# Current Energy Policies in the European Union

## MIT Global Change Forum

*28 March 2024*

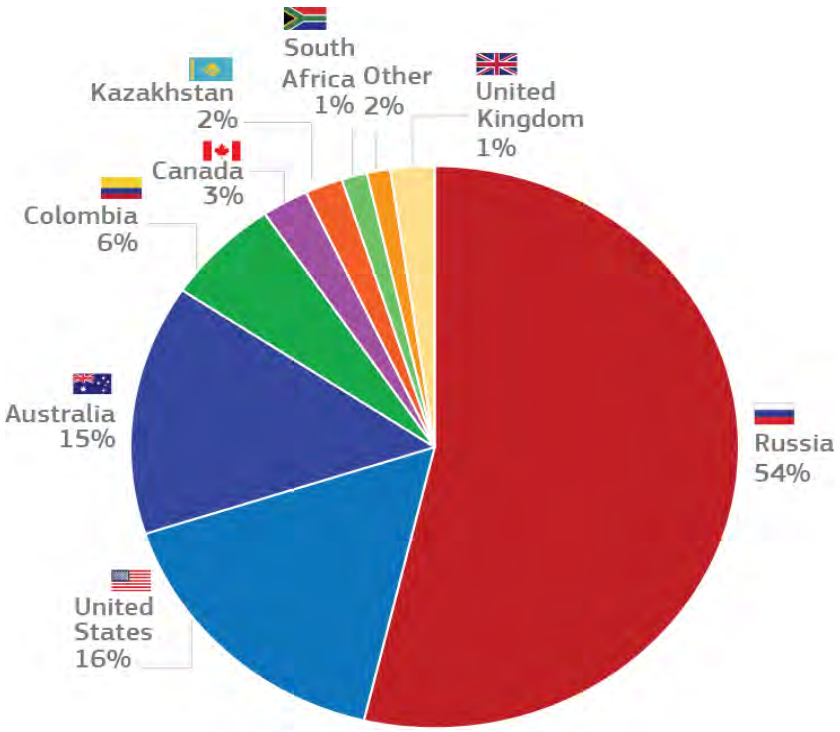
***BERT SAVEYN***

***Team Leader Modelling – DG Energy***

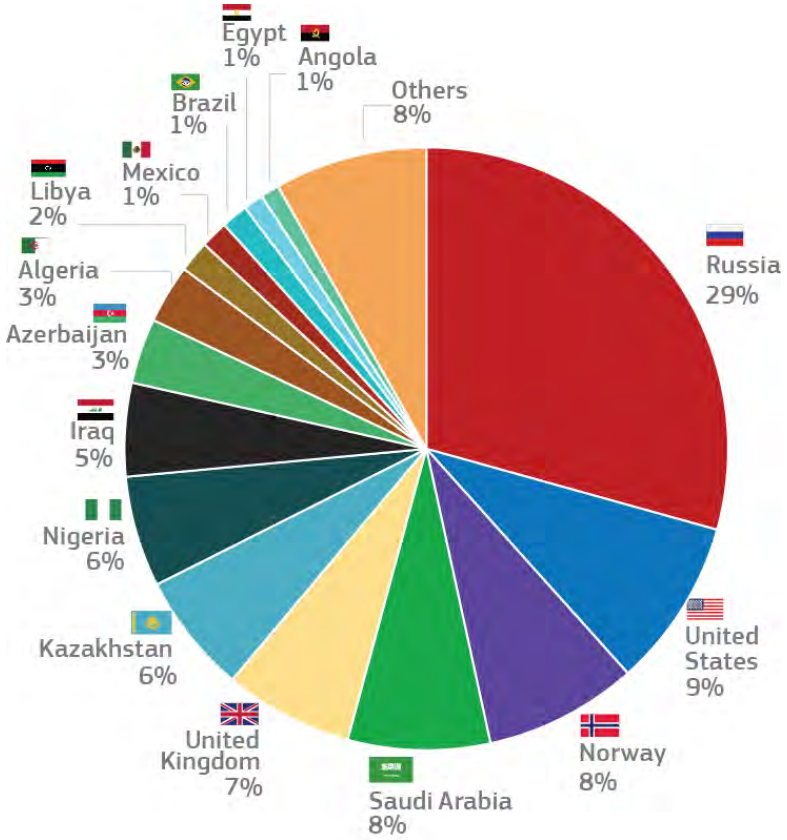

Prices significantly lower than during the energy crisis...
European Commission

# EU Energy Dependency on Russia (2021)

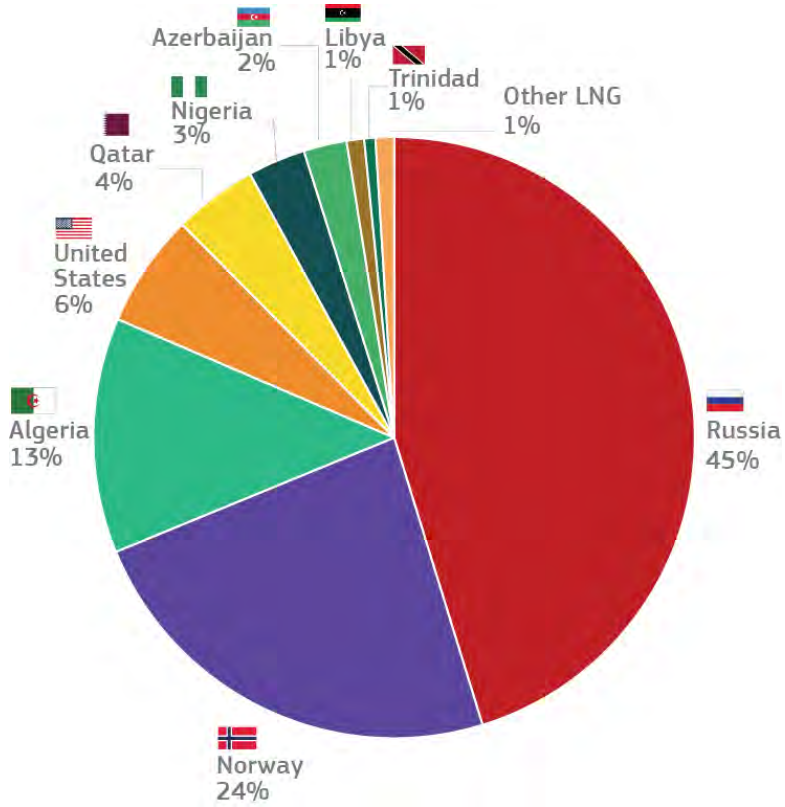
**Coal import dependency per country (2021)**




**Oil imports dependency per country (2021)**



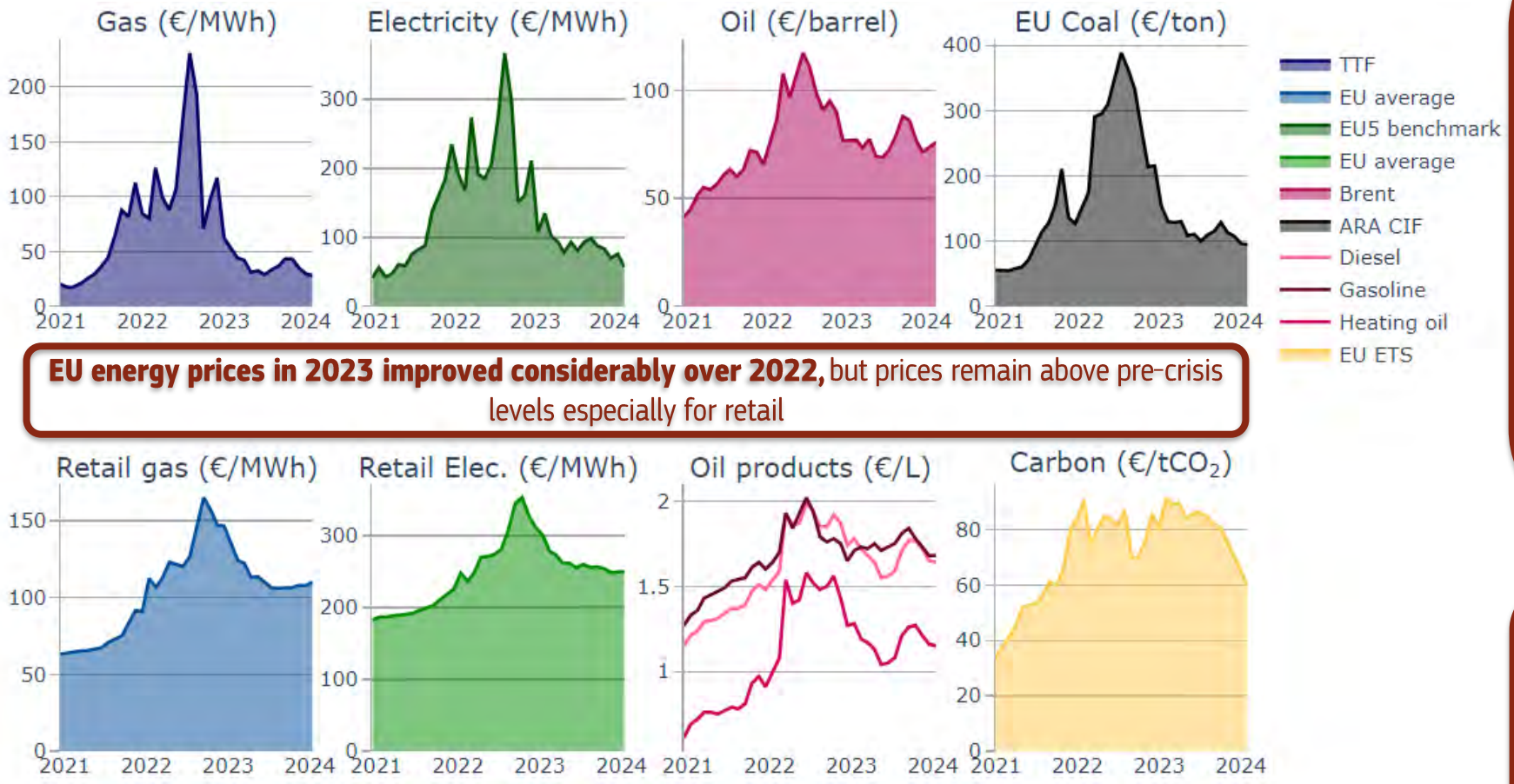

**Gas imports (pipe and LNG) dependency per country (2021)**






European Commission

# Energy prices – Monthly averages




**EU energy prices in 2023 improved considerably over 2022,** but prices remain above pre-crisis levels especially for retail

**2023 Average prices:**

- **Gas:** 41 €/MWh (-66%)
- **Retail gas:** 115 €/MWh (-16%)
- **Electricity:** 95 €/MWh (-50%)
- **Retail electricity**: 263 €/MWh (-10%)
- **Oil:** 77 €/barrel (-21%)
- **Oil products:**
  - **Diesel:** 1.68 €/L (-8%)
  - **Gasoline:** 1.74 €/L (-4%)
  - **Heating oil:** 1.17 €/L (-16%)
- **Coal:** 119 €/ton (-58%)
- **Carbon:** 83 €/$CO_2$ (+3%)

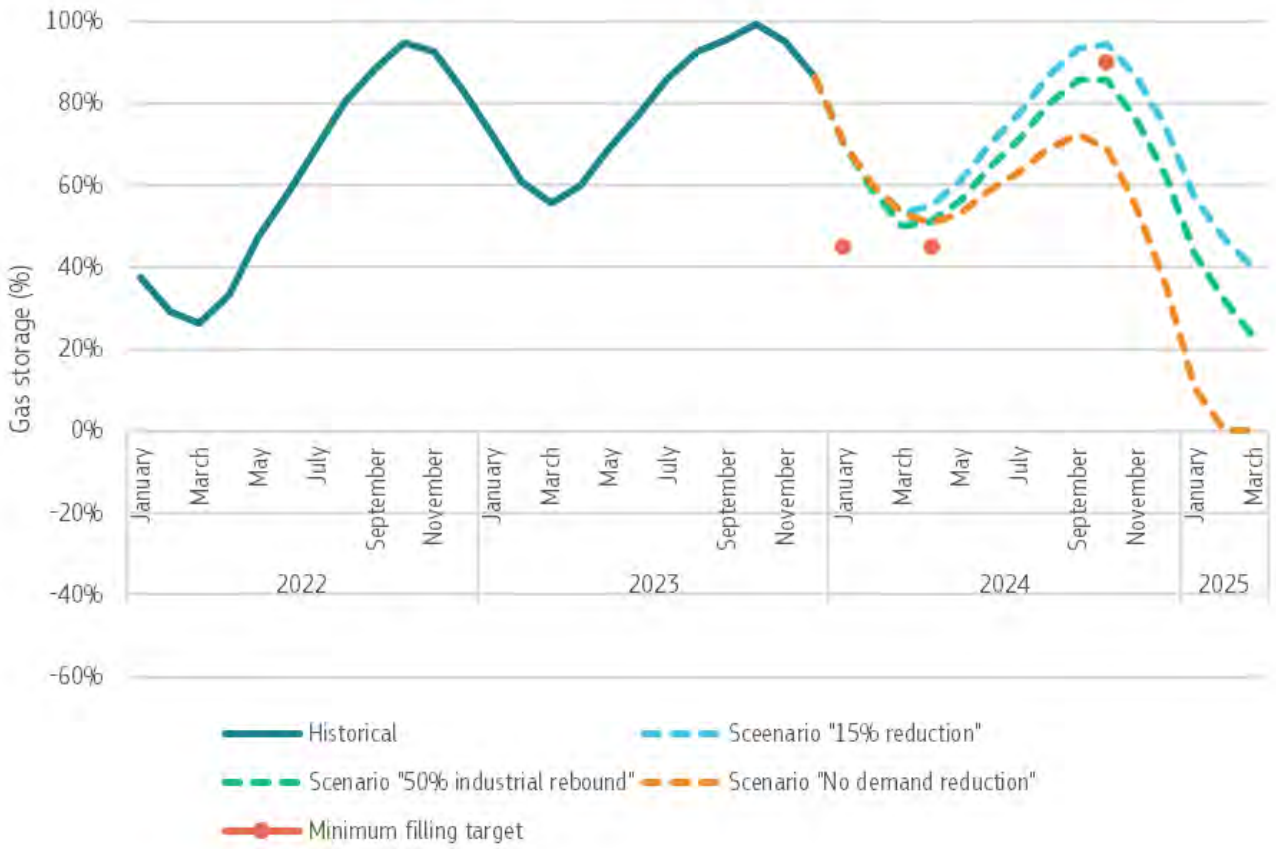
**Two-fold leverage** between gas and electricity prices observed during the crisis

*Gas power plant efficiency: 2 energy units of gas to produce 1 unit of electricity*

***Sources**: ENER Chief Economist (based on S&P Global Platts, VaasaETT, Weekly Oil Bulletin)*


...thanks to better
fundamentals...
European
Commission

# Natural gas storages




We assume no Russian pipeline gas which is partially compensated by a maximised LNG imports from non-Russian suppliers.

***Source**: ENER Chief Economist (based on GIE-AGSI)*

**Good starting point in storage in 2024: 85%**

**25 March: 59% full still**

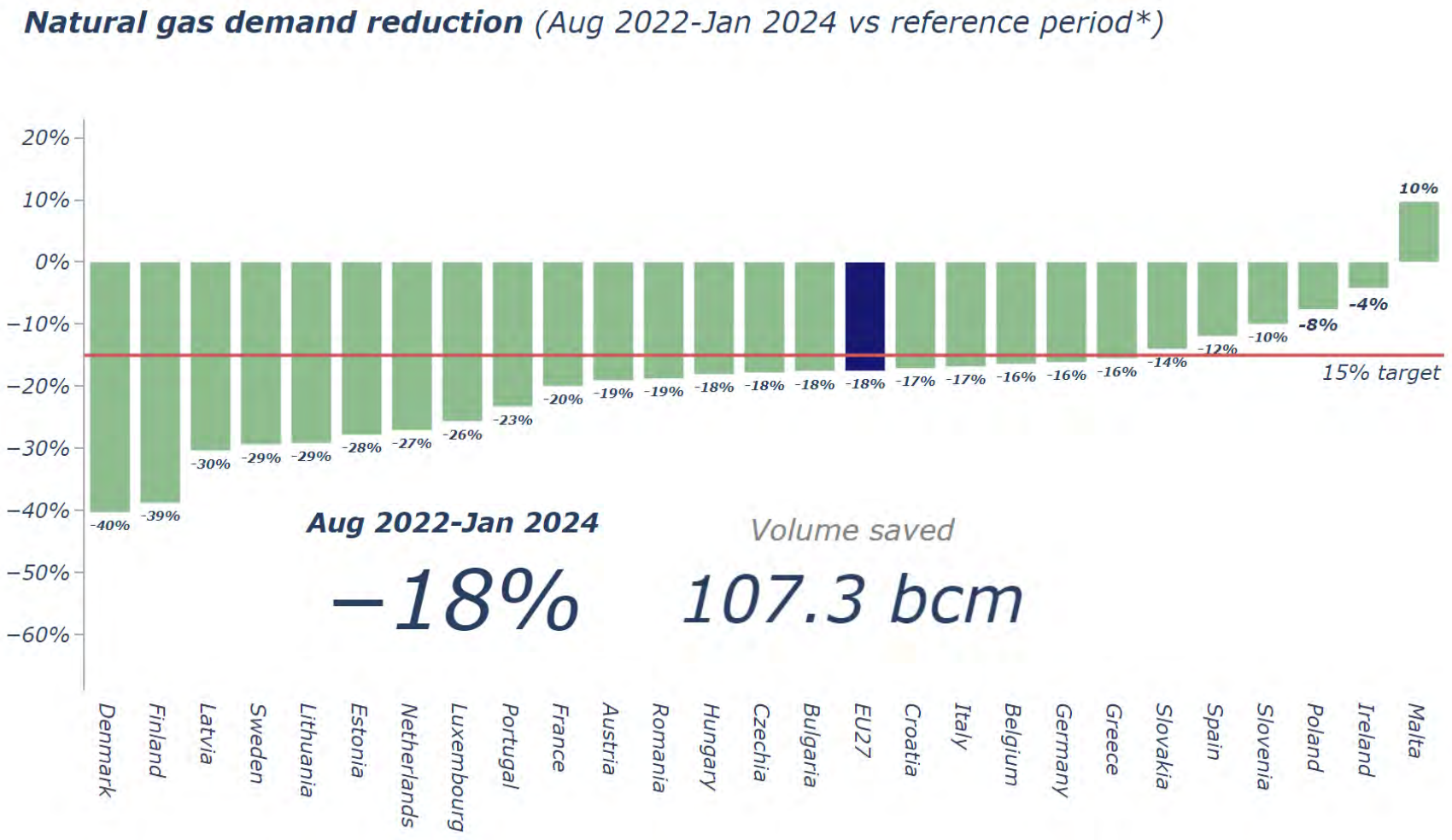
**Downward risks for winter 23/24:**

- Middle East conflict supply/trade disruptions
- Chinese natural gas demand recovery (unlikely)
- Colder-than-average winter (very unlikely)

**Upward risks for 23/24:**

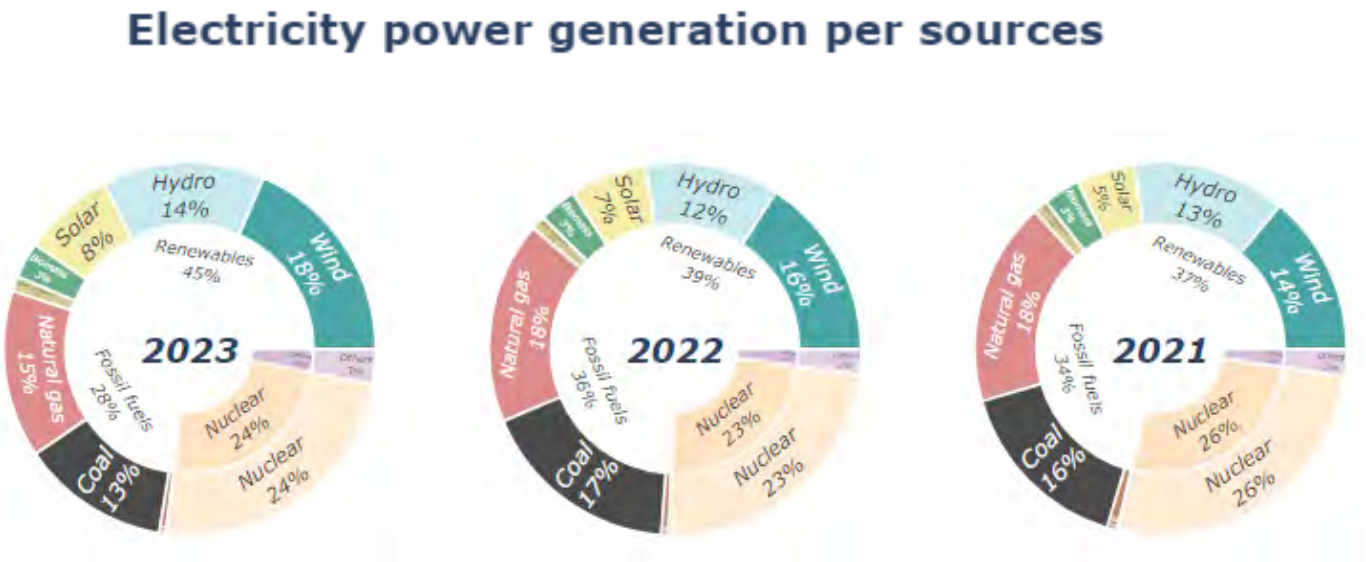
- Milder weather
- Maintain demand reduction in industry/power sector)

# Natural gas demand reduction



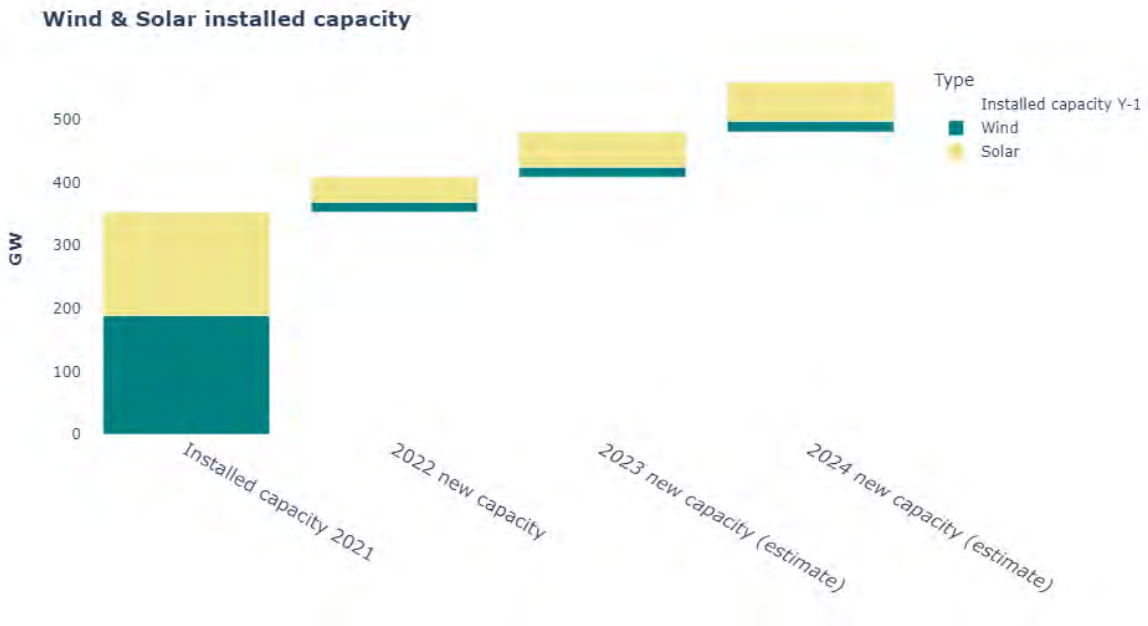

***Source**: ENER Chief Economist (based on Eurostat)*

# Renewables: record deployment




*New RES capacity growing fast*

- ***73 GW of new installed RES capacity in 2023**** *(around 13 bcm of gas saved)*




*Renewables also helping to reduce gas demand for power generation:*

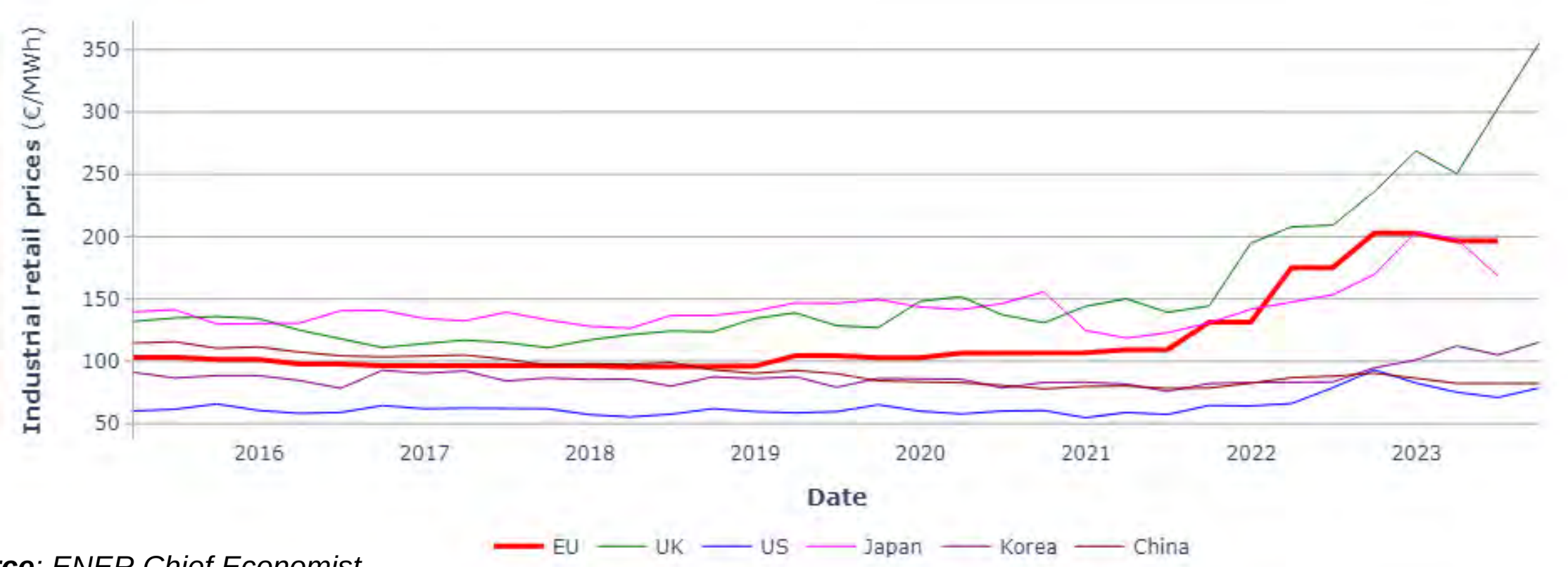
*Share of RES in power rising to 45% (2023) from 39% (2022)*

***Source**: ENER Chief Economist (based on Fraunhofer, ENTSO-E, Solar Power Europe, WindEurope). * Estimated*


…but a higher competitiveness spread…
European Commission

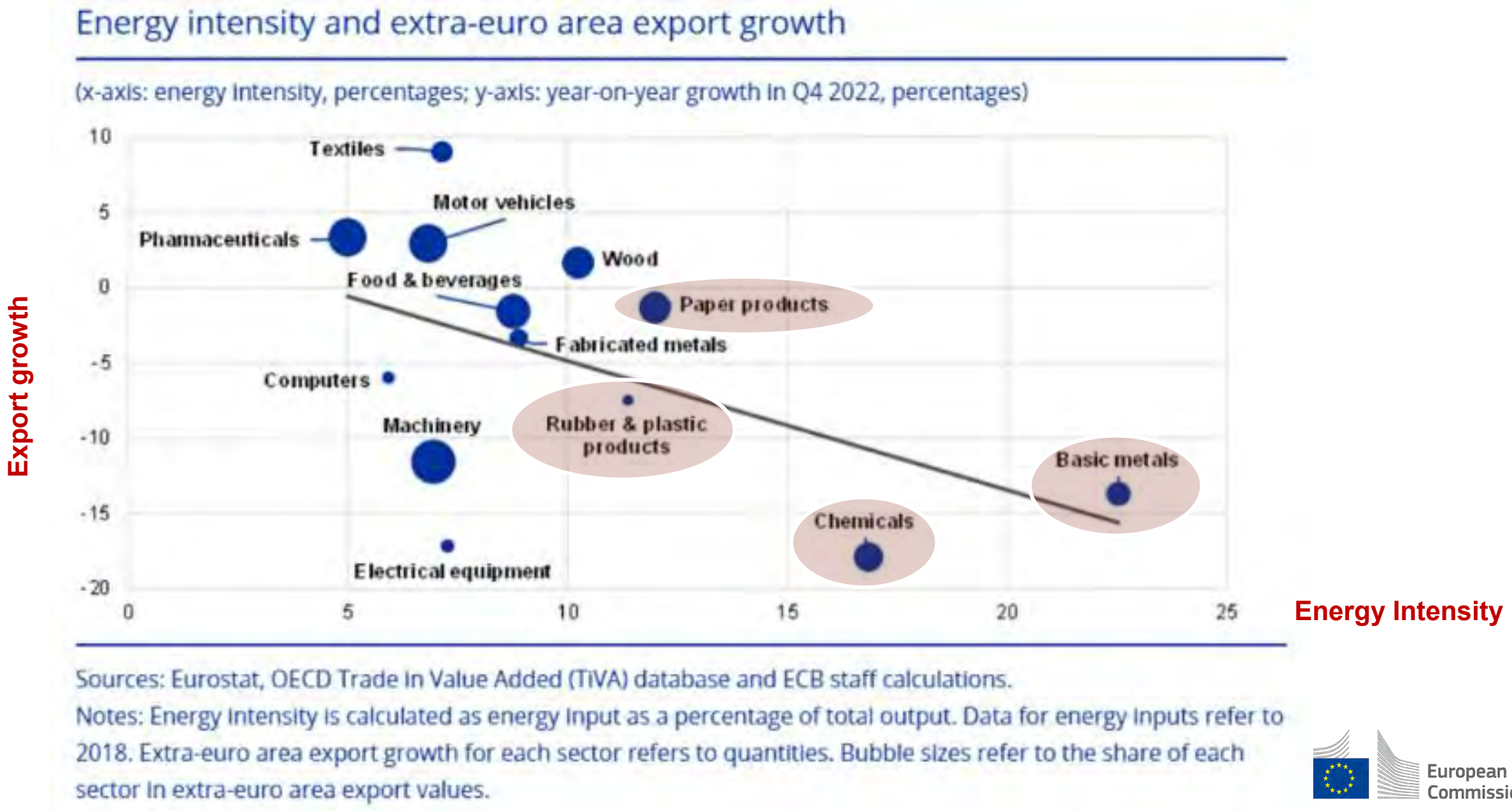
# Industrial competitiveness

*EU electricity **industrial retail prices 2 to 3 times higher** than in the US **(2021 to 2023)** while they were **1.5 - 2 times** higher in the past.*



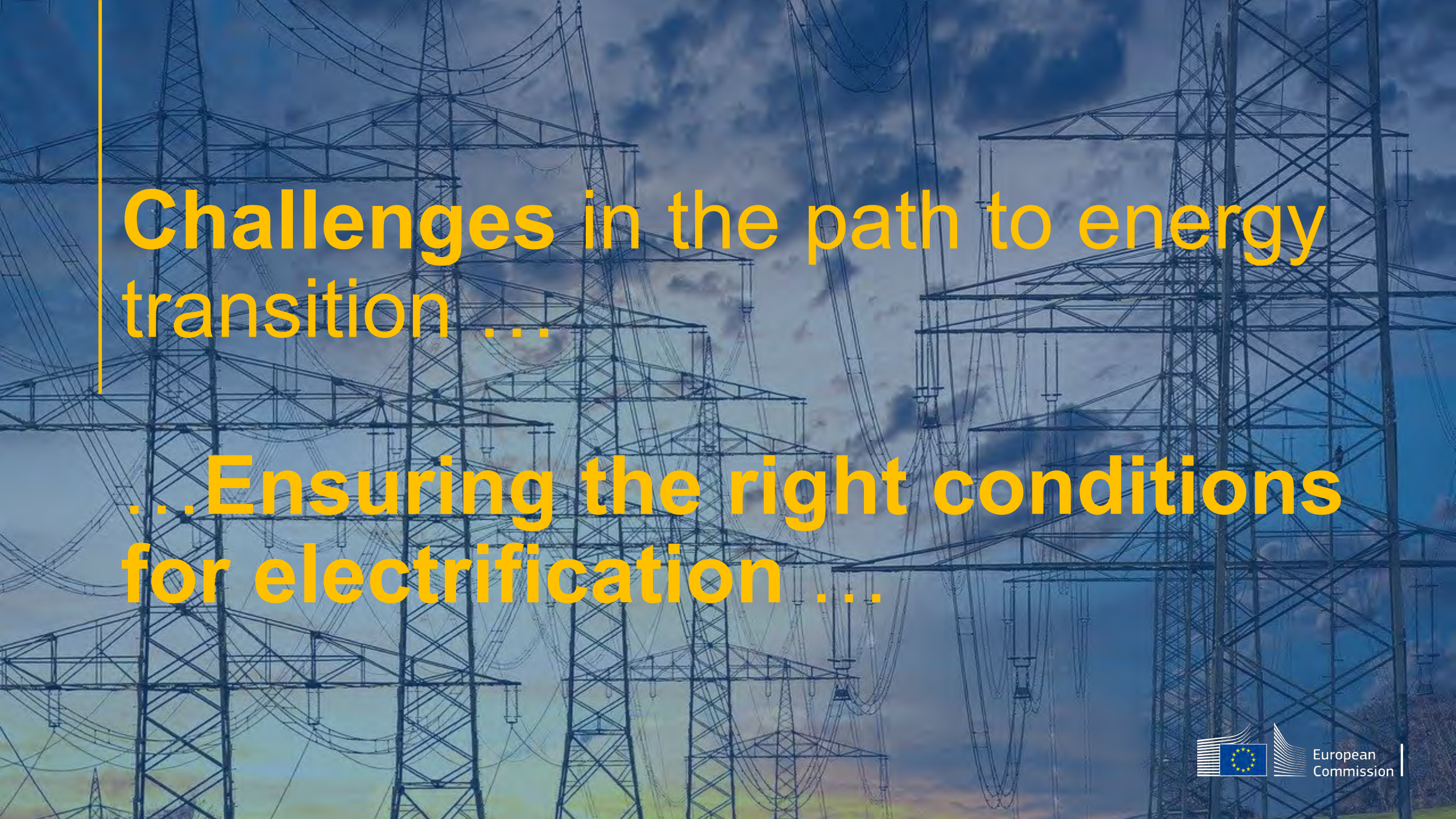

**Source**: *ENER Chief Economist*

# Impact on energy intensive industries




***Source**: ECB*

European Commission


Challenges in the path to energy transition …
…Ensuring the right conditions for electrification …
European Commission

# Displacing fossil fuels from the power mix leads to positive competitiveness effects (I)

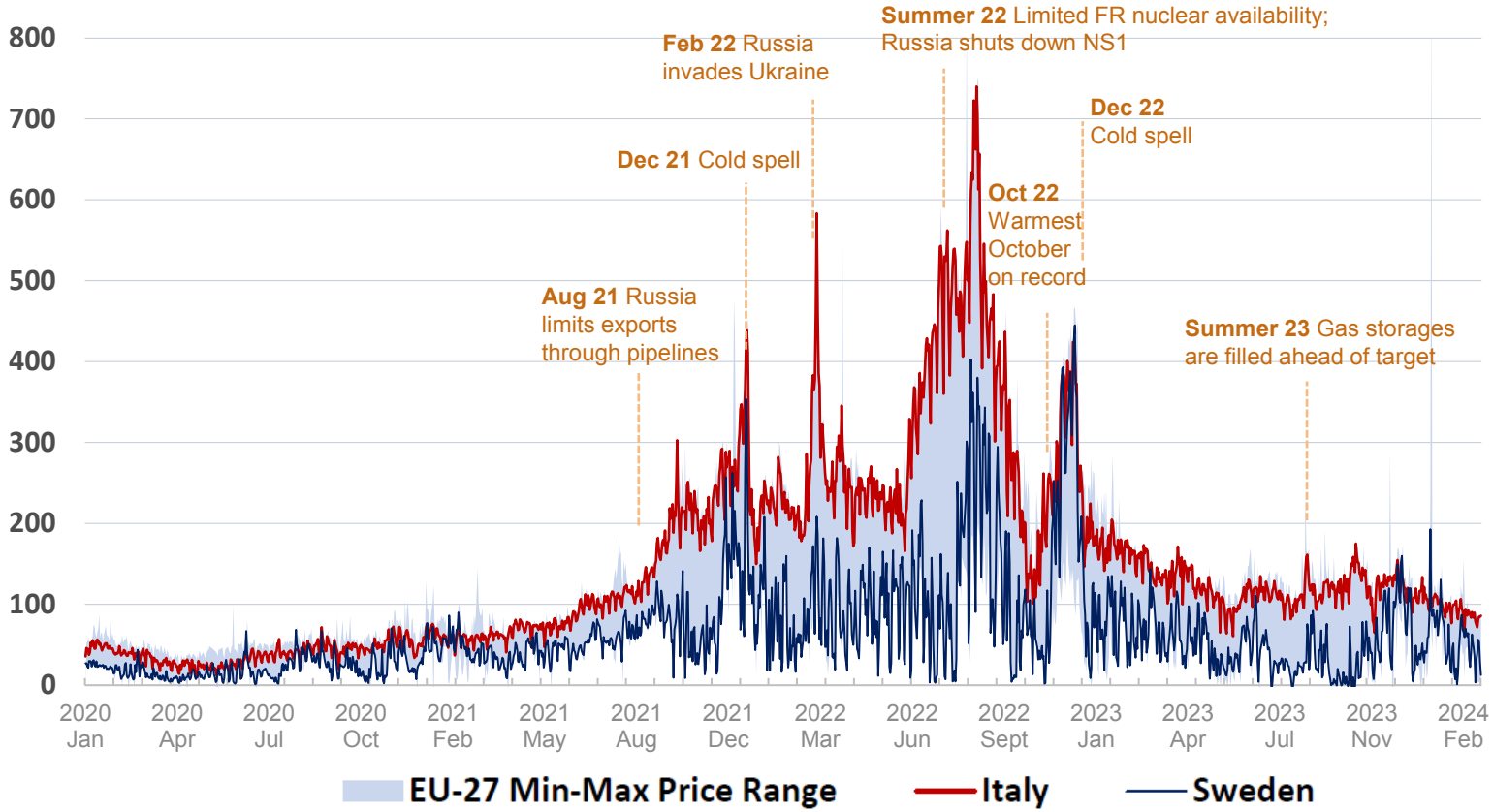
**PRICE EFFECT**

↑ Reliance on Fossil-based power plants

↓ RES Integration

↓ Nuclear

↔ Level of Interconnection

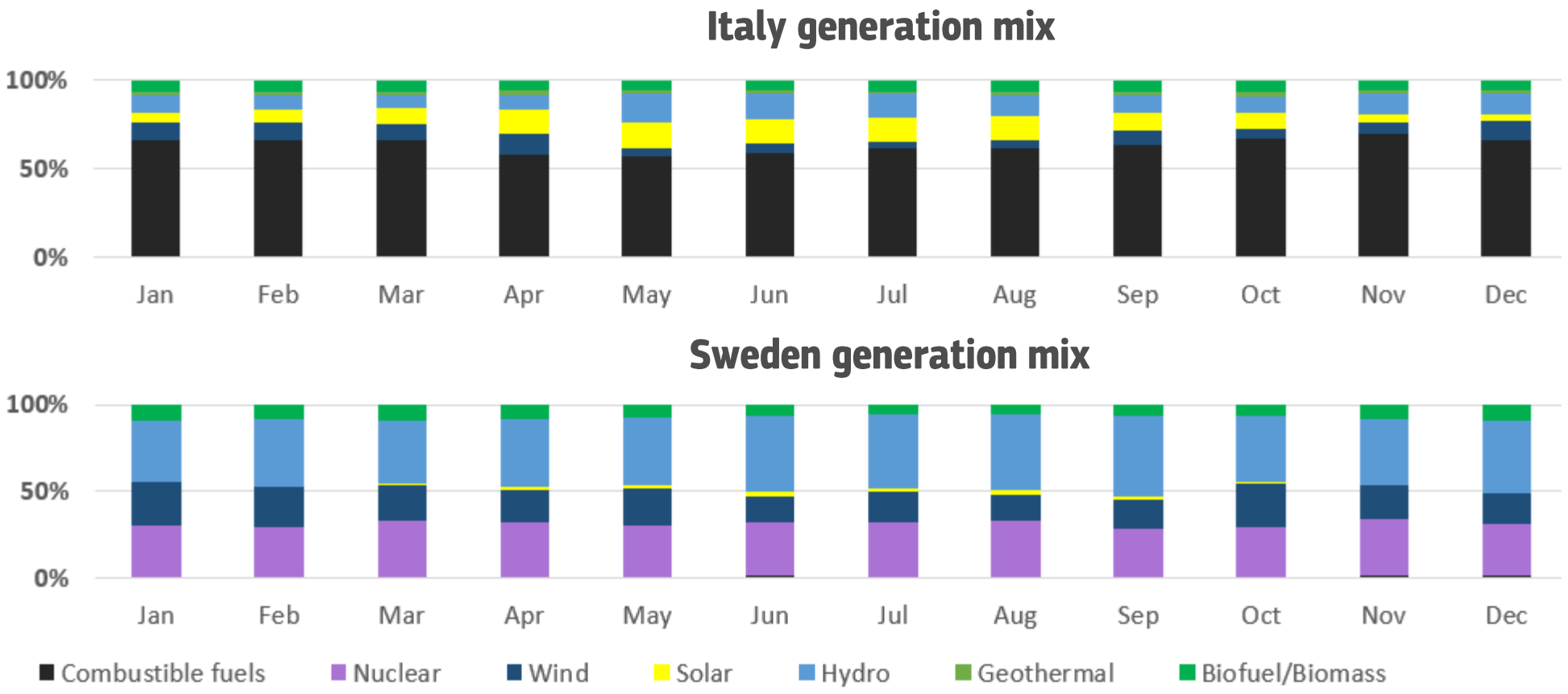



- Russia's weaponisation of EU gas deliveries lead electricity prices to record highs during 2021 and 2022
- EU wholesale electricity prices differences driven by generation mix and interconnection level differences

***Source**: ENER Chief Economist*

European Commission

# Displacing fossil fuels from the power mix leads to positive competitiveness effects (II)




- Power mix drives MS electricity price differentials:
  - Italy relies predominantly on combustible fuels
  - Sweden has almost 99% of non-fossil generation
- Marginal fossil-based generation set the electricity price in the merit order

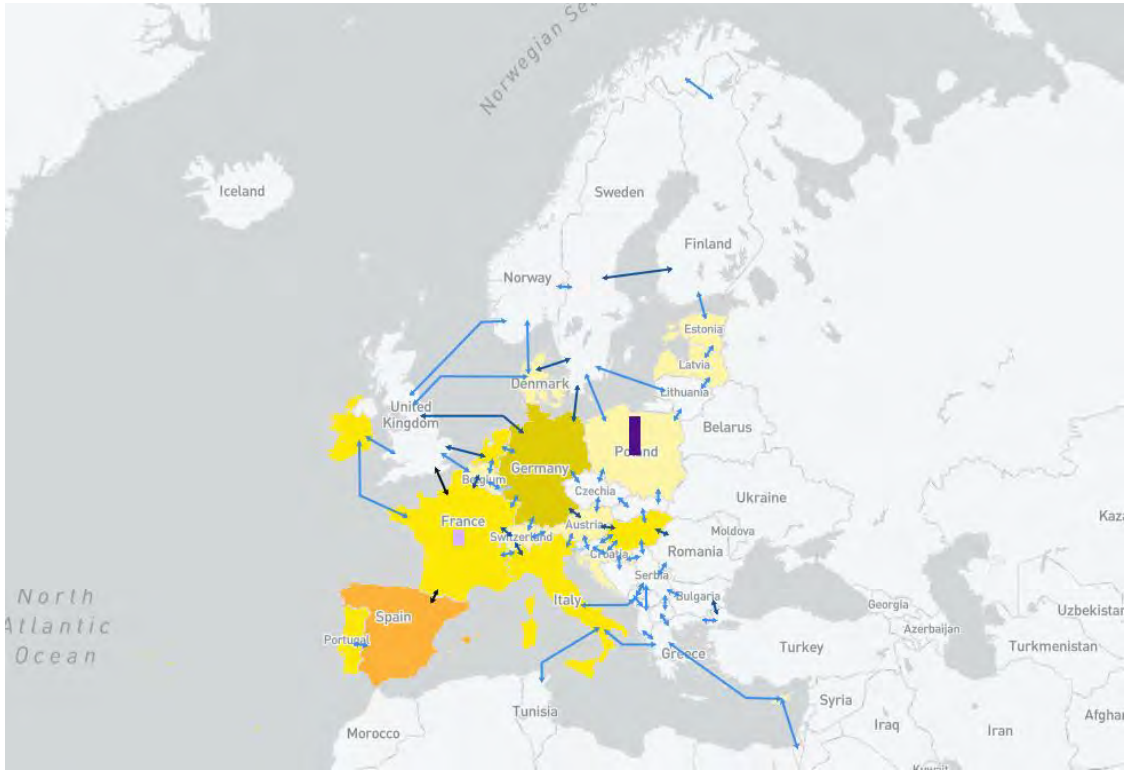
*Note: 2022 generation mix*

***Source**: ENER Chief Economist*

European Commission

# Grids and electrification

*Additional interconnections by 2040 (ENTSO-E's System Needs study)*




- *European Transmission System Operators see need for 64 GW of new interconnection by 2030 (compared to 2025), requiring investments of 2.5 bn per year*
- *Additional 24 GW of interconnection and 41 GW of storage required by 2040*

European Commission

# Increased flexibility needs

- *Flexibility requirements will increase in all EU MS towards 2050*
- *Total needs equal* ***to 30% of total electrical EU demand in 2050****, up from* ***24% in 2030 and 11% in 2021***

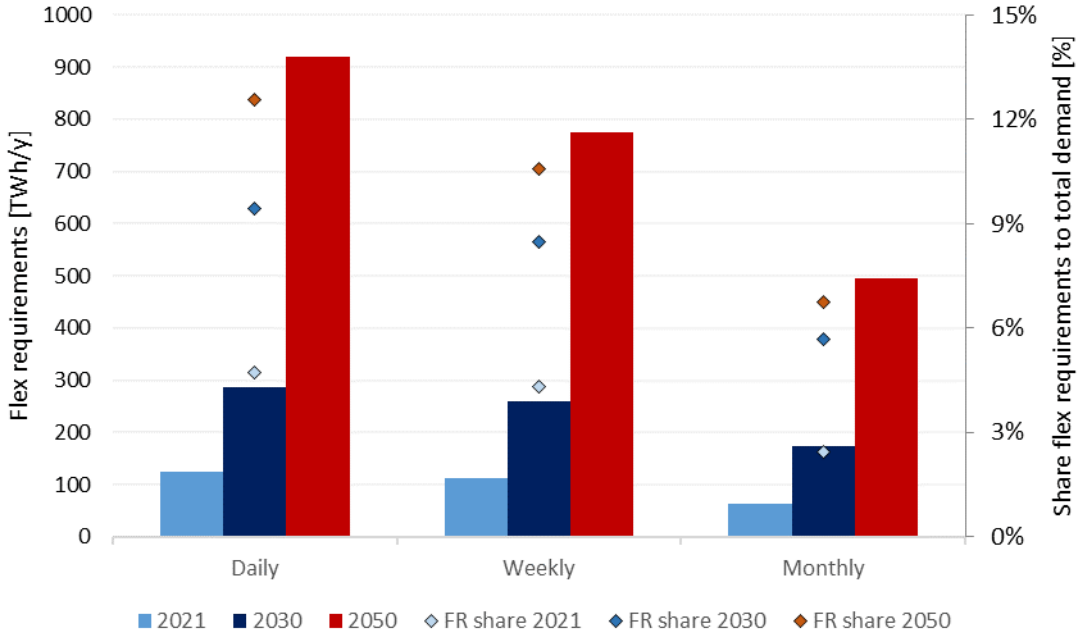



Figure: Daily, weekly and monthly flexibility requirements and their share to total demand in the EU for 2021, 2030 and 2050.

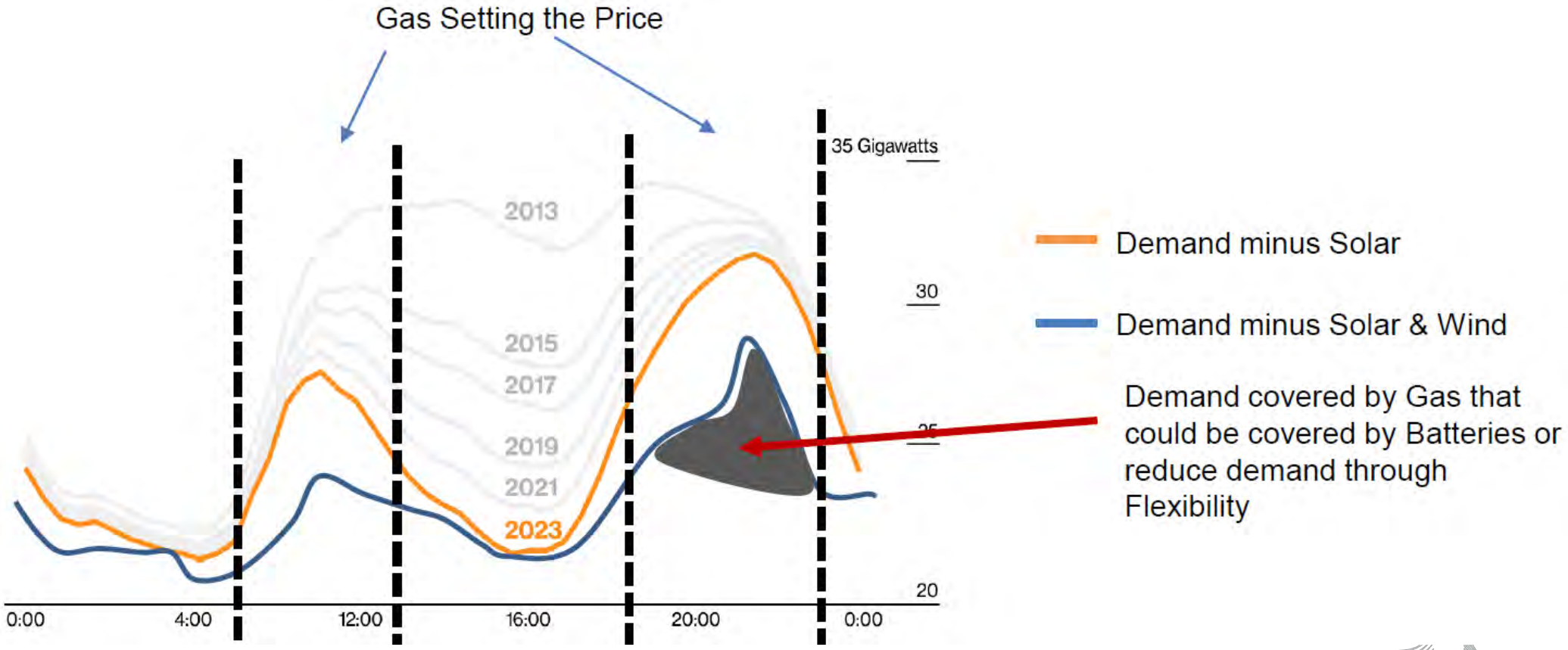
*Note: FR share = flexibility requirements share to total demand*

***Source****: ENER Chief Economist*

European Commission

# Increased flexibility needs

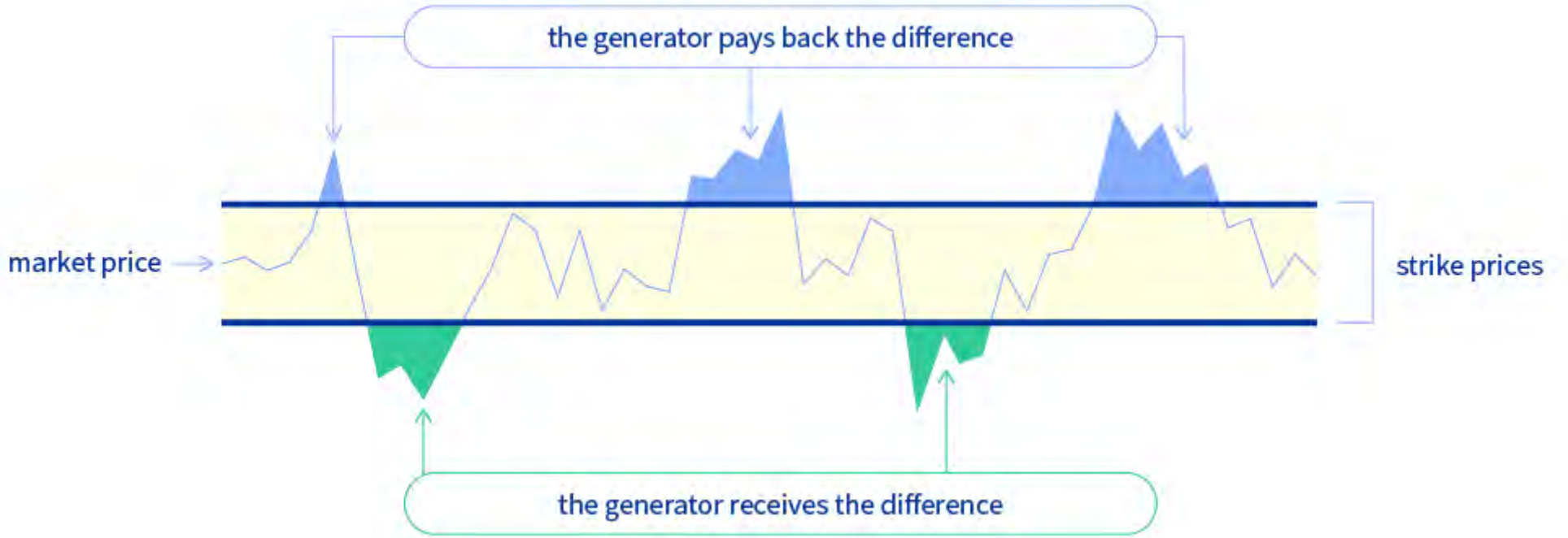
*Combination of* ***flexibility sources and storage will lower the dependence on gas prices (Germany)***




***Source***: *ENER Chief Economist*

# Electricity Market Design: Long-term contracts

*Long-term markets and price contracts, incl. Power Purchase Agreements (PPAs) and Contracts for Difference (CfDs), may help guarantee* ***predictable and stable prices for customers, secure predictable revenue streams for investors and ensure the bankability of new generation projects***.




European Commission


…2030 legislation is in place,
but we need to start the debate
about the next decade…
European
Commission

# Fit for 55 package:

## Delivering 2030 ambition

**13 inter-connected proposals** that strike a careful balance between pricing, targets, standards and support measures.

| Pricing | Targets | Rules |
|---|---|---|
| • Stronger ETS including in aviation<br>• Extending the ETS to maritime, road transport, and buildings<br>• *Updated Energy Taxation Directive*<br>• Carbon Border Adjustment Mechanism | • Updated Effort Sharing Regulation<br>• Updated LULUCF Regulation<br>• Updated Renewable Energy Directive<br>• Updated Energy Efficiency Directive | • Stricter $CO_2$ performance for cars & vans<br>• New infrastructure for alternative fuels<br>• ReFuelEU: More sustainable aviation fuels<br>• FuelEU: Cleaner maritime fuels |

| Support measures |
|---|
| Using revenues and regulations to promote innovation, build solidarity and mitigate impacts for the vulnerable, notably through the new Social Climate Fund and enhanced Modernisation and Innovation Funds |

# 2040: The EU's energy system is central

- Electrification of the economy remains key to decarbonization
- The power sector is the first to decarbonize (by 2040)
- Renewable energy will become the backbone of the energy system
- However, all low carbon energy solutions are necessary (including, nuclear, energy efficiency, storage, CCS, CCU, carbon removals, etc.)
- Need for Industry Decarbonisation Deal

# Summary of energy indicators (1/2)

| | 2030 | 2040 | 2050 |
|---|---|---|---|
| **Policy relevant indicators** | | | |
| **Energy-related CO2 reductions vs 2005** | -58% | -91% | -103% |
| **RES share in Gross FEC** | 42.4% | 74% | 89% |
| **FEC reduction vs 2015** | -19% | -36% | -40% |
| **Energy indicators – Supply** | | | |
| **Gross Available Energy (Mtoe)** | 1160 | 1037 | 1032 |
| - Fossil fuels | 663 | 270 | 150 |
| *- of which for non-energy use* | *96* | *96* | *80* |
| *- of which captured* | *1.8* | *13.3* | *24* |
| - Nuclear | 139 | 158 | 142 |
| - Renewables | 328 | 600 | 691 |
| **Net imports (Mtoe)** | 572 | 265 | 153 |
| **Import dependency (%)** | 50% | 26% | 15% |
| **Hydrogen production (Mtoe)** | 9 | 101 | 185 |
| **e-Fuels production (Mtoe)** | 2 | 38 | 60 |

- Fossil fuels use decrease substantially by 2040 (for energy use -80% vs 2020)
- By 2050 most fossil fuels used for non-energy purposes (plastic, fertilizers,…)
- RFNBOs production scales up exponentially between 2030 and 2040
- Overall Energy Consumption decreases

*Note: simplified version of the table 10 from the IA main document, section 6.2.1.*

# Summary of energy indicators (2/2)

| | 2030 | 2040 | 2050 |
|---|---|---|---|
| **Energy indicators – Power generation** | | | |
| **Gross electricity generation (TWh)** | 3362 | 5240 | 6922 |
| **Net installed power capacity (GW)** | 1617 | 2524 | 3256 |
| - Fossil fuels | 238 | 154 | 142 |
| - Nuclear | 94 | 88 | 71 |
| - Renewables | 1285 | 2278 | 3027 |
| **Storage and flexibility options (GW)** | 172 | 270 | 238 |
| **Final Energy** | | | |
| **Final Energy Consumption (Mtoe)** | 764 | 605 | 555 |
| **Electricity share in FEC** | 33% | 51% | 62% |
| **e-Fuels share in FEC** | 0% | 5% | 7% |

*Note: simplified version of the table 10 from the IA main document, section 6.2.1.*

- Electrification of the economy: generation almost doubles between 2020 and 2040.
- Renewables drive the expansion.
- Increased deployment of battery storage to provide flexibility.


The Green Transition is an investment agenda.
European Commission

# 2040: A comprehensive investment agenda

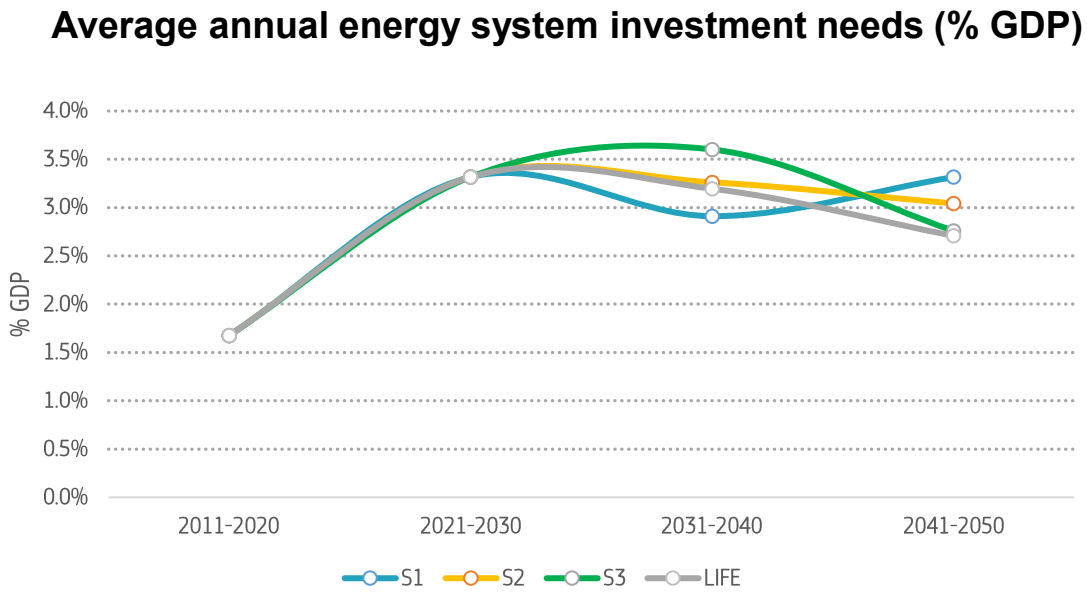



*Figure 103 of the IA Annex 8, section 2.2.1*

- € 710 bn per year in 1st decade (2031-2040) for energy, and then less in 2041-2050. Equivalent to € 660 bn per year on average between 2030 – 2050
- 1,5% of GDP above the investment in 2011-2020 for energy, and 0,2% of the GDP higher for transport;
- Share of GDP is comparable to this decade;
- The 2040 target gives regulatory certainty for long-term investments implementing the 2030 targets

# Thank you

**Comments/Questions**

**Bert SAVEYN**
Team Leader Modeling, Chief Economist Unit
e-mail: Bert.Saveyn@ec.europa.eu



European Commission