Forum Energii
Analizy i dialog

Energy Transition in Poland

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Forum Energii is a European, interdisciplinary think-tank based in Poland with a team consisting of experts working in the field of energy. We combine experience gained in business, public administration, media, and science with specialist knowledge in the field of energy.

The mission of Forum Energii is to initiate dialogue, propose knowledge-based solutions, and inspire action for a just and efficient energy transition that leads to climate neutrality.

TABLE OF CONTENTS

05 **Main conclusions**

06 **Chapter 1. Energy in Poland**

08 Structure of primary energy consumption (2023)
09 Structure of renewable primary energy consumption (2023)
10 Import wedge – demand and supply of total energy (2023)
11 Poland's import dependence
12 Energy transition indicators in 2024 (from 2004)
13 Change in electricity demand vs. GDP
14 Change in greenhouse gas emissions compared to other EU countries (2023)
15 The cost of importing fuels and raw energy materials
16 Diversification of energy sources from 2015 to 2024

17 **Chapter 2. National Power System**

19 **National balance**

20 Balance of domestic electricity production and consumption
21 Average annual cross-border electricity exchange capacity
22 Change in peak power demand
23 Reserve and unavaiable capacity
24 Structure of electricity consumption
25 Electricity consumption – demand increasing factors

26 **Achievable capacity**

27 Achievable capacity in 2024
28 Changes in achievable capacity in 2024 as compared to 2023
29 Changes in achievable capacity from 2015 to 2024
30 Changes in achievable renewable capacity from 2015 to 2024
31 Electricity prosumers

32 **Electricity generation**

33 Electricity generation in 2024
34 Changes in electricity generation in 2024 as compared to 2023
35 Changes in electricity generation from 2015 to 2024
36 Changes in renewable electricity generation from 2015 to 2024
37 Share of vRES in electricity generation and consumption
38 Curtailment of renewable energy sources
39 Electricity storage capacity

JULY 2025

TABLE OF CONTENTS

40 **Electricity and gas prices**

41 Comparison of spot electricity prices in neighbouring markets
42 Electricity prices on the spot market
43 Comparison of electricity prices in neighbouring markets (for households))
44 Comparison of electricity prices in neighbouring markets (for industry)
45 Comparison of natural gas in neighbouring markets (for households)
46 Comparison of natural gas in neighbouring markets (for industry)

47 **Chapter 3. Energy raw materials**

49 Trade balance of steam hard coalo
50 Hard coal balance in Poland
51 Domestic hard coal productiono
52 Structure of steam hard coal consumption
53 Structure of steam hard coal consumption – power and heat industry
54 Structure of lignite consumption – power and heat industry
55 Trade balance of natural gas
56 Natural gas balance in Poland
57 Domestic natural gas production (2023)
58 Structure of natural gas consumption
59 Structure of natural gas consumption – electricity and heat
60 Trade balance of crude oil
61 Crude oil balance in Poland (2023)
62 Domestic crude oil production (2023)
63 Coal and natural gas prices

64 **Chapter 4. Impact on climate. Emissions**

66 Specific emissions of primary energy consumption (2023)
67 Greenhouse gas emission intensity of electricity generation (2023)
68 Change in GHG emission intensity of electricity generation over time (2023)
69 Changes in greenhouse gas emissions in Poland
70 Structure of greenhouse gas emissions in Poland
71 Changes in greenhouse gas emissions from electricity and heat generation
72 Emissions from electricity and heat production, by fuelo
73 Carbon dioxide emissions covered by the Emissions Trading System (2023)
74 CO_2 emission allowances prices and Poland's income from their sale

JULY 2025

Main conclusions

- There has been a significant decline in hard coal consumption in the Polish economy. Relative to 2023, the decrease is 14%, and relative to 2015 it is as high as 33%.
- The aggregate share of coal in electricity generation continues to decline and was the lowest ever. Last year it reached 56.2%. This is a decrease relative to 2023 of 4.3 p.p.
- Poland's dependence on imported raw materials is steadily increasing, mainly due to the increasing share of oil and its derivatives in the structure of raw material consumption. In 2023, the total dependence was 45%, compared to 29% in 2014. Visible is, however, the diversification of supply.
- The total cost of raw material imports in 2024 was approximately PLN 112 billion. We paid the most for fuels and raw materials from Saudi Arabia (29%), Norway (18%) and the United States (17%).
- At the end of 2024, Poland cut itself off completely from fuel and raw material supplies from Russia. For the rest of the year, only LPG fuel was imported from this direction and its share of the total import cost was approximately 1%. By comparison, in 2015, Russia's share of import costs was 84.5%.
- Natural gas consumption is back to the levels before the full-scale invasion of Ukraine began and imports from Russia were cut off. Gas was mainly consumed for industrial purposes, but households are also playing a large and growing role. The increase in consumption of natural gas is mainly seen in the commercial and industrial energy sector.
- There is still a low level of new available capacity in the system. Apart from renewables, the only new large unit in the system was the gas-fired power plant in Gryfino (1.4 GW).
- CO_2 allowance prices are falling – at the end of 2024 they were EUR 67.27/t CO_2, and the weighted average price for the whole year was EUR 64.75/t CO_2. This is significantly lower than the allowance prices forecast by the European Commission. From the sale of emission allowances, the state budget received PLN 16.6 billion.
- Poland is still one of the most emitting countries in the world in terms of unit emissivity of energy consumption primary. Only Kuwait, South Africa, Kazakhstan and China were more emissive in 2023.

Chapter 1.
Energy in Poland

85%

of primary energy in Poland comes from fossil fuels (41% from coal, 27% from oil, 17% from gas).

1,2 bln PLN

amount for the bill for imports of raw materials and fossil fuels since 2015 (in 2024 PLN 112 billion, of which to Russia PLN 1.5 billion).

6,1%

of primary energy consumed in Poland is covered by renewable energy (other than wood).

45%

was Poland's dependence on energy imports total in 2023. This is 16 p.p. more than in 2014.

0%

of gas natural gas and coal consumed in 2024 came from Russia. In 2015, this was 52% and 7% respectively.

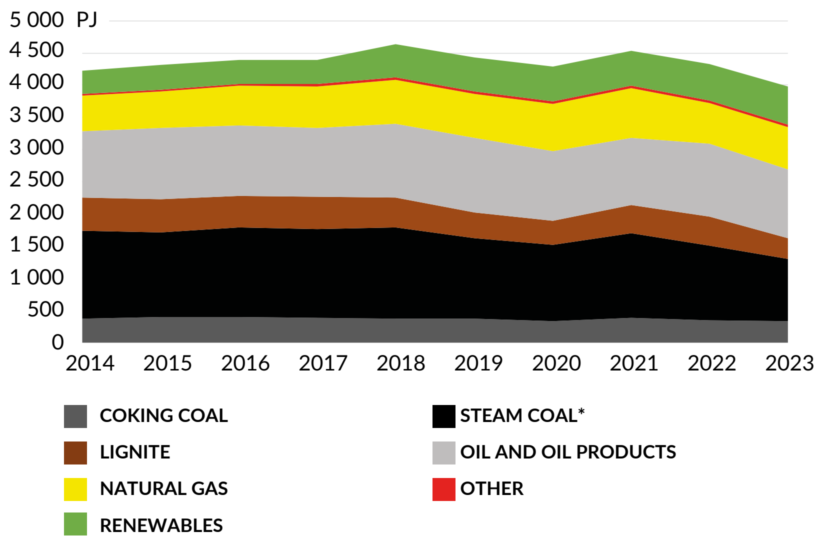
-38%

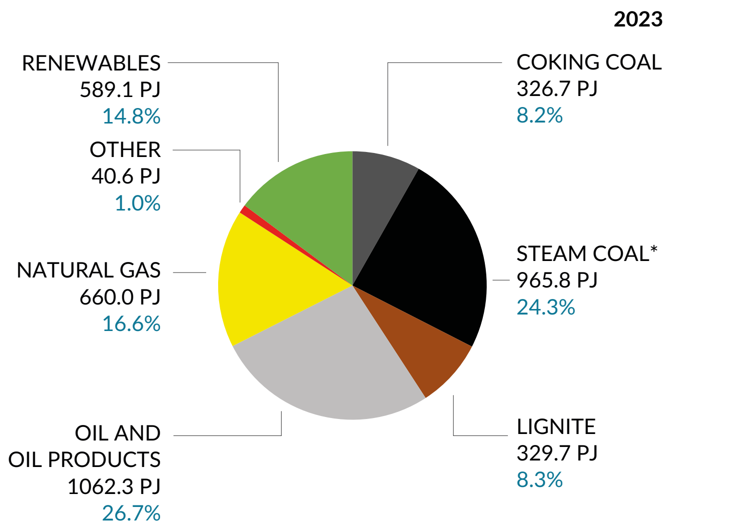
by this much the consumption of coal has fallen since joining the EU. Consumption of oil has increased by 41%, and natural gas by 43%.

The transition of the energy sector is progressing, and as of the end of December 2024, Poland is completely independent of raw material imports from Russia. Nevertheless, these changes are still barely visible, and the economy's dependence on imported raw materials is growing despite falling primary energy consumption. Poland's bills for imported raw materials are still very high.

Structure of primary energy consumption (2023)

- Consumption of primary energy, i.e. energy obtained directly from natural resources, has remained at a similar level over the years (a decrease of only 5.4% between 2014 and 2023).
- The structure of its consumption is also slowly changing, with a decreasing share of coal (-12.5 p.p. over the decade) and an increasing share of RES (+6.2 p.p.). Oil consumption is growing, having increased by 2.5 p.p. over the decade.
- In 2023, 85.2% of primary energy consumption in Poland was covered by fossil fuels of which 40.8% was coal.

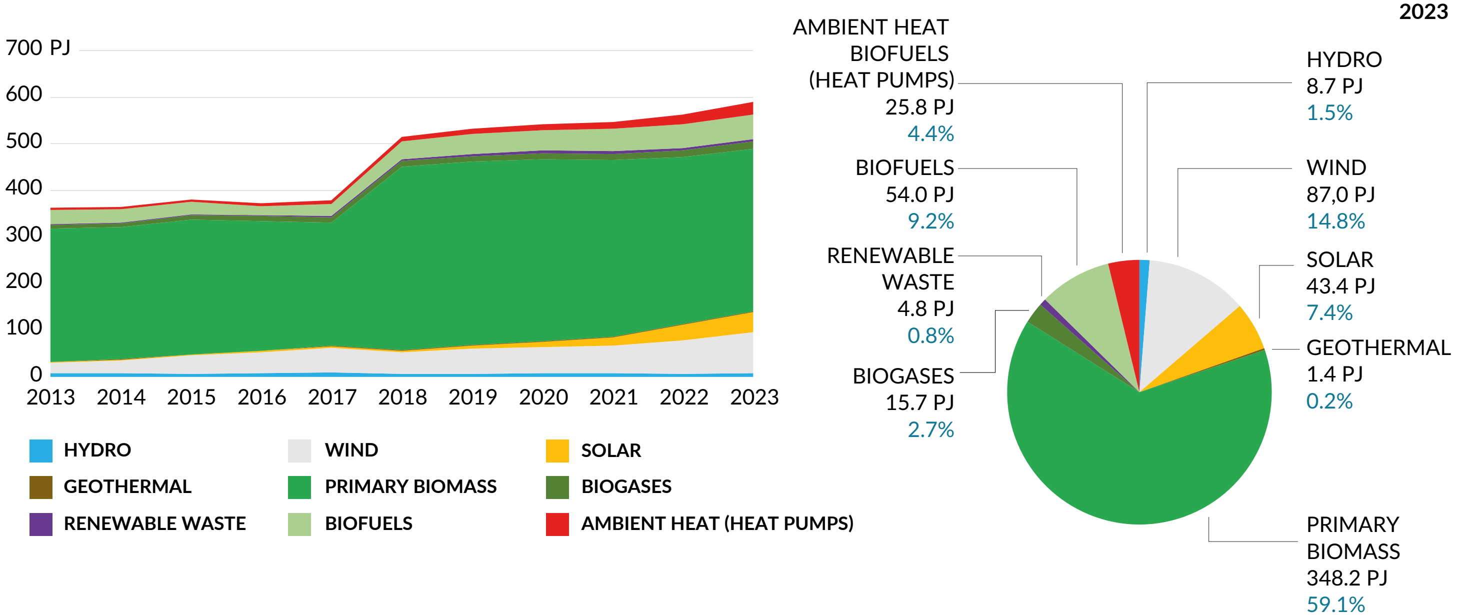




Source: own elaboration based on data from Eurostat.
* Anthracite was added to steam coal.

Structure of renewable primary energy consumption (2023)

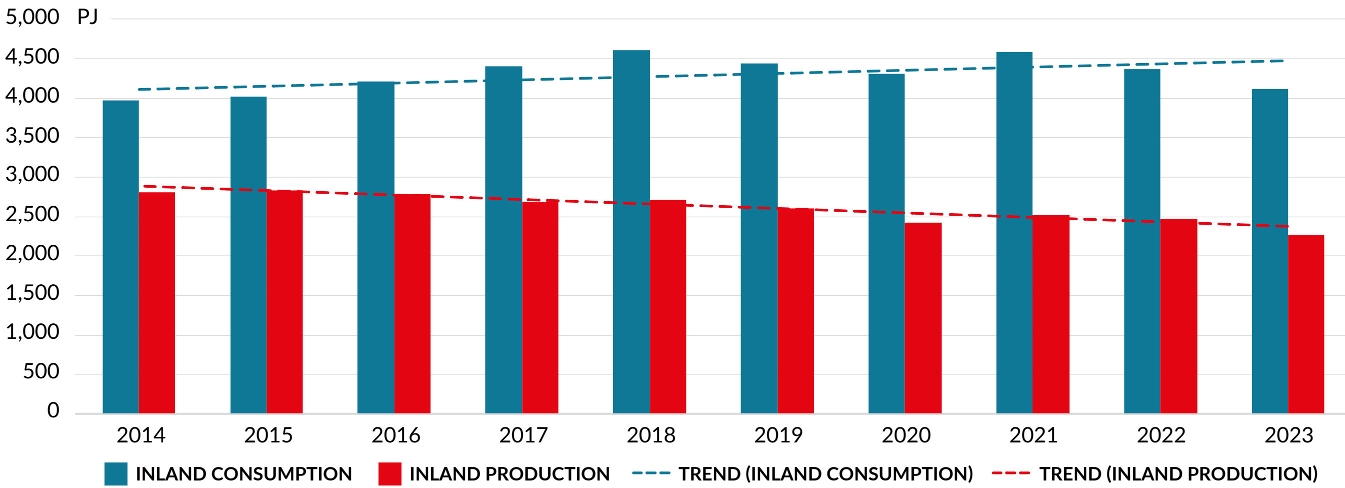
- Renewable sources accounted for 14.8% of the primary energy consumed in 2023 (used in all sectors of the economy). The vast majority (almost 2/3) was primary biomass, namely wood.
- Although the use of wind energy, solar energy and ambient energy (e.g. through heat pumps) has clearly accelerated in the last decade, these sources only account for 3.9% of primary energy consumption.



Source: own elaboration based on data from Eurostat.

Import wedge – demand and supply of total energy* (2023)

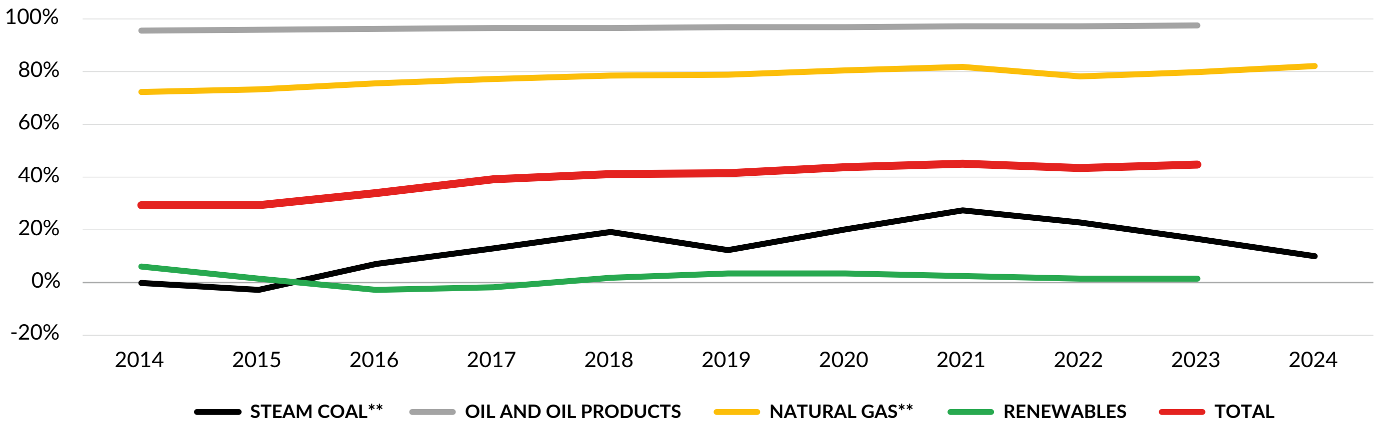
- Over the period 2014–2023, domestic energy consumption increased by 3.6% (142 PJ), with a 19.2% decrease in supply (-539 PJ). The decrease was mainly due to a decline in the mining of energy resources and the too-slow development of RES, which is not able to replace the losses in obtaing coal, among other things.
- This results in the increasing dependence of the Polish economy on energy imports from abroad.



Source: own elaboration based on data from Eurostat.
* Primary energy comes directly from fossil fuels (natural gas, coal, oil), while total energy also includes processed energy carriers such as electricity, gasoline, etc.

Poland's import dependence

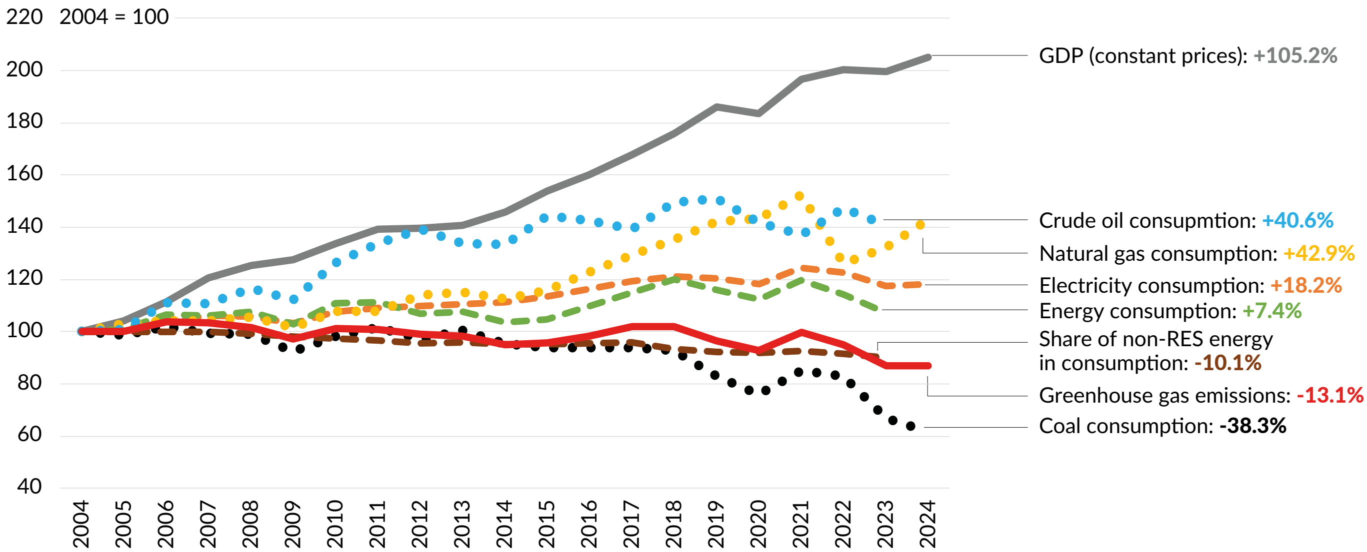
- The dependence of the Polish economy on energy imports* increased from 29% to 45% between 2014 and 2023.
- For years, the largest import dependency has been observed for oil. As much as 96–97% of the oil consumed in Poland comes from abroad.
- In 2024, the estimated dependence on natural gas imports was 82%. This is 2 p.p. higher than 2023 and 9 p.p. higher than 10 years ago.
- Steam hard coal imports in 2024 covered 10% of domestic consumption. The decrease compared to 2023 is due to the record low consumption of this raw material. Over the decade, dependence on imported steam coal has increased by 13 p.p.
- Dependence on renewable energy imports (mainly biofuels and biomass) hovers around zero.



Source: own elaboration based on data from ARE, GUS, ARP, ENTSOG and Eurostat.
* Import dependence is understood as the ratio of imported energy to energy consumed domestically.
** Estimated values for 2024. For the purposes of the estimates for hard coal, heating values unchanged from 2023 were assumed.

Energy transition indicators in 2024 (from 2004)

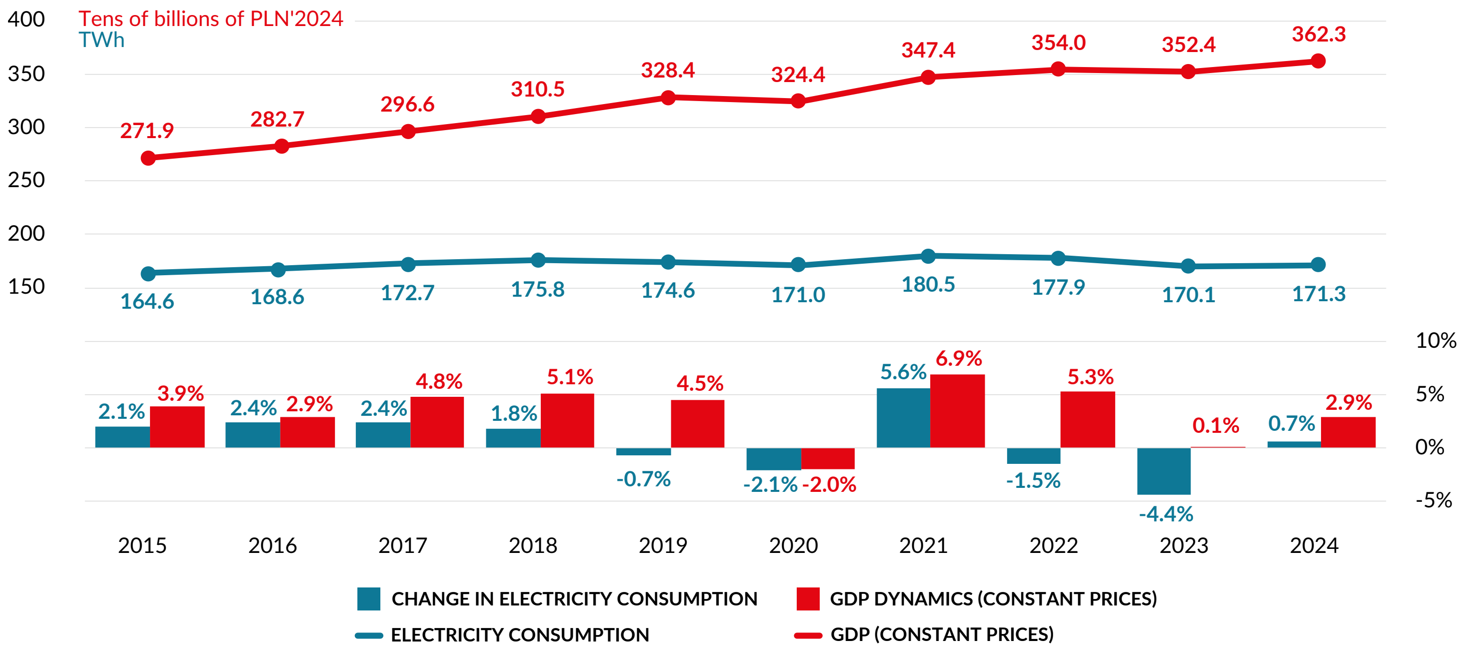
- In 2024, Poland achieved the fifth highest GDP growth among European countries since 2004 (behind Malta, Turkey, Ireland and Kosovo).
- The consumption of energy and fuels (especially for transport) in the Polish economy is steadily increasing, but the role of coal is clearly declining. Combined with an increase in the use of RES, Poland is starting to reduce greenhouse gas emissions.
- The Polish economy is slowly returning to the level of natural gas consumption before the suspension of supplies from Russia.
- There is a clear lack of correlation (so-called decoupling) between economic growth in the form of GDP and declining emissions of greenhouse gases.



Source: own elaboration based on data from ARE, GUS, EEA, ARP, ENTSOG, KOBiZE and Eurostat.

Change in electricity demand vs. GDP

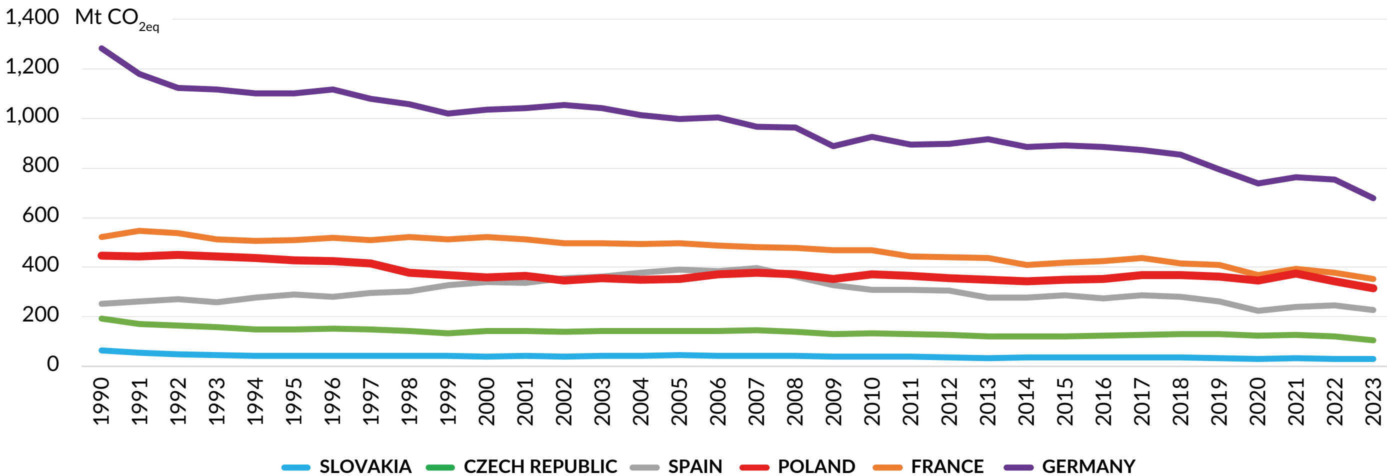
- Until now, economic growth has been correlated with an increase in electricity demand. However, this has changed in the last three years. It is apparent that the growth in electricity consumption has stalled against a steadily growing GDP.
- Despite the large cumulative increase in Poland's GDP (by 33.2% in constant prices) over the decade, the demand for electricity has only increased by 4.1% over this period.



Source: own elaboration based on data from ARE and GUS.

Change in greenhouse gas emissions compared to other EU countries (2023)

- Since 1990, net reductions in greenhouse gas emissions in Poland have amounted to 29.2% (38.4% in the European Union as a whole). However, since 2005 (the year in which the emissions trading scheme was launched) they have fallen by 9.9%.
- Among countries that emitted more than 50 million tonnes of CO_{2e} in 1990, the leaders in emission reductions are Romania (-71.4%) and Bulgaria (-56.3%).

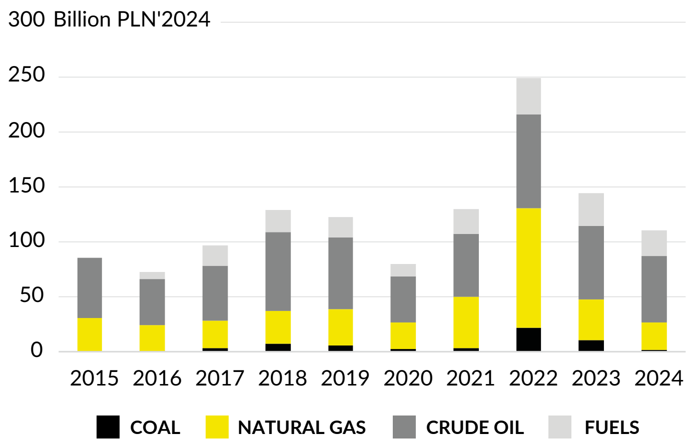


Source: own elaboration based on data from EEA.

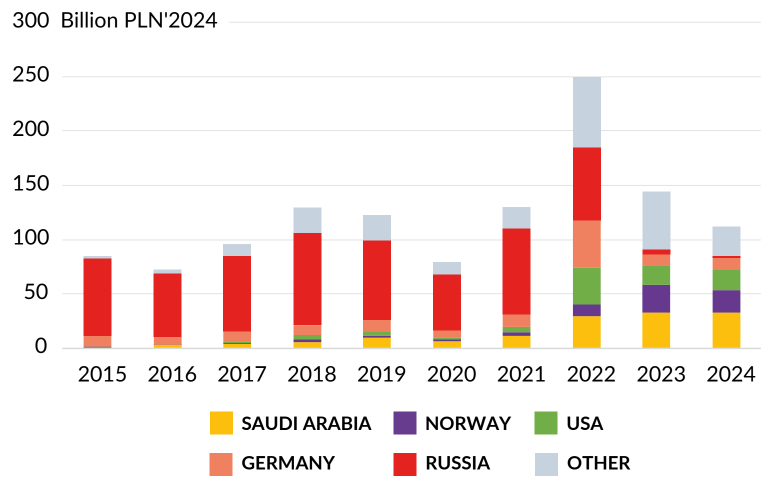
The cost of importing fuels and raw energy materials

- In 2024, after accounting for inflation, the value of net imports of energy and fuel raw materials to Poland was estimated at PLN 112 billion. More than half of this amount (54%) consisted of net imports of crude oil (PLN 60 billion), 23% of natural gas (PLN 26 billion), and 2% of coal (PLN 1.7 billion).
- Only LPG was imported from Russia in 2024. The value of these imports amounted to PLN 1.5 billion, or 1% of the total value of imports of raw materials and fuels. In 2015, imports from Russia accounted for 84% of the total cost. As of 20 December 2024, there is an embargo on LPG from Russia, so imports from this direction should cease.
- After eliminating fuel supplies from Russia (1% of the total value of imports), Saudi Arabia became the largest beneficiary of Poland's import dependence. In 2024, it earned PLN 32.9 billion from supplies to Poland. Second place went to Norway and third to the United States.

COST OF NET IMPORTS, BY RAW MATERIAL AND FUEL*

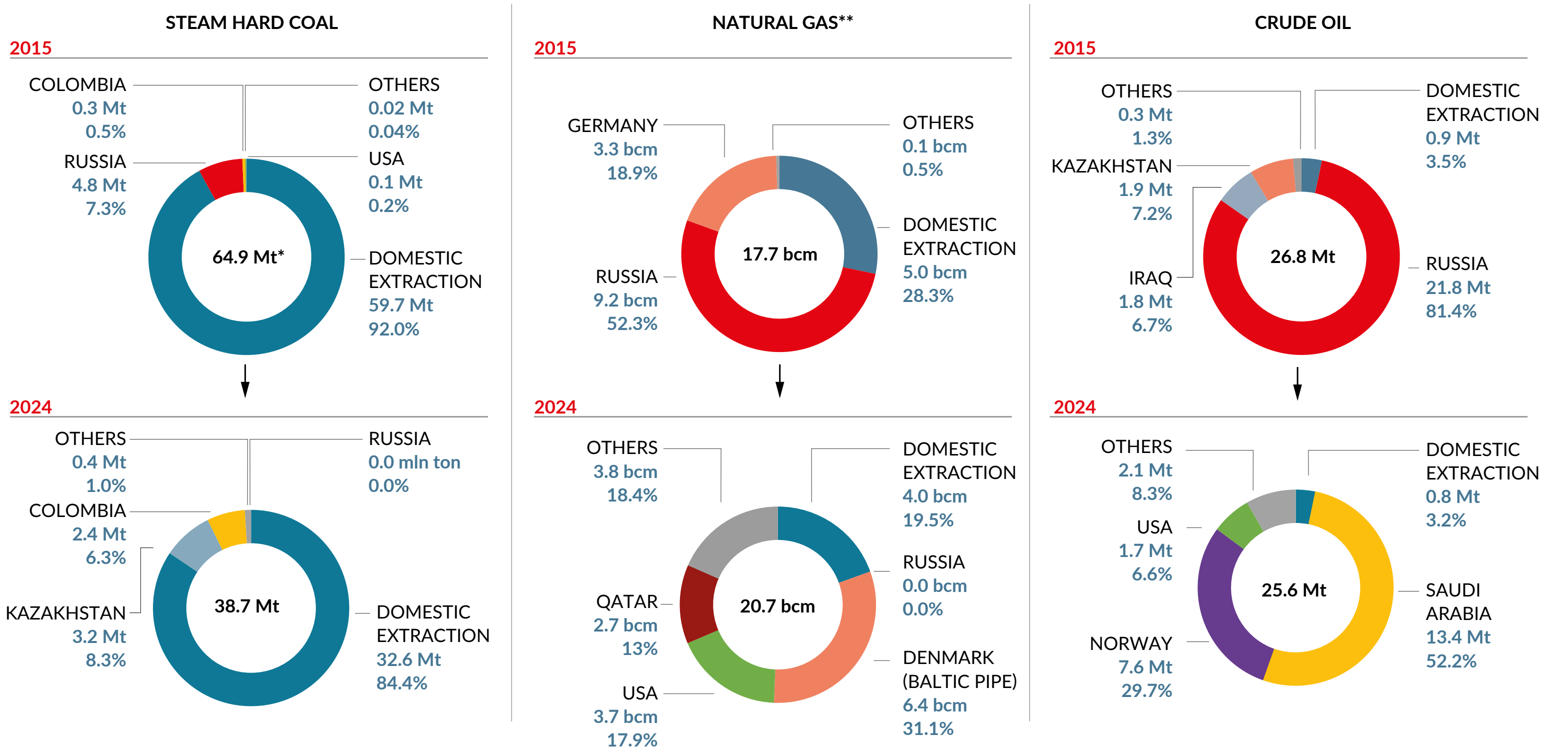


COST OF NET IMPORTS, BY PARTNER COUNTRY



Source: own elaboration based on data from GUS, Eurostat and NBP.
* In 2015 Poland was a net exporter of fuels.

Diversification of energy sources from 2015 to 2024*



Source: own elaboration based on data from GUS, ARP, ENTSOG and Eurostat

* Values inside are the sum of net imports and domestic extraction. If net imports were negative, they are not shown in the chart, but are included in the value given inside the circle.

** Extraction by a Polish company outside the country (such as on the Norwegian shelf) is not domestic extraction.

Chapter 2.

National Power System

29,4%

was the share of RES in the production of electricity in Poland. Coal's share is 56.2% – 4.3 p.p. less than in 2023.

2 TWh

amounted to net energy imports electricity. Poland returned, after the 2022 exception, to the role of importer due to higher domestic production costs.

4,7%

national electricity fed into the grid was produced by prosumers. Estimated self-consumption is 1.5% of national consumption.

28,5 GW

was the peak power demand in 2024. The 1.2 GW increase over 2023 is due to the electrification of the economy.

731 GWh

was the estimated reduction of electricity production from RES. This is equivalent to the annual consumption of approximately 330,000 households.

3,6 GW

is the minimum reserve capacity of generating units in the NPS during daily peaks in demand. This represents an improvement compared to previous years.

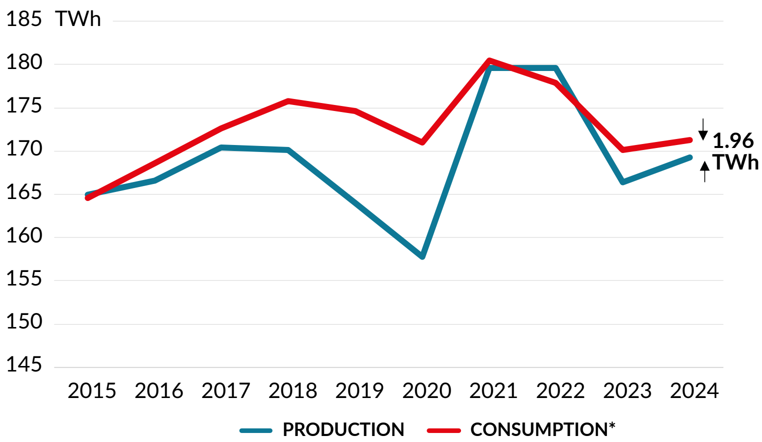
The rapid growth of RES (annual and hourly average), driven largely by prosumers, leaves less and less market space for coal-fired capacity. Through their inflexibility, the amount of curtailed RES power generation is growing dynamically. Capacity reserves are still at low levels, exacerbating the risk of imbalance of the system. The role of new sources of demand from electrified sectors is growing, and peak capacity demand has reached record levels.

National balance

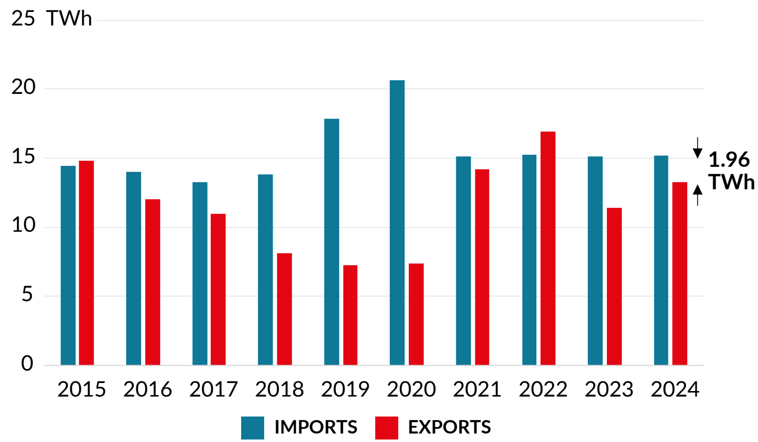
Balance of domestic electricity production and consumption

- Electricity consumption in Poland increased slightly y/y. It amounted to 171.3 TWh in 2024.
- In the energy crisis, Poland briefly became a net exporter of electricity. However, in 2024 it was again a net importer at 1.96 TWh (import – 15.21 TWh, export – 13.25 TWh). This is a decrease of almost half compared to 2023.
- Electricity imports in 2024 remain at levels similar to both the last three years and a decade ago.
- Electricity production has grown faster year-on-year than electricity consumption. This means less dependence on foreign energy imports.

NATIONAL BALANCE OF ELECTRICITY PRODUCTION AND CONSUMPTION



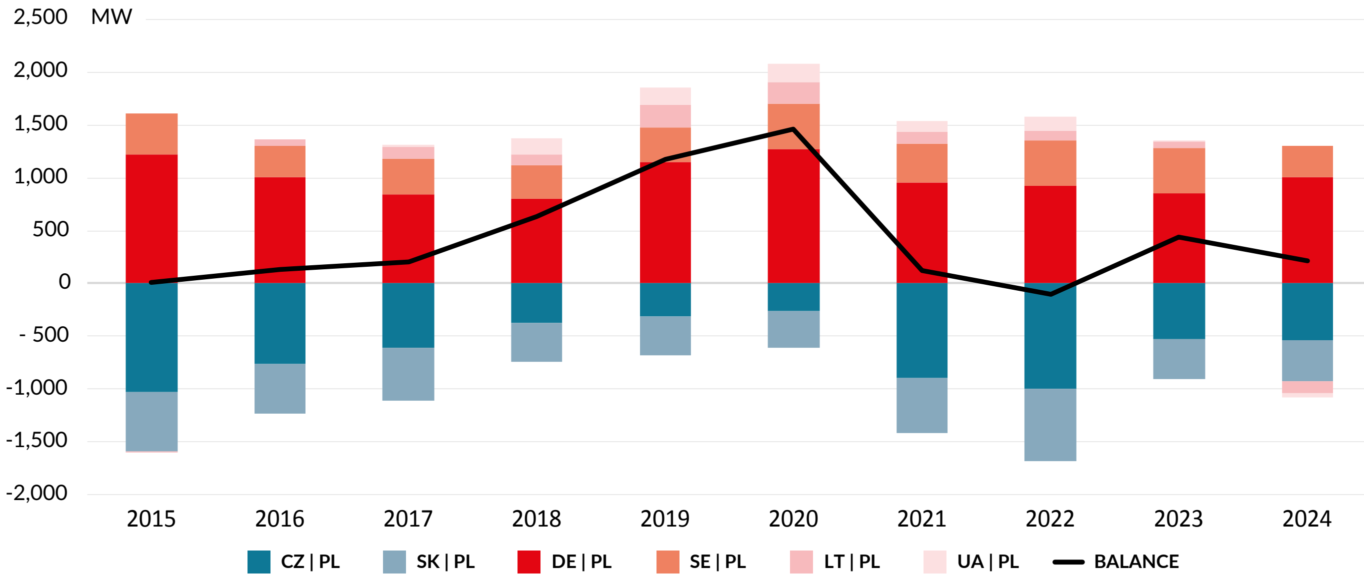
CROSS-BORDED EXCHANGE OF ELECTRICITY



Source: own elaboration based on data from ARE.
* Gross consumption (including the power plant's own needs).

Average annual cross-border electricity exchange capacity

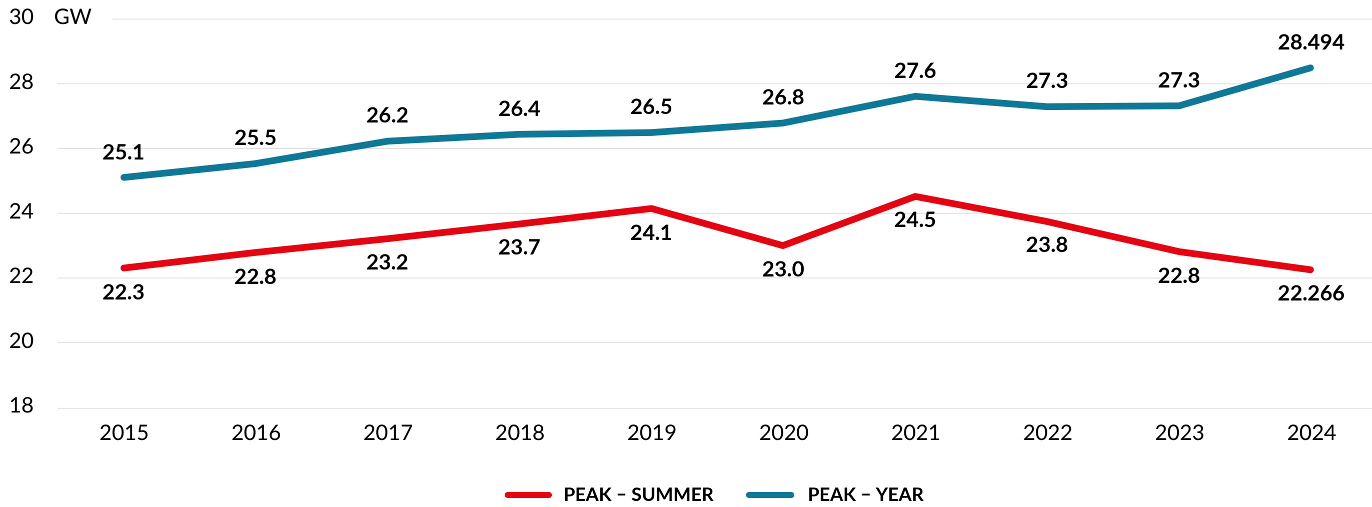
- Poland has for years imported electricity mainly from Germany and Sweden, while exporting southwards to the Czech Republic and Slovakia.
- DC links* (with Sweden and Lithuania) have for years customarily imported 400–600 MW. In 2024, this has changed, with imports from Sweden declining and the power balance on the connection with Lithuania being negative (Poland exported more).
- The highest average electricity import capacity in recent years was observed in 2020 at 1,466 MW.



Source: own elaboration based on data from ENTSO-E.
* February 9, 2025 saw the synchronization of the electricity systems of the Baltic states, including Lithuania, with the continental European system (ENTSO-E), marking the severance of the last technical links with the Russian BRELL system. From then on, Lithuania is synchronized with the European grid via an AC connection to Poland.

Change in peak power demand

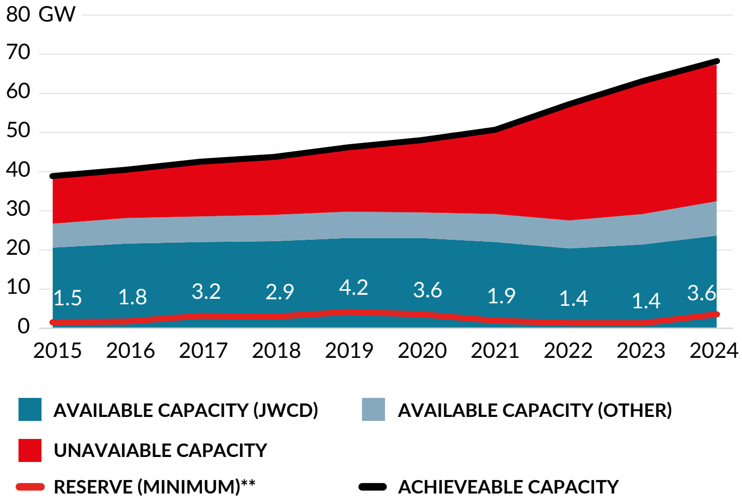
- Winter power demand in 2024 was 28.5 GW* – 1.2 GW more than in 2023. In contrast, summer power demand is declining for another year in a row, to 22.3 GW (down 0.5 GW from 2022).
- The increase in winter peak demand can be explained by the increase in heat pumps and electric cars.
- The reason for the decrease in demand in summer, despite the steady increase in air conditioners, is likely to be the development of photovoltaics prosumer photovoltaics followed by increasing self-consumption.

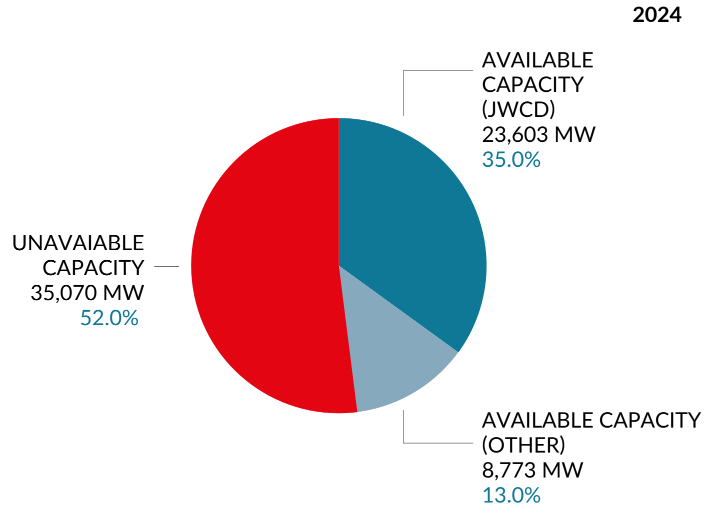


Source: own elaboration based on data from PSE.
* The values shown in the chart are the sum of PSE's measured power demand and the operator's estimated self-consumption. The significant decrease in peak power in summer may therefore be due to underestimation of prosumers' consumption, and in reality it may be higher.

Reserve and unavaiable capacity

- System capacity increased to 71.3 GW at the end of 2024. On average, this amounted to 68.3 GW.
- The level of capacity reserves of daily demand peaks in Poland improved compared to 2023. Its minimum value in 2024 was 3.6 GW.
- On average, 52% of achievable capacity was lost, mainly due to operating conditions.
- The average annual available capacity of JWCDs* was 23.6 GW, an increase of 2.1 GW in comparison to 2023.
- The share of JWCD's available capacity (in achievable capacity in Poland) fell from 53% in 2015 to just under 35% in 2024.

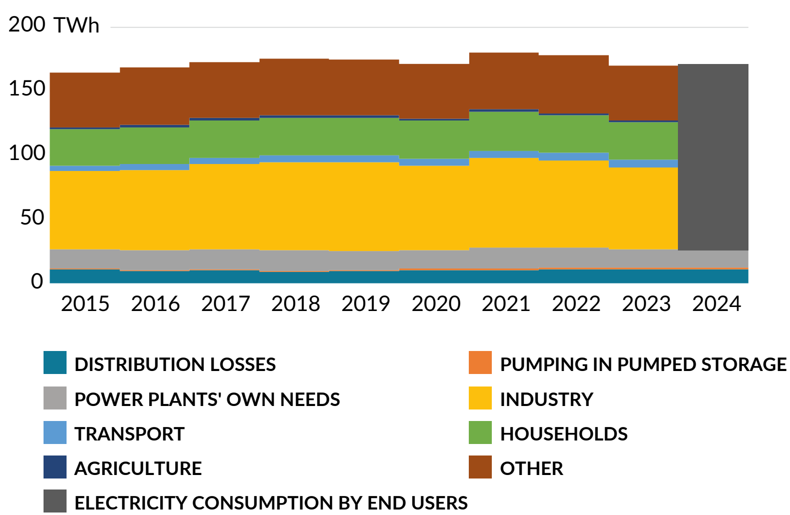


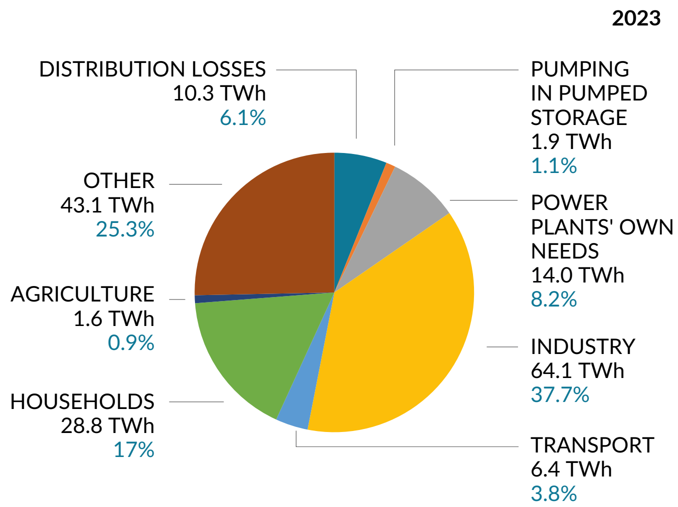


Source: own elaboration based on data from PSE.
* JWCDs – centrally dispatched generating units (power plants directly controlled by the transmission grid operator – PSE). The nJWCD units operator can dispose of to a limited extent.
** Minimum reserve of generating units in the NPS during daily demand peaks.

Structure of electricity consumption

- Gross electricity consumption amounted in 2024 to 171.3 TWh. End-user consumption accounted for 85.1% (145.8 TWh), and the remaining 14.9% (25.5 TWh) included consumption for CHPs' and power plants' own needs (8.2% in 2023) and losses in transmission and distribution networks (6.1% in 2023).
- Pumped storage power plants required 1.4 TWh of electricity in 2024 – that's 1.1% of gross domestic consumption. These units produced 1 TWh, so the efficiency of these energy storage units was 71.3%.
- In 2023 (latest data), industry was the largest end-user of electricity (64 TWh). Households consumed 29 TWh.
- Transport consumed 6.4 TWh in 2023. This is an increase of 8.2% y/y and 48.5% on 2015.



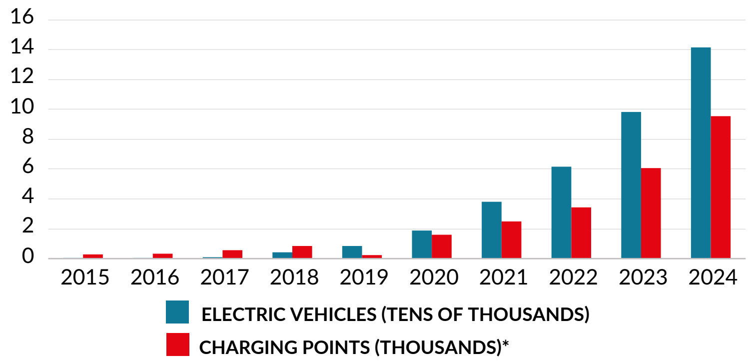


Source: own elaboration based on data from ARE and GUS.

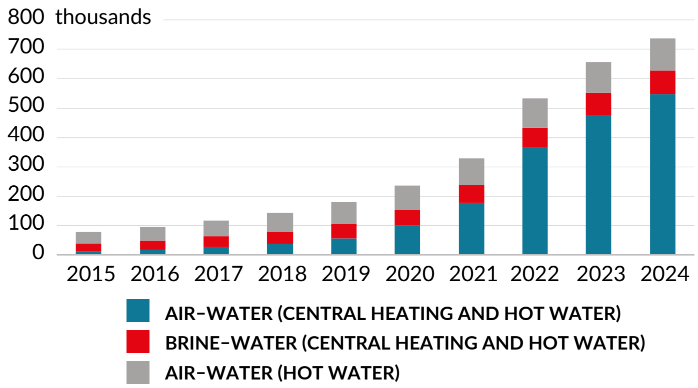
Electricity consumption – demand increasing factors

- The increase in electricity consumption (associated with the electrification of sectors) will, on the one hand, have the effect of increasing the load on the electric power system, but, on the other hand, will reduce the consumption of total energy (e.g. oil, coal, gas) across the economy due to higher efficiency.
- In 2024, sales of heat pumps were lower than in the previous three years and amounted to more than 80,000 units. At the end of 2024, there were about 737,000 of them in total*. 43,000 electric cars (BEVs and PHEVs) also arrived, totalling more than 141,000 at the end of 2024.

NUMBER OF EVS AND CHARGING POINTS



CUMULATIVE NUMBER OF SOLD HEAT PUMPS SINCE 2010

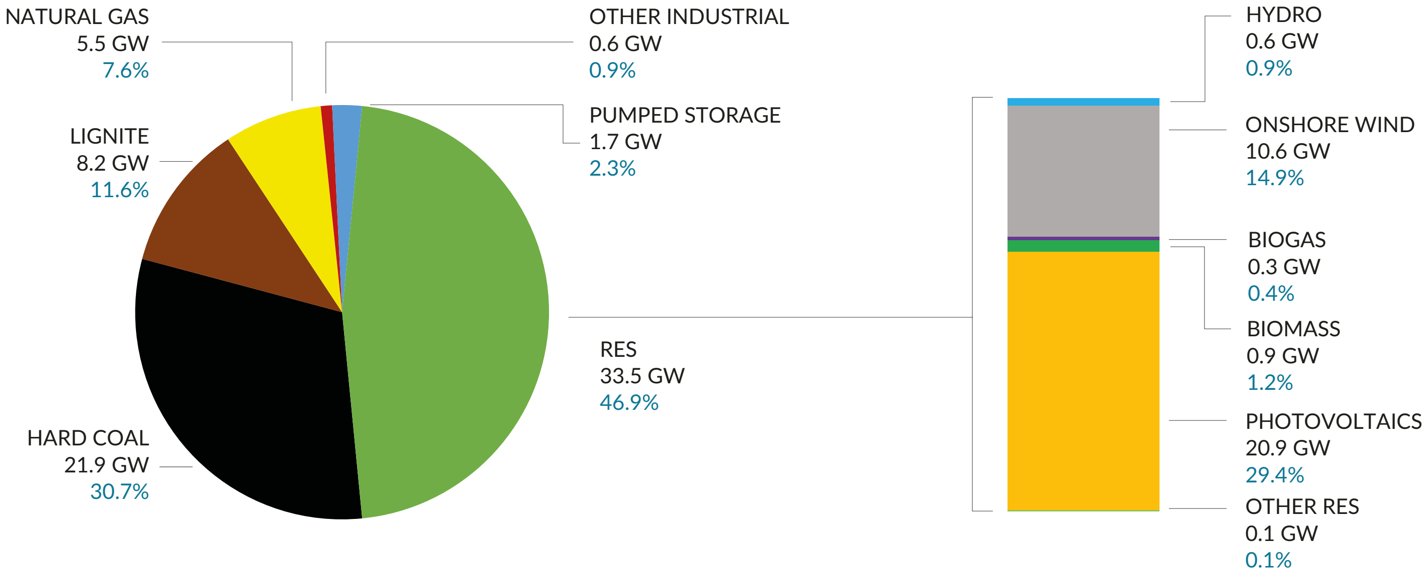


Source: own elaboration based on data from PSPA, EAFO and PORT PC.
* The decrease in the number of charging points in 2019 was due to a change in methodology.

Achievable capacity

Achievable capacity in 2024

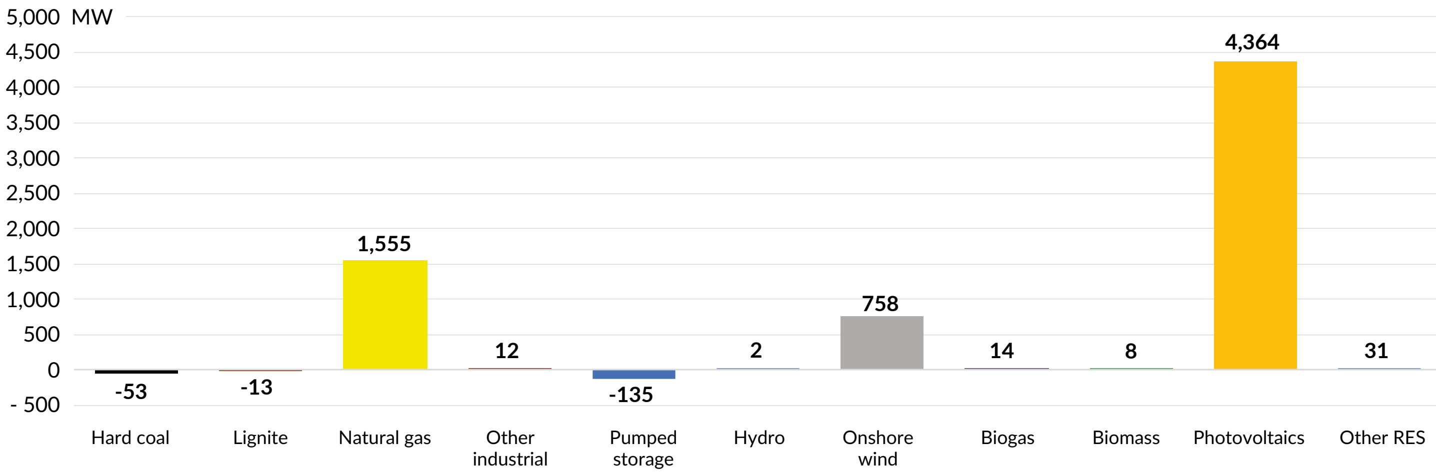
- 71.3 GW was the achievable capacity at the end of 2024. This is 6.5 GW more than a year earlier.
- The share of RES capacity increased to 46.9% (from 43.9%).
- At the end of 2024, the capacity of photovoltaic sources approached that of coal-fired power plants. However, it should be borne in mind, that renewable capacity is available depending on weather conditions.
- Photovoltaics are responsible for more than 62% of RES capacity (20.9 GW). Wind power accounts for almost 1/3 of RES capacity (10.5 GW).



Source: own elaboration based on data from ARE and PSE.

Changes in achievable capacity in 2024 as compared to 2023

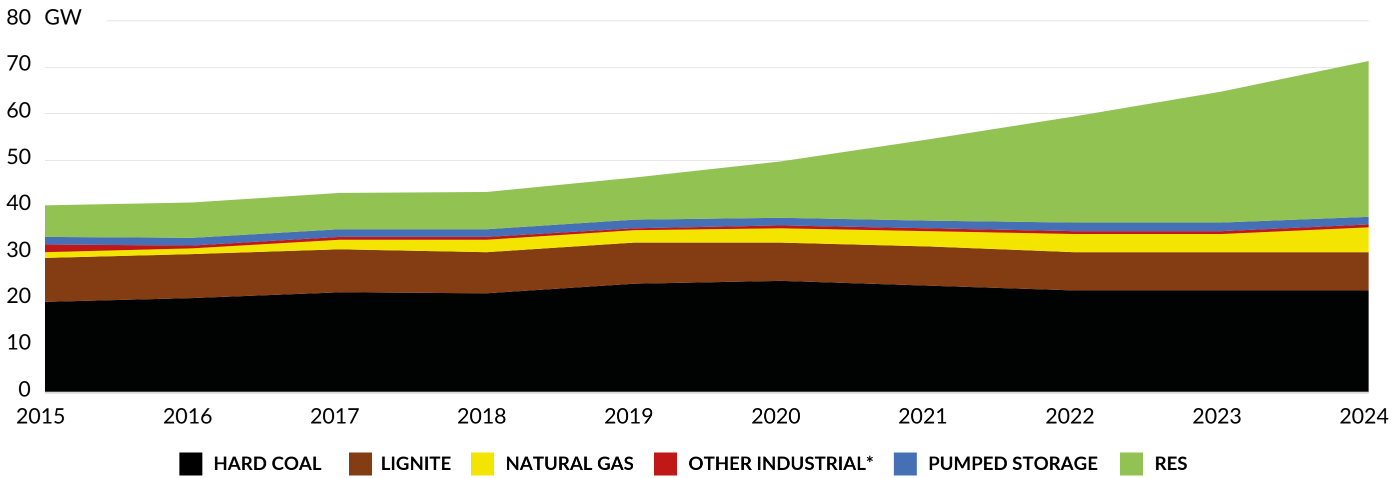
- More than 1.5 GW of natural gas capacity has arrived in 2024, mainly due to new units in Gryfino.
- On top of this, significant changes have been recorded in renewables, with 5.2 GW added.
- Solar energy is responsible for most of the increase in renewable capacity (4.4 GW), of which 1.4 GW is photovoltaic prosumer installations.
- There was also an increase of 0.8 GW of wind capacity, which is mostly the result of investments concluded in RES auctions in earlier years.
- The decrease in pumped storage capacity is most likely due to the ongoing modernisation of the Porąbka–Żar power plant.



Source: own elaboration based on data from ARE and PSE.

Changes in achievable capacity from 2015 to 2024

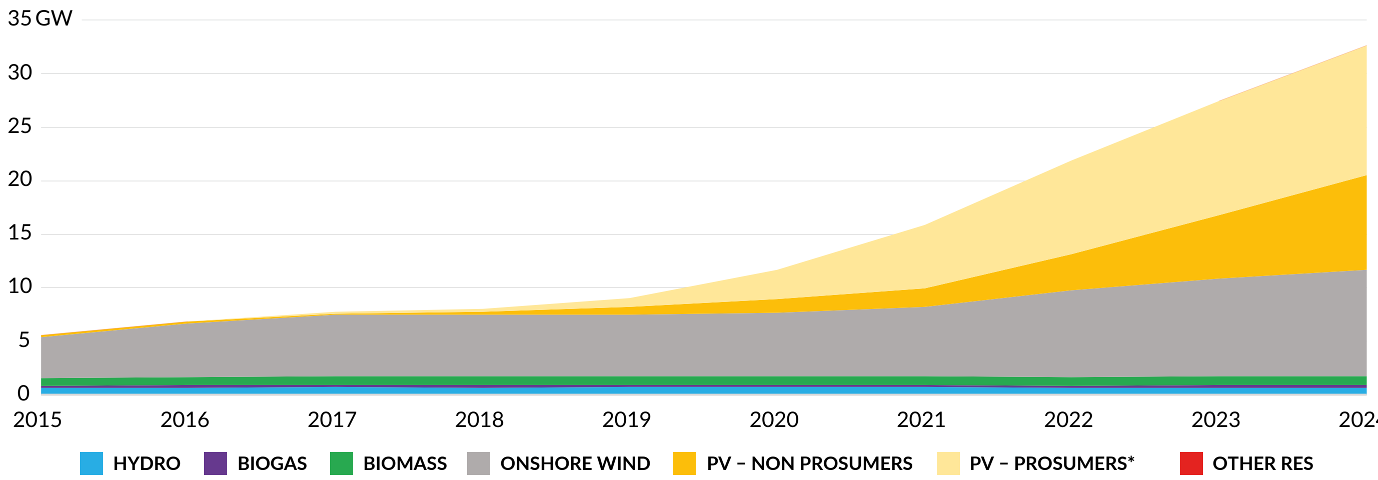
- Conventional sources' achievable capacity reached an all-time high of 36.2 GW – mainly due to new gas units in Gryfino.
- Since 2015, total achievable capacity has increased to 71.3 GW – an increase of 31.1 GW (by 77.1%).
- During this period, the capacity of conventional units increased by 4.4 GW (+14%) – of which hard coal by 2.3 GW (+11.9%), and natural gas by 4.2 GW (+343.2%). Lignite capacity decreased by 1.1 GW (-11.7%).
- RES capacity increased almost fivefold over the decade, from 6.8 GW to 33.6 GW.



Source: own elaboration based on data from ARE and PSE.
* By 2016, the "other industrial power plants" category also includes natural gas and hard coal capacity.

Changes in achievable renewable capacity from 2015 to 2024

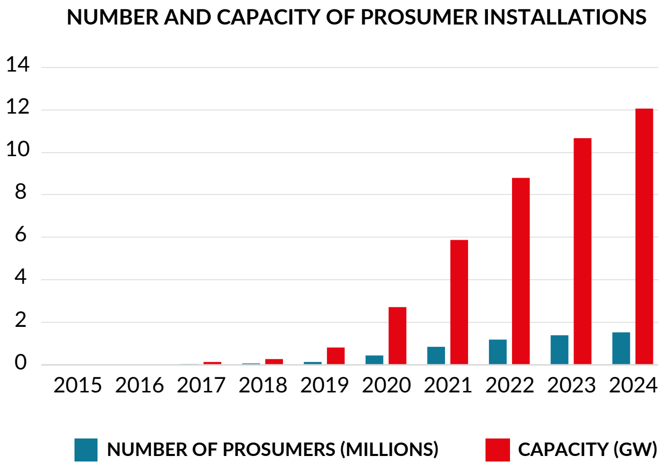
- At the end of 2024, 33.6 GW of RES were installed, an increase of 5.2 GW (+18.3%) y/y.
- Photovoltaic capacity increased by 4.4 GW (+26.3%), reaching 20.9 GW. The first photovoltaic installations started to appear in 2014, with a capacity of 0.1 GW at the end of 2015.
- The most dynamic growth has been in the capacity of installed prosumer PV installations. The first time such installations were reported in 2017 with a capacity of 0.1 GW, by 2024 there were already 12.1 GW.
- Wind power capacity increased by 0.8 GW over the year (+7.7%). Over 10 years, there was an increase of 5.6 GW (+112.6%).
- RES development is almost entirely driven by wind and photovoltaic investments.

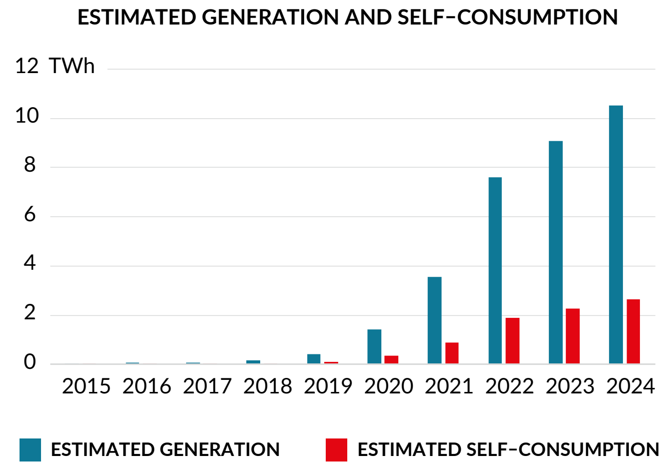


Source: own elaboration based on data from ARE.
* Prosumer PV capacity = installed capacity.

Electricity prosumers

- At the end of 2024, prosumer installation capacity reached 12.1 GW. This represents an increase of 12.9% (1.4 GW) over the year.
- This capacity consists of almost 1.5 million prosumer installations (+9.9% y/y). Photovoltaic installations account for 99.99% of these.
- Estimated total prosumer electricity production is about 10.5 TWh. Estimated self-consumption was about 2.6 TWh, meaning that about 1.5% of national consumption did not have to be sent through the NPS.
- Prosumers fed 7.9 TWh of electricity into the grid. This corresponds to 4.7% of national generation.



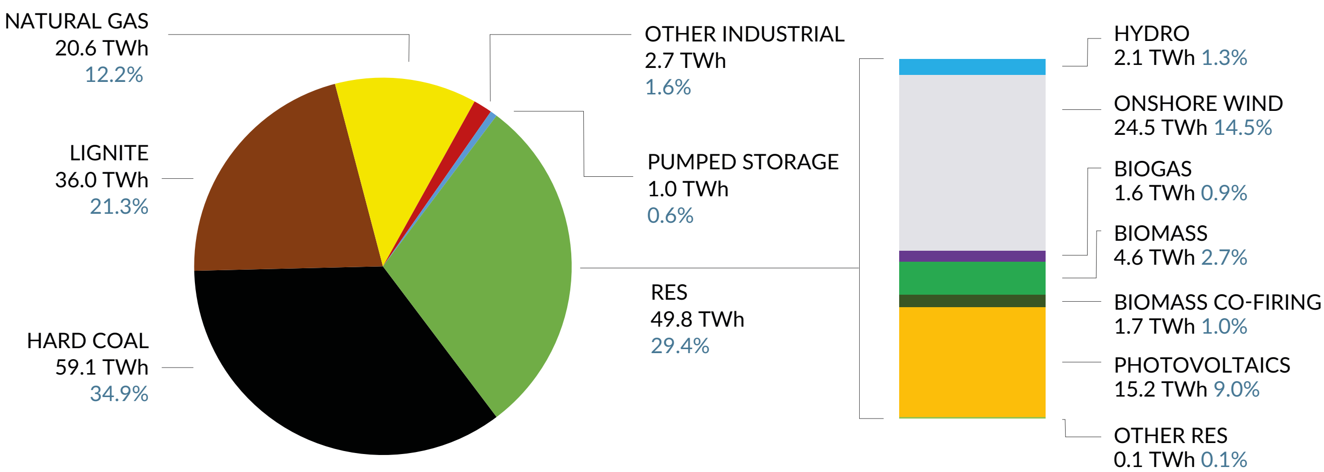


Source: own elaboration based on data from PTPiREE and ARE. For the purpose of the calculations, autoconsumption was assumed at 25%.

Electricity generation

Electricity generation in 2024

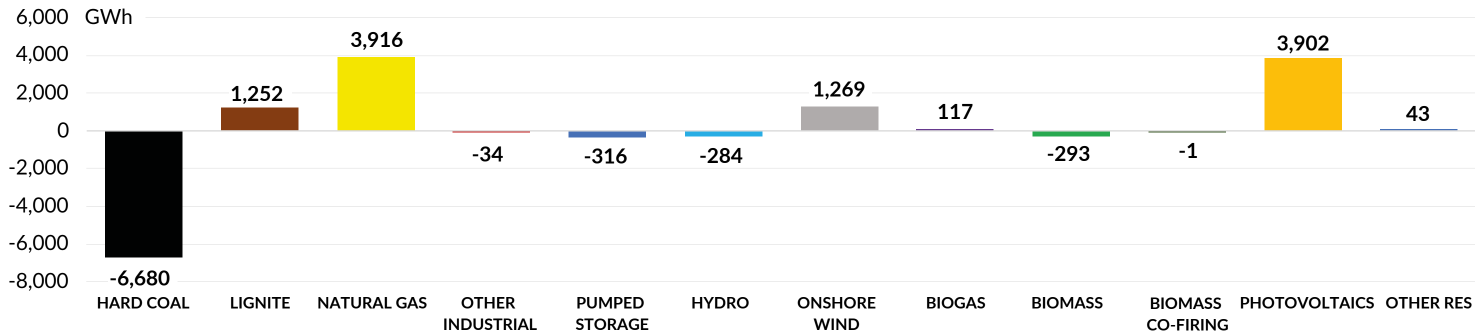
- 56.2% was the share of coal in gross electricity generation in 2024 (4.3 p.p. less than in 2023).
- Production from RES was 29.4%, 2.3 p.p. more than in 2023. With a record production of 49.8 TWh, more electricity was produced from renewables in 2024 than from lignite.
- Production from wind reached a record level of 24.5 TWh (14.5%).
- Electricity production from natural gas reached its highest level ever – 20.6 TWh (12.2% of electricity production) – due to new gas units in Gryfino and lower average annual gas prices.
- Coal units recorded the lowest capacity factors in history. Coal values (31%) approached the level of high wind turbines (27%).



Source: own elaboration based on data from ARE.

Changes in electricity generation in 2024 as compared to 2023

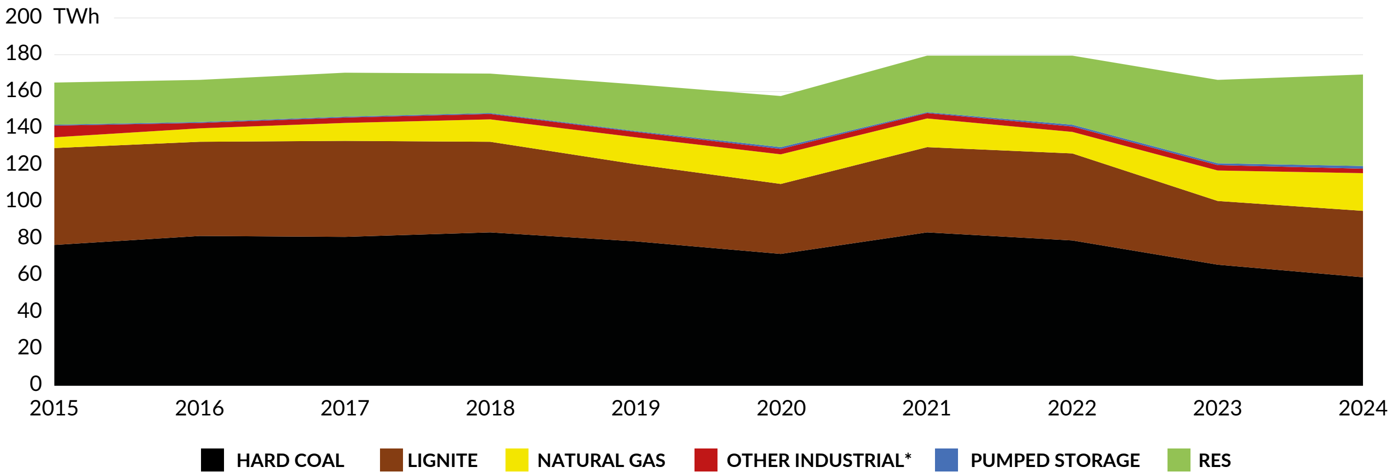
- Production from coal fell by 5.4 TWh (-5.4% y/y): from hard coal decreased by 6.7 TWh (-10.2% y/y) and from lignite increased by 1.3 TWh (+3.6% y/y).
- Higher electricity production from lignite may be due to the fall in the price of CO_2 emission allowances.
- Production from natural gas increased by 3.9 TWh (+23.5% y/y) mainly due to the new gas blocks in Gryfino.
- Among RES, production from photovoltaics (+34.4% y/y, +3.9 TWh) and wind (+5.5% y/y, +1.2 TWh) grew most rapidly.
- Pumped storage power plants, the only significant energy storage on a system-wide scale, scored a drop in production this year – 23.9% less than in 2023 – probably due to the shutdown of generators at the Porąbka–Żar power station for modernisation.



Source: own elaboration based on data from ARE.

Changes in electricity generation from 2015 to 2024

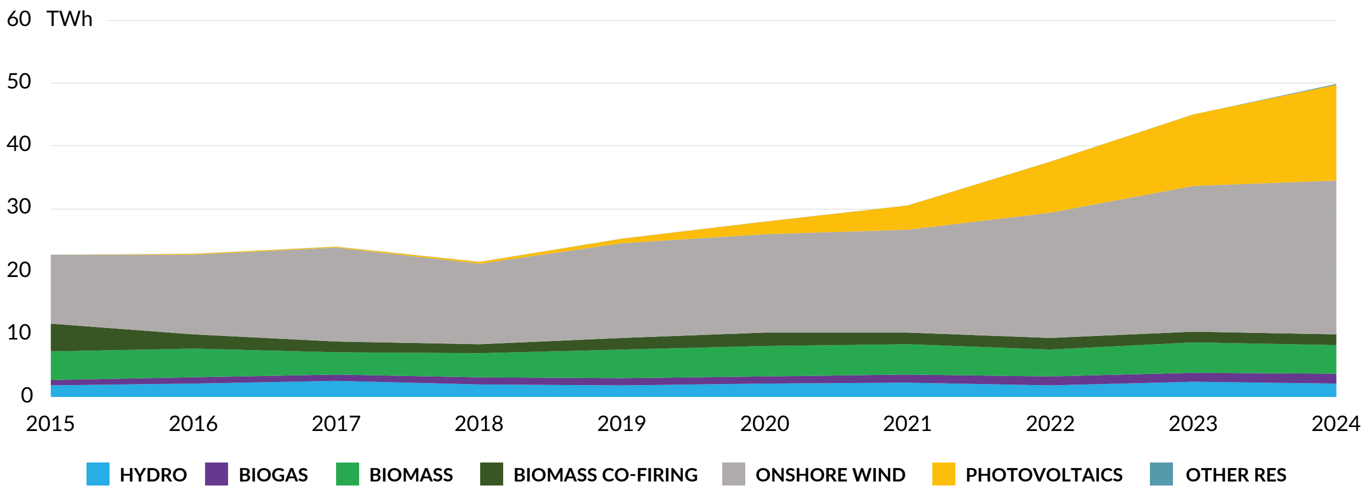
- Domestic electricity generation amounted to 169.3 TWh gross. This is 1.7% (2.9 TWh) more than in 2023.
- Over 10 years, electricity generation increased by 2.7% (from 164.9 TWh in 2015).
- Generation from conventional sources decreased by 16.4%, from 141.6 TWh in 2015 to 118.5 TWh in 2024. Declines in production were recorded in hard coal (-17.4 TWh, or -22.8%) and lignite (-16.9 TWh, or -32%), while production from gas sources increased (by 14.6 TWh, or 242%).
- Generation from RES increased by 119.7% (from 22.7 TWh in 2015 to 49.8 TWh in 2024).



Source: own elaboration based on data from ARE.
* By 2016, the "other industrial power plants" category also includes natural gas and hard coal capacity.

Changes in renewable electricity generation from 2015 to 2024

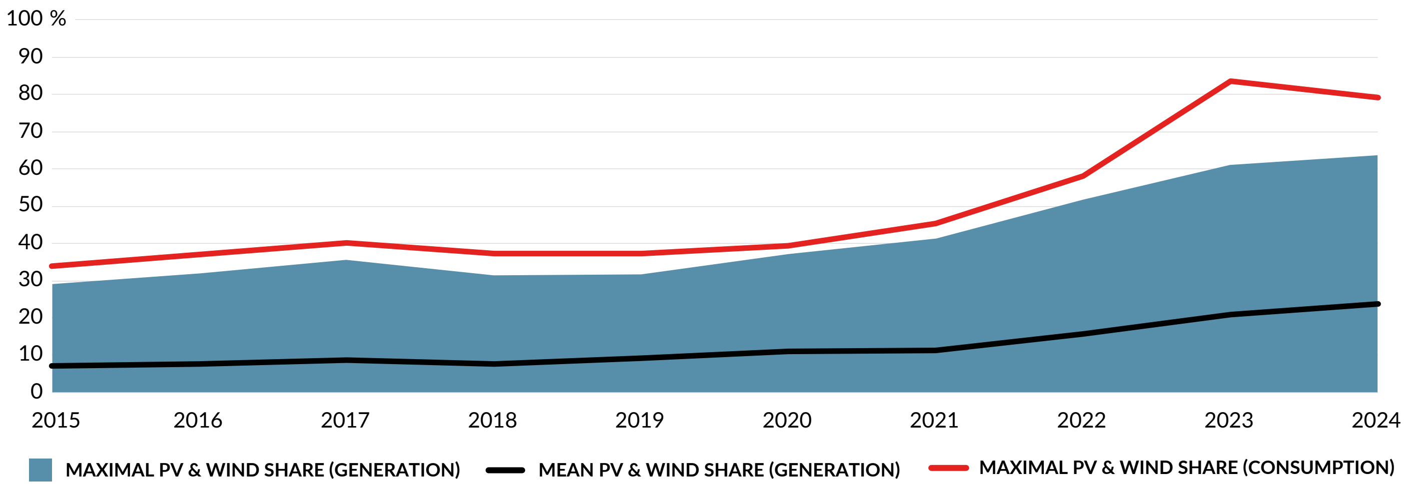
- 49.8 TWh of electricity will be produced from RES in 2024 – an increase of 10.5% y/y.
- Wind power was responsible for almost half of RES generation (49.1%) in 2024, the share of photovoltaics was 30.6% and biomass 10.8%.
- Over the 10-year period, the largest increase, apart from photovoltaics, was in generation from wind power, up 124.6% (+13.6 TWh). Generation from biogas also increased, by 86.3% (+0.7 TWh) and water, by 15.9% (+0.3 TWh).
- Biomass co-firing saw the largest decrease, by 61.8% (-2.8 TWh).



Source: own elaboration based on data from ARE.

Share of vRES in electricity generation and consumption

- With the development of RES, their role in the balance of the system is increasing – with renewable sources producing 29.4% of energy in 2024. Among them, weather-dependent sources – photovoltaic installations and wind power plants – play a major role. Their share of electricity production reached 23.5%. This compares with only 6.6% in 2015.
- In 2024, they were responsible for between 0.1% and 63.8% of electricity production each hour.
- Their production covered a maximum of 79.3% of hourly electricity demand. In 2015, this was 33.9%.
- The shares of consumption and production are not necessarily equal, as excess production over demand can be exported.

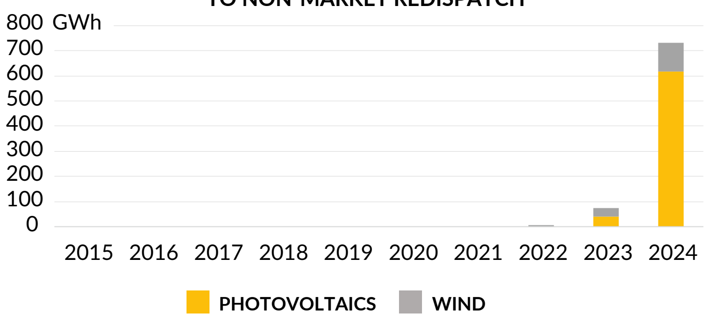


Source: own elaboration based on data from ARE and ENTSO-E.

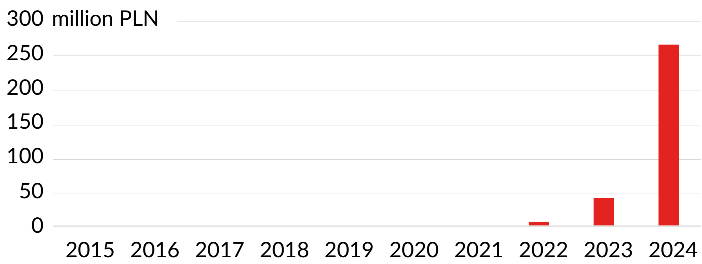
Curtailment of renewable energy sources

- An estimated 731.4 GWh of electricity was subject to non-market redispatch (curtailment) in 2024. This is about 2% of potential production from weather-dependent RES and an amount comparable to the annual demand of 330,000 households.
- 618 GWh, or 84.5% of the curtailment was for curtailment of photovoltaic (non-prosumer) installations, the remaining 15.5% was for wind farms (113.4 GWh).
- Curtailment on weekends and holidays amounted to 534.2 GWh, representing 70.3% of the annual reduction, and the maximum reduced hourly production was 6.3 GWh, that occurred on May 1, 2024.
- The estimated savings that reduced energy could bring in 2024 is 263 million PLN*.
- Non-market redispatch is a tool for maintaining system stability and regulation, used as a last resort by the Transmission System Operator. The main reason for the phenomenon is the low flexibility of the system (primarily conventional power plants) combined with the high capacity of RES.

ESTIMATED AMOUNT OF ELECTRICITY SUBJECT TO NON-MARKET REDISPATCH



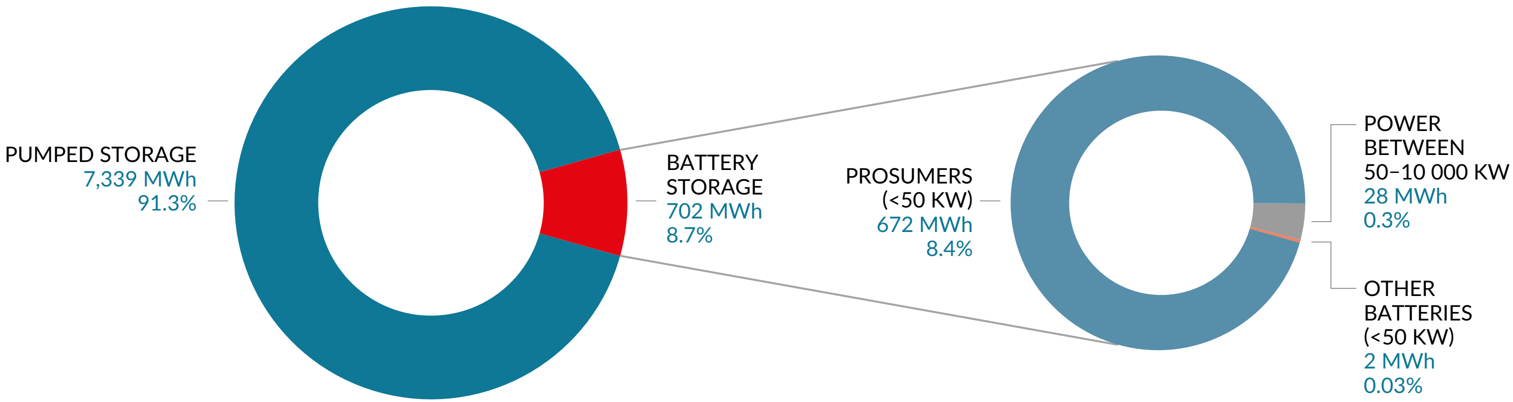
UNUSED SAVINGS POTENTIAL FROM RES



Source: own elaboration based on data from PSE.
* Estimated savings are understood here as the cost of fuel and emission allowances, assuming that the gap after limited RES production was covered by proportionally more coal and natural gas power plant operation.

Electricity storage capacity

- To help balance the system, energy storage technologies are being developed along with renewables electricity. Their growing importance is confirmed by the results of the Capacity Market auction held at the end of 2024.
- In Poland, energy storage facilities with a capacity of about 8 GWh and a total power of almost 2 GW were in operation in 2024.
- Of these, more than 90% are pumped storage power plants. However, about 0.7 GWh are prosumer installations with power of less than 50 kW.

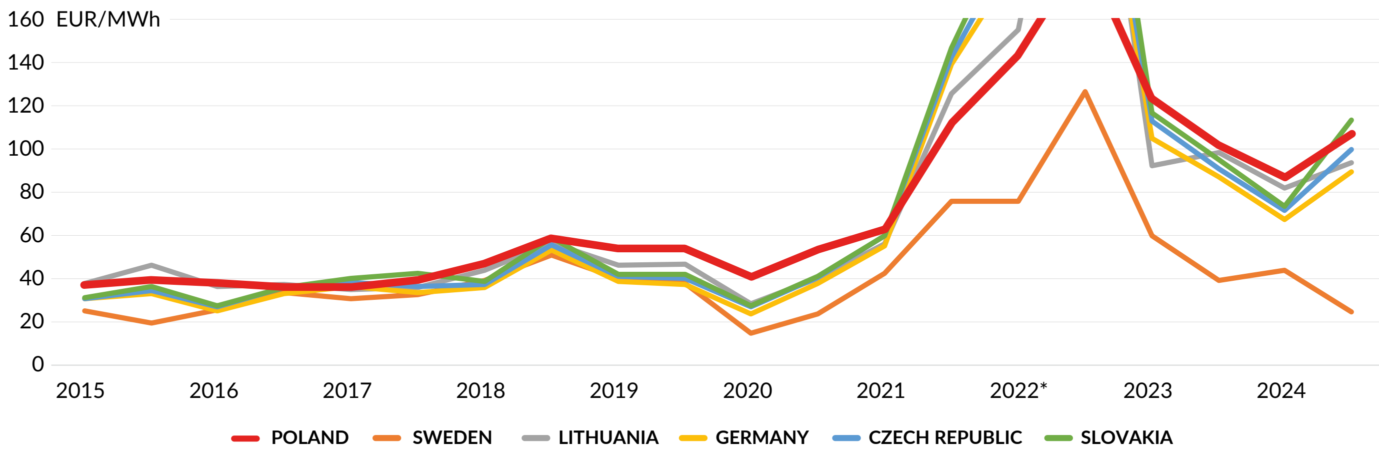


Source: own elaboration based on data from ARE.

Electricity and gas prices

Comparison of spot electricity prices in neighbouring markets

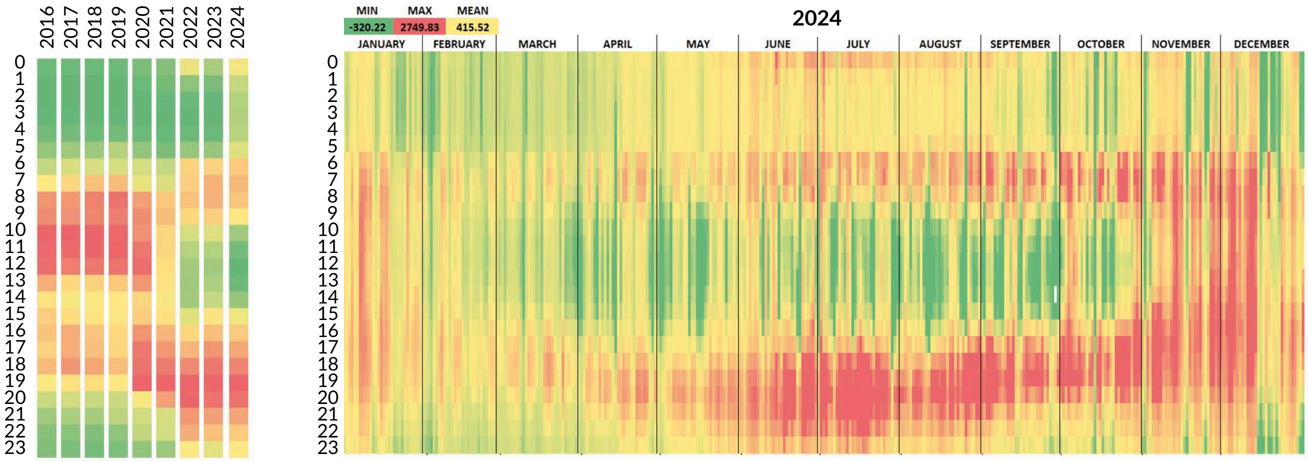
- In 2024, electricity prices in the markets initially declined relative to the previous year's prices. The second half of the year saw a rebound in prices. Thus, in the second half of 2024, energy prices in Poland amounted to 106 EUR/MWh – an increase of 5.1% y/y and 43.3% relative to the first half of 2021, i.e. pre-crisis prices.
- So far, spot electricity prices in Poland have been higher than in neighboring markets. However, in the second half of 2024 energy prices in Slovakia were 5.9% higher than in Poland.
- At the end of 2024, prices in Germany were 16.5% lower, in the Czech Republic 6.7% lower and in Lithuania 12.4% lower than in Poland. Sweden was cheaper by 77.2% primarily because its energy mix (based mainly on nuclear and hydroelectric sources) does not require the purchase of emission allowances and is immune to energy commodity price shocks.



Source: own elaboration based on data from European Commission and ENTSO-E
* To improve the readability of the graph, the scale on the vertical axis has been reduced. Electricity prices on the spot market in Poland reached an average value of 191 EUR/MWh in the second half of 2022. Among the other compared countries (except Sweden), the value oscillated around 300 EUR/MWh.

Electricity prices on the spot market

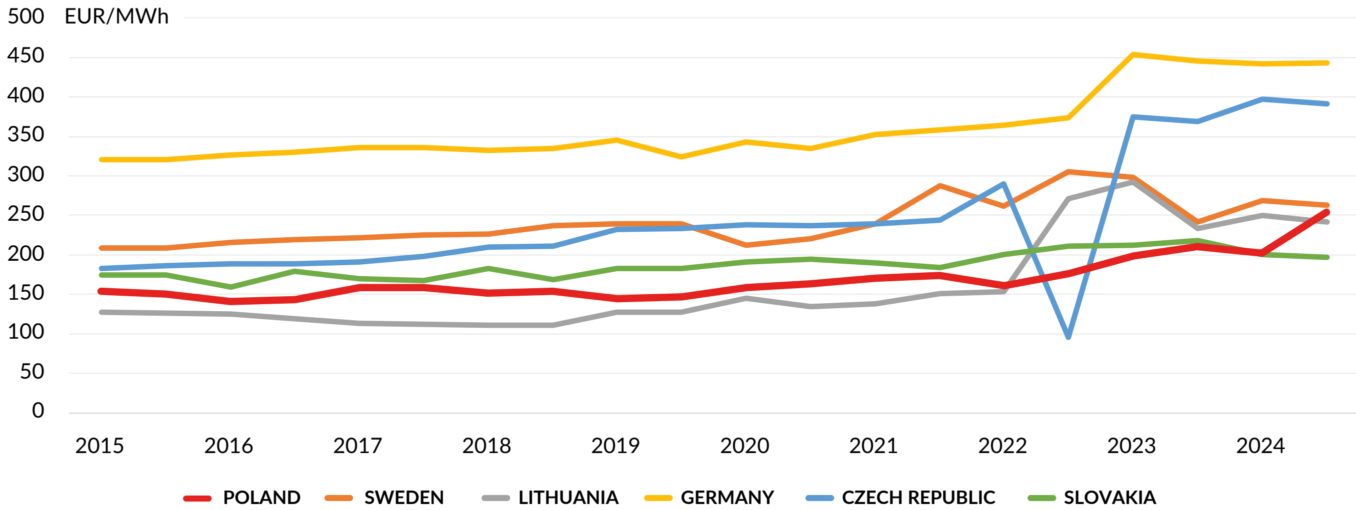
- The chart on the right (the so-called heatmap) shows the price of electricity at a given hour in 2024 on the spot market (green – lowest prices, red – highest).
- The average price in the Day-Ahead Market was 416 PLN/MWh in 2024, the lowest 320 PLN/MWh, and the highest 2750 PLN/MWh.
- The price of electricity is higher when electricity supply over demand is lower. The lowest level of reserves occurred throughout the year during the hours of 6:00–9:00 (morning peak) and 6:00–21:00/23:00 (evening peak in the off-summer/summer). The largest supply reserve occurred during the day in summer (due to photovoltaics).
- A change can be seen over the years: the pre- and early afternoon hours used to be the most expensive, while due to the expansion of photovoltaics, the midday zone is now one of the cheapest hours. The evening hours are the most expensive.
- In June, one can observe the emergence of greater price volatility. This is most likely the result of changes in the Balancing Market, which prices have also affected spot market prices.



Source: own elaboration based on data from TGE.

Comparison of electricity prices in neighbouring markets (for households)

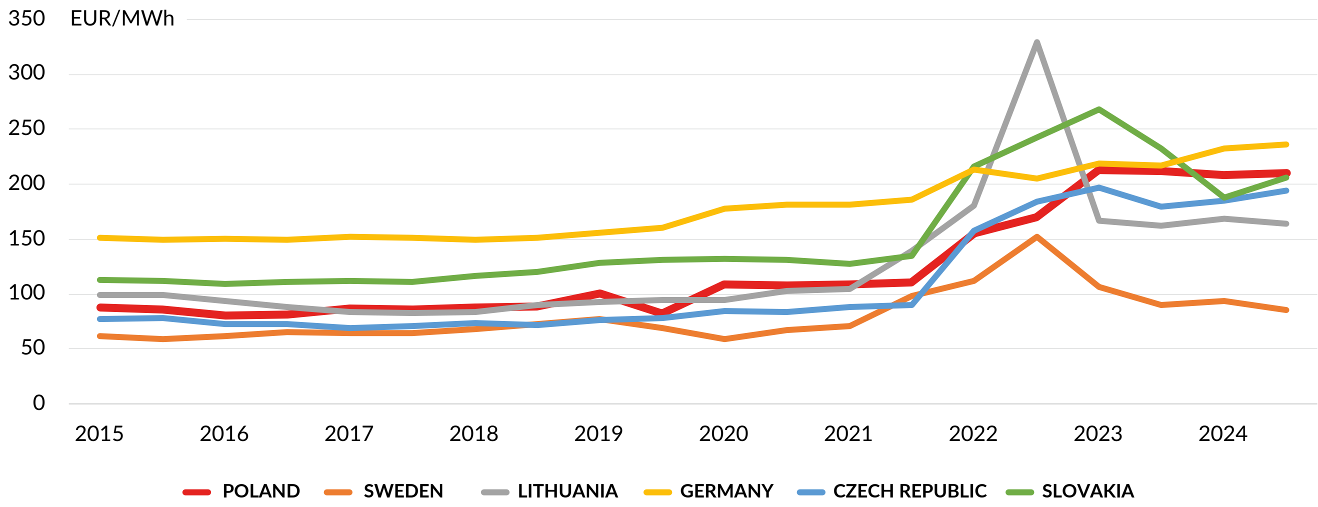
- For years, electricity prices for households* in Poland have been among the lowest (nominally) among neighboring countries. In 2024, however, there is a big change.
- Taking all taxes and levies into account, there was a jump in the price of electricity in Poland in the second half of 2024, which amounted to 25.4 eurocents/kWh – still 43% less than in Germany, 35% less than in the Czech Republic and 3% less than in Sweden. The price in Poland was 29% higher than in Slovakia, which had the lowets prices in the region.
- Electricity prices for households are largely shaped by a country's tax and regulatory policies. For this reason, the chart below is not a reflection of wholesale energy prices on the exchange.



Source: own elaboration based on data from Eurostat.
* Electricity prices for consumers consuming 1,000–2,499 kWh. These are the final prices that the consumer pays along with distribution costs and other charges. They also include all taxes and discounts.

Comparison of electricity prices in neighbouring markets (for industry)

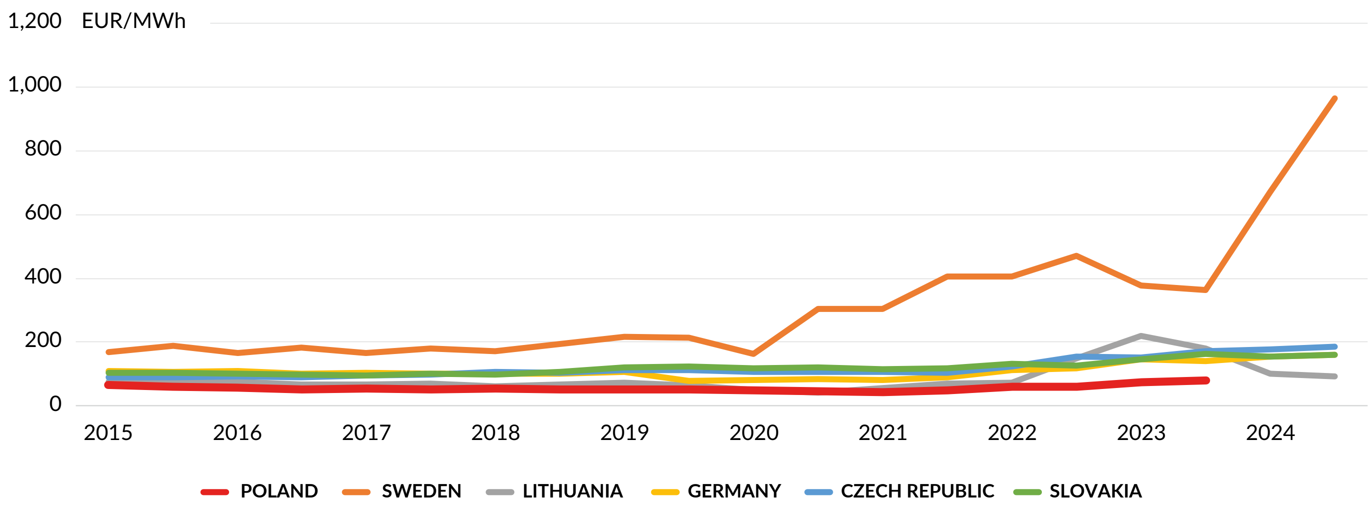
- After deducting VAT and all recoverable taxes and tributes, the average price of electricity for industry* in Poland in the second half of 2024 was 21 eurocents/kWh and was 17% lower than for households.
- Historically, Polish energy prices for industry have been low compared to its neighbors, but since the second half of 2021 they have been rising faster than in most neighboring countries. Prices in Poland have risen by 90% in this period, while they have risen by 114% in the Czech Republic and 53% in Slovakia.
- Electricity prices on the exchange significantly affect prices for industry. Their level translates into the competitiveness of the economy internationally and the prices of locally consumed products.



Source: own elaboration based on data from Eurostat.
* Electricity prices for customers with consumption of 500–1,999 MWh. These are the final prices that the consumer pays along with distribution costs and other charges. VAT and other taxes that the company can deduct from its bill have been subtracted.

Comparison of natural gas in neighbouring markets (for households)

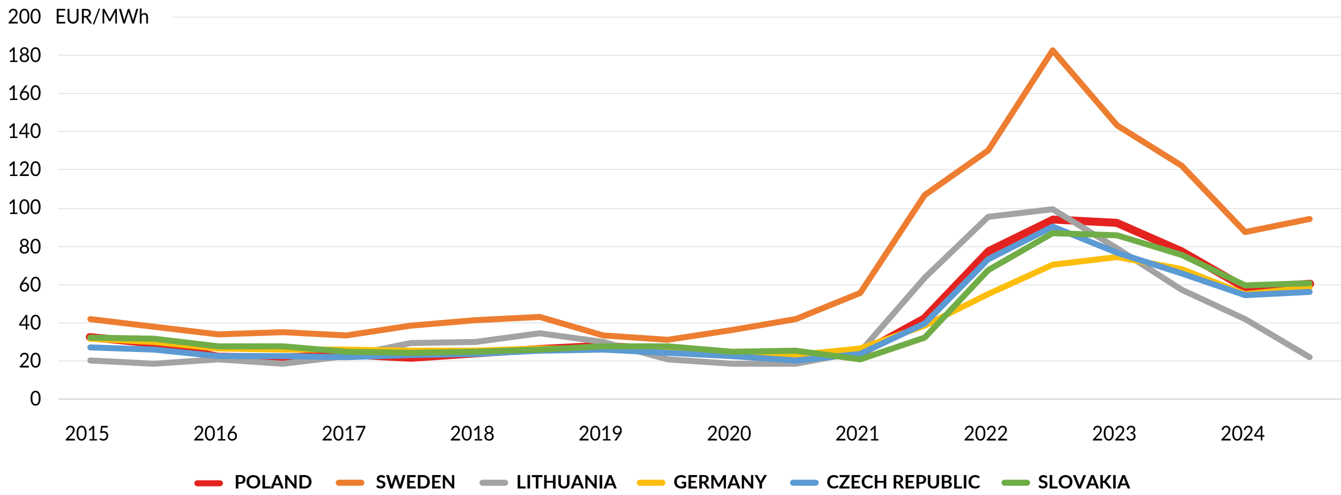
- Taking into account all taxes and levies, the price of gas for households* in Poland in the second half of 2023 was 7.98 eurocent/kWh. This is 78% less than in Sweden and about 50% less than in the Czech Republic, Germany, Slovakia and Lithuania.
- As in the electricity market, gas prices for households largely depend on the state tax policy and are not a direct reflection of the situation on the stock market.
- According to Eurostat, Poland is the only EU country to hide the price of natural gas for households in 2024, treating it as confidential information.



Source: own elaboration based on data from Eurostat.
* Natural gas prices for customers with consumption up to 20 GJ. These are the final prices that the customer pays along with distribution costs and other charges. They also include all taxes and discounts.

Comparison of natural gas in neighbouring markets (for industry)

- After deducting VAT and all recoverable taxes and tributes, the average price of natural gas for industry* in Poland in the second half of 2024 was 6.05 eurocents/kWh. At the end of 2023, it was 3% lower than for households.
- Historically, Polish gas prices for industry have been among the lowest among its neighbors. After significant price jumps since the second half of 2021, prices have stabilized, but are still higher than before the crisis (by 148% in Poland). In the second half of 2024, Sweden had the highest prices among neighboring markets (56% more expensive than in Poland), and Lithuania the lowest (64% cheaper than in Poland).
- Natural gas prices on the exchange significantly affect prices for industry. Their level translates into the competitiveness of the economy internationally and into the prices of products consumed locally.



Source: own elaboration based on data from Eurostat.
* Natural gas prices for customers with consumption of 100,000–999,999 GJ. These are the final prices that the customer pays together with distribution costs and other charges. VAT and other taxes that the company can deduct from its bill have been deducted.

Chapter 3.

Energy raw materials

-71%

by that much relative to 2023 (to 4 million tons) decreased net coal imports as domestic consumption declines.

0%

of net imports of steam hard coal, natural gas and crude oil came from Russia (in 2015 it was 91%, 73% and 84%, respectively).

-8 mln ton

that's a 14% drop in estimated hard coal consumption relative to 2023 (output by 5 million tons). In 10 years, the decrease in consumption is 24 million tons.

7%

This is how much the consumption of natural gas in Poland has increased relative to 2023. Relative to 2015 the increase is 22% (30 PJ).

41%

Imported natural gas came from the LNG Terminal, and 38% came from Baltic Pipe.

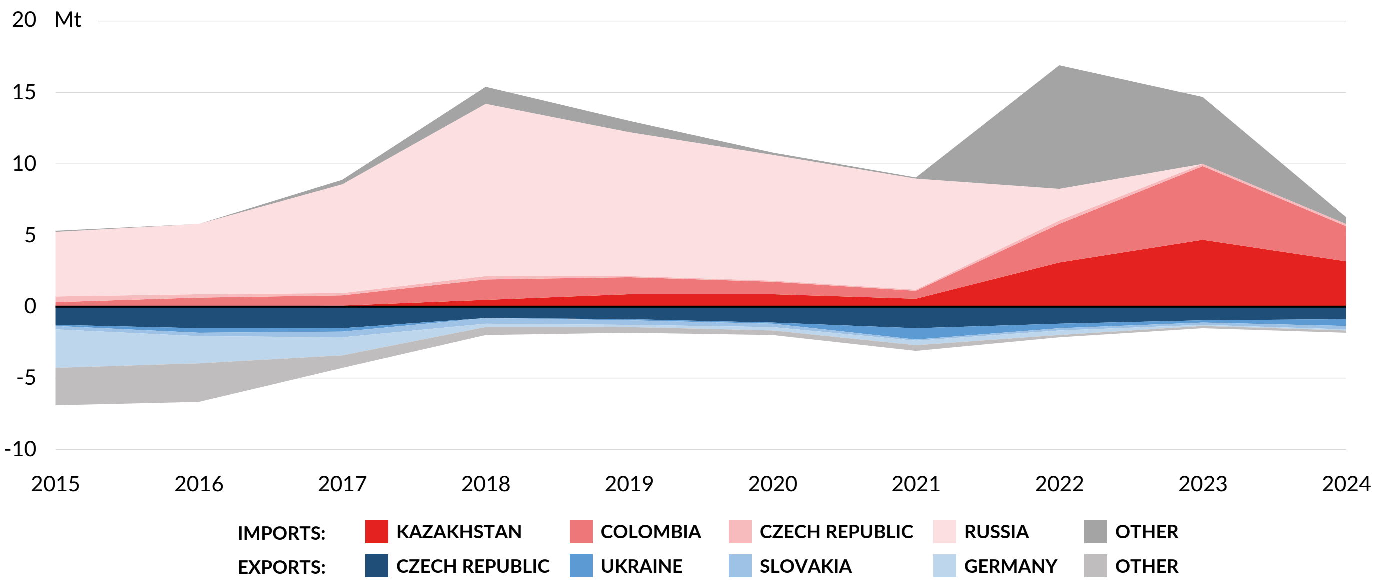
-19%

By this much the domestic production of natural gas in Poland has fallen over the last 10 years.

Poland's fossil fuel imports remain at very high levels, but the directions of imports have diversified. Imports of coal, gas and oil from Russia have dropped to zero. The only apparent dependence on Russia in the form of LPG has been nullified in December 2024. Natural gas is beginning to play an increasingly important role in the energy sector, but its main users are still industry and households. There is also a noticeable increase in gas prices on the market.

Trade balance of steam hard coal

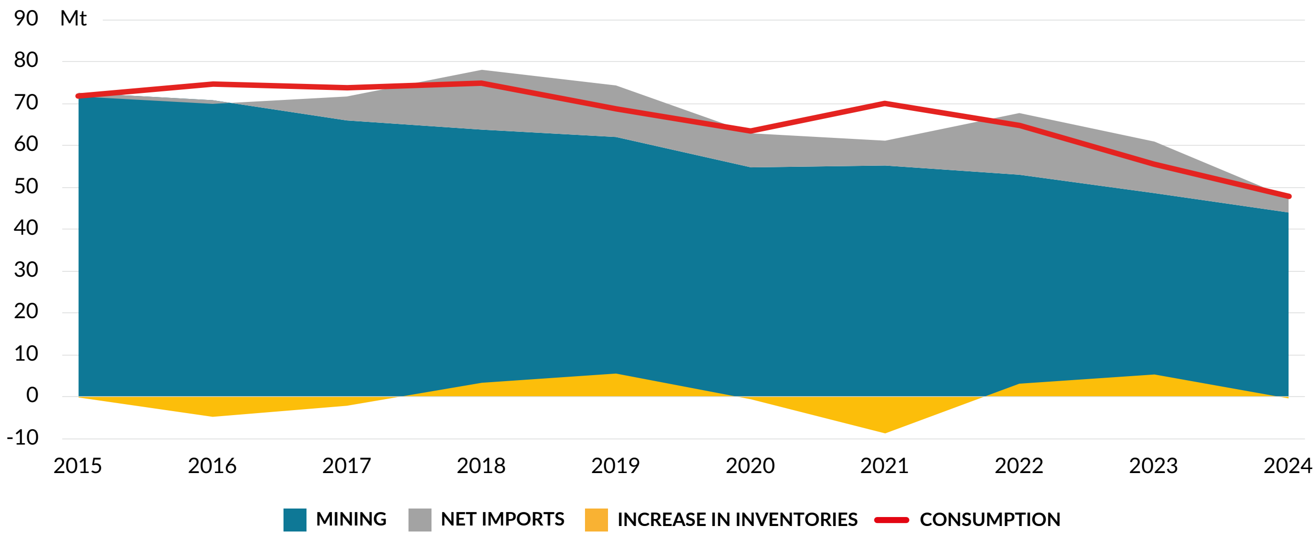
- In 2024, imports of steam hard coal to Poland amounted to 6.2 million tons – 8.5 million tons (-58%) less than in 2023 and 0.9 million tons (+17%) more than in 2015.
- 51% of imported coal came from Kazakhstan, 39% from Colombia, 3% from the Czech Republic, and 7% from other countries. Not a single ton of imported coal came from Russia.
- 1.9 million tons of steam coal were exported in 2024 – 0.4 million tons (-25%) more than in 2023 and 5 million tons (-73%) less than in 2014. The main customers for Polish coal were the Czech Republic (47%), Ukraine (25%), Slovakia (12%) and Germany (7%).



Source: own elaboration based on data from GUS.

Hard coal balance in Poland

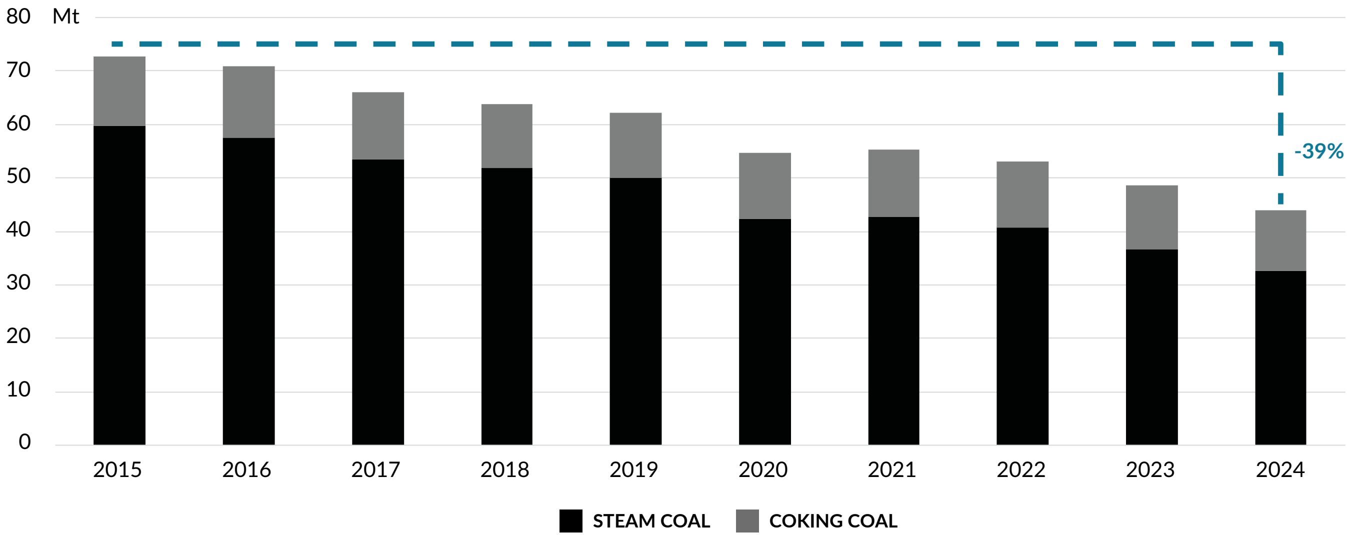
- According to estimates by Forum Energii, hard coal consumption in 2024 was about 48 million tons, down from 2023 by about 8 million tons (-14% y/y).
- Net imports fell by 8.7 million tons (down 71%, to 3.6 million tons). Production fell by 4.6 million tons (down 9%, to 44.0 million tons). Coal inventories decreased by 0.2 million tons.
- Over the 10-year period, coal consumption fell by about 24.1 million tons (-33%), output fell by 28.7 million tons (-39%), and net imports increased by 4.5 million tons. In 2015 Poland was an exporter of hard coal.



Source: own elaboration based on data from GUS, ARE, ARP and Eurostat.

Domestic hard coal production

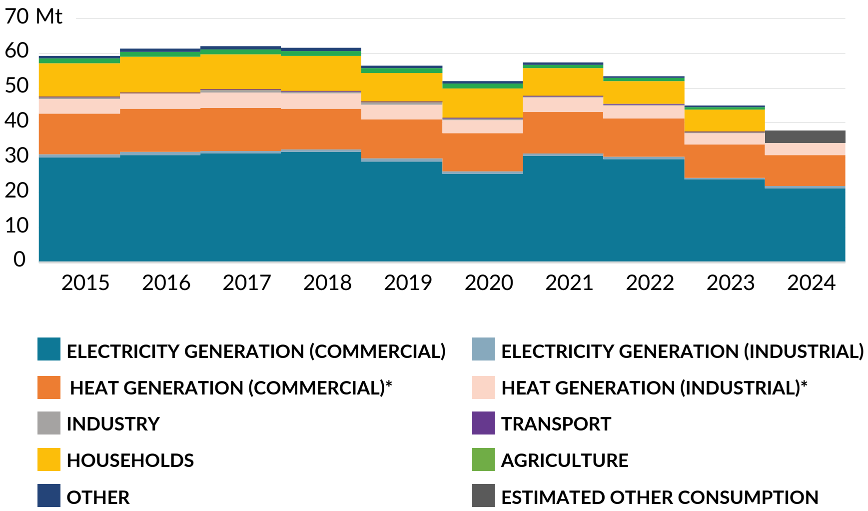
- In 2023, 44 million tons of hard coal were mined in the country's coal mines. Steam coal (including anthracite) accounted for 74% (32.6 million tons), and coking coal 26% (11.3 million tons).
- Total hard coal output fell by 4.6 million tons (-9%) during the year, with steam coal output down by 4 million tons (-11%) and coking coal down by 0.6 million tons (-5%).
- Over the decade, total hard coal output decreased by nearly 29 million tons (-39%), of which steam coal by 27.1 million tons (-45%) and coking coal by 1.6 million tons (-13%). The cumulative annual growth rate (CAGR*) was -4.9%.

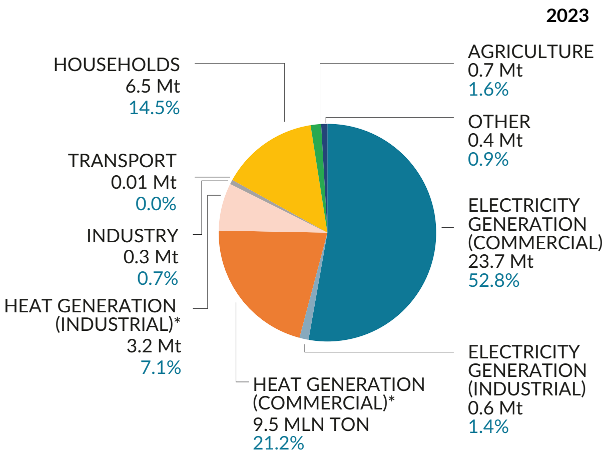


Source: own elaboration based on data from GUS and ARP.
* CAGR – an indicator used to measure the average annual rate of value growth over a specified period of time – here from 2015–2024.

Structure of steam hard coal consumption

- Estimated consumption of steam hard coal fell by 16% (-8.5 million tons) y/y in 2024, to about 36 million tons.
- In 2024, 96% of steam coal (35 million tons) was used to produce electricity and heat (at power plants, heating plants and combined heat and power plants). The remaining 4% (1.5 million tons) is the total consumption of other industries.
- Coal consumption for electricity generation is declining the most, with almost all of the decrease relative to 2015 occurring in 2023 and 2024.
- In 2023 (the latest data available), households consumed 6.5 million tons of steam coal (14% at the time) – that's 0.2 million tons less y/y (-3%) and 3.4 million tons (-34%) less over 10 years.

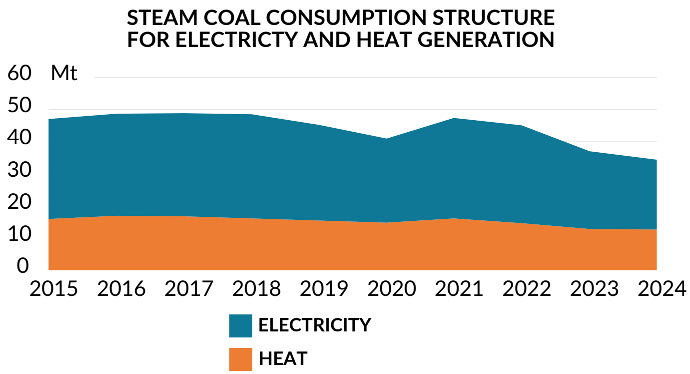


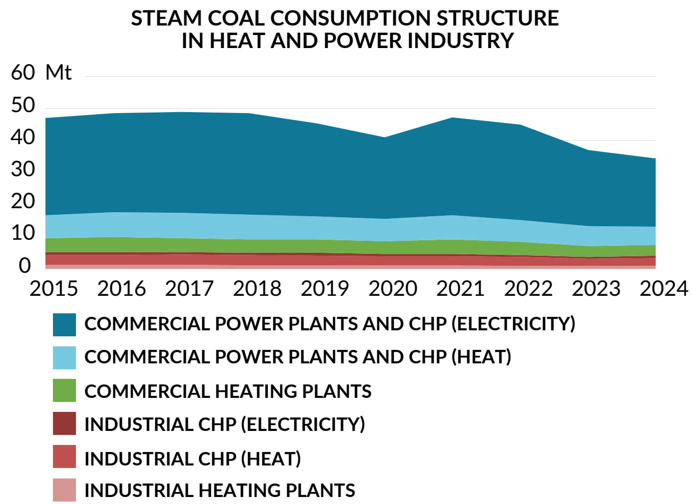


Source: own elaboration based on data from GUS, ARE, ARP and Eurostat.
* Data for 2024 estimated.

Structure of steam hard coal consumption – power and heat industry

- Hard coal consumption in the electric power and heating industry in 2024 was 34.3 million tons. About two-thirds of this (21.8 million tons) was used for electricity generation, and about one-third (12.5 million tons) for heat generation.
- Commercial electric power generation was responsible for 78% of consumption (26.7 million tons, of which 5.6 million tons for heat). District heating plants are responsible for 10% of consumption (3.4 million tons), while electric power and industrial heating plants accounted for about 12% (4.1 million tons, of which 3.4 million tons for heat).
- Coal consumption for heat production has been declining slightly over the past 10 years (-1.3% y/y, -21% relative to 2015). On the other hand, consumption for electricity generation has declined dynamically in 2024 (-10.4% y/y, -30% relative to 2015).
- Commercial electric power generation is almost entirely responsible for the decline in coal-fired electricity generation, while for heat generation, equally responsible are commercial and industrial units.



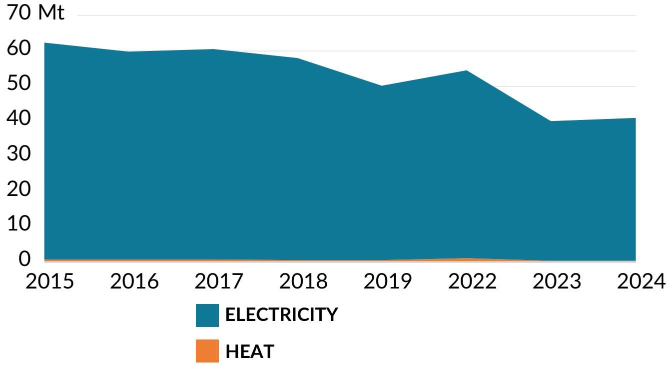


Source: own elaboration based on data from ARE and GUS.

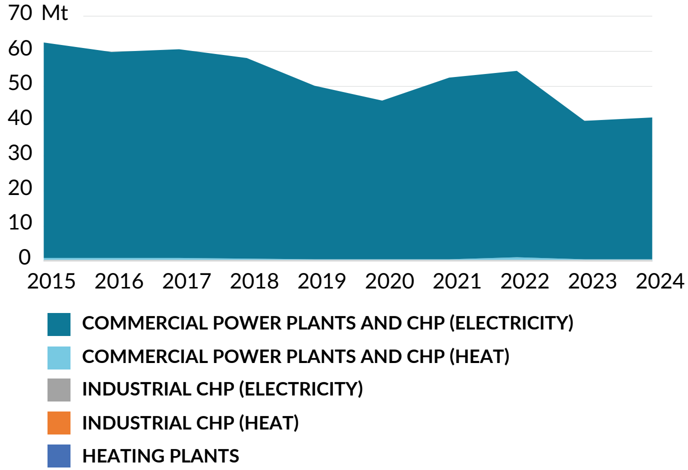
Structure of lignite consumption – power and heat industry

- Lignite is used almost exclusively in the energy sector (more than 99%). In 2024, 41 million tons of this raw material were consumed. It is not used in heating plants or industry.
- Almost the only purpose of lignite combustion is the production of electricity (98–99%) in the commercial electric power industry. In 2023, consumption for electricity generation was 40.6 million tons.
- Consumption of lignite increased relative to 2023 by 2% (14.4 million tons), and decreased by 34% (21.5 million tons) over 10 years.

LIGNITE CONSUMPTION STRUCTURE FOR ELECTRICITY AND HEAT GENERATION



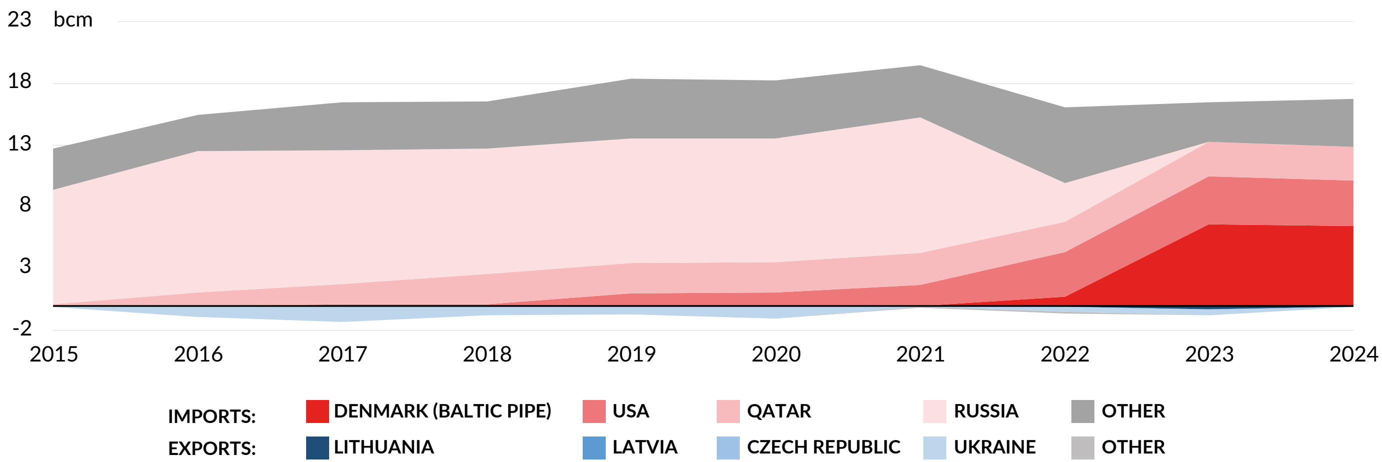
LIGNITE CONSUMPTION STRUCTURE IN HEAT AND POWER INDUSTRY



Source: own elaboration based on data from ARE and GUS.

Trade balance of natural gas

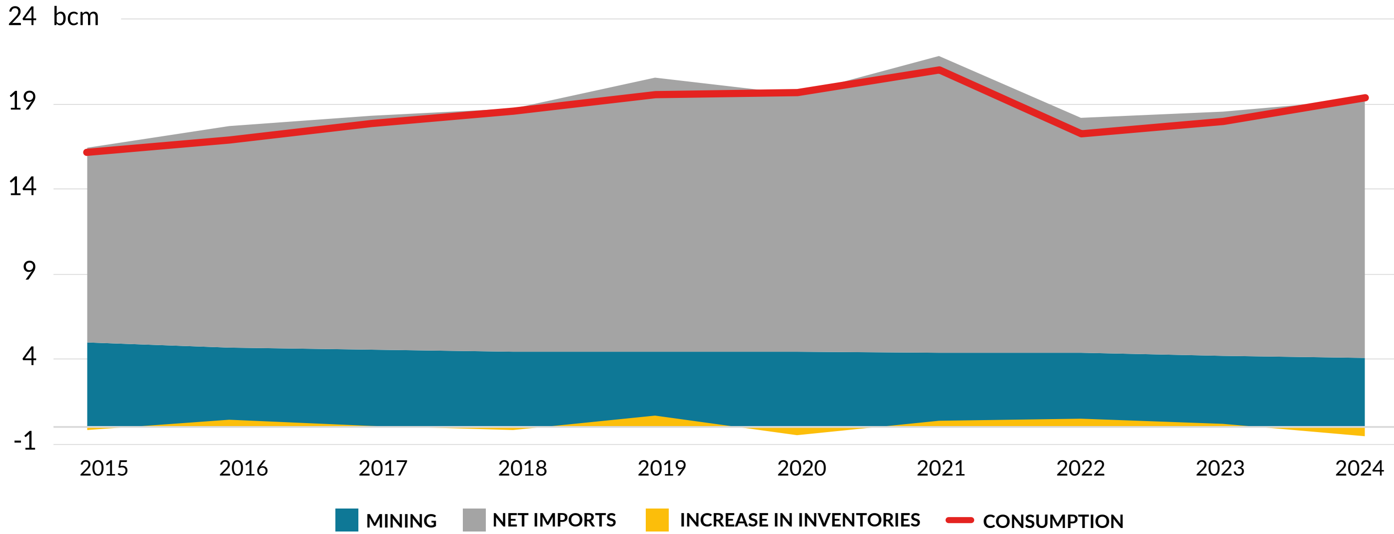
- Diversification of natural gas supplies to Poland – following the end of imports from Russia – continued in 2024. It fell from 8.5 bcm in 2014 to zero in 2023. In 2024, there were still no natural gas imports from Russia.
- In 2024. 38% of imported gas came from Denmark (Baltic Pipe). The US (22%) and Qatar (16%) were also important suppliers. Other directions accounted for 23% of imported gas.
- In total, in 2024, natural gas imports (both by pipeline and LNG) amounted to 16.8 bcm, 0.3 bcm more than in the previous year (+2%) and 4 bcm more than 10 years ago (+32%).
- 0.1 bcm of gas was exported from Poland in 2024 – 88% flowed to Lithuania, 7% to Latvia, 4% to the Czech Republic, and the remaining 1% to Ukraine and Slovakia.
- LNG imports accounted for 41% (6.8 bcm after regasification) of natural gas imports.



Source: own elaboration based on data from GUS.

Natural gas balance in Poland

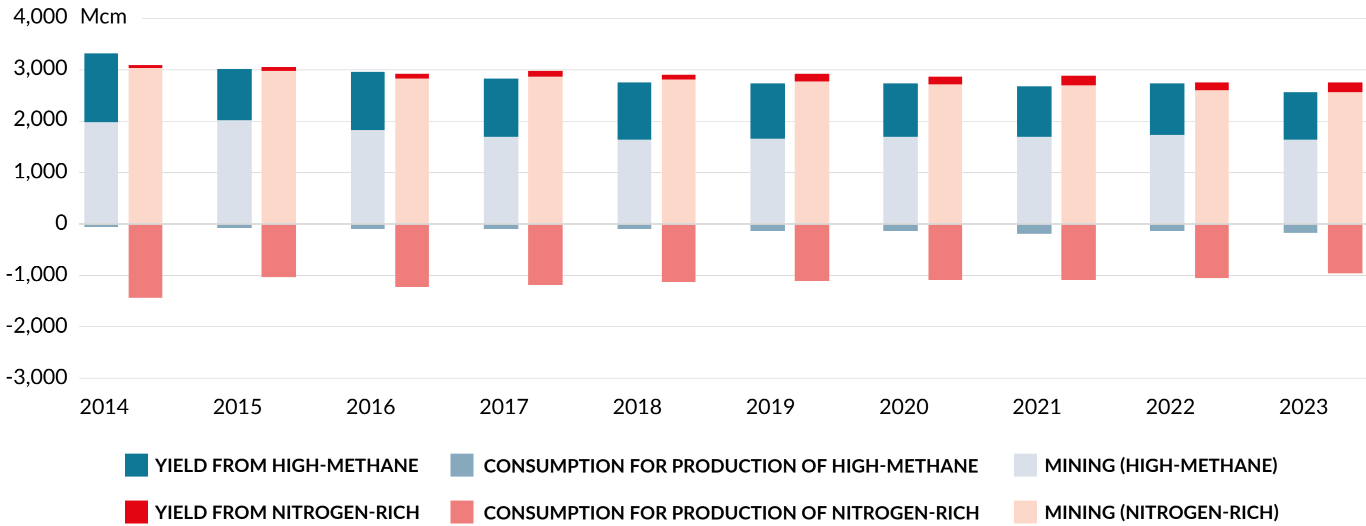
- Natural gas consumption in 2024 increased by an estimated 1.4 bcm (+8% y/y) over the previous year to 19.4 bcm high-methane gas equivalent.
- Net imports increased by 0.9 bcm (+6% y/y, to 15.2 bcm). Domestic production is estimated to have declined by 0.2 bcm (-4% y/y, to 4 bcm), and inventories by 0.5 bcm. By the end of 2024, storage fill was 86.4%.
- Over the decade, natural gas consumption increased by 3.2 bcm (+20%), while domestic production fell by 1.0 bcm (-19%). Net imports increased by 3.8 bcm (+33%).



Source: own elaboration based on data from ARE, GUS, ENTSOG and Eurostat. Production and consumption of nitrogenous natural gas converted to high-methane gas equivalent.

Domestic natural gas production (2023)

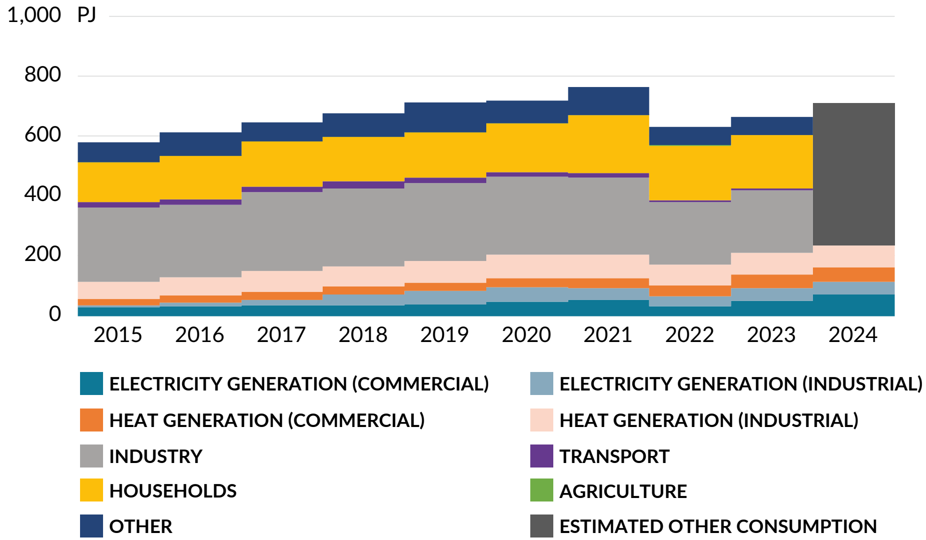
- Domestic production of high-methane gas is declining slightly. In 2023 (the latest available data), net production was 2.4 bcm, consisting of 1.6 bcm of gas from mining, 0.9 bcm from conversion (at the denitrification plant) of nitrogen-rich natural gas, and consumption of 0.2 bcm for the production of nitrogen-rich natural gas.
- In 2023, domestic production of nitrogenous gas did not deviate significantly from the long-term trend. A net 1.8 bcm was obtained, consisting of 2.6 bcm from production, 0.2 bcm from conversion (at the blending plant) of high-methane gas, and consumption of 1 bcm for high-methane gas production.

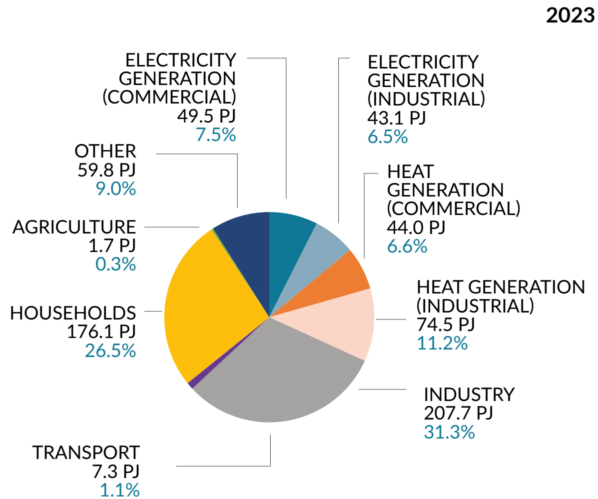


Source: own elaboration based on data from ARE and GUS. Volume of nitrogenated gas converted to high-methane gas equivalent.

Structure of natural gas consumption

- In 2024 1/3 of natural gas (235.8 PJ) was used to produce electricity and heat. Electricity generation accounts for the vast majority of the increase in gas consumption. Total consumption in other sectors of the economy was about 67% (475.1 PJ).
- The largest consumer of gas in Poland is industry, which in 2023 (the latest available data) was responsible for 31% of consumption (207.7 PJ). This represents no growth from the previous year and a 12% decline over the decade.
- The second largest consumer of gas in Poland is households, which in 2023 was responsible for 27% of consumption (176.1 PJ). This represents a 3% y/y decline, but a 34% increase over the decade.
- Natural gas consumption declined in 2022 as a result of rising prices and cutting off imports from Russia. However, it is slowly returning to pre-war levels.



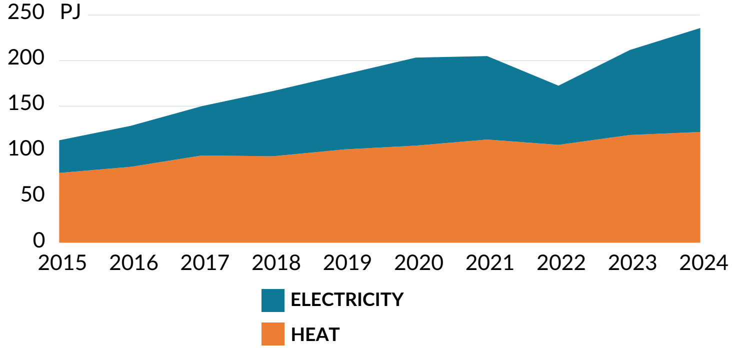


Source: own elaboration based on data from ARE, GUS and ENTSOG.

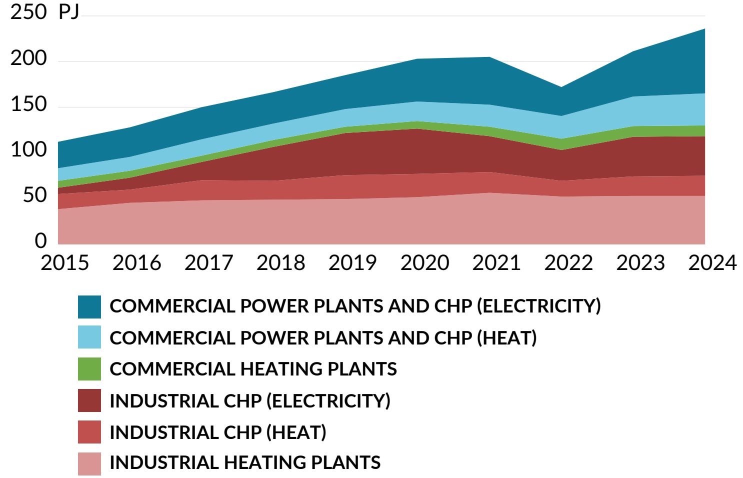
Structure of natural gas consumption – electricity and heat

- In 2024, the power and heat industry consumed 235.8 PJ of natural gas, of which 42% (121.6 PJ) for heat, and 48% (114.2 PJ) for electricity.
- Industrial CHP and heating plants are responsible for 50% of consumption (118.3 PJ, including 74.7 PJ for heat), district heating plants are responsible for 5% (11.9 PJ), and commercial CHP is responsible for 45% (105.6 PJ, including 46.9 PJ for heat).
- Both gas consumption for heat generation (+3% y/y, +59% vs. 2015) and electricity (+23% y/y, +216% vs. 2015) are growing.
- So far, industrial CHP has been mainly responsible for the long-term growth of gas consumption for electricity generation. In recent years, however, gas-fired utility units have begun to arrive. In the case of heat production, these are CHPs, and to a lesser extent industrial heating plants.

NATURAL GAS CONSUMPTION STRUCTURE FOR ELECTRICTY AND HEAT GENERATION



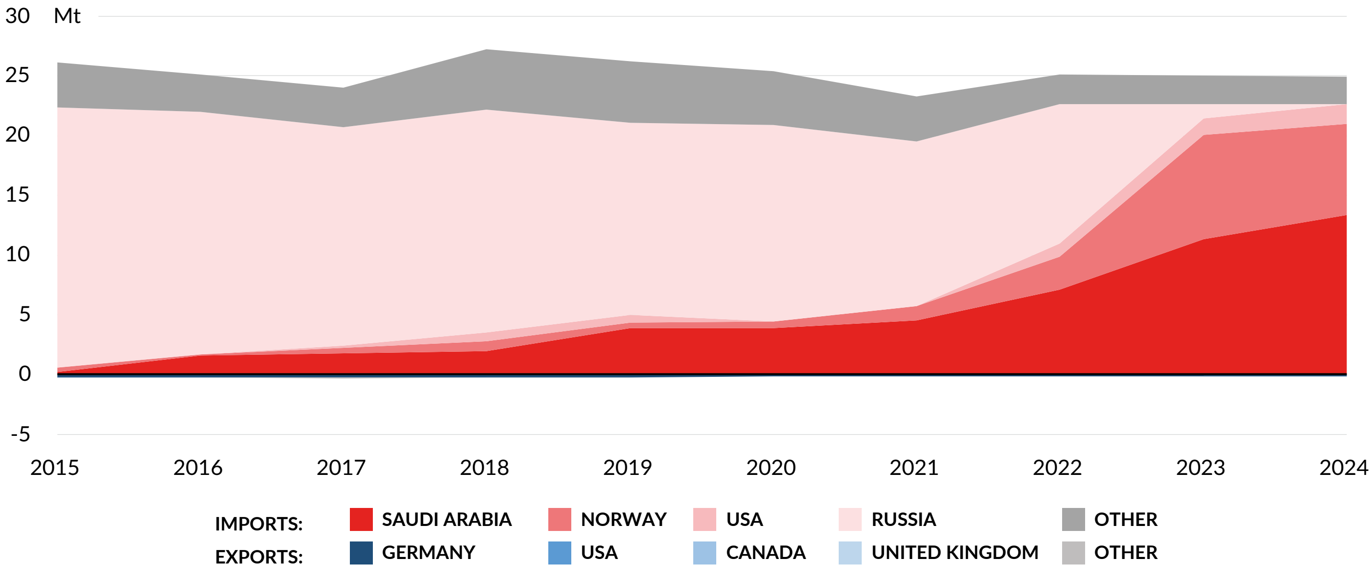
NATURAL GAS CONSUMPTION STRUCTURE IN HEAT AND POWER INDUSTRY



Source: own elaboration based on data from ARE and GUS.

Trade balance of crude oil

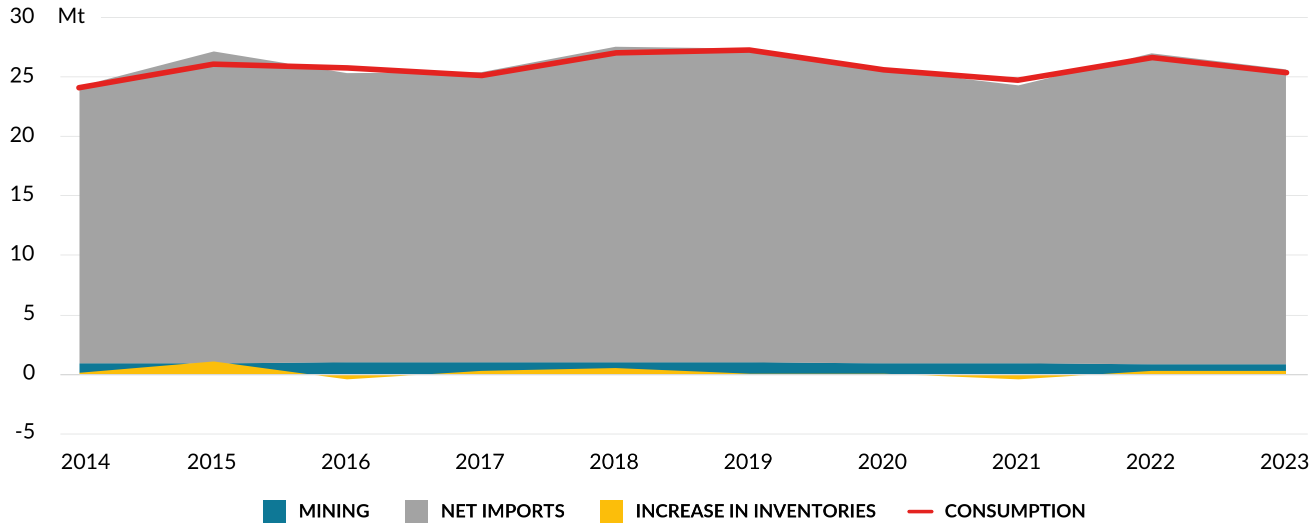
- In 2024, the diversification of the directions of crude oil supplies to Poland continued – imports from Russia were zero. In 2015, it was 83% (21.8 million tons), and in 2023. 5% (1.1 million tons).
- Russia's place in crude oil supplies to Poland was taken by Saudi Arabia (54% of imports, 13.3 million tons) and Norway (30%, 7.6 million tons). The USA brought 7% of it (1.7 million tons), and other directions accounted for 9% (2.3 million tons).
- In total, Poland's oil imports amounted to 25 million tons, similar to 2023.
- Poland exports almost no crude oil. The only, insignificant stream (0.18 million tons) flowed, as every year, to Germany.



Source: own elaboration based on data from Eurostat.

Crude oil balance in Poland (2023)

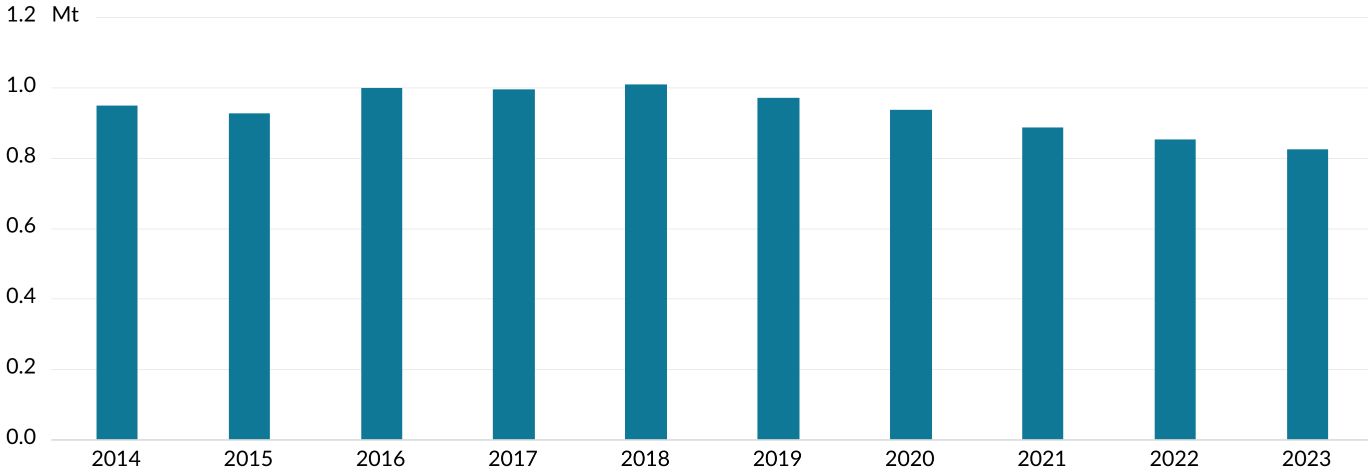
- Crude oil consumption declined to 25.4 million tons in 2023, down 1.2 million tons y/y (-5%) (latest available data).
- Net imports declined by 1.3 million tons (down 5%, to 24.8 million tons), and domestic production fell by 3% (to 0.8 million tons). Inventories increased by 0.3 million tons.
- Over the 2014–2023 decade, crude oil consumption increased by 1.3 million tons (+5%), production decreased by 0.1 million tons (-13%), and net imports increased by 1.5 million tons (+7%).



Source: own elaboration based on data from ARE.

Domestic crude oil production (2023)

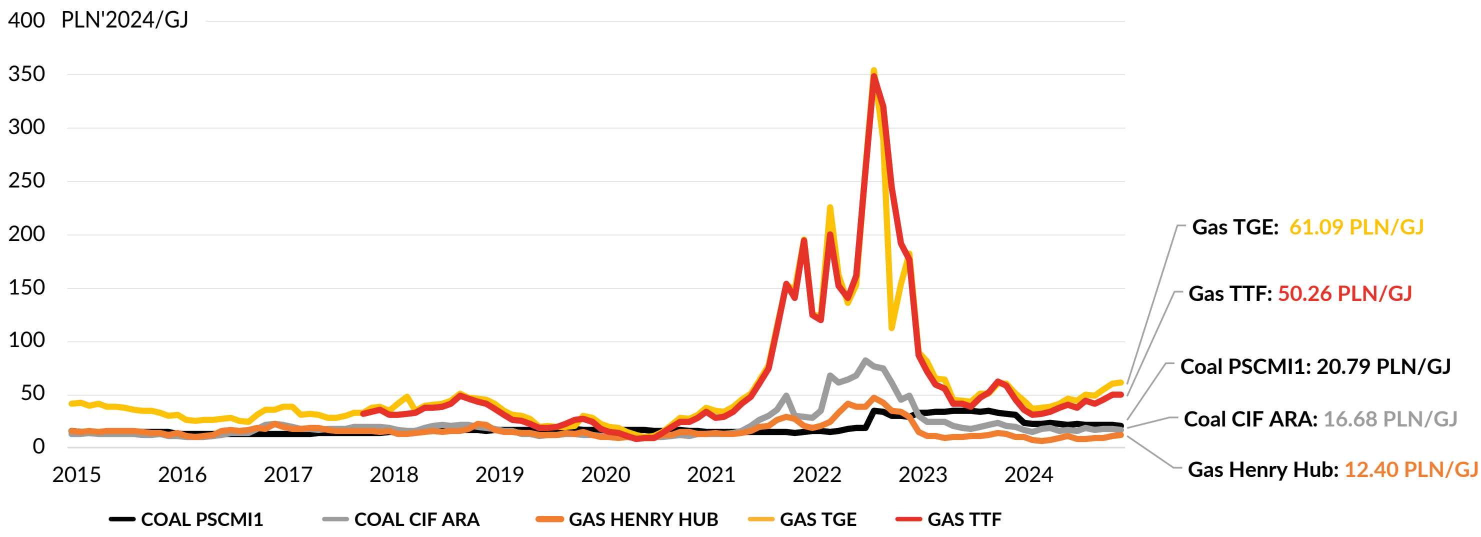
- Domestic crude oil production has been declining for five years. A decline of about 0.03 million tons was recorded in 2023.
- In 2023, domestic crude oil production was 0.83 million tons, down 3% y/y and 13% lower than in 2014.



Source: own elaboration based on data from ARE.

Coal and natural gas prices

- Energy commodity prices in 2024 were still above the level before the energy crisis and Russian aggression against Ukraine.
- Natural gas recorded a price increase relative to 2023. On the European TTF exchange, the price increase is 11% y/y, on the Polish TGE – 21%, and on the US Henry Hub – 19%. Relative to 2019, these prices are 108% and 118% higher, respectively, and 2% lower on Henry Hub.
- The price of coal fell 14% y/y on the European ARA exchange. However, relative to 2019, coal was 40% more expensive.
- Polish coal (PSCMI1) saw the biggest price drop in 2024, falling 34% y/y. However, it is still 19% more expensive than at the end of 2019.



Source: own elaboration based on data from ARP, Argus McCloskey, TGE, Stooq, NBP.

Chapter 4.

Impact on climate. Emissions

614 kg CO_2/MWh

was the unit emissivity of energy production electricity in Poland. This is the second highest result in the European Union.

5th

in the world is Poland's rank in terms of the largest unit gas emissions greenhouse gas per energy consumption.

PLN 16,6 bln

gained by the Polish budget in 2024 from the sale of emission allowances CO_2. Since 2015, after taking inflation into account, the value is 150 billion.

34%

of Poland's greenhouse gas emissions come from energy production electricity and heat.

44%

of Polish gas emissions in 2023 was traded in the ETS (96% in energy and 79% in industry).

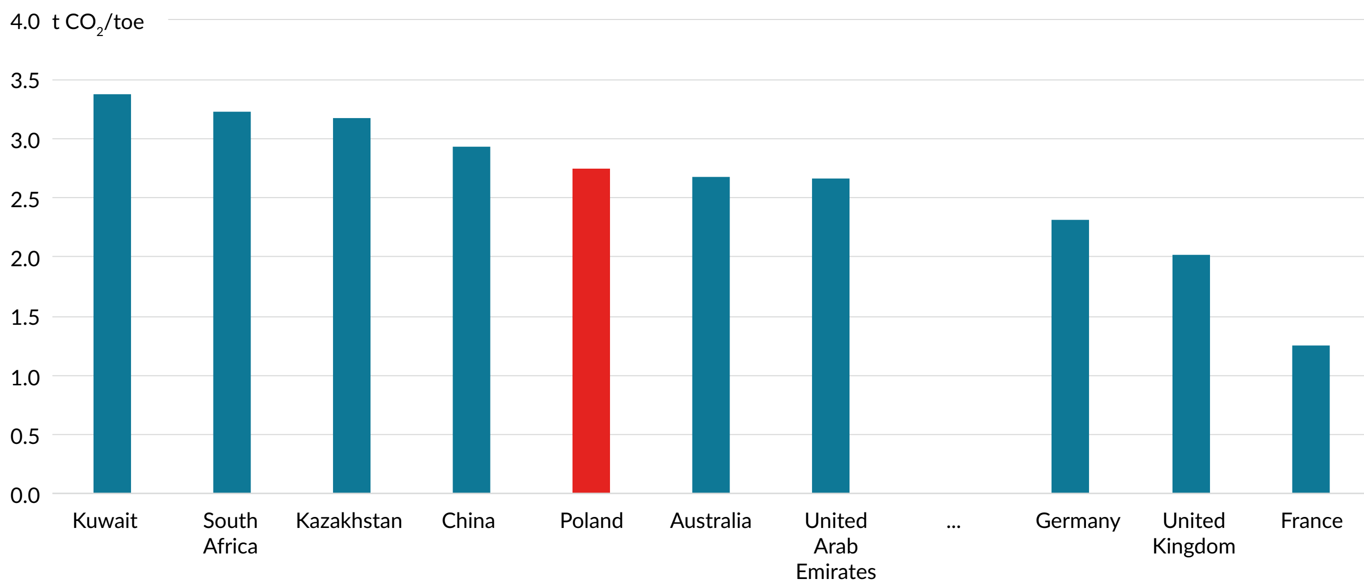
65 euro/t CO_2

was the weighted average price of CO_2 emission allowances in 2024. This is well below projections from policy documents.

The rate of reduction of CO_2 emissions in Poland is slower than in other countries in the region and the EU. Estimated emissions have hardly changed relative to 2023. Due to lower CO_2 emission allowance prices the large share of lignite in the electricity generation mix persists. The high level of emissions in the electric power industry translates into high energy prices, and in industry – a decrease in competitiveness.

Specific emissions of primary energy consumption (2023)

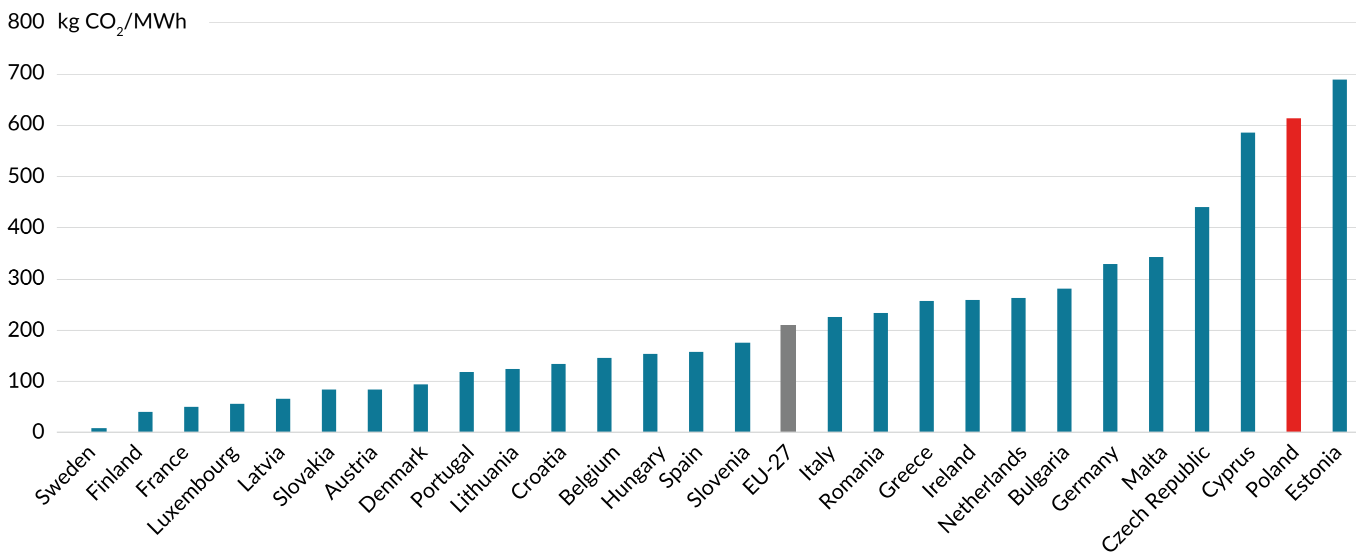
- In 2023. Poland was ranked fifth in the world (two places lower than in the previous year) in terms of emissivity of primary energy consumption*.
- Kuwait had the most carbon-intensive economy (3.38 t CO_2/toe). Poland, with a score of 2.74 t CO_2/toe (-0.15 y/y), ranked just behind China (2.93 t CO_2/toe). In comparison, the British economy emitted 26% less than Poland (2.02 t CO_2/toe), and the French economy emitted 54% less (1.26 t CO_2/toe).



Source: own elaboration based on data from Enerdata.
* The unit emissivity of primary energy consumption tells how many tons of CO_2 were emitted on average when 1 unit of primary energy was consumed (toe – tons oil equivalent, 1 toe = 41.9 GJ) In other words, it is the emissivity of energy consumption, regardless of its form (heating, fuels, electricity, etc.).

Greenhouse gas emission intensity of electricity generation (2023)

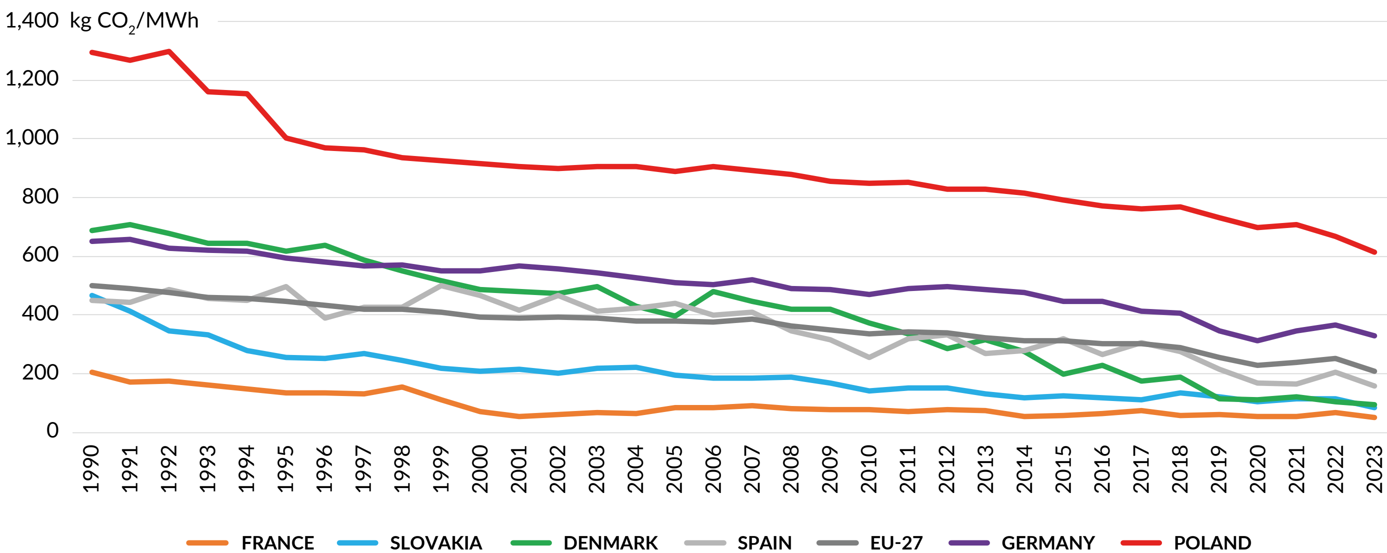
- The emissivity of electricity production in 2023 in Poland was 614 kg CO_2/MWh, the second highest in the EU (Poland was the most emissive in 2022).
- Such high emissivity has and will continue to have an impact on industry, due to the growing importance of the carbon footprint in industrial production, which must be reported. With high prices of CO_2 emission allowances the cost of generation of electricity also increases significantly, which translates into high prices on the wholesale market.



Source: own elaboration based on data from EEA.

Change in GHG emission intensity of electricity generation over time (2023)

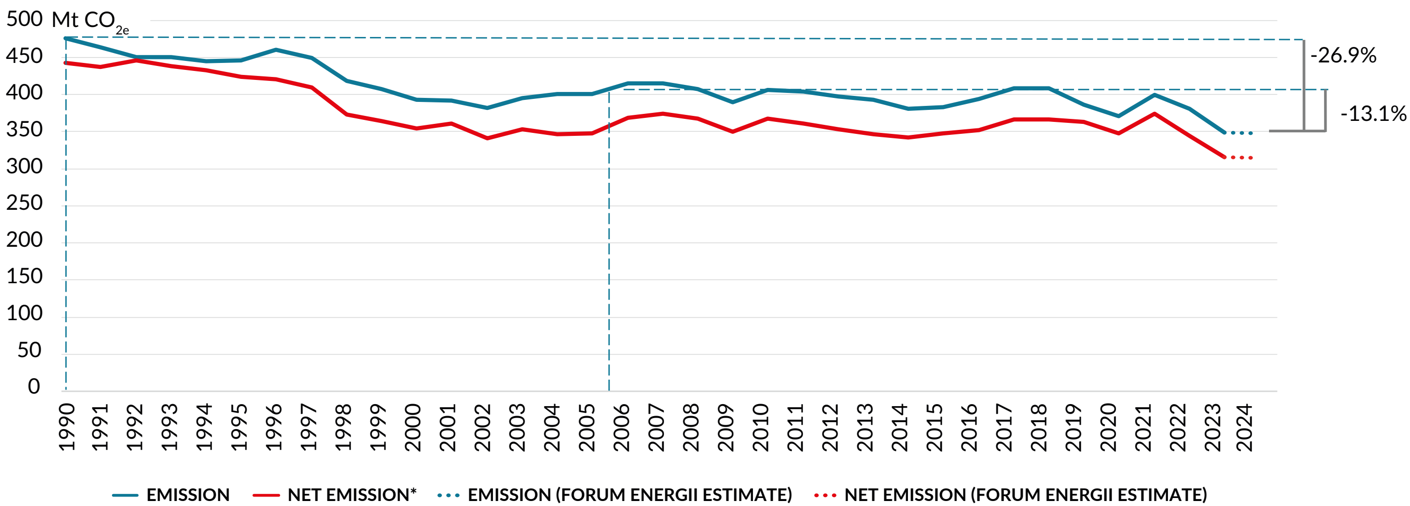
- Despite the decarbonization of electricity generation by 52.5% relative to 1990, Poland's power sector is (and always has been) one of the most carbon-intensive in the EU.
- The EU average decarbonization from 1990 to 2023 is 58.1%. Among countries with European-significant electricity systems, Denmark has been the most successful, with reductions in greenhouse gas emissions from the electricity industry there reaching 86.3% (note, however, that due to its size, location and connection to its neighbors, it is not a reference country to Poland).
- In the same period, Slovakia's emissions reductions were 82.1%, France's 75.6%, and Germany's 49.5%.



Source: own elaboration based on data from EEA.

Changes in greenhouse gas emissions in Poland

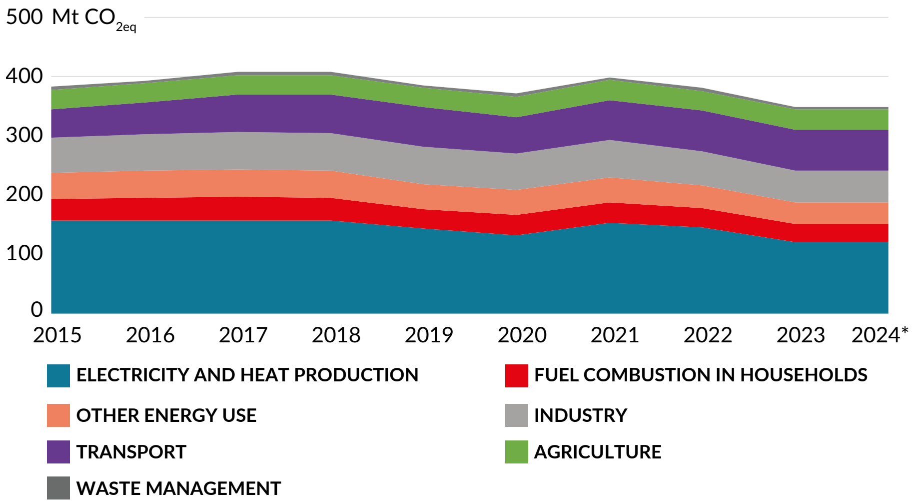
- According to Forum Energii estimates, Poland's gross emissions in 2024 were at a similar level as in 2023, at about 348.1 million t CO_{2e}.
- Land use, land use change and forestry (LULUCF) was responsible for absorbing about 33 million tons of CO_{2e}, reducing net emissions to about 315.4 million t CO_{2e}.
- Relative to 1990 (the reference year for the EU), Polish gross emissions fell by 26.9%.
- Relative to 2005 (the entry of the emissions trading system), Polish gross emissions fell by 13.1%.

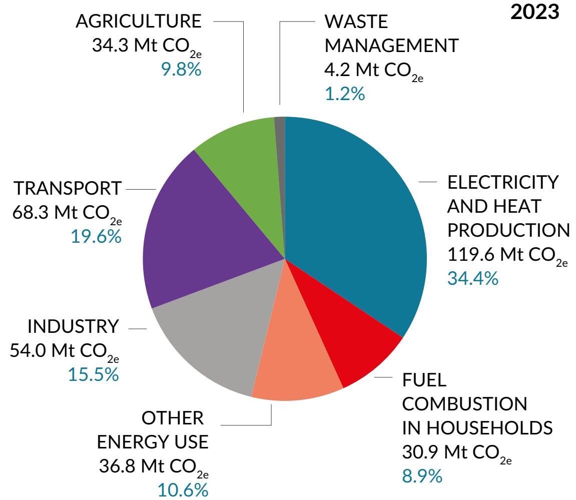


Source: own elaboration based on data from EEA, KOBiZE, ARE and GUS. Greenhouse gases: CO_2, methane, nitrous oxide.
* Net greenhouse gas emissions are lower than gross emissions because they take into account not only greenhouse gases released into the atmosphere, but also absorbed by trees, peatlands or soil (Land Use, Land Use Change and Forestry, or LULUCF).

Structure of greenhouse gas emissions in Poland

- In 2024, most GHG emissions came from electricity and heat production: 119.7 million t CO_{2e}, i.e. 34.4% of estimated total gross emissions. This represents a decrease relative to 2023 of 0.04 million t CO_{2e} (-0.03% y/y).
- Agriculture emissions increased by 2.8% y/y to 34.3 million t CO_{2e} in 2023 (latest available data).
- The largest decreases in emissions in 2023 were in the household fuel combustion sector (down 2.1% y/y, to 30.9 million t CO_{2e}) and in industry (down 7.9% y/y, to 54 million t CO_{2e}).
- Between 2015 and 2024, emissions from electricity generation (down 35.9 million t CO_{2e}, or 23.1%) and households (down 6.4 million t CO_{2e}, or 17.2%) fell the most, while emissions from transport increased (up 22.9 million t CO_{2e}, or 50.2%).

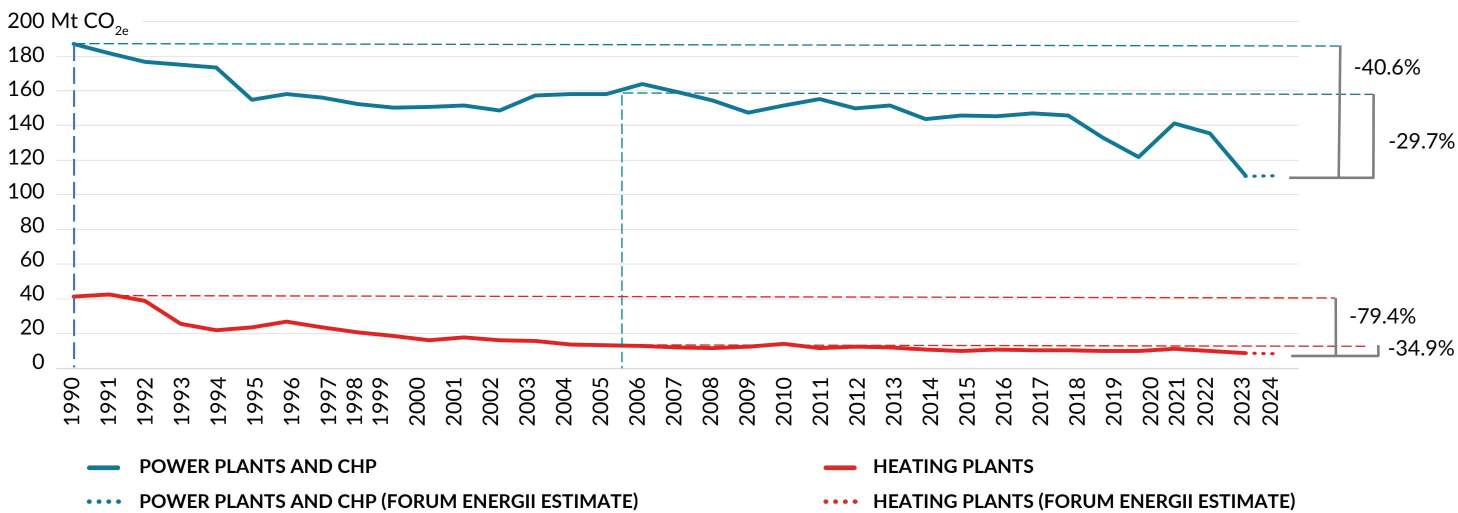




Source: own elaboration based on data from EEA, KOBiZE, ARE and GUS.
* Estimated values.

Changes in greenhouse gas emissions from electricity and heat generation

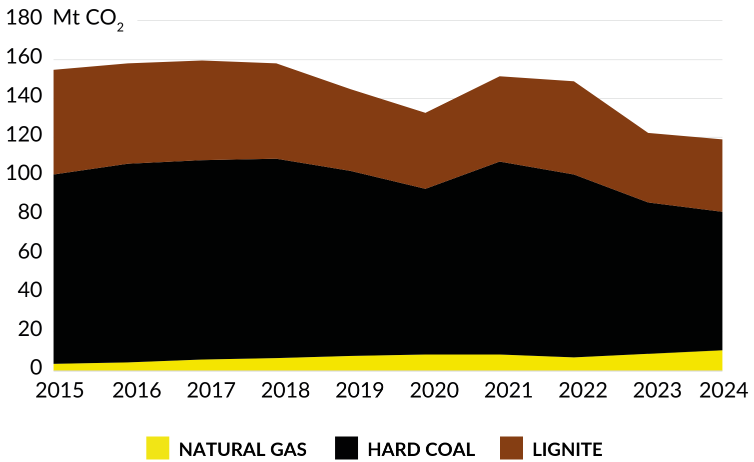
- According to Forum Energii estimates, emissions from power plants and combined heat and power (CHP) plants in Poland increased by 0.2% in 2024 relative to 2023 – to 111.2 million t CO_{2e}.
- Greenhouse gas emissions from district heating plants fell by an estimated 2.9% y/y, to 8.5 million t CO_{2e}.
- Relative to 1990, emissions from power plants and CHP fell by 40.6%, and from district heating plants by 79.4% (mainly due to a decrease in demand from industry and modernized district heating systems).
- Relative to 2005, the emission reductions are respectively: -29.7% and -34.9%.

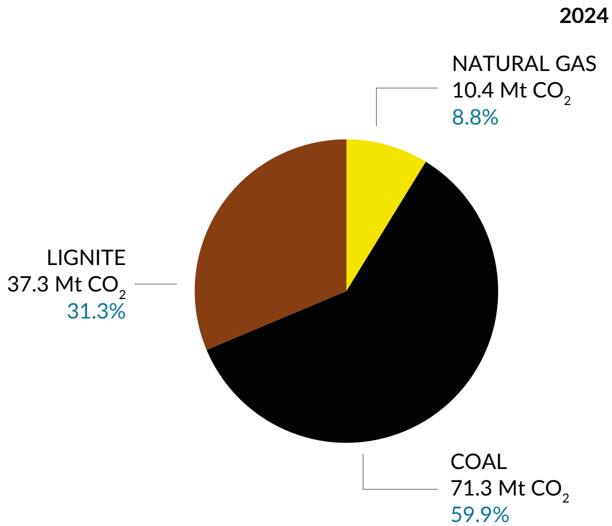


Source: own elaboration based on data from EEA, KOBiZE, ARE and GUS. Greenhouse gases: CO_2, methane, nitrous oxide.

Emissions from electricity and heat production, by fuel

- Hard coal was responsible for 60% of CO_2 emissions from power sector in 2024 (71.3 million t CO_2, -8% y/y).
- Lignite accounted for 31% of emissions (37.3 million t CO_2, +5% y/y).
- Electricity and heat production from natural gas were associated with 10.4 million t CO_2 emissions (+18% y/y), accounting for 9%.
- During the decade, emissions from lignite fell by 31% (-16.7 million t CO_2), and from hard coal by 27% (-26.1 million CO_2). In contrast, emissions from natural gas increased by 207% (+7 million t CO_2).

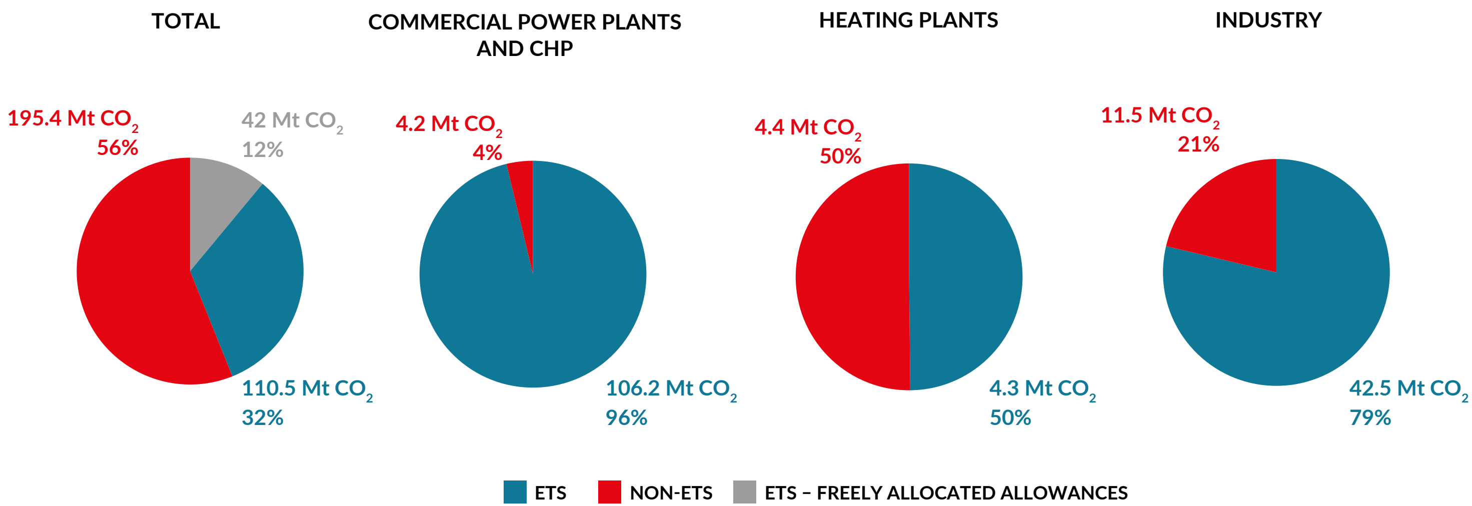




Source: own elaboration based on data from KOBiZE, ARE and GUS.

Carbon dioxide emissions covered by the Emissions Trading System (2023)

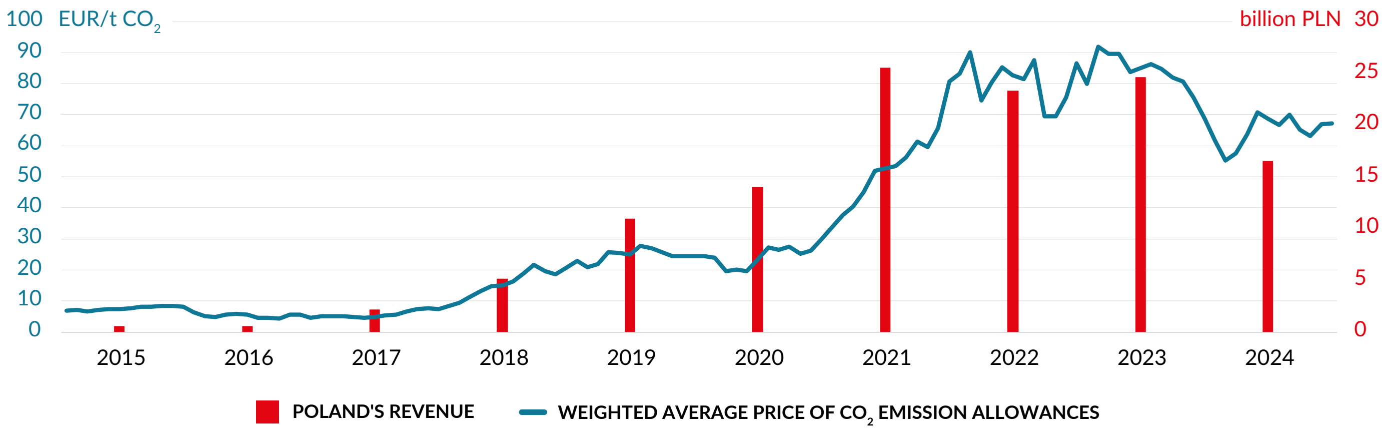
- Poland's total CO_2 emissions in 2023 amounted to 348 million tons, with 44% of them covered by the European Emissions Trading System (EU ETS).
- Among commercial power plants and combined heat and power plants, 106 million tons of CO_2 were covered by the ETS (96% of all emissions from this sector). For heating plants, the ratio is 50%, which means that 4.3 million t of CO_2 were subject to the ETS in 2023.
- For industrial emissions, 76% of emissions were covered by the ETS – 42.5 million t CO_2.



Source: own elaboration based on data from EEA and KOBiZE.

CO_2 emission allowances prices and Poland's income from their sale

- In December 2024, the weighted average monthly price of CO_2 emission allowances on the primary market (EEX) was 67.27 EUR/t CO_2. The weighted average price for the whole year was 64.75 EUR/t CO_2.
- There was a decrease in the price of EUAs* in 2024 compared to the previous year.
- The volume of allowances sold by Poland amounted to 59.3 million tons in 2024. This is 5.8 million tons less than in 2023.
- The country's budget gained PLN 16.6 billion from auctions of CO_2 emission allowances (EUA and EUAA**). This is PLN 8.1 billion less than in 2023, but PLN 16 billion more than in 2015.
- Total state budget revenues from the sale of CO_2 emission allowances between 2015 and 2024 were nominally PLN 123.5 billion, which, after taking inflation into account (in constant 2024 prices), corresponds to PLN 150.4 billion.



Source: own elaboration based on data from EEX and NBP.
* EUAs – European emission allowances for participants in the EU ETS.
** EUAA – European emission allowances for the aviation sector.

Notes

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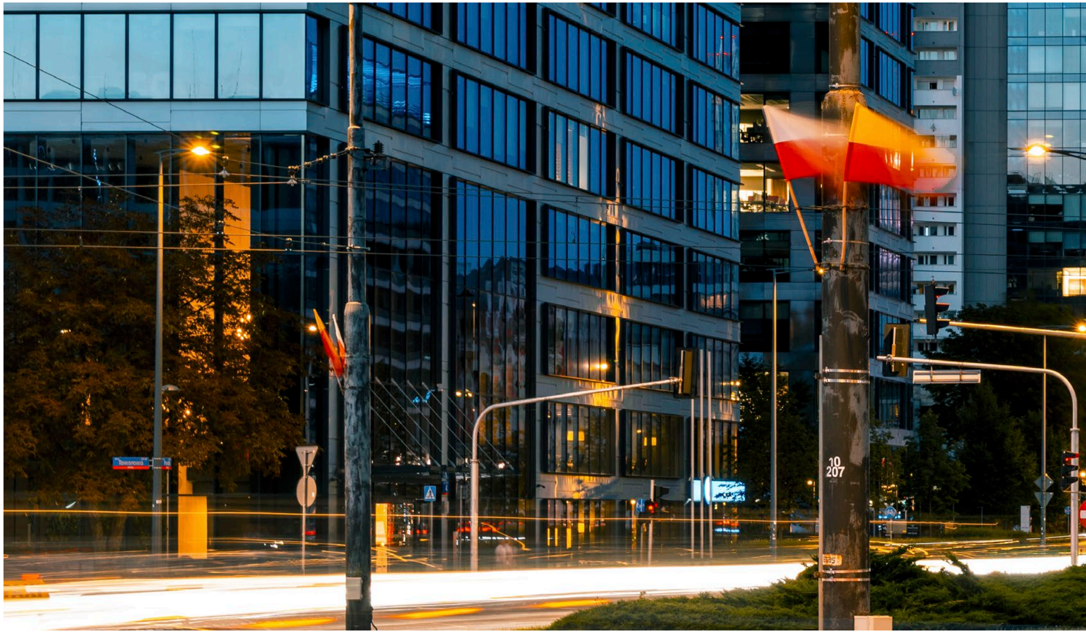

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