

Heating Sector Transition in Poland

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The mission of Forum Energii is to initiate dialogue, propose knowledge-based solutions, and inspire action for a safe and effective energy transition leading to climate neutrality.

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Introduction

Thermal comfort is one of the basic human needs. It is not only a matter of convenience but also of health, safety, and dignified living conditions. Unfortunately, heating costs are, on average, one of the highest items on the bill for Polish households, especially where buildings consume a lot of energy.

The heating sector – both district heating and individual heating – is the second largest energy sector in Poland in terms of energy consumption. For the last few decades, this issue has been left to its own devices. Politicians considered it the domain of local authorities and the individual choices of citizens. This would probably still be the case, were it not for the problems of poor air quality, fuel imports, high CO₂ emissions, and... heat bills. These are areas for which the state is responsible. Poland has national and EU obligations in this matter. There is also social pressure on the government to take action. Although large support schemes have appeared under EU funds and the National Recovery Plan (KPO), they are being spent in an ill-considered manner.

People do not know how to obtain funds for investments or what will be profitable in 5–10 years. What will be the market situation? How much will electricity cost? What will be the importance of coal and gas? A major difficulty is also the lack of information, related, among other things, to the ineffective operation of social assistance in Poland and growing housing problems.

The heating sector needs the attention of decision-makers and a development strategy. A lack of these will result in rising bills, social frustration, and an increase in anti-EU sentiment – especially since the entire building sector is also to be covered by emission charges (ETS2). Currently, some buildings, e.g., those heated by electricity (heat pumps or district heat), bear these costs, while buildings heated by coal and gas do not. This is an unfair distribution that causes a technological imbalance and does not motivate change. Instead of a social contract with miners, the government should propose a social contract with households, which would include a strategy for changes in the heating sector, increased consumer protection, and support systems for change.

Heating is a sector with a data deficit. There are also conflicting narratives about it. We believe that a reliable analysis will help present its real condition, which is why we have prepared a report based on concrete numbers. We hope that it will become an impetus for action for decision-makers, companies, and households.

I encourage you to read and discuss.

Joanna Pandera, Ph.D.
President of Forum Energii

Data Sources and Availability

The report is based on the most current data and materials published by: the Statistics Poland (GUS), the Energy Market Agency (ARE), the Energy Regulatory Office (URE), the National Energy Conservation Agency (KAPE), the National Centre for Emissions Management (KOBIZE), Eurostat, and others. In most sources, the latest data relates to 2023, so it is not possible to assess the changes that have occurred since then.

In the preparation of this publication, we noticed problems that may be a barrier not only to creating an objective and complete picture of the heating sector in Poland, but also to introducing necessary changes in this sector. These include:

- lack of up-to-date data – information concerning various sectors is published with a delay, most often annual or even greater (2–3 years), which makes it difficult to monitor the current situation in the heating sector – thus, data for the past year 2024 cannot be presented,
- changes in the way data is presented between editions of statistical reports – changes in tables, levels of accuracy, data aggregation, as well as insufficient data disaggregation and the abandonment of monitoring some indicators and the introduction of others,
- lack of methodical consistency in published data – statistical institutions use their own methods, which makes it impossible to create a coherent picture of the studied issue.

The Energy Regulatory Office data on district heat included in this report concerns only licensed enterprises with a capacity greater than 5 MW. Therefore, enterprises with smaller capacities are omitted.

The lack of data is a barrier to the transformation of the energy sector in Poland. Heat supply is a public domain and concerns every Polish household. Data concerning, for example, energy efficiency, pollutant emissions, or forms of heating should be regularly collected and widely available.

In the report, we present the two largest areas of the heating sector: **individual heating**, which is the heating of buildings using local heat sources, and district heating (or district heating), which is the heating of buildings by licensed heating companies.

A detailed list of graphic sources can be found at the end of the report.

Key Findings

- The heating sector – both district heating and individual heating – is the second largest energy sector in the country. In terms of the energy stream, it ranks immediately after the national electricity system. For heating purposes in 2023, the fuels consumed were primarily coal (approx. 18.7 million tonnes), gas (5.2 billion m³), and biomass (15.28 million tonnes). The share of oil and other fuels amounted to approx. 10%. The sector's annual CO₂ emissions amounted to approx. 17% of national greenhouse gas emissions, i.e., **60 million tonnes** (individual heating: 25.2 million tonnes CO₂/year, and district heating: 34.5 million tonnes CO₂/year).
- The cost of purchasing fuels for heating purposes in 2023 amounted to **PLN 74.4 billion (PLN 20.1 billion in district heating and PLN 54,3 billion in individual heating)**. The reliance on fossil fuels means the risk of increasing heating costs due to market price fluctuations and rising environmental costs (including CO₂ emission costs).
- Over the decade in individual heating, unit CO₂ emissions per GJ of heat decreased by 23% (reaching 48 kg CO₂/GJ). This large drop is primarily due to a change in the method of calculating biomass consumption in households and a sharp increase in the stream of this fuel, classified as zero-emission. The second factor in the reduction, although with a smaller impact, is the fight against smog and the replacement of heating devices stimulated by the „Clean Air” programme and other local initiatives.
- In district heating, the decrease in unit CO₂ emissions is slow. Over the decade, the index dropped by 4.9%, reaching a level of 98 kg CO₂/GJ. This means that the sector's transformation has practically not yet begun.
- Coal remains the dominant fuel. In district heating, its share is approx. **60%**, and in individual heating approx. **32%**. Polish households with individual heating consume approx. **75%** of the total amount of coal burned by European Union households for heating purposes.
- There are 6.95 million residential buildings in Poland, of which **0.55 million** are multi-family buildings heated primarily by district heat. Heat in single-family buildings mainly comes from individual heating sources and a small percentage from district heat. In single-family buildings, there are **4.9 million** gas boilers and **6.7 million** solid fuel heat sources.
- Before the end of 2023, there were still approximately 2 million buildings in Poland where the heat sources were the so-called „smokers” (so called „kopciuchy”, including boilers below the third class or non-class boilers). The elimination of these biggest sources of smog is slow. In 2023, 158 thousand heat pumps, 230 thousand gas boilers, 75 thousand solid fuel boilers (mainly biomass), and 1 thousand oil boilers were sold. Maintaining the current sales pace of modern low- or zero-emission heat sources does not guarantee the achievement of the goal set in the „Clean Air” programme – the elimination of non-class coal boilers by 2028.

- The emission of total particulate matter (PM) from households in 2023 is over 200 thousand tonnes and is at a similar level to 2015 (197 thousand tonnes). Particulates come from the combustion of coal and biomass. The decrease in their emissions caused by moving away from coal combustion in households is offset by the increase in emissions from biomass combustion. This does not favour solving the smog problem in Poland.
- The total primary energy stream from RES amounted to 589 PJ in Poland, of which approx. half – 267 PJ – is attributed to the heating sector. Biomass is the main source of renewable energy in heating, accounting for as much as 89% of the RES stream. The share of other zero-emission heat sources – solar energy, geothermal energy, waste energy, etc. – is still too low.
- In individual heating, the share of RES energy amounted to 39% (208 PJ), mainly due to biomass combustion. In contrast, in district heating, the RES share is only 14.4% (54 PJ) – also related to biomass combustion.
- The average primary energy consumption of most buildings in Poland, especially those put into use before 1990, is 2–3 times greater than the currently binding energy standard (WT 2021). Accelerating the thermal modernisation of buildings is key to reducing the cost of fuel consumption and limiting expenditure on new heating devices.
- District heat reaches approx. 52% of households. The length of district heating networks is successively growing, reaching 22.7 thousand km, which places Poland among the leading European countries in terms of network length and the share of district heat in home heating.
- In 2023, the Polish district heating sector once again closed the year with a financial loss – with a deficit of PLN 5.12 billion. The poor financial result is due to the high costs of purchasing fossil fuels and CO₂ emission allowances, as well as the functioning of a heat price setting system inadequate to current challenges.
- Over the decade, the purchasing power of the average national wage relative to district heat has fallen. In 2013, the average wage could buy approx. 80 GJ of heat, while in 2023, only 55 GJ. A serious strategic challenge facing the national administration is finding a solution for two opposing phenomena: the low profitability of the heating sector and the rising cost of apartment heating.
- In district heating, there is a slow increase in the electrical capacity of gas-fired CHP units, reaching a level of 3.5 GWe (including industrial CHP plants). The capacity of coal-fired CHP units is 4.5 GWe. These units are successively being replaced by flexible gas-fired units, which can more effectively support the balancing of the National Power System.

Chapter 1

Residential Buildings

Key Figures in 2023

6.95 million

was the number of residential buildings in Poland*, containing a total of 15.78 million dwellings with an area of 1.19 billion m².

59%

of all residential buildings in Poland were built before 1989. They are in a relatively low energy class.

156.7 kWh/m²/year

is the average primary energy consumption of all residential buildings in Poland – this is approx. Two times higher than the energy consumption in new buildings constructed in accordance with the WT 2021 standard (70 kWh/m²/year for single-family buildings and 65 kWh/m²/year for multi-family buildings)**.

Sources: Statistics Poland (GUS); Eurostat.

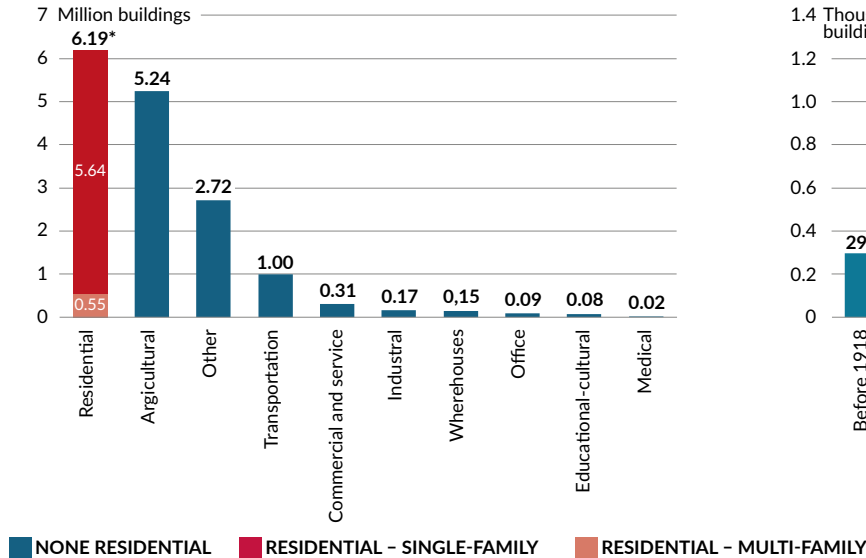
* Statistics Poland (GUS) materials show data discrepancies between the 2021 National Census and the Local Data Bank concerning the number of buildings or dwellings.

** Value obtained by dividing the energy consumed by households according to Eurostat for heating purposes by the area of dwellings for 2023.

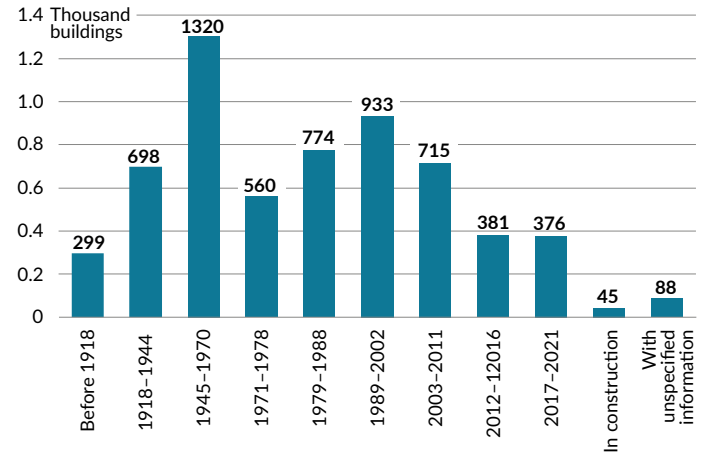
Structure of Buildings and Dwellings in Poland in 2023

- According to the latest Statistics Poland (GUS) data, in 2023 there were 6.95 million residential buildings in Poland, containing 15.78 million dwellings with a total area of 1.19 billion m².
- 59% of all buildings were constructed before 1989. This group requires the most urgent thermal modernisation measures due to its high energy intensity.

NUMBER OF BUILDINGS BY CATEGORY



RESIDENTIAL BUILDINGS BY CONSTRUCTION PERIOD



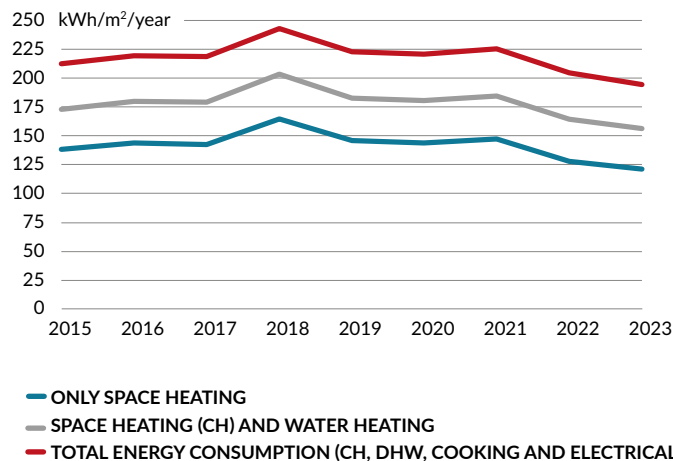
Source: Statistics Poland (GUS), National Census 2021.

* Number of occupied residential buildings according to the National Census 2021.

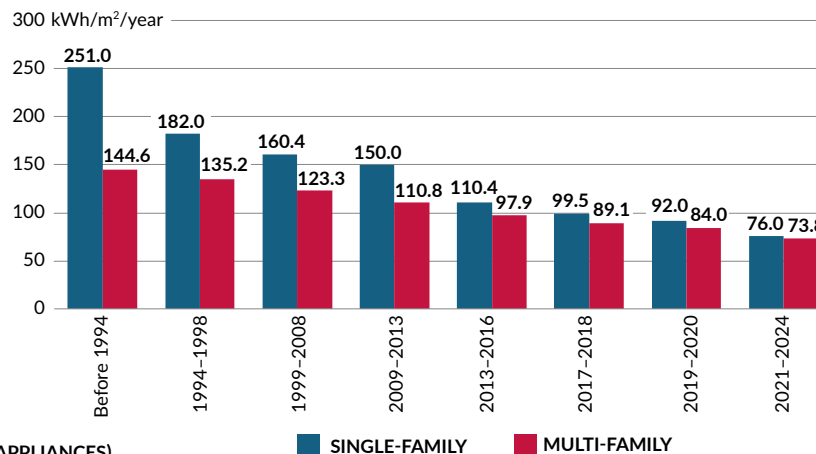
Primary Energy Consumption by Residential Buildings

- The introduction of the Technical Specifications 2021 (WT 2021) standard significantly reduced the energy consumption of new buildings.
- The average primary energy consumption in all residential buildings in Poland in 2023 was more than twice as high as in newly constructed buildings. This indicates the still large share of older, more energy-intensive buildings and the need for their thermal modernisation.
- Multi-family buildings have been characterised by a significantly lower unit energy demand than single-family buildings over the years.

ESTIMATED AVERAGE ENERGY DEMAND IN BUILDINGS*



PRIMARY ENERGY CONSUMPTION (PE) OF BUILDINGS DEPENDING ON THE YEAR OF CONSTRUCTION*



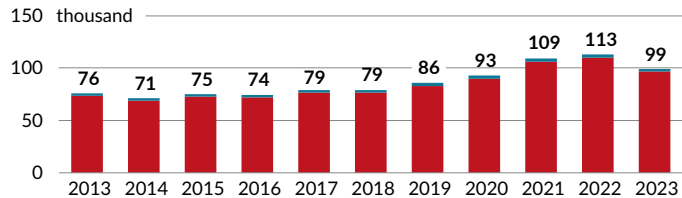
Sources: Eurostat; Statistics Poland (GUS); Draft National Building Renovation Plan presented for pre-consultation in December 2024.

* Number of occupied residential buildings according to the National Census 2021.

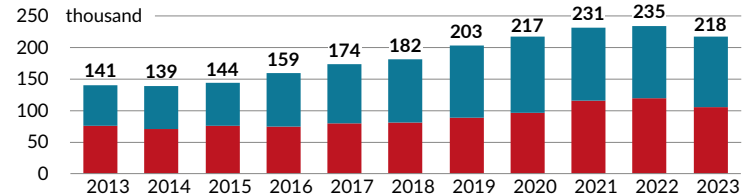
New Residential Buildings

- Single-family buildings dominate among the total number of new residential buildings. The dwellings located in them have a cumulatively much larger area than dwellings in multi-family buildings. Small-area dwellings dominate in multi-family buildings.
- The loss of residential area associated with the demolition and change of use of residential buildings between 2013 and 2023 was no more than 3.15 thousand dwellings per year (which translates into an area of approx. 200 thousand m² per year). This slow pace of replacing old, inefficient buildings with new, more efficient ones does not guarantee significant changes in the demand for heating energy.

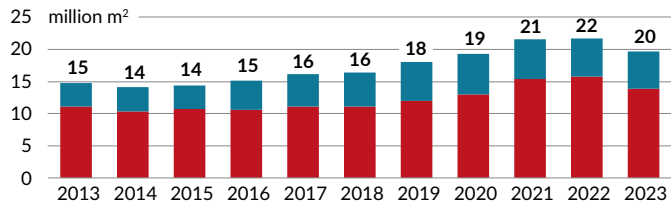
NUMBER OF RESIDENTIAL BUILDINGS COMMISSIONED



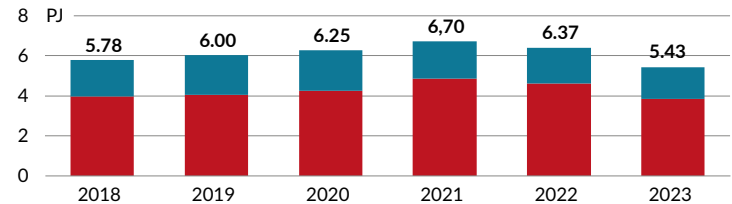
NUMBER OF NEW DWELLINGS



AREA OF NEW DWELLINGS



INCREASE IN PRIMARY ENERGY DEMAND IN NEW RESIDENTIAL BUILDINGS

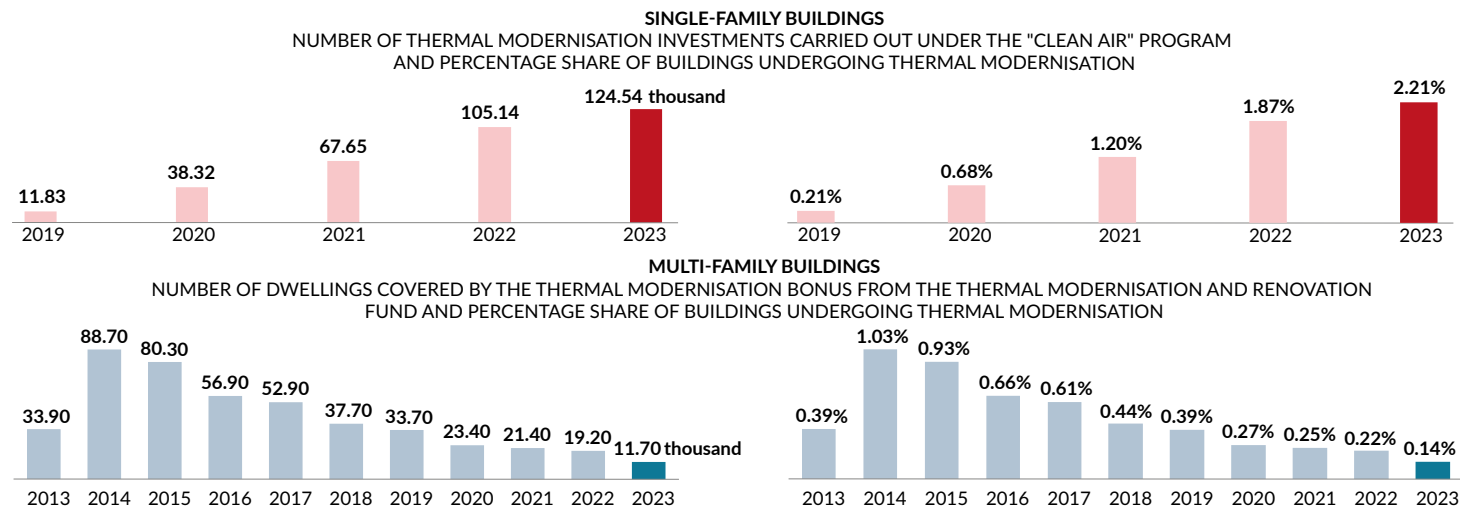


■ SINGLE-FAMILY ■ MULTI-FAMILY

Source: Statistics Poland (GUS); Local Data Bank.

Slow Pace of Thermal Modernisation of Residential Buildings

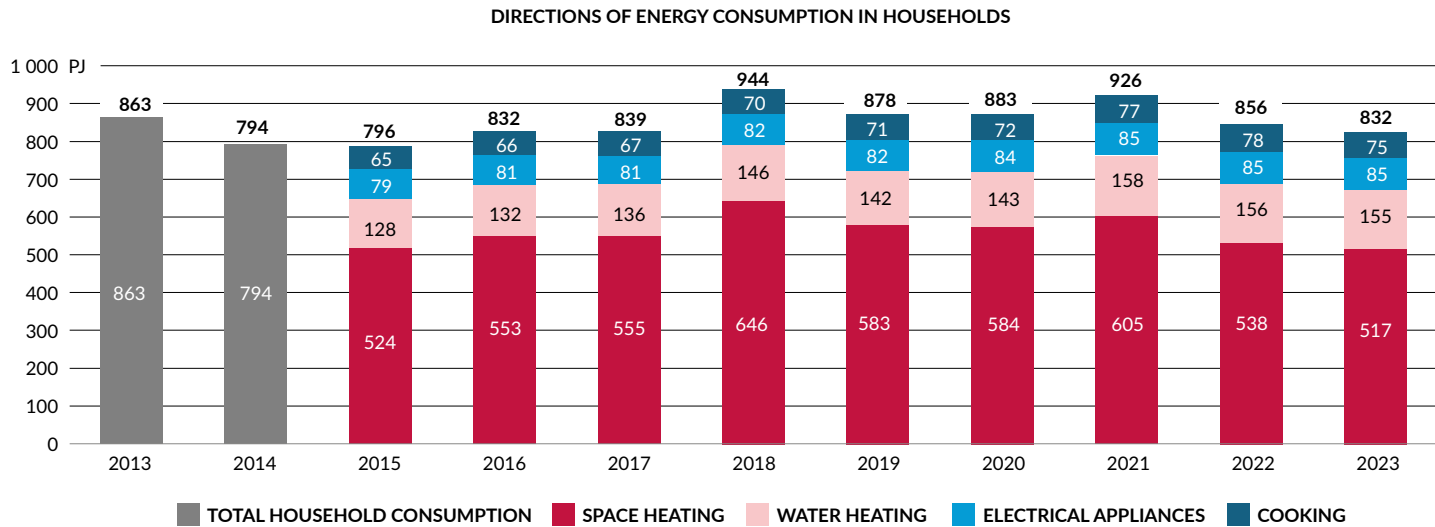
- Under the „Clean Air” program, 347 thousand thermal modernisation investments were carried out between 2019 and 2023. However, the pace of thermal modernisation remains insufficient. Achieving the 2030 target set out in the *Long-Term Building Renovation Strategy* would require increasing the pace of thermal modernisation to a level of 240 thousand investments per year.
- In the case of multi-family buildings, 460 thousand dwellings were supported by the thermal modernisation bonus from the Thermal Modernisation and Renovation Fund between 2013 and 2023, which is 5% of the total number of dwellings in multi-family buildings – this is still too little.
- The pace of single-family building modernisation is higher and continuously increasing, while the pace of multi-family building modernisation is low and continuously decreasing.



Sources: Ministry of Development and Technology (MRiT); National Fund for Environmental Protection and Water Management (NFOS, GW). No data is available regarding the modernisation of single-family buildings outside of support programs, carried out with own funds or with the support of the thermal modernisation tax relief.

Energy Consumption Structure in Households

- The vast majority of energy consumed by households is for heating purposes – the preparation of water heating and space heating
- Thermal modernisation of buildings can significantly reduce the demand for heating energy, thereby limiting the cost of heating for households.
- Changes in the level of energy consumption in Polish households overall between 2013 and 2023 (for space and water heating purposes) do not show an unambiguous trend. The effects of higher energy efficiency in new buildings, thermal modernisation of old buildings, and losses in the housing stock are compensated by the overall increase in dwelling area and the still large share of older buildings with a lower energy standard.

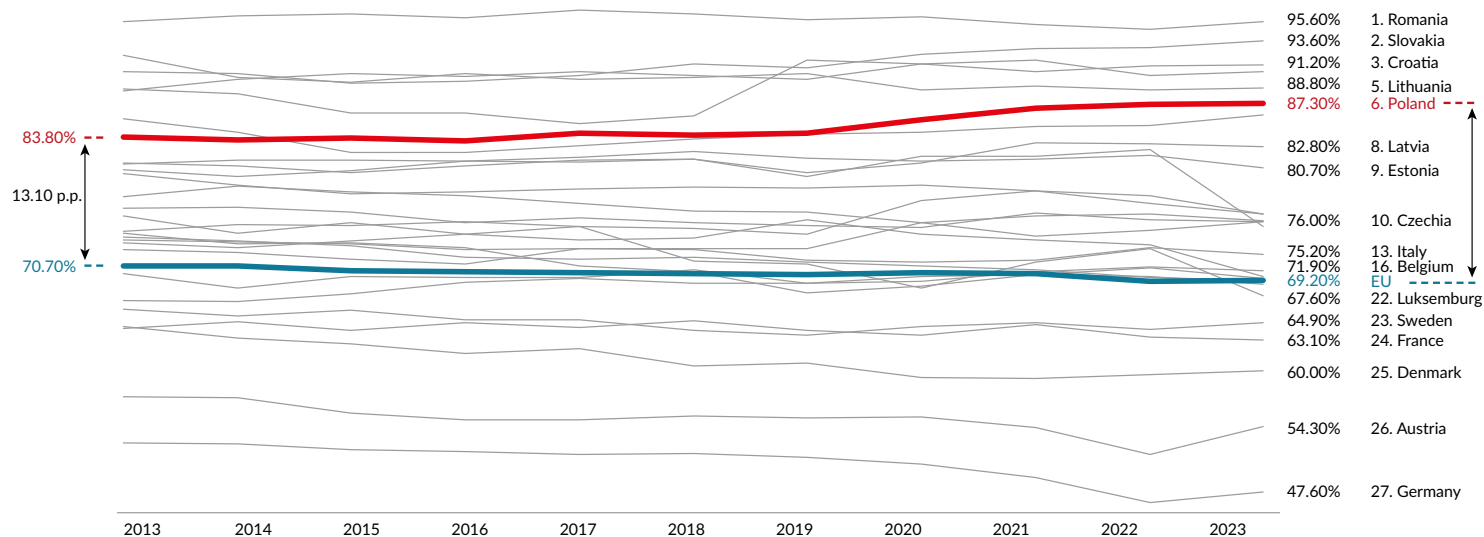


Sources: Eurostat; Statistics Poland (GUS).

Private Ownership of Dwellings Clearly Dominates Renting in Poland

- Countries with a small share of private dwelling ownership and a large rental market struggle with a slow pace of thermal modernisation of buildings. Building owners are not overly interested in spending on thermal modernisation, as a simpler action is to pass on rising heating costs to tenants.
- The large share of private ownership in Poland should favour processes to improve the energy efficiency of buildings in order to limit heating costs, as the dwelling owner is more susceptible to market incentives.
- On the other hand, there is a group of less affluent owners of dwellings and single-family houses in Poland. These are people whose only capital is frozen in the owned property, so they do not have the funds for investments, which slows down the process of thermal modernisation.

PERCENTAGE SHARE OF PEOPLE OWNING THEIR OWN DWELLINGS IN POLAND COMPARED TO EU COUNTRIES



Source: Eurostat.

Chapter 2

District and individual heating in Poland

Key Figures in 2023

22.7%

of the country's primary energy was consumed by the heating sector, which is one of Poland's main energy sectors.

68%

of primary energy came from fossil fuels – meaning the consumption of 18.73 million tonnes of coal, 5.2 billion m³ of gas, and 0.72 million tonnes of oil.

60 million tonnes CO₂

was the emission from the heating sector in 2023 (17% of national emissions).

28.5%

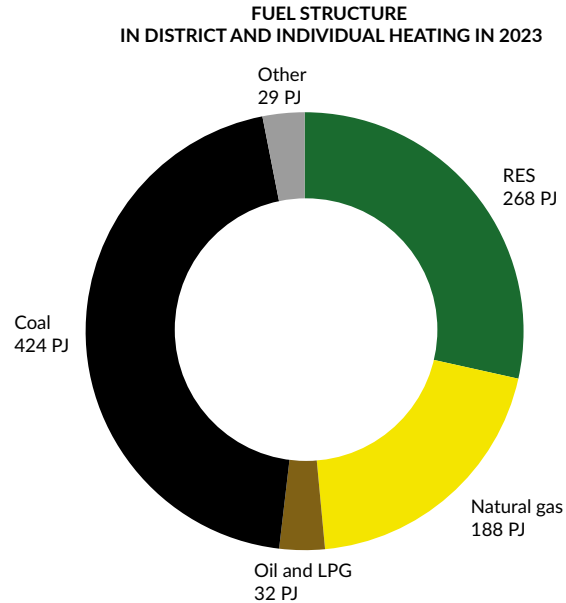
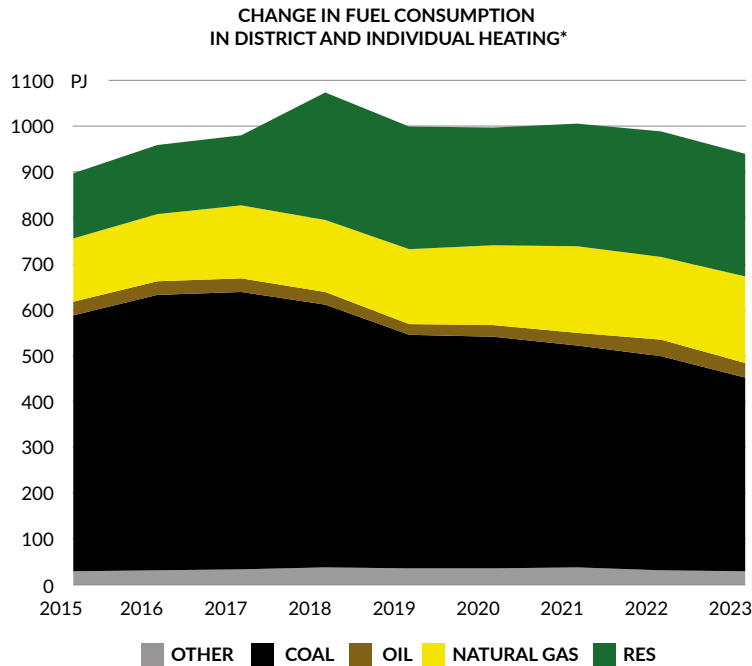
was the share of RES in heat production, with 89% of the entire RES stream coming from biomass.

74.4 billion PLN

this is the cost of all fuels consumed in the heating sector in 2023.

Primary Energy Consumption Structure in the Heating Sector

- The entire Polish heating sector (district and individual) consumes 22.7% of the primary energy in Poland.
- Individual heating consumes 526 PJ, which is more than half of the national energy consumption for heat production, compared to 415 PJ consumed in district heating .

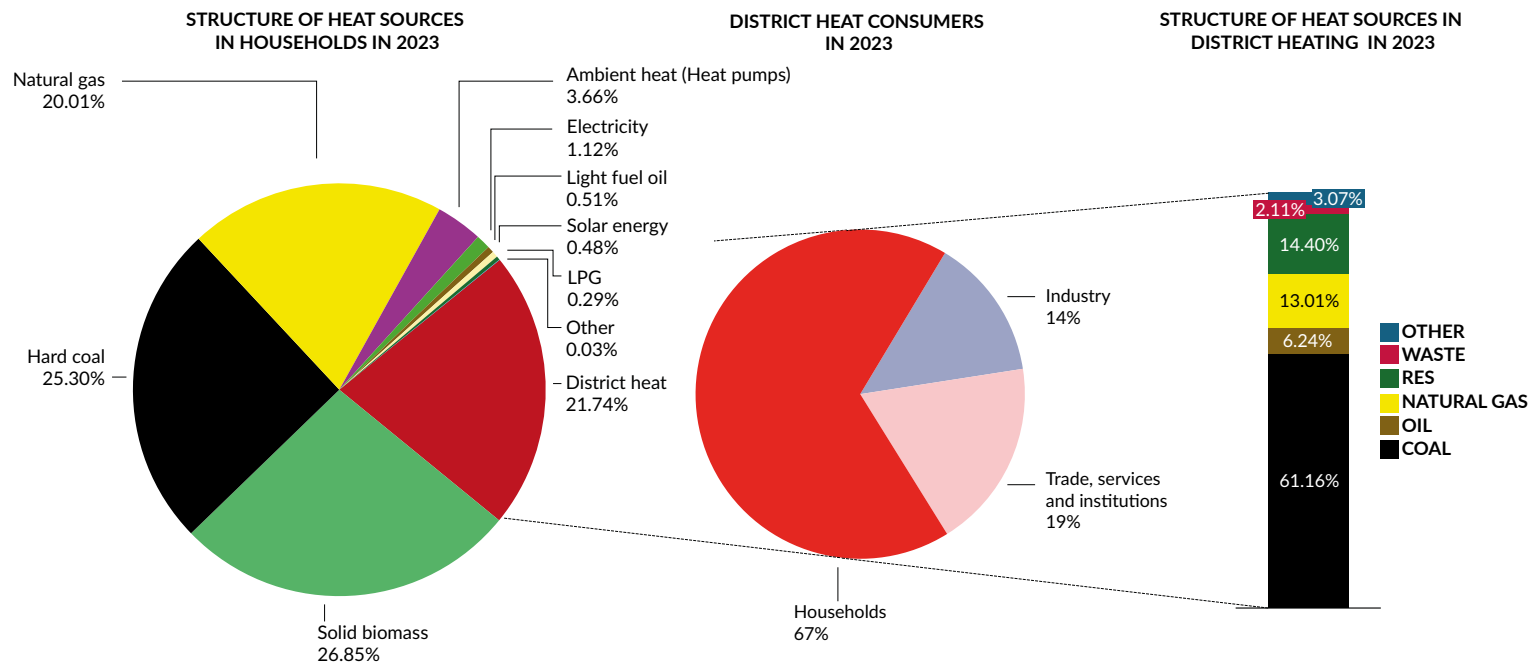


Sources: Eurostat; Energy Regulatory Office (URE).

* 2013 and 2014 – no Eurostat data on energy consumption for space heating and water heating purposes.

What We Heat With – Structure of Heat Sources

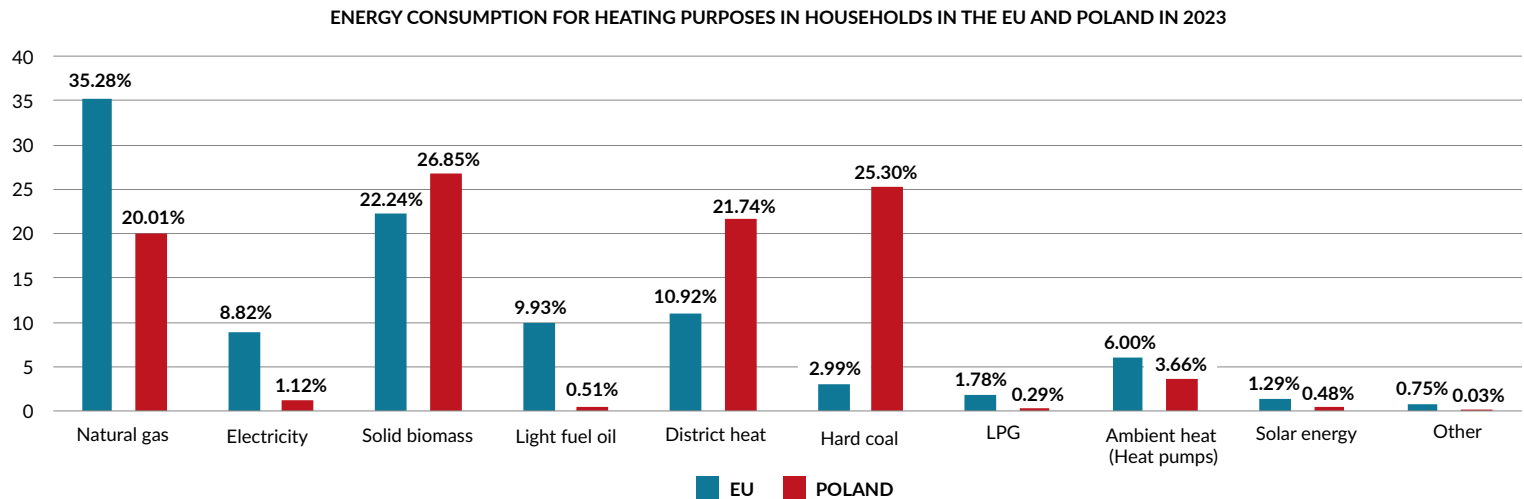
- In the heating sector in 2023, 68% of energy came from fossil fuels (coal, oil, and natural gas). Such a high share of these fuels means a high risk of increasing the cost of heating for households due to fuel price fluctuations and the cost of purchasing CO₂ emission allowances.
- Households are the largest consumer of district heat. Other consumers can be divided into two groups: trade, services, institutions (e.g., schools, offices), and industry.



Sources: Eurostat; Energy Regulatory Office (URE).

Fuel Consumption for Heating Purposes by Polish Households Against the EU Background

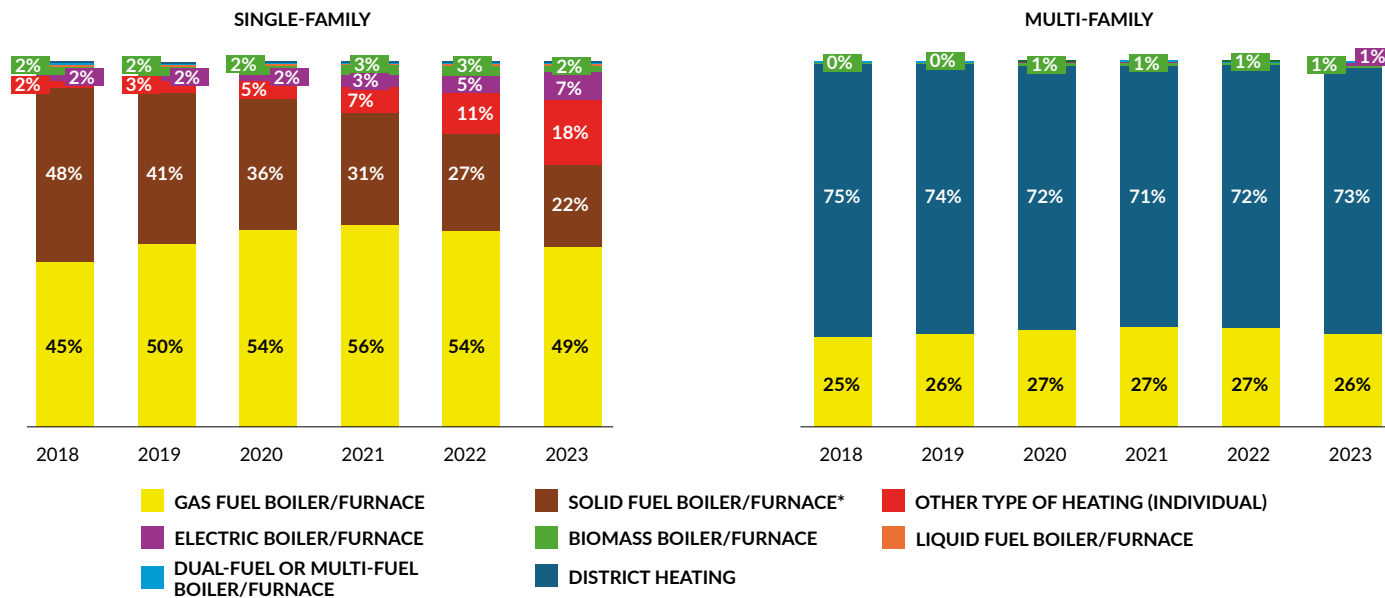
- Polish households in 2023 consumed 76% of the coal burned for heating purposes in households across the entire EU.
- The high share of district heat in heating domestic households should be positively assessed.
- Poland stands out against the EU background with a relatively low share of electricity and natural gas in energy consumption for household heating purposes.



Source: Eurostat.

Heating Devices in New Buildings

- In multi-family buildings, heating with district heat and gas-fired boilers dominates. The share of other heat sources is marginal.
- In single-family buildings, the share of installed solid fuel boilers decreased between 2018 and 2023 in favour of gas boilers and heat pumps.

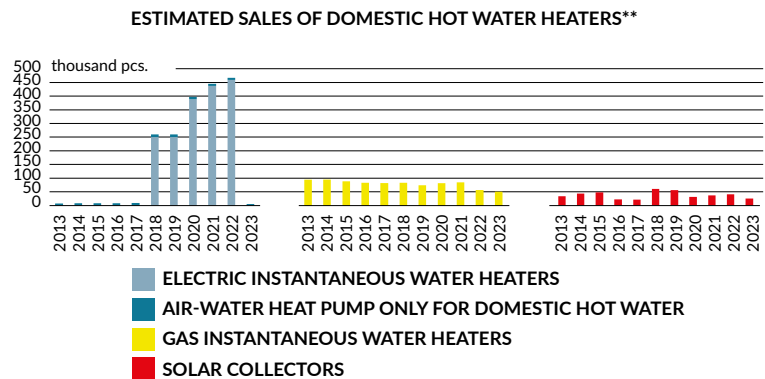
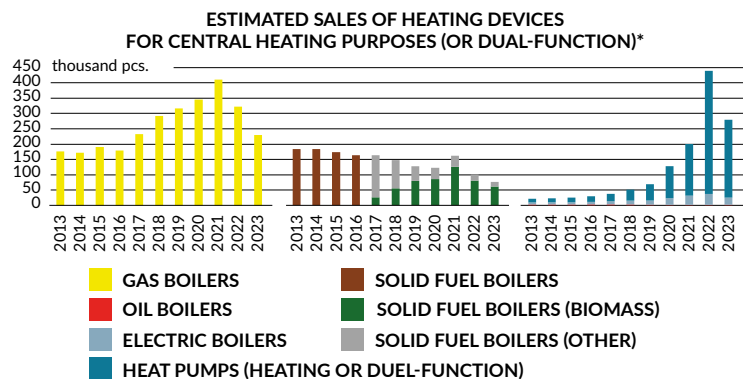


Source: Statistics Poland (GUS).

* The category solid fuel boiler/furnace includes both coal-fired and biomass-fired boilers.

Market for Heating Devices for Individual Heating

- Between 2013 and 2023, gas heating was the most popular in Poland.
- Interest in solid fuel boilers is decreasing, and among the devices sold, biomass boilers dominate.
- The number of gas water heaters (only water heating) is decreasing, being replaced by other sources of hot water, including dual-function installations, also used for space heating.
- Oil boilers remain one of the least popular solutions in individual heating, showing a further downward trend.
- The popularity of electric heating devices is growing: boilers and heaters, and heat pumps for space heating and water heating purposes. This may be related to better thermal insulation of new buildings combined with photovoltaics and support programs, as well as ease of use, and in the case of electric boilers and heaters – ease of installation and small space requirements.
- In September 2025, the number of buildings exclusively with non-class solid fuel heat sources amounted to 1.9 million, or 31.36% of single-family buildings.



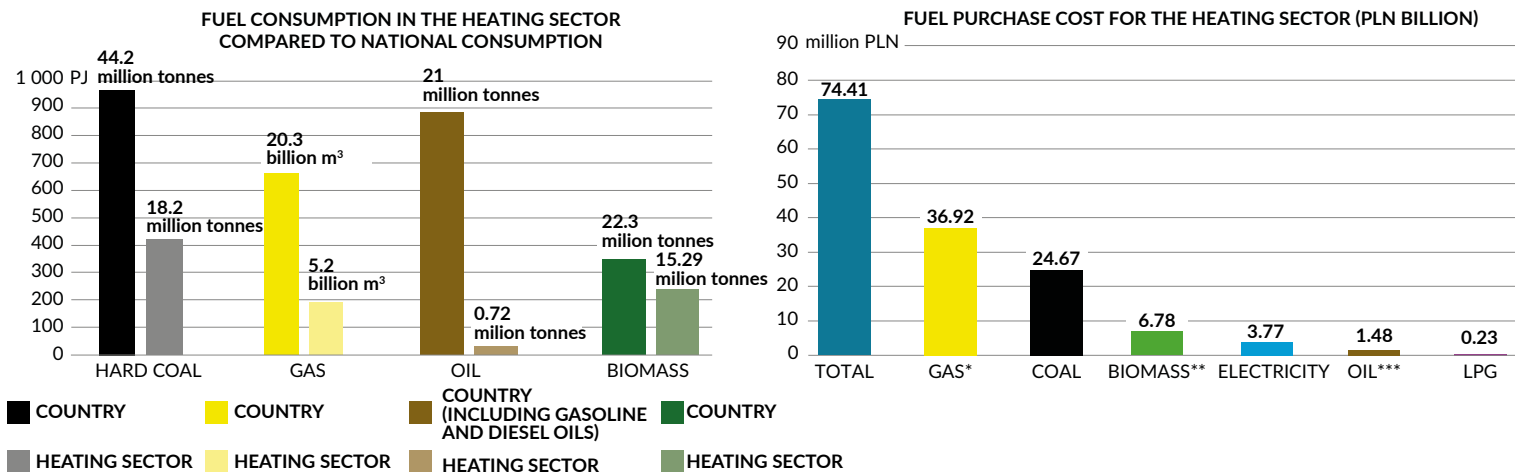
Sources: Polish Association of Manufacturers and Importers of Heating Devices (SPIUG); General Office of Building Control (GUNB).

* The share of biomass and other boilers was estimated based on the indicative shares contained in SPIUG reports. The number of heat pumps from the SPIUG report was reduced by the number of CH heat pumps provided by Port PC.

** Data on electric heaters only for the years with estimates in SPIUG reports. It was assumed that solar collectors are only used for CH purposes. It was assumed that a single installation has an area of 5 m².

Fuel Consumption and Purchase Cost in 2023

- In 2023, approximately PLN 74.4 billion was spent on purchasing fuels for heating purposes, including PLN 63.3 billion on fossil fuels – the remainder being biomass and electricity.
- 43% of the hard coal consumed in the country was burned by the heating sector. Individual heating primarily uses imported coal. district heating uses lower-quality energy coal fines produced by domestic mining.
- The share of gas in the heating sector is increasing. This fuel is convenient to operate and does not pollute the local environment, which is why gas heating is an increasingly popular option in the heating sector. The gas used is mostly imported, which makes this fuel a risky foundation for the heating sector transformation due to price fluctuations and CO₂ emission costs.



Sources: Eurostat; Energy Regulatory Office (URE); Statistics Poland (GUS).

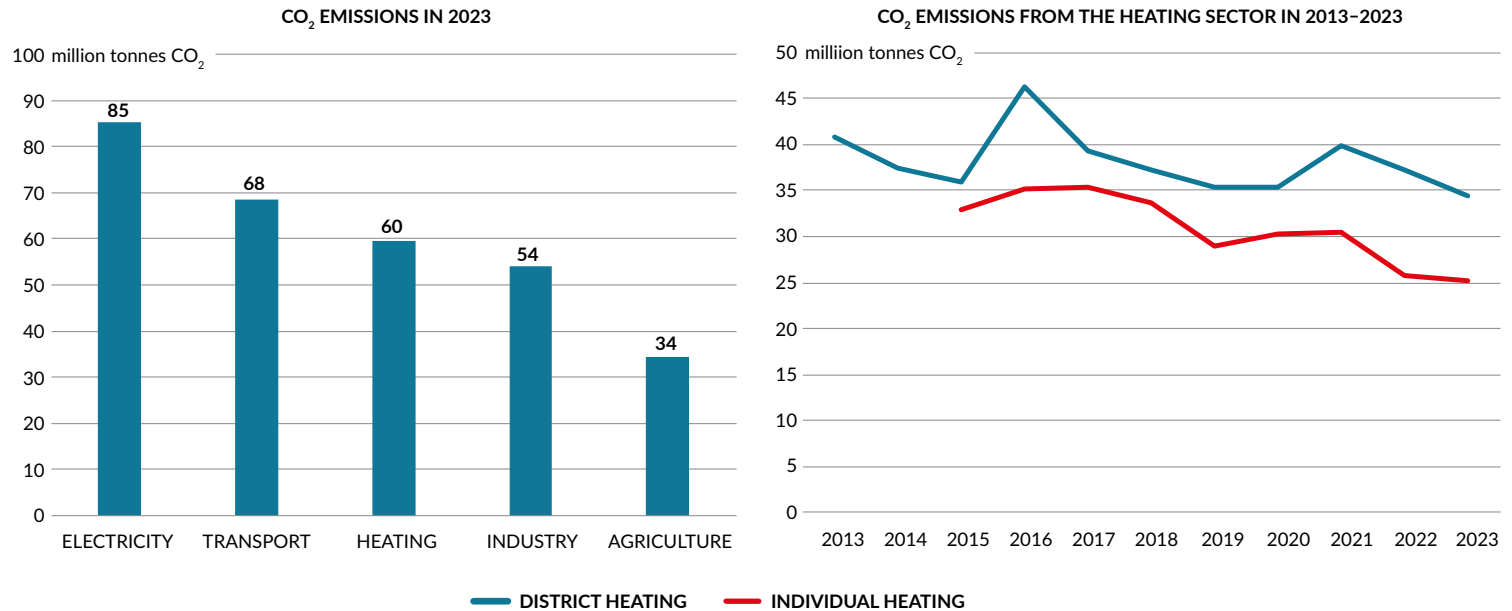
* High-methane and low-methane natural gas aggregated into one value.

** The number of tonnes of biomass was calculated based on the LHV (Lower heating value) of firewood and wood waste given by National Centre for Emissions Management (KOBiZE) (15.6 MJ/kg).

*** Light and heavy heating oils aggregated into one value.

CO₂ Emissions from the Heating Sector in 2023

- In 2023, 60 million tonnes of CO₂ originated from the heating sector. This is 17% of national greenhouse gas emissions.
- District heating has the dominant share in the CO₂ emission stream.
- The level of emissions from the heating sector is slowly falling – this is the effect of the fight against smog and the replacement of heat sources in individual heating, as well as the progressing transformation in district heating.

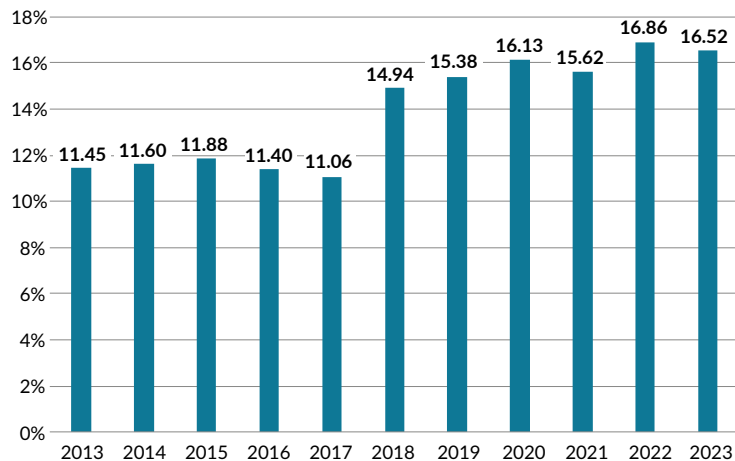


Sources: Eurostat; Energy Regulatory Office (URE); Statistics Poland (GUS).

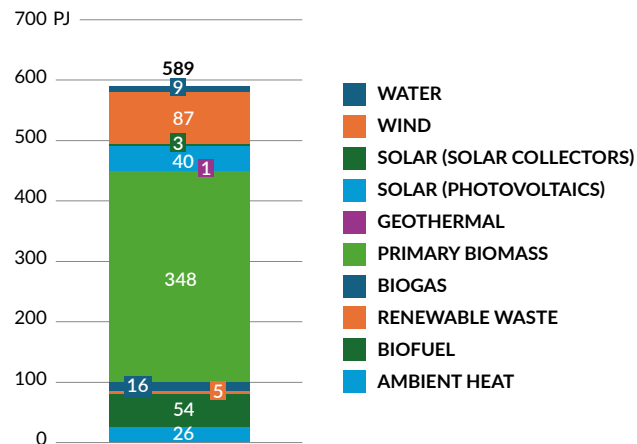
Share of RES Energy in Poland and the Structure of RES Sources in 2023

- Poland achieved the EU target for the share of RES energy in gross final energy consumption set for 2020, which was 15%. This result was achieved mainly through biomass combustion in the energy sectors.
- 45.5% of the renewable energy used in the country was attributed to the heating sector.

SHARE OF RES ENERGY IN POLAND'S GROSS FINAL CONSUMPTION



STRUCTURE OF RES SOURCES IN POLAND

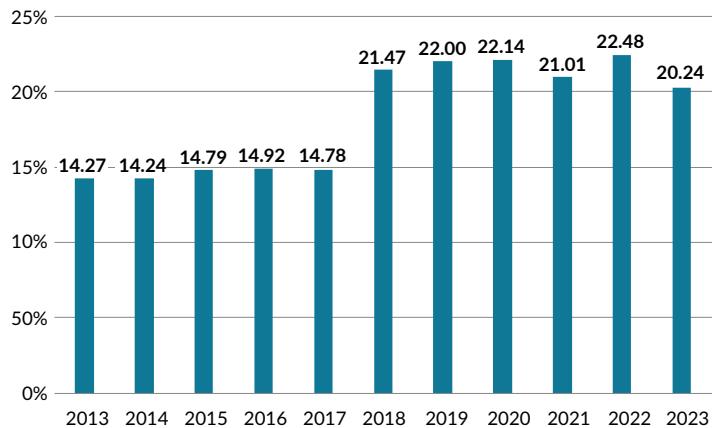


Sources: Eurostat; Energy Regulatory Office (URE); Statistics Poland (GUS).

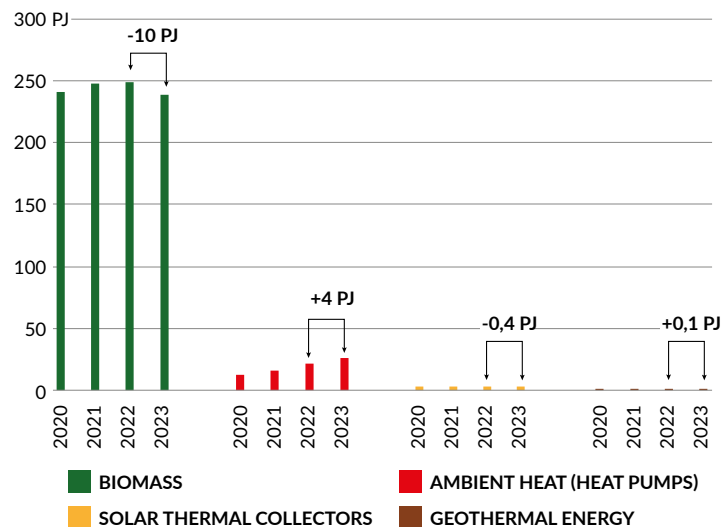
Share of RES Energy in the Heating Sector and the Structure of RES Sources

- In the entire heating sector in 2023, the share of RES energy amounted to 20.24%. The change in the method of calculating biomass consumption in individual heating improved the national statistics of RES consumption in heat by almost 7 p.p. since 2018.
- Biomass is the main source of RES energy in the heating sector. A further increase in the share of RES in this sector should be based on RES sources other than biomass due to the limited availability of this raw material.

SHARE OF RES ENERGY IN GROSS FINAL CONSUMPTION OF HEATING AND COOLING



STRUCTURE OF RES SOURCES IN THE HEATING SECTOR IN 2023



Sources: Eurostat; Energy Regulatory Office (URE); Statistics Poland (GUS).

Chapter 3

Non-district heating – Individual Heating

Key Figures in 2023

In domestic boilers and furnaces in Poland in 2023, the following were combusted:

6.8 million tonnes of hard coal, **10,5 million tonnes** of biomass.

3.7 billion m³

of natural gas was consumed for heating purposes in the individual heating sector.

25.5 million tonnes of CO₂

was the emission from non-district heating in 2023 (7% of national emissions).

2.1 TWhe

was consumed for heating purposes.

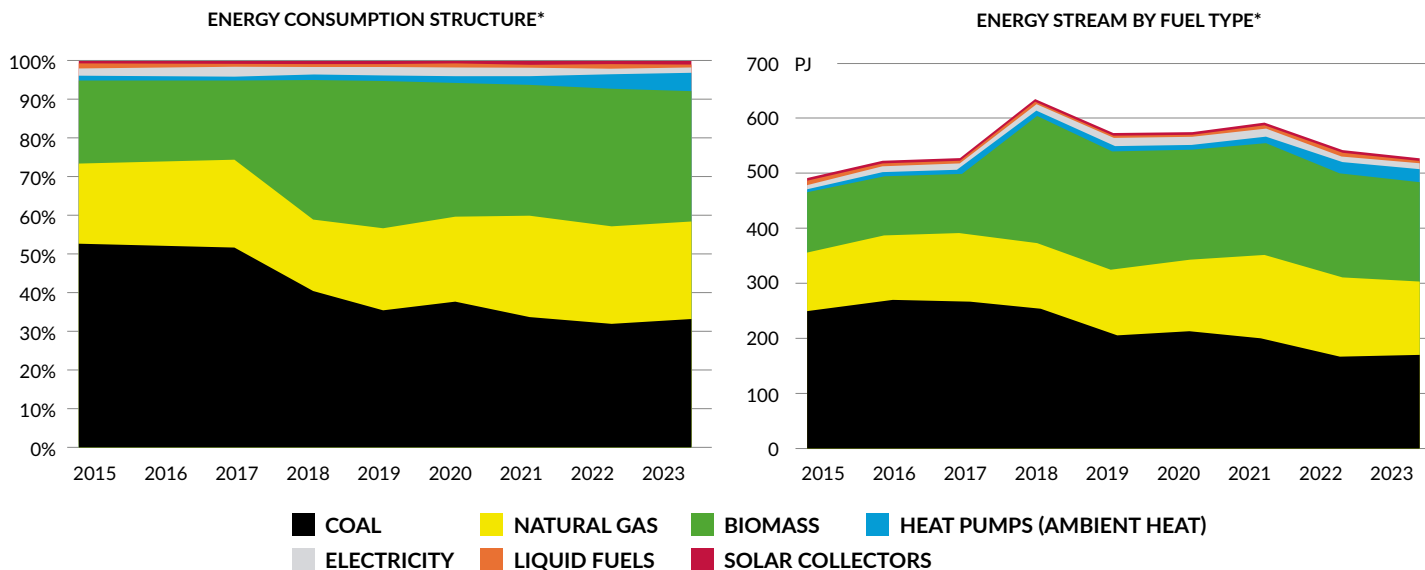
PLN 54 billion

this is the cost of energy for heating purposes in individual heating.

Primary Energy Consumption in Individual Heating

- The share of coal in the heat stream is slowly decreasing – from 52% in 2015 to 32% in 2023. The share of biomass and natural gas is successively increasing.
- The increase in biomass consumption in 2018 and the entire energy stream from it results from the adoption of a new method for estimating the amount of biomass burned in the country.
- The rate of decrease in energy consumption for heating purposes is still too slow. Since 2018, consumption has dropped by 17%, but it was 7% higher compared to 2015.

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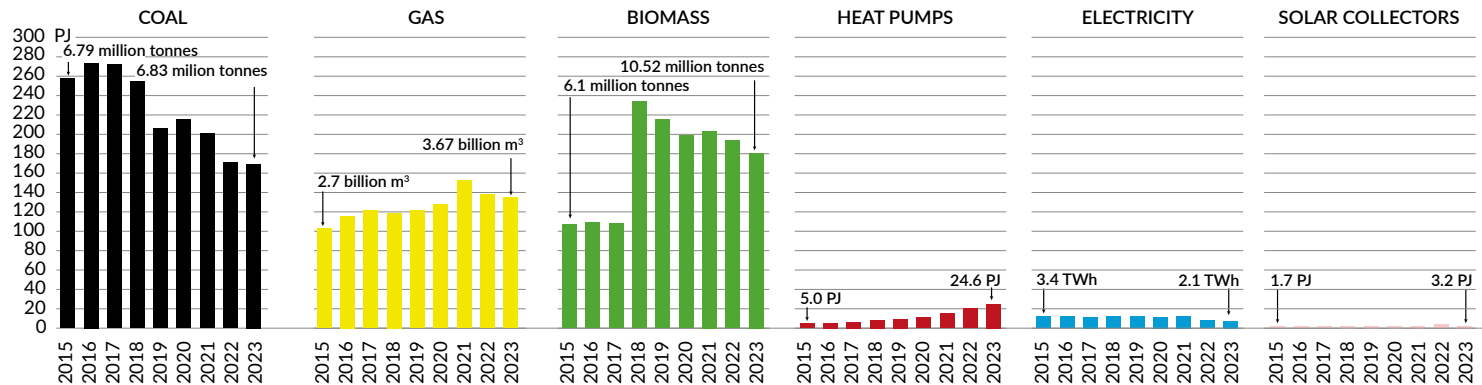
Source: Eurostat.

* Energy crossing the accounting boundary of the domestic heat source (energy at the “entry” to the building).

Final Energy Consumption in Individual Heating by Fuel Type

- A clear decrease in coal consumption was visible between 2015 and 2023 – from 10 million tonnes in 2015 to 7 million tonnes in 2023.
- Gas consumption increased from 2.74 billion m³ in 2015 to approx. 3.7 billion m³ in 2023. During this period, the length of the gas distribution network also increased from 120 thousand km to 159 thousand km.
- In accordance with the verified method for accounting for biomass consumption, 10.52 million tonnes of biomass were used in households in 2023 (assuming a calorific value of Wd=15.6 GJ/t).
- Total electricity consumption (heat pumps, electric heaters) amounted to approx. 2.1 TWh in 2023.

FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN 2023*



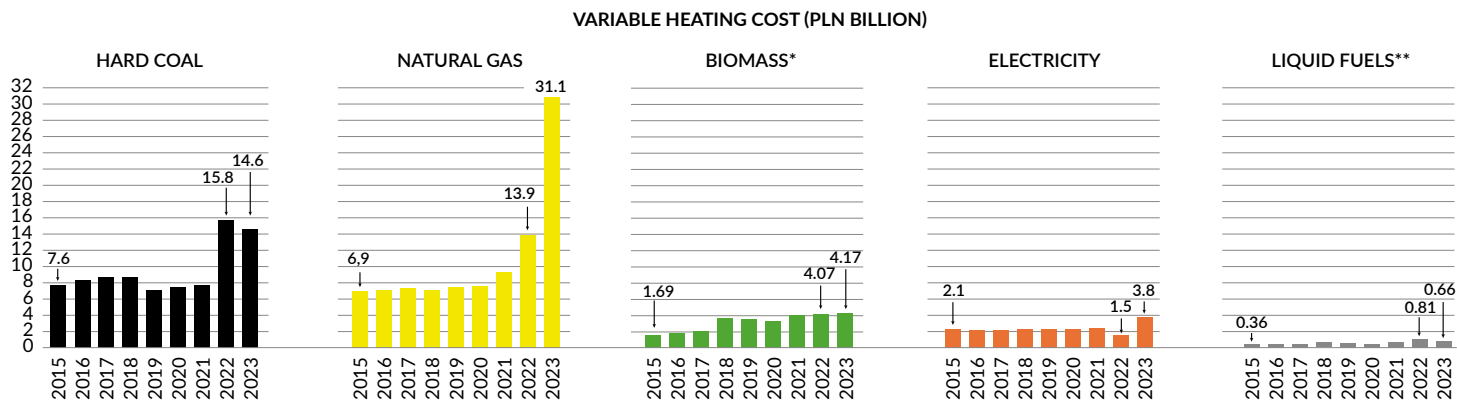
Source: Eurostat; National Centre for Emissions Management (KOBiZE).

* Natural units for extreme years.

Fuel Costs in Individual Heating

- The estimated cost of fuels at market prices that households would have to bear in 2023 for fuel purchase is approx. PLN 54 billion. The largest share of this amount (PLN 45 billion) is for gas and coal. However, households only incurred a part of this cost due to protective measures, such as freezing electricity and gas prices or the coal purchase subsidy. The remainder contributed to increasing the budget deficit.
- A sharp increase in fuel prices occurred in 2022 and 2023. This was caused by turmoil in global fuel markets as a result of the Russian invasion of Ukraine.
- In 2022, the cost of purchasing coal was the highest among all fuels (including natural gas) despite a drop in its consumption in households.
- The cost of electricity for heating purposes was relatively low. A noticeable increase occurred in 2023 despite less use of electric heating devices, as a consequence of rising electricity prices.

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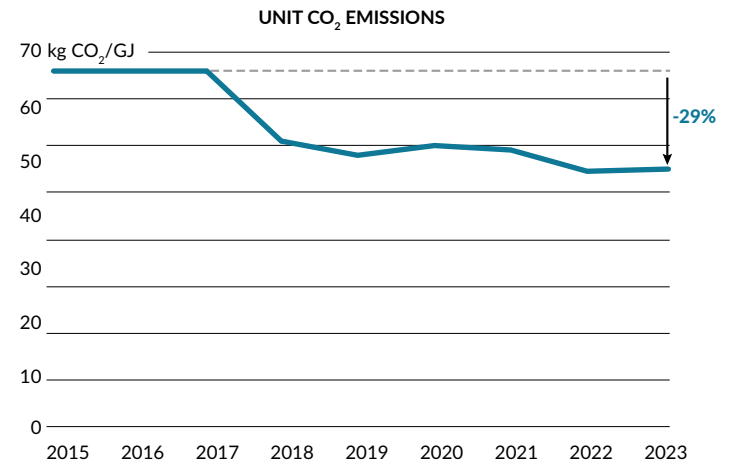
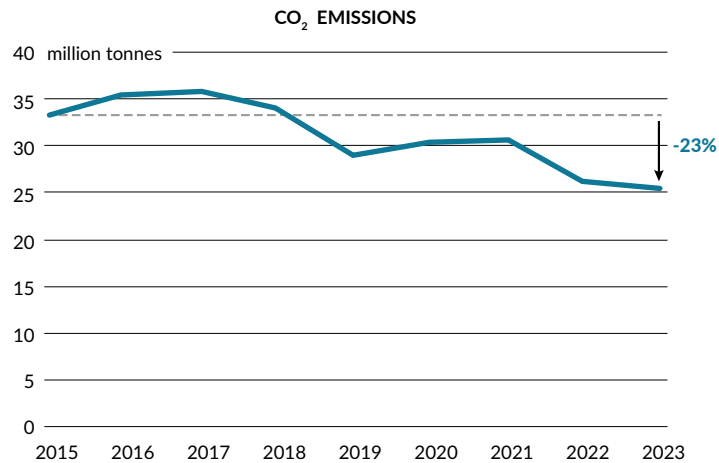
Sources: Statistics Poland (GUS); Bankier.pl – NBP euro exchange rate; PGNiG and PSG tariffs in 2014–2024; Lotos.

* Concerns various types of biomass collected in two groups: firewood and other types of biomass fuels (including pellets and briquettes). The cost includes free biomass.

** Estimated based on wholesale prices of light fuel oil.

CO₂ Emissions from Individual Heating are Falling Slowly

- Between 2015 and 2023, CO₂ emissions fell by 7.7 million tonnes, or 23%. Meanwhile, unit emissions per GJ of energy consumed for heat generation in individual heating fell from 70 kg/GJ to 48 kg/GJ, or 29%.
- The decrease in unit CO₂ emissions in 2018 results from the change in the method of calculating biomass consumption in individual heating. The volume of energy from biomass, classified as zero-emission, increased, which, as it were, "diluted" CO₂ emissions in a larger heat stream.

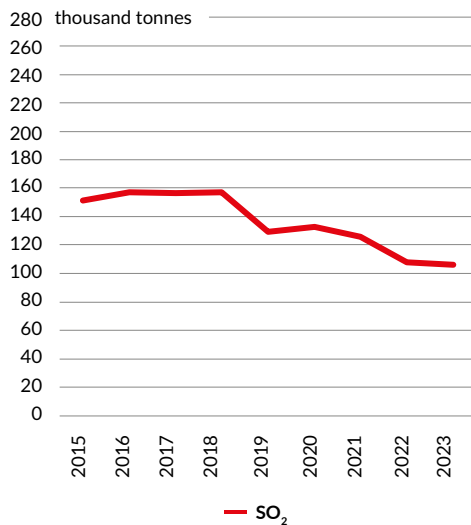


Sources: Eurostat; National Centre for Emissions Management (KOBiZE).

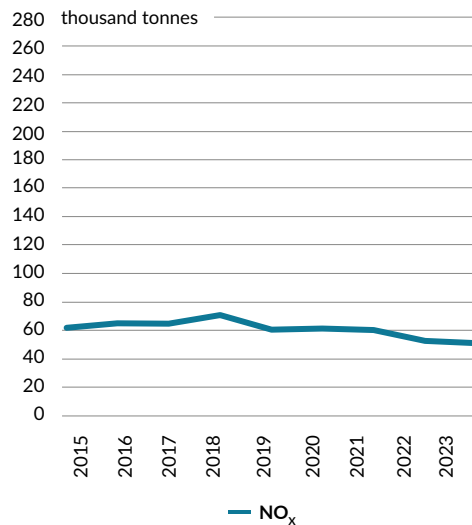
Gas and Dust Emissions in Individual Heating

- A downward trend in the emission of pollutants into the atmosphere has appeared since 2018. This is the effect of the replacement of heating devices and the gradual elimination of coal in individual heating.
- The replacement of coal boilers with other heating technologies using heat from fuel combustion (gas and biomass) slightly reduces the emission of nitrogen oxides (NO_x), which are always produced during the fuel combustion process.
- The growing share of biomass causes dust pollution (PM) to remain at a high level.

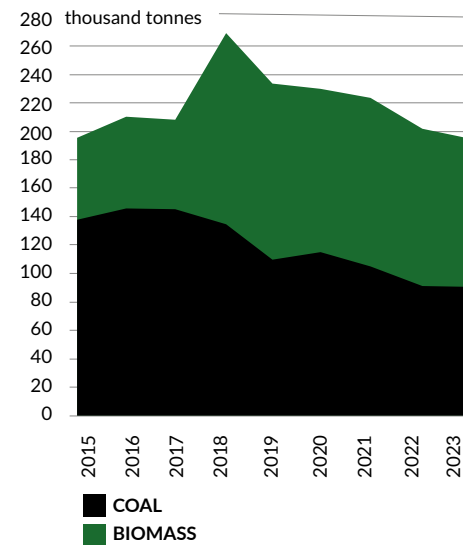
EMISSION OF SULFUR OXIDES



EMISSION OF NITROGEN OXIDES



TOTAL PARTICULATE MATTER



Chapter 4

District Heating

Key figures in 2023

PLN 3.9 billion – financial loss of the district heating sector in 2023, compared to PLN 42 billion in revenue.

52.6 thousand MWt – installed thermal capacity of heating devices.

22.8 thousand km – length of district heating networks.

11.6 thousand MWe – installed capacity of CHP (Combined Heat and Power) plants.

17% – share of electricity from high-efficiency cogeneration in the total electricity generation in Poland.

11.9 million tonnes of coal fuels combusted (61.2% share).

1.57 billion m³ of gas combusted (13% share).

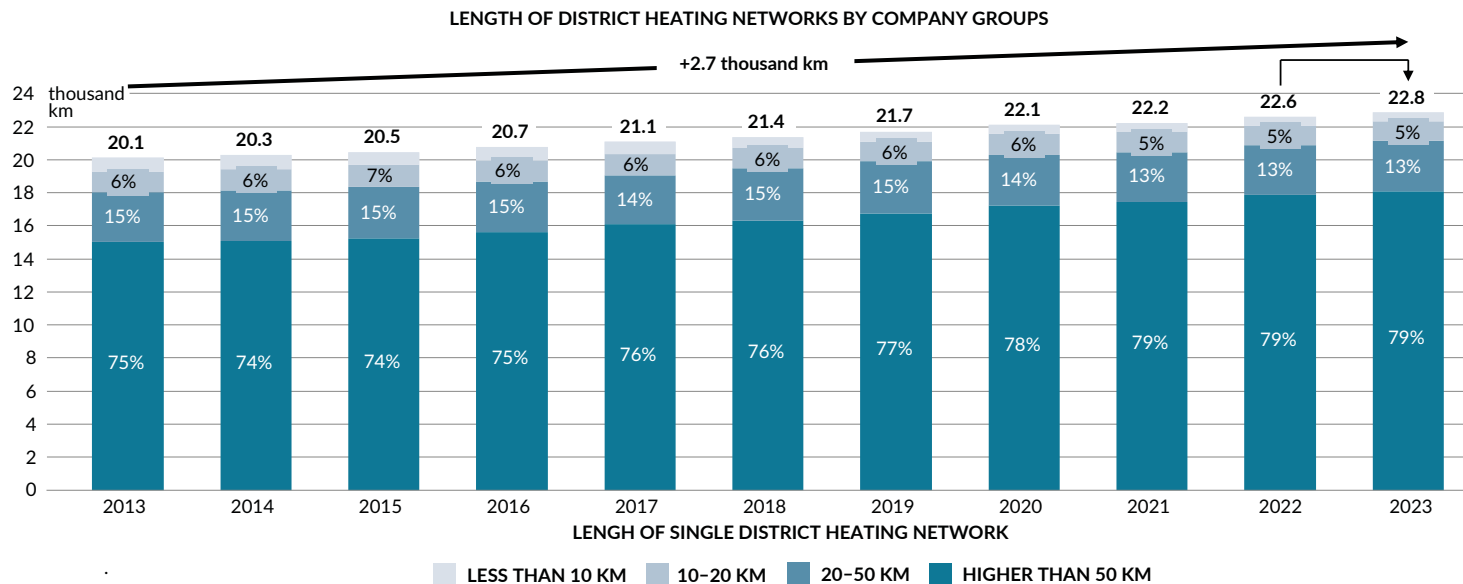
14.4% – share of Renewable Energy (RES).

34 million tonnes – CO₂ emissions from the district heating sector.

District Heating Networks
Heat Source Capacities
Production

Development of District Heating Networks in Poland

- The national district heating networks are developing at an average annual rate of about 1.15% of their total length.
- In terms of network length, Poland is among the European leaders.
- A more stable mechanism for tariffication of transmission and distribution activities (compared to the tariffication of heat generators) contributes to the successive development of heating networks.

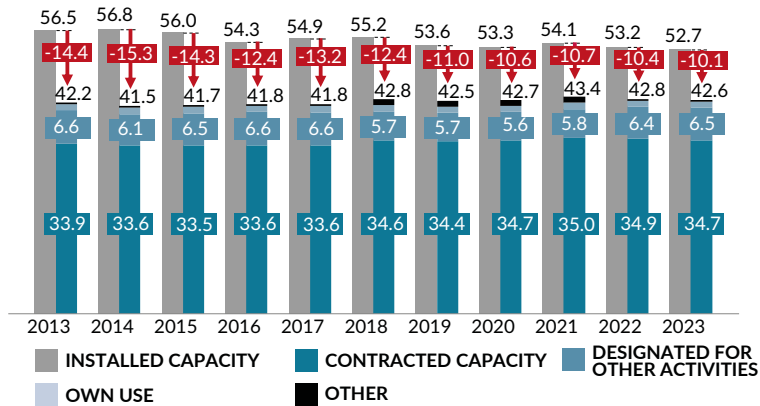


Source: Energy Regulatory Office (URE).

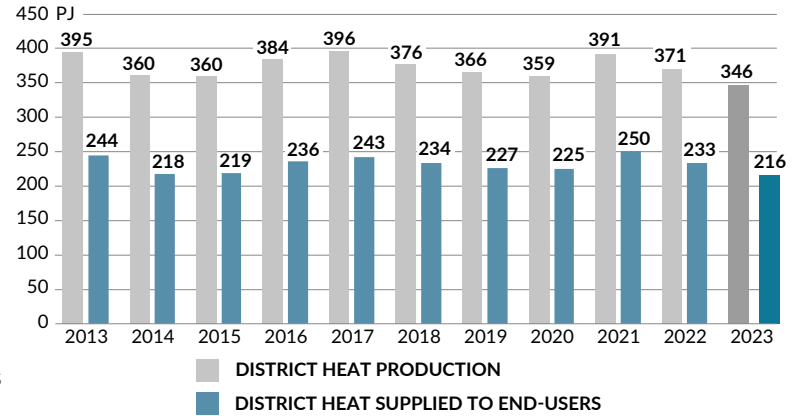
Thermal capacity of district heating plants

- The thermal capacity ordered by end-users is often overestimated. Proper regulation of substations and managing energy consumption would allow for their more efficient utilisation and reduce capacity demand, which would consequently lower apartment heating costs.
- Regulations concerning the calculated design temperatures of buildings (standard PN-EN 12831) that are inadequate for current climatic conditions force the maintenance of excessive generation capacity and the production of heat at too high parameters, which increases losses and the cost of heat production.
- Despite network development and the connection of new buildings, the demand for district heat is not increasing. This is offset by drops in demand resulting from the energy efficiency upgrades (thermal modernisation) of existing buildings connected to the network and the higher energy standards of new buildings connected to it. Changes in heat production are mainly a function of weather conditions.

INSTALLED THERMAL CAPACITY IN COMPANIES AND CAPACITY ORDERED BY END-USERS



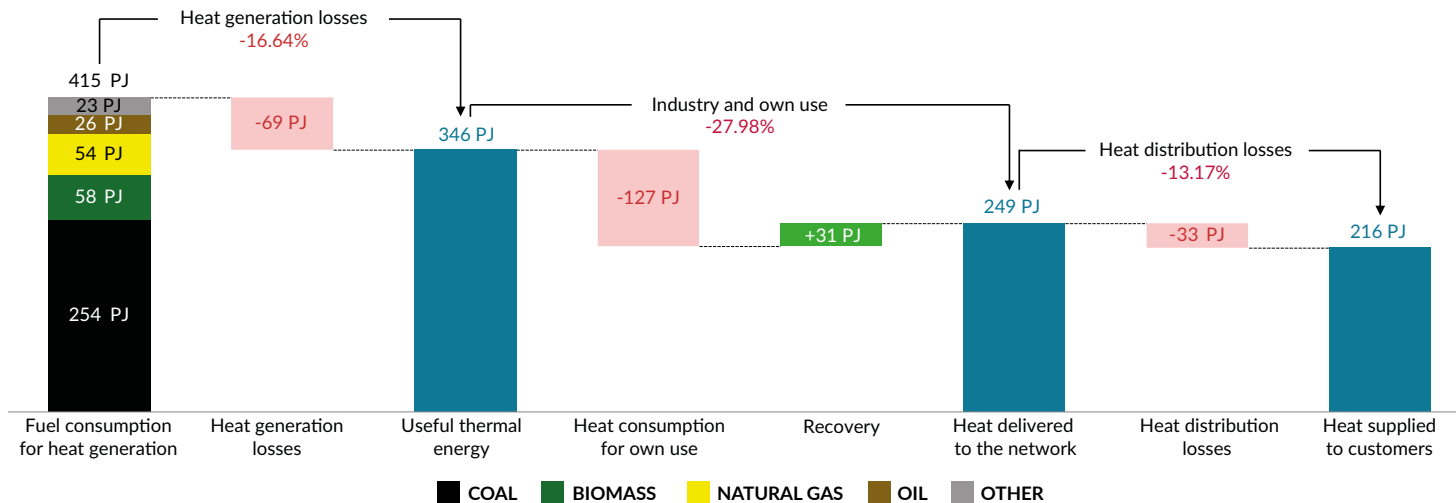
DISTRICT HEAT PRODUCTION



Source: Energy Regulatory Office (URE).

Heat Production in 2023 – From Fuel to Consumer

- Out of the total primary energy stream of 415 PJ (in 2023), only 216 PJ reaches the district heat end-users. The remainder is heat used for industrial purposes and losses.
- Out of the 127 PJ heat stream transferred to industry and consumed for the generators own needs, only 31 PJ (28%) is recovered as waste heat and transferred to the heating networks. The share of waste heat, as a zero-emission heat source, should gradually increase.
- Heat transmission losses (33 PJ) cost end-users approximately PLN 3.4 billion in 2023 (at an average heat generation price of PLN 104.65/GJ). Modernising heating networks and implementing low-temperature networks can reduce this cost.

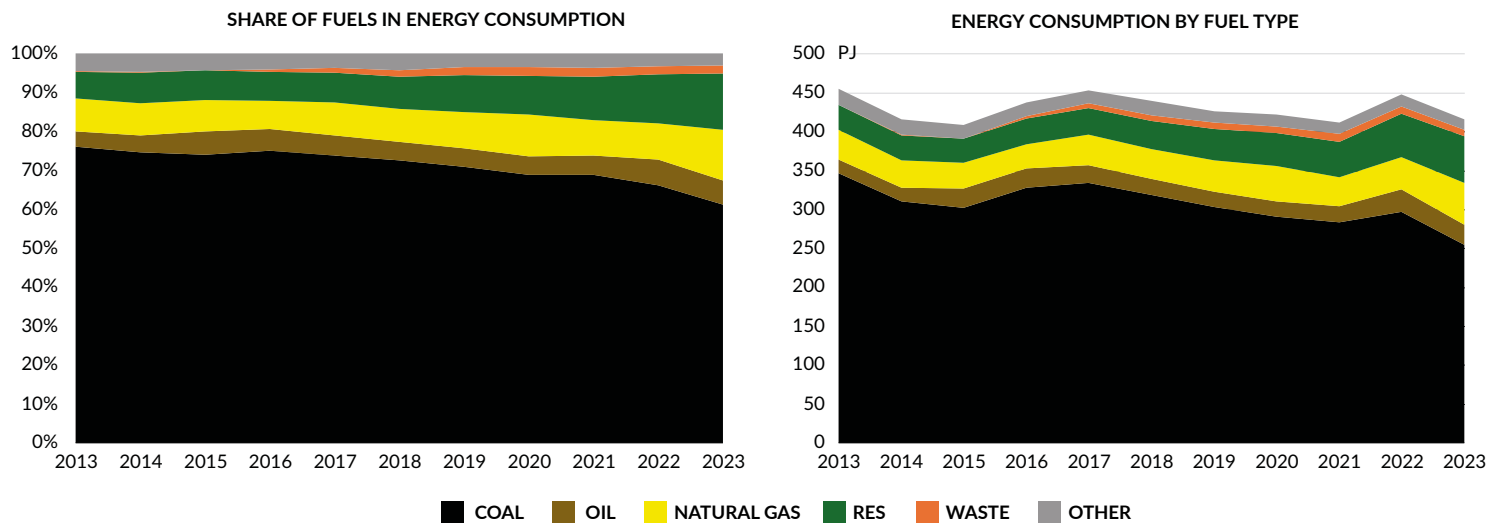


Source: Energy Regulatory Office (URE).

Fuels

District Heat Fuel Mix

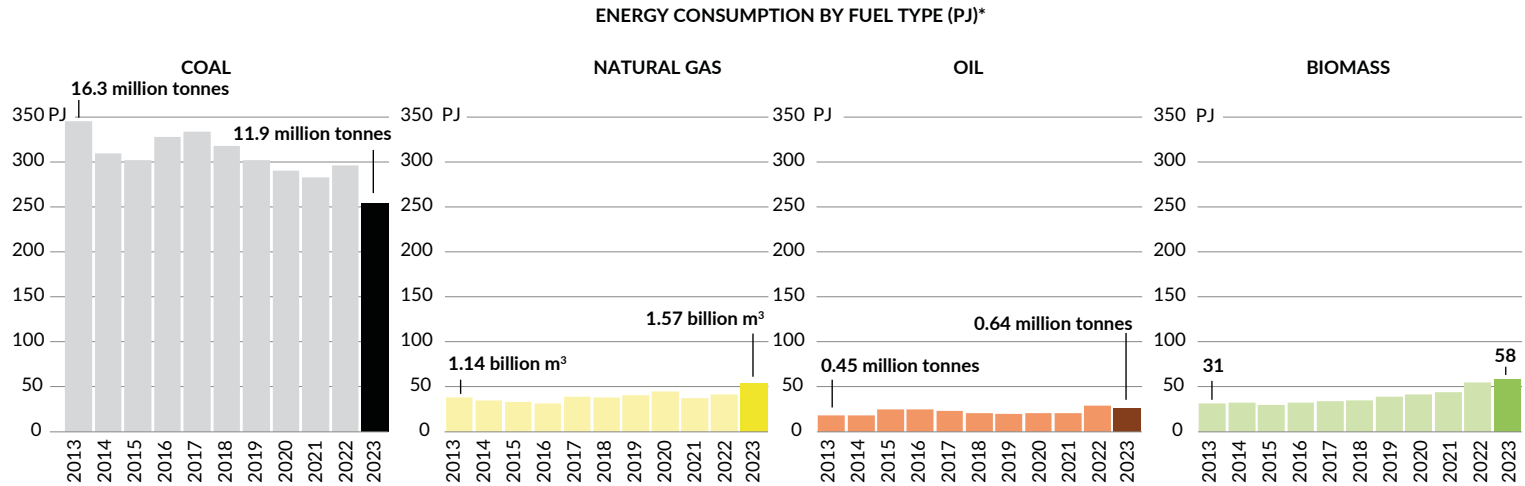
- Between 2013 and 2023, the share of coal fell by only 14.68 percentage points (p.p.), from 75.84% to 61.16%.
- 80.4% of heat in Poland comes from fossil fuels. This entails a risk of heat price increase due to the cost of purchasing CO₂ emission allowances (EU ETS) and fluctuations in fuel prices on global markets.
- The share of RES, waste energy and gas remains too small in heating systems, meaning many systems might not achieve the status of efficient district heating systems, risking the loss of access to support funds (EU funding).



Sources: Energy Regulatory Office (URE); National Centre for Emissions Management (KOBiZE).

Consumption of Basic Fuels for Heat Production

- Over the decade, coal consumption dropped by 4.4 million tonnes – to a level of 11.9 million tonnes.
- The share of natural gas increased only slightly. This is due to the high price of the fuel and the need for investment in building gas infrastructure and new generation capacity.
- The use of biomass is growing as an alternative to the retired coal-fired units.

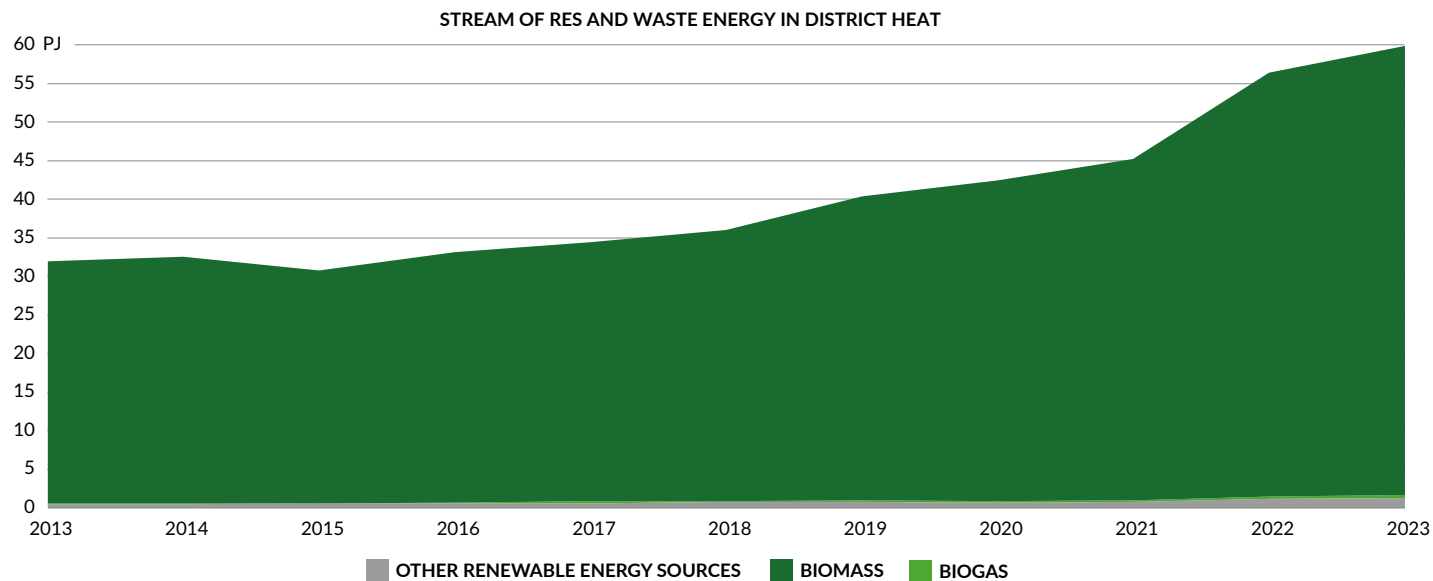


Source: Energy Regulatory Office (URE).

* Natural units for extreme years.

RES and Waste Energy in District Heat

- Biomass is practically the only RES source in Polish district heating. Its consumption has increased by 85% over the decade. The effort to change the fuel structure in generation plants and reduce CO₂ costs will put further pressure on the use of this fuel in the coming years.
- The heating sector is too slow in implementing other RES technologies – e.g., the use of solar energy, geothermal energy, biogas, or waste energy.



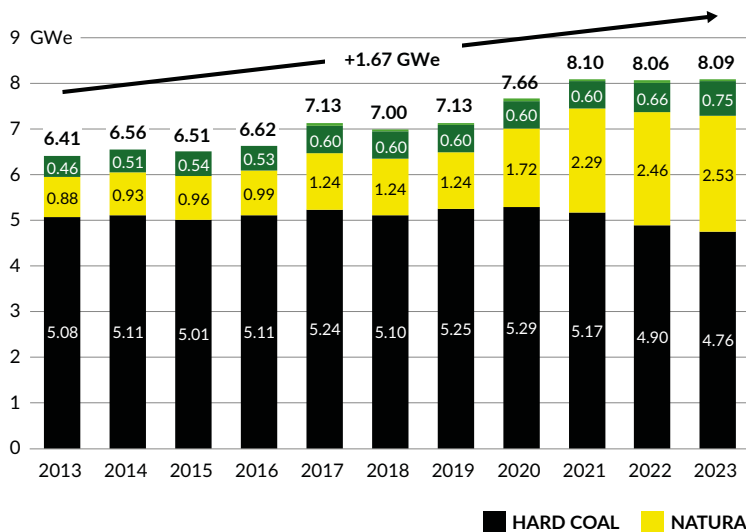
Source: Energy Regulatory Office (URE).

Cogeneration

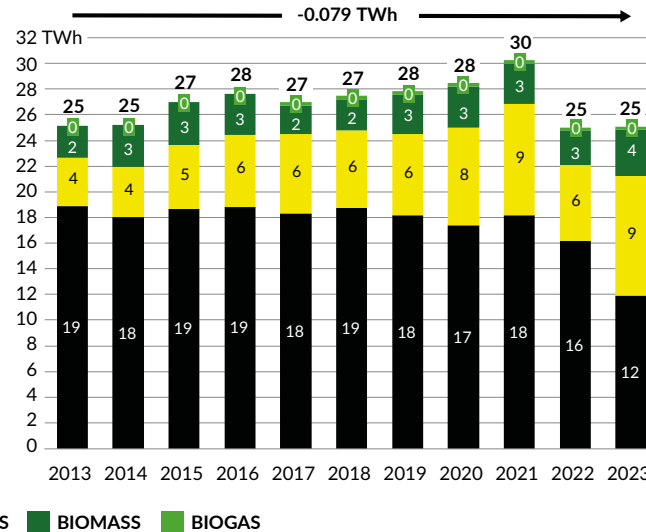
A Turning Point in the Development of District and Industrial CHP Plants?

- The exhausted coal-fired units are being replaced by gas-fired units. Legislative pressure and the cost of heat generation mean that practically all coal-fired CHP units will be phased out by 2035. It is therefore necessary to accelerate the construction of new CHP units, currently fuelled by natural gas, and in the future by green gases (e.g., hydrogen, biomethane).

INSTALLED CAPACITY IN DISTRICT CHP PLANTS



ELECTRICITY GENERATION IN DISTRICT CHP PLANTS

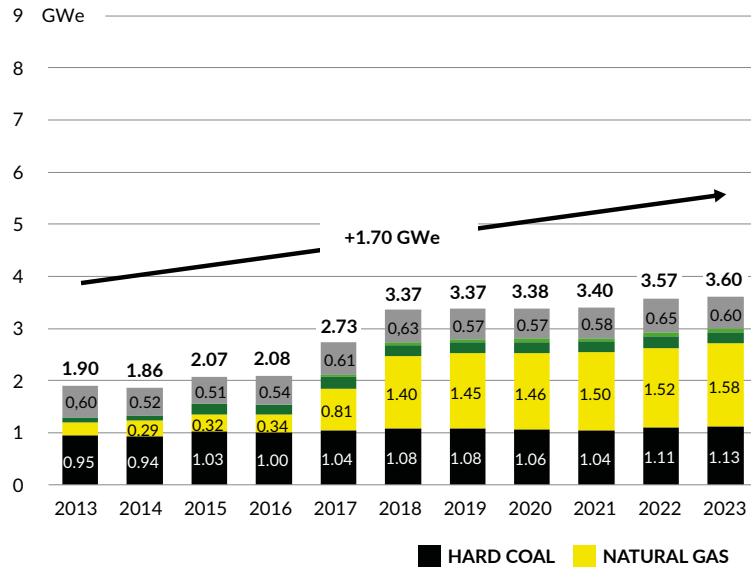


Source: Energy Market Agency (ARE).

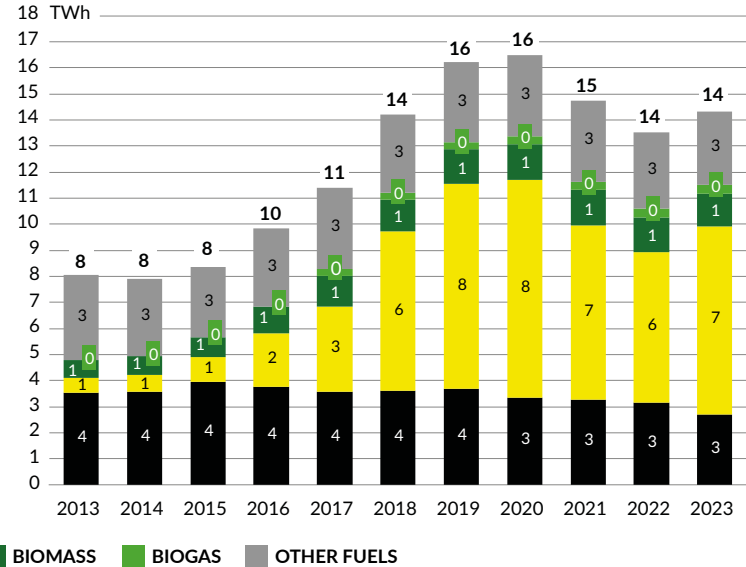
Industrial Power Generation

- Between 2013 and 2023, the group of industrial CHP plants recorded an increase in generation capacity of 1.7 GWe.
- The capacity increase in the industrial CHP group is mainly due to two PKN Orlen units (both with a capacity of 600 MWe) and many smaller units using various fuels.

INSTALLED CAPACITY IN INDUSTRIAL CHP PLANTS



ELECTRICITY GENERATION IN INDUSTRIAL CHP PLANTS

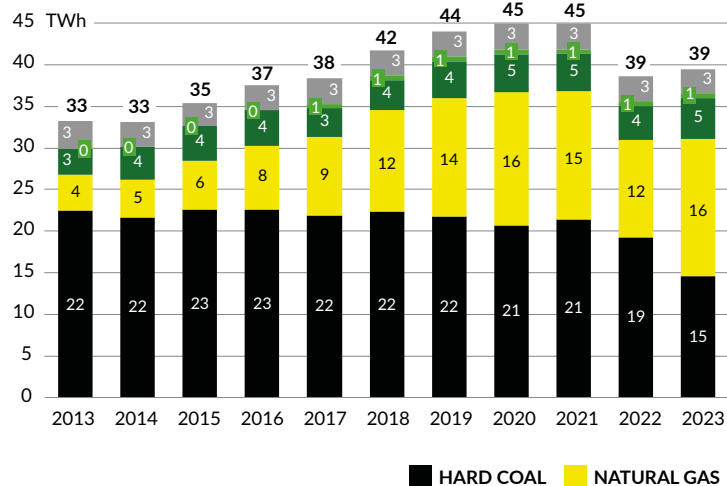


Source: Energy Market Agency (ARE).

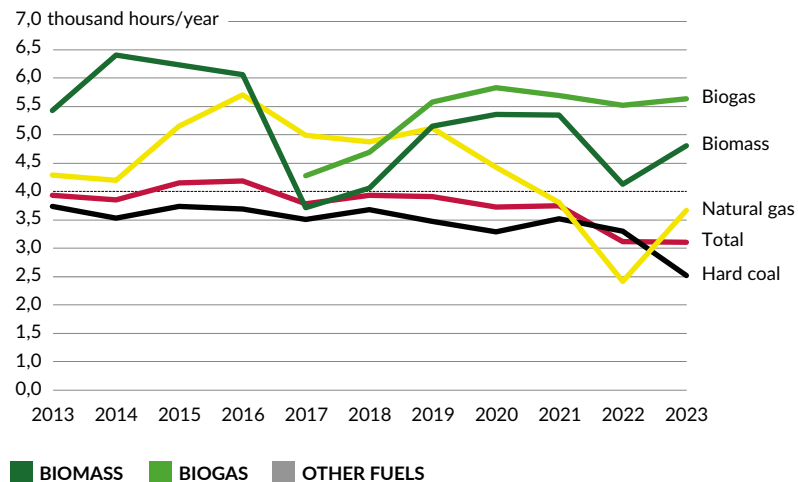
Electricity Generation in District and Industrial CHP Plants

- In the group of commercial CHP plants in 2023, only the running hours of biomass cogeneration capacity remained high, while the operating time of coal and gas cogeneration steadily decreased—the reason being the rising costs of fuel production and CO₂ emissions. Additionally, the operating time limitations were compounded by the heat tariffication mechanism for CHP, which did not reflect the dynamics of changes in operating costs and made the operation of the units unprofitable.
- In the group of industrial CHP plants, the operating profile is mainly determined by current production and business conditions in the final product market, so the capacity utilisation time is more stable. Overall, however, between 2013 and 2023, the utilisation time fell from 4226 hours to 3978 hours in 2023.

TOTAL ELECTRICITY GENERATION IN COMMERCIAL AND INDUSTRIAL CHP PLANTS



CAPACITY UTILISATION TIME OF COMMERCIAL CHP PLANTS

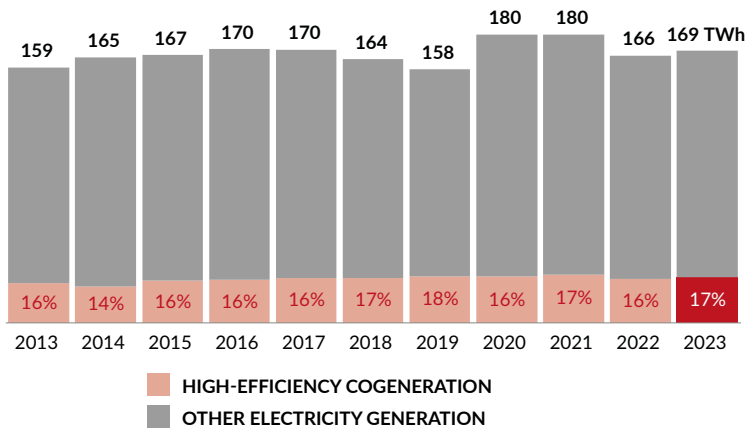


Source: Energy Market Agency (ARE).

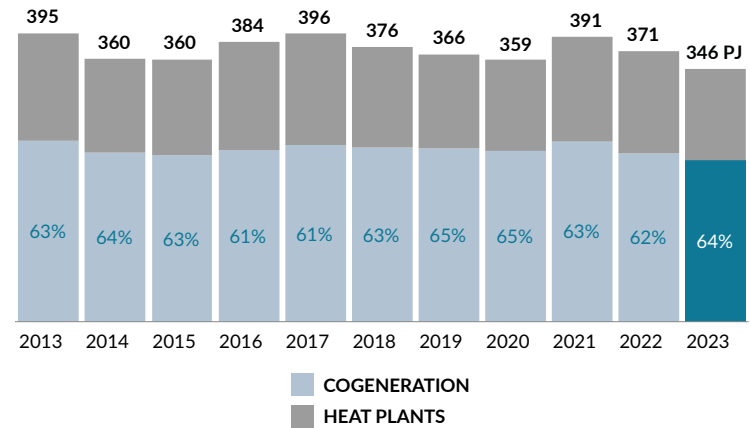
Share of Cogeneration in Heat and Electricity Stream

- The share of electricity generation from high-efficiency cogeneration has remained at a level oscillating around 16–17% for years. With rising domestic demand for energy and generation from other units, the relative share of CHP generation will decrease.
- Similarly, the share of heat from cogeneration in the national district heat stream remains at a constant level.
- There is potential to increase the electrical capacity of CHP units in the country, provided that exhausted coal-fired CHP units are replaced with gas-fired units, which are characterised by twice the electricity generation for the same heat production.

SHARE OF ELECTRICITY FROM COGENERATION IN NATIONAL GENERATION



SHARE OF HEAT FROM COGENERATION IN DISTRICT HEAT PRODUCTION

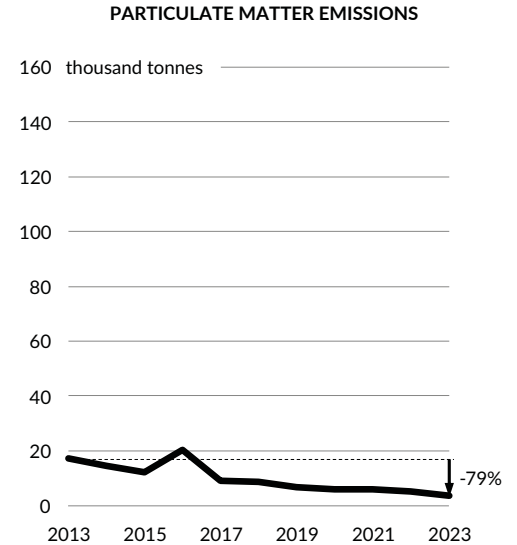
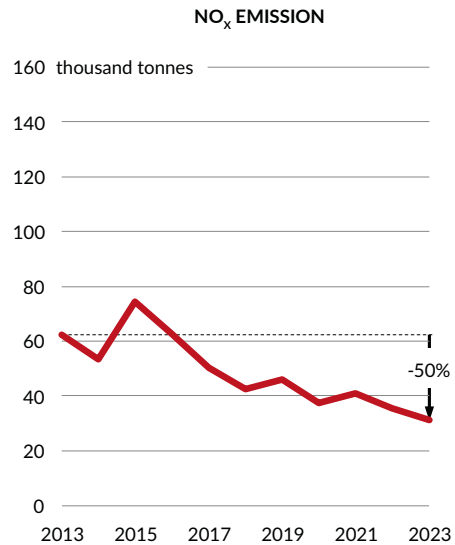
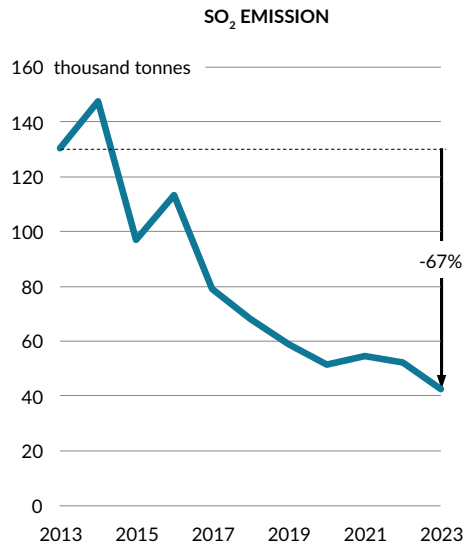


Sources: Energy Market Agency (ARE); Energy Regulatory Office (URE).

Climate and Environment

Emission of Gases and Dusts

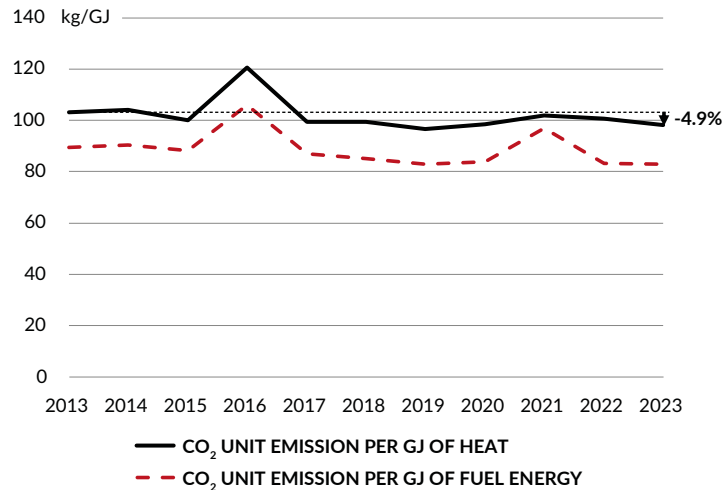
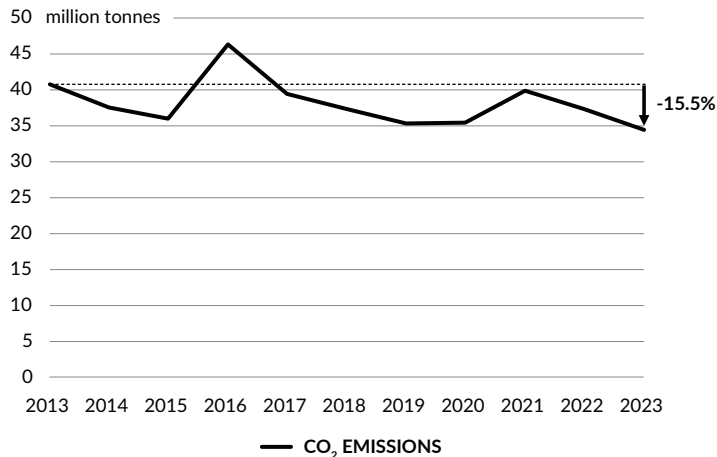
- Between 2013 and 2023, heating companies focused mainly on meeting increasingly stringent emission standards for gases (SO₂, NO_x) and dusts. Investment was mainly directed towards environmental protection equipment limiting pollutant emissions, but not towards replacing the heat sources themselves. Such actions cemented the fuel mix with the dominant position of coal.
- During the described period, unit emissions per GJ of heat significantly decreased – SO₂ from 0.33 kg/GJ to 0.12 kg/GJ, NO_x from 0.16 kg/GJ to 0.09 kg/GJ, PM from 0.04 kg/GJ to 0.01 kg/GJ.



Source: Energy Regulatory Office (URE).

CO₂ Emissions

- The implementation of biomass and gas technologies between 2013 and 2023 reduced CO₂ emissions per unit of heat by about 5%, from a level of 103 kg CO₂/GJ to 98 kg CO₂/GJ.
- Annual fluctuations in CO₂ emissions are a function of the volume of production and weather conditions. Nevertheless, the absolute decrease in emissions over the past decade amounted to approximately 6.3 million tonnes/year, or about 15.5%.
- The persistently high emissivity of district heat generates high operating costs for companies associated with the purchase of CO₂ emission allowances.



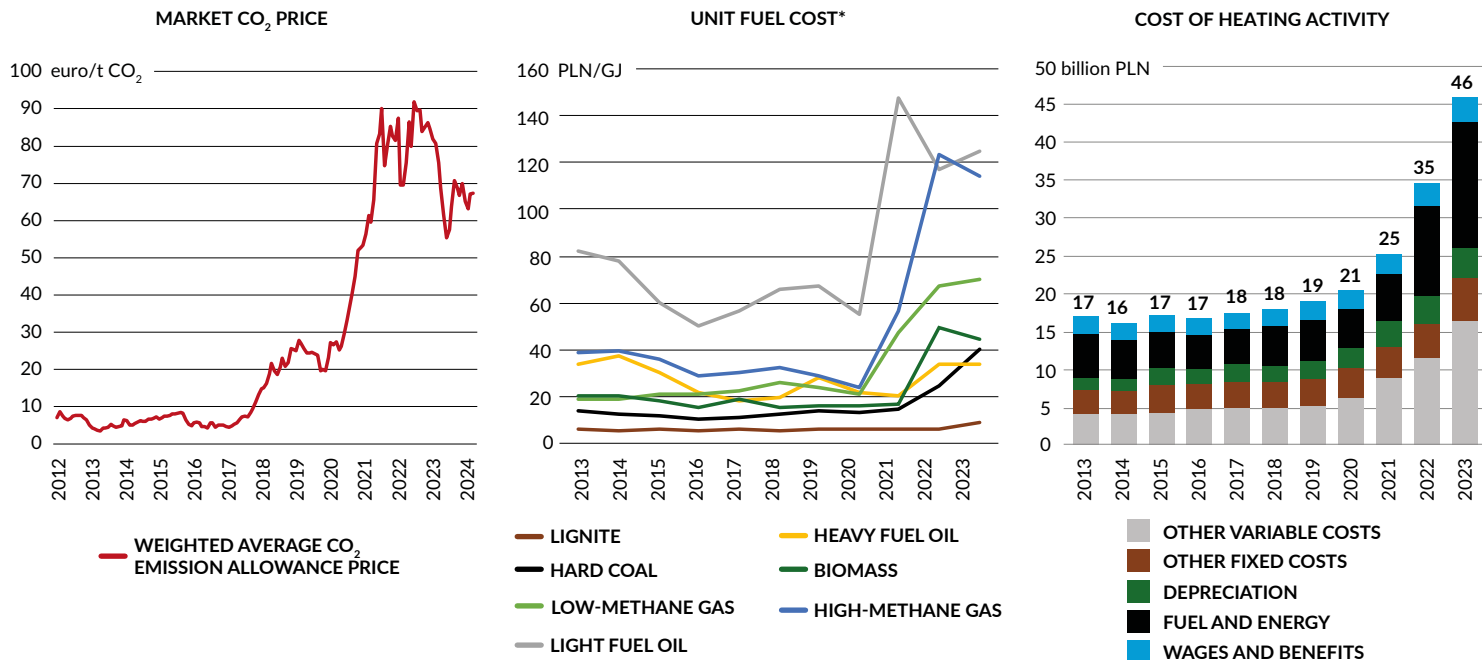
Source: Energy Regulatory Office (URE).

Heat Price

Profitability of District Heating Operations

Factors Determining the Cost of Heat Production

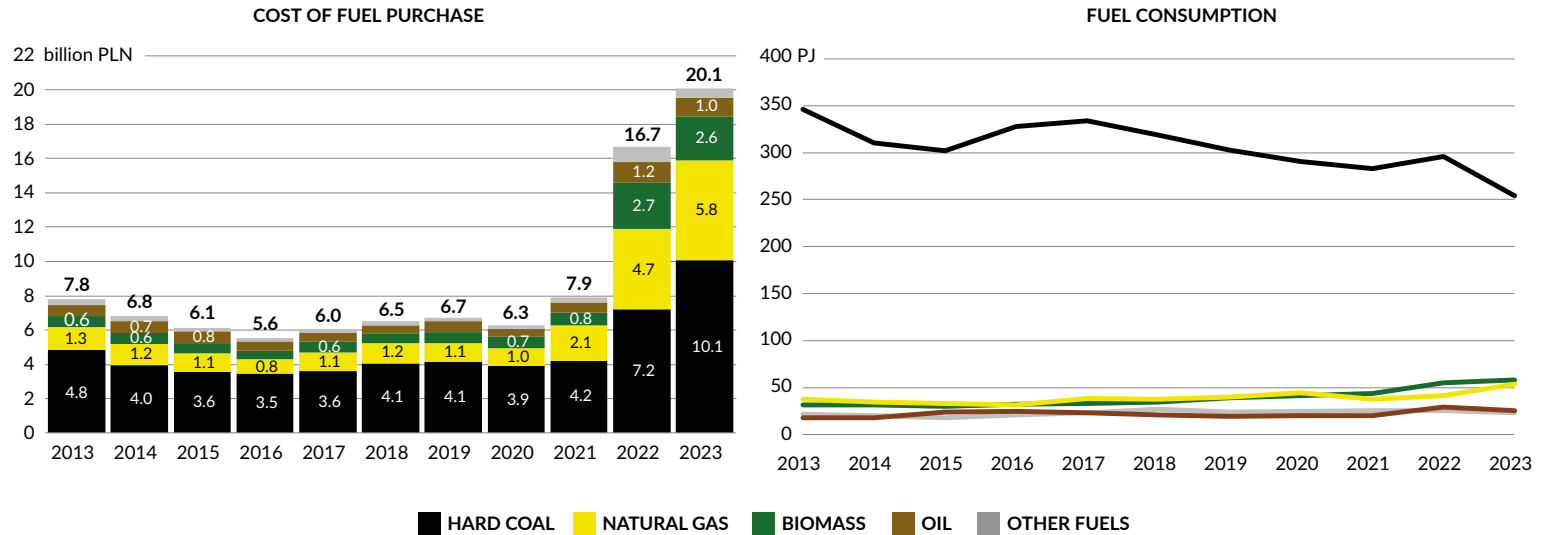
- The war in Ukraine, panic, and market speculation caused an unprecedented increase in fuel prices, which drastically raised the cost of heat generation.
- A steady increase in the purchase price of CO₂ emission allowances has been observed since 2019, which further increases the cost of heat production.



Sources: Energy Regulatory Office (URE); Forum Energii.
 * URE-C1 report includes transport costs.

Fuel Cost for Heat Production

- Between 2013 and 2023, the cost of purchasing fuels for district heat production amounted to PLN 96.5 billion. The main cost components were coal (PLN 53.1 billion) and natural gas (PLN 15.3 billion).
- The increase in the purchase cost of gas and biomass is a result of changes in market prices and increased consumption of these fuels. The increase in the purchase cost of coal, despite a drop in its consumption, is a consequence of rising market prices.
- In 2023, fuel purchase costs rose to PLN 20.1 billion, a 20% increase compared to 2022. Coal purchase costs increased by 40% (to PLN 10.1 billion), and gas by 24% (to PLN 5.8 billion).

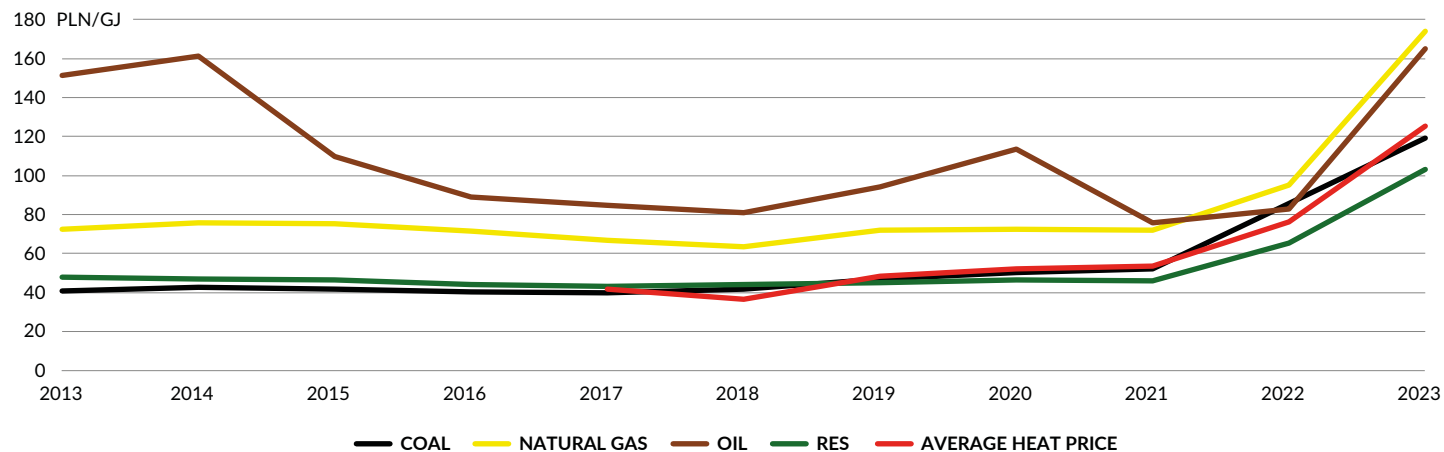


Sources: Energy Regulatory Office (URE); National Centre for Emissions Management (KOBiZE).

District Heat Price from Various Fuels (Excluding Transmission)

- The fuel market crisis and the increased cost of purchasing CO₂ emission allowances have caused a drastic increase in the average price of heat generated by the sector since 2020. Between 2013 and 2023, the average price of heat generated in heat plants and CHP plants increased from PLN 35/GJ to PLN 105/GJ (196%).
- Heat from biomass has been the cheapest for several years. This is influenced by the lack of charges for CO₂ emission allowances.
- Between 2013 and 2023, the price of transmission and distribution increased by 86%, from a level of PLN 15/GJ to PLN 29/GJ.

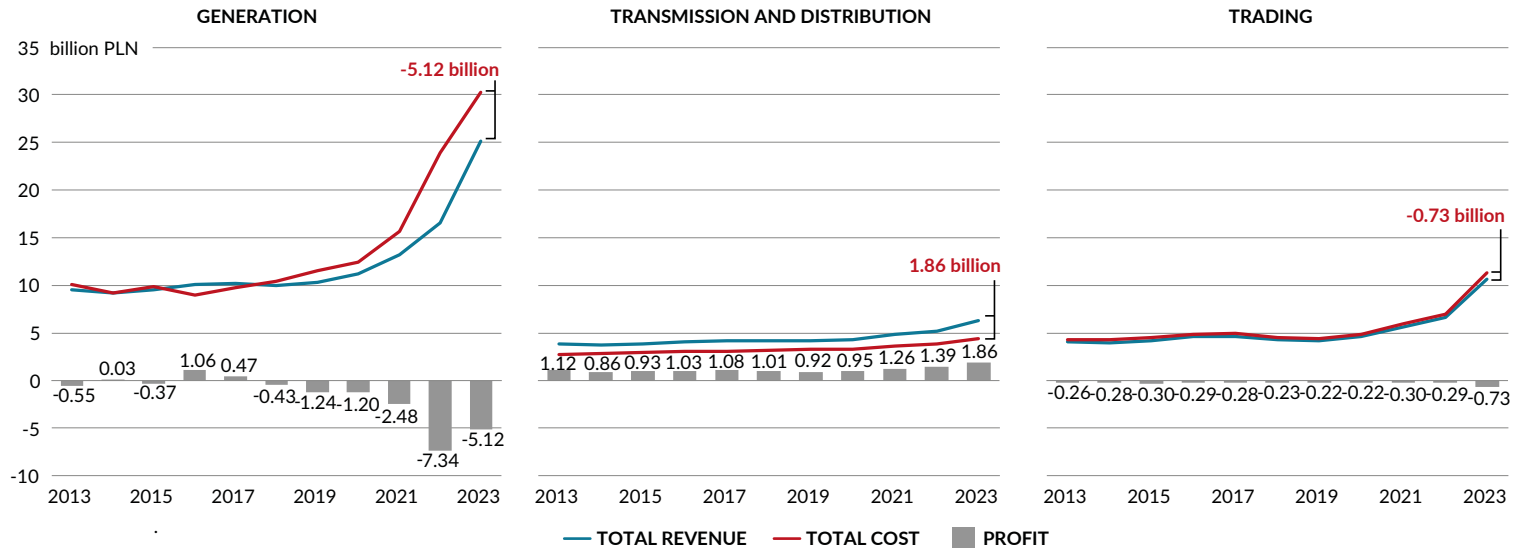
HEAT PRICE FROM NON-COGENERATION UNITS



Source: Energy Regulatory Office (URE).

Financial Results of the Heating Sector

- The heat generation sector has been reporting negative profitability for years, which prevents it from obtaining financing and carrying out significant development investments based on debt financing. The cause of this state of affairs are flaws in the heat price tariffification system, which does not allow for a flexible reaction to changes in the market environment of heating companies.
- Distribution companies are not exposed (to the same extent as generators) to the risks of changes in production costs, which is why their profitability is stable and sufficient for the successive development of heating networks and the modernisation of substations.
- Companies dealing with heat trading often have limited possibilities for cost optimisation. This is a consequence of the existing heat price setting mechanism, which translates into negative profitability of their operations.

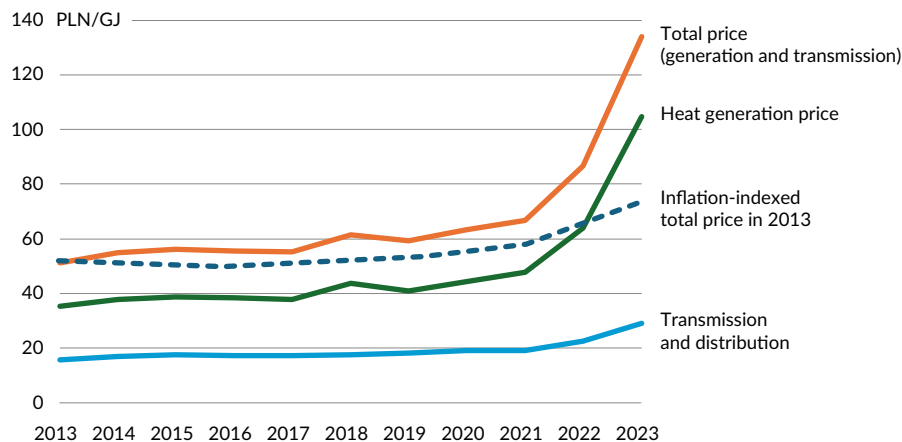


Source: Energy Regulatory Office (URE).

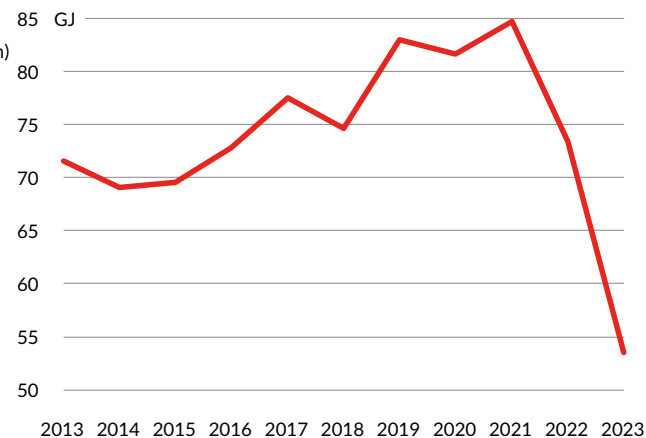
District Heat Gets More Expensive, Consumers Can Afford Less

- The heat price indexed only by inflation since 2013 would have reached a level of 74 PLN/GJ in 2023, which is 30% lower than the price actually achieved in 2023. This indicates the strong exposure of the heat price to political and market risks due to the high share of cost components dependent on the situation in global markets.
- Despite a significant increase in the average national wage – from PLN 3650 in 2013 to PLN 7155 in 2022 – the volume of GJ of district heat that can be purchased for the average wage dropped from 71.5 GJ in 2012 to 53.5 GJ in 2023. This is a dangerous phenomenon that may exert pressure on consumers to disconnect from heating networks.

AVERAGE HEAT PRICE



QUANTITY OF GJ OF HEAT PURCHASABLE WITH AVERAGE GROSS WAGE



Sources: Energy Regulatory Office (URE); Social Insurance Institution (ZUS); Statistics Poland (GUS).

Sources of Graphics

p. 11

Number of buildings by category

Statistics Poland (GUS), *Housing conditions in Poland in the light of the results of the National Population and Housing Census 2021, 2024*, Table 1. residential buildings and dwellings in buildings by building construction period, <https://stat.gov.pl/spisy-powszechno/nsp-2021/nsp-2021-wyniki-ostateczne/warunki-mieszkaniowe-w-polsce-w-swietle-wynikow-narodowego-spisu-powszechnego-ludnosci-i-mieszkan-2021,5,2.html>

Statistics Poland (GUS), *National Population and Housing Census 2021*, Chapter 1. Inhabited buildings, 1.1. Buildings and types, Table 1. Buildings by type in 2011 and 2021

Head Office of Geodesy and Cartography, *Data for download, Land and Building Register (EGiB), EGiB summary statements 2020–2025, National summary statement of building data as of 1 January 2023*, geoportal.gov.pl

RESidential buildings by construction period

Statistics Poland (GUS), *Housing conditions in Poland in the light of the results of the National Population and Housing Census 2021, 2024*, Table 1. Residential buildings and dwellings in buildings by age of building construction, <https://stat.gov.pl/spisy-powszechno/nsp-2021/nsp-2021-wyniki-ostateczne/warunki-mieszkaniowe-w-polsce-w-swietle-wynikow-narodowego-spisu-powszechnego-ludnosci-i-mieszkan-2021,5,2.html>

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Estimated average energy consumption in residential buildings

Eurostat, *Disaggregated final energy consumption in households – quantities, years 2015–2023*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

Statistics Poland (GUS), Local Data Bank (BDL), K11 – HOUSING ECONOMY AND MUNICIPAL INFRASTRUCTURE, G231 – DWELLING STOCKS, P2909 – Residential buildings in the gmina, <https://bdl.stat.gov.pl/bdl/metadane/cechy/2909>

Primary energy consumption (Ep) of buildings depending on the year of construction

Ministry of Development and Technology (MRiT), *National Building Renovation Plan – draft submitted for pre-consultation*, Table 10. Median and surface-weighted average values of the annual primary energy demand index for multi-family RESidential buildings depending on the year of commissioning [$kWh/(m^2 \cdot year)$], <https://kape.gov.pl/blog/aktualnosci-kape-1/krajowy-plan-renowacji-budynkow-730>

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Number of residential buildings commissioned

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION → G603 Housing construction, P4135 New residential buildings completed - technologies (quarterly data)

Number of new dwellings

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION → G603 Housing construction, P3821 Dwellings completed (quarterly data)

Area of new dwellings

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION → G603 Housing construction, P3821 Dwellings completed (quarterly data)

Increase in primary energy demand in new residential buildings

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION, G603 – Housing construction, P4136 – New residential buildings completed - floors (quarterly data) Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION, G603 – Housing construction, P3821 – Dwellings completed (quarterly data), <https://bdl.stat.gov.pl/bdl/metadane/cechy/3821>

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION, G643 – Energy performance of buildings, P4152 – Energy performance of buildings, <https://bdl.stat.gov.pl/bdl/metadane/cechy/4152>

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Single-family buildings. Number of thermo-modernization investments realized under the “Clean Air” program and the percentage share of buildings subjected to thermo-modernization

National Fund for Environmental Protection and Water Management (NFOŚiGW), *Report on the activities of the National Fund for Environmental Protection and Water Management, years 2013–2023*, <https://www.gov.pl/web/nfosigw/sprawozdania-z-dzialalnosci>

Multi-family buildings. Number of dwellings covered by the thermo-modernization grant from the Thermo-modernization and Renovation Fund and the percentage share of buildings subjected to thermo-modernization

Ministry of Development and Technology (MRiT), *Report on the implementation of activities under the National Housing Program – years 2013–2023*, <https://www.gov.pl/web/rozwoj-technologie/narodowy-program-mieszkaniowy>

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Directions of energy consumption in households

Eurostat, *Disaggregated final energy consumption in households – quantities, years 2015–2023*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

Statistics Poland (GUS), *Energy statistics in 2013 and 2014*, IX. Direct consumption of households, agriculture and other consumers in 2013 and 2014, <https://stat.gov.pl/en/topics/environment-energy/energy/energy-statistics-in-2013-and-2014,4,10.html>

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Percentage share of people owning their own dwellings in Poland compared to EU countries

Eurostat, *Distribution of population by tenure status, type of household and income group*, https://ec.europa.eu/eurostat/databrowser/view/ilc_lvho02/default/table?lang=en

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Change in energy consumption in district heating and other heating

Fuel structure in district and non-district heating in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities, years 2015–2022*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

Energy Regulatory Office (URE), *The District Heating Sector in Numbers, years 2018–2023*, Chapter 3. Production and consumption of fuels for heat generation, Table 2. Consumption of fuels for heat generation.

Energy Regulatory Office (URE), *The District Heating Sector in Numbers, years 2016–2017*, Production and consumption of fuels for heat generation, Table 3. Consumption of fuels for heat generation.

Energy Regulatory Office (URE), *The District Heating Sector in Numbers, years 2013–2015*, Statistical tables, Table 64. Consumption of fuels for heat generation by WZDE in 2015

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Structure of heat sources in households in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities, 2023*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

District heating recipients in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

Eurostat, *Disaggregated final energy consumption in services by NACE Rev. 2 activity – quantities*, https://ec.europa.eu/eurostat/databrowser/view/nrg_d_serq_n__custom_17560907/default/table

Eurostat, *Disaggregated final energy consumption in inparticulate matter by NACE Rev. 2 activity – quantities*, https://ec.europa.eu/eurostat/databrowser/view/nrg_d_indq_n/default/table?lang=en&category=nrg.nrg_quant.nrg_quanta.nrg_d

Structure of heat sources in households in 2023

Energy Regulatory Office (URE), *The District Heating Sector in Numbers 2023*, 3. Heat production and fuel consumption, Table 2. Consumption of fuels for heat generation in 2023, <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l>

[p. 21](#)

Energy consumption for heating purposes in households in the EU and Poland in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities, 2023*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

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Heating appliances in new buildings – single-family

Heating appliances in new buildings – multi-family

Statistics Poland (GUS), *Local Data Bank (BDL)*, K12 – INDUSTRY AND CONSTRUCTION, G603 – Housing construction, P4150 – Dwellings completed fitted with technical and sanitary infrastructure, <https://bdl.stat.gov.pl/bdl/metadane/cechy/4150>

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Estimated sales of heating appliances for central heating (or dual-function)

Estimated sales of domestic hot water (DHW) heaters

Association of Producers and Importers of Heating Appliances (SPIUG), *Heating appliance market in Poland, years 2013–2023*, <https://spiug.pl/raporty/>

General Office of Building Control (GUNB), *Structure of single-family buildings for central heating sources statement*, https://zone.gunb.gov.pl/pl/raporty/struktura_budynkow_zrodla_co

Fuel consumption in district heating versus national consumption

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ
Energy Regulatory Office (URE), *The District Heating Sector in Numbers – 2023*, Chapter 3. Production and consumption of fuels for heat generation, Table 2. Consumption of fuels for heat generation, <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l>
Statistics Poland (GUS), *Energy statistics in 2022 and 2023*, XIII The structure of selected energy carriers consumption in 2022-2023, <https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/gospodarka-paliwowo-energetyczna-w-latach-2022-i-2023,4,19.html>
The National Centre for Emissions Management (KOBiZE), *Net Caloric Value and Emission Factors Tables*, <https://www.kobize.pl/pl/article/monitorowanie-raportowanie-weryfikacja-emisji/id/318/tabele-wo-i-we>, <https://www.kobize.pl/pl/article/monitorowanie-raportowanie-weryfikacja-emisji/id/318/tabele-wo-i-we>
Coal consumption in the country – Forum Energii, Statistics Poland (GUS), Polski Rynek Węgla, Energy Market Agency (ARE), Industrial Development Agency (ARP)
Gas consumption in the country – Forum Energii, Statistics Poland (GUS), Energy Market Agency (ARE), Ministry of Climate and Environment (MKiŚ), ENTSOG

Cost of fuel purchase for district heating

Developed based on: URE, *The District Heating Sector in Numbers 2023*; Eurostat, *Disaggregated final energy consumption in households – quantities*; GUS, Energy consumption in households; GUS, Average annual retail price of 1000 kg of hard coal in 2023; PGNiG, PSG, PGE Distribution i PGE Obrót tariffs

CO₂ Emission in 2023

Forum Energii, *Poland's Energy Transformation. 2025 Edition*, M. Dusiło, 2025, <https://www.forum-energii.eu/transformacja-energetyczna-polski-edycja-2025>
European Environment Agency, *National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism; Approximated estimates for greenhouse gas emissions*, <https://www.eea.europa.eu/en/datahub/datahubitem-view/3b7fe76c-524a-439a-bfd2-a6e4046302a2>
European Environment Agency/Eionet, *Eionet Central Data Repository*, <https://cdr.eionet.europa.eu/>

CO₂ Emission from district heating in 2013–2023

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 35. Emissions of pollutants by WZDE, <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l>

Emission in non-district heating developed based on:

Eurostat, *Disaggregated final energy consumption in households – quantities*, 2022, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

National Centre for Emission Balancing and Management (KOBIZE), Calorific values (WO) and CO₂ emission factors (WE) in 2020 for reporting under the EU Emissions Trading System for 2023

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Share of RES energy in Poland's gross final consumption

Statistics Poland (GUS), *Energy from renewable sources in 2023*, Chart 1. Share of energy from renewable sources in gross final energy consumption, <https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/energia-ze-zrodel-odnawialnych-w-2023-roku,10,7.html>

Structure of RES sources in Poland

Eurostat, *Complete energy balances*, https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_c__custom_16663877/default/table?lang=en

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Share of RES energy in the gross final consumption of district heating and cooling

Statistics Poland (GUS), *Energy from renewable sources in 2023*, Chart 3. Share of energy from renewable sources in gross final energy consumption in heating and cooling, <https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/energia-ze-zrodel-odnawialnych-w-2023-roku,10,7.html>

Structure of RES sources in district heating in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

Eurostat, Database, Complete energy balances, [https://ec.europa.eu/eurostat/databrowser/view/nrg\)_bal_c_custom_16663877/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/nrg)_bal_c_custom_16663877/default/table?lang=en)

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Energy consumption structure

Energy flow broken down by fuels

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

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Final energy consumption broken down by energy sources in 2023

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

National Centre for Emission Balancing and Management (KOBiZE), *Calorific values (WO) and CO₂ emission factors (WE) in 2012–2019 for reporting under the EU Emissions Trading System for 2015–2022*.

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Variable heating cost

Statistics Poland (GUS), *Average annual retail price of 1000 kg of hard coal in 2015–2023*, <https://stat.gov.pl/sygnalne/komunikaty-i-obwieszczenia/lista-komunikatow-i-obwieszczen/komunikat-w-sprawie-przecietnej-sredniorocznej-ceny-detalicznej-1000-kg-wegla-kamiennego-w-2022-roku,53,10.html>

Statistics Poland (GUS), *Energy efficiency in 2012–2022, 2024*, <https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/efektywnosc-wykorzystania-energii-w-latach-2012-2022,5,19.html>

Average annual EUR exchange rate at NBP taken from bankier.pl.

Electricity prices in 2014–2023 developed based on PGE Obrót Detaliczny and PGE Distribution tariffs.

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CO₂ Emission

Unit CO₂ emission

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ.

National Centre for Emission Balancing and Management (KOBiZE), Calorific values (WO) and CO₂ emission factors (WE) in 2012–2019 for reporting under the EU Emissions Trading System for 2015–2023.

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Sulphur oxides emission

Nitrogen oxides emission

Total particulate matter

Eurostat, *Disaggregated final energy consumption in households – quantities*, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_D_HHQ

National Centre for Emission Balancing and Management (KOBiZE), Ministry of Climate and Environment (Ministerstwo Klimatu i Środowiska), *POLAND'S INFORMATIVE INVENTORY REPORT 2025*, [https://cdr.eionet.europa.eu/pl/eu/nec\)_revised/iir/envz9fpw/IIR_2025_PL.pdf/manage_document](https://cdr.eionet.europa.eu/pl/eu/nec)_revised/iir/envz9fpw/IIR_2025_PL.pdf/manage_document).

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Length of district heating networks in enterprise groups

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, District heating network.

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Installed heat capacity in enterprises and contracted by consumers

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Figures, Table 2, Installed capacity in district heating (Table 2, Moc zainstalowana w ciepłownictwie).

District heating production

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 76. Heat production from various types of fuels by WZDE.

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Heat production in 2023

Energy Regulatory Office (URE), *The District Heating Sector in Numbers – 2023*, Table 18. Production and distribution of generated heat by WZDE in 2023, <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l/12424,2023.html>

Energy Regulatory Office (URE), *The District Heating Sector in Numbers – 2023*, Table 5. Average prices of heat generated from various types of fuels <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l/12424,2023.html>

Energy Regulatory Office (URE), *The District Heating Sector in Numbers – 2023*, Table 2. Consumption of fuels for heat generation in 2023, <https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l/12424,2023.html>

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Share of fuels in energy consumption

Energy consumption broken down by fuels

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, 3. Heat production and fuel consumption.

National Centre for Emission Balancing and Management (KOBiZE), Calorific values (WO) and CO₂ emission factors (WE) in 2010–2013 for reporting under the EU Emissions Trading System for 2013–2016.

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Energy consumption broken down by fuels (PJ)

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, 3. Heat production and fuel consumption.

National Centre for Emission Balancing and Management (KOBiZE), Calorific values (WO) and CO₂ emission factors (WE) in 2010–2013 for reporting under the EU Emissions Trading System for 2013–2016.

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Energy flow from RES and waste heat in district heating

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, 3. Heat production and fuel consumption.

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Installed capacity

Electricity production in professional CHP plants

Energy Market Agency (ARE), *Statistics of Polish Power Industry*, years 2013–2023, Table. 3. 27. (47), Characteristic values of industrial thermal power plants.

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Installed capacity in industrial CHP plants

Electricity production in industrial CHP plants

Energy Market Agency (ARE), *Statistics of Polish Power Industry*, years 2014–2023, Table L.3.27.(47), Characteristic values of industrial thermal power plants.

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Total electricity production in professional and industrial CHP plants

Utilization time of installed capacity of professional CHP plants

Energy Market Agency (ARE), *Statistics of Polish Power Industry*, years 2014–2023, Tabl. 3.27.(47), Characteristic values of industrial thermal power plants; Tabl. 3.12.(32), Division of professional thermal power plants according to accepted criteria.

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Share of electricity from cogeneration in national production

Energy Market Agency (ARE), *Statistics of Polish Power Industry*, years 2014–2023, Table. 3.42.(62), Capacity and production of electricity and heat in high-efficiency cogeneration units.

Share of heat from cogeneration in district heating production

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 76. Heat production from various types of fuels by WZDE.

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SO₂ Emission

NO_x Emission

Particulate matter emission

Energy Regulatory Office (URE), *Heat Energy in Figures*, years 2013–2023, Statistical tables, Table 35. Emissions of pollutants by WZDE.

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CO₂ Emission

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 35. Emissions of pollutants by WZDE.

Unit CO₂ emission per GJ of heat

Unit CO₂ emission per GJ of fuel energy

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Economic situation, Table 10. Efficiency indicators of heat energy.

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Market CO₂ price

Forum Energii, *Poland's Energy Transformation. 2025 Edition*, M. Dusito, 2025, <https://www.forum-energii.eu/transformacja-energetyczna-polski-edycja-2025>.

Unit fuel cost

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 72. Average unit cost of fuels used for heat production by WZDE.

Cost of heating activity

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 59. Revenues and costs of district heating enterprises.

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Fuel purchase cost

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, Statistical tables, Table 68. Cost of fuels used for heat production.

Fuel consumption

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2013–2023, 3. Heat production and fuel consumption, Table 2. Consumption of fuels for heat production.

National Centre for Emission Balancing and Management (KOBiZE), Calorific values (WO) and CO₂ emission factors (WE) in 2010–2013 for reporting under the EU Emissions Trading System for 2013–2016.

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Heat price from non-cogeneration units

Energy Regulatory Office (URE), *Average prices of heat sold produced in generation units belonging to licensed enterprises that are not cogeneration units*, <https://www.ure.gov.pl/pl/cieplo/ceny-wskazniki/7904,Srednie-ceny-sprzedazy-ciepla-wytworzonego-w-nalezacych-do-przedsiębiorstw-posia.html>

Energy Regulatory Office (URE), *Heat Energy in Figures*, years 2017–2023, 4. Heat sales and prices, Table 3. Average heat prices from sources.

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Financial results of district heating – generation, transmission and distribution, trading

Energy Regulatory Office (URE), *Heat Energy in Figures*, years 2017–2023, Statistical tables, Table 59. Revenues and costs of district heating enterprises.

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Average heat price

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2017–2023, 4. Heat sales and prices, Table 5. Average prices of heat generated from various types of fuels.

Energy Regulatory Office (URE), *The District Heating Sector in Numbers*, years 2017–2023, 4. Heat sales and prices, Table 3. Average heat prices from sources.

Quantity of GJ of heat that can be purchased for the average gross wage

Social Insurance Institution (ZUS), Average wage since 1950, <https://www.zus.pl/baza-wiedzy/skladki-wskazniki-odsetki/wskazniki/przecietne-wynagrodzenie-w-latach>

Statistics Poland (GUS), *Announcement on the average wage in the national economy in 2023, 2024*, <https://stat.gov.pl/sygnalne/komunikaty-i-obwieszczenia/lista-komunikatow-i-obwieszczen/komunikat-w-sprawie-przecietnego-wynagrodzenia-w-gospodarce-narodowej-w-2023-roku,273,11.html>

Statistics Poland (GUS), Annual price indices of consumer goods and services since 1950, <https://stat.gov.pl/obszary-tematyczne/ceny-handel/wskazniki-cen/wskazniki-cen-towarow-i-uslug-konsumpcyjnych-pot-inflacja-/roczne-wskazniki-cen-towarow-i-uslug-konsumpcyjnych/>

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