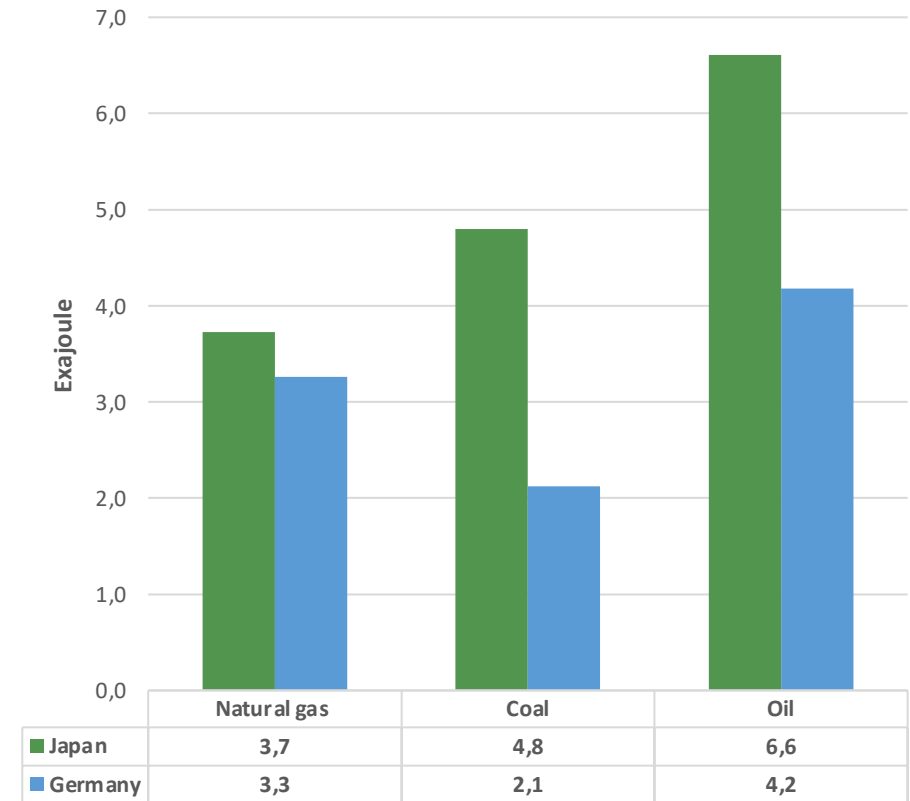
Based on Data: [DeStatis](#)

Japan: LNG Imports (2021)



Based on Data: [Nippon](#)

Consumption of Fossil Fuels in Exajoules* (2021)

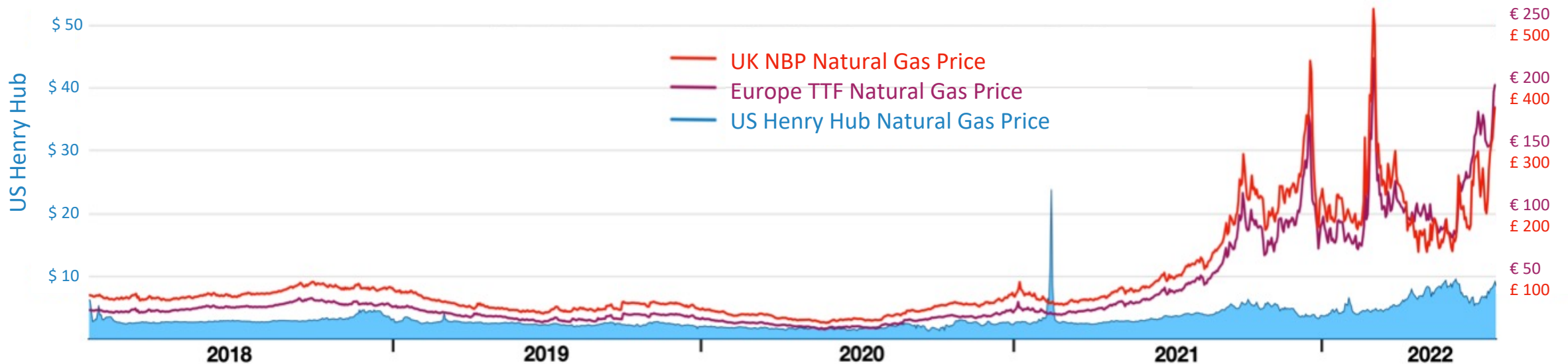


*1 Exajoule = 277 TWh

Source: [bp Statistical Review of World Energy \(2022\)](#)

Sky-Rocketing Gas Prices in Europe: Widening Competitive Edge of the US

Natural Gas Prices



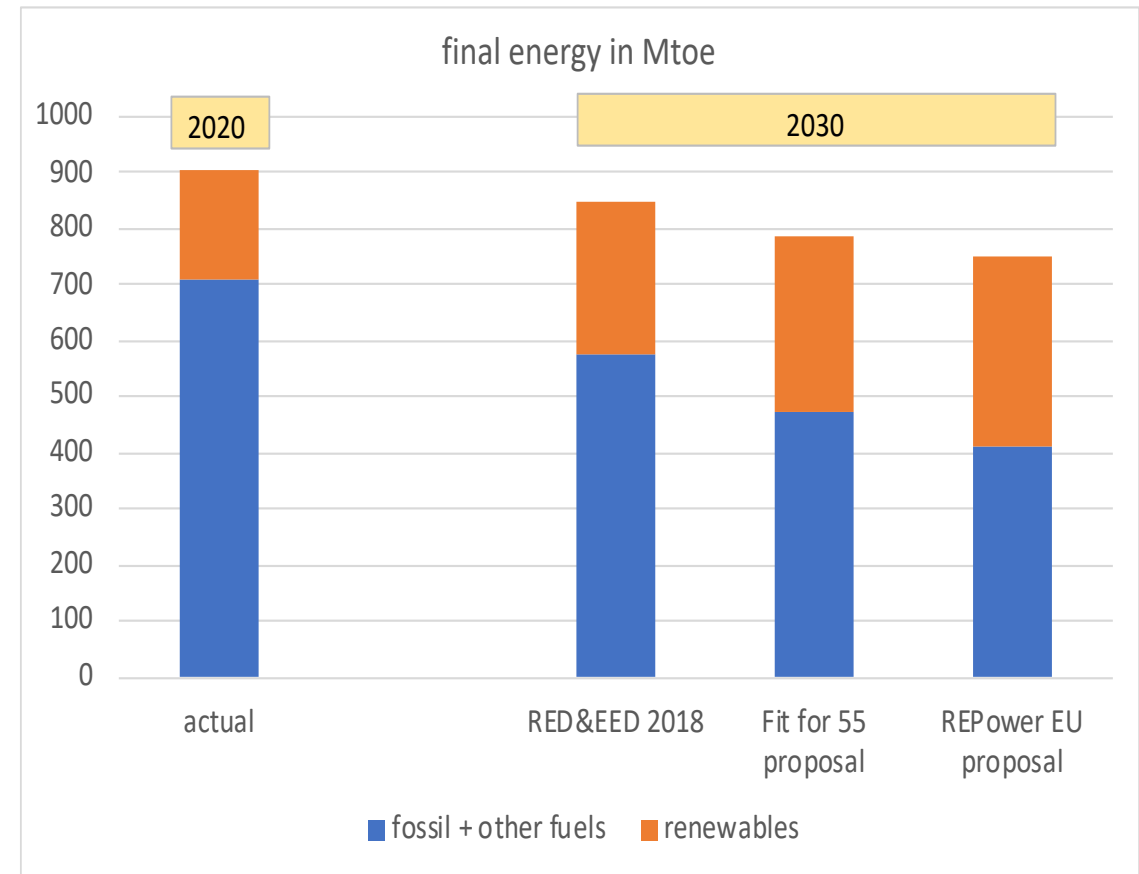
The Title Transfer Facility (TTF), is a virtual trading point for natural gas in the Netherlands. This trading point provides facility for a number of traders in Netherlands to trade futures, physical and exchange trades. Gas at TTF trades in euros per megawatt hour.

Source: https://en.wikipedia.org/wiki/Title_Transfer_Facility

EU Mid-/Longterm Response to Energy Crisis: Enhanced Energy and Climate Targets

- EU zero carbon target 2050, minus 55% by 2030
→ „Fit for 55“ legislative package
 - Energy efficiency target 9 % vs. 2020 reference (1,023 Mtoe primary, 787 Mtoe final)
 - RES to 40 % (+ 45 Mtoe vs. RED 2018)
- Response to crisis 2022: „RePower EU“ targets/proposals
 - Energy efficiency target 13 % vs. 2020 reference (980 Mtoe primary, 750 Mtoe final)
 - RES to 45 % (+ 67 Mtoe vs. RED 2018)

→ **would reduce fossil + other fuels
by 42% by 2030**



European Commission Proposals / Own Calculations and Graph

Germany: Rapid Impact Measures to Save Energy

- Households and users of commercial buildings are encouraged to **turn down heating**
- **Heating ban** for private indoor or outdoor swimming and bathing pools
- **Heating ban** for irregularly used premises (corridors, large halls, foyers, technical rooms)
- **Temperature default of 19 degrees** in public offices and non-residential buildings
- **Mandatory shutdown of decentralised drinking water heating systems** in public, non-residential buildings
- **Outdoor illumination ban** for public buildings (except for safety/security and emergency lighting)
- **Duty of disclosure** for gas and heat suppliers (regarding energy consumption, costs and savings potential)
- **Shop doors and entrance systems must remain closed**
- **Ban of illuminated advertising installations** from 10 p.m. to 6 a.m.
- **Further medium-term measures**, e.g. annual system check for gas heating; mandatory hydraulic optimization for larger buildings; companies using > 10 GWh/yr of energy have to implement cost-effective EE actions identified under Art. 8 EED within 18 months; cost-effective:= payback < 20% of lifetime

Source: [Federal Cabinet Approved Short Term Energy-Saving Measures \(August 24, 2022\)](#)

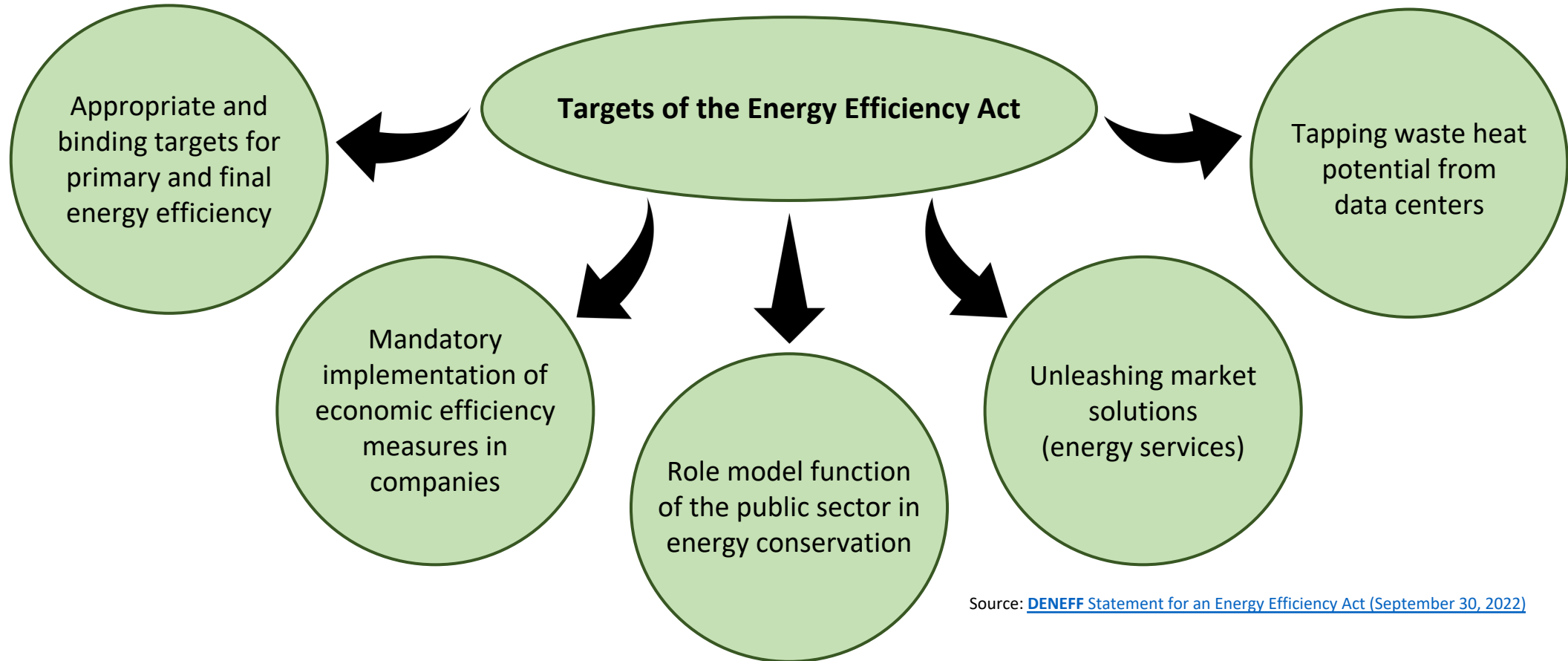
Energy Efficiency

- Buildings:
 - Government funding for energy efficiency renovation and renewable heating systems now increased to € 12 -13 bn per year until 2025; expanding green district heat
 - KfW „Efficiency House“ nZEB standard 55/40 for new build from 2023/25 respectively
- Industry: Increased funding for energy efficiency and low-carbon processes
- Transport: E.g. nation-wide monthly local/regional transport ticket for € 49

Renewables and electrification

- All new heating systems must use at least 65% renewables from 1/2024
- 80% (600 TWh) of renewables in electricity by 2030 (faster than 2045 decarbonization scenarios!)
- Hydrogen electrolyser capacity 10 GW in 2030
- 15 mn electric vehicles by 2030

Germany`s Energy Efficiency Act (Draft 10/2022)



Source: [DENEFF Statement for an Energy Efficiency Act \(September 30, 2022\)](#)

The energy efficiency act (draft) could lead to a more coherent, target-oriented legal framework for energy savings through structural energy efficiency investments and binding measures to reduce final energy consumption.

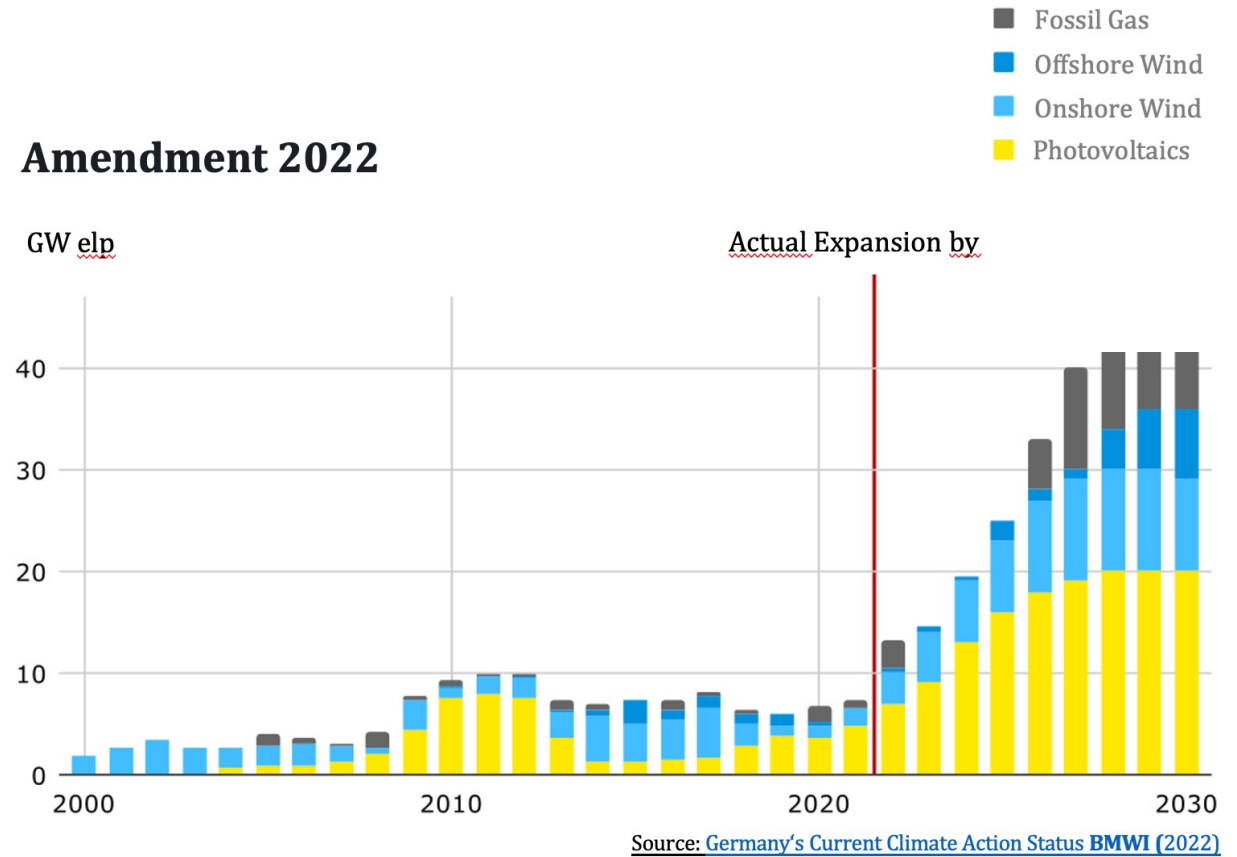
Expansion of Renewable Power Capacity

Federal Government's "Easter Package" (4/2022):

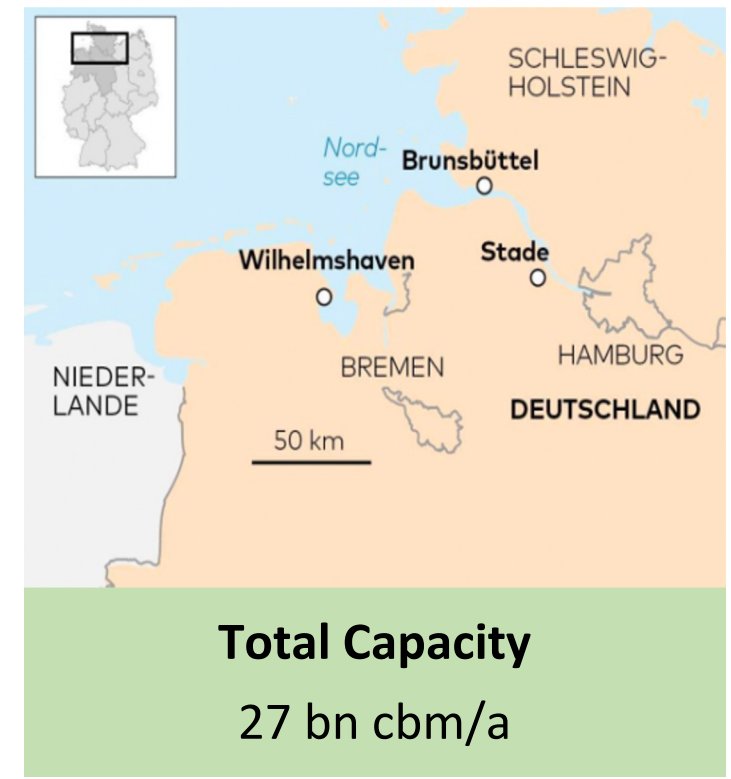
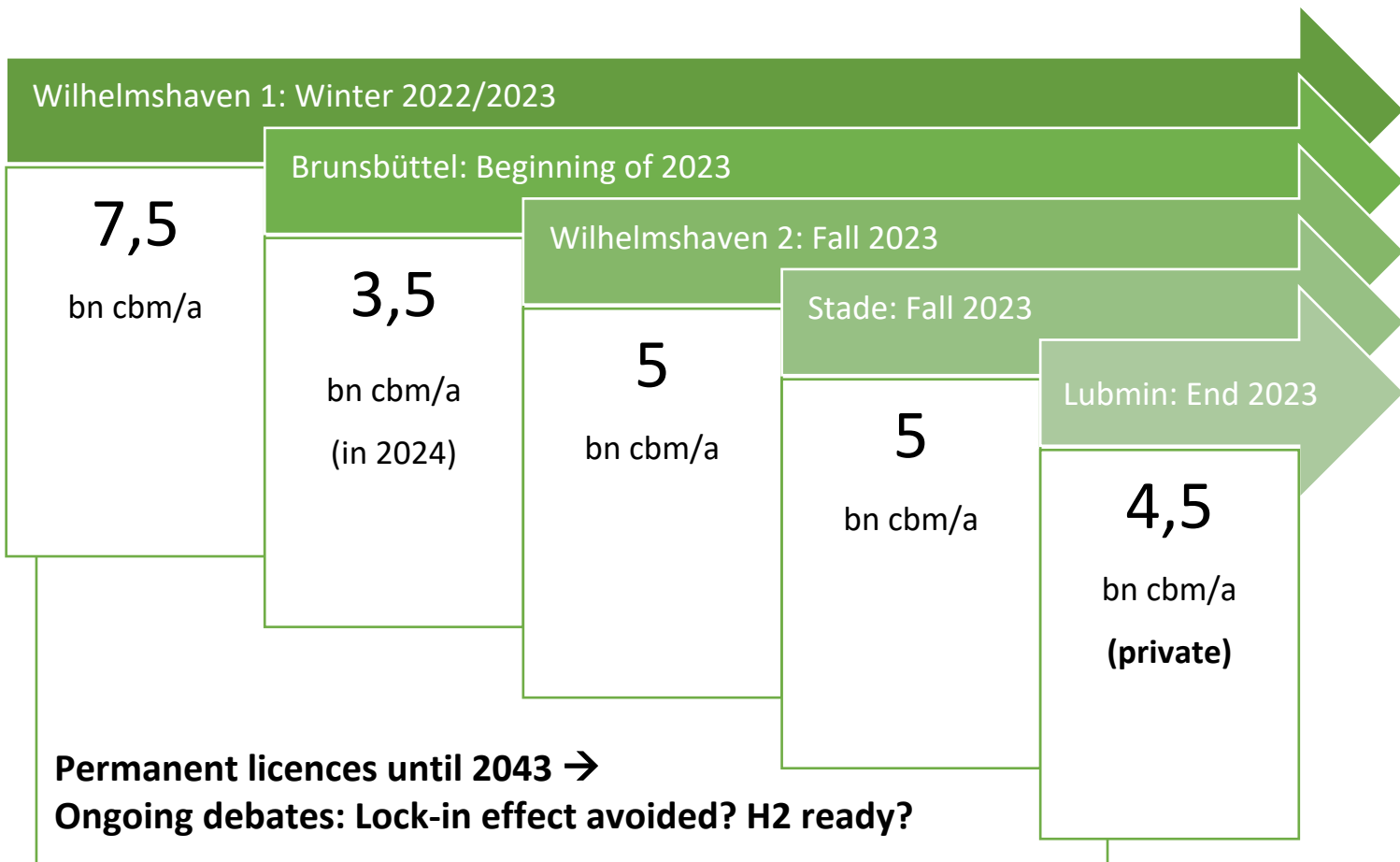
- "We are making it our joint mission to drastically speed up the expansion of renewable energy and to eliminate all obstacles and barriers." (Coalition Agreement)
- RES Act: Foster decisions on renewable energy as „over-riding public interest serving public security“
- New 80 % expansion target for 2030:
 - Installed onshore wind capacity ≈ 115 GW in 2030
 - Installed solar capacity ≈ 215 GW in 2030
- Target for 2035: Electricity almost entirely from renewable energy

Source: [BMWK Overview of the Easter Package \(April 6, 2022\)](#)

Amendment 2022



LNG-Terminals to Diversify Import Dependency



Onshore and Floating Units (FSRU)
FSRU = Floating Storage and Regasification Unit

Source: [Draft LNG Acceleration Act of the German Parliament \(May 10, 2022\)](#)

Phase-Out of Non Renewable Energy Sources:

Revised Targets and Emergency Measures

Coal Phase-Out

- North Rhine-Westfalia (NRW): coal phase out by 2030 instead of 2038 via contract with RWE
- 280 mn tons of lignite stay in the ground
- 3 GW will go off grid in 2030
- But: 1.2 GW - supposed to go off grid in 2022 - are prolonged to 3/2024 due to acute energy crisis
- RWE pledges to invest 15 bn € in renewables to provide grid security after 2030
- Pending debates on phase out date 2038/2030? in Eastern Germany

Nuclear Phase-Out

- 3 remaining nuclear power plants operate in stretch mode until April 15, 2023
- All 3 were supposed to go off grid end of 2022
- Work at 70-95% of max. capacity at the beginning to be reduced to 50-55% in the end
- Projected total electricity production: 3.7 TWh
- Grid stress test to decide whether going on line is necessary, e.g. due to French NPP insecurities

Source: [BMWK Press Release on Coal Phase-Out \(October 4, 2022\)](#)

Source: [BMWK Press Release on Implementation of the Nuclear Power Plant Deployment Reserve \(September 27, 2022\)](#)

Measures to avoid social and economic hardship

- ,Expert Commission Gas and Heat‘ set up by German government presented final report on October 31
 - Proposals on how to ease the burden on citizens and industry while maintaining gas savings incentives and linking this to a longer-term transformation perspective
 - Core of the report appeals for the stabilization of supply relationships and reducing inflation through a "**gas and electricity price brake**"

Measures:

- As an immediate relief the government takes over of the December advance payments of households and SMEs supplied with gas or gas-based district heating (amount based on September payment)
- From March 1, 2023 until at least April 30, 2024, the gas price brake is to take effect, capping 80 % of households‘ monthly gas costs at a price of 12 €_{ct}/kWh gas
- Starting at January 1st, 2030, a maximum electricity price of 40€_{cts} kWh will be fixed, capping 80% of electricity consumption
- For landlords currently covering energy costs for tenants with payment difficulties, hardship fund with interest-free loans
- Gas supply situation expected to worsen next year; further cost- and energy-saving measures necessary in all areas

Source: [BMWK Expert Commission Gas Heat Final Report \(October 31, 2022\)](#)

To Sum up: Germany`s Strategies Against the Energy *and* Climate Crisis

1. Decide on emergency and relief plans to secure affordable and safe energy supply
2. No change of mid term and long term climate ambition levels (2030/2045)
3. Boost efficiency+renewables to integrate energy sovereignty and climate mitigation
4. Transitional use of the last three nuclear power plants up to March 2023
5. Extend reserve of existing oil and coal power plants up to March 2024
6. Hold the national target to phase out coal „ideally by2030“
7. Avoid lock-in effects due to importing from new sources of fossil supply
8. CCUS only for carbon emissions from hard to abate sectors or from biomass energy

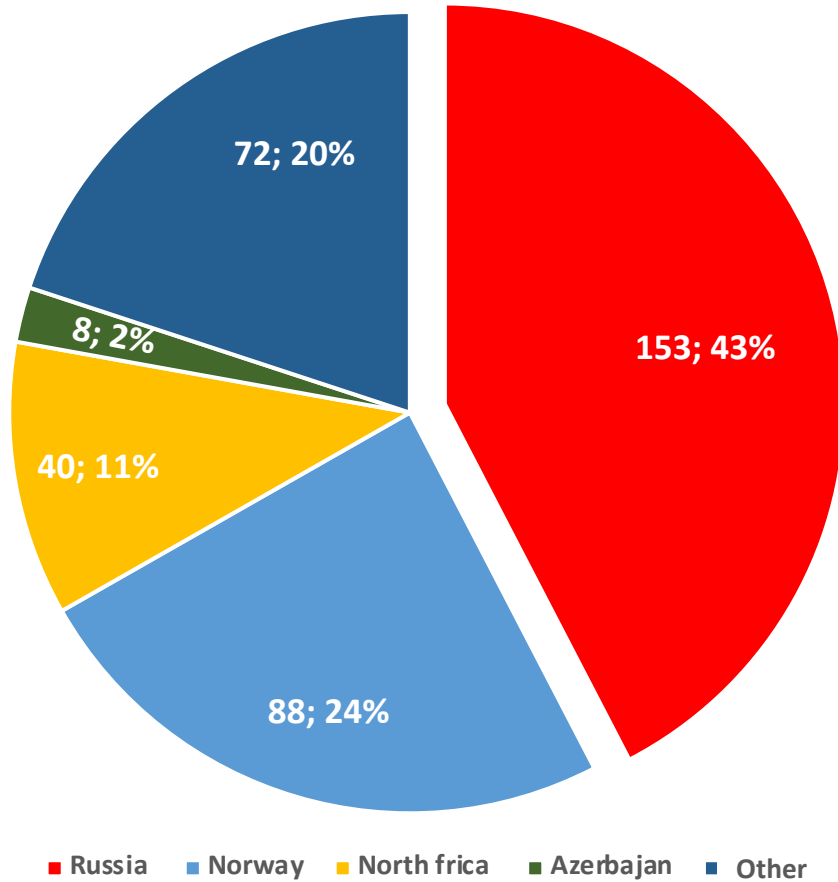
**Many Thanks
for Your Attention!**

For further information please visit our website:

<https://gjetc.org/>

EU: Pre-War Gas Import Dependency on Russia

EU Gas Import 2021 (bn cbm; %)



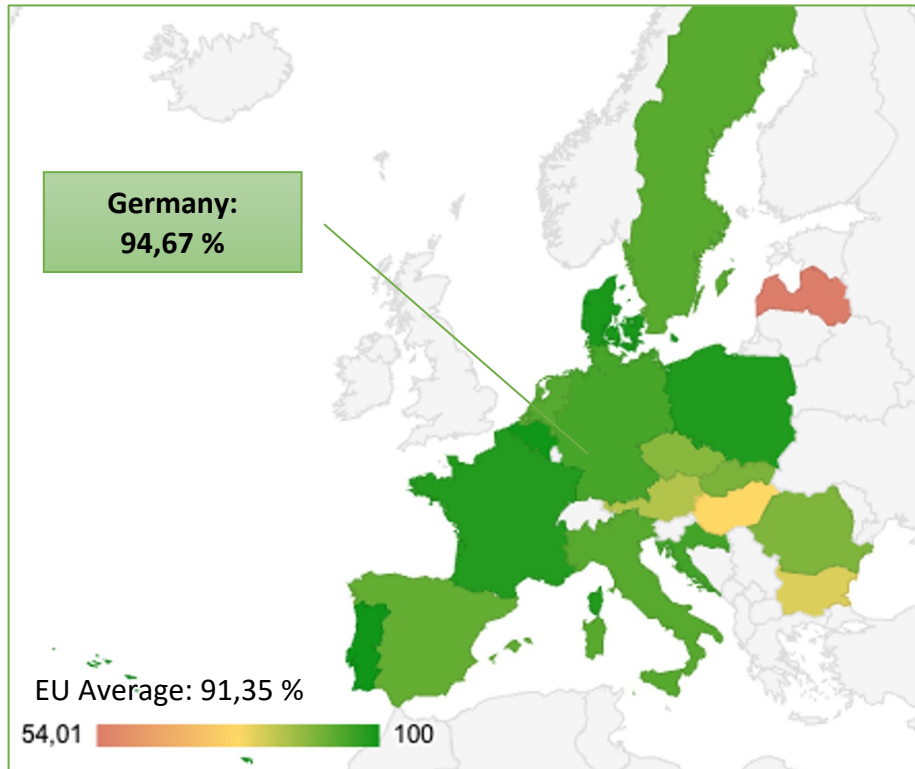
Source: [International Energy Agency \(March 3, 2022\)](#)



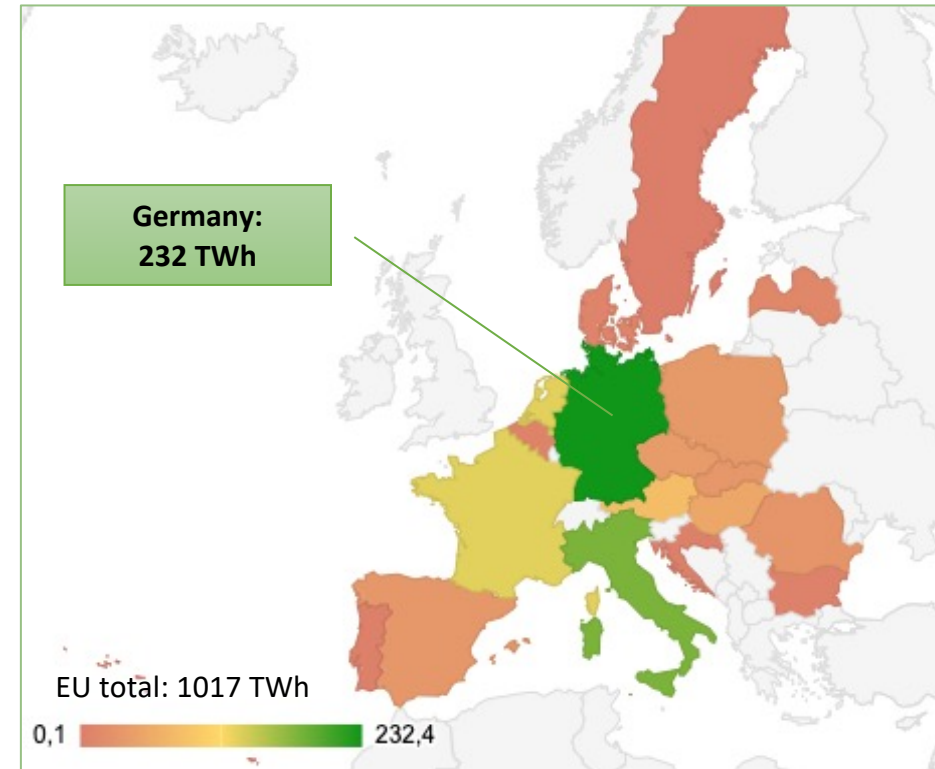
Source: [Bruegel Dataset on European Natural Gas Imports \(October 25, 2022\)](#)

Gas Storage Measures

Gas Storage in % / Country (Status: 10.10.2022)



Gas Storage in TWh / Country (Status: 10.10.2022)



Germany has the highest storage capacity in the EU → But not sufficient without ambitious savings

Based on Data: [AGSI](#)

Diversification of Gas Supply Sources

European Union

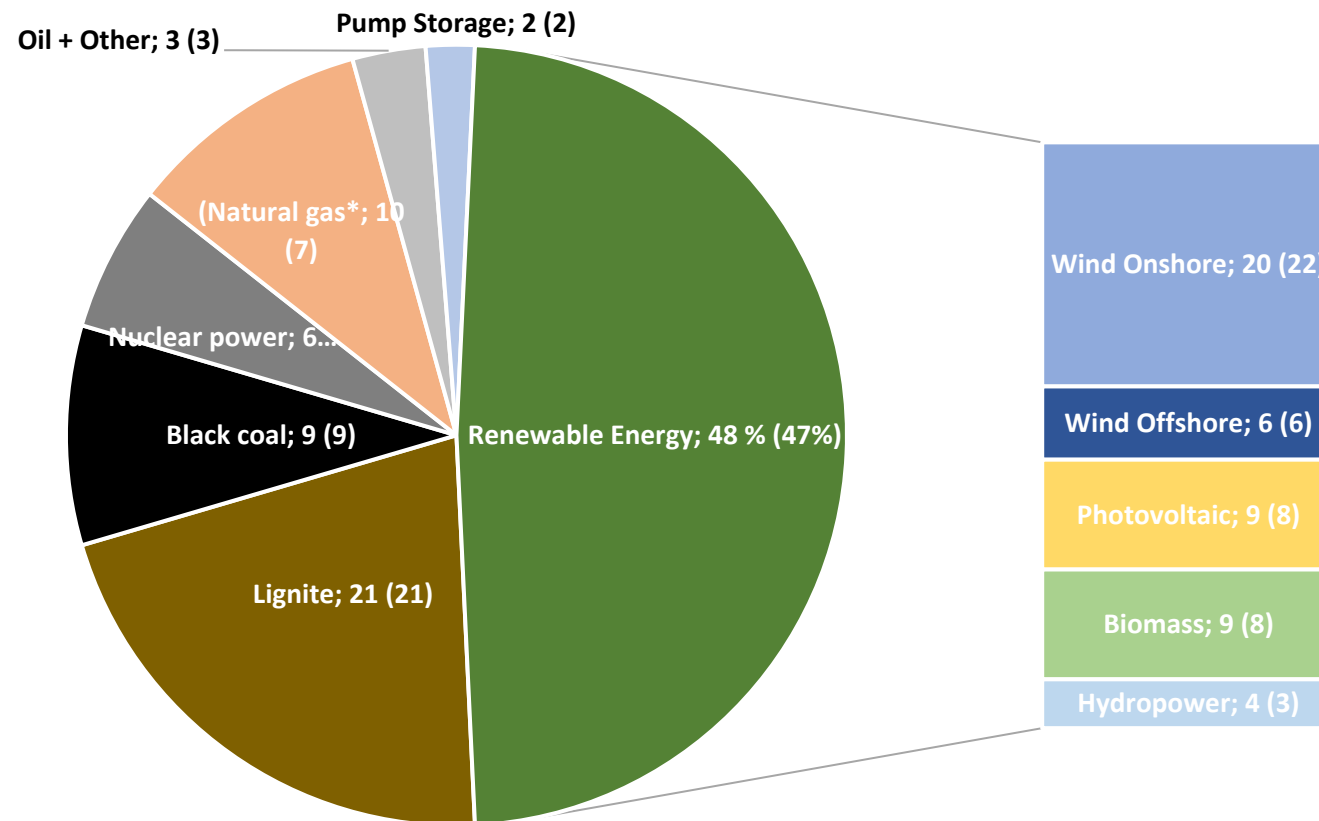
- Azerbaijan committed to increase its delivery volumes (currently **8,1 – 20 bn cbm**)
- Israel as strategic partner of the EU
 - Gas transportation into EU via Egypt's LNG-Terminals

Germany

- Norway (currently **30 %**), Belgium & Netherlands (currently **20 %**) remain key import partners
- Negotiations with Katar, Australia, Algeria & Nigeria
- Bilateral solidarity agreements with Austria & Denmark
- German - Canadian Hydrogen Alliance (first shipment 2025)
- VAE: New gas purchase agreements
 - First shipment 150.000 cbm LNG in december 2022
 - Additionally 250.000 t diesel / month

Germany's Electricity Mix (10/2022)

Share of Electricity Generation in October 2022 (with prior-year figures in %)



*public supply

Source: [Agora Energiewende](#)

European Union: Gas Savings/Price Brakes

Gas Savings

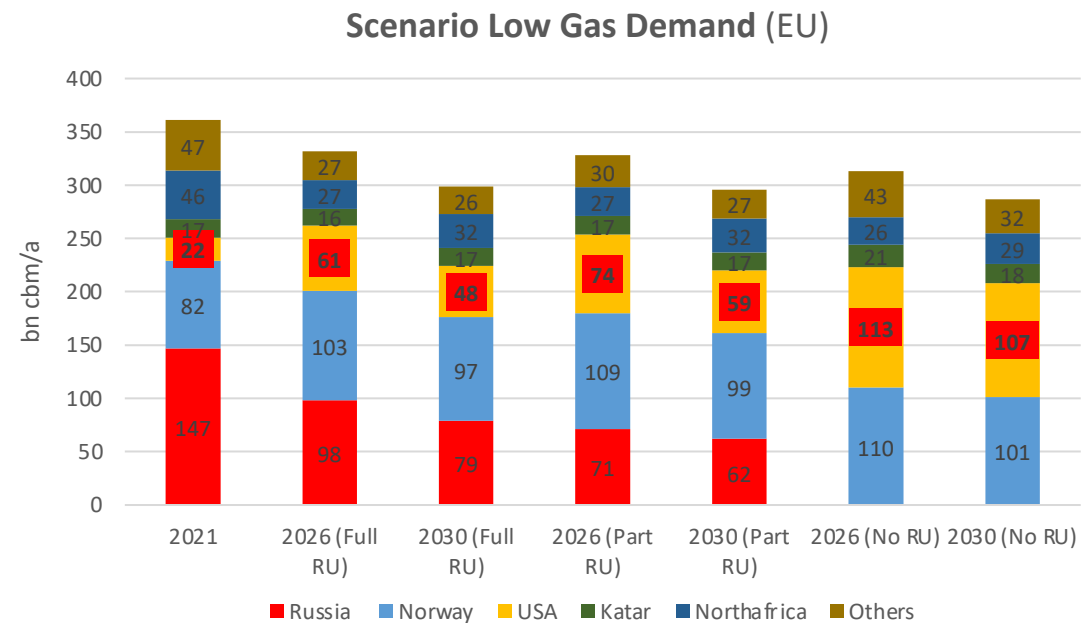
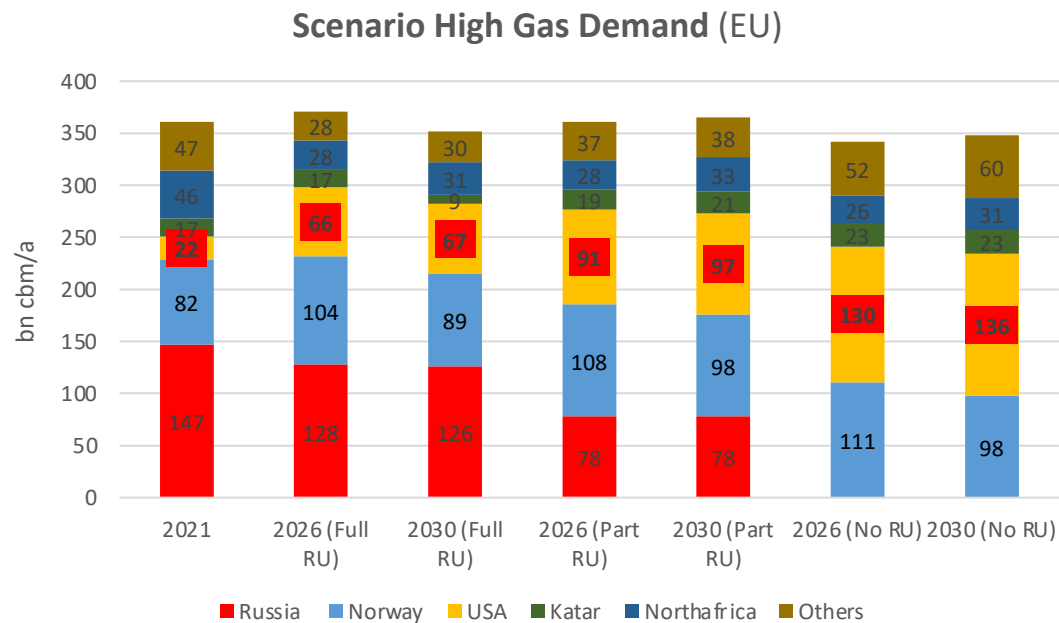
- Council regulation on coordinated demand-reduction measures
- Optional: Member states should aim to save **15 % gas** (compared to \emptyset last 5 years)
- Circumstances of individual countries are considered
- Timeframe: 01.08.2022 - 31.03.2023
- Possibility of 'Union alert' → Gas demand reduction becomes mandatory

Price and Profit Brakes

- Starting from 01.12.2022, the price for electricity will be limited to 180€/MWh
- Surplus Tax: 33% tax on surplus profits (20 % above \emptyset of last year)

Source: [European Council Press Release \(August 5, 2022\)](#)

Gas Import Scenarios of the EU: Predicting the USA as Major Supplier by 2030



Source: [EWI Research Study on the Developments in Global Gas Markets up to 2030 \(September 2022\)](#)