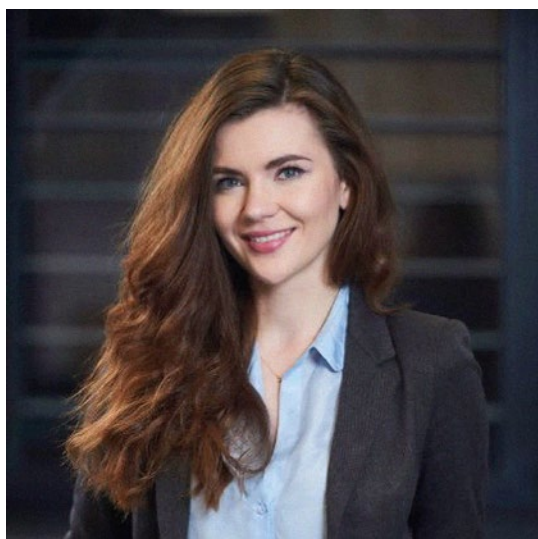


Wanda Buk & Marcin Izdebski

Analysis of the impact of ETS2 on the cost of living for Poles

Warsaw, June 2024

About the authors



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While working in law firms, she advised entities in regulated sectors. She held the position of Deputy Minister of Digitalisation, overseeing the telecommunications area. She carried out more than a dozen legislative projects for the sector. From 2020 to 2024, she served as Vice President of the Management Board for Regulatory Affairs at the Polish Energy Group (PGE S.A.), where, among other things, she supervised activities related to national and international regulations. On behalf of the Polish Electricity Committee, she represented the Polish energy sector in international forums. She was several times included in the ranking of *the 50 most influential lawyers* prepared by Dziennik Gazeta Prawna.



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Management summary

The European Union is undertaking the world's most far-reaching CO₂ reduction initiatives in the world. Having announced its ambition to achieve climate neutrality by 2050, it is consistently introducing new policies and regulations affecting virtually every area of Europeans' lives. Declaring that the transition to be cost-effective, socially balanced and fair, it has revised the Emissions Trading Scheme Directive to introduce a new ETS2 mechanism, parallel to the existing EU ETS, covering transport and construction. The mechanism is expected to become operational in 2027 and the implementation of the mechanism is not expected to be delayed due to the unlikely occurrence of the grounds provided for in the Directive that allow implementation to be delayed by one year.

The new system will charge emissions from fuel combustion by households and businesses not yet covered by the ETS1, including small heating plants, bakeries, caterers, shops. The additional costs will be hidden in the price of fossil fuels e.g. coal, gas, heating oil, motor fuels. The cost of purchasing fuels will increase not only by the amount of the emission charge, but also by the amount of VAT charged on the charge.

Poland is one of the countries whose citizens will be most affected by the launch of ETS2. For climatic reasons, we belong to the group of countries with a demand for heat that exceeds the EU average. We also have the highest use of coal in Europe, which is the most emitting fuel, for heating residential buildings. The highest costs of ETS2 will be borne by residents of the oldest, uninsulated single-family buildings.

In Poland in 2022, the share of final energy expenditure, as a proportion of total expenditure, was one of the highest in the EU – in Poland it was 7.8 per cent, only the Slovaks were ahead of us by 0.1 per cent, while the EU average was 5.1 per cent. The increase in the purchase costs of transport fuels will affect households both directly, when they fill up their cars, and indirectly. The indirect impact will be on the increased cost of transport services. Assuming fuel consumption at 2023 levels, the total net cost of purchasing transport-related emissions allowances will be around PLN 11.5 billion in 2027, rising to PLN 21 billion in 2030. Such a high increase in fuel purchase costs will force entrepreneurs in other industries to raise the prices of their goods and services.

The steep price increase will be felt twice – after the launch of ETS2 in 2027 and in 2030. – after the merger of ETS1 and ETS2. In the initial period, if the price of CO₂ allowances rises above €45 per tonne, there will be an increase in the number of allowances available on the market, which could result in a fall in their price. The European Commission al-

ready foresees a price increase above the original ceiling of €45 per tonne to €50 in 2028. After the merger of the systems, ETS2 allowance prices will equal those of the ETS1 (the average price in 2023 is €83.85), and households and small businesses will compete for the purchase of a limited number of allowances with power plants, steel mills or cement works. If the decline in industrial emissions is lower than currently assumed, households will bear a much higher cost than currently projected. If this scenario materialises, some citizens may be forced to give up their own means of transport and lower the thermal standards of their homes. Therefore, it is already necessary to initiate diplomatic and lobbying efforts in the European Union to keep ETS1 and ETS2 systems separate after 2030 and to introduce an effective mechanism to limit the level of prices in ETS1 and ETS2.

According to our analysis, which we based on the allowance price forecasts made by the European Commission, the introduction of ETS2 will affect the following prices as follows

According to our analysis, which we based on the allowance price forecasts made by the European Commission, the introduction of ETS2 will affect the following prices as follows:

The gas price, which averaged PLN 200.17/MWh in 2023, will increase as follows [PLN/MWh]:

2027	2028	2029	2030	2035	2040	2045	2050	2055
25.70	25.70	47.11	47.11	119.91	248.39	368.30	419.69	445.38

The price of a tonne of coal, which currently fluctuates between PLN 1,200 and 1,500, will increase [PLN/t]:

2027	2028	2029	2030	2035	2040	2045	2050	2055
306	509	560	560	1426	2954	4381	4992	5298

The net additional annual cost of heating a building, with average coal consumption for heating purposes, with an area of 100 m² will be [PLN]:

2027	2028	2029	2030	2035	2040	2045	2050	2055
1039	1732	1905	1905	4849	10045	14895	16973	18012

Net annual additional cost of heating a building, with average natural gas consumption for heating purposes, of 100 m² in relation to ETS2 in constant 2023 prices [PLN].

2027	2028	2029	2030	2035	2040	2045	2050	2055
301	501	551	551	1403	2906	4309	4910	5211

The additional annual cost of heating water for a household with average hot water consumption will increase as follows [PLN]:

	2027	2028	2029	2030	2035	2040	2045	2050	2055
natural gas	79	132	145	145	370	766	1135	1294	1373
coal	153	254	280	280	712	1475	2187	2492	2645

The additional annual cost of cooking meals will increase as follows [PLN]:

	2027	2028	2029	2030	2035	2040	2045	2050	2055
natural gas	62	103	113	113	288	596	884	1007	1069
LPG	70	117	129	129	328	680	1008	1149	1219

The net additional cost of transport fuels will increase as follows [PLN/l]:

	2027	2028	2029	2030	2035	2040	2045	2050	2055
diesel	0.35	0.59	0.65	0.65	1.65	3.41	5.06	5.77	6.12
petrol	0.29	0.49	0.54	0.54	1.37	2.84	4.22	4.80	5.10
LPG	0.21	0.34	0.38	0.38	0.96	1.99	2.96	3.37	3.58

For an average Polish family (statistically average based on CSO data), the cumulative additional ETS2 cost for gas heating will be in the years 2027–2030: PLN 6 338 and in the years 2027–2035: PLN 24 018. For coal use, it will be PLN 10,311 and PLN 39,074 respectively. In order to cover the additional costs associated with ETS2, an average Polish family in 2027 will have to spend the equivalent of 45% (in 2030 – 82%) of the monthly minimum wage in the case of gas heating, and 73% (in 2030 – 134%) in the case of coal heating.

A family with high energy consumption will incur a cumulative cost of £12100 between 2027 and 2030 if it heats with gas, and between 2027 and 2035: £45851. If it uses coal it will be PLN 20403 and PLN 77318 respectively. In order to cover the additional costs associated with ETS2, an average Polish family in 2027 will have to spend the equivalent of 86% (in 2030 – 157%) of the monthly minimum wage in the case of gas heating, and 144% (in 2030 – 264%) in the case of coal heating.

As part of the report, we have also analysed other variants (e.g. 2+2 families, childless couples), but it is clear that accurately calculating the impact of the new charges on the household budget of individual families requires access to a lot of specific data, which is why a calculator has been made available on the ets2koszty.pl website, allowing readers to calculate for themselves the costs that each of them personally will have to bear in connection with ETS2. Poland already has a wide range of tools that have been effective

in increasing household energy efficiency in recent years. Some of them – such as the CEEB tool, the issuance of energy certificates, the distributed system of sources and support areas – need to be modified, but they provide an excellent foundation for limiting the negative effects of ETS2 entry. Preparing for its launch requires, first and foremost, making the public aware of the upcoming legal changes and the consequences of these changes for their household budgets.

The administration's goal today should be to mobilise Poles to take action as soon as possible to reduce the carbon footprint of their buildings, which, in addition to extensive information campaigns, will only be achieved with the proper design of support programmes. Given the scale of the challenge and the timeframe for implementation, overlapping investments and competition for both building materials and access to skilled workers should be expected. Competition will also apply to the distribution of public resources allocated to transformation. It is important that their disbursement is preceded by a comprehensive analysis and interplay between the different programmes. Otherwise, similar results will be achieved at a higher financial cost, realistically leading to a decrease in the availability of transformation funds.

From the authors

The European Green Deal is a set of policies and legislation aimed at achieving climate neutrality (zero net greenhouse gas emissions) for the European Union by 2050. The policies that make up the Green Deal are intended to represent the European Union's contribution to limiting the increase in average global temperatures and thus contribute to reducing climate change. Currently, the European Union is the world leader in terms of reducing CO₂ emissions. Other countries in the world are not taking such far-reaching initiatives.

The interim goal to achieve climate neutrality is to reduce CO₂ emissions by 55 per cent by 2030 compared to 1990. To achieve this, the European Commission has prepared the largest regulatory change package in its history, the so-called Fit for 55. It applies to basically all areas of life.

In this report, we would like to focus on the regulation that, of the entire package, has the greatest impact on the household budgets of Poles and whose effects they will be confronted with on a daily basis, not only when using energy carriers directly, but also, for example, when buying products that require delivery by combustion vehicles, i.e. virtually all products.

This is due to a change in the rules for paying for greenhouse gas emissions. Until now, emission charges were mainly paid by large companies (ETS1) and citizens felt the impact of this policy in the form of increased charges for electricity and system heat. Over the years, this impact was small, with a noticeable increase coming only after 2020, when the announcement of changes to the emissions levy system led to a several-fold increase in the price of emission allowances. The effect of these changes overlapped with the energy crisis caused by Russia's actions.

A key change to the emissions charging scheme is the inclusion of emissions resulting from transport, including the use of private cars and the burning of fuels to heat residential buildings (ETS2).

Sound public discussion and the design of adequate state policies require access to data and in-depth analysis. The aim of our report is to provide citizens, including policy makers, with information on the actual impacts associated with the entry into force of ETS2. We hope that our work will contribute to the establishment of policies that provide adequate support to citizens in relation to the rising costs of home heating and the use of traditional cars.

We would also like to point out that due to the scale of the investments required, it is a colossal, if not impossible task to carry them out in the short or even medium term. This means that, in addition to financial support to increase the scale of investment in improving the energy efficiency of buildings, it is also necessary to introduce mechanisms

to compensate citizens for the increased costs of day-to-day living resulting from CO₂ emission charges.

The seemingly distant date of entry into force of ETS2, i.e. 1 January 2027, is de facto very close. Postponing legislative work will lead to the need to adopt a number of erroneous legal solutions in the future, as the administration, business and citizens will not be prepared to implement better solutions, which may require time-consuming changes, if only in the IT sphere. Politicians under social pressure due to the proximity of the entry into force of costly regulations will implement ad hoc, point solutions aimed at limiting social discontent rather than solving a systemic problem.

We would also like to emphasise that the aim of the Report is not to provide a comprehensive assessment of the Green Deal and the tools chosen at EU level to achieve climate neutrality, but only to show the effects of the already adopted EU regulations on changing the CO₂ emission charging scheme on the living costs of Polish citizens, together with a number of proposals to reduce these effects. We believe that the Report and the calculator provided with it, which will enable everyone to calculate the costs of the new regulations for their own households, will encourage Poles to take action to decarbonise their homes as soon as possible, while at the same time creating the right pressure on the public administration to launch (or continue) the necessary support programmes, which will not only focus on offsetting the costs of the new regulations once they come into force, but on the actual energy transformation of our homes and transport.

All calculations presented in the report are based on CO₂ emission allowance price projections prepared by the European Commission and provided by it to the Member States for use in designing their energy and climate policies.

Contents

Towards a Green Deal. Historical and regulatory context.	10
Origins of regulation – UN	10
EU regulations	12
Origins of regulation	12
Energy and climate change package	12
The 2014 Energy Policy Framework.	13
Green Deal – 2019	13
EU Emissions Trading Scheme – ETS1 and ETS2	16
ETS1	16
ETS2	18
Social Climate Fund	19
National context	20
Construction	20
Transport	23
ETS1 in Poland	23
Analytical part – household costs	26
Cost of ETS1	26
Cost of ETS2	27
Emission costs associated with the use of residential buildings	28
Final energy consumption of households in the European Union	30
Prices for fuels used to heat buildings in connection with ETS2	33
Housing conditions in Poland	34
Cost of heating buildings with their own heat source	36
Cost of heating water	38
Cost of cooking meals	38
Transport-related emission costs	39
Motor fuel prices in connection with ETS2	39
Cost of car use	40
ETS2 costs for sample families	41
Average family	42
Energy-intensive family	43
Family 2+2	44
Couple without children	45
Other costs related to emission charges	46
Heating	46
Electricity	48
Indirect costs	48
Emission reduction investments	49
Recommendations	50
Contact	52
Analysis of the impact of ETS2 on the cost of living for Poles	9

Towards a Green Deal. Historical and regulatory context.

Origins of regulation – UN

It was then that the first global climate conference was held, at which the Intergovernmental Panel on Climate Change (hereinafter IPCC) was set up and attention was drawn to the rising concentration of CO₂ in the atmosphere. The IPCC's first report was published in 1990. It stated that the Earth's average surface temperature would increase by approximately 0.3 degrees Celsius (with an uncertainty range of 0.2 to 0.5 degrees) over the coming decades, which is a greater increase than has occurred over the past 10,000 years.¹

In the early 1990s, the United Nations prepared the Framework Convention on Climate Change (hereinafter 'UNFCCC'). This was the first international treaty, with Parties committing to national action to stabilise greenhouse gas concentrations in the atmosphere and to develop national programmes to adapt to climate change. The UNFCCC also became the platform on which periodic international conferences and negotiations on action to reduce climate change are still held today, called the Conference of the Parties (COP)². The IPCC has systematically issued successive reports assessing climate change – six have been issued to date, the last one in 2022 which, even more alarmist than the earlier editions, called on governments to take radical action to reduce greenhouse gas emissions into the atmosphere.

The Kyoto Protocol (hereafter also 'Protocol') was adopted at the end of 1997 and was a supplement to the UNFCCC. It was groundbreaking in that it was the first document to commit signatories to specific targets for greenhouse gas emissions, which included carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆)³. The signatories to the Protocol committed to reduce their emissions by at least 5 per cent below 1990 levels between 2008 and 2012. The document categorised two groups of countries – highly developed and highly industrialised countries, which were required to control and reduce their emissions, and a second group – developing countries, which had no reduction targets imposed, but could benefit from the mechanisms introduced by the Protocol. It was this document that defined the CO₂ emissions trading mechanism for the first time.

The Kyoto Protocol entered into force in 2005 once the 2x55% rule had been met, i.e. ratified by more than 55% of member countries producing a minimum of 55% of global

1 www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_i_full_report.pdf

2 isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19960530238/O/D19960238.pdf

3 expressed in carbon dioxide equivalent

emissions. It ceased to be in force in 2012 when no agreement could be reached to extend it (admittedly, the agreement at COP18 was to extend the Protocol until 2020, but these arrangements were not ratified by a sufficient number of countries and therefore never came into force). There are many doubts today about its effectiveness, primarily because the world's largest emitters did not implement its provisions or targets (for various reasons – e.g. the United States did not ratify and China was classified as a developing country, so it had no reduction limits imposed and more than doubled its emissions while it was in force⁴). However, there is no doubt that by outlining the framework of reduction mechanisms, it has played a key role in setting, regulating and achieving the climate ambitions of the parties to the Convention.

In 2015, the so-called **Paris Agreement** (hereafter also ‘the Agreement’) was adopted and is still in force today. The Agreement established the goal of limiting the increase in global average temperature to well below 2°C above pre-industrial levels and committed signatories to efforts to limit the temperature increase to 1.5°C above pre-industrial levels. To achieve this long-term goal, the parties declared that they would aim to peak their greenhouse gas emissions ‘as soon as possible’ (while allowing that this would be later for developing countries). In the next step, signatories are to make emission reductions and, in the second half of the century, achieve a balance between anthropogenic emission sources and GHG removals. The effectiveness of the signatories’ actions is monitored through periodic evaluations of the implementation of the above commitments, to take place every five years (the first was prepared in 2023). The document also includes a mechanism for compensating damage caused in countries vulnerable to climate change. This includes both sudden weather disasters and slow-onset events, such as rising ocean and sea levels. Here, in view of the increasing number of lawsuits around the world for damages caused by climate change, it is worth mentioning that the document includes a provision, requested by the United States, stating that the agreement does not provide a basis for financial claims or compensation for victims of climate change.

As part of the Covenant, it is also stipulated that from 2020 onwards, developed countries will commit USD 100 billion per year to invest in emissions reduction and climate change adaptation. One of the tools is the Green Climate Fund (hereinafter “GCF”). As a developed country, Poland cannot become a beneficiary of the fund, despite its undeniably huge decarbonisation needs. After the adoption of the Accord, most countries updated their plans with more ambitious emission reduction targets. The most ambitious, however, was the European Union, which pledged to achieve carbon neutrality by 2050.

4 Source: EDGAR, European Commission

EU regulations

Origins of regulation

The European Union shows a far greater level of climate ambition than the rest of the world. Already since the early 1990s, the Community has started to introduce policies to reduce greenhouse gas emissions and promote sustainable development. By adopting the Kyoto Protocol in 1997, the EU committed itself to an 8% reduction in emissions below 1990 levels (whereas the Kyoto Protocol imposed a reduction target of 5% relative to 1990). This target was shared between member states according to the principle of ‘common but differentiated burden’, meaning that different countries had different reduction targets. Even before the Protocol came into force (but after its adoption) – in October 2003 – the European Union introduced Directive 2003/87/EC implementing the European Emissions Trading Scheme (hereafter the ‘Emissions Trading Scheme Directive’). The scheme, commonly referred to as the EU ETS, was launched in 2005 and, after several modifications, is still in place today. Further initiatives followed:

Energy and climate change package

Adopted in 2009. The energy and climate package was the first major package of legislative and policy initiatives that touched various sectors and areas of life.

The package is colloquially referred to as the 20-20-20 or 3x20 package because of the three main targets it established with a view to 2020:

- A 20% reduction in greenhouse gas emissions below 1990 levels;
- increasing the share of renewable energy in final energy consumption to 20%;
- 20% improvement in energy efficiency.

The package consisted of six legislative initiatives, from the point of view of this report, it is necessary to mention Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources – the so-called **RES Directive**, which set national targets to achieve by 2020 an overall share of renewable energy sources at 20% of total energy consumption in the EU and at 10% of energy consumed in the transport sector. For Poland, the target was then set at 15% of the overall share of RES in energy consumption and, as for all member states, 10% of RES in transport. The first target was met, as far as transport was concerned Poland was only able to show a 6.58% RES share. Failure to meet this target did not incur penalties, as the directive did not provide for sanctions, and a number of other member states also failed to meet this ambition⁵.

⁵ Eurostat 2021

The second piece of legislation was Decision No. 2009/406/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 – the so-called **NonETS Decision**. Its objective was to require Member States to reduce GHG emissions from non-ETS sectors by 10% compared to 2005 by setting minimum contributions by Member States for reductions in non-ETS areas. The decision covered emissions from sectors not covered by the EU ETS regime, i.e.: transport, agriculture, waste, industrial emissions not covered by the EU ETS, and the municipal sector with buildings, small heat sources, households and services. The regulation required the Member State (not the owner of the installation concerned, as is the case with the EU ETS) to limit emissions to the limit set by the Decision. In the first trading period (2013–2020), Poland was set a target of a ceiling of a maximum +14% increase in emissions by 2020 relative to 2005. This price was achieved. In the ongoing commitment period (2020–2030), our country is required to reduce emissions by 7% relative to 2005.

As part of the package, the Emissions Trading Scheme Directive was also significantly amended, which will be discussed in more detail in the chapter on the ETS.

The 2014 Energy Policy Framework.

In the following years, the EU's climate ambitions grew. At the European Council meeting at the end of October 2014, endorsed a binding EU target to reduce domestic greenhouse gas emissions by at least 40% by 2030 compared to 1990. In addition, Member States committed to at least a 27% share of renewable energy generation and a 27% increase in energy efficiency, also by 2030. Completion of the internal energy market was assumed by achieving the set target of 10% electricity interconnections and connecting energy islands, notably the Baltic States and the Iberian Peninsula.⁶

Green Deal – 2019

The European Union's aspirations to achieve climate neutrality in 2050 were set out by the European Commission in November 2018 in the document A Clean Planet for All. This was the world's first declaration of such high ambition. It set out the goal of 'achieving zero net greenhouse gas emissions by 2050 through a socially just and cost-effective transition'. Subsequently, this goal was also supported by the Parliament in resolutions: on climate change on 14 March 2019 and on the European Green Deal on 15 January 2020. The European Council in December 2019 declared the achievement of climate neutrality by the Community by 2050 while committing the Commission to align existing policies and legislation with the goal of climate neutrality and to introduce regulations that contribute to the goal, while respecting the level playing field among Member States. According to

⁶ data.consilium.europa.eu/doc/document/ST-169-2014-INIT/pl/pdf

the Council's declarations in its conclusions, the transition is to be cost-effective, socially balanced and equitable. The package of these regulations was called the European Green Deal. It is worth noting that Poland at this meeting was not ready to accept the goal of climate neutrality by 2050 EU leaders in December 2020 concluded and agreed on a final position.

- It sets the following targets for 2030:
- a reduction in net domestic greenhouse gas emissions of at least 55% compared to 1990 levels;
- an increase in the efficiency of the EU's final and primary energy consumption of at least 32.5% compared to projections in 2007.
- increase the share of renewable energy in final energy consumption by at least 32%;
- Reducing CO₂ emissions from road transport – emissions per kilometre from cars sold in the EU are to be reduced by an average of 37.5% from 2021 levels, from new vans by an average of 31% from 2021 levels, and from new large trucks must be reduced by an average of 30% from 2019/2020 reference period levels⁷.

These ambitions have been implemented in the EU legal order by a series of regulations adopted over the past years. Some of them have been modified in the legislative process.

The 2050 climate neutrality target and the intermediate 2030 binding target of reducing net greenhouse gas emissions in the Union by at least 55% by 2030 compared to 1990 levels were regulated by Regulation (EU) 2021/1119 establishing a framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999, the so-called **European Climate Law**.

The new **Energy Efficiency Directive 2023/1791**, which entered into force in October 2023, increased the EU's energy efficiency targets (however, they were defined slightly differently from the position submitted to the UNFCCC). The new targets were set to reduce primary and final energy consumption at EU level by 11.7% by 2030 compared to 2020 projections. They were also set in absolute terms (a final energy ceiling of 763 million tonnes of oil equivalent and for primary consumption of 993 million tonnes). The final energy consumption ceiling will be binding on Member States collectively, while the target for primary energy consumption will be indicative. Member States are required to prepare Integrated National Energy and Climate Plans which will include, inter alia, a trajectory towards this target. The final form of these for all Member States was to be known in 2024.

Since the announcement of the Green Deal, the RES Directive has also been amended twice, eventually increasing the initial target for renewables to 42.5 per cent by 2030, with EU countries aiming for 45 per cent. The current wording of the directive also sets 2030 targets for individual sectors. In the context of this report, mention should be made of:

⁷ Notification to the UNFCCC on behalf of the European Union and its Member States on the update of the nationally determined contributions of the European Union and its Member States of 18 December 2020

- the buildings sector – an indicative target of achieving a 49% share of energy from RES (with heating and cooling targets increasing by 0.8 percentage points per year until 2025 and by 1.1 percentage points between 2026 and 2030);
- in the transport sector, a target of a 29% share of energy from RES or a 14.5% reduction in greenhouse gas emissions through increased use of advanced biofuels and non-biological renewable fuels (e.g. hydrogen).

The reform also introduces a number of legal and administrative simplifications regarding the permitting process for investments in renewable energy sources. It came into force in November 2023.

On 19 April 2023, the reform of **Regulation 2019/631 of 17 April 2019 setting CO₂ emission standards for new passenger cars and for new light commercial vehicles** was adopted. It sets a path to zero CO₂ emissions for new passenger cars and new light commercial vehicles by 2035. Intermediate emission reduction targets for 2030 are set at 55% for passenger cars and 50% for light commercial vehicles.

A broader discussion is required of **Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings** (the so-called ‘EPBD’ or ‘Buildings Directive’), the final text of which was adopted in April this year. A key objective of the Buildings Directive is to initiate and support the renovation of buildings, including the transition to zero-emission heating systems, with the aim of ultimately decarbonising the sector completely. EC data shows that two-thirds of the energy used to heat and cool buildings in the EU comes from fossil fuels. According to current building standards, almost 75 per cent of this stock is energy inefficient, and 85–95 per cent of existing buildings will still be in use in 2050. So far, the annual energy renovation rate in the EU has been only 1 per cent; maintaining this would mean that the decarbonisation of the sector would take several hundred years.

As set out in the EPBD, Member States should aim to phase out individual fossil-fuel-fired boilers, with a priority to cease financial incentives for the installation of individual fossil-fuel-fired boilers (including gas) from 2025, except for those selected for investment before 2025. In addition, countries have been required to prepare National Building Renewal Plans, which will identify specific measures to phase out fossil fuels in heating and cooling, and should also set minimum energy performance requirements for buildings.

According to the reformed directive, all new buildings should be zero-emission from 2030 at the latest (for public buildings the deadline is 2028) and existing buildings should be converted to zero-emission by 2050. Member States should ensure that average primary energy consumption is reduced by at least 16% by 2030 compared to 2020 and by at least 20–22% by 2035 compared to 2020. At least 55% reduction in average primary energy consumption, should be achieved by renovating the 43% of residential buildings with the worst energy performance. New buildings should be able to install PV and also facilitate the installation of electric car chargers in multi-family buildings. At the same time, the Buildings Directive provides freedom to choose the tools by which countries achieve

the required improvements in the stock of residential buildings, such as minimum energy performance standards, technical assistance and financial support measures.

The reform also affects the system of energy performance certificates, which are an essential tool for assessing the energy performance of buildings. Every building for sale or rent should have an energy performance certificate with a specific energy class and indicator. In order for member states to better enforce the quality of certificates, providing precise and reliable information, a uniform certificate template was introduced for all member states.

Together with the Energy Efficiency Directive already mentioned, both regulations emphasise the information and education aspect. They encourage Member States to set up advice points – One-Stop-Shops – or similar mechanisms to provide technical, administrative and financial advice on energy efficiency. The Commission should provide guidance in this area in the coming months.

EU Emissions Trading Scheme – ETS1 and ETS2⁸

The emissions trading scheme was introduced into the EU legal order by Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading (hereinafter the “ETS Directive”), which entered into force in 2005. Monitoring of CO₂ emissions began in the European Union long before the ETS was set up, on the basis of Council Decision 93/389/EEC of 24 June 1993. Despite the prevailing perception that the first emissions trading scheme was created by the European Union, the fact is that it was in the USA that the first CO₂ trading scheme was designed in 2003⁹, and the European solution was largely a reproduction of this. The EU ETS was also the largest system in the world until China introduced emissions trading, and today it is the second largest. It regulates around 40% of the EU’s total greenhouse gas emissions and covers around 12 000 installations in the community and 600 in Poland.

ETS1

The EU ETS covers greenhouse gas emissions from installations within the EU as defined in Annex I of the EU ETS Directive, which include:

- energy production (power plants and combined heat and power plants in the EU with a capacity of more than 20 MW that burn fossil fuels such as coal, oil or gas);
- Iron and steel industry (ETS covers plants producing iron or steel, including iron reduction plants and steel melting furnaces);

⁸ For the purposes of this study, we will divide the ECJ system into ECJ1 and ECJ2. These are colloquial terms vis-à-vis the regulations that are contained in the act itself, but have already become firmly established in public and expert discussion.

⁹ www.ft.com/content/2e0b9b26-278f-11e3-ae16-00144feab7de#axzz2rPNfskip

- The cement industry (including all plants producing clinker, the main ingredient in cement);
- chemical industry (in particular installations producing acids such as nitric acid, sulphuric acid, ammonia);
- glass production;
- ceramics production (covers the manufacture of ceramic products by firing, including bricks, tiles, pipes, ceramic tiles);
- paper production;
- aluminium production;
- Aviation (all flights between EU airports).

The EU ETS implements the ‘polluter pays’ principle, which means that the cost is borne by those who generate emissions in power generation, industry, maritime and air transport, as well as storing emissions in CCS technologies. This takes place under the so-called cap and trade formula. An emission cap is set for each year, which is successively reduced by applying a linear reduction factor (LRF). Currently, the LRF is 4.2% (increased from 2.2% in 2021, previously 1.74%), and how much it will be is the subject of intense debate with each revision, as it is the LRF that directly affects reduction efforts. Allowances are auctioned each year or given free of charge to operators whose installations are at risk of carbon leakage (the allocation of unlawful allowances decreases each year, and in the power industry they are no longer available from 2019).

Since 2018, the MSR, or Market Stability Reserve, has also been in place in response to an oversupply of allowances in the market, leading to a reduction in the price of allowances and therefore the effectiveness of emission reductions by ETS entities. The MSR operates on an annual cycle. Each year the European Commission calculates the ‘total number of allowances in circulation’ (TNAC), which indicates the difference between the number of allowances that have left the market (as a result of surrenders i.e. the ‘consumption’ of emission allowances by covered installations) and the number of allowances that have entered the market. If this number is higher than 833 million, the number of allowances entering the market in the following year is reduced by transferring part of them to the reserve (24% of the total number of allowances in circulation until 2023 and 12% from 2024 onwards). Similarly, if the total number of allowances in circulation falls below 400 million, part of the allowances held in the MSR will be placed on the market. A secondary market for the trading of allowances by private operators has also been established. Here it should be noted that some of them (mainly financial institutions) have allowances in their stock with the intention of placing them on the market when the price reaches their expected ceiling, which means that these allowances are de facto not available to CO₂ emitters and this disturbs the market stability mechanism.

To bring the ETS in line with the emission reduction targets of the European Green Deal, the Parliament approved an update in April 2023. The reform set an ambition of a 62% reduction in emissions in ETS sectors by 2030 relative to 2005.

ETS2

As part of the Fit for 55 package, the key legislative proposal was the reform of the CO₂ emissions trading scheme, which was extended by introducing, in parallel to the ETS1 described in the previous chapter, a CO₂ emissions trading scheme for the building sector (related to the combustion of fossil fuels for heating), road transport and so-called ‘ancillary sectors’ (e.g. small heating plants not covered by the ETS1). These are sectors that account for 30% of total emissions in the European Union and have so far not been covered by the ETS. In the case of the ETS2, the emission reduction target for 2030 is 43% relative to 2005.

In contrast to the ETS1, those obliged to purchase and surrender allowances are not those who generate emissions, but those who market the fuels used in the sectors indicated above, i.e. de facto distributors of coal, natural gas and liquid fuels. Today, it is not yet established at what stage these entities will bear the cost. Naturally, this cost will be added by them to the price for the end customer.

As with the ETS1, member states will receive a pool of allowances, the supply of which will decrease each year. Part of the regulation will remain common to both mechanisms, e.g. concerning the surrender, surrender and cancellation of allowances, penalties and, in part, monitoring and reporting. A major difference is the absence of a pool of free allowances; from the start of the scheme, all allowances will be auctioned.

Many studies on ETS2 indicate that the price of emission allowances is capped (unlike ETS1) at €45 per tonne. However, this is not the case. The directive merely assumes that 20 million additional allowances are released from the market stability reserve if the average allowance price over the following two months exceeds €45. The architects of the system assumed that the release of additional allowances into the market would effectively reduce the price below the accepted €45, but there can be no certainty about this, especially as the mechanism for releasing additional allowances may not be used again until after a further 12 months (in an exceptional case after six months with the approval of a special committee). Moreover, European Commission projections from 2024, i.e. when the rules of the system were known, indicate that allowance prices will exceed the €45 level already in 2028.

Under the provisions of the Directive, entities that market fossil fuels in ETS sectors² must, from 1 January 2025, be authorised to do so and put in place an appropriate monitoring and reporting system. The obligation to surrender allowances for emissions takes effect from 1 January 2027, with a possible one-year delay in the start of the scheme if, on 30 June 2026, the average TTF gas price for the six calendar months ending was higher than the average TTF gas price in February and March 2022, or if the average Brent crude oil price for the six calendar months ending was more than double the average Brent crude oil price for the previous five years. Given the criteria described above, only

an extraordinary market situation, comparable to the recent energy crisis, can postpone the entry into force of ETS2.

It is worth noting that member states are obliged to implement ETS2 legislation by July 2025, and at the time of writing, the Ministry of Climate and Environment, i.e. the Ministry of Climate and Environment, has not presented a draft piece of legislation implementing the amendment to the directive.

Social Climate Fund

Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 established the Social Climate Fund (the 'Fund' or SFC). The creation of the Fund is the response of EU policy makers to the energy transition costs of buildings and transport generated by the ETS2. The EU acknowledges that the inclusion of these sectors in the ETS will hit vulnerable households, micro-entrepreneurs and transport users particularly hard. The preamble of the regulation devotes a lot of space to potential solutions that States should use when designing support mechanisms for those in need. The Fund itself is intended to operate between 2026 and 2032, so that it can be used even before the ETS2 comes into force. Part of the Fund will be financed by auctioning ETS2 allowances (up to €65 billion) and an additional 25% will be covered by domestic resources, giving an estimated total value of €86.7 billion¹⁰. According to Annex III to the Regulation, the maximum financial allocation for Poland is 17.6% of the total budget, which will be approximately EUR 15.2 billion.

The framework for action by the administration should be set out in a National Socio-Climate Plan to be submitted by each Member State to the Commission by 30 June 2025. The plans should include investment elements that promote long-term solutions to reduce dependence on fossil fuels, as well as identifying other measures such as temporary direct income support to mitigate the negative impact on household budgets in the short term. The regulation explicitly indicates that Member State governments should take measures to ensure that those in need receive the financial resources necessary to carry out thermal modernisation and decarbonisation of heating through vouchers, grants or interest-free loans. The administration should aim to mitigate the impact of the increase in the cost of fossil fuels on the most vulnerable and thus prevent fuel poverty and transport poverty in the interim period until these investments are made. At the same time, it stipulates that direct income support is to be temporary, otherwise it would remove the incentive to invest in improving the energy efficiency of buildings and transport. Direct support can only be used to counteract the direct effects of the introduction of the ETS2, and cannot be used to counteract the increase in electricity or heating costs associated with the inclusion of electricity and heat generation in the scope of the directive¹¹.

¹⁰ www.europarl.europa.eu/topics/pl/article/20220519STO30401/spoleczny-fundusz-klimatyczny-sprawiedliwa-transformacja-energetyczna

¹¹ eur-lex.europa.eu/legal-content/PL/TXT/?uri=CELEX%3A32023R0955

The Social Climate Fund, is another source of support for the energy transition, in addition to cohesion policy funds, InvestEU, loans from the European Investment Bank, the Modernisation Fund and the NIP.

National context

As in the case of EU regulations, national legislation is quite dispersed. While the EU ETS regulations have been consolidated in a single law (referred to later), the building and transport regulations within the scope of the report can be found in the Energy Law, the Environmental Protection Law, the Energy Performance of Buildings Act and the Energy Performance of Buildings Certificate, the Energy Efficiency Act, the Act on Supporting Thermomodernisation and Renovation and the Central Register of Building Emissions, as well as several regulations. Particularly in recent years, a number of programmes have also been launched to support emission-reducing investments in non-ETS sectors. Outlining the national context, we will focus on the most important regulations and measures.

Construction

In Poland, measures to reduce the carbon footprint of buildings have been taken for several years. The most important of these include:

- introducing quality requirements for solid fuels and requirements for solid fuel boilers,
- adoption of anti-smog resolutions,
- creation of a Central Building Emissions Register,
- launch of the 'Clean Air' and 'Stop Smog' programmes,
- introduction of a thermo-modernisation allowance,
- Adoption of a long-term building renovation strategy.

The Ordinance of the Minister of Development and Finance on requirements for solid fuel boilers of 1 August 2017 banned the installation of so-called 'fossil' boilers, i.e. boilers with the highest emissions. The Regulation of the Minister of Energy on quality requirements for solid fuels of 27 September 2018. (replaced by the Ordinance of the Minister of Climate and Environment of 23 December 2022 on quality requirements for solid fuels) defined quality standards for household fuel combustion.

Article 96 of the Environmental Protection Law enables provincial assemblies to introduce, by way of a resolution, restrictions or bans on the operation of installations in which fuel is burned. By October 2023, 14 voivodeships had adopted anti-smog resolutions: śląskie, małopolskie, mazowieckie, wielkopolskie, dolnośląskie, lubuskie, opolskie, podkarpackie, zachodniopomorskie, kujawsko-pomorskie, pomorskie, świętokrzyskie, łódzkie and lubelskie. The resolutions vary in content, ordering the replacement of old boilers and cookers,

and introducing partial or total bans on burning coal or wood. For example, in Warsaw, it is already forbidden to heat a house with brown coal from 2018, while from 1 October 2023, the ban applies to any type of coal. Violation of the anti-smog resolution constitutes an offence, which may result in a fine of up to PLN 500 or a fine of up to PLN 5,000.

Supporting the investments resulting from the above regulations were the government programmes 'Clean Air' and 'Stop Smog', as well as the introduction of a thermo-modernisation allowance. The 'Czyste Powietrze' programme, which is operated by NFOŚiGW, is the first nationwide programme aimed at reducing or avoiding emissions of dust and other pollutants introduced into the atmosphere by single-family buildings. The programme enables financial assistance to be provided to people who want to replace inefficient heat sources and will operate until 2029. In recent years, the bulk of the programme's funds have been allocated to the replacement of inefficient coal-fired boilers with high-class, much lower-emission ones (from 1 January 2022, the purchase of a coal-fired boiler from the programme is no longer possible). The originally declared allocation for 2018–2029 was supposed to be PLN 103 billion, but the Ministry of Climate and Environment recently announced that it plans to allocate only PLN 6.4 billion to the programme by the end of 2029. A similar objective to Clean Air is being pursued by Stop Smog, which is available through municipalities to residents in areas with anti-smog resolutions. These are not the only sources of funding available for the decarbonisation of construction that will be covered by ETS2. The National Fund for Environmental Protection and Water Management (NFOŚiGW) itself is conducting several activities, e.g. a pilot programme entitled Renovation with a guarantee of EPC (Energy Performance Contract) Plus savings, financed from the Modernisation Fund. It includes a pool of funds for modernisation work on multi-family residential buildings with more than seven units, enabling a reduction in final energy consumption of at least 30% compared to the existing state before modernisation. It is still possible to apply for subsidies under the municipal Low Emission Reduction Programmes. We view all these measures very positively – they are necessary for two reasons: they reduce emissions, but also the economic shock of the introduction of ETS2.

However, in the context of the scale of challenges facing Polish citizens in implementing the Green Deal, the level of support so far is insufficient. It is necessary to develop programmes (not to reduce them as in the case of Clean Air) and to mobilise funds from the Social Climate Fund as soon as possible. We are also critical of the dispersion of the ongoing programmes, each with different criteria and requirements. This leads to confusion for those wishing to learn about the available support mechanisms and take advantage of the funds. In order to remedy this, it is necessary for the administration to create a virtual space consolidating knowledge on available types and conditions of support, both from EU and budgetary sources, those on the central and local level (e.g. on the gov.pl website), unification of procedures and maximum automation of the process of obtaining and settling subsidies (e.g. on the model of tax returns on the podatki.gov.pl website). Dispersion of sources of financing, overlapping scopes of intervention, conditions for granting support, settlements, without proper coordination at the government level and without significant

simplification of the process, will significantly reduce the effectiveness of the intervention and delay the implementation of reduction targets resulting from European regulations.

The thermal modernisation allowance is available to owners or co-owners of single-family houses from January 2019 and amounts to a maximum of PLN 53,000. It consists in deducting from the tax assessment basis (income – in the case of a flat tax) the expenses incurred for the implementation of thermomodernisation investments in a single-family residential building.

Since July 2021, the Central Emission Inventory for Buildings (CEEB), which collects data on heat sources with a rated output of less than 1MW, has also been in operation. CEEB is an IT tool for the inventory of heat sources and fuel combustion sources in buildings. The system collects data on the energy status of buildings. Property owners can also order an inspection of their chimney flues on the CEEB website, order an online building inventory, download a simplified energy audit, report a worrying phenomenon related to air pollution. The system provides a tool for collecting and aggregating data that is essential for designing public policies and supporting the transformation process. The data is provided on a declaration basis and is not verified in any way. In our opinion, solutions should be considered to reduce the risk of reporting false information, e.g. in order to obtain support, as was the case with applications for the carbon allowance in 2023. Such a solution could be the introduction of an obligation to provide the installation number in CEEB when households purchase fuel, which the seller would have to introduce in the reporting process required by ETS2 implementation.

The Energy Performance of Buildings and Building Energy Performance Certificate Act of 29 August 2014 introduced the obligation to prepare energy performance certificates for buildings when a property is sold or rented. This obligation is incumbent on the owner or manager of the building. The certificate contains information on the amount of energy demand for heating and ventilation, domestic hot water preparation, cooling and, in the case of non-residential buildings, also lighting. The purpose of making the certification mandatory is to promote energy-efficient construction and raise public awareness of the potential for energy savings in buildings. With the information contained in the certificate, the owner can determine the indicative annual energy demand and thus the maintenance cost associated with energy consumption. As mentioned earlier, the obligation to have, in certain situations, an energy performance certificate for a building stems from the Buildings Directive, which, with its last revision, introduced a number of changes concerning them (the time for their implementation expires in 2025). The current system of certificates is inefficient; they can be obtained online for a small price, without any real verification of the technical condition of the building. Their quality leaves much to be desired. Thus, they do not meet the objective of providing information on the potential for energy savings in buildings. Persons authorised to issue energy performance certificates are listed in the Central Register of Energy Performance of Buildings, and in order to be listed there, it is sufficient to have a master's degree in engineering (specialisation is not important).

Transport

In the case of reducing emissions from passenger and public transport, public sector activity in terms of both legislation and setting up support schemes was lower than in the case of construction.

On 16 March 2017, the government adopted the Electromobility Development Plan. It envisaged the creation of a legislative framework by 2018, which was successful – the Act on Electromobility and Alternative Fuels entered into force on 11 January 2018. Next, by 2020, it was planned that electric vehicle power infrastructure would be built in selected agglomerations and that incentives for the purchase of electric vehicles would be intensified. These ambitions were partly realised – incentives were created in the form of the launch of the My Electrician support programme, but unfortunately the infrastructure part was not implemented. In July 2021, the My Electrician support programme was launched. The amount of the grant for individuals was PLN 18,750 (and PLN 27,000 for large families). This has not contributed to a significant uptake of electric cars according to the Electromobility Counter of the Polish Automotive Industry Association (PZPM) and the Polish Alternative Fuels Association (PSPA), at the end of April 2024, a total of 64,495 all-electric passenger and commercial vehicles (BEVs) were registered in Poland¹². Data from the European Vehicle Manufacturers Association ACEA shows that the average share of electric car sales in the EU has exceeded 14.6%, in Poland it is only 4%. There are two challenges: the high price of electric vehicles and the lack of an extensive charging network (at the end of April 2024, there were 6691 publicly available electric vehicle charging points in Poland)¹³. Significant expansion of the infrastructure is necessary to make the use of electric cars more widespread, for this to happen it is necessary to support entities investing in charging points (both public and private) and operators of electricity distribution networks, as well as to introduce and expand clean transport zones (of which there are none in Poland as at the date of publication of the report). The entry into force of ETS2 will result in an increase in the cost of using traditional combustion cars, which, combined with the decrease in the cost of purchasing electric cars forecast by experts, will lead to their widespread use, which may be hampered by a lack of sufficient infrastructure.

ETS1 in Poland

The ETS1 was introduced into the Polish legal order by the Act of 22 December 2004 on trading allowances for emissions of greenhouse gases and other substances into the air, amended several times and replaced in 2015 by a new one, which is still in force today. The scheme is administered by the National Balancing and Emissions Management Centre. Domestic emissions covered by the ETS1 outweigh the number of allowances allocated to Poland. This means that Polish entities are forced to buy allowances from pools sold by

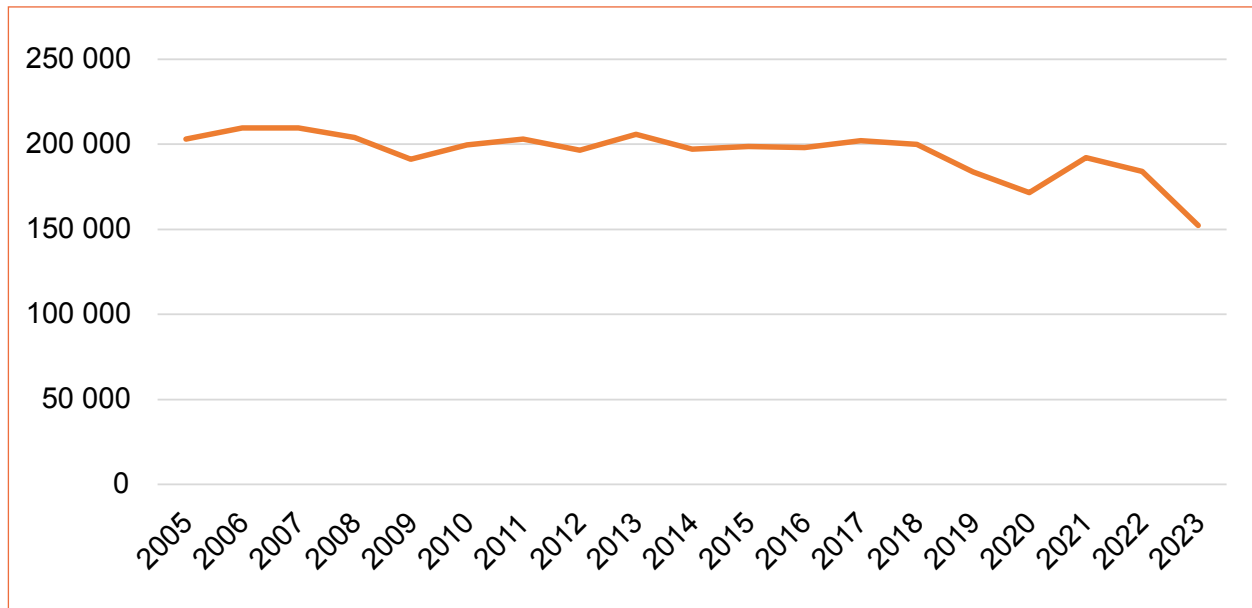
¹² www.pzpm.org.pl/pl/Rynek-motoryzacyjny/Licznik-elektromobilnosci/Kwiecien-2024

¹³ as above

other countries, so in this respect the money spent is not revenue for the Polish budget, but for other countries that do not need them for their energy transition to the same extent as Poland, as they are more advanced in their energy transition.

Over a number of years, the emissions of the sectors covered by the EU ETS have remained at similar levels, with a significant but temporary drop in emissions in 2020 which was related to the economic downturn caused by COVID-19 and in 2023.

Figure 1: CO₂ emissions from the ETS sector1 [thousand tonnes].



Source: European Environment Agency

According to KOBIZE, the total volume of CO₂ emissions in Poland that were covered by the EU ETS in 2023 amounted to nearly 154 million t CO₂ (together with the aviation sector) and, compared to emissions in 2022, decreased by nearly 17%. The largest decreases in emissions were seen in the power sector, among others. Emissions of power plants fell by 23% and district heating plants by 16%. The decrease in emissions in the power sector is dictated by a number of factors: decreased electricity consumption, increased imports, as well as increased generation from renewable energy sources. The above decreases, however, do not change Poland's position in terms of the energy sector's carbon intensity; it is still the most carbon-intensive in the EU. The money that EU ETS entities pay for emission allowances is entirely state budget revenue (with the exception of the part that the industry obtains from other countries' pools).

Last year, the state budget received approximately PLN 24.4 billion from the sale of CO₂ emission allowances. According to the regulations, half of these funds should be earmarked for purposes related to the energy transition in the broadest sense. In principle, they should be used to support investments to accelerate the transformation, but in recent years they have largely been used to provide direct support to citizens affected by energy price rises,

a common practice in European countries. With the stabilisation of the energy market situation, these funds should be redirected to support investments in the next years.

As indicated earlier, the government has so far not presented an approach to the implementation of ETS2 into the Polish legal order. Also, we do not know the draft Social and Climate Plan, the deadline for submission of which is July 2025. And it will be the basis for the disposal of funds from the Social Climate Fund.

Analytical part – household costs

As mentioned earlier, so far the CO₂ levy has covered power generation, district heating and the most emitting industries. The reduction of emissions from other so-called non-ETS sectors has been achieved by other means. Essentially, it boils down to promoting and financially supporting activities leading to decarbonisation, e.g. thermo-modernisation or the purchase of electric cars. This means that hitherto the policy for the non-ETS sectors has burdened national and EU budgets with the costs, rather than the citizens directly. From 2027, this will change for transport and construction. Emissions from these sectors will be subject to emission charges under the new ETS2. This will be done by including in the price of fuels (coal, gas, liquid fuels) a charge equivalent to the emissions produced by burning the fuel. This means that, when filling up a car, drivers will pay an additional charge, hidden in the price of the fuel, resulting from the emissions produced during driving.

Cost of ETS1

The European Commission periodically publishes projected prices for CO₂ emission allowances. Member States are obliged to use them in the process of preparing their energy and climate plans. The Polish National Energy Policy is also based on allowance price forecasts prepared by the EC.

The latest EC forecasts were prepared this year and cover the period up to 2055. The EC presents the prices of allowances at constant prices and therefore taking into account the purchasing power of money in 2023. This means that levy levels should be referred to the 2023 price and revenue levels, and the nominal projected levy levels will be increased by the cumulative level of inflation between 2023 and the year the levy is paid. For consistency throughout the forecast period, a fixed euro exchange rate of PLN 4.3/euro has also been assumed.

The EC has provided a projection of the price of CO₂ allowances in the ETS1 after 2030 in two options. The first based on existing policies (WEM), which in the EC's view does not allow for the achievement of the 2050 climate neutrality target. The second taking into account the additional measures (WAM) necessary to achieve climate neutrality. Given the declarations by representatives of the European Commission and the leaders of the largest EU countries, the radical WAM scenario should be accepted as more likely today, and this scenario was used for further analysis.

Table 1. CO₂ emission allowance prices in the ETS1 at constant 2023 prices [eur/t].

	2022 ¹⁴	2023 ¹⁵	2024	2025	2030	2035	2040	2045	2050	2055
WEM	80,82	83,85	95	95	95	100	100	160	190	220
WAM						140	290	430	490	520

Source: European Commission, KOBIZE

The price of emission allowances is market-driven and periodically there may be significant deviations from the projections provided by the EC. The key factor shaping the projected allowance prices is the expected level of emission reductions. This is due to the fact that in subsequent years of the projection an increasingly smaller amount of allowed emissions is assumed. In simple terms: this leads to a situation where, once the allowance price exceeds a certain level, the high cost forces emitters to reduce their emissions. This can be done by reducing economic activity in an industry, reducing energy intensity or investing in low-carbon technologies.

In our view, it makes sense to rely on the European Commission's forecasts for further analysis, as it has the widest access to emissions data and has a decisive influence on the shape of regulations that determine future market conditions in individual sectors. Moreover, the results of its forecasts are directionally consistent with those presented by independent analysts, which also assume further increases in allowance prices.

In recent years, the European Commission has shown its determination to keep the price of emission allowances high when it has intervened regulatorily in the ETS1 on several occasions affecting price increases through, among other things, the introduction of IAS and the modification of LRFs, as detailed in the previous chapter.

It is noteworthy that successive projections provided by the EC assume increasingly higher EUA price levels in the future, which may in part be due to increasing climate targets, e.g. the zero-carbon pledge was made in 2019.

Cost of ETS2

As outlined in the 2020 European Green Deal, the European Commission planned to integrate emissions from transport and fossil fuel combustion in buildings into the ETS1. Strong opposition from Member States led to the creation of a separate ETS2.

¹⁴ weighted average price on the SPOT market

¹⁵ weighted average price on the SPOT market

Table 2. CO₂ emission allowance prices in the ETS2 at constant 2023 prices [eur/t].

2027	2028	2029	2030	2035	2040	2045	2050	2055
30	50	55	55	140	290	430	490	520

Source: European Commission

The regulation introducing the ETS2 assumes a mechanism to limit a surge in allowance prices. It assumes the sale of additional emission allowances on the market in the event that they exceed the nominal price of 45 eur/t, as described in more detail earlier in this report. Interestingly, the Commission itself assumes in its projections that this mechanism will be ineffective, as it already assumes a level of 50 eur/t in 2028 at 2023 constant prices, i.e. at nominal values even higher.

The European Commission's projections for ETS2 extend to 2030. After that, a merger between ETS2 and ETS1 is assumed. This will mean a sharp increase in the cost of emissions for households, as current prices in ETS1 are higher than those projected for ETS2. According to KOBIZE data, in 2023 the average price in ETS1 was €83.85 per tonne of CO₂ emitted and the EC's projected price for ETS1 for 2030 is €100, while the projected price for ETS2 is almost twice as low, i.e. €55.

After the merger of ETS1 and ETS2, households and small businesses will compete to buy a limited number of emission allowances with power plants, steel mills or cement works. This means that if the decline in industrial emissions is lower than current EC projections, with a decreasing number of allowances (each year the EC assumes a decrease in emissions until zero-emissions are achieved in 2050), their price will increase, forcing households to reduce their emissions through investments in energy efficiency and zero-emission technologies, or deteriorating quality of life as a result of reduced transport use and the thermal standard of buildings.

Emission costs associated with the use of residential buildings

Residential buildings accounted for 9.4% of total emissions in the European Union in 2022. They have shown a gradual reduction over the years. The extension of the charging scheme to buildings, following the introduction of ETS2, will translate into households primarily through increased costs of heating, heating water and cooking meals. This will have a significant impact on most Polish families.

Currently, some households already bear the CO₂ costs of heating their homes. This is the case for households using district heating generated in installations with a capacity of more

than 20 MW, which are already included in the ETS1 (these are district heating plants in large and medium-sized cities). The cost of emissions incurred by district heating plants is included in the district heating tariff and ultimately passed on to consumers (this is one of the reasons for the large variation in heat prices). On a similar basis, a small number of households heating with electricity, including those using heat pumps, are covered by indirect emission costs (in terms of grid electricity consumption).

The ETS2 will charge emissions from the combustion of fuels by households and businesses not yet covered by the ETS1, e.g. small heating plants, bakeries, caterers, shops. The emission charges will be hidden in the price of fossil fuels e.g. coal, gas, heating oil, motor fuels. Furthermore, the cost of purchasing fuels will increase not only by the amount of the emission charge, but also by the amount of VAT charged on the charge.

The impact of the new regulations on individual families will depend on a number of factors. The most important of these include:

- type of fuel used,
- area of the flat,
- the technical condition of the building and the heating appliance,
- maintained indoor temperature,
- the location of the building,
- building type.

A thorough analysis of the impact of the new charges on individual families' household budgets would require access to a lot of specific data, i.e. the type of fuel used and its average annual consumption, hot water consumption and how it is heated, the appliance used for cooking meals and how often it is used.

A calculator has been made available on ets2koszty.pl which allows us to calculate for ourselves the costs that each of us personally will have to incur for ETS2.

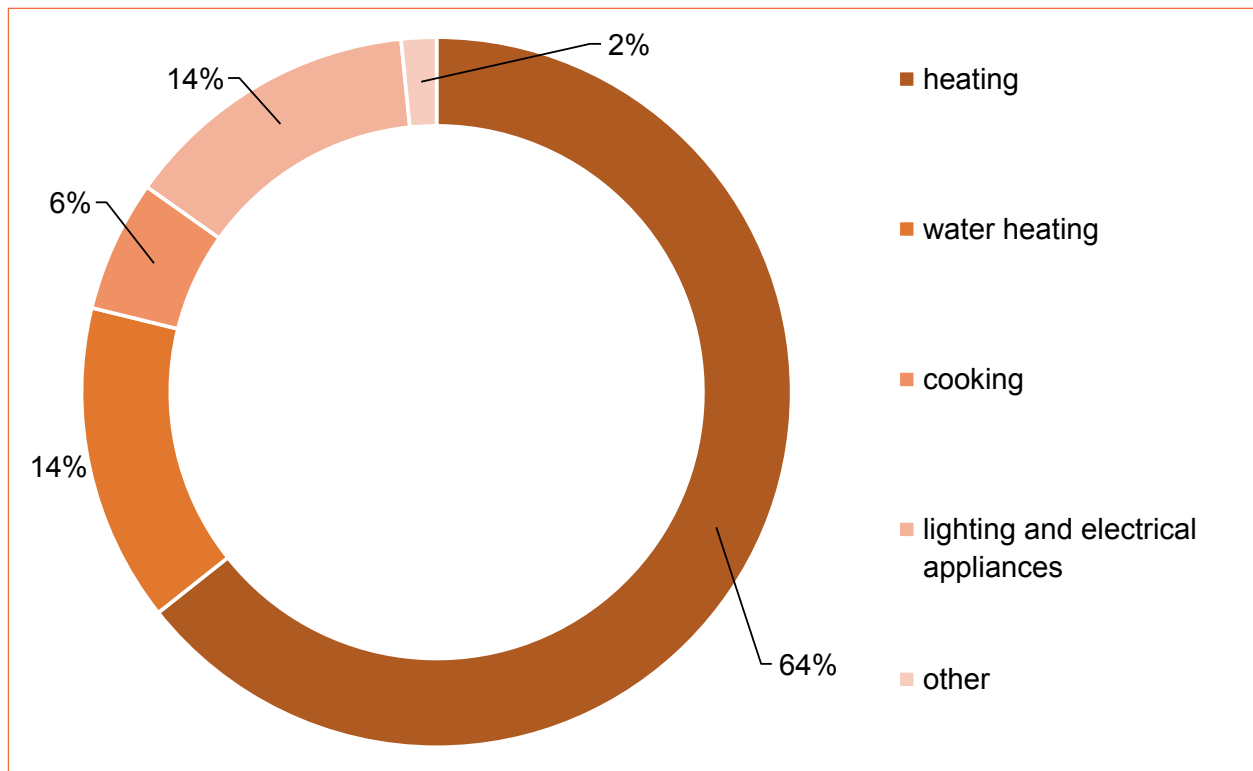
The highest ETS2 costs will be borne by residents of the oldest, non-insulated single-family buildings. The costs incurred will vary depending on the region in which the building is located, as a result of differences in average annual temperatures in different parts of Poland. For example: a building in Suwałki requires more fuel than the same building located in Lower Silesia.

Final energy consumption of households in the European Union

Household final energy consumption is a coefficient that describes the amount of energy, regardless of its form (electricity, district heating, energy stored in fuel e.g. coal, gas), that is consumed by households in a year.

In the European Union, households consume the most final energy in connection with domestic heating: 64%. Only 14% of the total energy supplied to a building is consumed for lighting and powering electrical appliances (excluding appliances for space heating or cooling). Water heating and cooking also account for a significant proportion of consumption, with 14% and 6% of total energy consumption respectively.

Figure 2: Structure of household final energy consumption in the European Union in 2021 by destination.



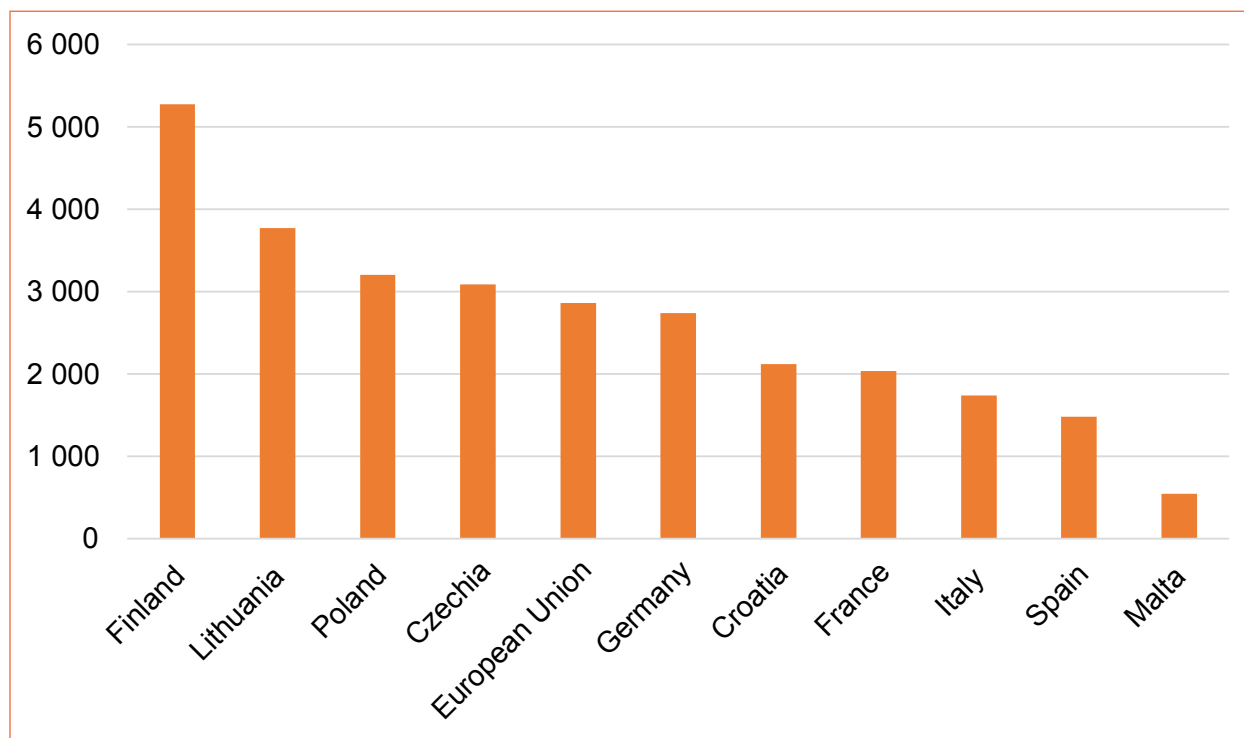
Source: Eurostat

It should be noted that these are figures averaged over all countries in the European Union. Climatic conditions vary from region to region. This means that the share of energy for heating in total consumption varies considerably between countries.

An indicator showing the relationship between climatic conditions and heating demand is the so-called heating degree days (HDD). The higher its value, the greater the number of days with daily temperatures below 15 degrees Celsius and the lower the average temperature on such days.

The highest heat demand in 2022 occurred in the Scandinavian countries and decreased gradually as one moves south. Poland (3200 degree-days) is among the countries with a demand above the EU average (2858 degree-days). The lowest heat demand is found in Malta and takes the value of 544 degree-days. Depending on the year, the results can vary by several percent.

Figure 3: Degree day (HDD) values for selected European Union countries in 2022.

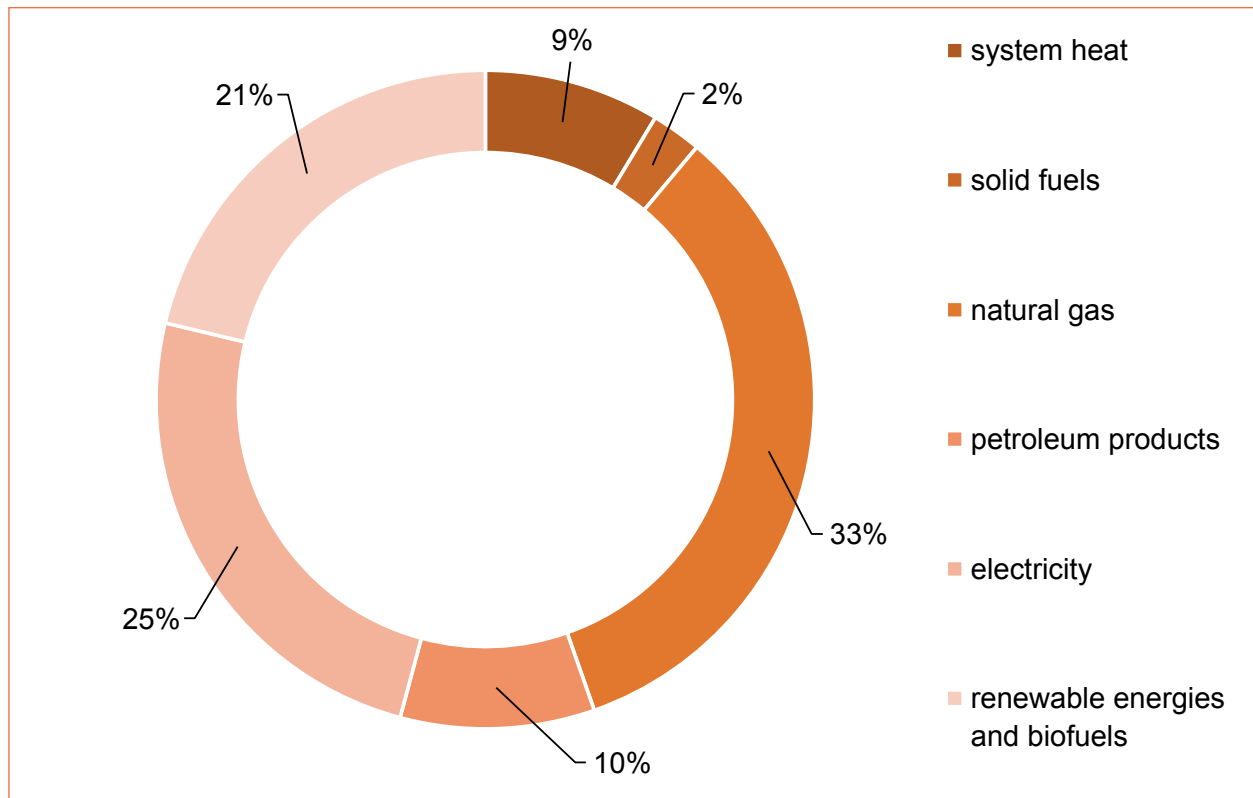


Source: Eurostat

In addition to final energy demand, another important factor affecting future ETS2 charges is the structure of the fuels used. This factor will result in a difference in costs not only between individual families, but will also affect the onerousness of the new regulations for the economies of individual countries.

On average, the higher cost of the ETS2 will be borne by the citizens of countries that make greater use of fossil fuels, particularly the most carbon-intensive coal. In 2021, only 2% of the final energy used in households in the European Union came from fossil solid fuels, mainly hard coal. Natural gas accounted for the largest share of final energy demand (33%), followed by electricity (25%, regardless of the type of fuel used) and renewable energy sources (21%, e.g. solar collectors, heat pumps, biofuels such as pellets, wood, biogas). System heat, popular in Poland, covered only 9% of EU households' final energy needs.

Figure 4: Structure of household final energy consumption in the European Union in 2021 by fuel [%].

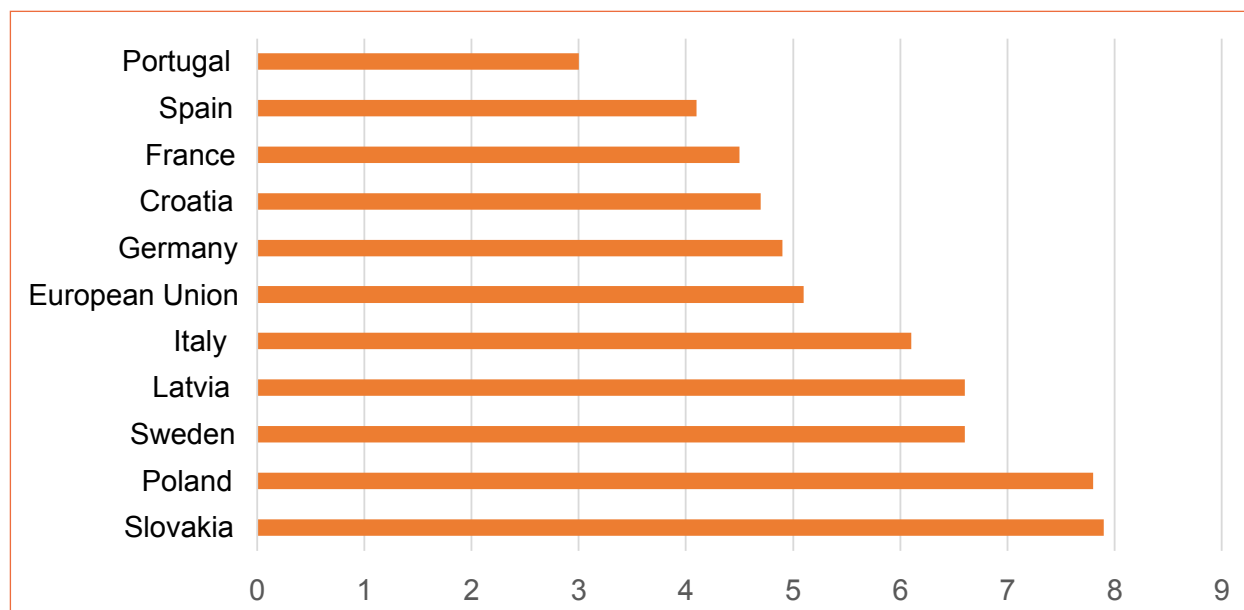


Source: Eurostat

Despite the differences in the starting position of national citizens outlined above, the ETS2 will operate on a level playing field for all. This means that citizens of the richest countries will pay the same per tonne of CO₂ as the rest. This will affect the severity of the new regulations for the household budgets of the citizens of the individual countries.

Already today, the share of expenditure on the purchase of electricity and fuels as a proportion of total expenditure varies between citizens of different countries. This is due to disparities in wealth and heating demand.

Figure 5: Share of electricity and fuel purchase expenditure in total expenditure in 2022 [%].



Source: Eurostat

In 2022, among EU countries, the highest share of energy expenditure in total expenditure was in Slovakia (7.9%), followed by Poland (7.8%). The EU average was 5.1%. Below the average were the richest countries and the southern countries.

Prices for fuels used to heat buildings in connection with ETS2

ETS2 will result in an increase in the price of fuels purchased for heating purposes. To the net price of fuels will be added the cost of acquiring CO₂ emission allowances, which will have to be borne by the marketer, i.e. the importer or manufacturer.

Based on the CO₂ emission allowance price projections discussed above, the net price increase for the most commonly used fuels was calculated. The values below are the direct cost to marketers of the fuels. The actual increase in the final price may be higher for the consumer. It will be due to indirect costs incurred by traders, i.e. reporting costs, administrative costs, increased working capital, hedging currency risk. Their amount should be relatively small in relation to emission charges.

The increase in gas prices is shown in Table 3 in PLN per MWh, the prices shown are expressed in constant 2023 prices. As can be seen, a significant jump in prices occurs after 2030, when, in line with the European Commission's assumptions, the ETS2 will merge with the ETS1. For comparison, in 2023 the gas price for residential customers was PLN 200.17/MWh.

Table 3. Net additional cost of natural gas due to ETS2 at constant 2023 prices [PLN/MWh].

2027	2028	2029	2030	2035	2040	2045	2050	2055
25.70	42.83	47.11	47.11	119.91	248.39	368.30	419.69	445.38

Source: Own calculations based on EC data

The increase in coal prices is shown in Table 4 in PLN per gigajoule, the prices shown are expressed in constant 2023 prices. Due to the higher carbon intensity per unit of energy, the increase in coal prices per unit of energy e.g. GJ or MWh¹⁶ is almost double that of natural gas.

Table 4. Net additional cost of coal due to ETS2 at constant 2023 prices [PLN/GJ].

2027	2028	2029	2030	2035	2040	2045	2050	2055
12.98	21.95	24.51	24.88	68.21	152.22	243.14	298.48	341.24

Source: Own calculations based on EC data

Due to the common practice in Poland of expressing the price of coal per tonne rather than per unit of energy, Table 5 shows the increase in the price of a tonne of coal, assuming a calorific value of 25 GJ/tonne. If higher calorific value (better quality) coal is purchased, the cost of emissions included in the price of a tonne of coal will increase, but the amount of heat obtained from a tonne of coal will also be higher. For comparison, before the energy crisis, a tonne of heating coal cost around PLN 1,000, while today it stabilises at around PLN 1,200 to 1,500.

Table 5. Net additional cost of coal due to ETS2 at constant 2023 prices [PLN/t].

2027	2028	2029	2030	2035	2040	2045	2050	2055
306	509	560	560	1 426	2 954	4 381	4 992	5 298

Source: Own calculations based on EC data

Housing conditions in Poland

Due to the inclusion of residential emissions, the only way to reduce the increase in the cost of housing will be to reduce the consumption of fossil fuels. This is possible through thermo-modernisation of the building, i.e. reducing heat losses or replacing heat sources with zero-emission ones, i.e. heat pumps, biomass. However, given the number of residential buildings in use in Poland, this will be a time-consuming process, spread over at

¹⁶ 1 MWh = 3.6 GJ

least a dozen years. This means that, during this time, a significant proportion of Polish families will be bearing the increasing costs of ETS2 charges.

According to the Central Statistical Office (CSO), in 2021, there were 5 637 000 inhabited single-family buildings and 552 000 multi-family buildings in Poland. They contained, respectively: 5932 thousand and 8609 thousand flats. The area of the average flat in a single-family building was 109 m² and in a multi-family building 51 m².

In 2021, less than 1% of buildings were equipped with a heat pump, and emission-free biomass, mostly firewood, was used as the main source of heat by around 13% of households, but no significant increase in its use should be assumed. This is due to the legal restrictions on its use introduced by successive local authorities because of the dust emitted during its combustion and the associated smog.

According to the Central Emission Register of Buildings (CEEB), in October 2023, there were more than 4.8 million gas cookers, including gas water heaters, and more than 4.3 million boilers for various types of solid fuel, i.e. coal or biomass, installed in residential buildings. In addition, there are 3.5 million less efficient solid fuel heating appliances installed in Polish buildings, i.e. fireplaces, tiled cookers, goats, kitchen ranges. Interpretation of CEEB data is difficult because many buildings have more than one reported heat source and some of them may be used only occasionally or even have not been used for years.

The time-consuming nature of this process can be realised from the data of the Polish Organisation for the Development of Heat Pump Technology, according to which, in the record year 2022, 203 000 heat pumps were installed in Poland, but in 2023 only 124 000. Assuming the installation of 200 000 heat pumps per year only in single-family buildings, of which there are over 5 million, this process will take over 25 years! Of course, with the commitment of significant resources and the creation of attractive regulatory incentives (i.e. subsidies), this rate may be increased, but the market potential will still be limited by the availability of qualified installation teams, **and overstimulation of the market may threaten to increase the cost of installation, leading to a similar effect at the expense of higher private and public funding.**

In addition, it should be remembered that the installation of a heat pump is only justified in buildings with good thermal insulation. If the pump is installed in a building with poor insulation, the heat pump's electricity consumption will be significantly higher, limiting the savings associated with its installation.

This means that, for a significant proportion of buildings, it is necessary not only to replace the heat source, but also, or even primarily, to carry out a comprehensive thermo-modernisation, including insulation of walls and roofs, replacement of doors and windows and installation of mechanical ventilation. Of course, the extent of the modernisation required depends on the technical condition of the building and the thermomodernisation work carried out to date.

A certain proxy relating to the technical condition of a building may be the period of their construction. According to the Central Statistical Office (GUS) data for 2021, as many as 58.9% of residential buildings in Poland were built before 1989, which means that they are currently over 35 years old. Since their construction, some of them have undergone partial thermomodernisation, but given the technical progress in energy efficiency, it can be assumed that they do not meet current standards, for new buildings.

A CSO report on the thermal modernisation of multi-family buildings between 2010 and 2016 shows that the investments carried out during this period contributed to a decrease in average primary energy demand from 226 kWh/m² to 141.5 kWh/m². However, this means that they still have more than twice the energy demand of the newest multifamily buildings for which the established limit is 65 kWh/m² and will require further investment to improve energy efficiency.

According to CSO data, in 2021 more than half of households (52%) used district heating, this is due to the fact that most flats are located in multi-family buildings using this type of heating. This type of heat supply will also be associated with increased emission charges in the future, but due to its diversity and specificity, this issue is described in more detail later in the report.

Cost of heating buildings with their own heat source

As indicated in the analyses so far, the largest part of household energy demand is the heating of buildings. Below is the increase in heating costs for a 100 m² building.

According to the Central Statistical Office, in 2021, an average household using a coal-fired boiler for heating consumed 34 kg of coal per year to heat 1 m² of the building. As pointed out earlier in the report, using averaged data does not always allow the right conclusions to be drawn due to the varying technical condition of buildings. For comparison: 20% of the most energy-intensive buildings heated with coal consumed more than 65 kg/m², which means that the increase in annual heating costs for such a building will be almost double that shown in Table 6. For the purpose of the analysis, the average calorific value of coal was assumed to be 25 GJ per tonne.

Table 6. Net annual additional cost of heating a building, with average coal consumption for heating, of 100 m² in relation to ETS2 at constant 2023 prices [PLN].

2027	2028	2029	2030	2035	2040	2045	2050	2055
1039	1732	1905	1905	4849	10045	14895	16973	18012

Source: Own calculations based on EC data

The emission costs associated with coal heating will be a significant burden on household budgets. Failure to introduce adequate protective policies will lead to a sharp increase in fuel poverty. A particularly drastic increase in the cost of heating buildings is to be expected after 2030, when the European Commission assumes a merger of the ETS2 with the ETS1. If this scenario materialises after 2030, the majority of Poles using coal will be at risk of fuel poverty (monthly disposable income per person in 2023 was PLN 2678, and the calculated costs are given in real 2023 prices).

Thus, government programmes to support thermo-modernisation should be primarily targeted at families using coal. In addition, as soon as the ETS2 comes into force, it will be necessary to introduce mechanisms to compensate the least well-off for increased heating costs. This could take the form of extended energy vouchers linked to incentives for thermo-modernisation of buildings.

Aid mechanisms should include subsidies and state-guaranteed investment loans to cover the contribution. Otherwise, some households, even in the case of an economic justification for thermomodernisation, may not be able to carry it out, due to a lack of available funds as well as creditworthiness. In order to optimise spending, the provision of support should be preceded by a comprehensive energy audit. The problems of the current energy certificate system were described earlier in this report.

According to the CSO, in 2021 an average household using a gas boiler for heating would consume 117 kWh of gas on average per year to heat 1 m² of the building, while the 20% most energy-intensive buildings would consume 202 kg kWh/m², meaning that the increase in annual heating costs for such a building would be more than 70% higher than that shown in Table 7.

Households using natural gas used twice as much fuel to heat m² a building as those using hard coal. This means that buildings heated with gas are, on average, more energy efficient. There are two reasons for this. The first is that, over the last few years, few new buildings, and therefore more energy efficient ones, have been fitted with coal sources. The second reason may be the proportionally better uptake of funds earmarked for thermal modernisation by owners of gas-heated buildings. This may be due to the fact that benefiting from support programmes requires an own contribution, which may be more difficult to raise for poorer households, more likely to use coal-fired boilers.

Table 7. Net annual additional cost of heating a building, with an average consumption of natural gas for heating purposes, with an area of 100 m² in relation to ETS2 at constant 2023 prices [PLN/MWh].

2027	2028	2029	2030	2035	2040	2045	2050	2055
301	501	551	551	1 403	2 906	4 309	4 910	5 211

Source: Own calculations based on EC data

On average, the emission costs associated with gas heating will not be as high as for coal heating. This is due to the statistically lower energy intensity of buildings heated with gas (the energy intensity of individual buildings can be much higher) and the almost twice lower emissivity of gas per unit of energy.

Cost of heating water

On average in the European Union countries, hot water heating is associated with the second highest energy consumption in residential buildings after heating. According to Eurostat data, in Poland in 2021, 11% of the energy used to heat water came from coal and 32% from natural gas. The remainder was electricity, district heating and renewable energy sources.

According to the CSO, in 2021 the average household had 2.9 persons and used 53 m³ of water per year, which means a monthly hot water consumption per person of about 1.5 m³. At the same time, 10% of households used more than 100 m³ of hot water.

Table 8. Net additional annual cost of water heating for a household with average hot water consumption due to ETS2 at constant 2023 prices [PLN/MWh].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
natural gas	79	132	145	145	370	766	1 135	1 294	1 373
coal	153	254	280	280	712	1 475	2 187	2 492	2 645

Source: Own calculations based on EC data

The cost of heating water will not increase the burden on household budgets as much due to ETS2 as the cost of heating. However, these costs do add up.

Eliminating the use of fossil fuels from water heating seems relatively simplest due to the ubiquity and ease of installation of electric water heaters, but achieving the savings from this will depend on future electricity prices, which are already burdened by ETS1 emissions costs.

Cost of cooking meals

According to CSO data, in 2021 53% of households used natural gas for cooking meals and 30% used LPG. Households using natural gas for cooking meals consume an average of 2.4 MWh of gas per year. As with the demand for energy used for heating or water heating, there is a wide variation in cooking fuel consumption. 20% of households on average use

more than 5.2 MWh of natural gas which means that the ETS2 costs for such households will more than double.

Assuming an energy demand for cooking of 2.4 MWh, Table 9 shows the ETS2 costs associated with cooking depending on the type of cooking fuel used.

Table 9. Net additional annual cooking cost due to ETS2 at constant 2023 prices [PLN/MWh].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
natural gas	62	103	113	113	288	596	884	1 007	1 069
LPG	70	117	129	129	328	680	1 008	1 149	1 219

Source: Own calculations based on EC data

Due to its higher emissivity per unit of energy, the cost of using LPG will be higher than natural gas.

Transport-related emission costs

Transport accounted for 25.6 per cent of total greenhouse gas emissions in the European Union in 2022, meaning that it was the second most emitting sector after energy. In contrast to the energy sector, transport emissions did not show a significant reduction; moreover, emissions increased every year between 2013 and 2019. This trend was only broken in the aftermath of the pandemic and the Europe-wide lockdowns in place, but with the lifting of the pandemic restrictions there was an increase in transport emissions between 2020 and 2022.

Emissions in the transport sector come primarily from road transport, which accounts for 95% of them, with passenger cars accounting for 56%. The increase in emissions is linked to the steady increase in the number of vehicles in use and their average annual mileage, despite a decrease in the average vehicle emissions per 100 km. In Poland, transport was responsible for 20 per cent of total emissions.

This means that the inclusion of transport in the ETS2 will impose a higher cost on European economies than the inclusion of fossil fuel burning emissions from households.

Motor fuel prices in connection with ETS2

For motor fuels, ETS2 will operate on a similar basis as for heating fuels. Its cost will be hidden in the fuel price and consumers will be indirectly charged for it by fuel distributors.

Based on the CO₂ emission allowance price projections discussed in the report, an ETS2-related net fuel price increase was calculated.

Table 10. Net additional cost of transport fuels due to ETS2 at constant 2023 prices [PLN/l].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
diesel	0.35	0.59	0.65	0.65	1.65	3.41	5.06	5.77	6.12
petrol	0.29	0.49	0.54	0.54	1.37	2.84	4.22	4.80	5.10
LPG	0.21	0.34	0.38	0.38	0.96	1.99	2.96	3.37	3.58

Source: Own calculations based on EC data

A litre of diesel will see the largest price increase due to ETS2, due to its higher emissions per litre of fuel. The increase in fuel acquisition costs will affect households both directly when they fill up their car and indirectly. The indirect impact will be on the increased cost of transport services. Fuel consumption in Poland has been on an upward trend for years, and forecasts by the Polish Organisation of Oil Industry and Trade indicate that this trend will continue until 2030. Assuming fuel consumption at the level of 2023¹⁷ the total net cost of purchasing transport-related emission allowances will be approximately PLN 11.5 billion in 2027, rising to PLN 21 billion in 2030. Such a high increase in fuel purchase costs will force businesses to raise the prices of their goods and services.

We saw the same mechanism for any price increase in 2022, when inflation from energy carriers shifted to other goods and services in the wake of the energy crisis.

Cost of car use

The average mileage of cars in 2022 in Poland varied according to the type of fuel used. Diesel cars averaged 13,579 km and 20% of such cars drove more than 22,748 km. The average diesel consumption was 7.22 l/km, with 10% of the most fuel-efficient ones burning less than 5.55 l/km and 20% of the most fuel-efficient ones above 9.04 l/km.

In 2022, the average mileage of petrol cars was 12,899 km, 20% of such cars covered more than 19,916 km. On average, petrol-engined vehicles consumed 7.52 litres/km, the 10% most fuel-efficient burned less than 5.84 litres/km and the 20% most fuel-intensive burned more than 9.22 litres/km.

In contrast, the average mileage of LPG cars was 14,623 km and 20% of such cars covered more than 24,903 km. On average, LPG vehicles consumed 10.18 litres/km, with the 10%

¹⁷ According to POPiHN data, fuel consumption in 2023 is: motor gasoline 8,025 thousand m³, diesel 23,303 thousand m³, LPG 4,621 thousand m³

most fuel-efficient vehicles consuming less than 7.96 litres/km and the 20% most fuel-intensive vehicles consuming more than 12.52 litres/km.

Table 11 shows the increase in annual running costs of a passenger car due to ETS2. An annual mileage of 10 000 km and an average fuel consumption of the average for the engine type were assumed.

Table 11. Net annual additional cost of purchasing fuel for a car with an average fuel consumption of 10,000 km due to ETS2, depending on the type of fuel used in constant 2023 prices [PLN].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
diesel	255	425	467	467	1 190	2 465	3 655	4 165	4 420
petrol	221	369	405	405	1 032	2 137	3 169	3 611	3 833
LPG	210	350	385	385	980	2 029	3 009	3 429	3 639

Source: Own calculations based on EC data

In the case of transport, limiting the increase in its cost will be much more difficult and costly than limiting the increase in the cost of housing. This is because the only practical way to achieve this will be to replace the car with an electric one, an expense that is beyond the reach of a significant proportion of the population.

In 2023, 475,000 new cars were registered in Poland, an increase of 13.2 per cent year-on-year. Individuals bought 131,000 new cars. In comparison, all registered cars were 27 347 thousand, industry experts estimate that a significant proportion of registered cars are not actually used, and the number of cars in use is around 20 million. By comparison, at the end of April 2024, there were a total of 64 495 electric cars and commercial vehicles registered in Poland.

Targeting support programmes at people replacing their cars with new ones leads to a situation where the relatively wealthiest people or companies (if they are not excluded from applying for subsidies) receive the subsidy, which does not contribute to the fairness of the energy transition.

ETS2 costs for sample families

So far in the report we have focused on detailing the impact of ETS2 on household costs. In this section we will summarise the costs for a few example families we have defined. We will only count direct costs, although, as we have indicated in the report, additional indirect costs should also be expected.

Average family

For the purposes of the report, we decided to statistically parameterise the average Polish family and calculate what additional costs they would incur as a result of ETS2. We have taken all the characteristics of such a family relevant to the result as averages for Poland based on CSO data, hence the seemingly absurd assumptions of e.g. 2.9 family members.

Assumptions made:

- area of the flat 75m²
- number of persons in the household 2.9
- annual hot water consumption 53 m³
- annual gas consumption for cooking 2400 kWh
- number of cars per capita 0.701
- average annual car mileage 13 323 km
- Average annual fuel consumption 7.71 l/km
- coal consumption for heating 34 kg/m²
- gas consumption for heating 117 kWh/m²

We decided to carry out the analysis in two variants, the first for a family using natural gas to heat the dwelling, heat hot water and cook meals and the second for a family using coal to heat the dwelling, heat hot water and use natural gas to cook meals.

Table 12. net additional annual cost to the average family of ETS2 at constant 2023 prices [PLN].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
option I (gas)	1 001	1 668	1 835	1 835	4 670	9 674	14 344	16 346	17 347
option II (coal)	1 628	2 713	2 985	2 985	7 598	15 738	23 336	26 592	28 220

Source: Own calculations based on EC and CSO data

The analysis carried out shows a significant disparity in the costs incurred between the average family using coal and natural gas. This points to the need, described earlier in the report, to provide special support for families using coal heating.

Cumulative ETS2 costs, assuming unchanged energy demand, in 2027–2030 will be for variant I (gas) PLN 6338 and in 2027–2035: PLN 24018¹⁸ and for variant II (coal) PLN 10311 and PLN 39074 respectively.

¹⁸ Assuming a linear increase in ETS2 costs between 2031 and 2035

The annual cost of ETS2 in 2027 for Variant I (gas) will be equivalent to 45% of the monthly net minimum wage¹⁹, and for Variant II (coal) 73% and in 2030 it will increase to 82% and 134% of the minimum wage respectively. In relation to the average salary in 2027, it will be 27% for Variant I (gas) and 44% for Variant II (coal) and in 2030 49% and 80% respectively.

Energy-intensive family

The costs incurred for ETS2 will depend on the level of energy demand. This depends primarily on the level of heat loss in the building in question. Thus, the highest costs will be incurred by occupants of buildings that have not yet been thermally modernised.

For the purposes of the report, based on CSO data, we parameterised the energy-intensive family and calculated what additional costs they would incur due to ETS2. Relative to the average family, we made modifications to the consumption of hot water, fuel for home heating and cooking, assuming that their consumption would correspond to that of the 20% most energy-intensive households in the category. We assumed mileage and fuel consumption based on data for the 20% of cars with the highest mileage and fuel consumption.

Assumptions made:

- area of the flat 75m²
- number of persons in the household 2.9
- annual hot water consumption 100 m³
- annual gas consumption for cooking 5200 kWh
- number of cars per capita 0.701
- average annual car mileage 21 851 km
- Average annual fuel consumption 9.71 l/km
- coal consumption for heating 65 kg/m²
- gas consumption for heating 202 kWh/m²

We decided to carry out the analysis in two variants, the first one for a family using natural gas to heat the dwelling, heat hot water and cook meals and the second variant for a family using coal to heat the dwelling and heat hot water and natural gas to cook meals.

¹⁹ On a contractual basis, the minimum net wage in 2023 was around £2,747 and the average net wage was around £4,587. The cost of ETS2 is expressed in constant 2023 prices and households will pay it in amounts plus the VAT rate, which is currently 23% for fuel

Table 13. Net additional annual cost to a family with high energy demand due to ETS2 at constant 2023 prices [PLN].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
option I (gas)	1 910	3 184	3 502	3 502	8 915	18 468	27 383	31 204	33 114
option II (coal)	3 222	5 369	5 906	5 906	15 034	31 142	46 176	52 619	55 841

Source: Own calculations based on EC and CSO data

An energy-intensive family using natural gas will incur 91% higher ETS2 costs than the average family using natural gas. An energy-intensive family using coal will incur 98% higher costs than the average family using coal and as much as 222% higher costs than the average family using natural gas.

The increase in costs for energy-intensive households from the first year of ETS2 will be so great that many will be condemned to fuel poverty. Support for such families will require the introduction of mechanisms to compensate for ETS2-induced increases in the cost of living. In our view, this support should take the form of monetary direct transfers combined with a strong incentive for thermo-modernisation.

The cumulative costs of ETS2, assuming unchanged energy demand, in 2027–2030 will be for variant I (gas) PLN 12100, and in 2027–2035: PLN 45851 and for variant II (coal) PLN 20403 and PLN 77318 respectively.

The annual cost of ETS2 in 2027 for Variant I (gas) will be equivalent to 86% of the net monthly minimum wage and for Variant II (coal) 144% and in 2030 it will increase to 157% and 264% of the minimum wage respectively. In relation to the average salary, in 2027 it will be 51% for Option I (gas) and 86% for Option II (coal) and in 2030 94% and 158% respectively.

Family 2+2

As another variant for the analysis, we took a family with two children living in a 150 m² house. We assumed that the family has 2 cars: the first one used more often with an economical diesel engine and the second one used less often with a low-efficiency petrol engine.

Assumptions made:

- area of the flat: 150 m²
- number of persons in the household: 4
- annual hot water consumption: 72 m³

- annual gas consumption for cooking 2400 kWh
- average annual mileage of 1 car (diesel): 20,000 km
- average annual fuel consumption of 1 car: 5.5 l/km
- average annual mileage of 2 cars (petrol): 5,000 km
- average annual fuel consumption of 2 cars: 10 l/km
- coal consumption for heating 34 kg/m²
- gas consumption for heating 117 kWh/m²

We decided to carry out the analysis in two variants, the first one for a family using natural gas to heat the dwelling, heat hot water and cook meals and the second variant for a family using coal to heat the dwelling and heat hot water and natural gas to cook meals.

Table 14. Net additional annual cost to a family of 2+2 for ETS2 at constant 2023 prices [PLN].

	2027	2028	2029	2030	2035	2040	2045	2050	2055
option I (gas)	1 156	1 926	2 119	2 119	5 393	11 171	16 564	18 876	20 031
option II (coal)	2 363	3 939	4 332	4 332	11 028	22 844	33 872	38 598	40 961

Source: Own calculations based on EC data

The 2+2 family we have described will incur costs similar to those of an average household. Due to the higher proportion of costs associated with heating the dwelling than with transport in this example, the cost difference between a family using gas and coal is greater at 104%. As in the other examples, the radical increase in costs, to levels leading to widespread fuel poverty, occurs in the 2030s when, as envisaged by the European Commission, ETS2 will merge with ETS1, as described in more detail earlier in the report.

Couple without children

As a final option for analysis, we took a couple living in a 50m² flat equipped with natural gas for heating, hot water and cooking. The couple occasionally uses a car with an inefficient petrol engine.

Assumptions made:

- area of the flat: 50 m²
- number of persons in the household: 2
- annual hot water consumption: 36 m³
- annual gas consumption for cooking 2400 kWh
- average annual car mileage: 5,000 km
- average annual fuel consumption 10 l/km

- gas consumption for heating 117 kWh/m²

Table 15. net additional annual cost to the couple for ETS2 at constant 2023 prices [PLN].

2027	2028	2029	2030	2035	2040	2045	2050	2055
407	678	746	746	1 899	3 933	5 832	6 646	7 053

Source: Own calculations based on EC data

This example refers to a household with a relatively low energy demand. This is due to both the smaller size of the dwelling and the lower mileage of the car than in the previous examples. Even in this case, the annual cost will be more than a few hundred zloty in the first period, which means one of the highest increases in the cost of covering energy needs ever. For many families, this will be higher than the increase caused by the energy crisis due to the energy price freeze discs introduced at the time.

Other costs related to emission charges

Heating

Due to the local nature of district heating, the impact of ETS2 entry on heat prices will vary. The structure of the capacity and heat generation fuels used in each system is different, which means that the calculation of the ETS2-related costs for each system has to be done individually. Such capabilities are available to each heat supplier. In order to provide reliable information to consumers, the state should introduce an information obligation in this regard, which is fulfilled by the district heating companies when notifying them of tariff changes.

Currently, only a proportion of district heating units incur emission charges. This is the case for district heating plants above 20 MW, which are covered by the ETS1. The prices of the heat they supply already include the cost of emissions, which, according to EC projections, will increase rapidly after 2030, translating into a further increase in the cost of supplied heat.

A significant proportion of ETS1 district heating plants are in the process of implementing or preparing to implement decarbonisation investments. These typically involve co-firing biomass in coal units, the construction of new gas or biomass units, increasing the use of other renewable energy sources, i.e. high-capacity heat pumps, and the use of heat storage technologies, which will lead to decarbonisation.

According to the Energy Regulatory Office's data for district heating plants above 5 MW in 2022, 65% of heat was produced from hard coal, 9% from natural gas and 7% from fuel

oil. The current fuel mix and the scale of district heating systems (one of the highest shares of system heat in covering heating needs among European countries) means that the process of their decarbonisation will take time and that heat consumers must expect a further increase in their heat prices, along with an increase in the price of emission allowances in the ETS1.

Smaller district heating systems of less than 20 MW, typically located in county towns and smaller cities, will not incur CO₂ costs until 2027. With the entry of the ETS2, the cost of fuel acquisition for such units will increase (by including emission costs in the fuel price). This increase will be proportional to the increases faced by households using individual heat sources and will depend on the fuel mix used by the heat supplier concerned.

Given the lack of influence of heat consumers on the modernisation of district heating plants, the only available strategy to reduce the increase in heating costs will be the thermo-modernisation of buildings, which, according to the Central Statistical Office (CSO), between 2011 and 2016 allowed for an organic energy demand reduction of 37% on average and, based on currently available technological solutions, may involve a greater reduction in demand.

There are a number of constraints on the modernisation of small district heating plants. Only one of them, against all appearances not the largest, is the lack of financial resources to carry out the investment. At least as serious a challenge in small district heating companies is the lack of competence to carry out complex technical and economic analyses and experience in carrying out large and complex investments that go beyond the current operation and replacement of owned assets. The lack of existing competence leads to postponing investment decisions, even when public funds are available to finance them. In order to accelerate the transformation of the district heating industry, it is necessary for the government to support the decision-making processes and to provide readily available funds to allow district heating plants to acquire external experts necessary to carry out analyses and supervise the investment process.

As in the case of thermo-modernisation and replacement of individual heat sources, there is limited availability of personnel with the knowledge and competences required to implement such projects in the case of investments in district heating transformation. Overstimulation of the market through aid programmes can lead to investment delays and increased implementation costs.

Electricity

Electricity generation is one of the sectors subject to ETS1 levies. Despite the European Commission's forecasts of price increases in the ETS1 discussed in the report, it is not possible to translate them simply into electricity price forecasts. Energy price formation is a complex process that depends on many variables. Current prices (SPOT market) depend on, among other things, fuel and ETS1 prices, the availability of energy from renewable energy sources, the volume of demand or the availability of imported energy. In the long term, energy prices depend on the projected demand for electricity and the structure of the future energy mix. This means that, in the long term, the key influence on electricity prices will be exerted by the state's energy policy, including investment decisions taken today concerning, inter alia, nuclear energy, energy storage, RES and electrification of other sectors of the economy, i.e. heating, transport.

The level of emission allowance prices forecast by the European Commission will mean a further increase in the cost of energy production from fossil fuel power plants, i.e. coal and gas. However, this will be offset by an increase in the production of cheaper, emission-free energy from emission-free sources, and the resultant of these two opposing processes will shape future energy prices.

The scale of the impact of the ETS1 on energy costs can be traced back to 2022 data. The average cost of emissions included in the energy price was then 260 PLN/MWh²⁰. This means that the average household in 2022 paid a net PLN 655 in energy bills due to ETS1. If the decrease in emissivity is slower than the increase in ETS1 allowance prices, further increases even with a decrease in average emissivity could lead to an increase in the total emission costs hidden in the energy bill.

In order to avoid an increase in the cost of electricity, it is necessary to accelerate investment in the transformation of the electricity sector. This means that it is another sector that will be involved in competition for the resources of the construction sector potentially leading to bottlenecks and associated price increases.

Indirect costs

Indirect costs associated with ETS2 will arise from increases in the cost of doing business, which businesses will attempt to pass on to their customers. The most glaring example of this will be the increase in the cost of transport services, which are directly dependent on motor fuel prices.

²⁰ According to the NOBiZE, the average emissivity of the national power industry in 2022 was 685 kg/MWh and the average ETS1 price was 80.82 eur/t

The impact of energy price increases on overall prices was seen globally in 2022, when a sharp rise in energy commodity prices led to a global increase in inflation. The impact of the entry of ETS2 will be smaller, but the process of passing on price increases to other sectors of the economy will be analogous. The difference will be its restriction to European Union countries, which may result in a worsening of the competitive position of European companies vis-à-vis non-EU players. However, this impact will be limited, as the most energy-intensive, and therefore vulnerable to energy price increases, industries are already predominantly covered by the ETS1. In their case, the deterioration in competitiveness and the need to raise prices will be influenced by the gradual reduction in the pool of CO₂ allowances allocated to them free of charge, and by the projected price increase in the ETS1.

Because of the variation in the way they cover their energy needs, the situation for individual companies will vary. Those that already use less carbon-intensive sources or are more energy efficient will have an increasing advantage.

Emission reduction investments

Reducing the costs of CO₂ emissions including ETS2 entry is possible by carrying out investments that reduce the energy intensity of the economy and by replacing energy generation sources (electricity, heat) with zero-emission ones.

With today's technological developments, many of the zero-carbon solutions are more expensive than traditional solutions, which means that investment in them is only justified if supported by public funds. Thus, it is the decision to target resources to particular sectors that determines the pace of investment. At the same time, as individual technologies become more widespread, their costs will fall, leading to an investment boom, especially if they continue to receive extensive public support, as exemplified in recent years by prosumer photovoltaics.

The desire to avoid some of the costs associated with emissions is driving the need to accelerate investment simultaneously in many sectors. This will lead to overlapping investments and competition for both building materials and access to skilled workers. Competition will also apply to the distribution of public funds allocated to the transition. It is important that their disbursement is preceded by a comprehensive analysis and interplay between the different programmes. Otherwise, similar effects will be achieved at a higher financial cost, realistically leading to a decrease in the availability of funds for transformation. An important parameter in the evaluation of individual programmes should be their impact on the achievement of social objectives, primarily the reduction of fuel poverty and the reduction of as many emissions as possible with as few resources as possible. This will potentially avoid the situation we are facing in the ETS1, where budget revenues from the sale of emission allowances are less than the expenses incurred by domestic entrepreneurs for their purchase.

Recommendations

On the basis of the analyses carried out, we recommend that the governors take the following actions:

- Start of the legislative process on the rules implementing ETS2 in the Polish legal system. An urgent start of the work will provide more time for entrepreneurs and administration to adapt to the new requirements.
- To submit the assumptions of the Socio-Climate Plan for consultation as soon as possible, together with an indication of the distribution of funds for the various initiatives and a timetable for their disbursement. This will make it possible for citizens to plan investments in energy efficiency and for businesses to develop the skills and implementation capacity needed to meet the increased demand for services, at least partially reducing bottlenecks and inefficiencies.
- Carry out a wide-ranging information campaign on the date of entry into force of ETS2 and the associated costs and potential savings to be achieved through investments in energy efficiency, including available and planned investment support mechanisms.
- Priority approach to reducing emissions from buildings. Introduce preferences in terms of the availability of support and its amounts for owners of the most energy-intensive buildings, in particular those heated by coal.
- Increasing the available funds in the current investment programmes, i.e. Clean Air, and modifying the current criteria in order to retrofit as many of the least energy-efficient buildings as possible before the entry into force of ETS2. Currently, the criteria are income-based; in our opinion, they should be supplemented with qualitative ones, i.e. reward those facing the greatest investment effort, but also the greatest potential reduction.
- Expanding the current support mechanisms to include state-guaranteed special-purpose loans for thermo-modernisation in order to make investment feasible for those who have neither the means nor the creditworthiness to cover their own contribution.
- Investment support in the transport sector should concern the development of infrastructure so as to reduce its costs for end users and increase its accessibility. We believe that providing direct support for the purchase of electric vehicles is inefficient and leads to the flow of public funds to the relatively wealthier part of society, which could be used more efficiently for thermal modernisation of buildings or expansion of infrastructure serving all citizens.

- Creation of a TEB – Buildings Energy Transformation Base. In order to effectively supervise the process of adapting properties to the requirements arising from European standards, as well as to effectively provide support to households on whom the financial burden will fall, an IT tool along the lines of the Central Building Energy Efficiency Register should be created. The TEB database should contain information downloaded from the CEEB on installed heat sources and data from the building's energy efficiency certificate. In addition, the TEB database should make it possible to load data from an audit performed by an energy advisor.
- It should be made compulsory for the end-user to quote the CEEB number when purchasing fuel and oblige the vendor to report the volume of fuel sold to a specific customer. Information on electricity consumption should also be integrated with CEEB. Pooling this data will enable better targeting of public policies in the future, both in terms of investment programmes and energy poverty reduction.
- Reforming the energy certification system and introducing supervision of its quality in order to provide citizens with reliable information on the energy intensity of their buildings. The current way in which certification operates should be seen as superficial and a mere bureaucratic burden. It makes sense to verify the knowledge of those authorised to issue certificates and to introduce an obligation to register the certificate issued in the CEEB or TEB system.
- In view of the wide dispersion of funding sources, scope and conditions of support in the area of thermal modernisation of buildings, a government platform should be set up to aggregate knowledge and propose to potential applicants the best form of support for them and enable them to submit an application.
- Initiate diplomatic and lobbying efforts in the European Union to keep ETS1 and ETS2 separate after 2030 and to put in place an effective mechanism to limit price levels in ETS1 and ETS2.

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