

A large green arrow graphic pointing to the right, with a rounded left end. The text is centered within the arrow's shaft.

# Energy transition in Poland Towards Net-Zero

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**SITE Energy Talk**  
**18 April 2024, Stockholm**

## KEY DRIVERS

### Government

National Policy and measures  
Energy mix  
Social issues (employment in coal regions)  
Political issues (energy security)  
Economic issues (energy prices)

### EU Regulatory Framework

Targets: Net-Zero, RES, Energy Efficiency.  
Policies and legislations on Climate, Energy, Environment, Sustainable Finance, Industry, etc.

### Market

Consumers  
Investors

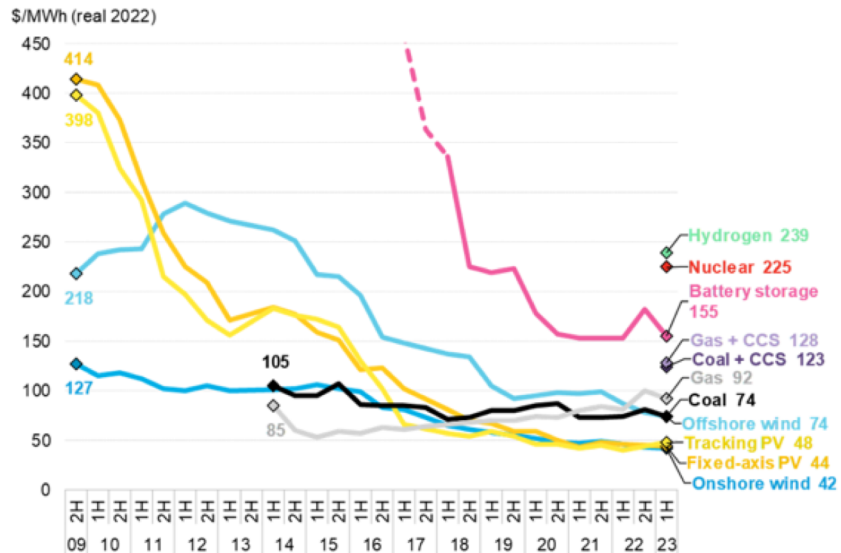
### Megatrends

- Drop in the cost of green technologies
- Global decarbonization (Paris Agreement)
  - Growing demand for clean energy
- Geopolitics – i.e. energy security concerns

## KEY DRIVERS

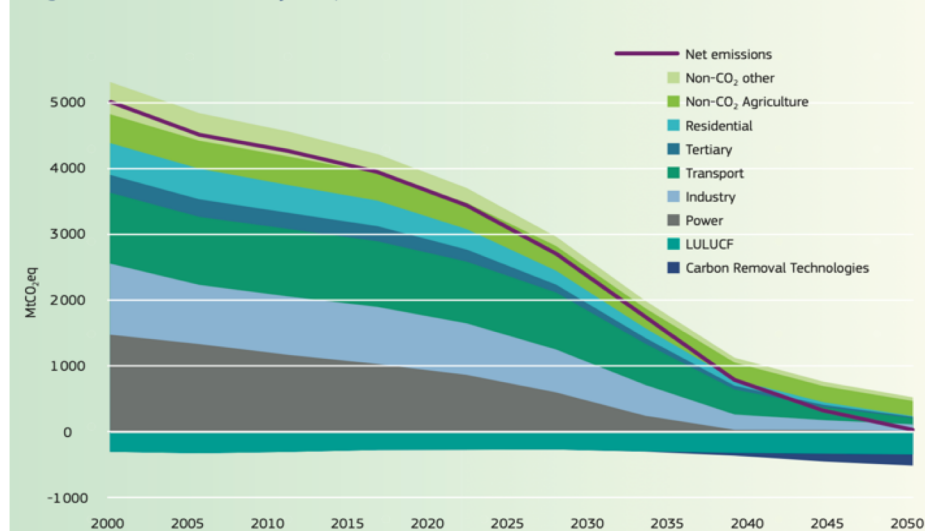
- Drop in the cost of green technologies
- Global decarbonization (Paris Agreement)
- Growing demand for clean energy

Figure 1: Global levelized cost of electricity benchmarks, 2009-2023



Source: BloombergNEF

Figure 5: GHG emissions trajectory in a 1.5°C scenario



Source: EC



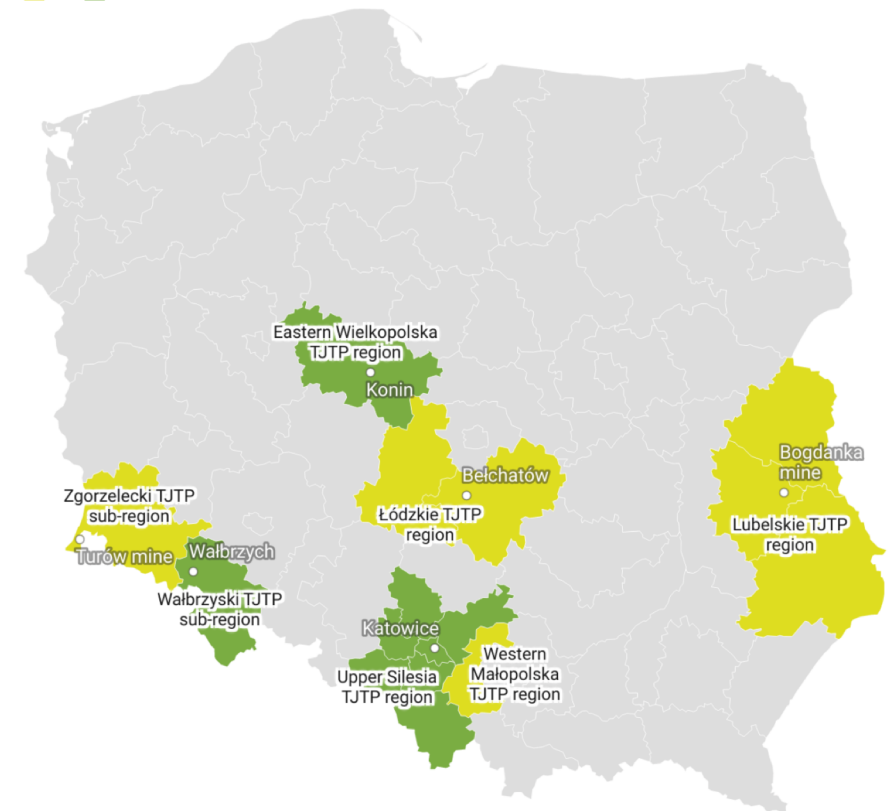
## KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR

- Political agreement on hard coal mining phase out by 2049
- Coal phase-out in the power sector estimated by 2035/40
- Just transition: 6 coal regions out of 16 Polish regions. Main coal region - Silesia (4.6 million people = 12% of Poland's population)

### Just Transition regions in Poland

Priority Just Transition region

■ No ■ Yes

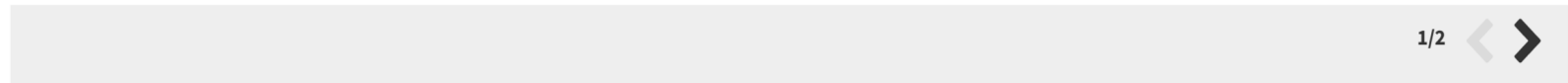




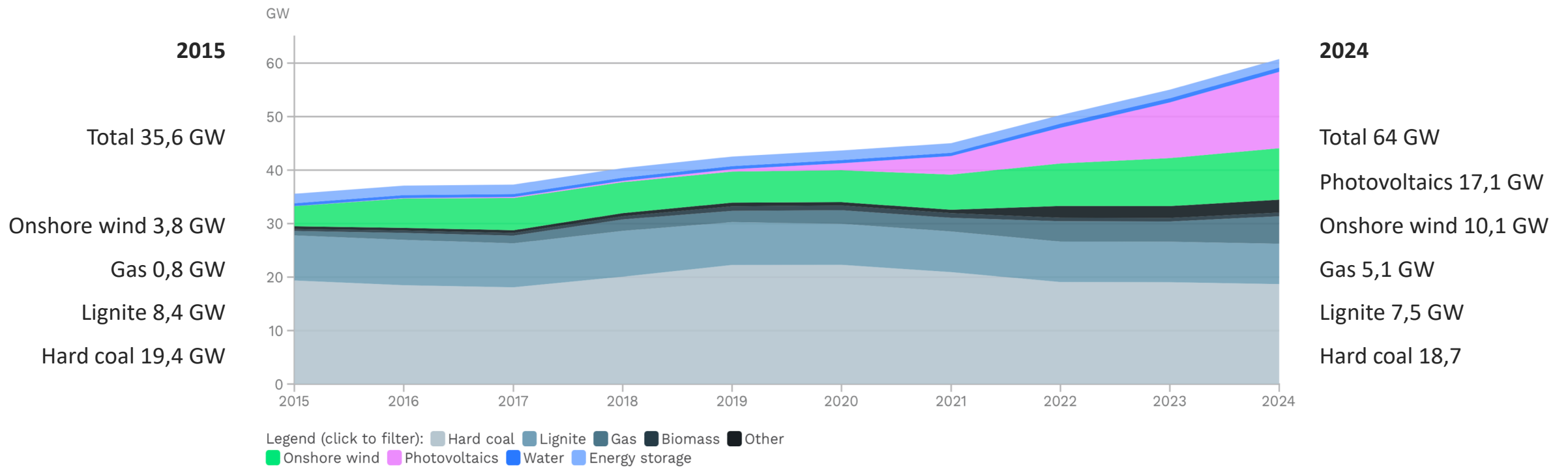
## KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR

### Electricity generation capacity in Poland

in gigawatts (GW) or percentage, state at the beginning of the year, by source



Arrows - switch between absolute and percentage values



Legend (click to filter): ■ Hard coal ■ Lignite ■ Gas ■ Biomass ■ Other ■ Onshore wind ■ Photovoltaics ■ Water ■ Energy storage

Own representation by energy.instrat.pl • Data: ENTSO-e based on PSE (Transmission System Operator)

A Flourish data visualization

## KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR

### Structure of electricity production



■ hard coal ■ lignite ■ oil ■ gas ■ RES ■ biomass and others ■ hydro ■ PV ■ wind

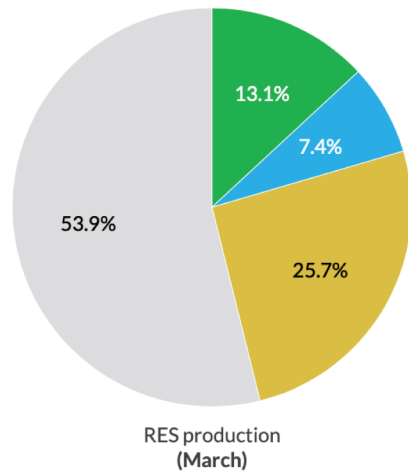
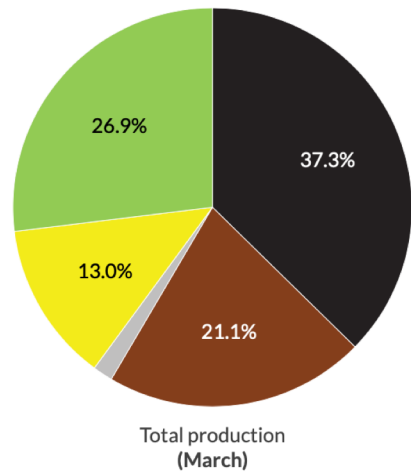


Chart: Forum Energii • Source: own elaboration based on data published by: ENTSO-E, PSE, ARE • [Download image](#)

- gas (natural gas, coal gasification)
- biomass and others (biomass co-firing, biogas plants, hybrid RES)
- hydro (hydro run-of-river and water reservoir)
- production from hydro pumped storage plants not included

### Share of RES in electricity generation



Values in %

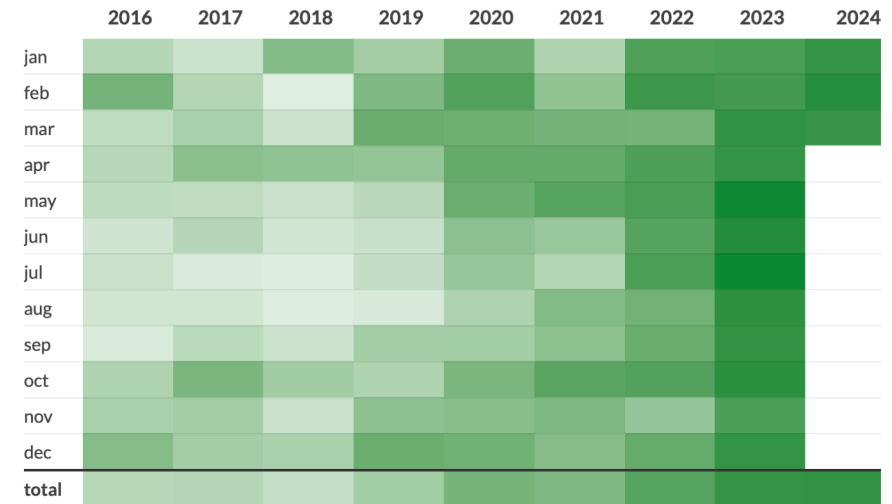


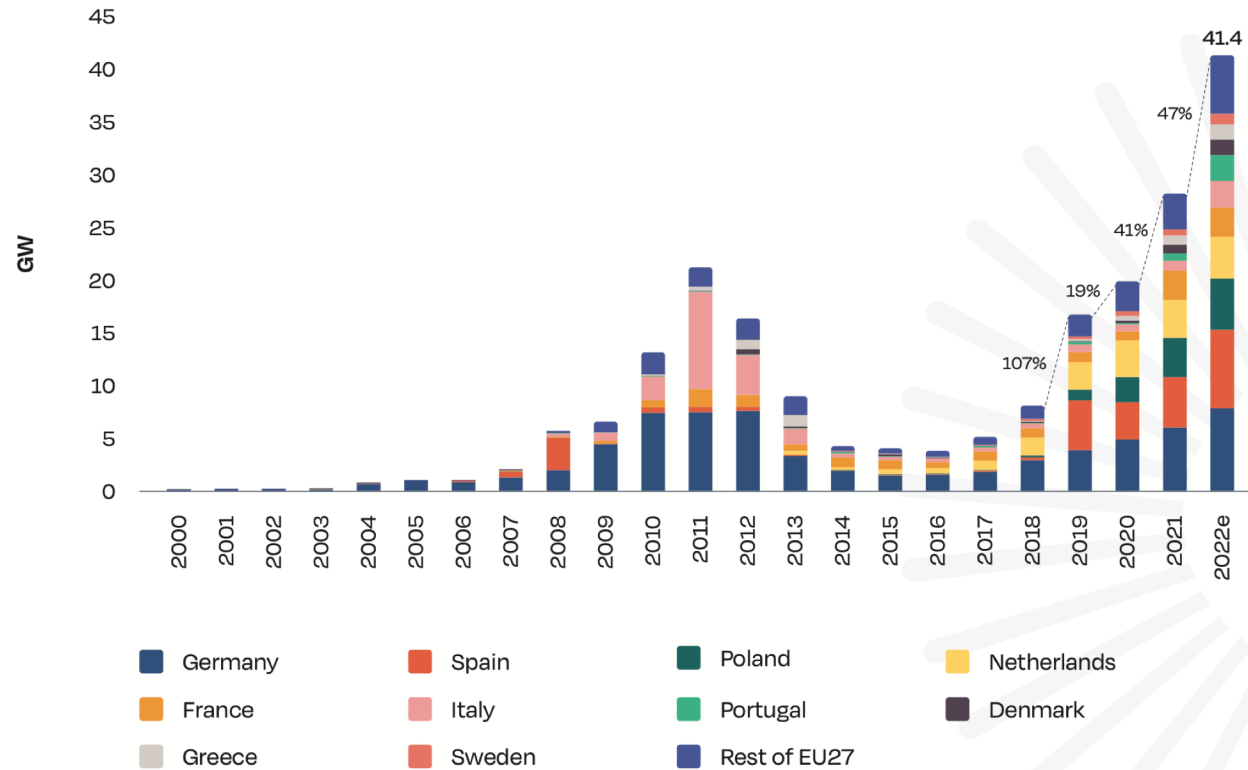
Table: Forum Energii • Source: own elaboration based on data published by: ENTSO-E, PSE, ARE • [Download image](#)

The graph shows the share of renewable electricity in total production for a given month and year. The share of renewables in consumption may differ minimally from the visible values due to imports and exports. Since 2015, an expansion of wind sources is visible (higher % of RES in autumn and winter), while a dynamic expansion of photovoltaics (higher % of RES in spring and summer) is visible since 2020.

- Growing role of RES (mainly onshore wind and solar energy)
- More and more energy companies on the market (state controlled and private)

## KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR

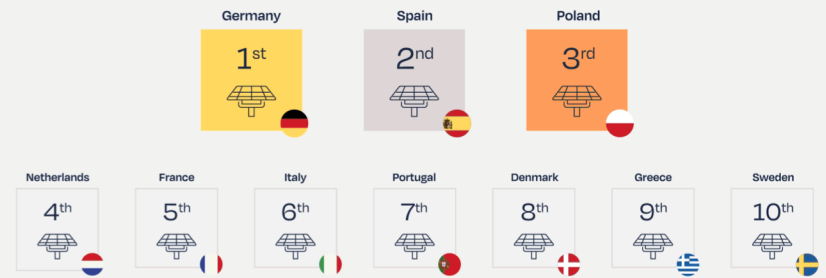
FIGURE 2 EU27 ANNUAL SOLAR PV INSTALLED CAPACITY 2000-2022



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### The EU solar leaders

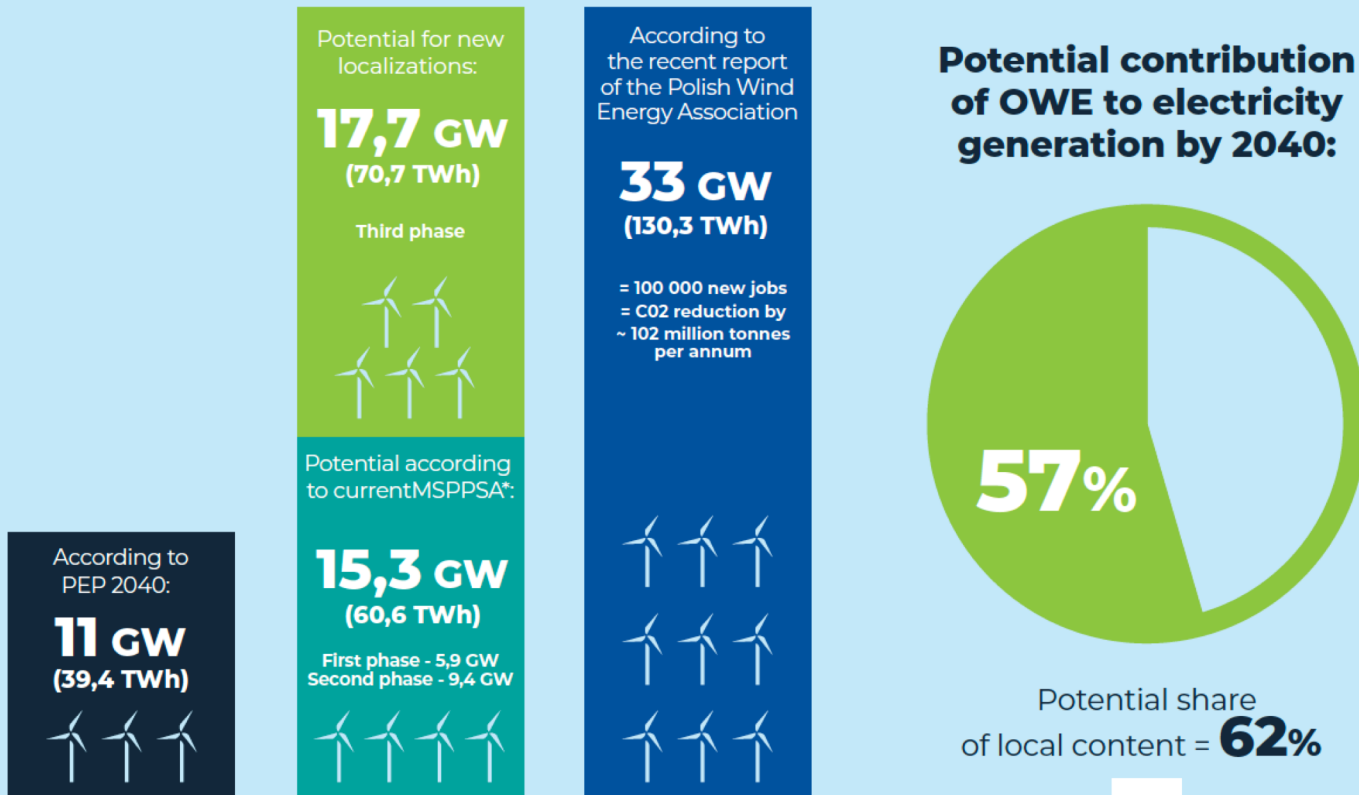
The top 10 countries adding solar capacity in 2022



- Solar revolution in Poland driven by prosumers
- Government support scheme "My electricity"
- 11 GW out of 17 GW of PVs installed by prosumers (1,4 million installations)

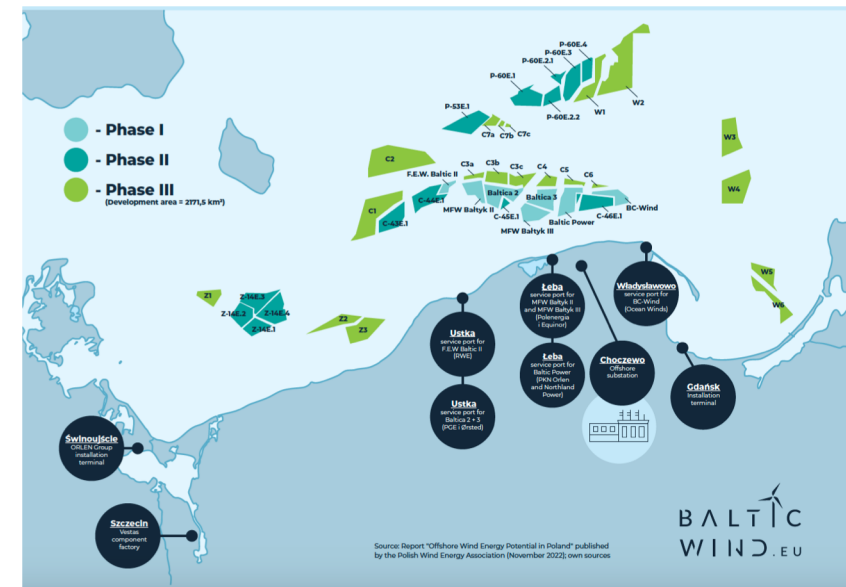
## KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR

### Offshore Wind Energy Potential in Poland



\*Maritime Spatial Plan for Polish Sea Areas in scale of 1:200 000 (adopted by the Regulation of the Council of the Ministers of 14 April 2021 on the adoption of the spatial development plan of Internal sea waters, territorial sea and the exclusive economic zone at a scale of 1:200 000 [Journal of Laws of 2021, item 935])

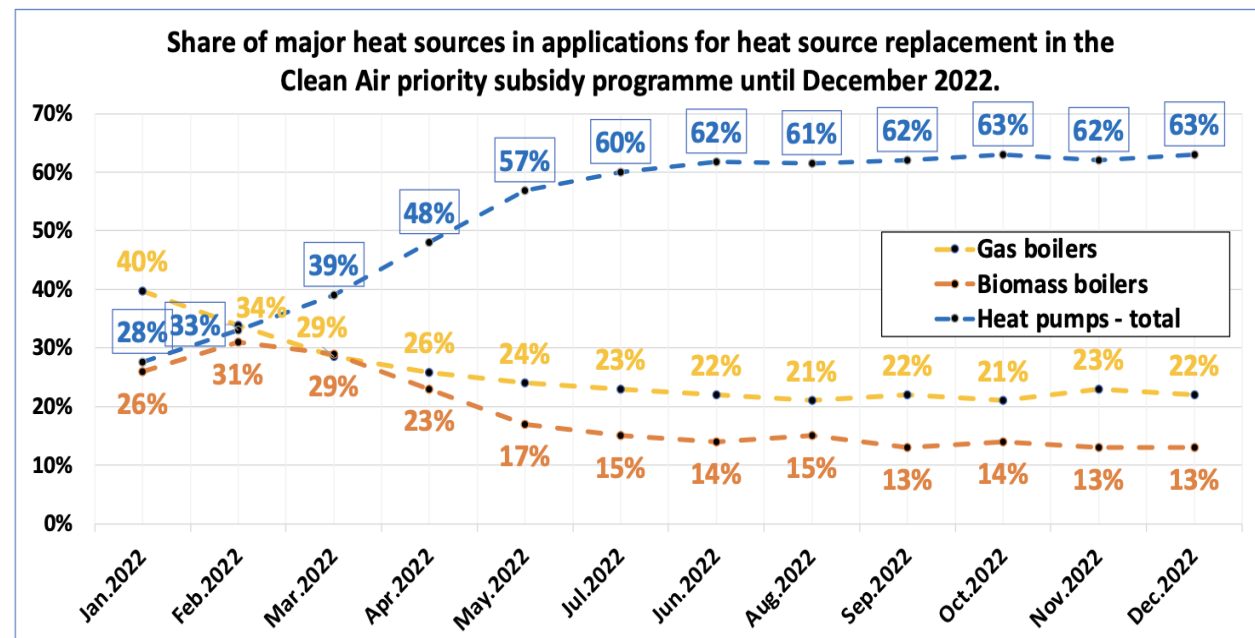
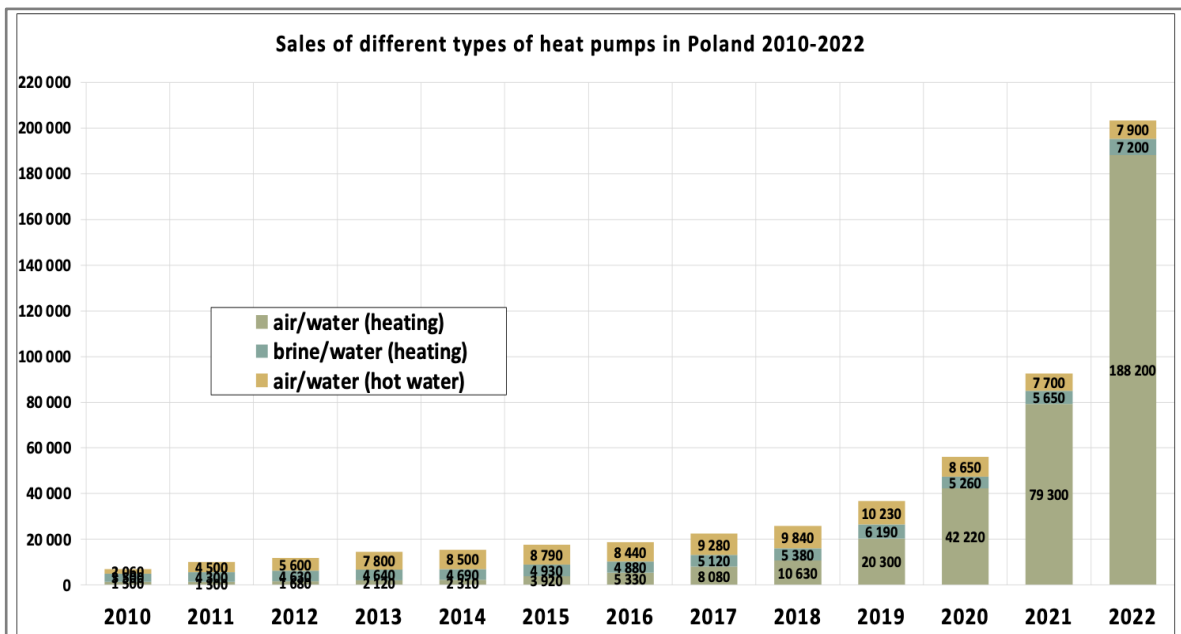
- 1<sup>st</sup> phase of OWE under implementation
  - first electricity planned for 2026
  - 6 GW by 2030
- Support scheme for additional 12 GW



**KEY CHALLENGE: DECARBONIZATION OF ELECTRICITY SECTOR**

- 6 GW coal-fired power plant to be phased out by 2030 - this generation needs to be replaced. Followed by i.e. 5 GW Bełchatów lignite power plant phase out in 2031-2036
- Main obstacle - grids. Electricity system is already unable to consume all renewable energy generated on sunny/windy days
- PSE Grids Development Plan - by 2030 over 50% of consumed electricity should be produced by RES
- Nuclear – government plans 6-9 GW as from 2033 until 2043

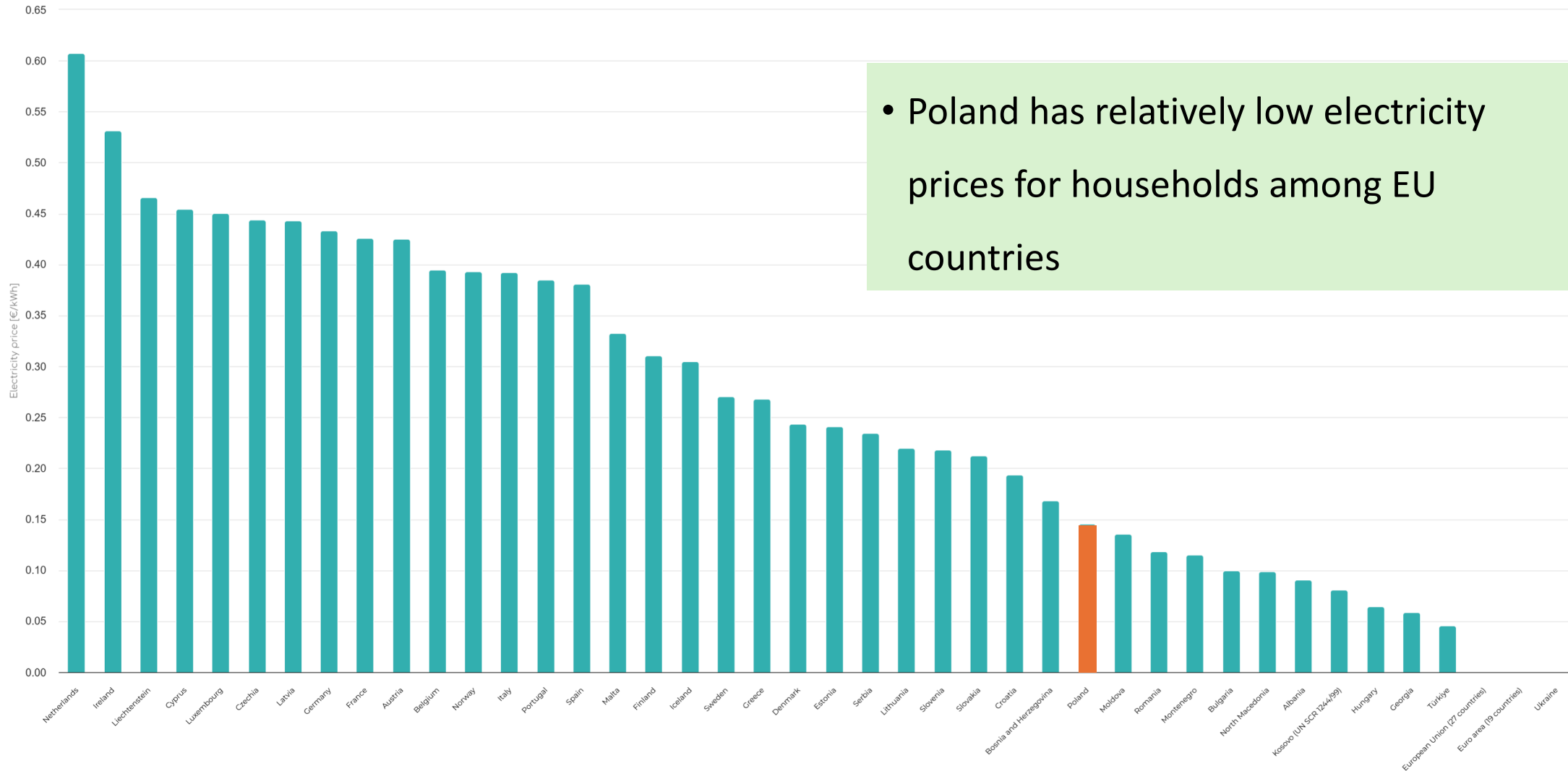
## DECARBONIZATION OF INDIVIDUAL HEATING



- Poland – one of main markets for heat pumps
- Heat pump market in 2022 grew by 120%, for building heating by 130%
- In 2022, almost 1/3 units in the total number of space heating units sold in Poland was a heat pump

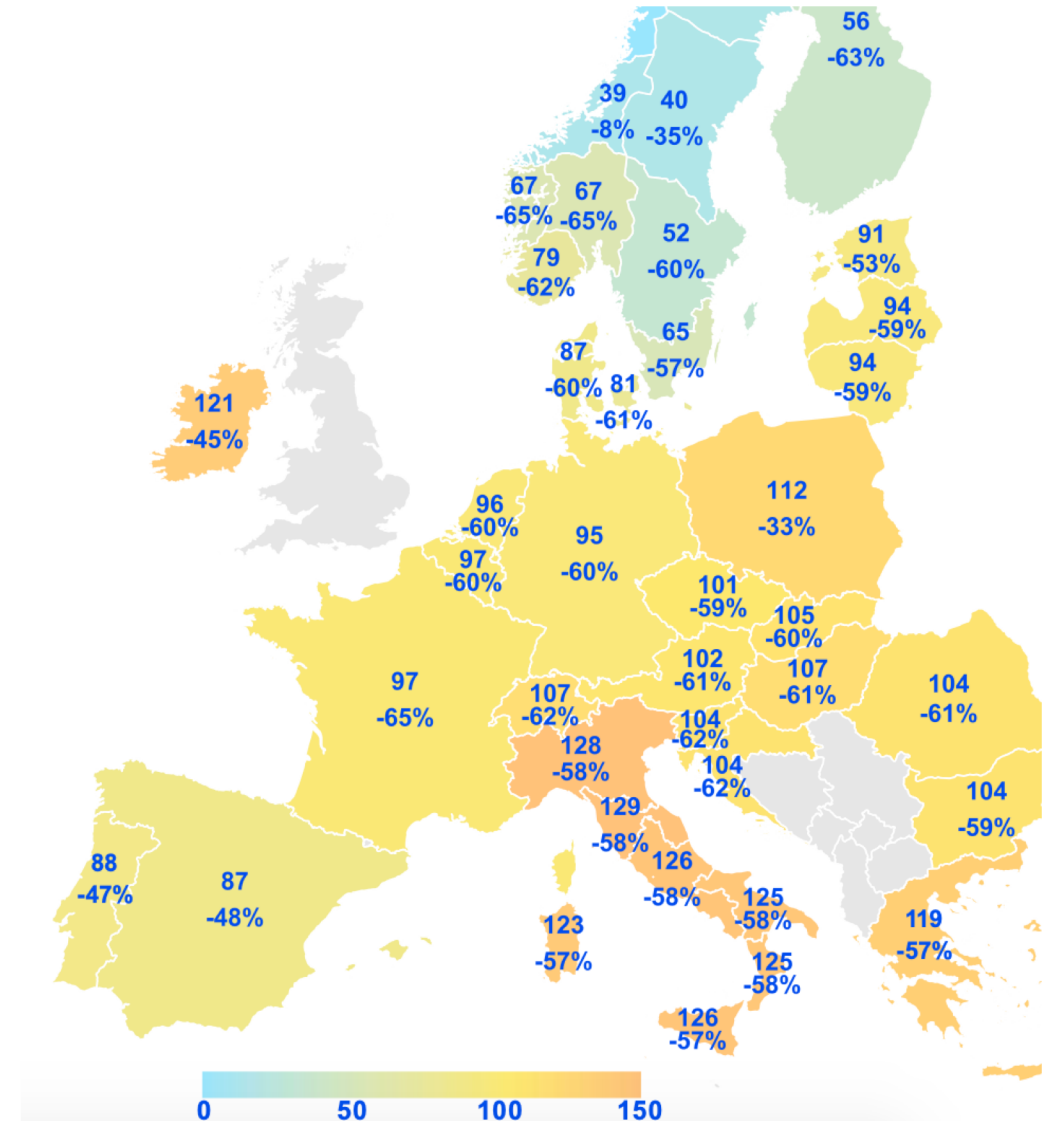
## COMPETITIVENESS OF THE ECONOMY

Electricity prices for household consumers - bi-annual data (from 2007 onwards)(Euro/Kilowatt-hour)  
undefined 2023 - Band DA : Consumption < 1 000 kWh



## COMPETITIVENESS OF THE ECONOMY

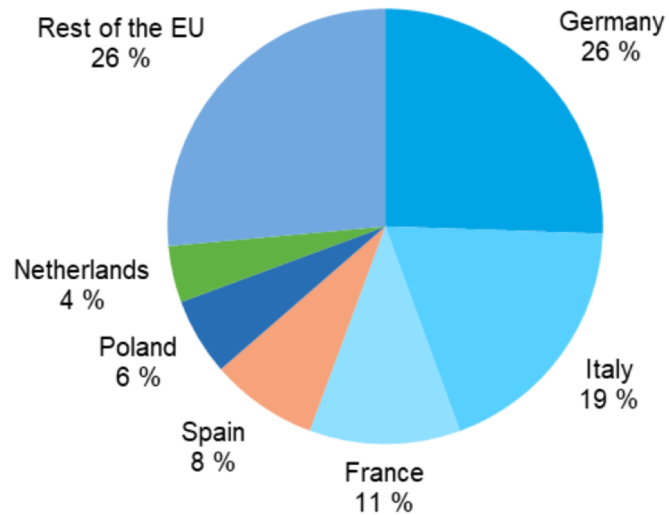
- Average annual day-ahead electricity prices & year- on-year difference in the EU-27 /EEA(Norway), Switzerland – 2023. Prices decreased by up to 65%
- Relatively high electricity prices in Poland among EU countries





## COMPETITIVENESS OF THE ECONOMY

EU value of sold industrial production, by country, 2022 (% of total value of sold production)



Note: EU except Cyprus, Luxembourg, Malta  
Source: Eurostat (online data code: DS-056120)

eurostat 

Figure 2: EU value of sold industrial production, by country, 2022 (% of total value of sold production)

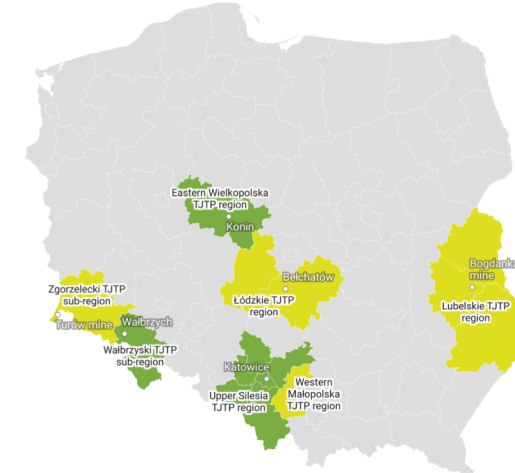
Source: Eurostat [DS\\_056120](#)

- In 2022 six EU Member States (incl. Poland) generated 74% of the EU's value of sold industry production.
- Polish industry is mainly concentrated in central and southern regions (e.g. Silesia)

CEE Bankwatch Network  Polish Green Network 

### Just Transition regions in Poland

Priority Just Transition region  
No Yes



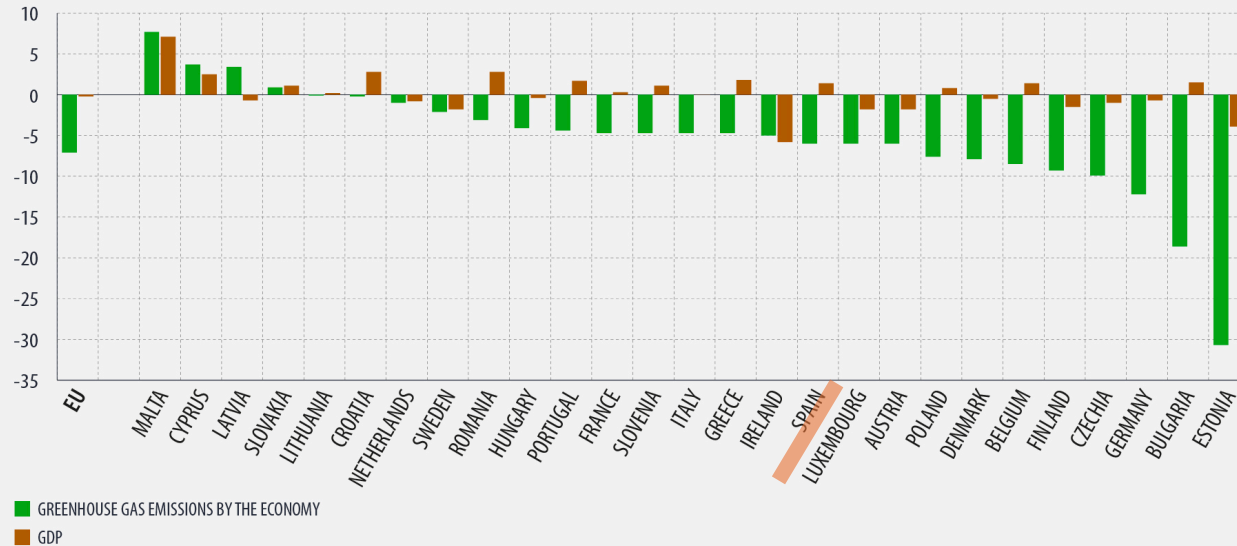
Map of Polish Just Transition regions based on the Program on European Funds for Just Transition, prepared by the Department for the Coordination of Implementation of EU Funds at the Polish Ministry of Funds and Regional Policy, April 2021.

Map: CEE Bankwatch Network - Created with Datawrapper

## COMPETITIVENESS OF THE ECONOMY

### Growth rates of greenhouse gas emissions by the economy and GDP, Q3 2023

(% change compared with the same quarter of the previous year)



GREENHOUSE GAS EMISSIONS BY THE ECONOMY  
GDP

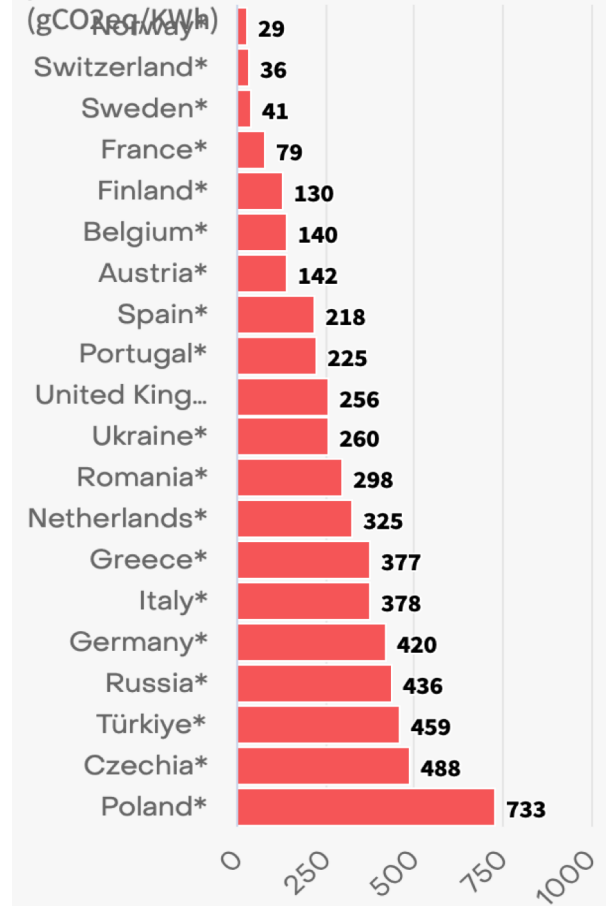
All data are estimated by Eurostat, except for the Netherlands and Sweden, which provided their own estimates.

eurostat

- Competitiveness undermined by high carbon footprint
- GHG intensity - most challenging for the industry
- Poland is one of the countries showing that GDP growth can be achieved by reducing emissions

### Carbon intensity ranking

Emissions intensity of electricity production in 2023, \*else 2022 (gCO<sub>2</sub>eq/kWh)



Source: EMBER, ember-climate.org

## COMPETITIVENESS OF THE ECONOMY

### The price of emissions allowances in the EU

Cost per tonne of carbon dioxide produced (€)



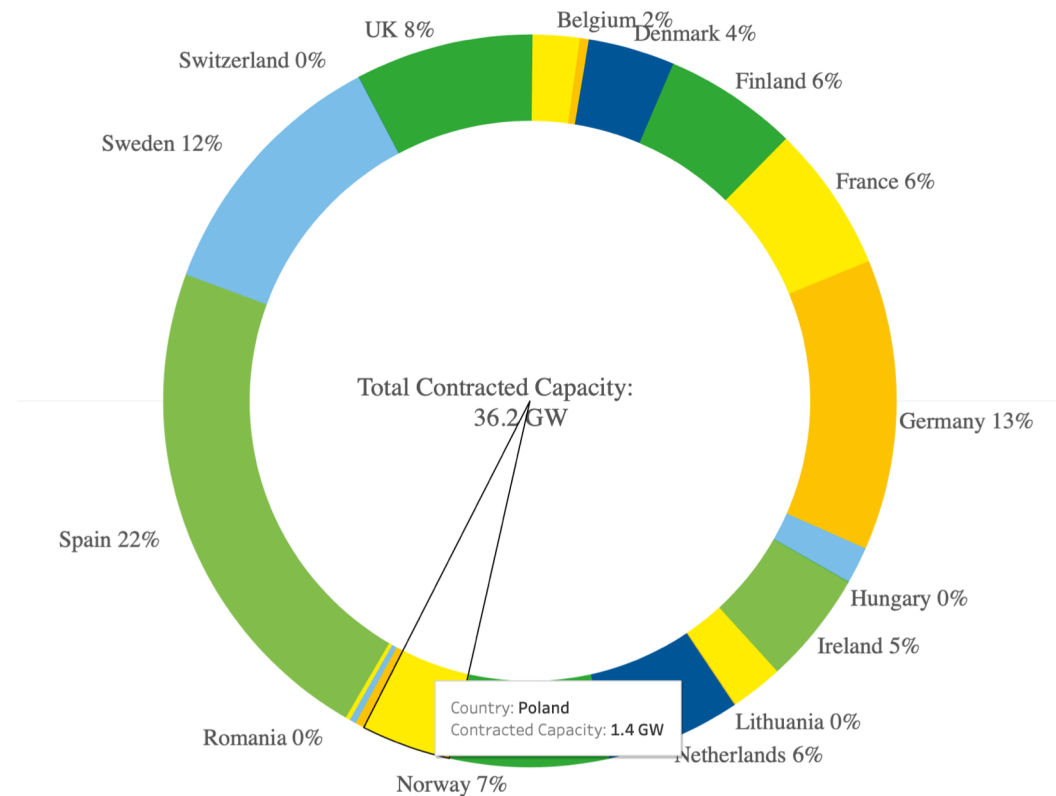
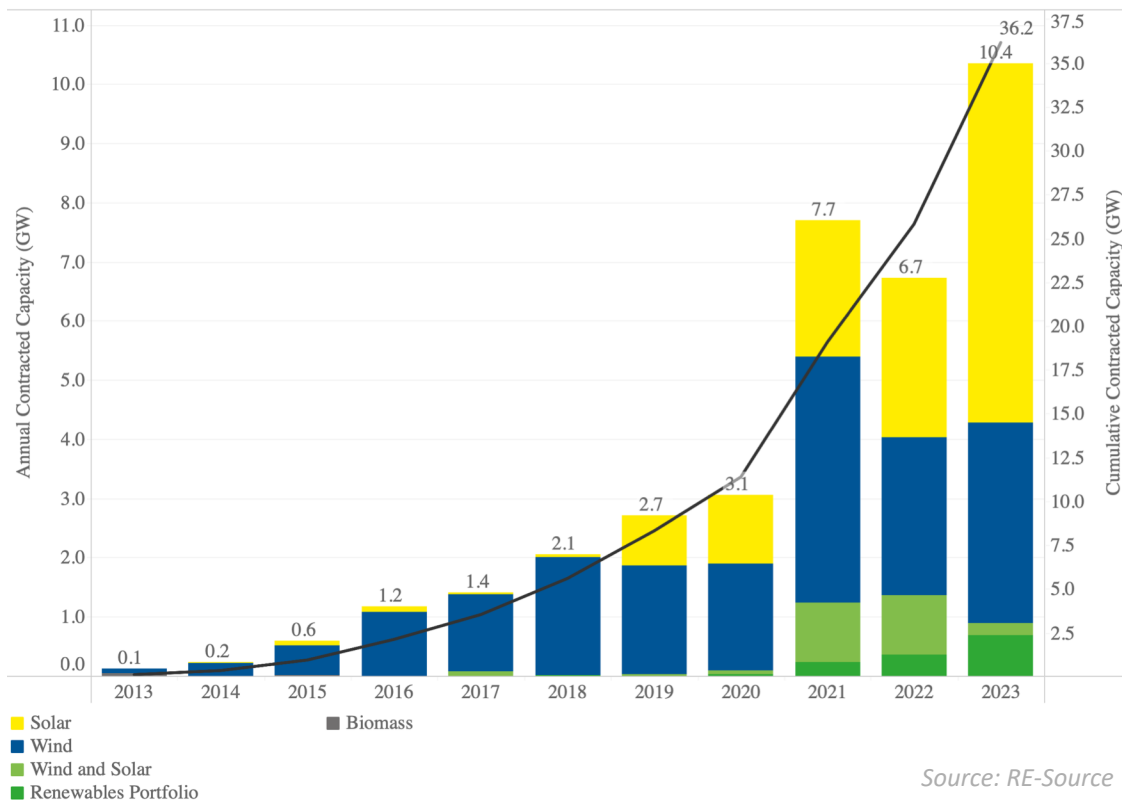
Source: Data provided by Montel; due to licensing this data is not available for download  
EU Emissions Trading Scheme prices (December contract)

EMBER

Source: EMBER, ember-climate.org

- EUAs price impacts competitiveness of carbon-intensive economies and companies incl. electricity producers
- Example: annual cost of EUAs for PGE is PLN 22 billion = 1.2 GW offshore wind farm project.

## COMPETITIVENESS OF THE ECONOMY



- Growing consumers demand for green energy – growing cPPA market
- In 2023 European cPPA market increased by 10.4 GW to over 36 GW
- In 2023, the main customer sectors were: heavy industry (2,9 GW), ICT (2,5 GW), retail (0,8 GW), telecommunications (0,7 GW). Significant growth was recorded among the automotive, food and beverage and retail industries.
- Poland with 1,4 GW is one of 19 countries in Europe with cPPA market.

## CONCLUSIONS

- The need to decrease GHG intensity to keep competitiveness
- To keep energy prices at affordable level
- Maintaining the functionality of the RES-based system (grids, grids, grids)
- More and more companies investing in RES generation
- “Electricity production gap by/after 2030” threat – as a result of coal-phase
- Energy security concerns (Russian war against Ukraine) – strategic infrastructure, energy sources supplies
- European initiative Net-Zero Industry Act as “win-win” for EU27

**Thank you for your attention!**