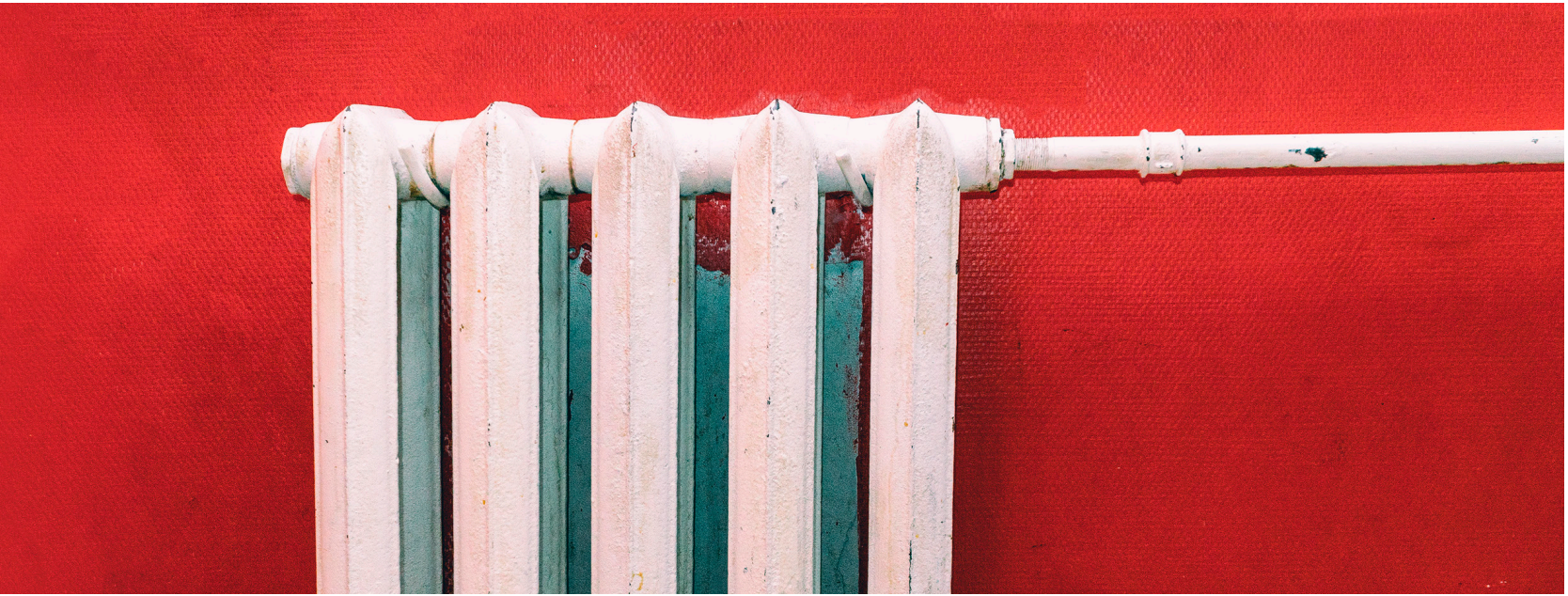
Forum Energii
Analizy i dialog



Heating in Poland

Edition 2019

www.forum-energii.eu

AUTHOR:

Rafał Macuk, Forum Energii

COOPERATION:

Joanna Maćkowiak-Pandera PhD, Andrzej Rubczyński, Forum Energii

EDITING:

Brien Barnett

GRAPHIC DESIGN:

Karol Koszniec

MANY THANKS

We would like to thank the Institute for Structural Research, Chamber of Commerce Polish District Heating, and the National Energy Conservation Agency for their cooperation and assistance in obtaining data necessary to prepare this publication.

DATE OF PUBLICATION:

December 2019

Forum Energii is a think-tank focused on the energy sector. Our mission is to create the foundations for an effective, safe, clean and innovative energy sector based on data and analyses.

TABLE OF CONTENTS

DECEMBER 2019

DECEMBER 2019

Foreword

Poland suffers from smog, especially in winter. To start to improve air quality, heating must first be seen in the broad perspective, composed of both district heating networks and household heat supply. As much as 70% of heat is generated in individual heating systems. The remaining 30% is produced in district heating systems—one of the most developed district heating networks in Europe. This distinction is now threatened with gradual degeneration and the loss of opportunities to provide an external development impulse. As much as 80% of the heating systems in Poland do not meet the requirements of the Energy Efficiency Directive and this eliminates the possibility of support from EU funds.

One of the main barriers to clean heat is not only the lack of a comprehensive strategy for this area but, above all, the lack of publicly available data to describe the condition of this sector. It is striking that the supply of heat—a major environmental and social issue in Poland—is so poorly described and recognised. There is no data on the status of the energy efficiency of individual buildings, heating sources, and many other source points. Fragmentary information is collected by the Central Statistical Office, the Energy Regulatory Office, and the Energy Market Agency. However, they are not easily accessible. The lack of knowledge about the sector results in low interest in key institutions and it is difficult to propose corrective solutions if the problem is not well diagnosed.

We present this report in order to share the collected data in an accessible form and to support the discussion on the strategy of supplying clean heat to Polish homes.

Enjoy your read,
Dr. Joanna Maćkowiak-Pandera
President of Forum Energii

Heating - definition and access to data

We define heating in a broad sense, both as district heating, which includes district heating networks with generation sources, and non-system heating, i.e., individual heating systems in households.

This report is based on the most up-to-date data and materials published by the Central Statistical Office (GUS), Energy Market Agency (ARE), Energy Regulatory Office (ERO), National Energy Conservation Agency (KAPE), National Centre for Balancing and Emissions Management (KOBiZE), Chamber of Commerce Polish District Heating (IGCP), Eurostat, and others.

While preparing this publication, we have noticed problems that may be a barrier not only in creating an objective and complete picture of the heating sector in Poland but also in introducing necessary changes in this field. These are:

- Lack of access to data—either they are not collected or not made public; and,
- Lack of methodological consistency in published data—statistical institutions apply their own method, which makes it impossible to create a coherent picture of the examined issue.

For example, the ERO data on district heating included in this report concern only licensed companies with a capacity greater than 5 MW. Therefore, enterprises with smaller capacities were omitted.

The lack of data is a barrier to the transformation of the energy sector in Poland. The supply of heat is a public domain and concerns every Polish household. Data on, e.g., energy efficiency, pollutant emissions, or forms of heating should be regularly collected and made available to the public.

Main conclusions

- For years, politicians in Poland have not been interested in the problem of heating, seeing it as difficult to address (dispersed structure), socially sensitive (heating costs), and political (pressure to use traditional coal instead of cleaner forms of heat generation).
- The effect of the negligence in improving the quality of heating is the worst air pollution in the EU as a result of emissions from more than 4 million homes heated by their own solid fuel heat sources. Domestic households in Poland account for 87% of the coal consumed by all households in the European Union.
- Due to the scale of the problem and the dispersion of individual heat sources, responsibility for changes in heating is shared between different levels of government and local administration. The lack of a coordinator for heating issues in general has resulted not only in poor air quality but also in low energy efficiency of buildings, large losses of primary energy, as well as a lack of development impulses for small and medium-sized enterprises cooperating with construction and heating.
- There is a lack of both long-term energy efficiency policy and modernisation of the heating sector, as well as indications to domestic industry of key technologies, which are the foundation of the transformation and, at the same time, the source of business development.
- The less-than-fully planned policy of privatisation of the heating sector in the 1990s became a development impulse for large heating companies but it left undercapitalised small heating systems to their fate. As a result, currently about 80% of heating companies in Poland (responsible for the production of 38% of district heating) are classified as inefficient.
- The lack of a vision for the development of district heating and its long-term goals has led the government administration to focus almost exclusively on controlling prices in heating systems.
- The lack of a precise national energy policy, combined with keeping heat prices as low as possible, stopped the modernisation of the heating system and led to accumulated problems.
- Ineffective social policies to prevent energy poverty (which affects about 12% of the population) are blocking the modernisation of heating.
- It is necessary to define modernisation goals for the heating sector in the perspective of 2030 and to develop mechanisms to support their implementation and business models that introduce changes.

The greatest amount of heat is generated in individual households

- District heating is a quarter of the heat stream.
- The state's energy and environmental policies should cover both district heating systems and individual heating.

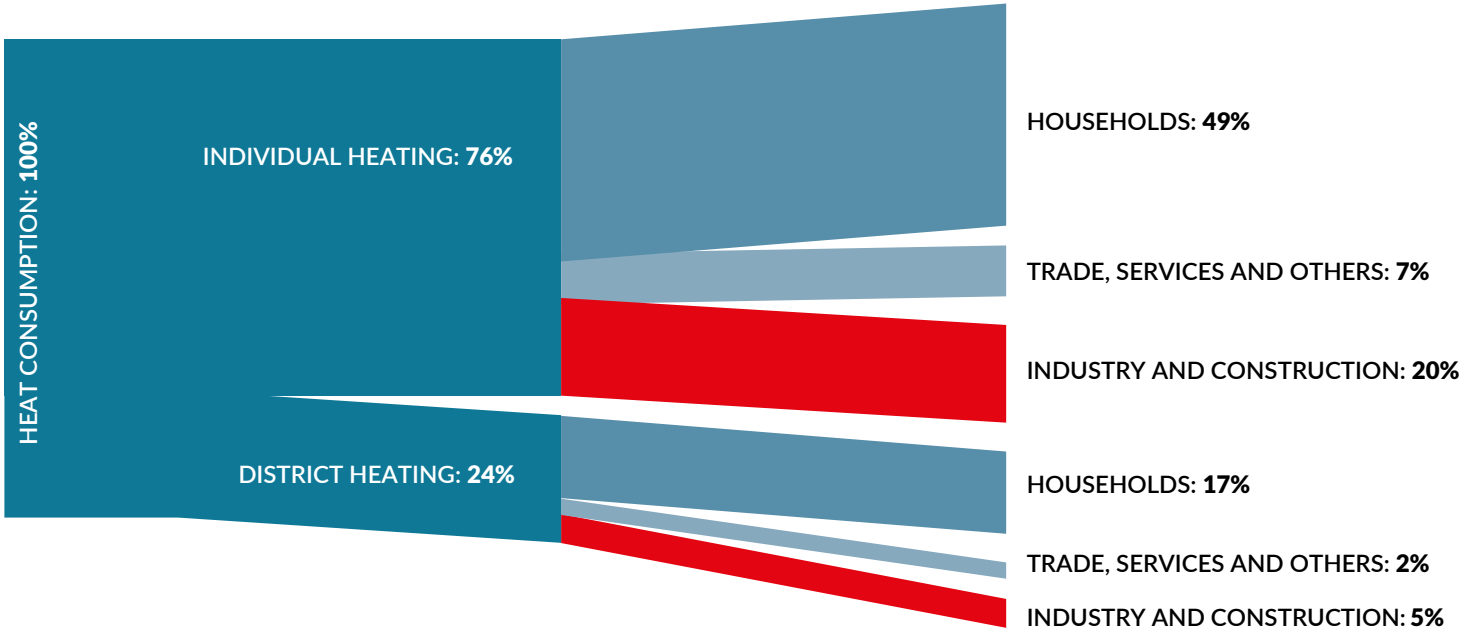


Chart 1. Structure of heat consumption in Poland

Source: based on data from the National Agency for Energy Conservation (KAPE), Central Statistical Office (GUS) and Energy Regulatory Office (ERO).

Buildings and energy efficiency

Heat production is dominated by solid fuels

- As many as 3.5 million buildings use inefficient solid-fuel heat sources for heating.

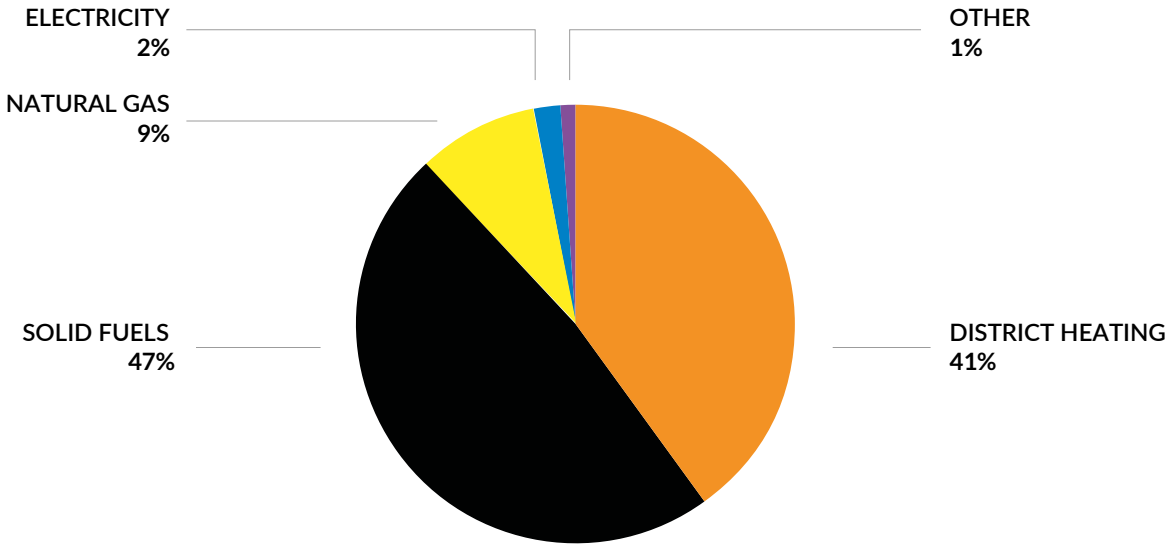


Chart 2. Domestic heating solution by energy carrier in 2015

Source: based on CSO data.

The most buildings were built before 1988

- Until 1988, energy efficiency was of marginal importance in construction. This translates into high energy consumption for heating purposes today.

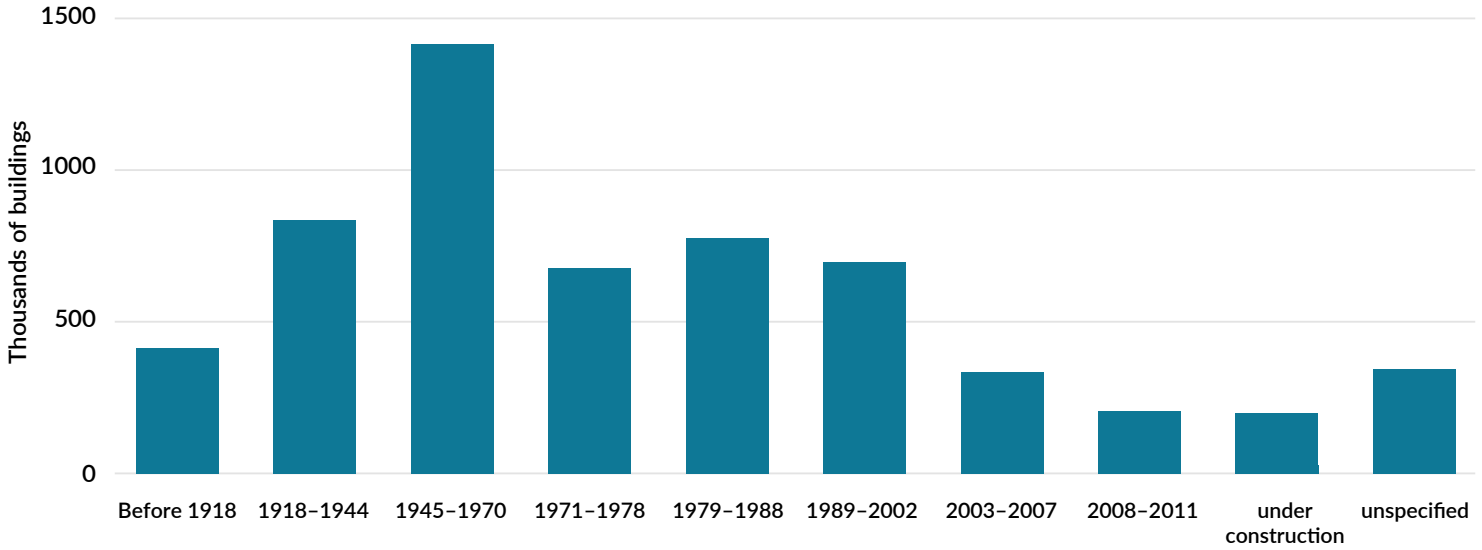


Chart 3. Age structure of the housing stock as of 2012

Source: based on National Census of Population and Housing 2011, CSO, Warsaw.

Energy standard of buildings in Poland is low

- Almost two-thirds of buildings in Poland are characterised by low energy efficiency.
- Poorly performing thermomodernisation has hindered the improvement of energy efficiency for many years.

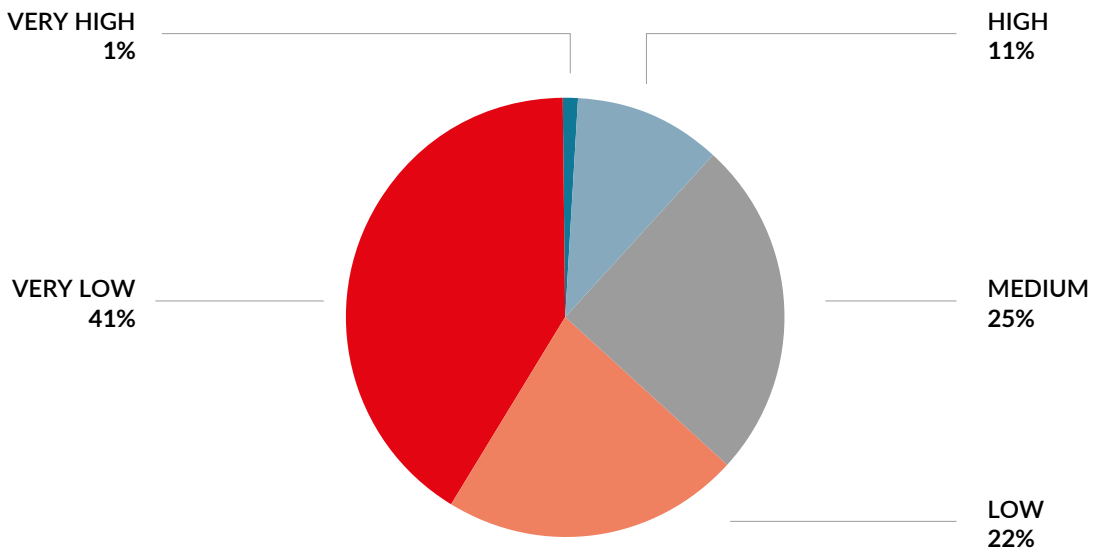


Chart 4. The standard of thermal insulation of buildings in Poland in 2017

Source: based on data from the Institute of Environmental Economics.

Most of the energy in households is used for heating

- The relatively high share of energy for space heating is due to the low energy efficiency of buildings and Poland's climate zone.
- The constant increase in average daily temperatures observed in recent years will reduce heating energy consumption.

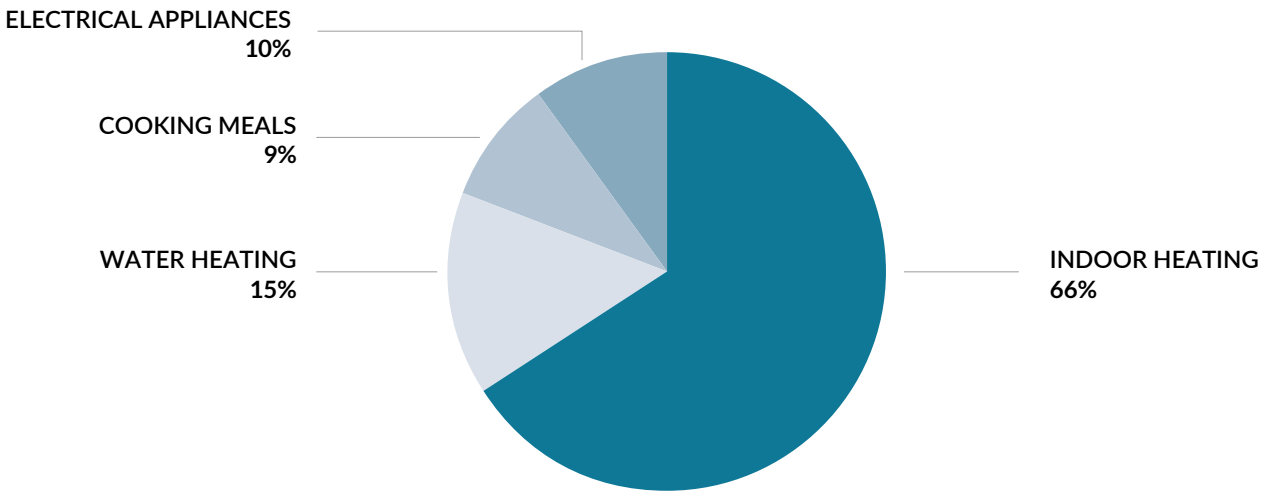


Chart 5. Energy consumption structure in households in 2017

Source: based on CSO data.

Fuels and emissions

The heating sector is dominated by coal

- The consumption of coal for heating purposes is 24 million tonnes, of which as much as 12 million tonnes is burned in households heated individually and by other small consumers of coal.

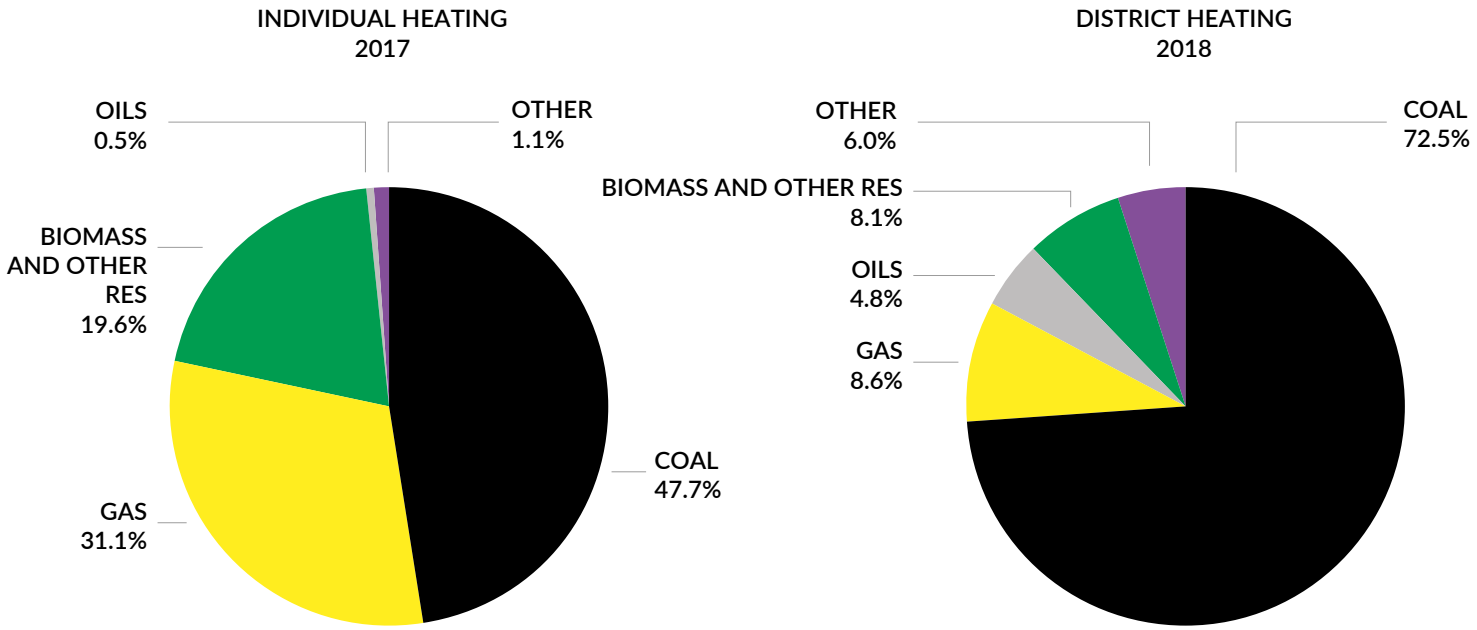


Chart 6. Fuel consumption for heating purposes

Source: based on data from KAPE, CSO, and ERO.

CO_2 emissions are still high

- CO_2 emissions from individual household heating remain consistently high.
- The specific CO_2 emission per GJ of district heating has decreased by about 10% since 2007, due to a lack of investment leading to the substitution of generation sources.

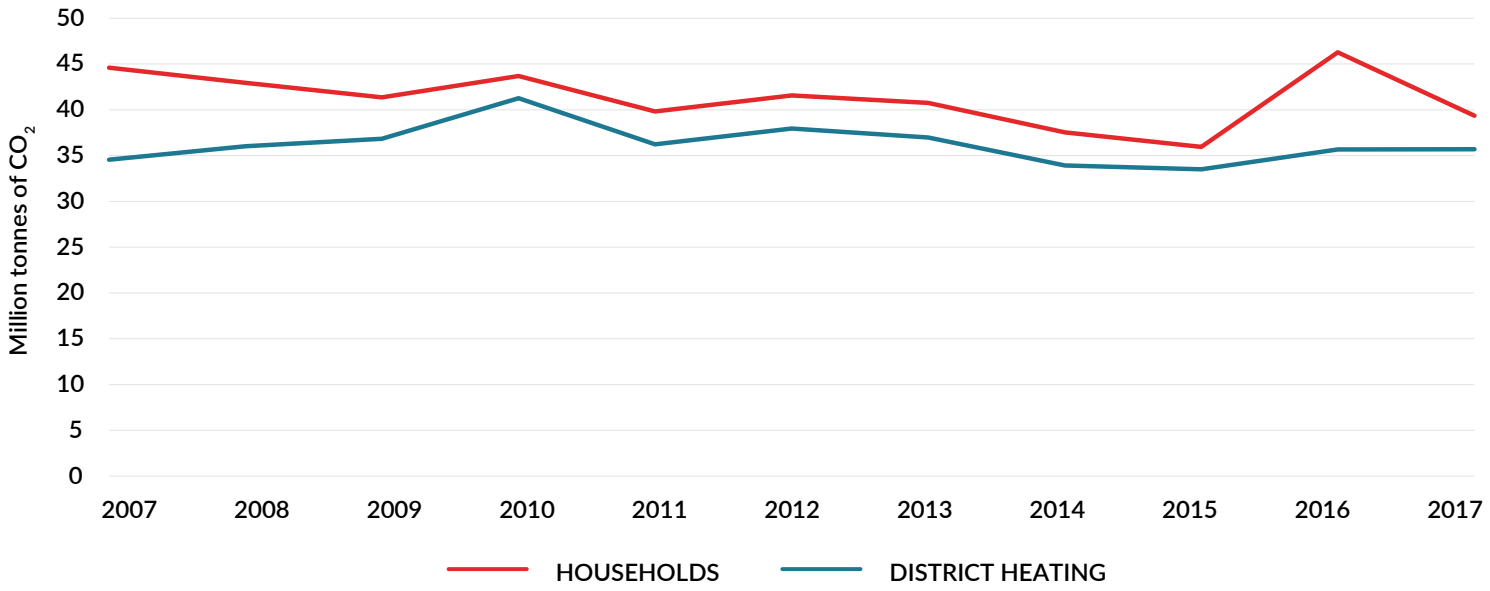


Chart 7. CO_2 emissions from heating, including district heating companies and households

Source: based on data from EEA and ERO.

The main source of smog is the combustion of solid fuels in individually heated households

- Other significant sources of air pollution are industry and transport.

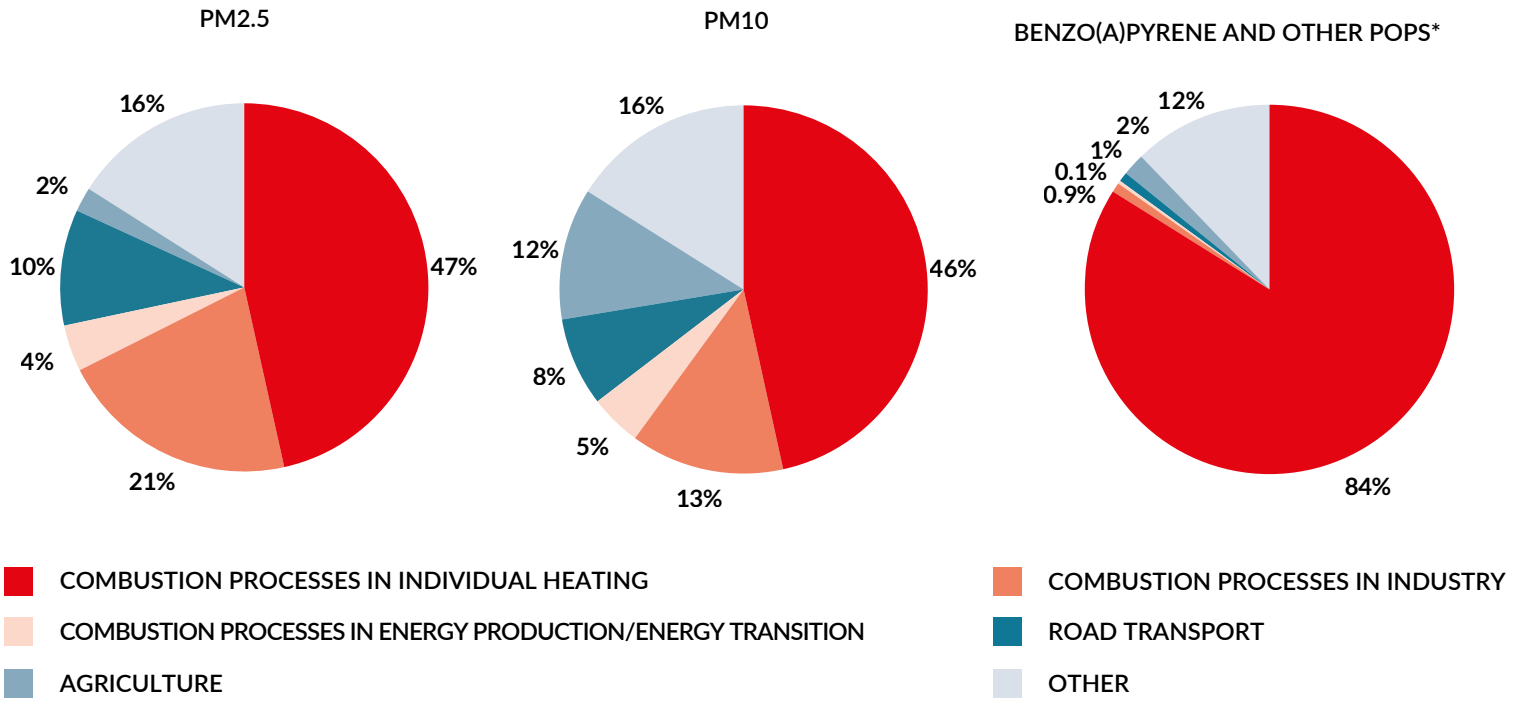


Chart 8. Sources of air pollution in 2017

Source: based on KOBIZE data.

*POP – persistent organic pollutant

Households in Poland consume the most coal in the European Union

- Polish households consume 87% of the coal burned in EU households, which is directly connected to air pollution and smog formation.
- The high share of district heating in the domestic heating of households should be assessed positively.
- Poland stands out in comparison with the EU in terms of the relatively low share of natural gas and electricity in final consumption in households.

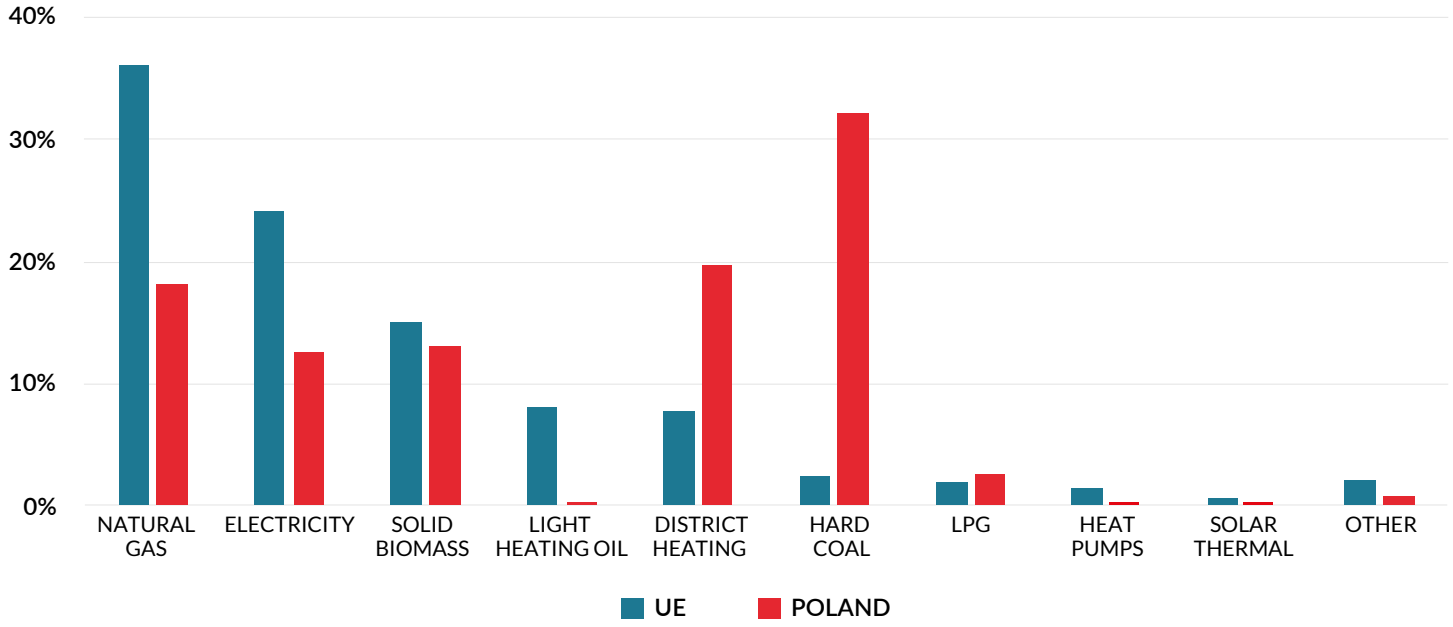


Chart 9. Comparison of the structure of energy consumption in households in the EU and Poland in 2017

Source: based on Eurostat and CSO data.

Energy poverty

Defining energy poverty

- 4.6 million people, i.e., 12% of the Polish population, suffer from energy poverty.

A household is considered to be energy poor when it has difficulties in meeting its energy needs due to low income or the characteristics of the housing. Energy needs are the total consumption of heat, as well as electricity, necessary for a decent standard of living, i.e., heating the apartment, heating water, lighting, preparing meals, and using basic household equipment. If the cost of meeting an energy need is so high that household members are faced with the dilemma of whether to reduce this need or save on other goods such as food, medicine, or education, then we are talking about energy poverty.

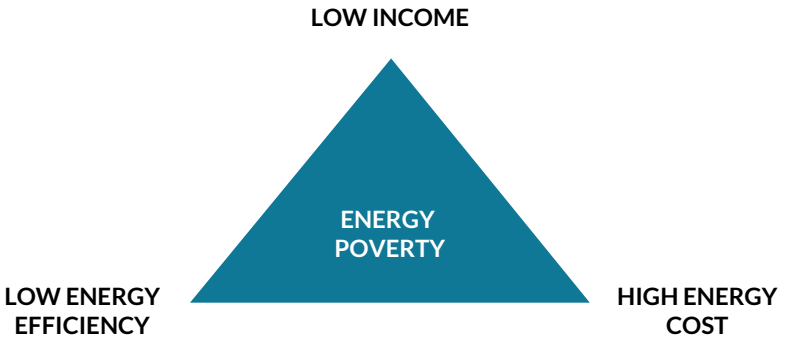


Figure 1. Definition of energy poverty
Source: Institute for Structural Research (IBS).

Most of the energy poor live in single-family buildings constructed between 1961 and 1995

- According to the current regulations, only the energy poor living in multi-family buildings can receive energy allowances.
- All energy poor should be supported.

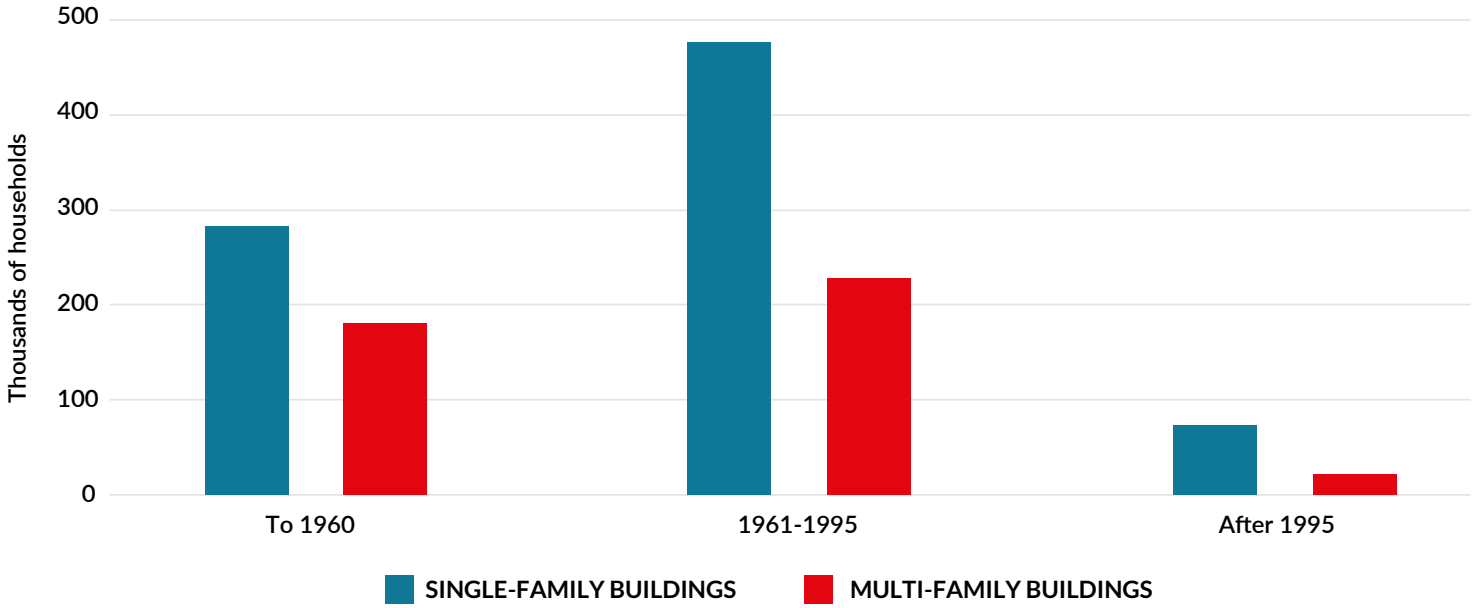


Chart 10. Number of energy-poor households by type and age of building in 2018

Source: IBS.

Most of the energy poor live in single-family houses in the countryside

- In cities, the problem concerns multi-family buildings.

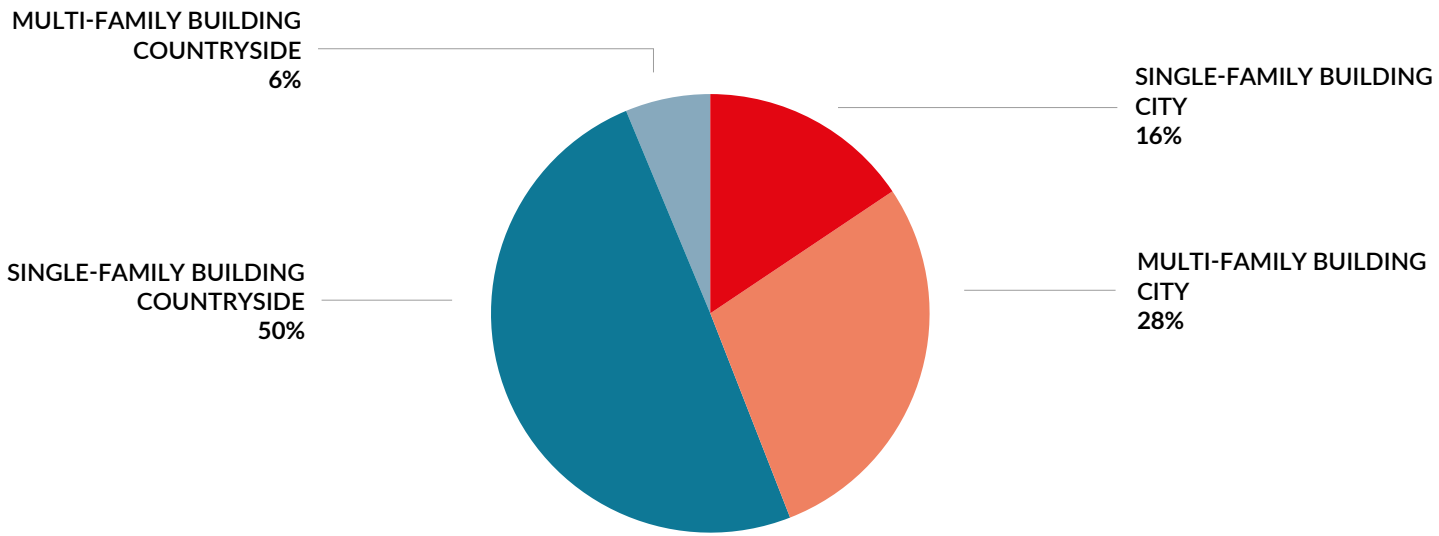


Chart 11. Energy poverty by building type and location in 2016

Source: based on IBS data.

District heating

current state and challenges

The main heat consumers of district heating are households

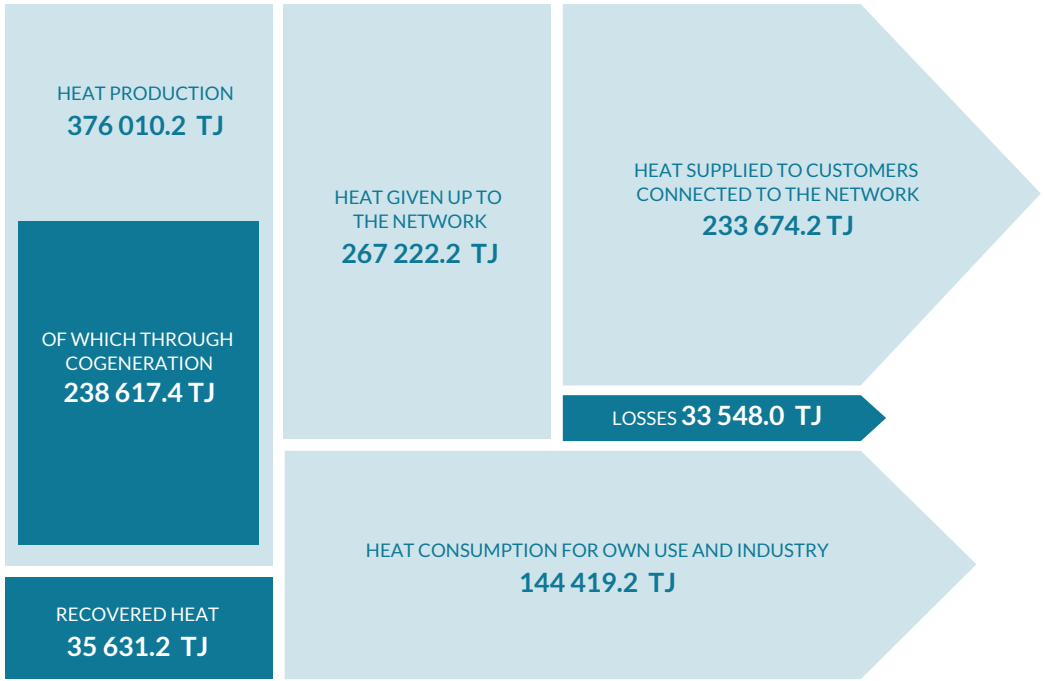


Figure 2. Production and distribution of heat in 2018

Source: based on ERO data.

Only 66% of heat is generated through cogeneration

- The ineffective cogeneration-support mechanisms used in the past resulted in the share of heat from these units remaining unchanged for years.

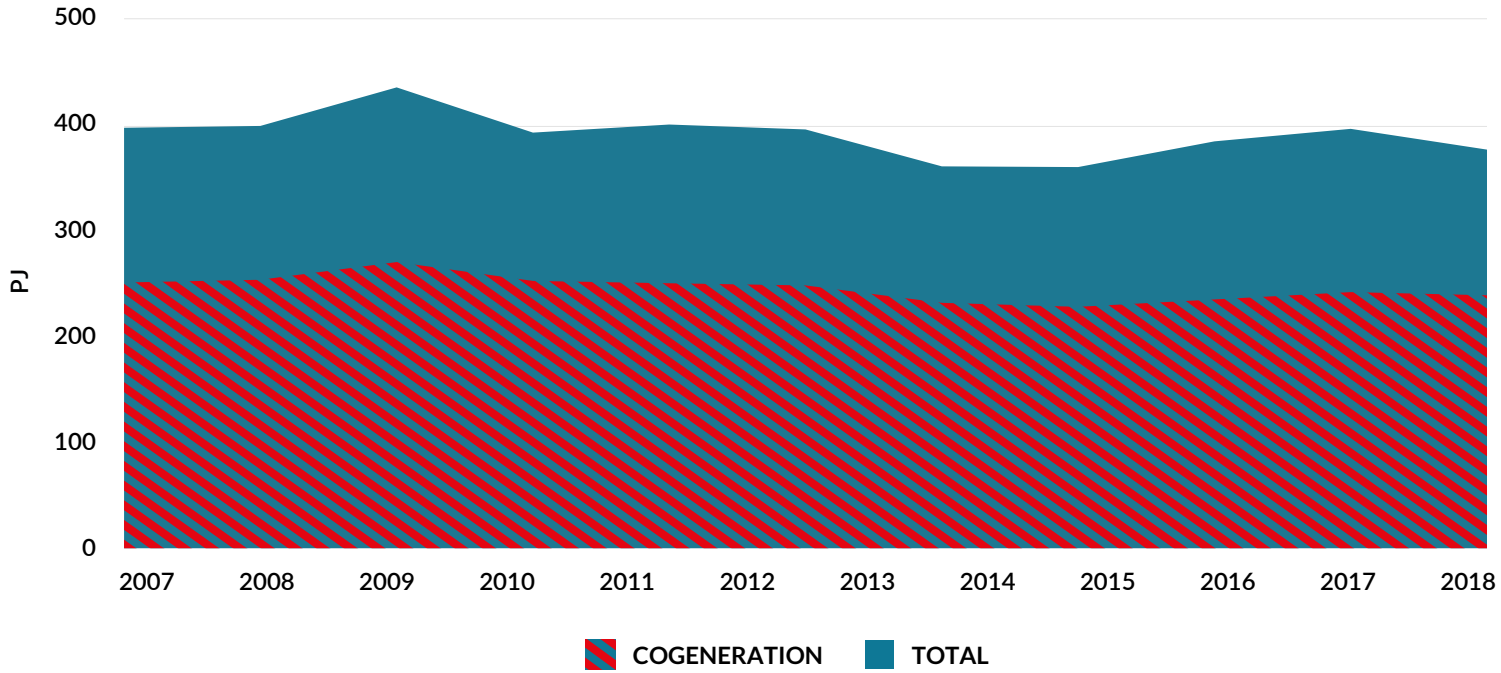


Chart 12. Heat production from cogeneration in the heat stream

Source: based on ERO data.

No action has been taken to change the heating fuel mix

- The use of gas has increased by 3.5 p.p. and of RES by 3 p.p. over the last decade.

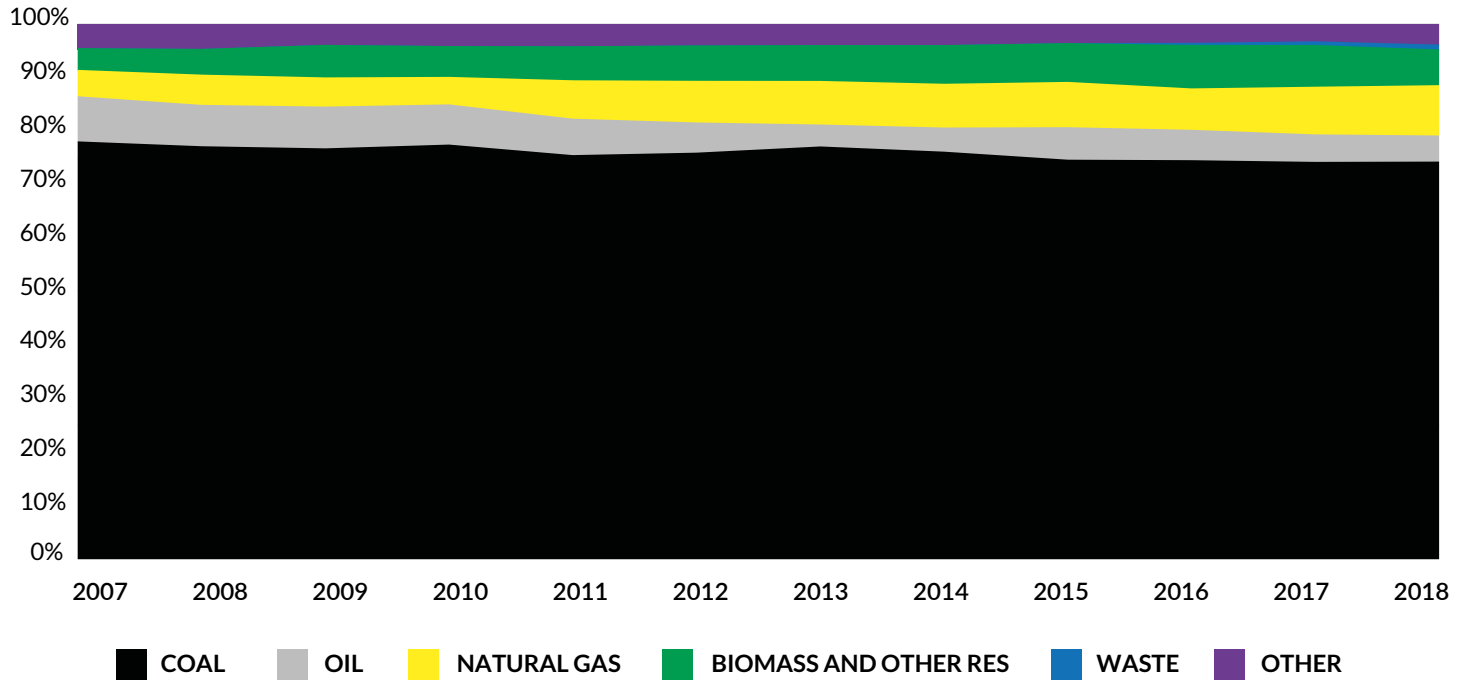


Chart 13. Heating fuels by type

Source: based on ERO data.

As much as 80% of the heating systems in Poland are inefficient

- The high share of inefficient systems and the lack of pressure to change the situation pose a threat to the functioning of district heating in Poland.
- The legal limitation of state aid for inefficient district heating systems hinders their modernisation and transition to low-emission technologies.

An efficient district heating and cooling system are ones using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat.

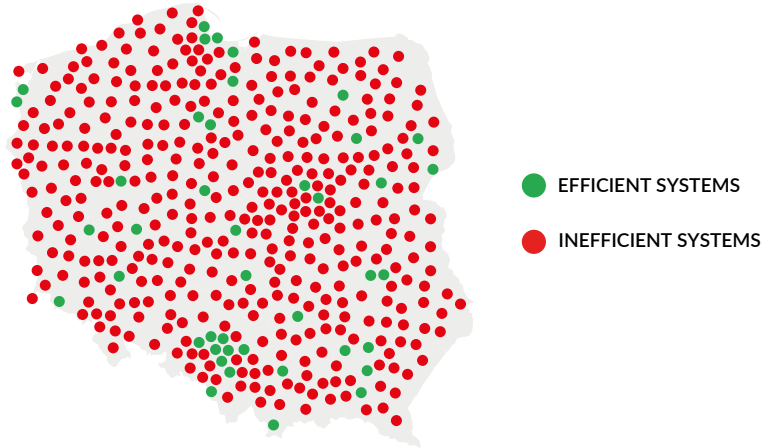


Figure 3. Efficient and inefficient district heating systems in Poland in 2015.
Source: IGCP.

Smaller cities, lower efficiency

- Among the challenges is the high share of inefficient systems in the production of heat for small and medium-sized towns.

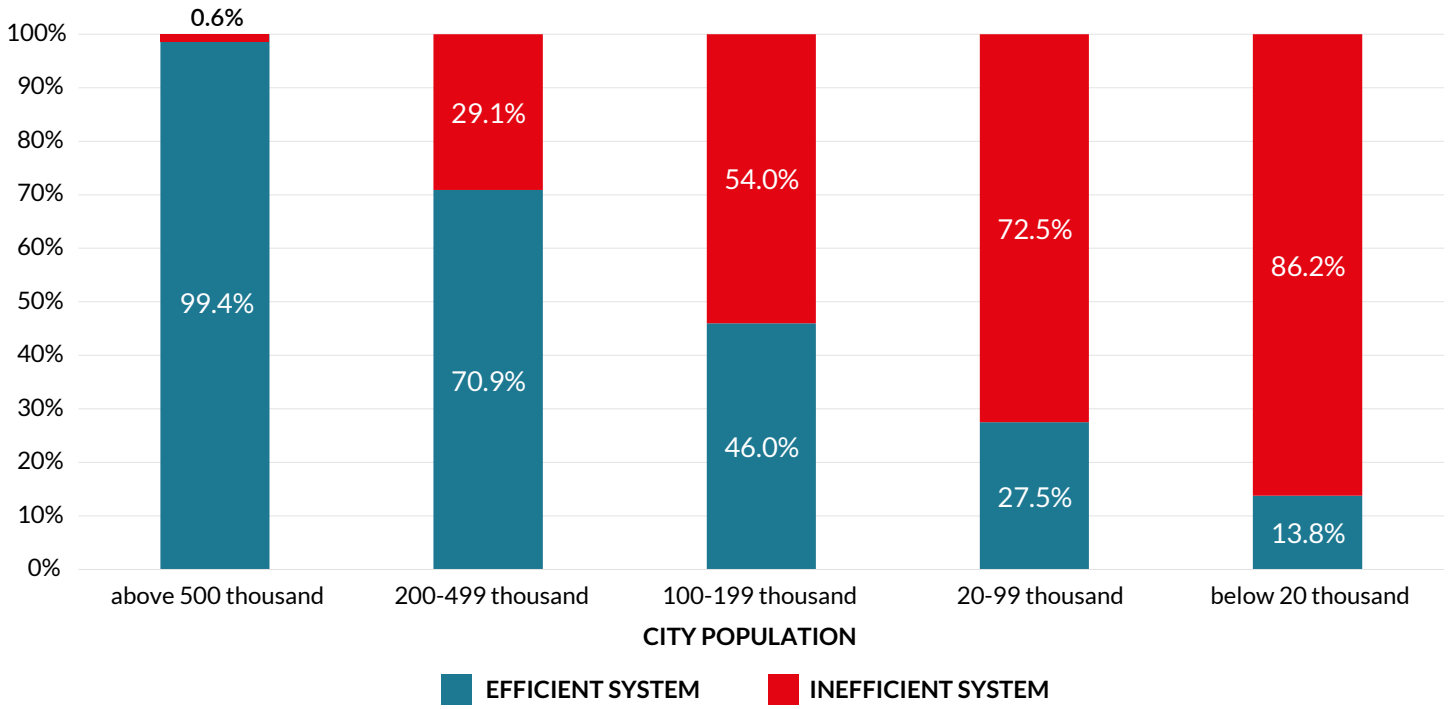


Chart 14. Share of heat supplied from efficient systems in cities of different sizes in 2016

Source: Prepared based on data from the Energy Market Agency (ARE) (including generation capacity from 1 MW), Forum Energii.

The heating sector has adapted to the current challenges, but the most serious are yet to come

- Heating companies have directed their main investment efforts to comply with stricter gas- (SO_x, NO_x) and dust-emission standards.
- Few investments in new gas and biomass generation sources has led to a relatively small decrease in CO_2 emissions in the past decade.
- Due to the large share of coal in the production of heat, the Polish heating sector will have to bear increasingly higher costs of purchasing CO_2 emission allowances.

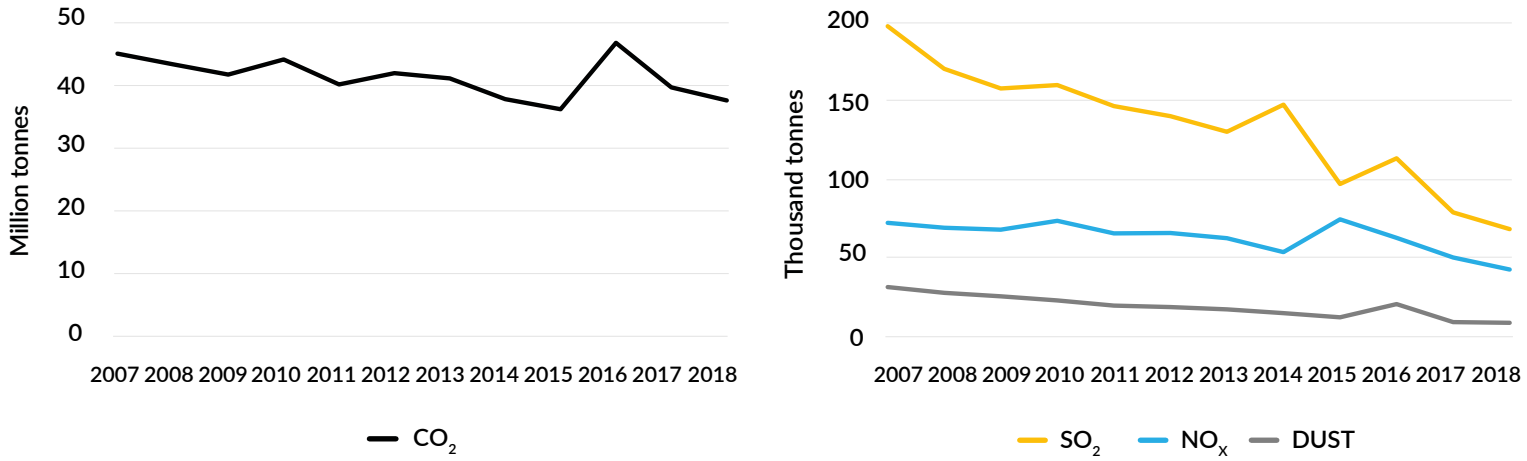


Chart 15. Gas and dust emissions from district heating

Source: based on ERO data.

Heat sales are falling despite an increase in the number of customers

- The strategic challenge for the heating sector is how to serve a market in which energy efficiency is constantly increasing.
- Despite the increase of the district heating network and the heated area of buildings, the volume of heat sold has been decreasing.

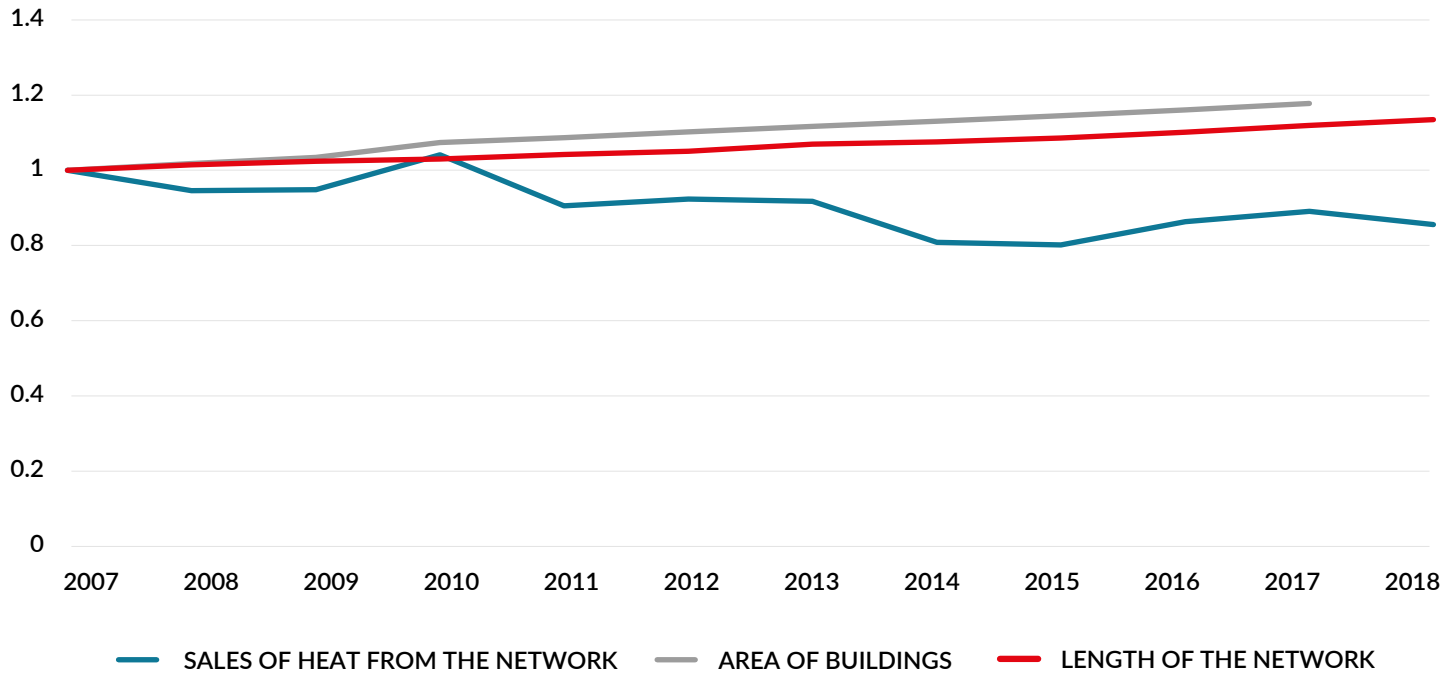


Chart 16. Heat sales compared to the heated area of buildings and network length (index values compared to 2007)

Source: based on data from ERO and the Central Statistical Office.

District heating
financial aspects

Average prices of heat from heat-only units

- Heat prices reflect to a small extent the recent rapid changes in fuel and CO_2 emission allowances prices.
- The lack of biomass co-firing in the power industry has increased the price attractiveness of biomass in district heating. It can be assumed that if co-firing is resumed, the price of biomass heat will start to rise.

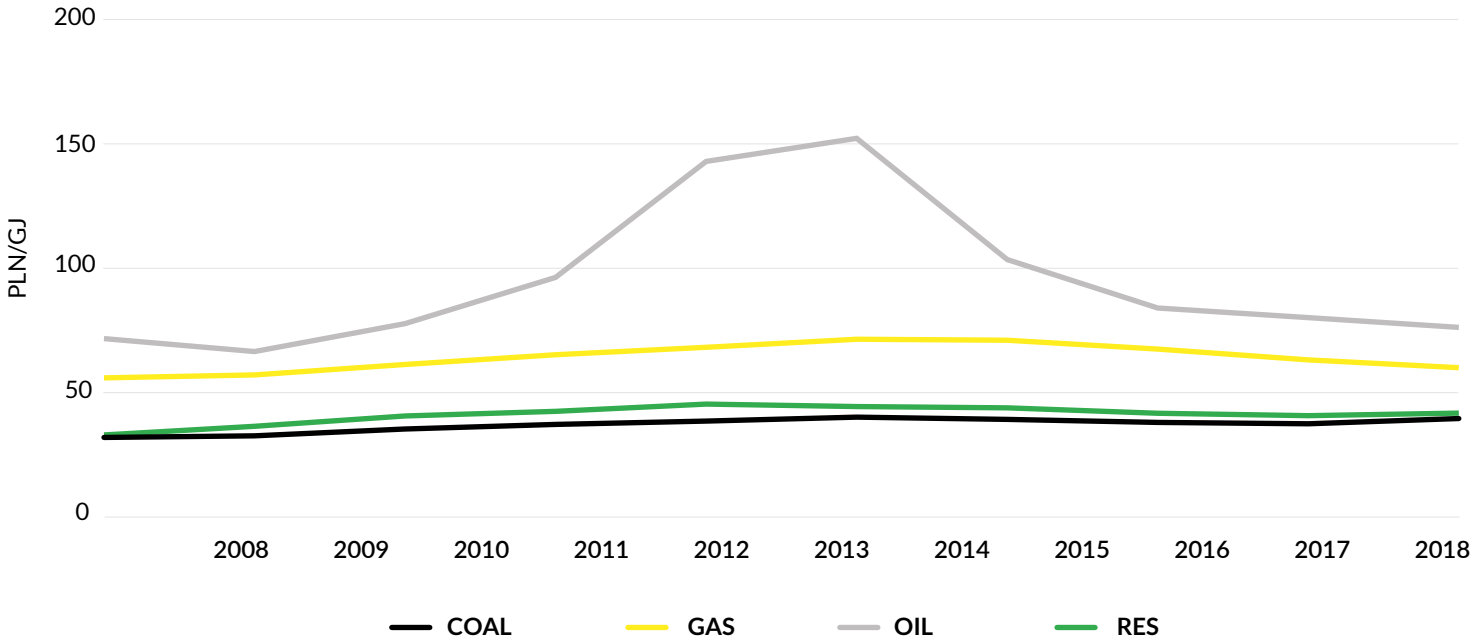


Chart 17. Average prices of heat from heat-only units (without transmission) by fuel

Source: based on ERO data.

Large district heating systems in cities reduce average heat prices for the region

- At the provincial level, there is a large disproportion between the average maximum and minimum heat price of about 30%.
- The heat price is influenced by the large share of inefficient heating systems.

Figure 4. Average price of heat sold from a district heating network by province (voivodship) in 2018

Source: based on ERO data.

The price of heat from coal is becoming less and less competitive

- The trend of increasing the price of heat from coal will intensify because of the rising cost of CO_2 emission allowances and increasingly stringent environmental standards.

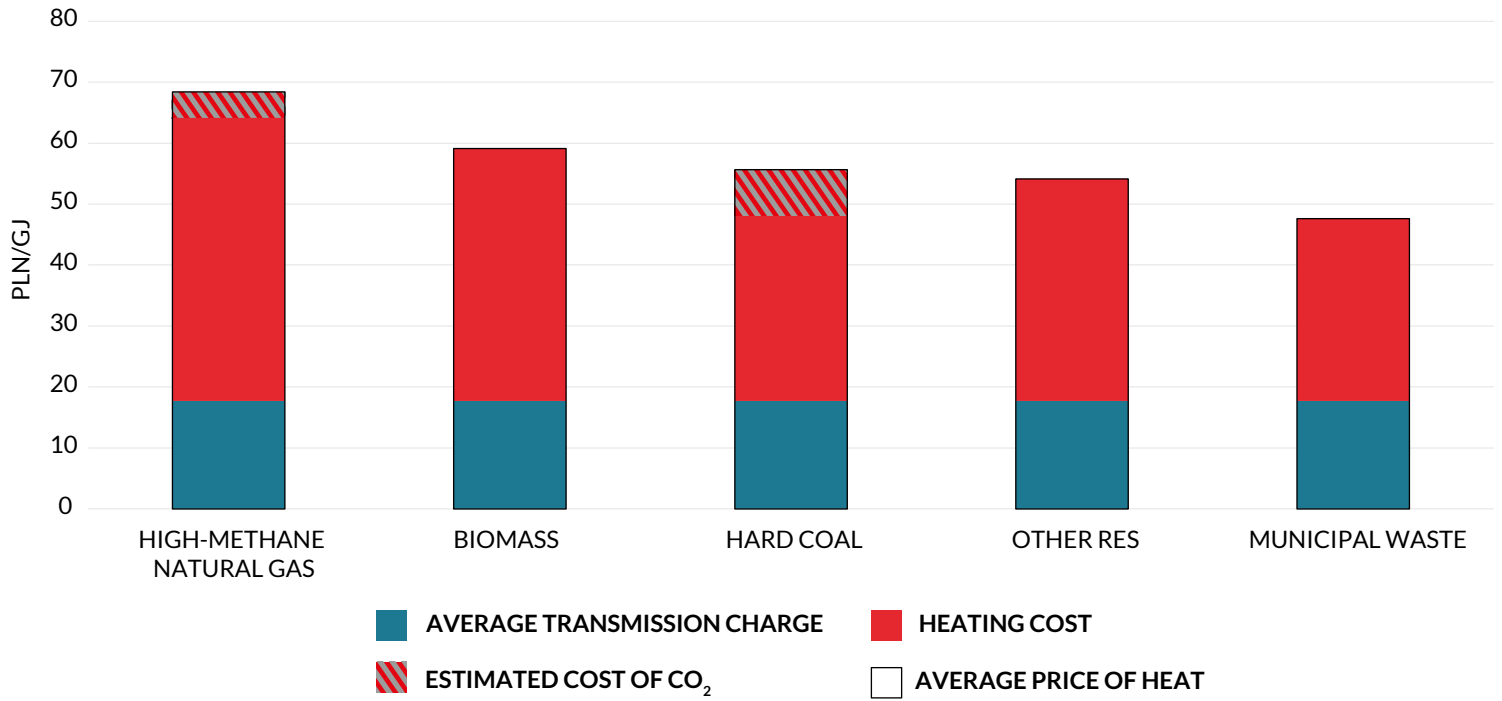


Chart 18. Average price of district heat from different fuels in 2018

Source: based on ERO data.

Heat producers' costs exceed their income

- The permanent lack of profitability from production prevents investment in clean technologies.
- Revenues from distribution allow the network to develop successively.

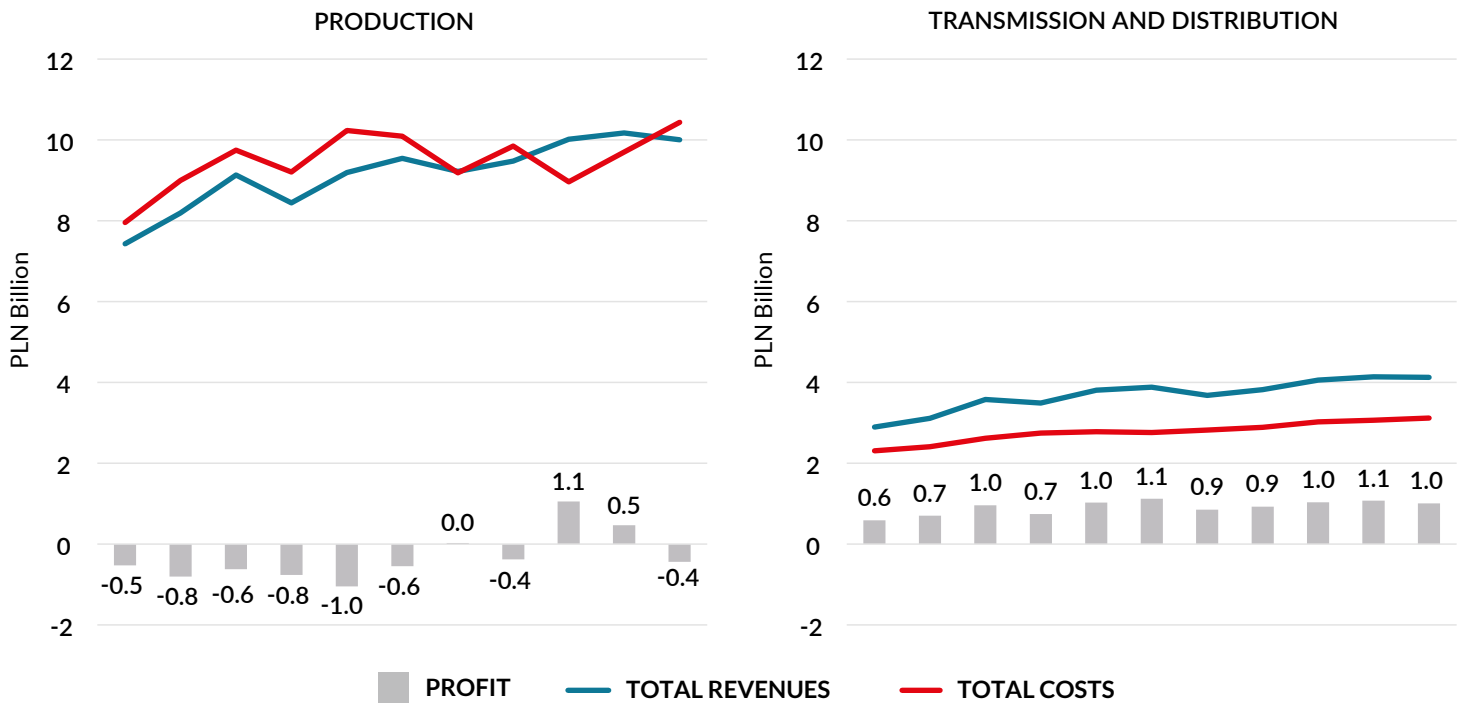


Chart 19. Total revenues, costs, and profit of district heating companies in 2018 by type of activity

Source: based on ERO data.

District heating
in the European Union

Poland has the largest number of district heating customers among all EU countries

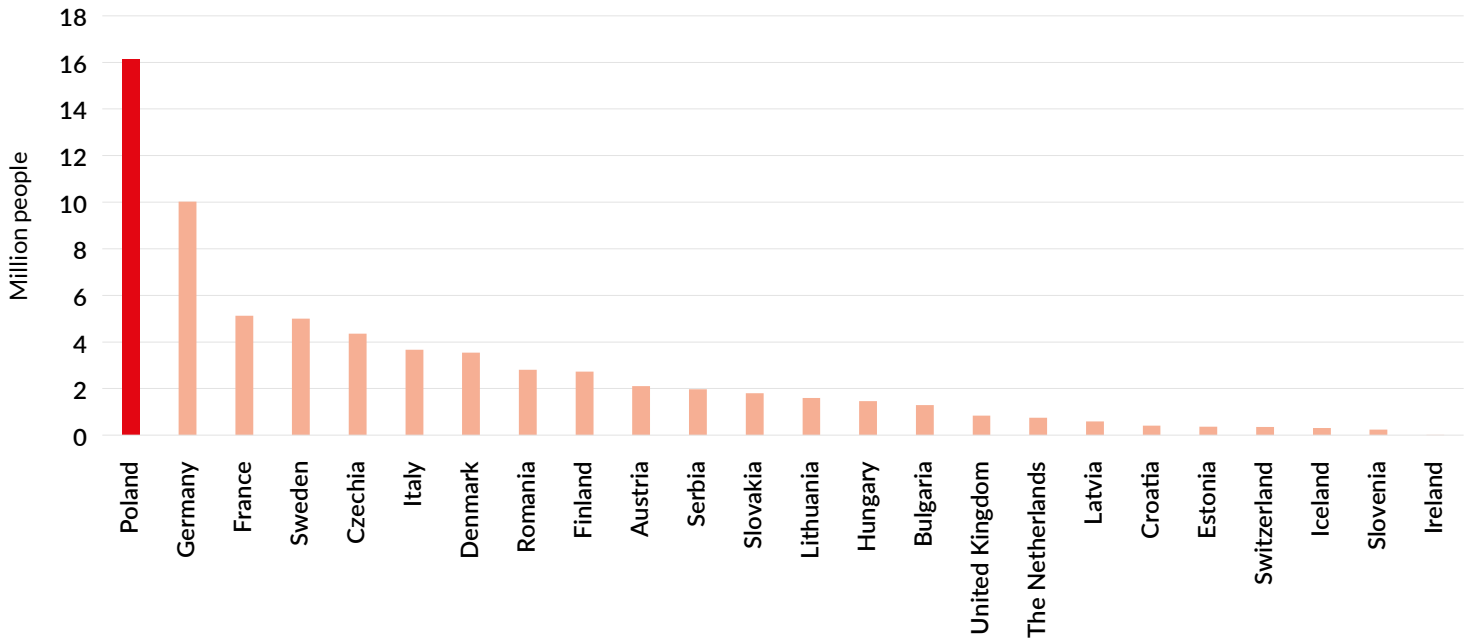


Chart 20. Population using district heating in Europe in selected European countries in 2015

Source: based on data from Euroheat & Power, European Commission.

Poland is second in Europe when it comes to the amount of consumed heat produced in district heating systems

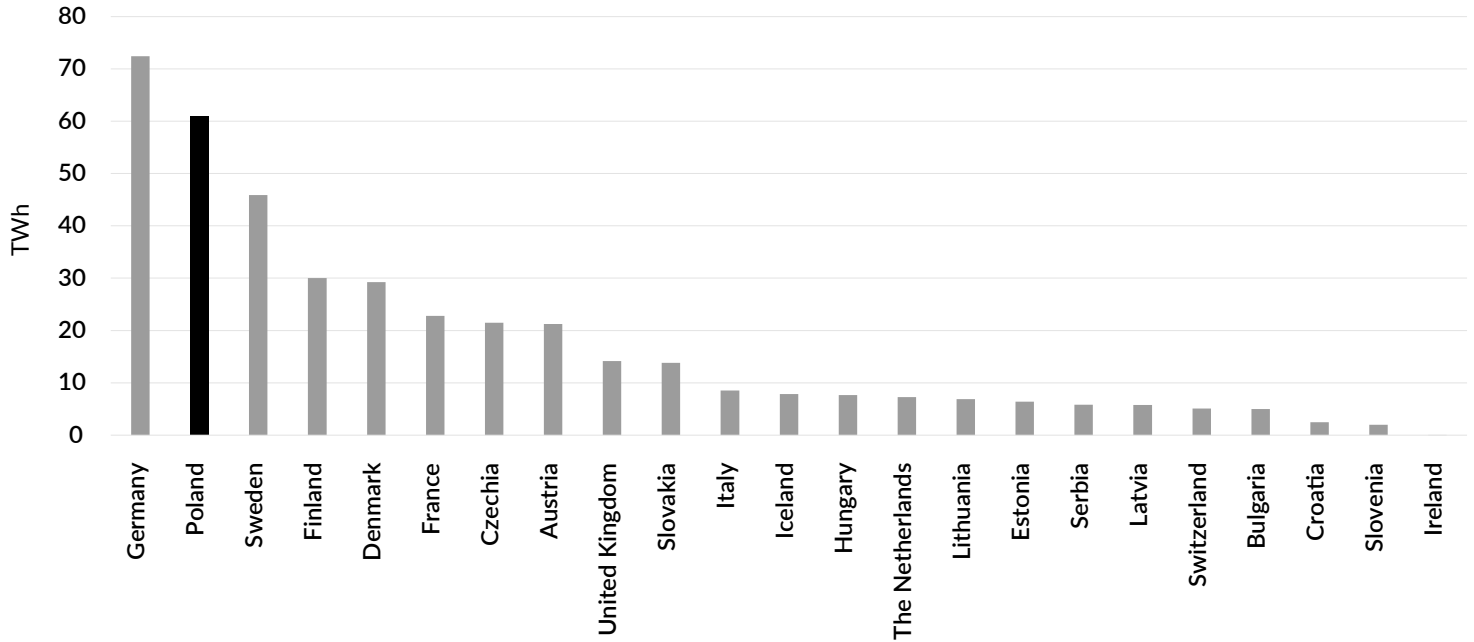


Chart 21. District heat consumption in selected European countries in 2015

Source: based on data from Euroheat & Power, European Commission.

Despite the extensive heating system in Poland, the share of cogeneration compared to the EU is relatively small

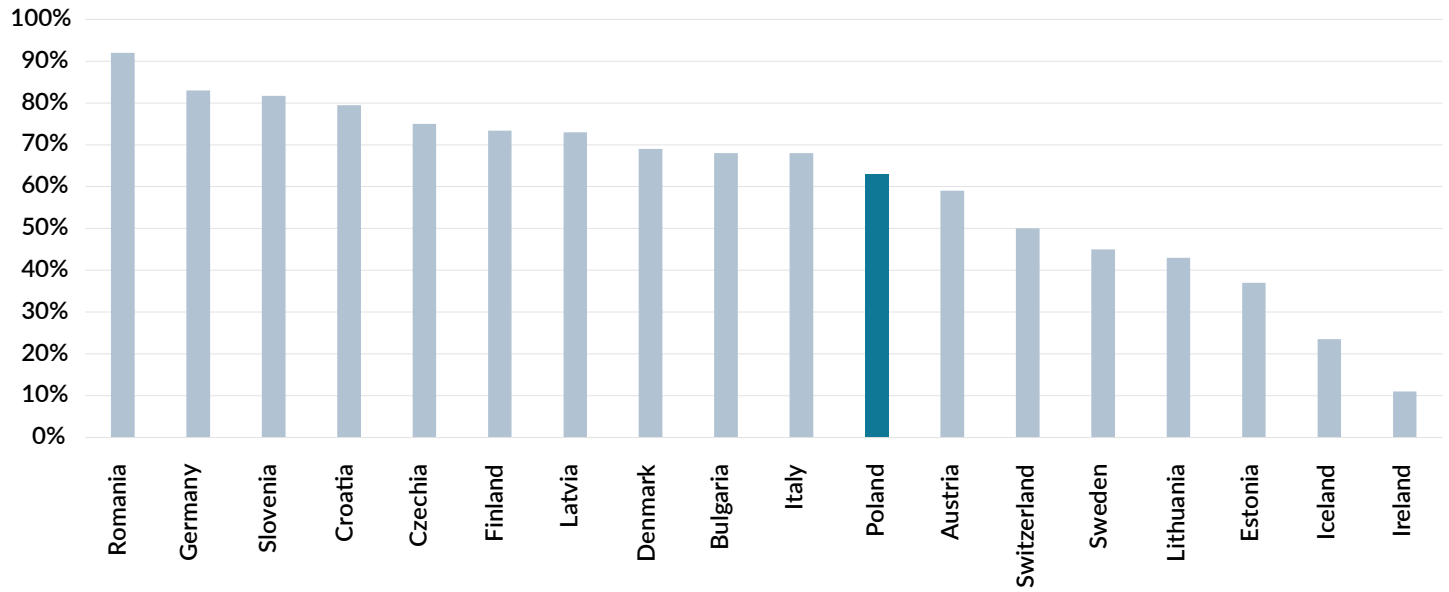


Chart 22. Share of cogeneration in district heating in the European Union in 2017

Source: based on data from Euroheat & Power, European Commission.

For more than 30 years, the fuel mix in the EU has been changing rapidly

- In recent years, RES has been developing quite dynamically.

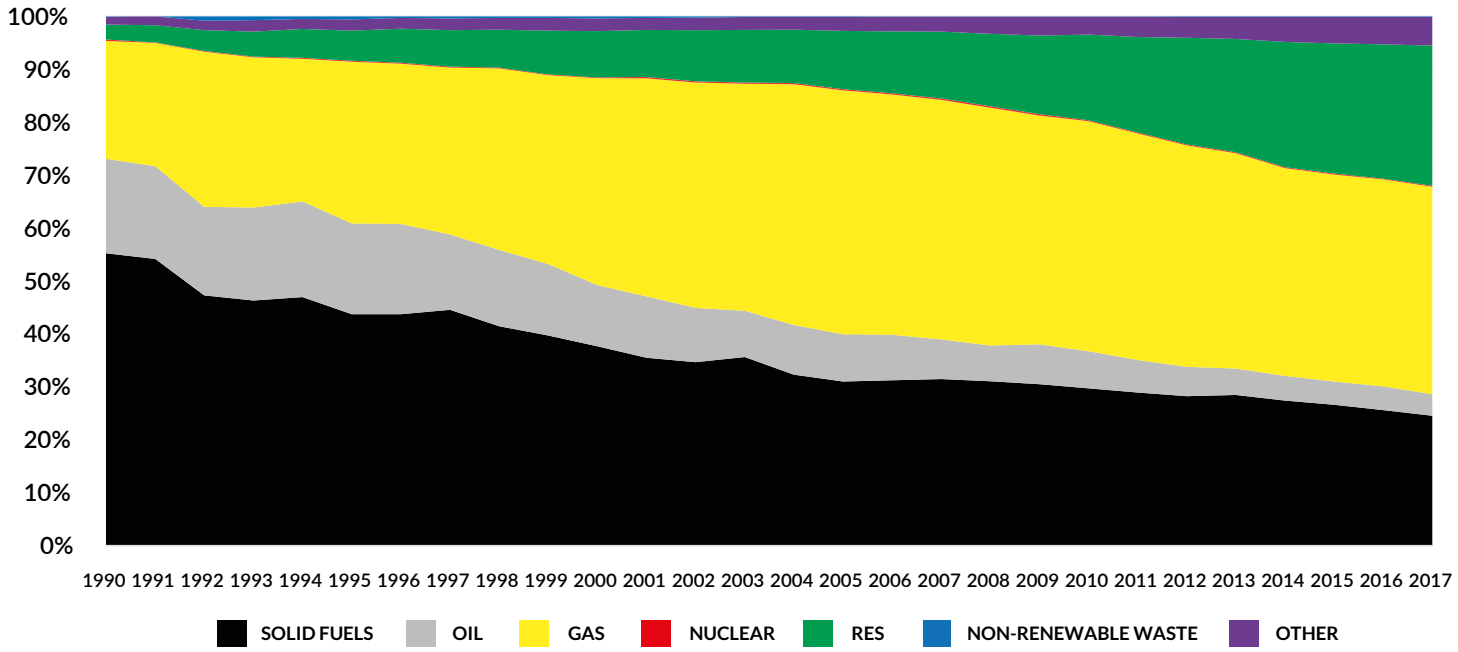


Chart 23. Structure of fuels used to produce district heating in the European Union

Source: based on Eurostat and European Commission data.

District heating fuel mix of selected EU countries in 1990-2017

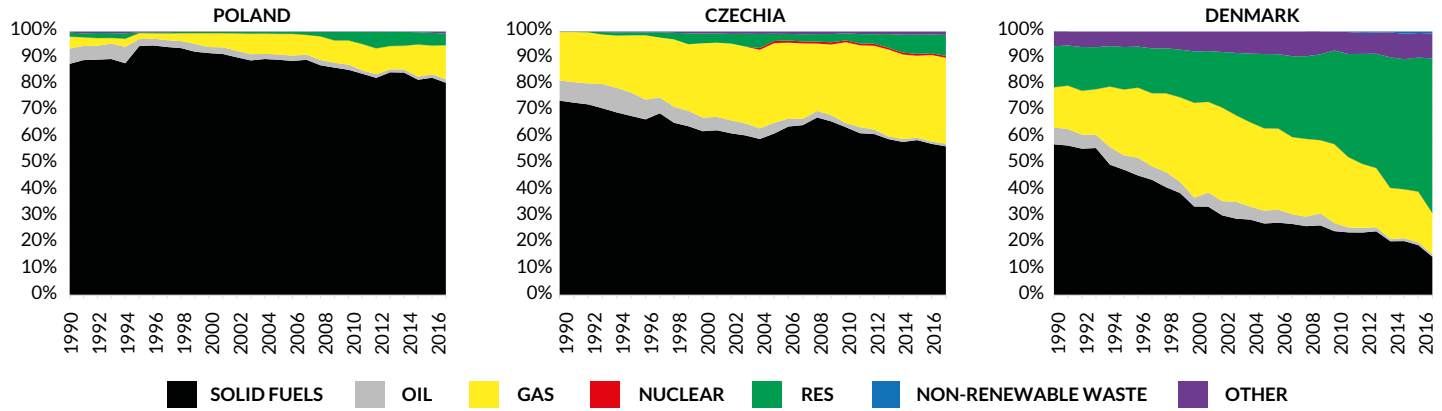


Chart 24. Structure of fuels used to produce district heating in Poland, Chechia and Denmark

Source: based on Eurostat and European Commission data.

District heating fuel mix of selected EU countries in 1990-2017

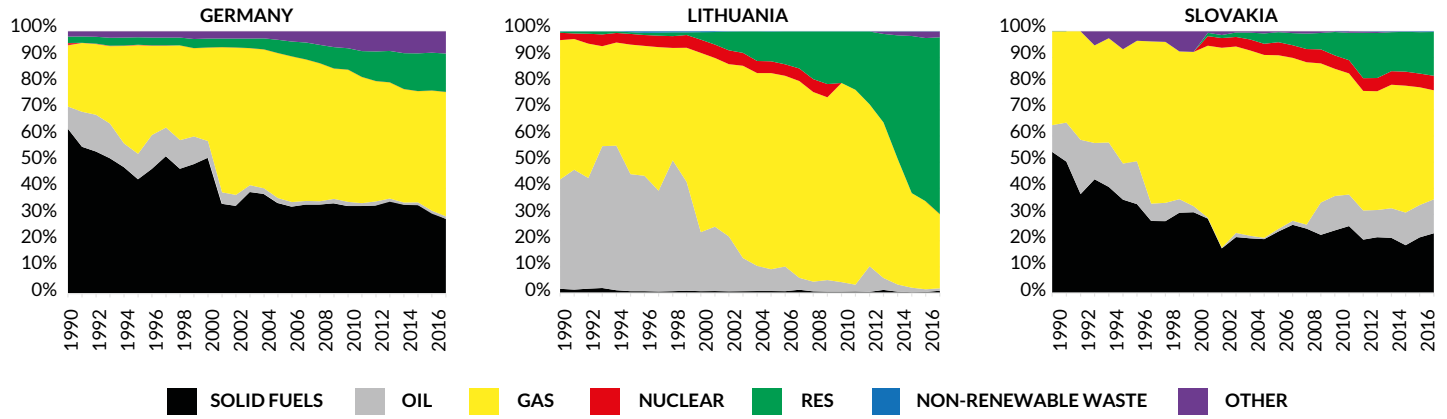
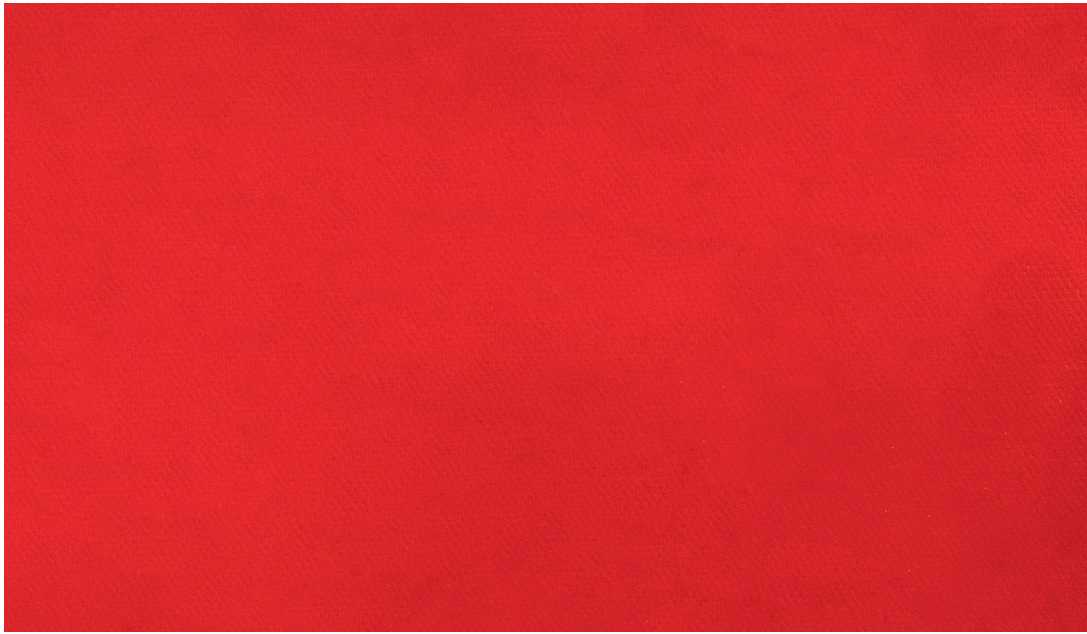


Chart 25. Structure of fuels used to produce district heating in Germany, Lithuania, and Slovakia

Source: based on Eurostat and European Commission data.

Heating in Poland
Edition 2019



FORUM ENERGII, ul. Chopina 5A/20, 00-559 Warszawa
NIP: 7010592388, KRS: 0000625996, REGON: 364867487

www.forum-energii.eu