

Who took the burden of the energy crisis?

Country briefing paper: Germany

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FINAL

30 June 2023

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Suggested citation

Best, Aaron, Flora Dicke, Nora Kögel (2023): Who took the burden of the energy crisis? Country briefing paper: Germany. Ecologic Institute, Berlin.

Acknowledgements

This paper is part of a project led by IEEP in partnership with six other members of the Think Sustainable Europe (TSE) network - Association for International Affairs (AMO) in Czechia, the Basque Centre for Climate Change (BC3) in Spain, Ecologic Institute in Germany, EnergiaKlub in Hungary, IDDRI in France and Wise-Europa in Poland - and with modelling inputs led by BC3. We gratefully acknowledge the financial support of Laudes Foundation for this work.

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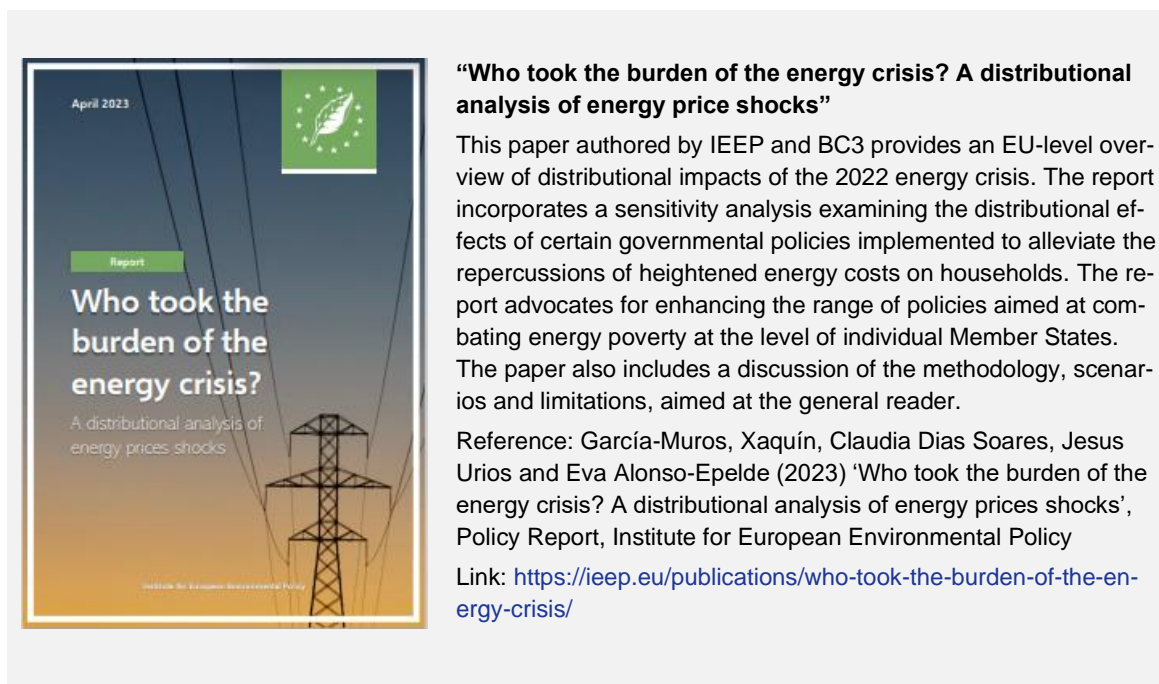
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1 Introduction

This country briefing paper describes Germany's policy response to the energy crisis of 2022 and provides a model-based summary of the distributional effects of energy price shocks on German households. The paper serves as a companion paper to the report "Who took the burden of the energy crisis? A distributional analysis of energy price shocks" by IEEP and BC3 (see Figure 1), which examines the impact of the surge in energy prices on the welfare of European households and offers an assessment of the socio-economic consequences of energy price fluctuations in 2022.¹

Figure 1. EU-level summary and modelling methodology paper



Change in energy prices 2021-202

In 2022, Europe faced the most severe energy crisis seen in decades. Already in 2021, Europe had witnessed a significant rise in energy prices following the COVID-19 pandemic.² However, the geopolitical turbulence and uncertainty stemming from Russia's invasion of Ukraine on February 24, 2022, sparked an unprecedented surge in energy prices throughout Europe. In Germany, the most significant factor propelling the spike in energy costs was the dramatic increase in natural gas prices, primarily driven by Russia's curtailed supply. Even before Russia's invasion of Ukraine, Gazprom had stopped replenishing its European gas reserves and supplying

¹ IEEP (2023), “Who took the burden of the energy crisis? A distributional analysis of energy price shocks”, <https://ieep.eu/publications/who-took-the-burden-of-the-energy-crisis/>

² Oliver Ruhnau, Clemens Stiewe, Jarusch Muessel and Lion Hirth (2023), “Natural gas savings in Germany during the 2022 energy crisis”, *Nat Energy* 8, 621–628, <https://doi.org/10.1038/s41560-023-01260-5>

the spot market in autumn 2021. By September 2022, all Russian gas imports to Germany via Nord Stream 1 ceased.³

Dramatic increases in energy prices were seen throughout the EU (see Table 1). Price increases in Germany were *higher* than the non-weighted EU country average for **liquid heating fuel** and **diesel**, and *lower* than the non-weighted EU country average for **electricity**, **natural gas** and **petrol**.

Table 1: Energy price increases in 2022 (as % of 2021 prices) for primary households' energy sources

| Country | Electricity | Natural gas | Liquid fuel (heating) | Diesel | Petrol |
|-----------|--------------|--------------|-----------------------|--------------|--------------|
| BE | 57.0% | 113.1% | 70.5% | 26.7% | 20.3% |
| BG | 3.9% | 131.9% | 22.5% | 39.3% | 30.8% |
| CZ | 15.9% | 66.6% | 24.4% | 38.9% | 27.4% |
| DK | 63.9% | 106.5% | 39.7% | 38.4% | 25.3% |
| DE | 20.1% | 46.9% | 70.3% | 39.6% | 21.7% |
| EE | 94.4% | 132.0% | 47.8% | 45.9% | 30.0% |
| IE | 41.7% | 62.7% | 78.3% | 33.8% | 21.8% |
| EL | 43.1% | 127.0% | 45.1% | 36.9% | 24.6% |
| ES | 26.8% | 16.5% | 72.5% | 28.5% | 14.9% |
| FR | 7.4% | 40.9% | 66.0% | 28.9% | 15.8% |
| HR | 8.6% | 13.0% | 76.1% | 29.6% | 17.0% |
| IT | 110.3% | 73.7% | 38.5% | 22.0% | 11.8% |
| CY | 41.5% | 22.0% | 57.5% | 36.0% | 23.4% |
| LV | 36.2% | 126.9% | 56.3% | 43.7% | 32.3% |
| LT | 46.2% | 75.9% | 84.5% | 47.2% | 32.8% |
| LU | 2.1% | 50.7% | 69.9% | 43.1% | 27.8% |
| HU | 10.1% | 49.0% | 26.0% | 14.1% | 13.3% |
| NL | 118.0% | 123.2% | 114.0% | 34.0% | 14.7% |
| PL | 4.9% | 33.7% | 77.9% | 33.0% | 21.8% |
| PT | 22.2% | 62.3% | 42.3% | 25.7% | 14.0% |
| RO | 17.5% | 59.5% | 9.8% | 43.4% | 28.6% |
| SI | 4.6% | 42.1% | 33.3% | 28.8% | 24.5% |
| SK | 11.7% | 19.7% | 16.6% | 38.7% | 22.1% |
| FI | 40.8% | 31.2% | 66.3% | 40.7% | 26.5% |
| SE | 36.0% | 5.7% | 43.3% | 44.5% | 27.1% |

Source: Eurostat (2023): Harmonised indices of consumer prices; see <https://ec.europa.eu/eurostat/web/hicp>

In response to the energy crisis of 2021-2022, the German government introduced several relief packages, totaling nearly 300 billion euros, aimed at reducing the financial burden on citizens. The first two packages, launched in February 2022, included tax-relief measures such as raising the lump-sum allowance for employees, increasing the basic tax-free allowance, and augmenting the commuting allowance. Measures like the abolition of the renewable energy surcharge and the introduction of a lump-sum energy price payment further eased energy costs. Support for households also included heating allowances and child bonuses.

³ Stuart Elliott, Bowles, and Montgomery (2022), "European gas prices surge on renewed Russian gas supply uncertainty", S&P Global, <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/082222-european-gas-prices-surge-on-renewed-russian-gas-supply-uncertainty>

The third package, passed in December 2022, focused on reducing energy prices and inflation. This included capping electricity and gas prices, reducing the VAT on gas, and further tax reforms. In addition, it included one-off payments for pensioners and students, heating cost allowances, and increases in child benefits and unemployment benefits. Efforts were also made to promote use of public transport over private vehicles.

The following section provides further details on the German relief packages passed in 2022.

2 Germany's policy response to the energy crisis

In order to cushion rising energy prices resulting from the curbed natural gas supplies from Russia to Europe in 2021 and 2022, the German government agreed on multiple relief packages in 2022. Together, the relief measures amount to almost 300 billion euros.⁴

2.1 The first and second relief packages

First relief package

The first package was adopted at the end of February 2022 and initiated tax relief measures aimed to especially benefit citizens with lower and middle incomes. It amounted to a total volume of more than 15 billion euros.⁵ The first relief package included the following key measures:

- The **lump-sum for income related taxes** ('Arbeitnehmerpauschbetrag') was raised by 200 euros to 1,200 euros. This means that employees could claim work-related expenses (like work-clothes, office material etc.) up to a value of 1,200 euros without having to submit supporting documents.
- The **basic tax-free allowance for the income tax** was increased by 363 euros to 10,347 euros.⁶
- The **commuting allowance for long-distance commuters** (from the 21st kilometre) was increased from 35 to 38 cents for a limited period until 2026. Increasing the allowance, which is deducted from the taxable income, reduced income taxes for individuals with commuting distances over 21 kilometres.
- The **abolition of the renewable energy surcharge** ('EEG Umlage') took effect on July 1, 2022, six months earlier than planned, resulting in reduced energy bills for households. The surcharge was initially introduced in 2000 and aimed to promote the generation of electricity from renewable sources such as wind, solar, and hydro power. The surcharge was intended to cover the difference between the higher costs of producing renewable electricity and the market price for electricity on the electricity exchange. The surcharge had increased significantly since its introduction, which had resulted in higher electricity costs for consumers.⁷

⁴ Die Bundesregierung (2022), "Wir entlasten Deutschland", <https://www.bundesregierung.de/breg-de/schwerpunkte/entlastung-fuer-deutschland>

⁵ Die Bundesregierung (2022), "Entlastungspaket I - Steuerliche Erleichterungen beschlossen", <https://www.bundesregierung.de/breg-de/suche/entlastungspaket-eins-2010636>

⁶ Ibid

⁷ Die Bundesregierung (2022), "EEG-Umlage fällt weg – Stromkunden werden entlastet", <https://www.bundesregierung.de/breg-de/suche/eeg-umlage-faellt-weg-2011728>

Remarks on distributional effects

Measures that decrease income-tax burdens generally leave households that pay income taxes with more monetary resources. However, it should be noted that households that are not subject to the income tax do not profit from these measures.

It should also be noted that Germany has a progressive income tax, meaning the tax rate increases with a rising income. An increase in the amount that can be deducted from taxable income in Germany, like the above-described allowances and lump-sums, leads to a higher level of tax relief the higher the income and thus a regressive effect. While all individuals paying income tax benefit, individuals with higher incomes benefit more in absolute terms.

Second relief package

Like the first package, the second relief package was adopted in February 2022. It focused on direct income support as well as measures to reduce transport costs for households.⁸ The second relief package included the following key measures:

- **Energiepreispauschale** – Primarily, an 'Energiepreispauschale' or energy price lump sum payment of 300 euros was introduced, which was specifically aimed at employed persons liable to income tax.
- **Heating allowance** – In addition, the government recognized the burden of increased heating costs, and thus implemented a 'Heizkostenzuschuss', a one-off heating allowance. Housing benefit recipients were eligible for 270 euros, while apprentices and students receiving state education funding were granted 230 euros.
- **Kinderbonus** – The relief package also included a 'Kinderbonus', a one-off child bonus of 100 euros per child, which was intended to assist families with the increased cost of living.
- **Kinderzuschlag** – Additionally, the monthly child allowance for parents with low incomes ('Kinderzuschlag') was increased by 20 euros.
- **One-time payments to benefits recipients** - The government acknowledged the particularly vulnerable position of individuals on social benefits and unemployment benefits. To support these groups, one-time payments of 200 euros and 100 euros were respectively dispersed, aiming to ease financial hardships.⁹
- **9€-Ticket** – To support commuters and relieve the rising costs of transport, the government introduced the 9€-Ticket for all local and regional public transport in all of Germany. During the months of June, July and August 2022, a monthly ticket could be purchased for the price of 9 euros. It aimed to incentivize the use of public transport over private vehicles, thereby reducing fuel consumption as well as greenhouse gas emissions.
- **Reduced excise tax on fuels** – In the same time period, the energy tax rate on fuels was reduced by 29.55 cents/litre for petrol and 14.04 cents/litre for diesel. This measure aimed to directly lower the cost of fuel for consumers and mitigate the impact of high global oil prices.

⁸ Die Bundesregierung (2022), "Entlastungspaket II - Weitere Erleichterungen auf dem Weg", <https://www.bundesregierung.de/breg-de/suche/entlastungspaket-zwei-2028052>

⁹ Ibid

Remarks on distributional effects

A policy brief by the Macroeconomic Policy Institute (IMK) analysed the two **first relief packages and their distributional effects**, examining for a number of different household types the extent to which these households are relieved by the measures.¹⁰ Their analysis shows that households with employed adults are noticeably relieved across all income groups. Overall, the relief is socially balanced in the sense that among working households, especially those with low and medium incomes are relieved. Especially for low-income families with two working adults, the majority of the additional burden caused by the energy price spike is compensated through the measures. Single people with higher incomes, on the other hand, were relieved less relative to the burdens. A social imbalance can be observed in the treatment of non-employed persons such as pensioners: Here, the relief is extremely low even for households with very low incomes.

2.2 The third relief package and price brakes on gas and electricity

Third relief package

The third relief package was passed in September 2022 and comprised diverse measures to alleviate the additional burden caused by the high energy prices and subsequent inflation. The German government stated that the package would reduce the burden on citizens by 65 billion euros.¹¹ The third relief package included the following key measures:¹²

- **Tax reforms** – Several tax reforms were passed. Most prominently, to reduce the high gas prices, the VAT on all gas consumption was reduced from 19 to seven percent until the end of March 2024, retroactive from October 2022. Further tax reforms aimed to relieve the tax burden on pensioners, low-income-earners and mitigate ‘cold progression’, a process whereby inflation increases people’s tax rates in terms of their real income.
- **Further one-off payments** – Pensioners receive an energy price lump sum of 300 euros from pension insurance in December 2022 and students received a one-off payment of 200 euros around March 2022. As a short-term measure for the winter heating period, an additional one-time heating cost allowance was paid to recipients of housing benefits from September to December 2022: 415 euros for a 1-person household, 540 euros for two persons; and an additional 100 euros for each additional person.
- **Social benefit reforms** – Additional reforms of various social benefits were passed as well. For example, the child benefits that every child receives was raised by 18 euros, now amounting to 237 euros per month per child. The monthly child allowance for parents with low incomes (‘Kinderzuschlag’) was increased for a second time by an additional 21 euros now amounting to 250 euros per month. Further, the housing benefit system has been reformed, now reaching more people. Moreover, the unemployment benefits system was reformed with the aim to make it less bureaucratic and more targeted.¹³

¹⁰ Sebastian Dullien, Katja Rietzler and Silke Tober (2022), “Policy-Brief: Die Entlastungspakete der Bundesregierung“, <https://www.econstor.eu/handle/10419/264317>

¹¹ Die Bundesregierung (2022), “The third relief package – ‘Germany stands united at this challenging time’“, <https://www.bundesregierung.de/breg-en/news/third-relief-package-2123130>

¹² Ibid

¹³ Further social benefit reforms include: revisions to how pension contributions are taxed; changes to home office allowance; changes to social security contributions for people with low incomes.

- **Postponed increase in CO₂ price** – Furthermore, the increase in the CO₂ price by five euros per tonne, previously planned for January 2023, was postponed by one year to January 2024.
- **Reduced-price public transport (49€-Ticket)** – Aiming to make public transport use more affordable and simpler to use while increasing incentives to move away from individual transport in passenger cars, a successor regulation for the 9€ -Ticket was decided. In May 2023, a local and regional public transport ticket costing 49€ monthly with validity across all of Germany was introduced.
- **Electricity price brake** – The government decided to ease the burden of electricity prices by introducing a price brake, however, the specific design and the form of the regulation was still to be worked out when the third relief package was decided.
- **Disgorgement of windfall profits** – In order to finance the electricity price brake, windfall profits of electricity producers were to be partially skimmed off. Energy companies that produced electricity at consistently low production costs (e.g. from renewable, coal-based and nuclear sources) were making very high windfall profits on the European electricity market.¹⁴

While this policy brief focuses on households, it is worth noting that additional measures were introduced to relieve businesses. Further details about measures for households and businesses can be found in the German government's English-language summary of the third relief package.¹⁵

The gas and electricity price brakes

The above-mentioned electricity price brake was finally passed in December 2022, along with a price brake on gas.¹⁶ The Federal Government is funding the brakes as part of its protective shield worth 200 billion euros.¹⁷ For households, these brakes cap the electricity and gas price to a set amount per kilowatt hour. This applies to a quota amounting to 80 percent of historical consumption, which is usually the previous year's consumption. Above the respective discounted quota, the usual (i.e. market) electricity prices apply. Therefore, an incentive to save energy is maintained while the price spikes are mitigated.¹⁸

¹⁴ Due to the merit order principle on the EU electricity spot market, the production facility with the highest marginal production costs—usually coal and gas—determines the electricity price. Windfall profits result for companies producing energy at (significantly) lower marginal production costs.

¹⁵ Die Bundesregierung (2022), "The third relief package – 'Germany stands united at this challenging time'", <https://www.bundesregierung.de/breg-en/news/third-relief-package-2123130>

¹⁶ Die Bundesregierung (2022), "Price caps for electricity, gas and heat – Energy price brakes are entering into effect", <https://www.bundesregierung.de/breg-en/search/energy-price-brakes-2156430>

¹⁷ Die Bundesregierung (2022), "Relief for electricity and gas prices 200 billion euros for economic protective shield", <https://www.bundesregierung.de/breg-en/news/protective-shield-2131014>

¹⁸ Die Bundesregierung (2022), "Price caps for electricity, gas and heat – Energy price brakes are entering into effect", <https://www.bundesregierung.de/breg-en/search/energy-price-brakes-2156430>

3 Modelling results

3.1 Methodology

Modelling results summarised in this section stem from a microsimulation model developed by the Basque Centre for Climate Change (BC3) with IEEP. The model calculates the direct, overnight distributional impacts of energy price spikes on different household types for each EU Member State and for the EU as a whole. The microsimulation is based on household consumption data from Eurostat's 2015 Household Budget Survey (HBS) for all EU Member States. The household surveys map the consumption expenditures of 20,000 different household types in the EU. They thus represent very granular data, which enables modelling the impact on very heterogeneous household types.

Price data from the year 2021 are used as a basis for the modelling. The change in prices due to energy price spikes is calculated according to the scenarios, with the resulting distributional impacts modelled for different household types and their consumption patterns.

The modelling describes how different scenarios affect the disposable income of different household types. Results are presented by deciles of income distribution (vertical distribution effect), as well as by socio-demographic characteristics (horizontal distribution effect). The scenarios examined are as follows:

- **Reference scenario** –this scenario models the distributional consequences of energy price spikes in 2022 on households in Germany and the EU overall. It compares 2022 energy prices to those in 2021.
- **Scenarios analysing alternatives to reduced excise taxes on vehicle fuels** – Two hypothetical scenarios were modelled as alternatives to the German government's reduction in excise taxes on vehicle fuels in 2022. Such excise tax reductions were implemented in many EU countries. Germany introduced a reduction of the energy tax on vehicle fuels (petrol and diesel) for three months in 2022. These scenarios enable a comparison of the distributional effects between the approach of reducing fuel taxes and the approach of compensating poorer households directly.
 - **Scenario D1: "direct compensation to poorest households"**. This hypothetical scenario posits a policy that directly compensates low-income households (bottom decile) from a budget equivalent in size to the one that was used for the reduction in excise taxes on vehicle fuels.
 - **Scenario D1-5: "direct compensation to poorer households (bottom 50%)"**. This hypothetical scenario posits a policy that directly compensates poorer households (bottom 50%) from a budget equivalent in size to the one that was used for the reduction in excise taxes on motor fuels.

This paper functions as a country-level companion paper to the flagship paper written by IEEP and BC3 for the EU as a whole. That paper provides further details on the findings and methodology behind the results (see Figure 1).

Limitations

The main caveats for interpreting the results are the following:

- **Static modelling assumes no behavioural change.** The modelling does not reflect any changes in aggregate energy demand or demand for particular types of energy as a result of price changes (i.e. the modelled demand response to price changes is perfectly inelastic). Usually, such behavioural effects are small over the short and medium term, as households do not easily alter their energy consumption patterns in response to price changes. Due to the sharp change in energy prices coupled with households' inflation concerns during the period, consumption patterns probably did change to a fairly significant degree for some households, however.
- **No changes in environmental impacts.** Static modelling does not show the expected environmental effects of changes in energy prices.
- **Distributional analyses use averages per decile.** Using decile averages masks substantial differences in effects within decile groups stemming from sociodemographic, behavioural and technological differences. The average effect for a group is thus not representative for all persons in the group, e.g. in a particular decile, there may be a household in an urban area that uses district heating and public transport while another household in that same decile may live in a rural area with long commute distances and live in a poorly insulated house with oil heating. These differences in energy consumption patterns would drive quite different welfare impacts for the same change in energy prices. The outputs of the microsimulation model enable analyses on several attributes besides income deciles. This paper contains supplementary analyses that examine how impacts differ by population density and by household type, respectively.

Important note: The "impact on household welfare" referred to in the report graphs refers to the change in household expenditure on energy products/electricity as a share of total expenditure due to the change in energy prices. It can also be referred to as "disposable income impact" or "change in disposable income" (where "disposable income" is the income remaining to a household after all taxes and charges).

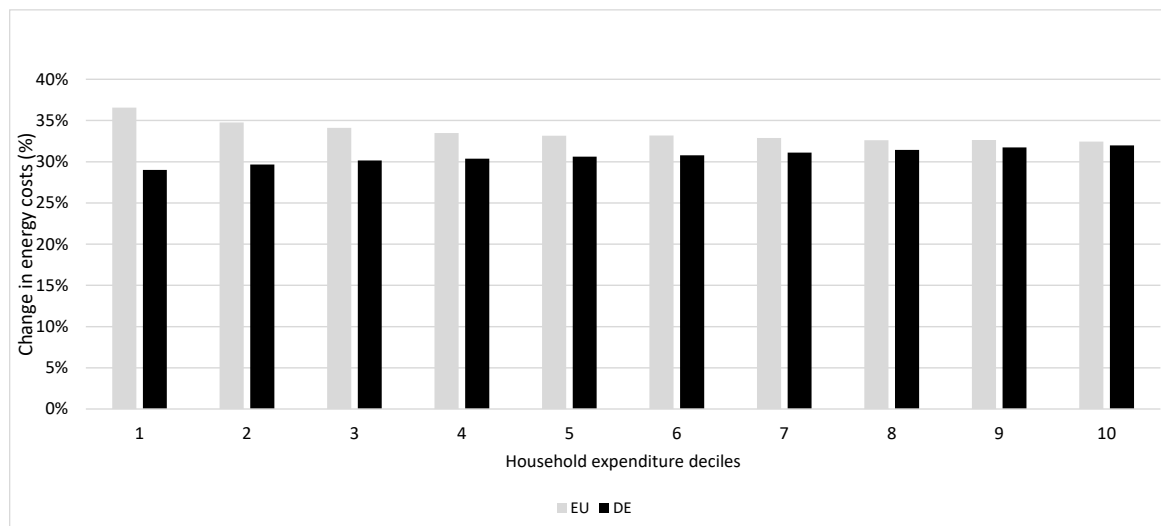
3.2 Reference scenario: energy price impacts on German households

The following analyses show how changes in energy costs from 2021 to 2022 affected household expenditure on energy as well as household welfare impacts in the European Union (EU) and Germany. The accompanying graphs show these impacts by decile, with each decile representing 10% of households, starting from those with the lowest income on the left of the graph and ending on the right with the 10% households with the highest incomes.

By how much did energy prices increase for German households in 2022?

As can be seen in Figure 2, the increase in energy costs in Germany was slightly below the average increase across EU member states. The most significant difference occurs within the lowest income decile, with an increase of approximately 37% in energy costs for the EU compared to a 29% increase for Germany. As the household expenditure decile increases, energy cost changes between the EU and Germany converge. This convergence is most prominent in the highest decile, where energy cost changes exhibit almost no difference, recording an approximately 33% increase for the EU and a slightly lower increase for Germany.

Figure 2. Energy cost changes by expenditure deciles (%) - EU vs DE

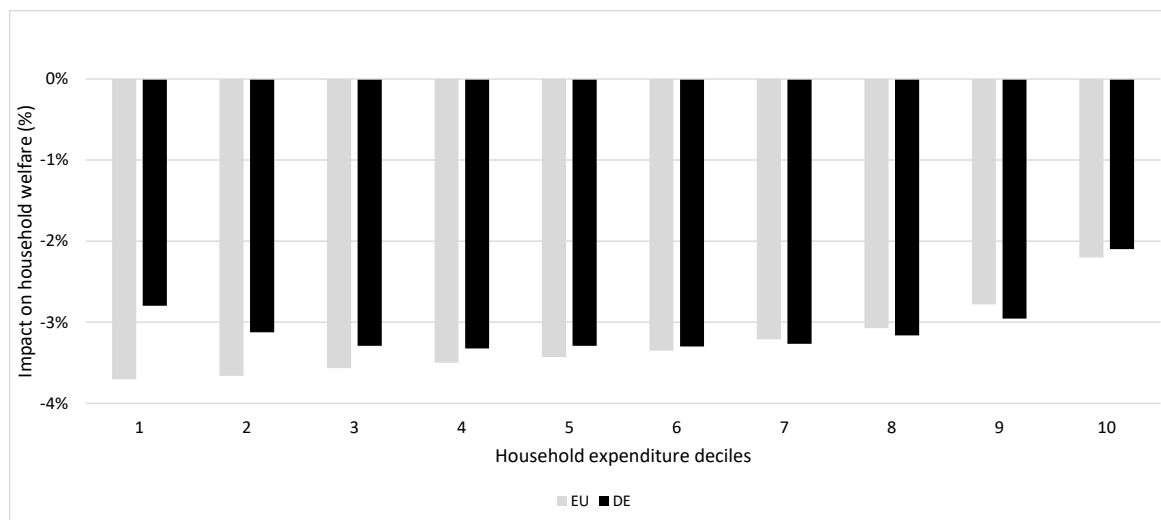


The graph illustrates the disparity in the evolution of energy costs across different household expenditure deciles within the EU and Germany. While the price shock was significant across all income groups, the effect in the EU was regressive, with households in lower income brackets experiencing the highest percentage increase in energy costs. This was not the case in Germany, however, where the percentage change in energy costs rose with higher income levels. The gap in energy cost changes between the EU and Germany narrows for higher income groups, eventually becoming almost identical for the wealthiest households (the highest decile).

What were the welfare impacts of 2022 energy price increases for German households?

Figure 3 illustrates the welfare impacts encountered by households across Europe and Germany due to the energy price spikes of 2022. These impacts are measured as a share of household expenditure. Each depicted decile corresponds to the average household of each European Union nation, reflecting the particularities of their respective income distributions. For instance, the first decile embodies the least affluent 10% of households from within each of the EU member states, such as Germany, Poland, Ireland, and so on.

Figure 3. Welfare impact of 2022 energy price increases by expenditure deciles (%) - EU vs DE



Unsurprisingly, following the surge in energy prices in 2022, the welfare impacts were negative across all income deciles. When examining the EU aggregates, it becomes evident that the adverse impacts were most severe for the poorest decile, which witnessed a welfare loss of 3.7%. These losses gradually diminish with higher income deciles, culminating in a 2.2% welfare loss for the wealthiest decile, representing the top 10% of households.

The German scenario, however, charts a different course. Much like the EU data, the wealthiest decile in Germany bears the least burden, experiencing a welfare loss of just over 2%. However, contrary to the EU trend, the greatest welfare loss in Germany is not experienced by the lowest income decile but by those households falling within the 3rd to 7th deciles, which all experienced a 3.3% welfare loss. The welfare loss of the least affluent decile stands at 2.8%.

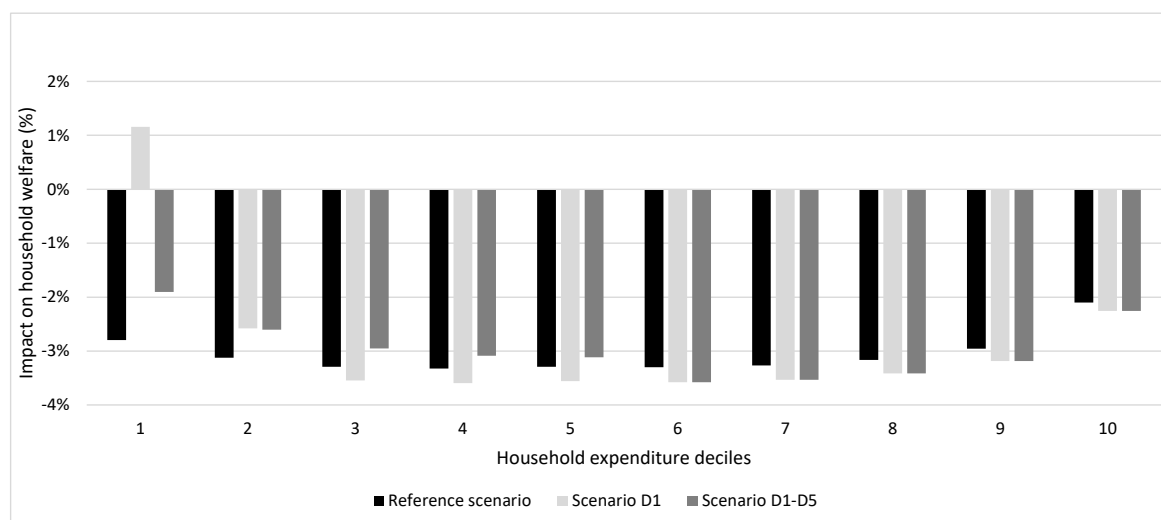
Interestingly, there is a marked leap between the 9th decile, experiencing a 3% welfare loss, and the 10th decile, at 2.1%. Upon comparing the welfare losses between the EU and Germany, the most glaring disparity appears in the lowest decile, where a 0.9% difference in welfare losses can be observed. Overall, the analysis illustrates how increases in energy prices have differentially impacted households depending on their income level and geographic location, highlighting the complex dynamics of economic welfare under changing market conditions.

3.3 Scenario analysis: alternatives to reducing excise taxes on vehicle fuels

What were the welfare impacts of 2022 energy price increases for German households and how would these impacts have been different under different redistribution scenarios related to fuel excise taxes?

Figure 4 provides a comparison of welfare impacts by expenditure deciles in Germany, measured in percentages. The comparison covers different scenarios – a reference scenario versus two alternative compensation scenarios that transfer direct compensation to poorer households. The purpose of this comparison is to investigate the welfare impacts of the 2022 energy price spikes on German households and to explore how these impacts could have potentially varied under different redistribution approaches.

Figure 4. Scenario-based comparison of welfare impacts by expenditure deciles (%) - reference scenario vs scenarios including direct compensation to poorer households



Two hypothetical scenarios are depicted in Figure 4. Scenario D1, titled "direct compensation to poorest households," envisages a policy that directly compensates the lowest-income households (bottom decile), utilizing a budget of the same size as the one allocated for reducing vehicle fuel excise taxes. Scenario D1-5, termed "direct compensation to poorer households" (bottom 50%), envisions a policy that directly compensates the less affluent half of households, again employing a budget comparable to the one used for reducing motor fuel excise taxes.

Focusing on the lowest decile, both alternative scenarios dramatically diminish the welfare loss experienced by the poorest 10% of households when compared to the reference scenario. Notably, scenario D1 even offers a positive welfare impact (+1.2%), revealing a progressive distributional effect. Similarly, for the second-lowest decile, welfare losses shrink under the alternative scenarios, albeit by a smaller margin – from 3.1% to 2.6%.

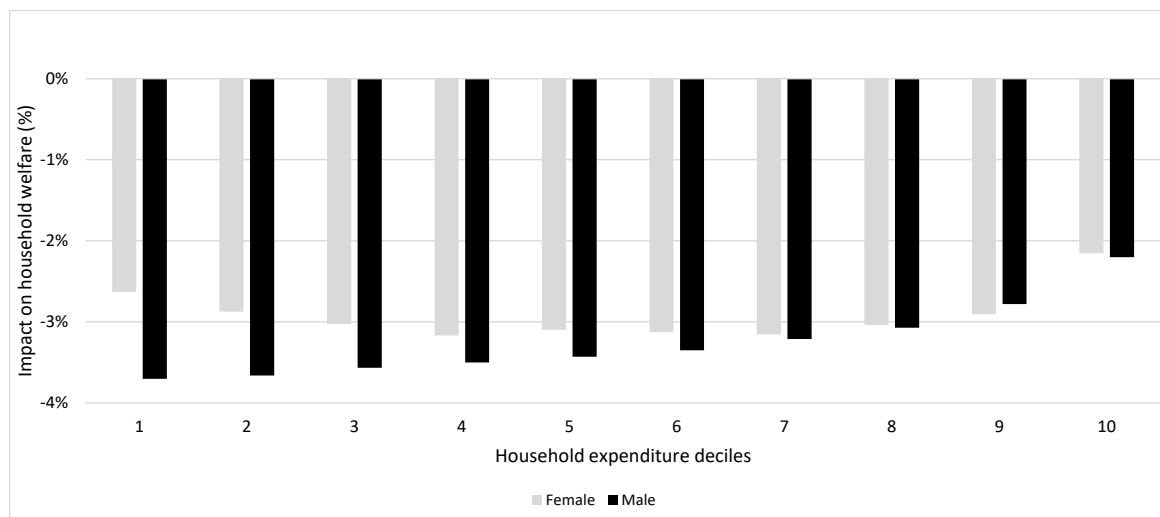
Predictably, households within the first to fifth deciles fare better under Scenario D1-5. On average, the welfare loss for deciles 3 to 5 decreases by 0.2%. As can be expected, under both alternative scenarios, households within deciles 6 to 10 experience a larger welfare loss relative to the reference scenario. This is because these households pay the full, unchanged excise tax on fuels but receive no direct compensation. Interestingly, for the highest income decile, the disparities among the various scenarios are minimal (0.2%). This suggests that the welfare impact for the wealthiest decile remains largely unaffected, regardless of the applied scenario. Overall, the two alternative scenarios indicate the progressive distributional effects of each of the direct-compensation policies.

3.4 Analyses by household type: gender and urban vs rural

Differences for female-headed and male-headed households

As described in the main EU-level paper (see Figure 1), mobility and energy use exhibit gender-specific traits, resulting in diverse consumption patterns. For instance, women face a higher risk of experiencing energy poverty due to pre-existing inequalities between men and women, such as the gender pension gap and gender pay gap. Additionally, women are more likely to be employed in low-paying sectors and part-time jobs. Consequently, female-headed households allocate a larger portion of their income to cover housing expenses. Caring responsibilities also contribute to higher energy consumption among women. For instance, spending more time at home and engaging in activities like cooking and bathing necessitate greater energy use. So, generally, women are disproportionately affected by escalating costs of home energy and electricity. However, when it comes to private mobility, there is also a notable gender difference. Women tend to rely more on public transportation and walking, while men tend to drive more. Additionally, women are less likely to own a car compared to men.

The gender-specific difference in mobility patterns is reflected in Figure 5, which shows the welfare impact of 2022 energy price increases by expenditure deciles (%) for female vs. male households. A 'female' household is understood as a female-headed household or a household where the reference person ('the main breadwinner') is a woman, and vice versa for a 'male' household. Non-binary genders are included in both data categories but not explicitly referenced.

Figure 5. Welfare impact of 2022 energy price increases by expenditure deciles (%) – female vs. male households

The results show that the difference between the two gender categories is most pronounced in the first decile, where male-headed households experienced a welfare loss of 3.7% and female-headed households a loss of 2.6%. The smallest difference can be observed for the richest 10%, where both genders had a loss of about 2.2%. The differences between male and female households are strongest for deciles 1 to 5 but gradually converge as the deciles increase.

The overall trend is that male households face a larger welfare loss than female households. This is in line with the empirical evidence mentioned above: because women are less likely to use a car, their share of household expenditure going to energy products is lower overall. One can assume that the difference between male and female households would have been even stronger without the reduced excise tax on fuels.

However, it is important to note that this trend is not the same across all Member States. As described in the main EU-level paper (see Figure 1), those where the energy price shocks were dominated by soaring electricity prices, like Italy or Belgium, are more affected than male households.

Differences for urban and rural households

Energy use in households tends to differ based on whether households are located in rural and urban areas. As also described in the main EU-level paper (see Figure 1), energy needs are higher in rural areas compared to densely populated urban areas, driven by differences in household heating and transport. Rural dwellings often tend to be larger and detached, thus requiring more energy for heating and cooling purposes. The so-called urban heat island effect, which drives elevated temperature in urban environments, can reduce the need for energy consumption related to heating. Energy use for transport is also higher in rural areas, driven by higher reliance on private motor vehicles in rural areas. Urban areas have more efficient transport alternatives, such as public transport, combined with shorter trip distances conducive to walking and cycling.

Figure 6. Welfare impact of 2022 energy price increases by expenditure deciles (%) – urban vs. rural households

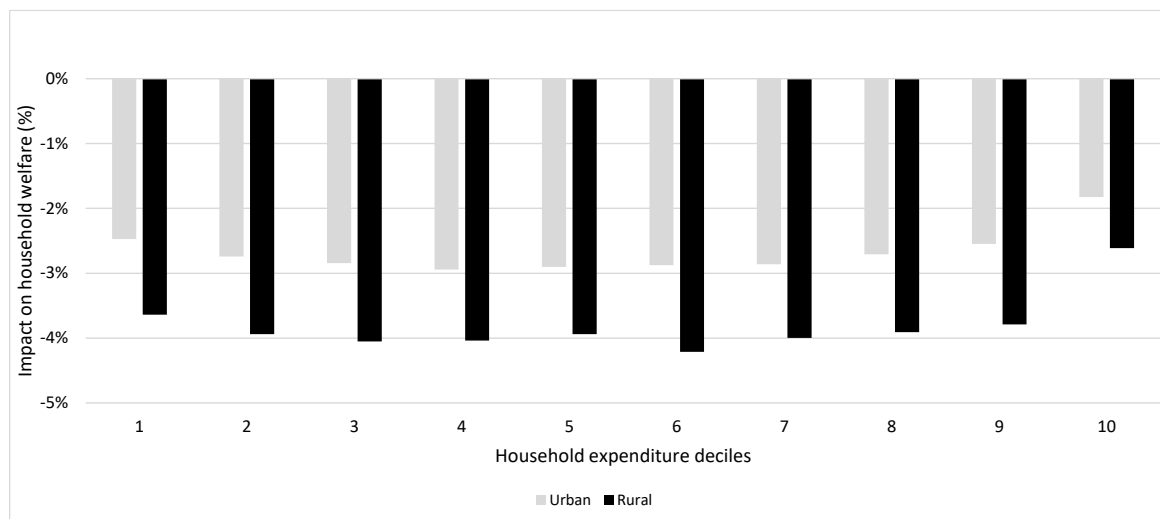


Figure 6 compares the welfare impacts under the reference scenario in Germany for urban vs. rural households. Across all income deciles, rural households consistently endured a more substantial negative welfare impact compared to their urban counterparts. This result is consistent with expectations, given the higher levels of average energy use in rural households. The divergence between the two groups varied somewhat, with a difference of 1.3% observed in the third, sixth, and ninth deciles, while the smallest difference of 0.8% emerged in the tenth decile. Specifically, in the lowest income decile, rural households experienced a welfare loss of 3.6%, whereas urban households experienced a less severe loss of 2.5%. Conversely, within the highest income decile, rural households encountered a welfare loss of 2.6%, while urban households faced a lesser impact, with a welfare loss of 1.8%.

4 Conclusion

As a response to the 2022 energy crisis, Germany passed three major relief packages in 2022, two in February and a third in September. The first package included tax-relief measures targeted at citizens with lower and middle incomes. The second package focused on direct-income support and measures to reduce transport costs. The third package contained a range of measures aimed at reducing energy costs and alleviating higher cost burdens on households.

Overall energy costs in Germany jumped by 31.0% in 2022 compared to 2021. Across all EU member states, energy costs were 33.2% higher. The microsimulation analysis behind this paper's findings shows that compared to a regressive welfare effect across EU member states as a whole, the welfare impacts seen in Germany, though negative for all income groups, hit middle-income households the hardest with welfare losses of 3.7%. Overall, the net effect of the price shock in Germany and the policy response of the German government resulted in average welfare losses of 2.9% in Germany, just below the EU member state average of 3.0%. Consistent with differences in energy-use patterns by household type, welfare losses were higher for rural households as well as male-headed households.

The scenario analysis of one German policy response (a decrease in the excise taxes on motor fuels) clearly shows that a targeted and temporary redistribution policy that transferred funds to vulnerable households could have yielded greater relief to poorer households than the policy path that was chosen.

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