Fossil fuel prices and inflation in Poland

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The analysis presented in this report was conducted in September 2022 with the most recent data available at that time, and the report considers policy announcements until end of September 2022.

Key findings

- **Fossil fuels, including natural gas, household coal and transportation fuels, are responsible for a large share of consumer price inflation in Poland** in the past 12 months, contributing c. 40% to the annual inflation rate, which currently stands at 14.2%.
- **Recently, the price of household heating energy sources, such as coal and gas, has been rising much faster than in the last decade**, with household coal prices rising 157.3% and gas prices up 37.5% over the twelve months to August 2022. This is partly due to Polish and EU embargos against Russian gas and coal, creating a mismatch between coal and natural gas supply and demand. Other drivers are the weakening of the zloty against the US dollar and euro, and the uptick in global demand after Covid-related lockdowns.
- **Electricity prices, as distinct from energy used for transport and heating, have had smaller swings and the year-on-year price growth (5.1%) is below that of Poland's overall inflation rate**, which stood at 14.2% in the twelve months to July 2022. This is the result of heavily regulated retail prices in Poland, where regulators tend to fix prices for a year in advance.
- **For 2023, the Polish government has already announced to freeze household electricity tariffs for the first 2,000 kWh, at a cost of 30bn zlotys given current wholesale electricity prices.** The cost of renewables has been falling dramatically over the past decade, but Poland's energy mix remains dominated by coal and gas, which in turn drive Polish wholesale prices. This means that Poland has not yet been able to benefit from the low cost of renewable energy, and remains vulnerable to fossil fuel price shocks.
- **We estimate that the increase in energy prices currently make an average household €914 worse off in 2022 compared to 2020, and that the lowest income households now spend c. 34% more on energy than in 2020**. For households in the bottom 20% of the income distribution, the share of energy costs in overall household expenditure has been high compared to higher income EU states in all years reported, from 2005 to 2015. Based on energy price inflation and expenditure growth in Poland, we estimate that the share of energy costs in total household expenditure has risen to 12.9% in 2022 for the lowest income households, up from the estimated share of 9.6% in 2020.
- **In response to rising fuel prices, the Polish government has introduced support packages worth more than 50 billion zlotys (US$10 billion) or close to 1.5% of GDP to protect households, businesses and municipalities from soaring energy bills.** The measures include a cap on coal prices, freezing electricity prices until the end of 2023, as well as direct subsidies and cash transfers to households. Incentives have been introduced to increase energy efficiency and businesses and municipalities are also financially supported. Expenditure on these interventions can only be partly recovered through windfall taxes in the energy sector.

- **Expanding the share of renewables supports energy security and affordability.** The rapid deployment of renewables could bring significant benefits to Poland, by reducing Poland's dependence on coal and gas in power generation, and increasing the share of technologies with very low marginal cost in the electricity production. Increasing the share of renewables would directly lower the average cost of electricity production, and has the potential to reduce wholesale prices in the long term.
- Coupling the deployment of renewables with increased electrification of transport and heating would reduce household and business consumers' exposure to volatile fossil fuel prices, and limit the need for government intervention during times of high fossil fuel prices.

Energy prices and inflation in Poland

This report explores the role of energy prices in recent inflation

The world is experiencing a surge in cost of living and corresponding inflation levels, which can be mostly attributed to supply-side factors. Soaring prices of fossil fuel-based energy preceded and accompanied this return to inflation in countries across the EU. Many renewable energy sources are now cheaper than fossil fuels in electricity generation, especially for newly built capacity (IRENA, 2022). However, many of these advantages are new and not fully understood across policy and investment landscapes.

The perception of the EU's Climate Law, which sets a target to cut emissions by at least 55% from 1990 levels by 2030, is that it is environmentally motivated. However, the policies supporting this target may also have significant effects on both the level and the volatility of cost of living pressures that arise from the fossil fuel energy complex.

This paper sets out to explore the role of energy prices in inflation in Poland, with a view to understanding the potential for faster energy transition measures to ease inflationary pressures and risks.

Poland is a net energy importer, and strongly reliant on fossil fuel import

Poland is a net energy importer and its dependence on imports has increased over time if all energy sources and consumption (including electricity) are considered. Net imports accounted for 43% of gross available energy in 2020, a huge increase from 11% in 2000 (Eurostat, 2022: NRG_IND_ID; European Commission, 2022c). Poland's coal for electricity generation is mostly sourced from domestic production, and Poland is the EU's biggest coal producer (over 50 million tonnes from its own mines in 2021) (Mining Technology, 2019; Reuters, 2022b). In the last few years, coal imports from Russia were significant (8 million tonnes out of 12 million tonnes of total coal imports in 2021 (Reuters, 2022b)), but in 2022, the EU introduced an embargo on Russian coal imports in response to Russia's invasion of Ukraine, effective from 10 August. Coal is also widely used in home heating in Poland and Russian imports were crucial to meet domestic heating demand prior to the war in Ukraine (Reuters, 2022b).

Prior to the war, Poland was heavily reliant on oil and gas imports from Russia, despite previous efforts to diversify supplies. Poland has very little domestic production of oil and natural gas (OECD, 2020). Oil imports account for over 97% of Poland's crude oil use, and 78% of Poland's natural gas supply is imported (European Commission, 2022c). Historically, Russia accounts for two-thirds of Poland's gas imports and around three-quarters of oil imports (OECD, 2020). Already before the war in Ukraine, Poland had tried to diversify its gas imports, by initiating LNG imports from the US (Reuters, 2019) and building a new pipeline between Poland and Norway (DW, 2022). The Polish energy sector is heavily regulated, including regulated gas prices that are due to be liberalised in 2024, and the largest coal producers are majority-owned by the Polish state (OECD, 2020).

Poland's electricity production is dominated by coal

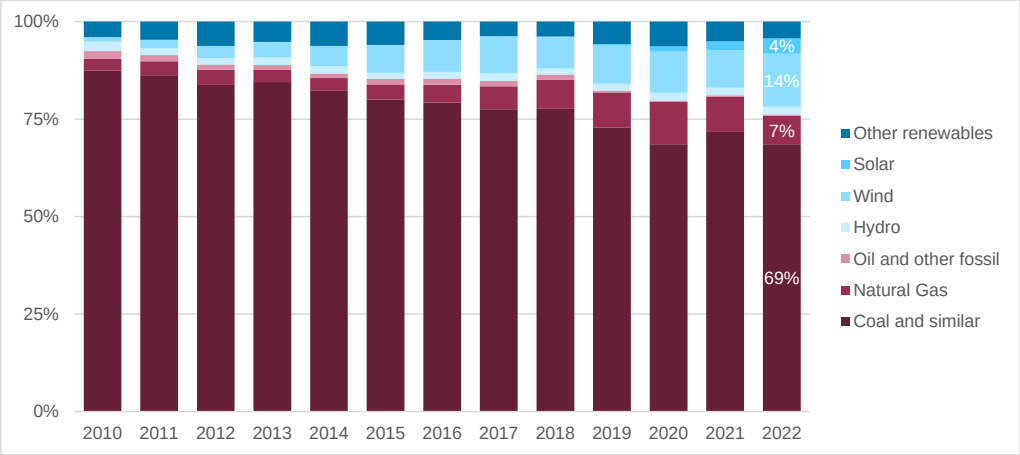
The Polish electricity generation mix is among the most carbon-intensive in developed countries, due to its reliance on coal. According to IEA data, coal accounted for around 72% of Poland's electricity generation in 2021, the highest share among IEA member countries. Natural gas accounted for 9%, taking the share of fossil fuels in the electricity mix to over 80%. Over time, the

share of coal in Poland's electricity mix has fallen, while that of natural gas has roughly tripled since 2010.

The share of renewables in Poland's electricity mix has increased, but remains below that of other major EU countries. Renewable sources have doubled over the past decade and accounted for 19% of Poland's electricity generation in 2021, still less than in neighbouring Germany (45%), but more than in the Czech Republic (16%). The share of renewables increased to 24% in the first half of 2022, mainly due to an increase in the share of wind power (from 10% to 14%), and an increase in the share of solar power (from 2.3% to 3.9%) compared to 2021 (EEA, 2022).

In fact, there has been some progress in the deployment of renewable energy sources. Installed solar PV capacity has risen from 0.2 GW in 2016 to 7.7 GW in 2021, and there are also plans to install 11 GW of offshore wind power capacity by 2040 (IEA, 2022). Figure 1 shows the share of renewable energy sources in the Polish electricity mix, which increased from around 8% in 2010 to 24% in the first five months of 2022.

Figure 1 Electricity generation mix, Poland 2010 to 2022 (Jan-May)



Source: IEA (MES_0522)

Poland's National Energy and Climate Plan sets targets for the future energy system

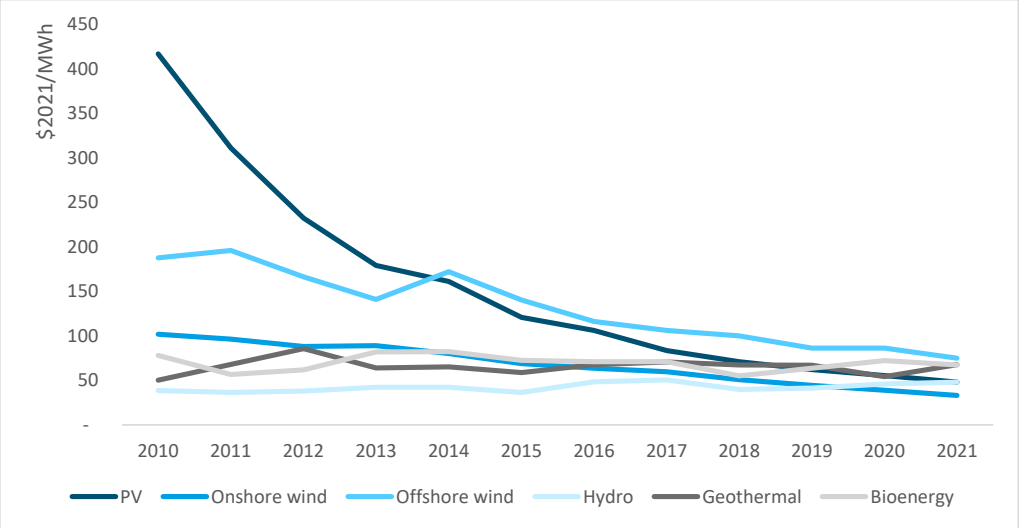
The key objective of the Polish climate strategy is to lower dependence on coal. Poland has set out its energy policy targets in the National Energy and Climate Plan, which is mandatory under EU law. Key aspects of the future strategy are to reduce the use of coal, to increase renewable electricity generation capacity, and to keep using natural gas as a transitional fuel. There will be further energy market liberalisation in line with EU regulations.

Significant investment in renewables will come through Poland's national Recovery and Resilience Plan, which mobilises €45bn in grants and loans from the EU's Recovery and Resilience Facility, 43% of which are planned to be spent on the green transition (European Commission, 2022d). Poland plans to increase the share of renewables in electricity production to 32% by 2030. However, recent analysis by the IEA concludes it is likely that emission reductions and energy efficiency targets will have to tighten to support the EU-wide target to reduce GHG emissions by 55% by 2030 (IEA 2022).

The cost of renewables is now much lower than that of fossil fuels

The lifetime costs of renewable energy sources have fallen dramatically and are now much lower than those of fossil fuels. The levelized cost of electricity (LCOE) of renewable energy technologies has been falling globally, as shown in Figure 2. The largest drop has been observed in the lifetime cost of solar photovoltaic power generation, which has fallen by 88%, from $417 to $48 per MWh (2021 prices). Similarly, the lifetime costs of offshore and onshore wind projects have decreased by 60% and 68%, respectively.

Figure 2 LCOE of renewable energy sources, 2010-2021 (in constant $2021/MWh)



Source: IRENA, 2022
Note: Global weighted average of commissioned projects

Projected lifetime costs of fossil fuel-based electricity generation have been relatively stable over the past decade, but have now risen sharply as a result of higher gas and coal prices. The cost of fossil-fuel based electricity sources has remained largely unchanged until late 2021. Gas-fired power plant costs rose sharply in 2022 due to the current hike in natural gas prices, with fuel-only costs estimated at $270 per MWh of electricity in Europe, and lifetime costs of plants accordingly above that figure. LCOE estimates in Europe have remained largely unchanged for renewables ($42 and $61 per MWh for onshore wind and solar PV) (IRENA, 2022).

The lifetime cost per MWh of wind power and solar PV are likely to remain below that of fossil fuels. Thanks to falling capital cost, the LCOE of renewables is expected to decrease further (particularly solar PV), while the capital cost of fossil fuel-based electricity generation (coal and gas) is expected to remain unchanged and mainly dependent on fuel and carbon prices. With carbon prices likely to rise, the cost of coal- and gas-fired electricity generation will increase further over the coming years, even though combined cycle gas turbines (CCGT) are already one of the most expensive energy sources. Poland is likely to remain reliant on coal in the medium term, which makes future increases in Polish electricity generation costs and wholesale prices likely.[1] Accelerating the deployment of renewables would reduce system-wide electricity generation, and eventually help reduce wholesale prices too.

[1] Poland is among the few EU countries that has no credible phase-out plan for coal or not before 2049 (Beyond Coal, 2021)

Polish retail electricity prices have been relatively stable and low in the last decade

Poland's wholesale electricity prices have tended to be higher than in neighbouring countries, but have not risen as sharply as in other EU countries in the past year. While Poland's wholesale prices have been among the highest in Europe in the last decade, in late 2021, Polish wholesale prices did not increase as dramatically as in neighbouring countries such as Germany, the Czech Republic and Slovakia, and were among the lowest in Europe at the end of 2021.

Box 1: Electricity price setting in the EU Member States

Key wholesale electricity prices in the EU are based on a marginal price model, set in place by EU legislation. In the electricity market, the electricity sources with the cheapest operating cost are used first, and power plants that are more expensive to operate are added until total electricity demand in the market is satisfied. This is known as merit order. The last, i.e. the marginal, and therefore most expensive, plant activated to satisfy demand sets the price for the whole market. This means that the market clearing price is equal to the marginal price of electricity production. As a result, wholesale prices can vary significantly during the day, as demand varies at different times of the day and night.

Renewable and nuclear energy sources are usually the cheapest electricity sources. However, to satisfy demand during peak hours, many countries rely on gas and coal fired plants, which then consequently set the wholesale electricity price. As gas has become more expensive since Russia's invasion of Ukraine, wholesale electricity prices have also soared.

Marginal price models are preferred for their transparency, efficiency and for the incentives they provide to keep generation costs as low as possible. As can be seen in the illustration below, operators of renewable electricity sources can achieve revenues much higher than their marginal costs, which incentivises investment in renewables (European Commission 2022b).

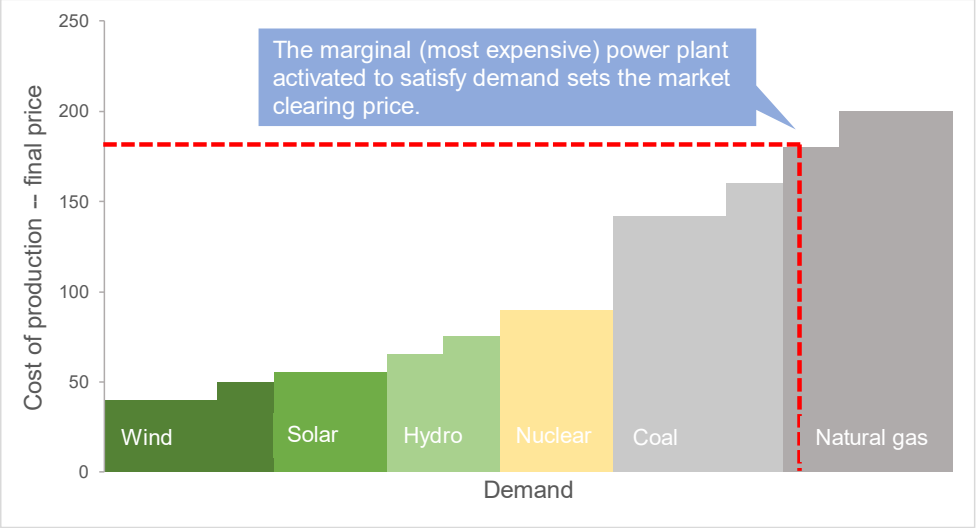
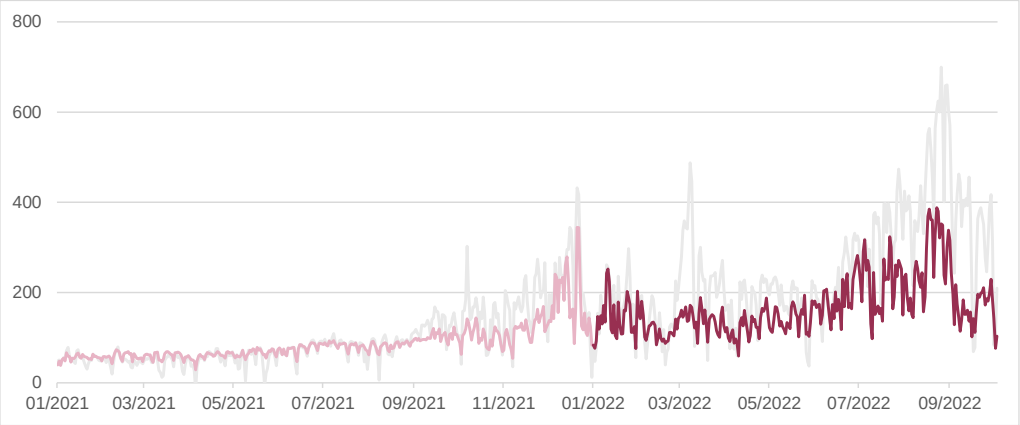


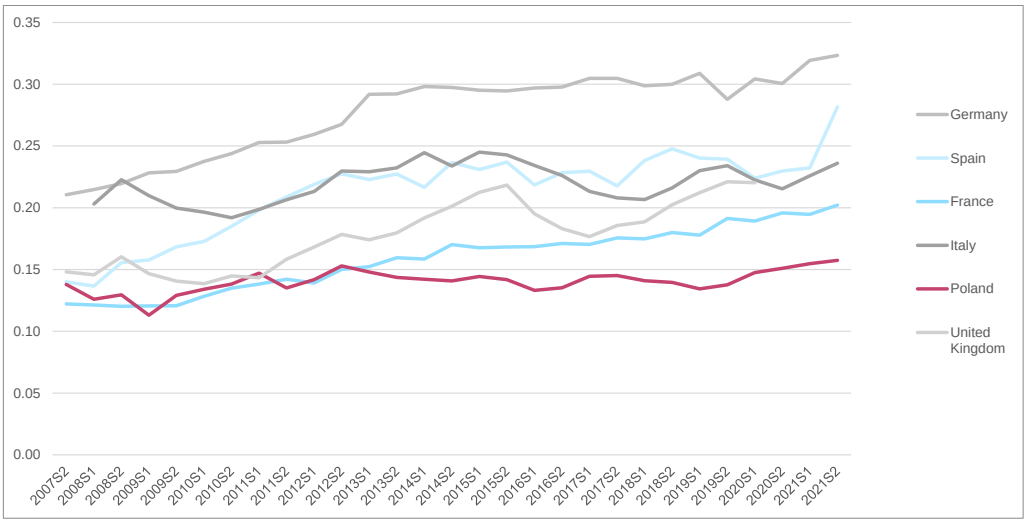
Figure 3 Wholesale day-ahead electricity prices in Poland (red lines) and Germany (grey lines) for comparison. CE analysis of Bundesnetzagentur (2022) data.



CE analysis of Bundesnetzagentur (2022) data.

Unlike Polish wholesale prices, retail prices have long been at the lower end of the range of European peers in the last decade (Forum Energii, 2022), as can be seen in Figure 4.

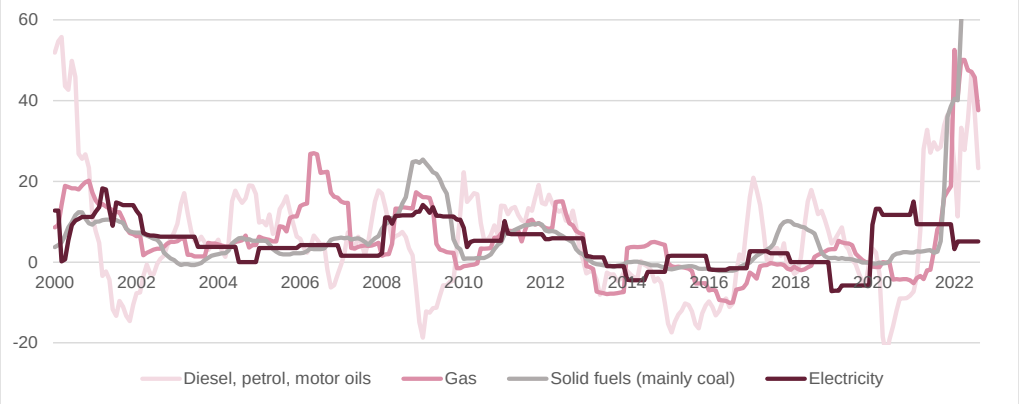
Figure 4 Retail electricity prices in Poland (purple) and selected EU countries, in € per kWh



Source: Eurostat dataset: NRG_PC_204
Note: all taxes and levies included; in band DC: consumption is between 2500 and 5000 kWh yearly

Energy prices increased faster than overall consumer prices over the past two decades. Figure 5 shows the monthly change in electricity and fuel prices (petrol and diesel) over the last 22 years. Even though the average monthly change of electricity, gas and 'fuels and lubricants for transport' (petrol, diesel and motor oils) is similar in the period 1995-2021, the standard deviation (an indicator of volatility) of diesel and petrol is by far the highest, while electricity and gas are not as far from each other, with the volatility of gas slightly lower. This illustrates that consumers are historically exposed to much larger price swings for transportation fuels than for household energy. One explanation for this is that household energy markets are strongly regulated by the Polish state. Figure 5 and Table 1 illustrate the price volatility and increase of different energy sources in greater detail.

Figure 5 Annual rate of change in electricity, gas and fossil fuel retail prices, monthly data



Source: Eurostat dataset: PRC_HICP_MMOR

Table 1 Standard deviation and average monthly change of retail electricity, gas and fuel prices.

	1996-2021:M7		2021:M8-2022:M8	
	Standard deviation	Average monthly price change (%)	Standard deviation	Average monthly price change (%)
Electricity	2.05	0.47	0.43	1.27
Gas	1.77	0.44	8.06	3.45
Coal	0.68	0.13	7.40	9.18
Fuels and lubricants for transport	2.70	0.52	9.00	2.99
All items	0.51	0.32	0.79	1.12

Source: Eurostat dataset: PRC_HICP_MMOR
Notes: Fuels and lubricants for personal transport equipment category is driven by price change of diesel and petrol. This category has been chosen due to its better data availability
In case of coal, data are only available from January 2015

Fuel prices have risen sharply over the past year, driving up electricity prices as well

The current energy price hikes are strongly connected to global developments. Price growth of all energy sources has almost always exceeded overall general inflation in the past 27 years.[2] Since January 2020, energy prices have increased more than at any other time since the 1990s. Fossil fuel prices have risen sharply, with petrol prices up 38%, diesel up 41%, gas up 42%, and the price of coal up by 167%. Electricity prices meanwhile have risen by just under 30% (see Table 2). Reasons for the recent increase in fossil fuel prices are the uptick in global demand after the end of Covid-related lockdowns, the weakening zloty against the US dollar and, more importantly, Russia's invasion of Ukraine in February 2022, which led Poland to stop coal imports from Russia before the EU-wide embargo took effect.

Household coal prices have risen dramatically since the beginning of the war in Ukraine, with significant impacts on households which often still use coal in heating. It is important to note that coal for electricity generation is mainly sourced from local mines, while household coal is more frequently

[2] The only exception is the price of coal, which grew by less than the general price level on average

imported, mostly from Russia. As a result of the embargo against Russian coal and increased use of coal in European electricity generation since the beginning of the war to substitute for natural gas, coal prices have surged (IER, 2022). Moreover, Polish coal is not a perfect substitute for imported coal (due its lump size and price) and, therefore, 60% of those using coal for heating are threatened by energy poverty (Reuters, 2022b).

Due to government intervention, retail electricity prices have remained relatively stable, unlike retail fossil fuel prices. Although only coal prices have historically been relatively stable, in the past 12 months, the standard deviation of fossil fuel price changes was 3-4 times higher than their 25-year average (see standard deviation figures in Table 2). At the same time, the price volatility of electricity has decreased. The explanation of the latter relies on several government interventions that have largely frozen electricity prices.

Table 2 Recent change in retail electricity, gas, petrol and diesel prices in Poland

As of September 2022, Change since:	January 2022 (last 8m)	September 2021 (last 12m)	September 2020 (last 24m)	January 2020 (last 32m)
Electricity	5.1%	5.1%	15.1%	**28.5%**
Gas	25.1%	37.5%	48.4%	**41.8%**
Diesel	19.7%	31.6%	63.5%	**41.3%**
Petrol	14.7%	19.5%	54.4%	**38.4%**
Solid fuels	88.2%	157.3%	164.0%	**167.2%**
All items (overall inflation)	10.9%	14.8%	20.7%	**23.9%**

Source: Eurostat, PRC_HICP_MMOR

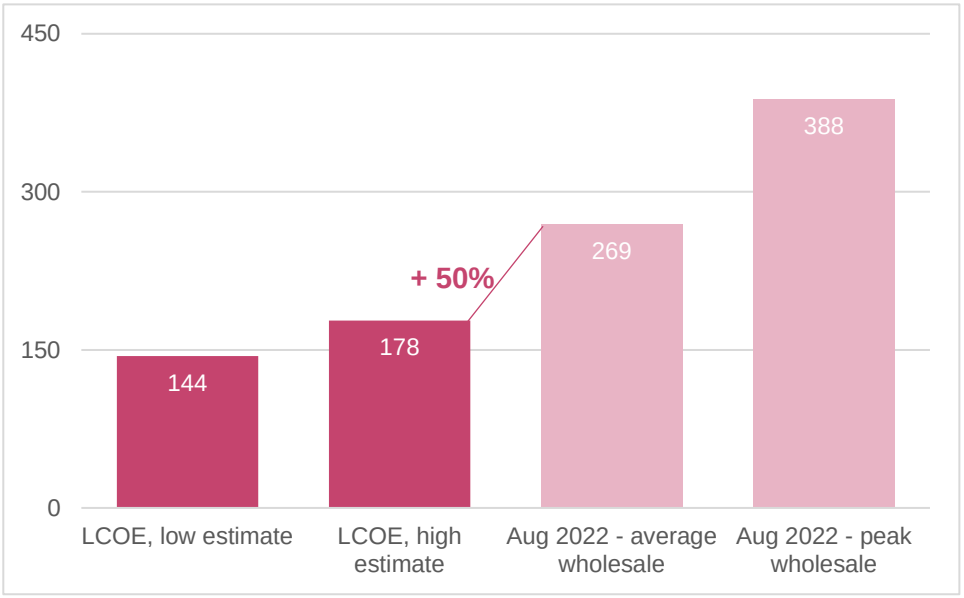
We estimate that Polish electricity prices are at least 50% above production costs

Wholesale electricity prices are significantly higher compared to generation costs. We estimate current electricity generation costs in Poland, weighted across technologies and factoring in current gas and carbon prices, to be in the region of €150 per MWh.[3] The average wholesale price of electricity in Poland in August this year was €269 per MWh, with a peak of €388 on 23 August.

Our generation cost estimates suggest that current wholesale electricity prices are at least 50% times higher than average electricity generation costs across all technologies (Figure 6). Note that estimates of electricity generation costs are crude and depend on a large range of factors, such as forecasts of oil, gas and coal prices for fossil fuel-based electricity generation, lifetime of power plants, construction costs, and the cost of capital. These estimates for the weighted average cost of power generation across the electricity grid are nevertheless much higher than recent IRENA estimates for the cost of renewables – it is clear that increasing the use of renewables could bring down the average production cost across the grid.

[3] Our estimates are based on IEA energy mix data for the six months to May 2022 and data on the levelized cost of electricity from Cambridge Econometrics' E3ME macro-economic model, IRENA and the World Bank (Timilsina, 2020).

Figure 6 Estimates for LCOE of Polish electricity generation in the first half of 2022 and Polish wholesale electricity prices in August 2022



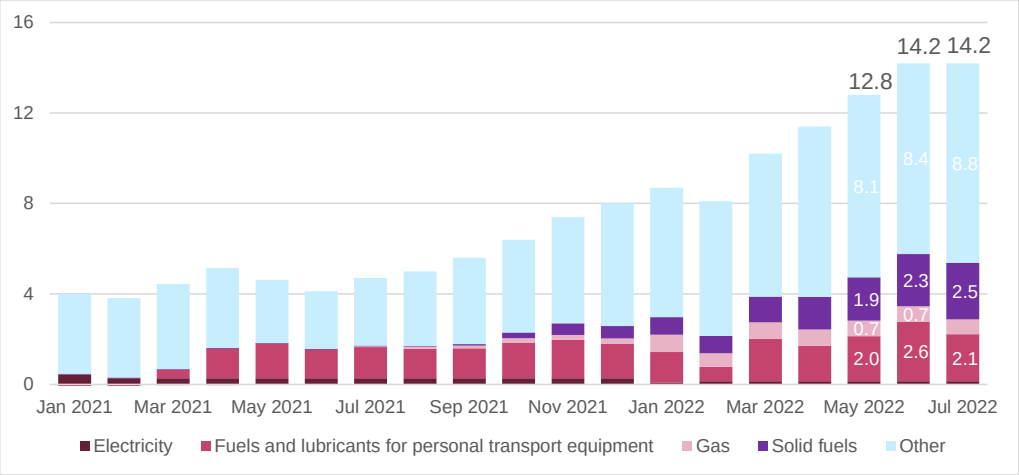
Sources: LCOE: IRENA/World Bank (Timilsina, 2020) (low estimate), Cambridge Econometrics E3ME and IRENA data (high estimate);
Wholesale electricity prices (spot) in Spain: Bundesnetzagentur (2022)

Energy prices are key drivers of the recent consumer price inflation

Fossil fuels are responsible for a large part of current consumer price inflation. Retail energy prices are a component of the consumer prices index (CPI), and their weights account for around 10% of the overall basket of goods and services included in the CPI (gas and fuels account for around 7% and electricity for around 3%). Recently, however, they have had a much higher contribution to overall inflation. Fossil fuels alone (transport fuels and gas) accounted for approximately 40% of the overall year-on-year inflation rate in June 2022, and 37% in July 2022 (Figure 7). Electricity prices contributed the least to the overall increase in retail energy prices, while coal prices as well as petrol and diesel were key drivers of Poland's CPI inflation.

Poland currently has a higher inflation rate than European neighbours, but this may be partly due to a slight depreciation of the zloty against the euro over the past 12 months, and a significant 20% drop against the US dollar over the same period.

Figure 7 Contribution of electricity, gas and fuel prices to consumer price inflation in Poland



Source: Eurostat dataset: PRC_HICP_MANR

Poor households spend a higher share of their incomes on energy

While poorer households spend less on energy (and everything else) than wealthier ones, they spend a larger proportion of their incomes on energy bills, as can be seen in Figure 8. We estimate that between 2005 and 2020, household expenditure on energy as a share of total expenditure has fallen for all income groups.

Household energy expenditure increased by nearly 50% in the last two years for the poorest 20% of households. In 2015, the average Polish household in the bottom 20% of the income distribution spent 11.7% on household energy, which is predominantly electricity, gas and solid fuels (mainly coal). Since then, Eurostat data shows that retail energy prices increased by 4% between 2015 and 2020, and by 48.3% between mid-2020 and mid-2022, while the overall price level changed by 8.8% and 20.5%, respectively. The recent increase in retail energy prices is largely driven by the price of coal, which tripled from August 2021 to August 2022. Household coal has a similar weight in the inflation basket to that of natural gas, which illustrates its importance.

The poorest households are more severely affected by soaring energy prices than high income households. For households in the bottom 20% of the income distribution, the share of energy costs in overall household expenditure remained high (over 11%) in all reported years. Based on energy price inflation and expenditure growth in Poland, we estimate that the share of energy costs in total expenditure decreased to 9.6% in 2020 but risen to 12.9% in 2022 for the lowest income households. This means that the poorest households now spend around 34% more on energy than in 2020, and over 25% more than the richest households relative to their overall living cost. We estimate that an average household is approximately €914 worse off in 2022 compared to 2020 as a result of rising retail energy prices alone.

Figure 8 Household expenses by quintile and household expenditure on energy as a share of total household expenditure

Sources: Eurostat datasets: HBS_STR_T223, HBS_EXP_T133, PRC_HICP_MANR
Note: 2020 and 2022: CE's own estimate, based on energy price inflation and change of mean consumption expenditure by quintile

Poland is taking measures to address the energy price increases in 2022

In response to the recent increases in fossil fuel prices, the Polish government has introduced various subsidies to support households. This includes a price cap on coal and cash subsidies amounting to several hundred euros per household, depending on the type of fuel used for heating. Furthermore, in order to substitute Russian coal imports, Poland has been looking for other sources, including increasing its own production and ordering millions of tonnes of coal from Colombia and Africa. (Reuters, 2022b; Mining Technology, 2019)

Poland has also announced a freeze to electricity prices at the current levels for the first 2,000 kWh of use, plus a 10% discount on bills for those households that reduce consumption by at least 10% in 2023. To save energy, local and national government organisations will also be required to save 10% of electricity (Notes from Poland, 2022).

The cost of subsidies is high, but partly financed by a tax on windfall profits in the energy sector. Taken together, measures aimed at mitigating household spending on energy and at supporting energy-intensive companies, cost around 30 billion zlotys (US$6bn). This is on top of 11.5 billion zlotys state subsidy on household coal and helping out municipalities with 13.7 billion zlotys to cope with rising energy prices (Reuters, 2022a). This will partly be covered from windfall profit tax in the energy sector, worth of 13.5 billion zlotys (Reuters, 2022c).

Discussions about EU-wide actions are ongoing

The European Commission and other EU countries are also developing measures to address high energy prices. Other EU countries have made similar interventions, and there is a debate in Europe about how the link between electricity and gas prices can be weakened in European electricity markets, where peak load capacity is typically gas-based (Zakeri et al. 2022; Ember Climate 2021). In fact, Zakeri et al. (2022) find that between 2015 and 2019, fossil fuel prices have determined European wholesale prices 66% of the time. In Poland, coal-fired power plants often determine wholesale prices (Rabobank 2022), and as a result of coal and gas prices shooting up, electricity prices have also risen sharply in the past 12 months. In the long term, the widespread deployment of renewables to the point where coal- and gas-fired peak load capacity could be replaced by stored excess electricity from renewables using battery storage, green hydrogen and pumped hydro, could reduce electricity prices sustainably (see, for example, World Economic Forum (2022)).

The Polish government is also looking at options to reform the electricity market. One idea that is reportedly being considered is to remove the obligation for electricity to be traded on a central exchange, hoping that direct sales from producers to suppliers and consumers might reduce average wholesale prices and consumer bills (Parkiet, 2022).

In the EU, member states have agreed to a series of short-term EU-wide emergency measures to reduce consumer bills. On 14 September 2022, the European Commission proposed a reduction in electricity consumption, a tax on energy providers' excess profits, and a 'revenue cap' on producers of non-marginal electricity (renewables, nuclear, lignite). Revenues from the cap and the tax would be used to reduce consumer bills. The measures were agreed on 30 September and include a revenue cap of €180 per MWh for producers with low operating costs, a solidarity levy for the fossil fuel sector and binding targets to reduce peak-time energy demand by 5% (European Council, 2022).

Considering the historical volatility of global fossil fuel prices and their impact on economies when their prices are high, a further expansion of renewables appears the right policy choice. Boosting the share of renewables increases energy independence, reduces the exposure of domestic consumers to global market prices, and has the potential to bring down electricity prices in the long run, given their much lower cost than fossil fuel-based alternatives (IRENA 2022). Renewables will also be important in Poland to counterbalance the rising cost of coal-based electricity generation as carbon prices increase. Increasing the electrification of transport, industry and heating, coupled with an expansion of renewables, can further reduce household and business consumers' exposure to volatile fossil fuel prices, and limit the need for government intervention during times of high energy prices.

Conclusions

Fossil fuel prices are clearly linked to the current cost of living pressures in Poland and are making an outsized contribution to recent spikes in inflation, transport and heating-related fuels in particular. These pressures are present even in countries which have a substantial domestic fossil fuel supply, as is the case for coal in Poland, as the vast majority of fossil fuels is imported and dependent on global market prices.

The potential of renewable energy to alleviate cost pressures through lower consumer prices in transport, heating, and electricity can be hard to identify due to market structures and policy provisions. For example, the electricity market design based on marginal pricing means natural gas or coal prices often affect wholesale electricity prices. This means that rising fossil fuel prices also push up electricity prices, and even more so if the share of renewables is low, as is the case in Poland. Energy cost subsidies to households and businesses are also prevalent in EU country responses to the crisis and intermediate price signals to householders, businesses and investors.

Despite these confounding factors, the evidence suggests that decarbonising energy systems could moderate the contribution of energy prices to consumer price inflation and volatility in the long run. Ramping up the share of renewables in electricity production should eventually affect wholesale prices if total electricity demand can more often be satisfied with renewables sources alone. Likewise, expanding the use of renewables in household heating and transport reduces consumer exposure to fossil fuel price volatility in international markets.

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