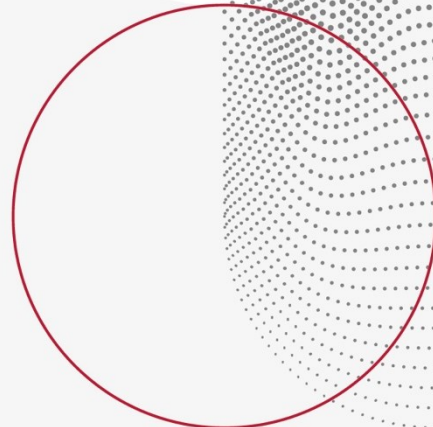
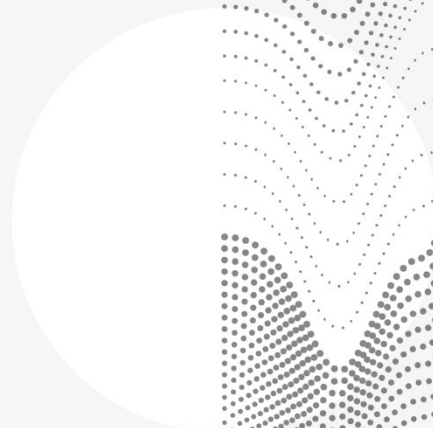
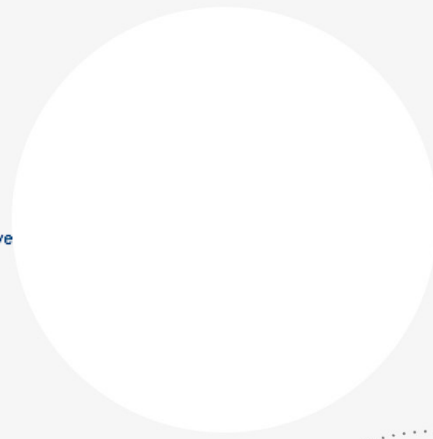


IBS RESEARCH REPORT 02/2023
MAY 2023

DISTRIBUTIONAL EFFECTS OF CARBON PRICING IN POLAND

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DISTRIBUTIONAL EFFECTS OF CARBON PRICING IN POLAND•

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Abstract

The report aims to indicate the potential effects of climate policy and point out mechanisms to reduce inequalities caused by increased energy prices. Based on the macroeconomic model and microsimulation, we present the effects of carbon pricing and its consequences for economic sectors and households within a ten-year horizon. We indicate that carbon tax uptake would reduce the value added generated by the service sector and industry employment. In the case of households, households in Poland in the 2033 perspective will lose 2% of their income compared to the scenario without introducing the carbon tax on average and distributional effects would be regressive. To counteract the inequalities that can be introduced by carbon pricing, we argue for redistribution mechanisms in the form of direct cash transfers for low-income households combined with incentives to undertake pro-climatic investments. Such actions will allow both to support climate policy goals and reduce the risk of increasing social inequalities.

Keywords: carbon pricing, distributional effects, carbon tax, Social Climate Fund

JEL: L71, J21, Q43

• This report is part of the European Climate Initiative (EUKI). EUKI is a project financing instrument by the Federal Ministry for Economic Affairs and Climate Action (BMWK). The EUKI competition for project ideas is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. It is the overarching goal of the EUKI to foster climate cooperation within the European Union (EU) in order to mitigate greenhouse gas emissions. This report uses data from Statistics Poland. Statistics Poland has no responsibility for the results and conclusions presented in this report, which are those of its authors. The usual disclaimers apply. All errors are ours.

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1. Introduction

The end of 2022 brought significant climate policy decisions for Poland. The European Union has increased the reduction goal in the sectors covered by the ETS to 62% in 2030 and decided to include construction and individual transport in the Emissions Trading System (ETS-II) from 2027. This change may encounter social tensions. Households will directly feel the increasing cost of domestic heating and car transport. Poland is particularly exposed to price hikes due to the significant share of coal and gas among domestic heating sources and the large and outdated car fleet.

To alleviate the price increase, European Union will launch Social Climate Fund between 2026-2032. This Fund will protect EU residents from increasing heating and fuel costs by supporting energy-efficient investments and safety nets. Poland will receive the highest allocation in Europe (17.6%; EUR 11.4 billion in current prices), of which a maximum of 37.5% can be allocated to direct transfers for the least affluent residents (Council of the EU, 2023). This amount would allow financing the allowance of 53 EUR a year to each Polish household during the funding period (according to current prices). Climate policy will be an important subject during the autumn campaign preceding the parliamentary election in 2023. So, what kind of postulates should be formulated to prevent social tensions and protect the most vulnerable social groups?

The report aims to indicate the distributional effects of the carbon pricing policy and suggest mechanisms to reduce inequalities caused by increasing energy prices in a 10-year horizon.

In the report, we:

- indicate the recent energy and transport poverty level as well according to the most current data,
- estimate the effects of the introduction of carbon pricing for households with various income levels,
- indicate the mechanisms of limiting the ETS-II burdens on households.

In our previous works, we suggested deep energy retrofits and fiscal solutions that would reduce energy poverty in Poland (Sokołowski and Frankowski, 2021; Sokołowski et al., 2021), with particular emphasis on vulnerable groups (Frankowski et al., 2022). In this report, we point out which redistribution mechanism would tackle the social effects of extended climate policy. Moreover, we suggest an obligatory impact assessment with analysis, including the effects on income decile groups, to avoid promoting solutions which lead to inequalities. The proposed solutions will enable to avoidance of social tensions, reduce inequalities, implement an ambitious climate policy, and weaken the arguments of opponents of the energy transition.

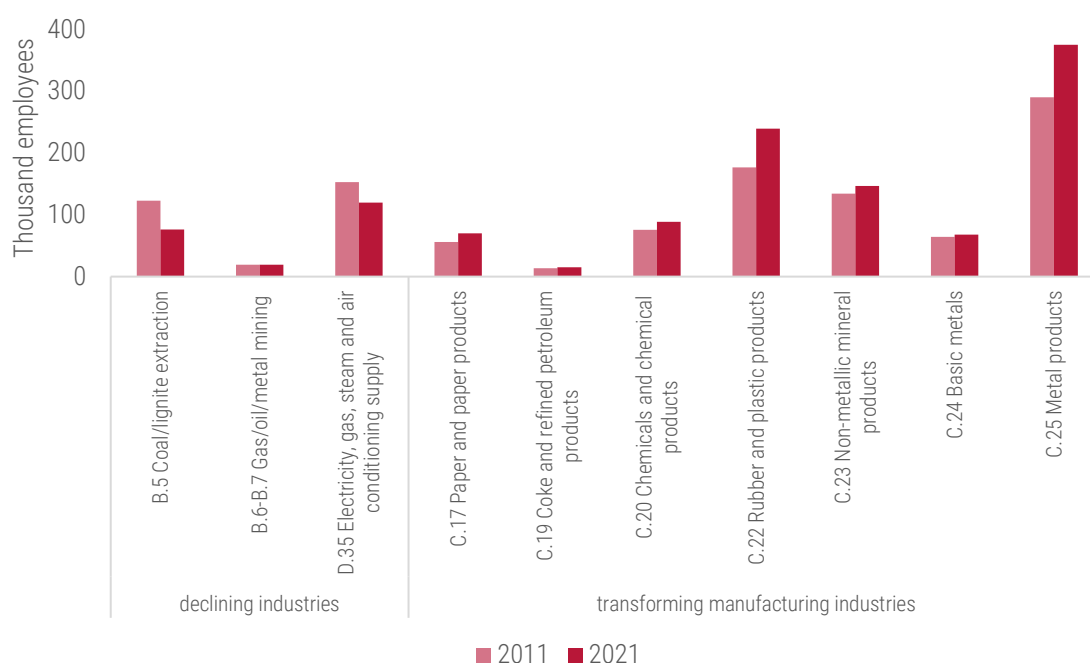
The study consists of five chapters. In chapter two, we indicate crucial statistics from the point of view of the exposition of Polish society at the ETS-II. In chapter three, we present the potential impact of carbon pricing on various social groups. In chapter four, we offer solutions for the plan to implement the Social Climate Fund, and then in chapter five, we summarise the report.

2. Why is Poland vulnerable to climate-related social tensions?

This chapter indicates three central tension causes arising around climate policies: lagging energy transition, growing energy poverty and transactional attitudes towards the European Union.

The Polish economy is energy-intensive despite the high pace of economic development. First, the energy-intensive industries still contribute to overall employment (Figure 1), which results from the position of Polish companies in global supply chains. Poland is slowly moving towards countries with a high technological level, but these changes have a small extent to reduce the energy consumption of the economy. Second, coal still ensures about 2/3 of produced electricity and heat. Third, decarbonisation has only recently been an area of state policy. Social agreements regarding coal mine closures were concluded with the mining and energy sector representatives in 2021 and 2022, respectively. With high energy prices, decarbonisation can challenge businesses and households heating homes with fossil fuels.

Figure 1. Employment in carbon-intensive sectors between 2011 and 2021



Source: own elaboration based on Statistics Poland 2011-2021.

The residential sector is strongly addicted to coal. In Poland, coal is used not only in industry but also in households. Despite the progress of the domestic energy transition, coal is still used by 45% of households. This problem applies to households in rural areas with lower availability of gas grids and district heating networks in cities. For this reason, decarbonisation will be a severe challenge to households, and it must accelerate as much of this coal was imported from Russia before this country attacked Ukraine in 2022.

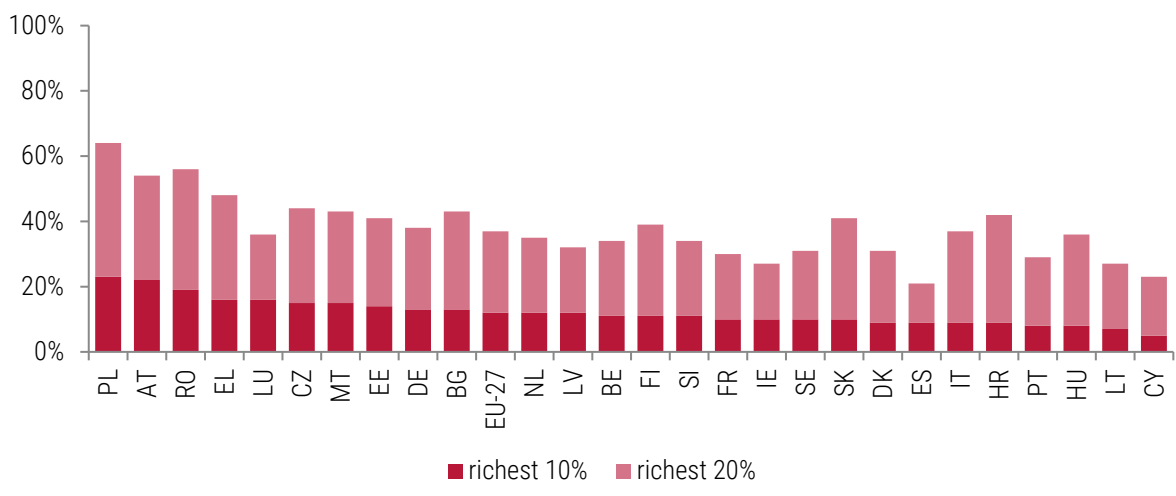
In the last year, the energy poverty level in Poland and the overall vulnerability to this phenomenon increased. According to the most recent data, in 2021, energy poverty measured by the Low-Income High-Costs indicator concerned 11% of the population (1.5 million households), which means an increase in the phenomenon by nearly two percentage points compared to 2020. Furthermore, 400,000 households (3%) were at risk of energy poverty. Among the most exposed to energy poverty social groups were low-income households: retirees, pensioners and households receiving social assistance. Energy poverty concerns people living in old houses with individual heating and is more common in rural areas. The effectiveness of energy poverty mitigation tools

– both social benefits (Sokołowski et al. 2021), investment support schemes (Sokołowski, Frankowski 2021), as well as introduced ad hoc subsidies, e.g. coal allowance (Polish Smog Alarm/Frank Bold/Institute of Structural Research, 2022) is limited. In the case of these instruments, policy designers put simplicity of implementation beyond efficiency (e.g. making everyone eligible for the coal benefit regardless of income). Some policies are also ineffective as they encounter administrative obstacles, such as the lack of investment pre-financing for households in energy poverty.

In Poland, also the prices for engine fuel increased last year. Wholesale prices of E-95 gasoline and eco-diesel oil within a few months of the start of the Russian military aggression increased by almost 20%, which also increased inflation. The share of households with high transport expenditure and low income was about 9% in August 2022, much higher in rural areas (13%)¹. This measure can be considered a proxy for the transport poverty level in Poland. Moreover, above ¾ Polish households have at least one car, one of Europe’s highest indicators. At the same time, the car fleet is quite old; hence the carbon pricing and ETS-II can cause tensions, especially in rural areas, where expenses are correspondingly higher, like the age of cars.

Poles represent a transactional approach to climate policies. Our society remains enthusiastic about European integration against other nations, but at the same time, we would be reluctant to introduce new environmental fees (Sokołowski et al., 2023). If so, they would be willing to take the income of a small group of the most wealthy people (Figure 2). Tax aversion is associated with low trust in state institutions and misbelief about the adverse effects of climate change.

Figure 2. Preferences regarding burdens to reduce energy consumption in EU-27



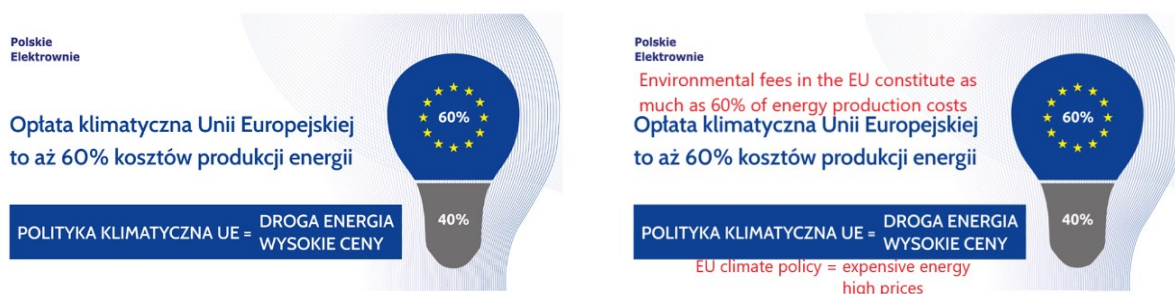
Note: Question: Which of the following groups of the population in (our country) do you believe should mainly make more efforts to reduce their energy consumption?
Source: own elaboration based on Eurobarometer (2022)

New carbon tax uptake without safety net uptake can polarise a strongly divided society. Some politicians play social concerns about the further increase in energy prices, seeing opposition to climate policy as a base for gathering political support. This example was a misleading nationwide campaign of the state-led energy enterprises in 2021, blaming the climate policy for energy price uptake (Figure 3). In 2023, a report by C40 Association recommended that individual consumption restrictions regarding meat, dairy products, buying clothes, cars and air travel (C40 et al., 2019) were used to antagonise society even four years after publishing. To debunk such narrations, climate policies must be introduced transparently, and proposed solutions must be

¹ Own estimates based on the nationwide survey with 10,000 people (August 2022).

understandable, effective, progressive (Dechezleprêtre et al. 2022) and protect social groups in the most challenging situation against radical energy price hikes.

Figure 3. A misleading campaign blaming the EU for the energy price hikes launched in Poland in 2021



Note: the panel on the left shows the original banner displayed in Poland. The panel on the right shows the banner with English translations (in red). Source: polskieelektrownie.com.pl (2021).

Why is Poland vulnerable to climate-related social tensions? Because the Polish economy is still carbon-intensive, climate policies with significant effects on household budgets will probably be used to polarise society. In the next chapter, we indicate how new climate and energy policies will burden the economic sectors and households in Poland and how to reduce these burdens through an effective redistribution policy.

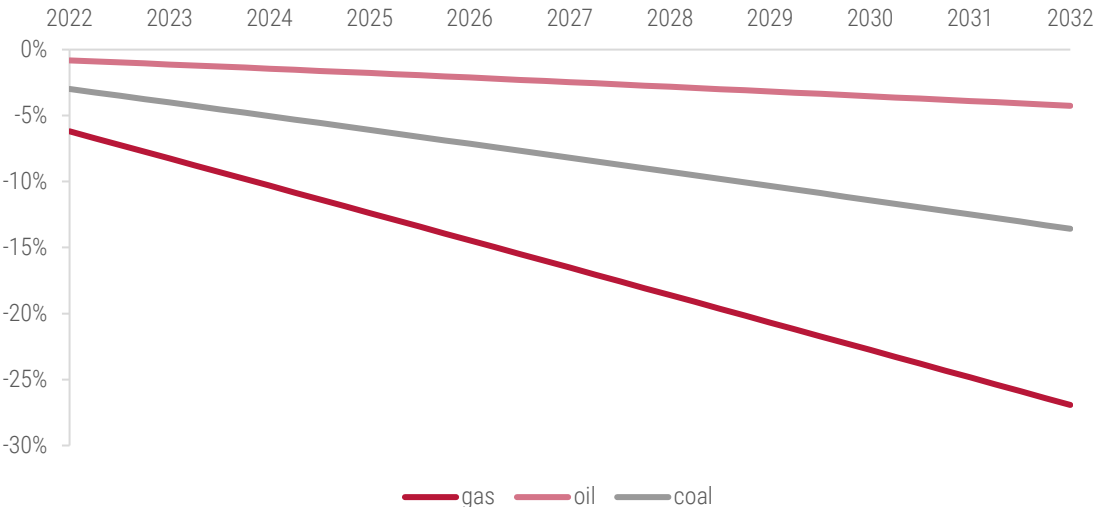
3. What are the macro and microeconomic implications of taxing emissions?

In this chapter, we present the consequences of an economy-wide carbon tax. We consider three pathways for redistributing the revenues from this tax (EPG, 2022), identifying efficient solutions regarding climate and social aims. Although the introduction of a carbon tax in such shape currently appears to be a theoretical scenario, the simulation allows us to indicate the approximate consequences of the impact of climate policies on the gross domestic product, employment and households' welfare and the scale of redistribution needed to protect the least well-off and most vulnerable groups from the adverse effects of change. In the following subsections, we present results on macro- and microeconomic effects. The results refer to the baseline scenario (without the carbon tax) of the projected level of economic growth (Section 3.1) and the situation of households by income or expenditure decile (Section 3.2).

3.1. Macroeconomic impact

Introducing a carbon tax would reduce the dependence of the Polish economy on fossil fuel imports. The decrease in fuel consumption would be visible, especially in the short term and in the case of gas. By 2023, imports of this fuel would decrease by 1/4 compared to the baseline (no tax) scenario (Figure 4). Introducing a carbon tax would require further diversification of supply sources for oil imports. However, these options are possible, as demonstrated by introducing embargoes on Russian fossil fuels (Antosiewicz et al., 2022).

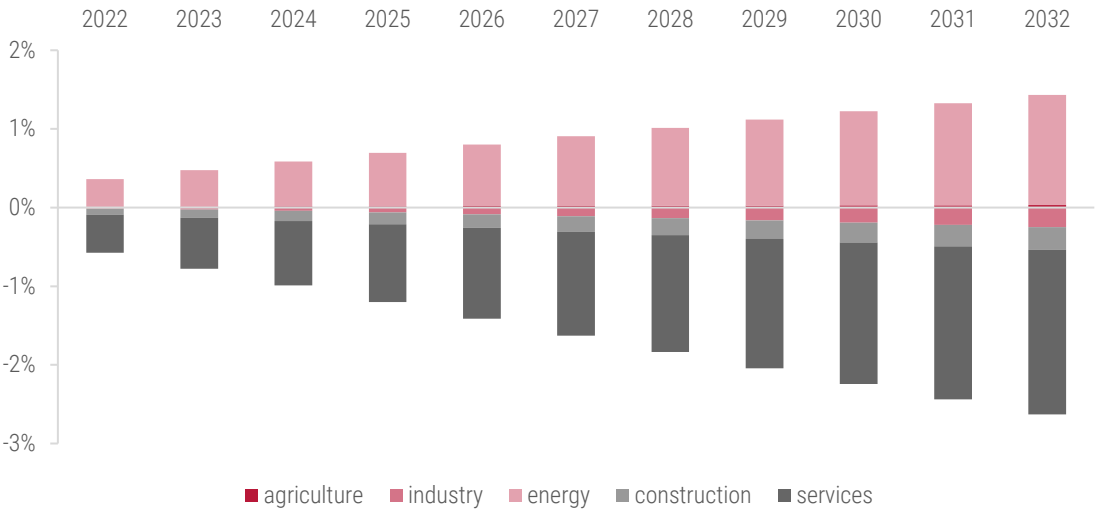
Figure 4. Change in fossil fuels imports after the introduction of a carbon tax (% change from baseline)



Source: own elaboration based on MEMO model simulation

The services sector would be most negatively affected by the carbon tax. This is primarily due to the largest share of services in the projected economic growth (2 pp; Figure 5). However, services have greater adaptability to change than other economic sectors. The scale of the challenge is more significant for construction and industry, where decarbonisation will pressure fixed assets, including production methods and technologies. Steel, cement and chemical plants already take steps to reduce CO₂ emissions (as the ETS covers them), but these actions should be further supported by government industrial policy. Oppositely, the added value generated by the energy sector will increase due to the surges in energy prices following the introduction of the climate tax.

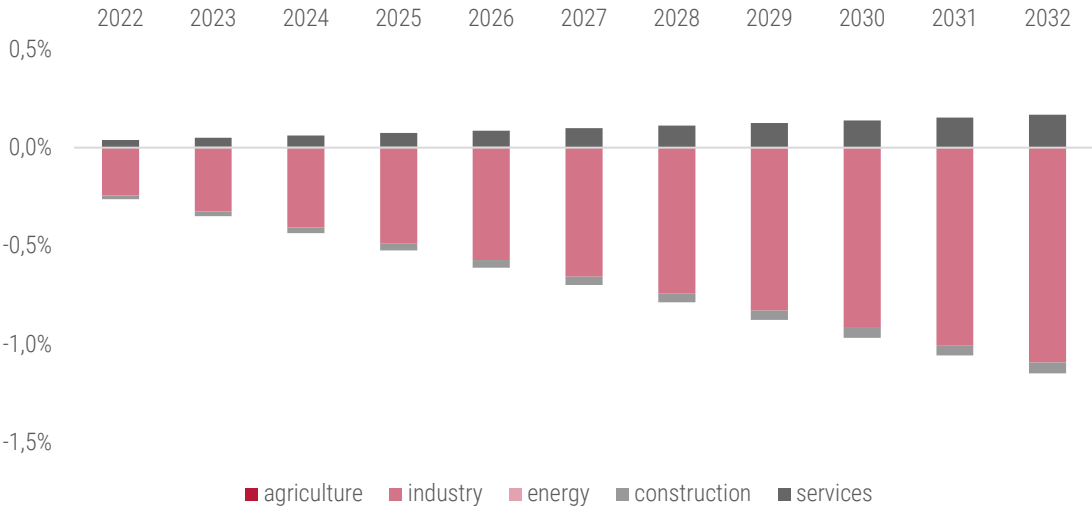
Figure 5. Change in value-added after the introduction of the carbon tax broken by economic sectors (% change from baseline)



Source: own elaboration based on MEMO model simulation

A carbon tax in the 2032 horizon would have a limited negative impact on employment. The impact would lead to a decrease of around 0.1 per cent compared to the no-ETS scenario. The most significant reduction in employment is in the industry (1 pp; Figure 6). However, the magnitude of the impact of the carbon tax on employment will increase in the long term. Therefore, labour market adjustments resulting from the carbon tax should be addressed beforehand, applying industrial (support for more efficient technologies) and labour market policies (e.g. re-qualification). Poland's relatively good labour market situation in 2023 would help the labour market transformation caused by introducing the carbon tax. A reduction in employment due to the introduction of the carbon tax could more strongly affect local labour markets dependent on the industry, especially after including road transport and the residential sector in the ETS, which would reduce demand for the services of energy-intensive industries. Finally, the displacement caused by the introduction of the tax will lead to an increased share of the service sector.

Figure 6. Changes in employment in Poland after the introduction of the carbon tax by economic sectors (% change from baseline scenario)



Source: own elaboration based on MEMO model simulation

Taxing emissions will primarily affect workers in energy-intensive industries and mining. The mining and energy unions secured the sector's interests through "social agreements" with the government in 2021 (coal mining) and 2022 (lignite mining and energy). For other industries, such agreements still need to be included. Mining and energy's relatively strong bargaining position is due to the sector's tradition and geographical concentration, which mobilises the industry and workers to associate, articulate interests, and exert political pressure (Frankowski et al., 2022). Much less attention is paid to other, more dispersed energy-intensive industries: cement, steel, chemicals, metals, food and transport. The share of these sectors in employment in Poland is higher than in other EU countries.

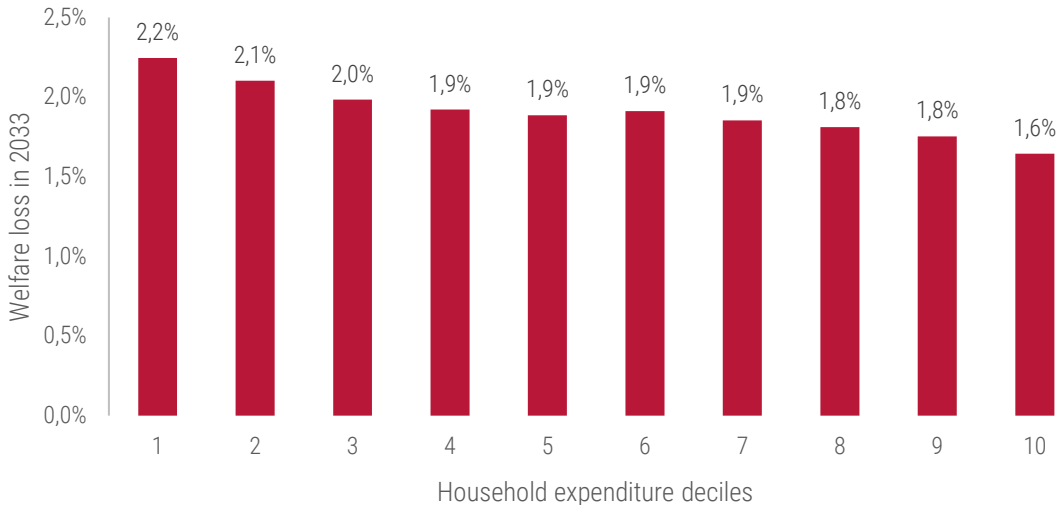
Taxing emissions will be a significant macroeconomic challenge in regional policy and political economy. Decarbonisation may reduce the importance of Silesia as a region concentrating on coal and energy industries (Mazurkiewicz et al., 2023). A large part of the announced investments in energy - such as offshore wind or a nuclear power plant - is planned in the northern part of the country. In addition, the potential for locating renewable sources: e.g. wind and solar power, in traditional industrial regions is weaker than in other parts of the country. Decarbonisation will also affect existing political sympathies and may position politicians hoping to support workers in energy-intensive industries as opponents of climate policy. Strong regional institutions and support instruments will mitigate these tensions (Vona, 2023). However, unlike previous climate policy

instruments, ETS-II will more directly impact households and may create tensions that Poland has so far managed to avoid.

3.2. Microeconomic impacts

In Poland, the carbon tax will be regressive – the indigent will bear more of the costs of the new solutions than the wealthy. Simulation using the QUAIDS model indicates that households in Poland in the 2033 perspective will lose, on average, 2% of their income compared to the scenario without introducing the carbon tax (Figure 7). Households with the highest income (the last three deciles of the income distribution) will lose less than the average families in Poland. Notably, the effects of introducing a carbon tax in Poland will be more regressive than in other EU countries (Ohlendorf et al., 2021).

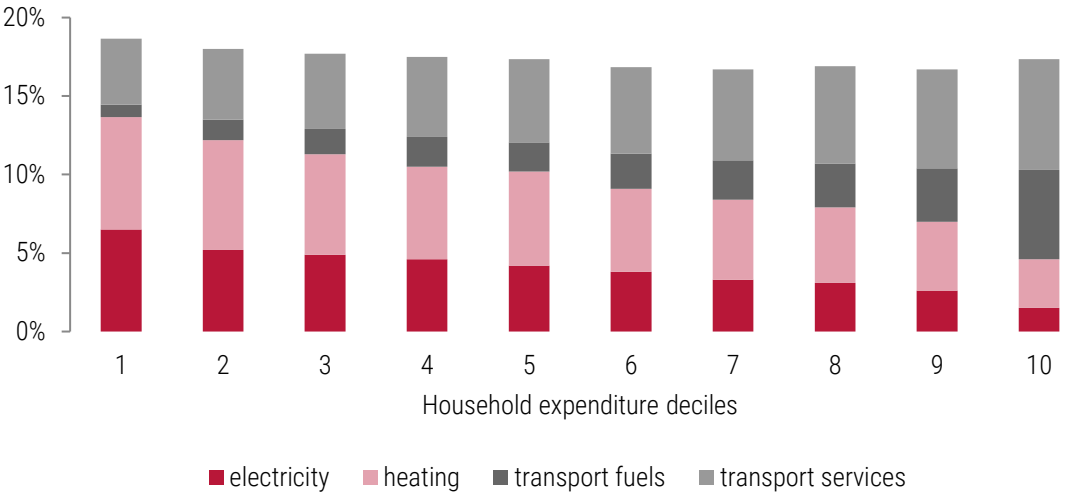
Figure 7. Changes in welfare as a result of a carbon tax introduction by expenditure deciles (% change compared to baseline scenario)



Source: *Distributional Impact of Carbon Pricing in Central and Eastern Europe (EUKI)*. A document with a detailed methodological annex will be published in the first half of 2023.

The distributional effects of a carbon tax depend on the amount and type of energy used. The share of expenditure on the different types of energy used varies in Poland. Less affluent households spend relatively more on electricity and domestic heating than more affluent households (Figure 8). In the case of transport fuels, more affluent households – especially those belonging to the tenth income decile – spend proportionally the most on this purpose (over 5%). These differences are likely because the less affluent tend to forgo personal transport altogether. In the case of heating or electricity use, such a substantial reduction is not possible.

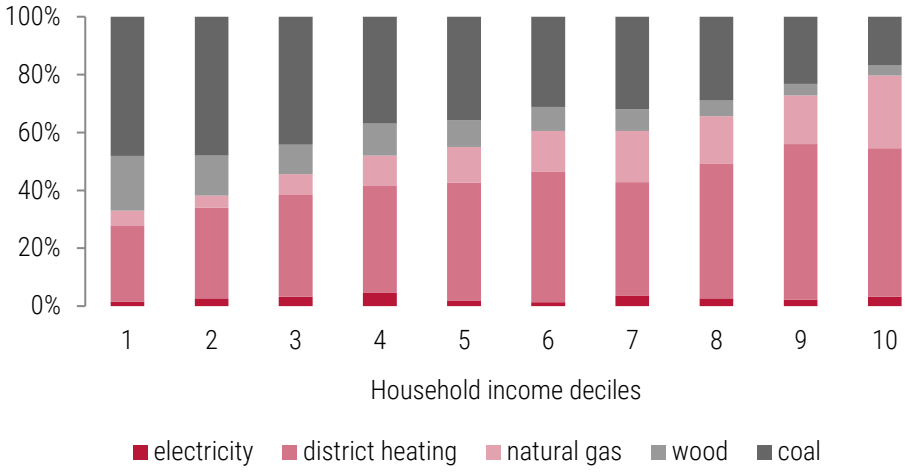
Figure 8. Energy consumption by spending decile in Poland



Note: We further analyse the relationship between expenditure and income distribution in Poland. The 70% of households with expenditures in the lowest decile are also in the four lowest income deciles; similarly, among households with the highest expenditure, the majority also have the highest income. Either way, the 12% of households with the highest spending are among the poorest 30%, and this distribution should be considered when interpreting the results.
Source: own elaboration based on the QUAIDS model (The Quadratic Almost Ideal Demand System)

The distributional effects of the carbon tax depend on heating technologies. Less well-off households use solid fuels (Figure 9). The domestic energy used is also related to the place of residence and the type of building. The less affluent are more likely to live in rural areas and individually-heated single-family houses. Among more affluent people, usually living in cities, gas and district heating (primarily coal-fired) are more popular heating sources. The ETS-II charges will not directly affect households in dwellings connected to district heating, as the ETS-I already covers heating in grid-heated buildings. In addition, higher heating prices in multi-family buildings are shared by many households. Housing associations or communities collectively have a greater financial capacity to make the necessary investments, while individual single-family homeowners need to do it independently.

Figure 9. Consumption of fuels for home heating by income deciles (%)



Note: Shares for households that marked a given heating medium as "basic" are indicated.

Source: own elaboration based on a survey on fuels and energy carriers 2018 (E-GD).

Redistribution of carbon tax revenues is a solution that would reduce inequalities. The effects of redistribution vary depending on the method adopted for transferring ETS revenues to households. An unconditional transfer effectively reduces inequality and is the most favourable solution for less wealthy households, in contrast to the reductions in taxation of labour costs (Antosiewicz et al. 2022). The distinction between nominal and relative spending burdens remains crucial for planning redistribution measures. The most affluent households bear the highest costs in absolute terms, but proportionally the largest share of income will be lost by the less wealthy, with the highest energy expenditure. Therefore, introducing a carbon tax will be associated with reductions in consumption and sacrifices in other spheres of life on already tight budgets.

Simulations indicate that subsidising energy prices or direct cash transfers would reduce energy poverty to pre-carbon tax levels in Poland. The baseline level of energy poverty was 11% in 2021, which would increase to 13% in 2033 in the scenario of introducing a carbon tax. At the same time, redistribution of funds to households would reduce this effect. In the case of Poland, energy price subsidies would be the most effective mechanism for reducing energy poverty. Such a policy would hibernate the current situation as it does not offer any incentives for a more ambitious climate policy and, in absolute terms, favour the most affluent households, who consume more energy and transport fuels. Hence, from the climate policy point of view, it is more sensible to introduce unconditional transfers (e.g. continuation of energy allowances introduced in 2022). This would achieve emissions reductions and energy poverty decrease. In contrast, the third proposed solution – earmarking funds from the carbon tax to reduce labour taxation – would not significantly lower levels of energy poverty as many people in energy poverty depend on pensions or social benefits.

Table 1. Scenarios for energy poverty levels after the introduction of a carbon tax and redistribution mechanisms

Baseline (2021)	Estimated level of fuel poverty after the introduction of the tax without protective mechanisms (2033)	Changes in fuel poverty levels in the post-redistribution scenario		
		Direct transfer	Double dividend	Energy price subsidies
10,8%	12,52%	10,2%	11,55%	9,85%

Note: The table shows estimates of energy poverty in Poland before the tax in 2021 and after the introduction of the tax in 2033.

Source: *Distributional Impact of Carbon Pricing in Central and Eastern Europe (EUK1)*. A document with a detailed methodological annex will be published in the first half of 2023.

4. Recommendations for public policy

The report indicated the potential impacts of extending climate policy in Poland and identified mechanisms to reduce inequalities caused by rising energy prices. We also presented the recent data on energy poverty and transport exclusion in Poland and estimated the effects of introducing climate taxes on households with different budgets. In the following summary, we present lessons for public policy, focusing on the Social Climate Fund, a newly-established mechanism to address possible inequalities possible to appear in line with the more ambitious climate policy goals in the EU.

The Social Climate Fund will target households, transport users and micro-enterprises to prepare the less well-off for the introduction of ETS-II. From 2026, the fund will directly support households and finance investments in reducing dependence on fossil fuels. The fund is intended to finance improvements in the energy efficiency of buildings, decarbonising the heating and cooling of buildings, including renewable energy, and providing better access to zero- and low-carbon transport. It combines several different energy policies and includes subsidies for 'green' technologies with preferences for the less well-off and direct transfers. According to the European Commission's regulation, Poland will receive around EUR 12.7 billion, almost 18% of the total allocation. Over two-thirds of this amount will be earmarked between 2028 and 2032. The distribution manner will be decided by each country on its own when preparing its implementation plan for the Social Climate Fund.

The use of the Social Climate Fund can contribute to reducing energy poverty. However, it is essential that the choice of public policy instruments supports both the achievement of climate policy goals and reduces the risk of increasing social inequalities. Targeting support to vulnerable social groups through a direct transfer mechanism would allow climate policies to be implemented effectively while counteracting the adverse effects of an increased tax burden. **As energy price subsidies under the Social Climate Fund will not be possible, it is worth envisaging direct transfers in the programme.** We recommend that direct transfers take up as high a share as possible in the fund and that the arrangements for the rest of the fund would still favour less well-off households. More than pursuing more ambitious climate policies and redistribution mechanisms are required to tackle climate change. It is necessary to include additional activities to monitor climate policy's social and environmental impacts and increase transparency and public acceptance to avoid social tensions.

- Firstly, information on the direction of financial flows related to implementing environmental and climate policy should be organised. This concerns not only ETS funds but also numerous national funds (e.g. the operation of local funds for environmental protection and water management), which are not transparently monitored and reported by the state.
- Secondly, assessing the potential distributional effects of new climate policy instruments should be mandatory to avoid generating new inequalities.
- Thirdly, energy poverty should be tackled while simultaneously addressing the issue of transport exclusion. Among other things, there should be a discussion on how to maintain or target the allowances introduced in the wake of high energy prices in 2022 and adequately communicate these measures.
- Fourthly, direct transfers with incentive mechanisms for pro-climate investments should be introduced. At the same time, state policy must not give incentives to perpetuate inefficient technologies, as was the case with the coal benefit in Poland.
- Fifthly, household investment support should be linked to advisory and technical assistance to introduce minor improvements that reduce energy consumption and costs.

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