

**Energy, Greenhouse Gas Emissions
and Climate Policies – Austria and
Poland Compared**

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Abstract

For the project "Social Aspects of Market-Based Instruments for Greenhouse Gas Emission Reductions – SoMBI" Austria and Poland were chosen as case study countries to compare the impacts of an EU-wide carbon price combined with different revenue recycling policies. The detailed analysis will focus on the macroeconomic and greenhouse gas emission effects of the introduction of the carbon pricing and revenue recycling schemes as well as the distributional effects of such price mechanisms for different household types. The two countries were chosen as they differ considerably in terms of their energy systems and economic conditions. Further differences regard the level of ambition of the respective domestic climate policies as well as the priorities set in energy policies. The aim of this paper is to provide indications of the sectors that are emission-intensive and/or labour-intensive and are likely to gain or lose from the chosen revenue recycling mechanisms. Moreover, the findings will provide background information for the interpretation of modelling results for the various carbon pricing and recycling options.

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Energy, greenhouse gas emissions and climate policies – Austria and Poland compared

1. Introduction

For the project SoMBI Austria and Poland were chosen as case study countries to compare the impacts of an EU-wide carbon price combined with different revenue recycling policies. The detailed analysis will focus on the macroeconomic and GHG (greenhouse gas) emission effects of the introduction of the carbon pricing and revenue recycling schemes as well as the distributional effects of such price mechanisms for different household types. The two countries were chosen as they differ considerably in terms of their energy systems and economic conditions. Further differences regard the level of ambition of the respective domestic climate policies as well as the priorities set in energy policies.

The aim of this paper is to provide indications of the sectors that are emission-intensive and/or labour-intensive and are likely to gain or lose from the chosen revenue recycling mechanisms. Moreover, the findings will provide background information for the interpretation of modelling results for the various carbon pricing and recycling options.

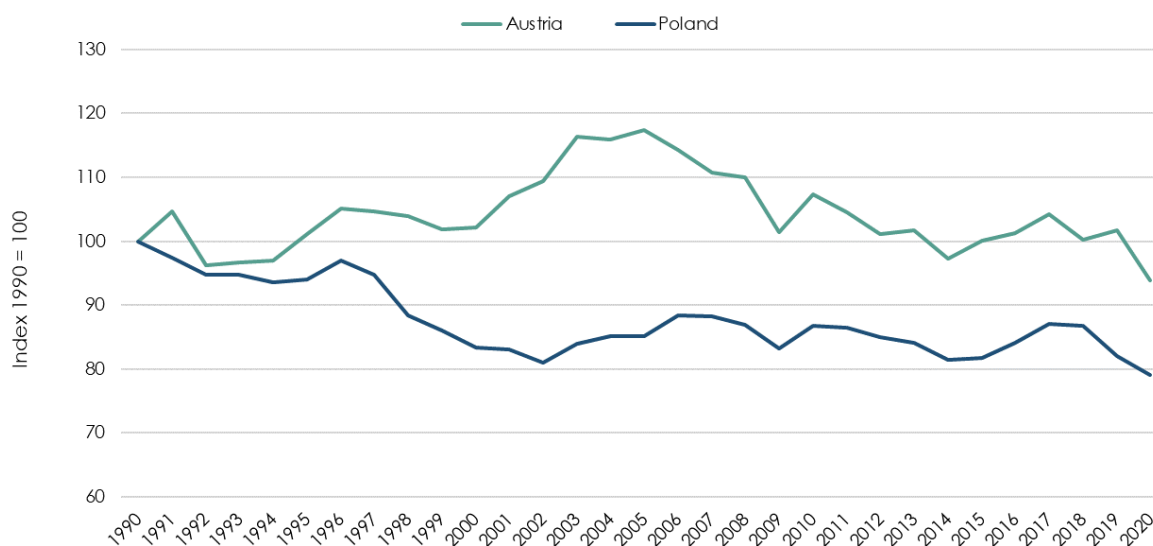
The paper is structured in the following sections: We start by describing the countries' relevant framework conditions, especially the development and structure of energy use, the related greenhouse gas emissions, and specificities of the energy systems. Country-specific challenges and potential social risks related to decarbonization are highlighted. We provide a summary of climate policy and related policy areas (especially energy policy). In addition, we discuss the public acceptance of climate policy in general and carbon pricing in particular in the two case study countries. The final part of the paper comprises a comparison of the structure of the respective national tax systems, with a focus on the distribution between taxes on labour and the environment on the one hand and on energy taxation (including carbon components) on the other. Moreover, information is provided on the financing of the social security system in order to gain insights about the potential for certain revenue recycling options (e.g. reducing labour-related taxes or social security contributions). The final section provides conclusions.

2. Emissions in Poland and Austria

In this section, the development of greenhouse gas emissions in Austria and Poland is described. Poland has consistently been the fourth largest emitter of greenhouse gases in the EU 27 over the past two decades, accounting for 11% of the EU's total GHG emissions (average 2018-2020)¹. Annual emissions were about 402 Mt of CO₂e on average in the period 2000 to 2020 (excl. LULUCF). Due to the industrial restructuring after the end of communism Poland could reduce its greenhouse gas emissions by nearly 20% during the 1990-ies, but then fluctuated between 385 Mt and 420 Mt without any real downward trend prior to the COVID-19 crisis (Figure 1).

In Austria, emissions have been growing significantly until 2005 and have only in recent years declined to 1990 levels again. Average annual GHG emissions have been at 83 Mt in the period 2000 to 2020. Austria generates 2.2% of the EU's total GHG emissions (11th rank) and has reduced emissions at a slower pace than the EU average since 2005. The country's carbon intensity is lower than the EU average, following a similar steady downward trend.

Figure 1: **Development of greenhouse gas emissions in Austria and Poland, 1990-2020**



Source: Eurostat.

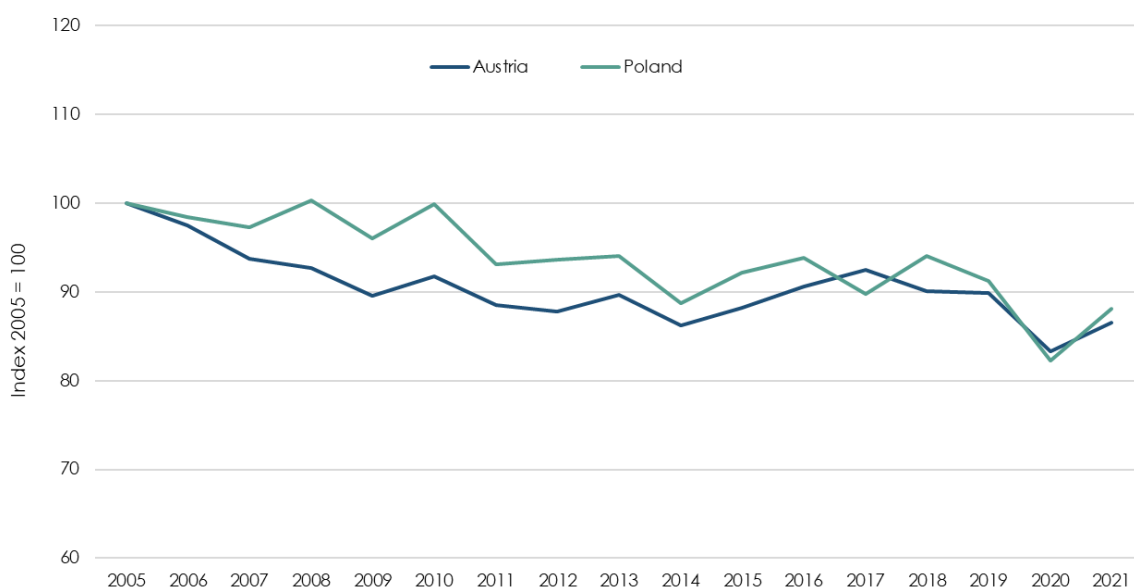
Taking into account only emissions covered by the Effort Sharing Decision (ESD; buildings, transport, services, non-ETS industry, waste management – i.e., emissions not covered by the EU Emission Trading System, EU ETS), the emissions in Poland more or less continuously increased (with the exception of the years 2011-2014), reaching the highest level in 2018 (213 Mt). In 2020

¹ Regarding per capita emissions Poland has been on rank 6 or 7 in recent years but has been consistently above the EU average since 1990.

Poland's ESD emissions were below the target of a 14% increase relative to 2005², due to the economic downturn caused by the COVID-19 pandemic. In 2019 and 2021 emissions reached the target level.

Most of the emission increases since 2015 are caused by higher fuel consumption in transport. Between 2005 and 2019 transport emissions increased by 83% (LIFE Unify, 2022) due to several reasons. First, the vehicle stock in Poland is very old³ – passenger cars are on average 14.3 years old (EU average 11.8 years), trucks 13.2 years (EU average 14.1) and busses 15.6 years (EU average 12.8 years). The modernization of the vehicle fleet would not only reduce transport-related GHG emissions but also the persistent air pollution in cities. In addition, there is high potential for intensifying public transport in Poland, which so far is supplied only insufficiently. Due to urban sprawl and an underregulated spatial planning system, settlement structures with low population density and little to no public transport are increasing while simultaneously road infrastructure has been expanded in recent years (LIFE Unify, 2022).

Figure 2: **Development of greenhouse gas emissions in Austria and Poland according to Effort Sharing Decision, 2005-2021**



Source: Eurostat.

Regarding the building sector, the problem is twofold: the energy efficiency of the building stock is low and heating of single-family-houses as well as apartment buildings is still largely based on fossil fuels. In 2020, 51% of boilers were coal-fired and 24% gas-fired. Also, district

² As one of 13 southern and eastern EU Member States with lower GDP per capita, Poland was allowed to raise its greenhouse gas emissions by 2020 compared to 2005 in the context of EU Effort Sharing.

³ <https://www.acea.auto/figure/average-age-of-eu-vehicle-fleet-by-country/>

heating that plays a role for heating apartment buildings is predominantly produced with coal (LIFE Unify, 2022).

In Austria, Effort Sharing Decision emissions have been slowly declining from 56 Mt in 2005 to the lowest non-COVID-related value of 48 Mt in 2014. Since then, the emissions have remained mostly stable.

One main issue in climate policy is to reduce transport-related emissions, which have been steadily growing since 1990 (+57%) and constitute nearly one third of total emissions. The causes are growing transport volumes as well as transit traffic refuelling in Austria due to the generally lower fuel prices compared to neighbouring countries (especially Germany and Italy). In contrast to transport, emissions from buildings have declined by 30% since 1990 due to a fuel shift towards less emission-intensive or renewable heating, thermal renovation in the building stock as well as stricter guidelines for the energy efficiency of new buildings.

Regarding the industrial structure, the share of energy-intensive basic industry (paper, non-metallic mineral products, iron and steel, etc.) is high in Austria, and industrial activities account for a higher share of the economy than in comparable countries. Similar to Poland's coal mining industry, the carbon-intensive industry in Austria is of high relevance as employer and may be the principal employer in certain regions. Both investment needs and the necessity of skill adjustments are bound to be large, as illustrated by the ongoing transformations in the automotive cluster (OECD, 2021).

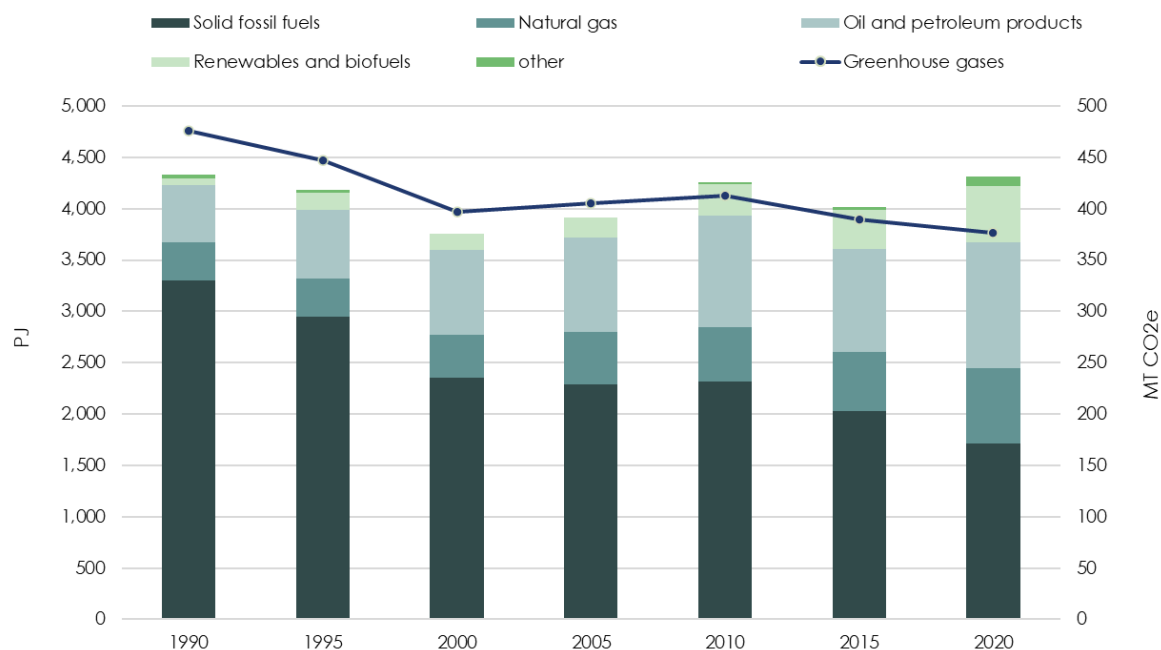
3. Energy use in Poland and Austria

3.1 Poland

Poland is among the most carbon-intensive developed economies due to its still heavy reliance on domestically produced coal⁴. In 1990 the share of coal in the energy mix (gross inland consumption) was 76%. Since then, the importance of solid fossil fuels has declined, which translated into a 17% reduction of greenhouse gas emissions until the year 2000. The share of coal further declined to 40% in 2019/2020. Simultaneously the shares of natural gas and oil have increased (to 17% and 29% respectively). Renewables still play a minor role with a share of only 12% in gross inland consumption, which is below the country's renewable target of 15% for 2020.

⁴ In 2020 Poland was the largest producer of hard coal and the second largest producer of lignite in the EU (Brauers and Oei, 2020). The main part (around 80%) of production is consumed domestically (Antosiewicz et al., 2022).

Figure 3: **Development of gross inland consumption by energy source and greenhouse gas emissions in Poland, 1990-2020**



Source: Eurostat.

Similarly, in final energy consumption the share of coal declined from one third in the early 1990-ies to 12% in recent years. The shares of natural gas and oil increased from 10% and 15% to 15% and 35%. Another 8% of final energy consumption is heat, which, however, is predominantly (75%) produced by coal.

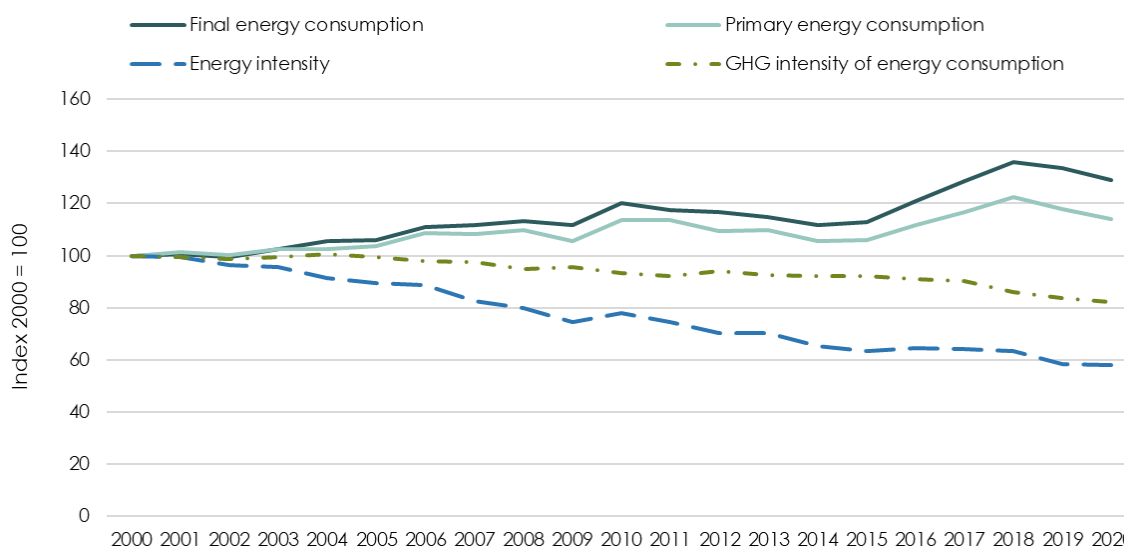
The industrial modernization after the end of communism led to improvements in energy efficiency and a decoupling of emissions from economic growth (Antosiewicz et al., 2022). In addition, the fuel shift (see Figure 3) reduced the emission intensity of energy consumption, although to a lesser extent. Overall, after 2000 greenhouse gas emissions remained largely stable, while energy consumption increased further.

Still, the carbon intensity of the Polish economy in absolute terms is 172% above the EU average, and second highest among EU Member States (European Union, 2021B). Energy intensity is 80% higher than the EU average and twice as high as Austria's.

The protection of the Polish coal mining sector and the continued use of coal is one focus of the Polish energy policy and is usually not only justified on energy security grounds but also by the claim of it being an important employer. While in 1990 almost 388,000 persons were employed in Polish coal mines, several government programs led to mine closures, restructuring and mergers (Brauers and Oei, 2020). By 2015 the number of people employed in coal mining had declined to 82,000, with another 60,000 people employed by sectors dependent on coal mining (e.g. coal-fired power plants). Together, this amounts to 1% of total employment

(Antosiewicz et al., 2022). However, coal mining is regionally concentrated and provides a larger share of employment in these regions⁵, which would be harder hit by the energy transition accordingly.

Figure 4: **Development of energy consumption, energy intensity and greenhouse gas intensity of energy consumption in Poland, 2000-2020**



Source: Eurostat.

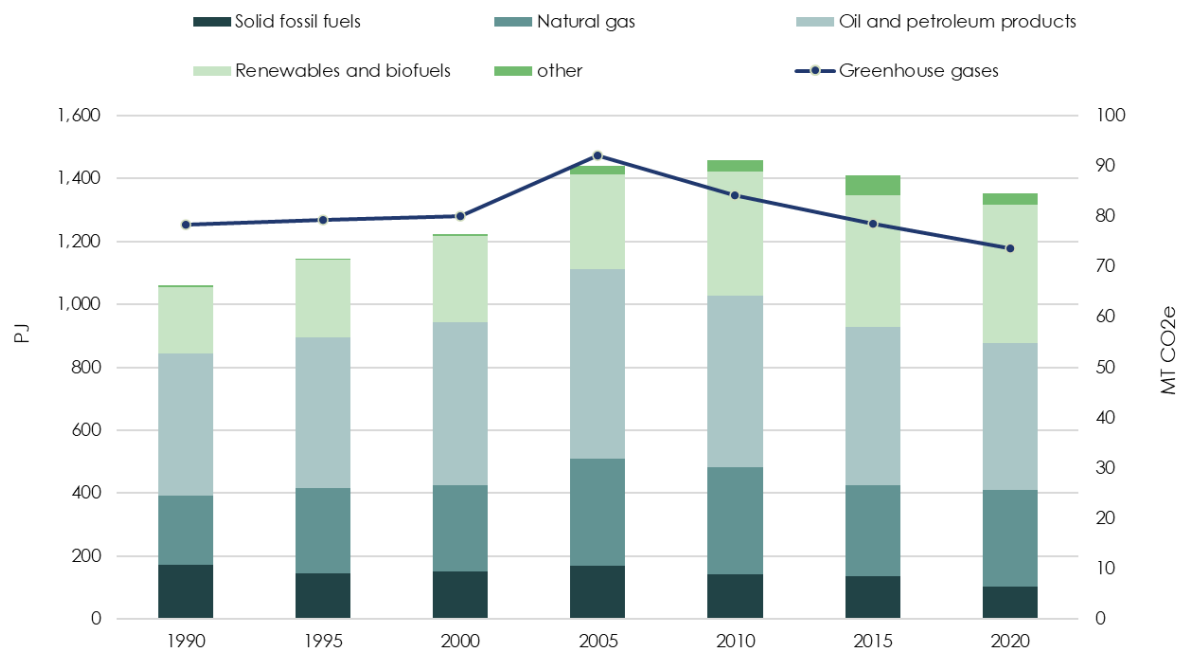
3.2 Austria

In contrast to Poland, the relevance of coal in Austria's energy system is very limited. Its share decreased from 16% of gross inland consumption in 1990 to 7.6% in 2020. Oil has a current share of about one third (compared to 42% in 1990), natural gas holds a stable share of 22%. Renewables have increased from 20% to more than 30% in gross inland consumption. Final energy consumption shows a similar pattern. Solid fossil fuels have been nearly phased out. The share of oil in final energy consumption also declined from 42% in 1990 to 34% in 2020 (37% in 2019), while natural gas slightly increased in relative importance as did renewables and heat. While Poland heavily relies on coal for the generation of electricity and heat, Austria's share of renewables in energy generation in 2020 has reached 78% for electricity⁶ and around 50% for heat.

⁵ As described in Žuk (2023) in the Turoszow Basin, for instance, nearly 40% of residents directly or indirectly depend on employment in the local lignite mine or coal-fired power plant.

⁶ The major share (around 60%) comes from hydropower, which has been developed substantially since the mid-twentieth century.

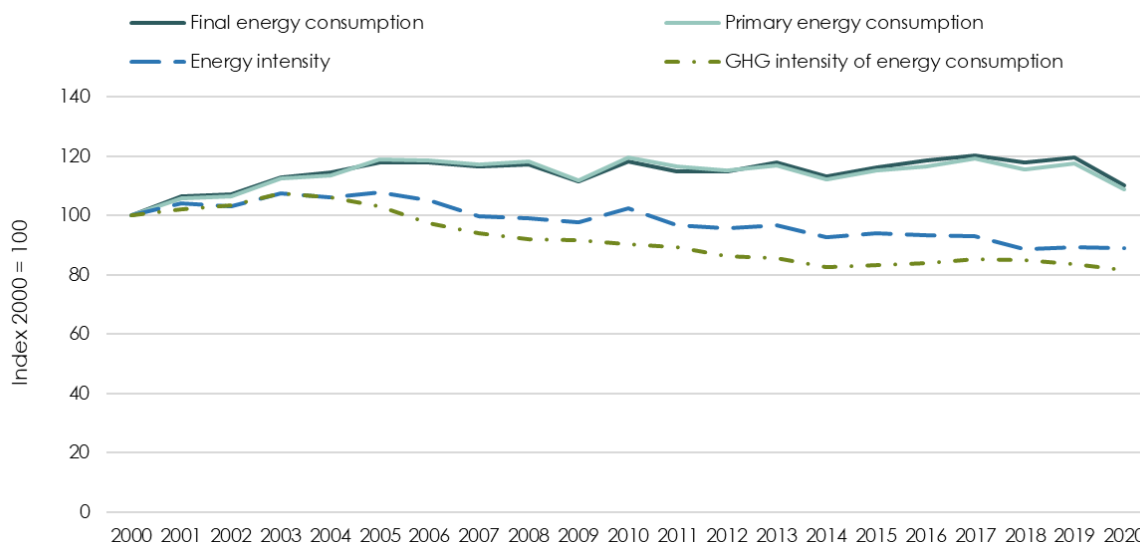
Figure 5: Development of gross inland consumption by energy source and greenhouse gas emissions in Austria, 1990-2020



Source: Eurostat.

Although the fuel shift led to an improvement in the carbon intensity of energy consumption after 2005, the economy's energy intensity declined (Figure 6) and is constantly below the EU average, efforts have not been sufficient to reduce GHG emissions in Austria.

Figure 6: **Development of energy consumption, energy intensity and greenhouse gas intensity of energy consumption in Austria, 2000-2020**



Source: Eurostat.

4. National climate policies

4.1 Poland

Poland is notorious for being the "least climate ambitious" EU member state (Skjærseth, 2018) or an overall very low performer regarding climate policy (Climate Change Performance Index 2023⁷). The country has been opposing EU climate policy approaches and the tightening of targets for years and has had some success in affecting the EU's policy making (Skjærseth, 2018). The carbon-intensive economy still relies to a large extent on domestically produced coal, the continuation of coal extraction and consumption are a prominent part of Polish energy and even climate policies. At the COP 24 in Katowice it was emphasized by the Polish President that there were no plans to fully give up on coal (Brauers and Oei, 2020) and that there is the need for a just transition for coal-dependent regions (European Union, 2021B).

The resistance to climate policy and a shift away from coal originates from a combination of various interests in defending the status quo (Skjærseth, 2018; Brauers and Oei, 2020; Wagner and Matuszek, 2022). On the one hand, most political parties in Poland are opposing ambitious climate policy, with right wing parties and strongly religious groups being even more sceptical regarding climate change and scientific results and disapproving of international regulation regarded as limiting national sovereignty (Żuk et al., 2021). On the other hand, opposition to climate policies came from the coal industry (mining and electricity generation) as well as the

⁷ <https://ccpi.org/>.

traditionally powerful coal miners' unions. The combination of political and ideological issues is shown by Żuk et al. (2021) to constitute the main obstacle for implementing environmental policies in Poland.

Also, in the current National Energy and Climate Plan (NECP; Ministerstwo Aktywów Państwowych, 2019) coal is included as a means to ensure a stable and reliable electricity supply. In this document it is envisaged to reduce the share of coal in electricity generation to 56-60%⁸ by 2030, a goal that is regarded as little ambitious (Brauers and Oei, 2020). Overall, energy and climate policy define energy security as a priority, with covering a growing energy demand and ensuring energy independence as key aspects. The diversification of the energy mix not only requires the continuation of coal use but also the increase of renewable generation capacity (especially offshore wind) as well as the implementation of nuclear energy, with the first nuclear power plant planned for 2033. In addition to the NECP, the "Energy Policy of Poland until 2040" (PEP2040) defines the framework for the country's energy transition. One main motivation – in addition to energy security – is improving air quality which is a major environmental problem in Poland.

The Polish energy and climate policies define the following targets for 2030 (corresponding to the EU 2030 targets):

- A reduction of CO₂ emissions in non-ETS sectors by 7%,
- a share of RES in gross final energy consumption of 21-23%⁹, taking into account an annual increase of RES in heating and cooling of 1.1 pp and the achievement of 14% renewable fuels in transport,
- an increase in energy efficiency of 23% (reduction of primary energy consumption compared to forecasts).

In terms of energy taxation, the implicit tax rate on energy¹⁰ in Poland is still below the EU average (in 2021) but has nearly doubled since 2002. Poland also has a CO₂ tax in place, although the tax rate is only 0,07 € per t CO₂¹¹.

The IEA (2022) concludes that despite the persistent dominance of coal in Poland's energy system the country has made notable progress towards the energy transition. The support for photovoltaics has made Poland one of the fastest growing markets in the EU with capacity increasing from 0.2 GW (2016) to 7.7 GW (2021), most of which are residential, small-scale

⁸ After reaching an agreement on a social contract with the coal miners' union the Polish government decided to start phasing out coal mining in 2021 and close the last coal mine in 2049.

⁹ The achievement of the higher target is conditional on additional funds made available by the EU to support i.a. a just transition.

¹⁰ This indicator is defined by Eurostat as the ratio between energy tax revenues and final energy consumption calculated for a calendar year and is used to quantify the role of fiscal policy in shaping demand for energy.

¹¹ This value is by far the smallest CO₂ tax rate globally. In the EU, carbon prices (outside Poland) range from 17 €/t CO₂e in Latvia and Spain to 130 €/t CO₂e in Sweden. The Polish carbon pricing instruments, however, technically is no tax but a fee. It was introduced in 1980 as part of a system of environmental fees (Donski and Paczosa, 2022).

systems. Also, as a result of Poland's offshore wind¹² strategy 5.9 GW of capacity are forecasted to come online by 2027 with a further expansion by 11 GW planned for the period until 2040.

Box 1. Compensation Measures during the Energy Crisis in Poland

According to an analysis by Bruegel (Sgaravatti et al., 2023), in Poland compensation measures with a volume of 12.4 bn € (2.2% of GDP) have been announced or implemented respectively to mitigate the effects of rising energy prices on households and companies. The most relevant compensation measures targeted at the use of energy include the following:

Already in October 2021 the Polish government increased the value of energy bills allowances and extended the number of beneficiaries to cover the 20% of households most vulnerable to energy price increases¹. At the beginning of 2022 subsidies for heat pumps in new, energy-efficient single-family houses were implemented, covering between 30% and 45% of the purchase and installation costs. In June 2022 lump-sum subsidies for coal consumed by households and housing cooperatives were introduced. In autumn 2022 a special electricity allowance was implemented for households using electricity for heating purposes.

In addition, tax reductions and price caps were introduced: In early 2022 Poland decreased VAT on several energy sources. The VAT rate was lowered to 0% for gas and to 5% for heating respectively, the rates for petrol and diesel were reduced to 8%. In December 2022 electricity price caps² for households as well as for small and medium-sized enterprises, schools, nurseries, hospitals, social cooperatives and associations were introduced. In January 2023 heat price caps for households in areas with heat price increases of more than 40% prior to October 2022 came into place.

Moreover, a 10% discount on electricity bills in 2024 was introduced for those customers reducing their electricity consumption between October 2022 and December 2023 by at least 10% compared to the period October 2021 to December 2022.

¹ Similar relief measures were implemented for the agriculture sector.

² For households, a lower price cap than for the other beneficiaries applies.

4.2 Austria

Austria's government has set the target of carbon neutrality to be reached by 2040. The main targets and approaches for climate policy until 2030 in Austria are summarized in the national energy and climate plan (NECP; Federal Ministry for Sustainability and Tourism, 2019). It includes the following targets:

- Reduction of non-ETS greenhouse gas emissions by 36% compared to 2005¹³,

¹² Regarding onshore wind, the 2016 Act on Windfarms halted the high growth in wind energy capacity of previous years by introducing strict regulation regarding the distance of wind projects from buildings, farms and natural areas, practically banning wind investments on most of the country's territory. In addition, property taxes on wind farms were increased. In early 2023 the government has approved a law that would reduce these restrictions.

¹³ The plan recognizes that even in the "with additional measures" scenario the emission reduction will not be sufficient and indicates the requirement to implement further measures. A current report to the EU (Umweltbundesamt, 2023B) underlines this, and concludes that according to the scenario considering all measures implemented by January 1, 2022, Austria would clearly miss the EU climate targets for 2030. GHG emissions would exceed the target by 12 m tons.

- Austria's target for renewables is estimated at 46%-50% of gross final energy consumption in 2030.
- For energy efficiency, Austria's target in terms of primary energy intensity is equivalent to a range of 28.7-30.8 Mtoe; for final energy consumption it corresponds to 24.0-25.6 Mtoe.
- Regarding energy security, the Austrian NECP aims to reduce reliance on imported fossil fuels by pursuing the goal of reaching 100% renewable electricity by 2030.

According to the Climate Change Performance Index 2023, Austria is among the medium-performing countries. The appraisal gives a low rating for GHG emissions and energy use, a medium rating for climate policy and a high rating for the performance in renewable energy. The rating for climate policy has improved compared to previous indices due to new policies that have been implemented recently. This regards in particular the implementation of CO₂ pricing in October 2022 and the introduction of the nationwide public transport ticket as well as other improvements in public transport.

The implicit tax rate on energy in Austria is also below the EU average and has even declined between 2002 and 2021. However, this does not account for the introduction of the CO₂ price, which from 2022 on will result in an increase of the implicit tax rate on energy.

In its assessment of Austria's national energy and climate plan (European Commission, SWD (2020) 919 final) the European Commission concludes that the level of ambition is adequate but for instance regarding energy efficiency targets remain low. Moreover, the plan does not provide sufficient details for various measures, e.g. how energy efficiency would be prioritized or how the remaining gap to the 2030 emission target will be filled.

Several climate policy initiatives have been implemented recently, most notably the eco-social tax reform including the introduction of the CO₂ pricing (and revenue recycling via a lump-sum climate bonus targeted at all individuals). In July 2021 the Renewable Expansion Act was passed in the National Parliament, committing Austria to 100% green electricity by 2030. The government has also increased the level of ambition with respect to other existing measures like phasing out fossil fuel-based heating systems in residential buildings, which is supported by different subsidy programs. However, other necessary laws like the climate law, the energy efficiency law, and the renewable heat law are long overdue and have yet to be passed.

In contrast to the very centralized Poland, Austria is a federal republic with nine provinces, where competence for climate action can lie either at federal or provincial level, or even be a joint responsibility. Responsibility for key policy areas for climate protection like spatial planning, building codes, land use and infrastructure permit procedures lies at provincial level. The International Energy Agency has recommended that Austria reviews the division of competences and consider efforts to streamline procedures (European Union, 2021 A). Several analyses have been carried out considering climate policy integration in Austria's federal structure. Steuerer and Clar (2014) discuss the role of federalism for Austria's mitigation performance finding that federalism constrained climate policy integration by adding "a vertical dimension to an already complex horizontal integration". Kettner and Kletzan-Slamanig (2018) find that due

to the cross-cutting nature of climate policy, responsibilities are fragmented, and problem awareness depends on the respective institution's core competence, leading to widely diverging views on whether climate policy in Austria is too ambitious or too weak. Especially, potential negative impacts of climate policy on competitiveness or employment are seen to hamper a more ambitious implementation of mitigation policies.

Box 2. Compensation Measures during the Energy Crisis in Austria

Austria has implemented a number of compensation measures in the context of the current energy and inflation crisis. The measures were introduced via three packages of relief measures supplemented by several individual measures with a total volume of 47.7 bn. € in the period 2022 to 2026. Thereof, permanent structural measures (most notably the abolition of cold progression and the valorization of social benefits) accounted for about 25 bn. € (see Baumgartner et al., 2023). According to the analysis by Bruegel (Sgaravatti et al., 2023) which is based on a common framework for the recording of EU Member States' support measures in the energy crisis, the Austrian compensation measures amount to 23.1 bn. € (5.3% of GDP). Inflation was largely driven by the rise in energy prices; accordingly, a large share of the short-term and temporary relief measures for households and businesses (18.1 bn. €, or 82.5% of the short-term relief volume) was directly related to energy (see Kettner and Schratzenstaller, 2023, forthcoming).

The measures included most notably

- a reduction of the excise duties on gas and electricity to the minimum stipulated by the EU energy taxation directive,
- suspension of households' and companies' support payments for renewable electricity,
- postponement of the introduction of carbon pricing for Non-ETS sectors from July to October 2022,
- increase in commuter subsidies,
- heating and electricity cost subsidies for households,
- electricity price subsidies for an annual electricity consumption up to 2,900 kWh¹ for households,
- subsidies for energy cost increases (most notably for gas and electricity) for companies.

¹ For households with up to 3 persons; for larger households, higher thresholds apply.

5. Tax structure and environmental taxation

In this section, the tax structures by economic function (taxes on consumption – to which environmental taxes belong –, labour and capital) as well as the role of environmental taxes in the two countries are described. The distribution of tax revenues from labour and consumption, and energy respectively, hints at the potential of shifting tax burden away from labour towards environmental or energy taxes.

5.1 Poland

Figure 7 shows that in Poland, with 40.0% (mean value 2017-2021) the share of labour-related taxes in total tax revenue was significantly below the EU 27 average of 52.0%. This may be due to a relatively low top statutory personal income tax rate of 32% compared to the EU average of 38.9%.

In contrast, both the share of capital taxation and environmental taxation were higher than the EU average. The share of environmental taxes in total tax revenue amounted to 5.8% in the EU 27, whereas the mean share reached 7.5% in Poland.

The social security system in Poland is mostly insurance-based and funded by social security contributions from employers and employees. Employees pay 13.7% of the gross wage. This contribution includes

- pension insurance contribution – 9.76% of the gross wage,
- disability insurance contribution – 1.5% of the gross wage,
- sickness/maternity insurance contribution – 2.45% of the gross wage.

Employers have an obligation to pay social security contributions and payroll taxes equal to 20% of gross wage. This value consists of:

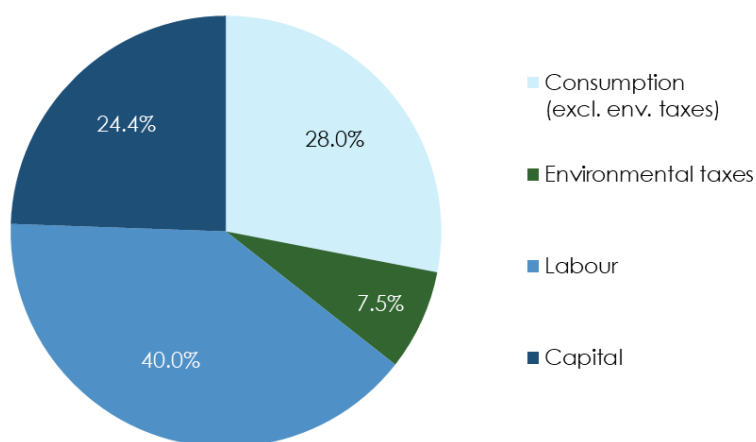
1) Social security contributions:

- 9.76% dedicated to pension insurance
- 6.5% dedicated to disability insurance
- 1.21% (on average) dedicated to accident insurance

2) Payroll taxes:

- 1% for the Labour Fund
- 1.45% for the Solidarity Fund
- and 0.1% for the Guaranteed Employee Benefit Fund

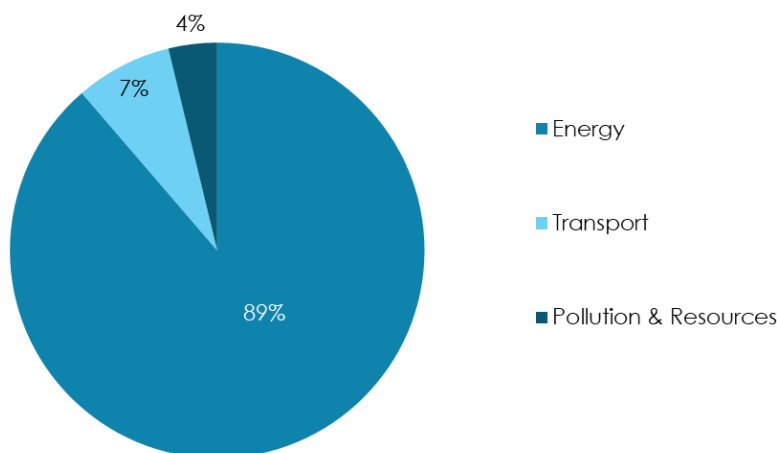
Figure 7: **Distribution of total tax revenues according to type of tax base, Poland (average 2017-2021)**



Source: European Commission (2023), DG Taxation and Customs Union, Taxes in Europe database.

The main part of environmental taxes stems from excise duties on energy (including transport fuels). Between 2017 and 2021 energy taxes had an average share of 89% in total environmental taxes in Poland (Figure 8). Transport-related taxes had a mean share of 7%, resource and pollution taxes made up for 4%. Poland has introduced a carbon fee in the 1980s, although the rate is very low (0.1 \$/tCO₂e)¹⁴. In addition, the tax covers only 4% of Poland's CO₂ emissions. According to World Bank (2023), revenues from this tax amounted to 6 m € in 2021.

Figure 8: **Disaggregation of environmental taxes, Poland (average 2017-2021)**

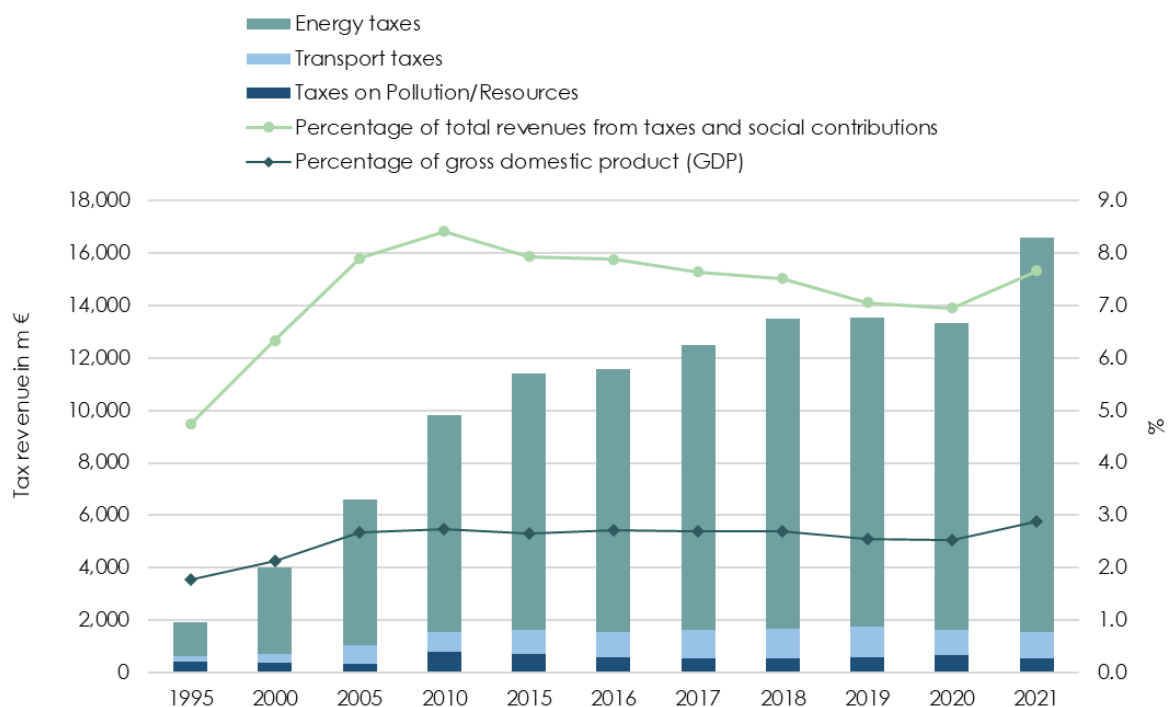


Source: Eurostat.

Revenues from environmental taxes increased drastically over the period 1995 to 2021, from 1.9 bn € to 16.6 bn € since many of the taxes were gradually introduced over the period under consideration and tax rates were also raised. As most of the newly introduced taxes are excise duties on various energy products the difference in revenue volumes from energy taxes in relation to the other environmental tax categories also starkly increased. The share of environmental taxes in total revenue from taxes and social contributions went up from 4.7% in 1995 to more than 7% in 2021.

¹⁴ Although the Polish carbon fee is not a tax it is listed in the World Bank's Carbon Pricing Dashboard. It is not included in the European Commission's list of environmental taxes. For details on the system of environmental fees in Poland see Donski and Paczosa (2022).

Figure 9: **Development of environmental taxes, Poland (1995-2021)**



Source: Eurostat.

5.2 Austria

The disaggregation of tax revenues according to economic functions corresponds partly to the EU average. Consumption taxes held a share of 26.6% on average during the last five available years (EU: 27.5%). With 55.9%, the largest part of tax revenues stemmed from labour-related taxes (EU: 52.0%). This is also due to a high top statutory personal income tax rate of 50%.¹⁵ Capital taxes had the smallest share in the country's overall tax revenues with 17.4% (EU: 20.5%). Environmental taxes have for years been below the EU average and have also declined in importance in the past decade. Between 2017 and 2021 their share in total tax revenues was 5.3% (EU average: 5.8%).

Austrian social insurance includes sickness, accident (accidents at work and occupational diseases), pension and unemployment insurance. Social insurance is based on employment (not residence), and the insured person cannot choose between the insurance funds. Rates of compulsory (pre-tax) social security contributions are for employees:

- 3.87% for sickness
- 3% for unemployment

¹⁵ Taxable incomes above 1 m € are taxed at 55%.

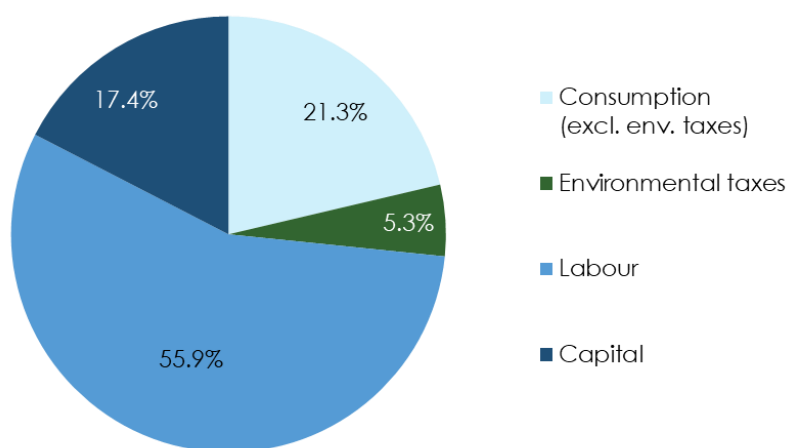
- 10.25% for pensions

Employers' shares are:

- 3.78% for sickness
- 3% for unemployment
- 12.55% for pensions
- 1.1% for work-related accidents

In addition, the employer is liable to the Family Burdens Equalisation Levy at the rate of 3.9%, and the municipal tax on payroll at the rate of 3% of monthly gross salaries and wages.

Figure 10: **Distribution of total tax revenues according to type of tax base, Austria (average 2017-2021)**

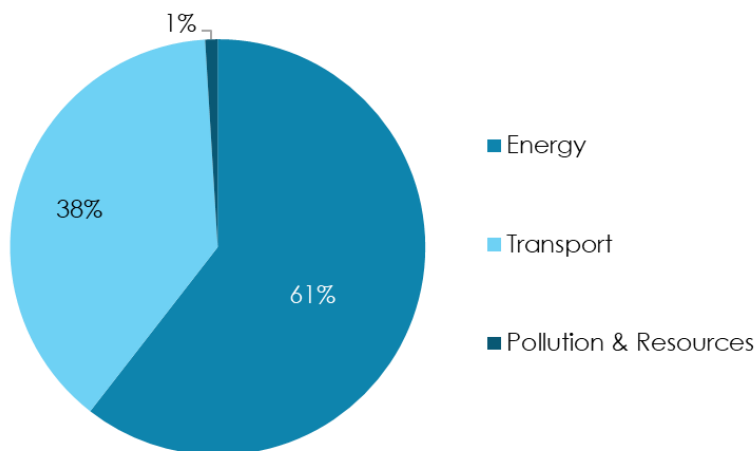


Source: European Commission (2023), DG Taxation and Customs Union, Taxes in Europe database.

The main component of environmental taxes in Austria are energy taxes (61%), but in contrast to Poland also transport-related taxes generate a considerable volume and make up a share of 38%. Pollution and resource taxes are of only marginal importance in Austria. As carbon pricing was only introduced in October 2022 it is not yet included in the data displayed here. The initial tax rate was set at 30 €/tCO_{2e}, in January 2023 it was 32.5 €/tCO_{2e}¹⁶.

¹⁶ Data on tax revenues are not yet available.

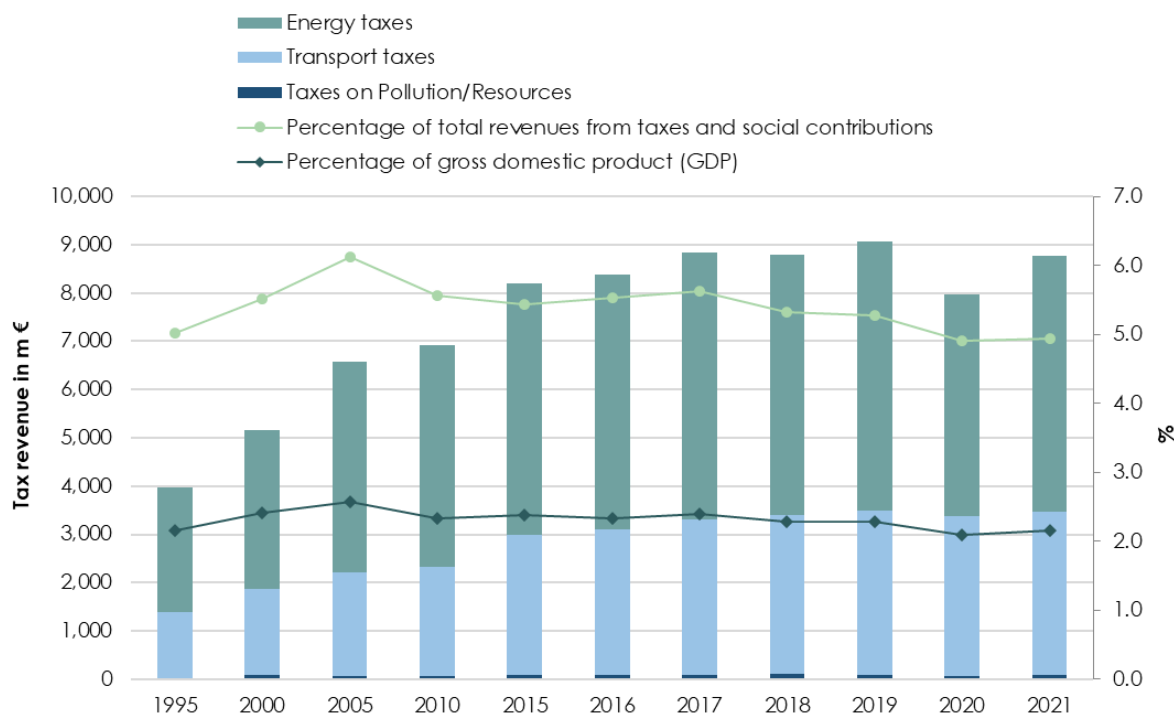
Figure 11: **Disaggregation of environmental taxes, Austria (average 2017-2021)**



Source: Eurostat.

Revenues from environmental taxes increased over the period 1995 to 2021 from 3.9 bn € to 8.8 bn €. However, the relevance of environmental taxes in total tax revenue and social contributions declined from 5.2% to 4.9%. With the introduction of carbon taxation in Austria the share is expected to increase again. Generally, given the high share of labour-related taxes in Austria there is considerable potential for a tax shift towards more environmental taxation.

Figure 12: **Development of environmental taxes, Austria (1995-2021)**



Source: Eurostat.

6. Public opinion towards climate change and climate or energy policies

6.1 Poland

Regarding the public opinion towards climate change and climate or energy policies the evidence from Poland is mixed.

In spring 2021 a special Eurobarometer survey (European Commission, 2021B) regarding climate change was carried out. The results show that only 11% of Polish respondents (below the EU average of 18%) see climate change as the single most serious problem facing the world. 69% (below the EU average of 78%) consider climate change to be a very serious problem. In line with the EU average, 62% state that national governments are responsible for tackling climate change. 30% state that they are personally responsible. In general, respondents in Poland are less likely than the EU average to have taken any action to fight climate change. The most frequently mentioned action is trying to reduce waste and separating it for recycling.

More than 90% of Polish respondents agree that GHG emissions should be reduced to a minimum while offsetting the remaining emissions in order to make the EU economy climate-neutral by 2050. More than 80% support the statements that both the EU and their national government should ambitiously increase renewable energy and that climate change and environmental issues should be tackled to improve public health.

A recent survey carried out in 20 countries (Dechezleprêtre et al., 2023) analysed the respective attitudes towards climate change, climate policy and factors that determine the support for or opposition to climate action. 85% of the Polish respondents agree with the statement “climate change is an important problem” (average of high-income countries 84%). 86% (relative to 81%) are of the opinion that their country should take climate policy measures. Regarding the willingness to adopt climate-friendly behaviour, Polish respondents would be most likely to reduce flying (58%; average 51%), drive a fuel-efficient or electric vehicle (53%; average 54%) or reduce meat consumption (49% vs. 40% average of high-income countries).

Personal action would be increased most by financial support and fairness considerations (the rich doing their part). Regarding specific policies, the Polish respondents show the highest support (significantly above average) for subsidies (for low-carbon technologies, building insulation, organic vegetables), bans for polluting cars and green infrastructure programs. In contrast, their support for taxation measures (carbon or energy taxation – with or without revenue recycling as cash transfer) is well below the average. Furthermore, there is little support for reducing subsidies for cattle farming or taxing beef.

Finally, several surveys were carried out in Poland and the coal basins specifically (Żuk et al., 2021; Żuk, 2023) asking about the attitudes towards energy transition and abandoning coal. The support for or rejection of climate policies or energy transition are not necessarily determined by the respondents' location (living in the coal basin or not) but on the one hand by their current and expected economic and financial situation, and by their political, ideological and religious beliefs on the other hand.

6.2 Austria

Regarding the Austrian public's attitudes towards climate change and climate policy, the results of the 2021 special Eurobarometer survey (European Commission, 2021A) can be summarized as follows: In Austria, 15% of respondents (EU average 18%) consider climate change to be the single most serious problem facing the world (ranking second behind the spread of infectious diseases). 69% of Austrian respondents (below the EU average of 78%) think that climate change is a very serious problem.

Deviating from the EU average (58%) two thirds of respondents in Austria state that business and industry are responsible for tackling climate change. However, 48% (EU average 41%) say they are personally responsible. In addition, 71% say they have taken action to fight climate change in the past six months. Nearly half of respondents in Austria are more likely to buy and eat more organic food.

80% of Austrian respondents support the statement that mitigating climate change and environmental issues should be a priority in order to improve public health. More than 80% agree that the national government and the EU should set ambitious targets for renewables and GHG emissions should be reduced or offset to make the EU climate-neutral by 2050.

In autumn 2022 a survey was carried out among 1,007 Austrian citizens (Transformations-Barometer; Umweltbundesamt, 2023A) to assess their attitudes towards environmental and climate

issues. Results show that the topics of environment, climate and sustainability have reached the Austrian population, the majority is aware of these issues.

56% of respondents consider the excessive use of resources as a "very great challenge" for sustainable living, followed by waste in the environment (54% of respondents), water pollution (52%), the loss of green spaces to development (51%) and industrial agriculture (50%).

When asked which of the 10 environmental problems listed was the "most urgent", almost one third (30%) named the destruction of nature and over a quarter (27%) named climate change. The other possible answers were increasing energy consumption (8%), increasing consumer culture (7%), biodiversity loss (6%), increasing waste (6%) and traffic (3%).

A quarter of the respondents stated that they had already changed their own mobility behaviour, diet and consumption patterns for reasons of sustainability (fewer flights, less meat consumption, more trips on foot or by bike). Just under half of respondents (47%) are altering behaviours that are easy to change (less meat consumption, waste collection, buying organic products). 12% declared they would consider changes such as using public transportation or better waste disposal for the future.

7. Conclusions

The main differences between Poland and Austria can be found in their energy systems. Poland has been and still is relying heavily on its own hard coal and lignite resources that still represent the most important fuels in electricity heat generation and the most important heating fuel in the household sector. Coal is regarded as a strategic resource to ensure not only an affordable, domestic energy supply but also independence from other suppliers abroad, foremost Russia. EU climate and energy policy initiatives are widely regarded as undesired interference with the country's sovereignty. Therefore, opposition to climate policy making – from right wing political parties, religious groups as well as the coal industry and unions – continues to be very pronounced. Apart from shifting away from coal, there is large potential for reducing emissions through improving the thermal quality of buildings as well as by increasing the availability of public transport and modernising the vehicle fleet. However, energy and climate policy measures have to deal with the challenge of avoiding or mitigating adverse social impacts. Already now, energy poverty is widespread and persistent in Poland. In addition, the energy transition will massively impact those regions where coal mining is concentrated and currently provides a large share of employment. Accompanying strategies and measures will be necessary in order to ensure a just transition and cushion vulnerable households against increasing costs due to climate action and carbon pricing in particular.

Austria's energy system, by contrast, shows a much larger share of renewables in the energy system. The share of hydropower in electricity generation is comparable with the share of coal in Poland. The main emitter outside the emission trading sectors (industry and energy generation) is transport. This sector's emissions have been constantly growing since 1990 due to higher domestic mileage and importantly due to refuelling by trucks as fuel prices are significantly lower than in neighbouring countries (Germany, Italy). In contrast, the building sector has

managed to reduce emissions since 1990. There is still potential for further fuel shift and emission mitigation in heating, but it is comparatively low.

Due to these different preconditions and lower purchasing power in Poland, it can be assumed that an EU-wide uniform CO₂ price will affect households in Austria and Poland to a different extent. In particular, the high share of coal heating systems in Polish households may require differentiated recycling measures to avoid social hardships.

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