

DIW Weekly Report

A policy bulletin from the German Institute for Economic Research

43⁺44 2024

Economy. Policy. Science.

DIW BERLIN



251 Report by Stefan Bach, Mark Hamburg, Simon Meemken, Marlene Merker, and Joris Pieper

Carbon pricing: Swift introduction of a climate dividend needed, reduce at higher incomes

- A climate dividend paid automatically to all residents can significantly mitigate carbon pricing burdens
- Low-income households with high energy consumption in particular require relief and additional subsidy programs
- The dividend should be reduced as a part of wage and income taxes for high-income earners

LEGAL AND EDITORIAL DETAILS



DIW Berlin — Deutsches Institut für Wirtschaftsforschung e. V.
Mohrenstraße 58, 10117 Berlin

www.diw.de

Phone: +49 30 897 89–0 Fax: –200

Volume 14 October 23, 2024

Publishers

Prof. Dr. Tomaso Duso; Sabine Fiedler; Prof. Marcel Fratzscher, Ph.D.;
Prof. Dr. Peter Haan; Prof. Dr. Claudia Kemfert; Prof. Dr. Alexander S. Kritikos;
Prof. Dr. Alexander Kriwoluzky; Prof. Karsten Neuhoff, Ph.D.;
Prof. Dr. Carsten Schröder; Prof. Dr. Katharina Wrohlich

Editors-in-chief

Prof. Dr. Pio Baake; Claudia Cohnen-Beck; Sebastian Kollmann;
Kristina van Deuverden

Reviewer

Dr. Wolf-Peter Schill

Editorial staff

Rebecca Buhner; Dr. Hella Engerer; Petra Jasper; Adam Mark Lederer;
Frederik Schulz-Greve; Sandra Tubik

Layout

Roman Wilhelm; Stefanie Reeg; Eva Kretschmer, DIW Berlin

Cover design

© imageBROKER / Steffen Diemer

Composition

Satz-Rechen-Zentrum Hartmann + Heenemann GmbH & Co. KG, Berlin

Subscribe to our DIW and/or Weekly Report Newsletter at

www.diw.de/newsletter_en

ISSN 2568-7697

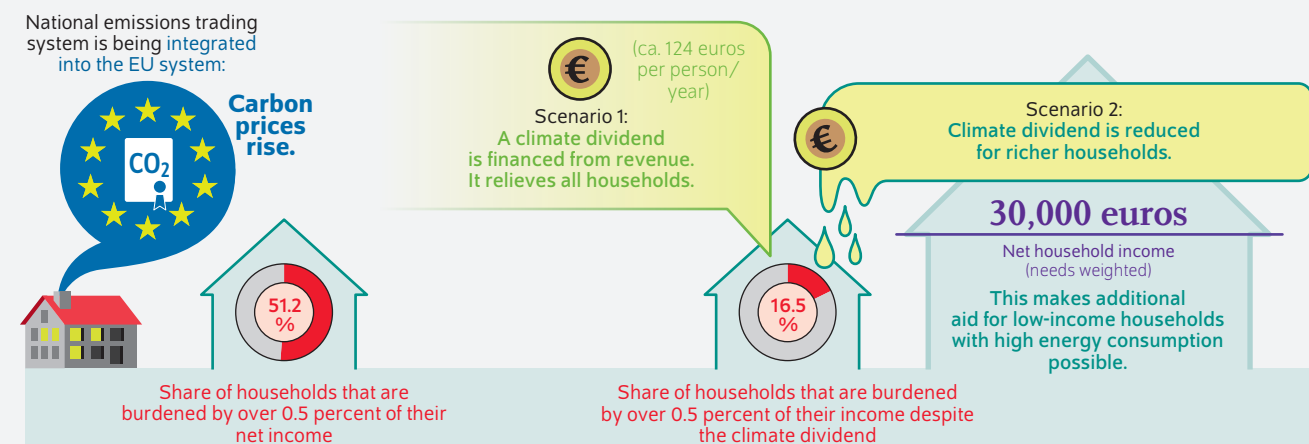
Reprint and further distribution—including excerpts—with complete
reference and consignment of a specimen copy to DIW Berlin's
Customer Service (kundenservice@diw.de) only.

Carbon pricing: Swift introduction of a climate dividend needed, reduce at higher incomes

By Stefan Bach, Mark Hamburg, Simon Meemken, Marlene Merker, and Joris Pieper

- Transition from German National Emissions Trading System to European Emissions Trading System from 2027 may increase carbon price considerably for motor and heating fuels
- A climate dividend automatically paid to all residents in Germany can significantly mitigate carbon pricing burdens
- A climate dividend relieves low-income households that are not sufficiently met by other measures
- Low-income households with high energy consumption require additional aid and subsidy programs
- To this end, the climate dividend should be reduced for higher-income earners as part of wage and income taxes

Reduce the climate dividend as a part of wage and income taxes to benefit low-income households with high energy consumption



Sources: SOEP v37; Federal Ministry of Finance; authors' calculations.

© DIW Berlin 2024

FROM THE AUTHORS

"A climate dividend paid to all residents automatically that supports low-income households with high energy consumption in particular could contribute to strengthening societal acceptance of noticeable carbon cost increases as well as social support for a more ambitious climate policy."

— Stefan Bach —

MEDIA



Audio Interview with Stefan Bach (in German)
www.diw.de/mediathek

Carbon pricing: Swift introduction of a climate dividend needed, reduce at higher incomes

By Stefan Bach, Mark Hamburg, Simon Meemken, Marlene Merker, and Joris Pieper

ABSTRACT

With the transition from the German national emissions trading system to the European Emissions Trading System (EU ETS2) from 2027, final consumer prices for fossil motor and heating fuels are likely to rise significantly. This increase will affect low-income households more noticeably, as they spend a larger share of their income on energy than high-income households. Existing relief measures, such as the basic income scheme, the housing benefit, and subsidy programs, only partially reach these groups. A climate dividend that is automatically paid out to all residents largely mitigates excessive effects of the carbon pricing burden. However, additional aid and subsidy programs are required due to the remaining burdens on vulnerable low-income households with high energy consumption. These programs could be financed if above-average and high-income earners did not receive the climate dividend. Carbon pricing does not affect these groups as much and they generally have more opportunities to reduce their fossil energy consumption. Thus, the climate dividend should be paid to all households, but reduced unbureaucratically as a part of wage and income taxes for above-average and high-income earners.

Carbon pricing is a key instrument to achieving climate targets in Germany and Europe. Since 2005, the European Emissions Trading System (EU-ETS1) has captured the carbon emissions of the energy industry, industrial processes, other large combustion plants, and aviation. In 2021, Germany introduced its national emissions trading system (national ETS) for fossil and heating fuels in the heating and transportation sectors. Currently, the carbon price is 45 euros per ton; by 2026, it will increase up to 65 euros per ton.¹

The European Emissions Trading System for fuels (EU-ETS2) will be introduced in 2027 and integrate the existing national ETS. Due to the strict European emission caps and, in some cases, little progress in decarbonization in Europe, it is expected that the carbon price for motor and heating fuels will rise significantly. According to studies, prices of 200 euros per ton are possible.² The effects on the end consumer prices expected for 2026 may therefore increase many times over.³

On average, low-income households spend a higher share of their net income on energy and transportation costs than above-average and high-income earners (Figure 1). Therefore, due to the rising carbon price, they have a greater burden relative to income than higher-income households. Carbon pricing, without other relief for household budgets, thus

1 If fully passed on, a carbon price of 65 euros per ton including VAT in 2026 results in a share of the final consumption price of 17.9 cents per liter for E10 and 20.5 cents per liter for diesel and heating oil each. It is 1.4 cents per kilowatt hour for natural gas. Authors' calculations based on standard heating values from the Energiebilanz and emission factors of the Federal Environment Agency (available online, accessed on October 7, 2024. This applies to all other online sources in this report unless stated otherwise).

2 European Commission, *Impact Assessment Report. Accompanying the document "Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757* (Brussels: European Commission, July 14, 2021) (available online); Wilfried Rickels et al., "Potential efficiency gains from the introduction of an emissions trading system for the buildings and road transport sectors in the European Union," Kiel Working Paper no. 2249 (2023) (available online); Matthias Kalkuhl et al., "CO₂-Bepreisung zur Erreichung der Klimaneutralität im Verkehrs- und Gebäudesektor: Investitionsanreize und Verteilungswirkungen," MCC Working Paper (in German; available online); Claudia Günther et al., "The Emerging Endgame: The EU ETS on the Road Towards Climate Neutrality," (2023) (available online).

3 If fully passed on, a carbon price of 200 euros per ton including VAT results in a share of the final consumption price of 55.1 cents per liter for E10 and 63.2 cents per liter for diesel and heating oil each. It is 4.4 cents per kilowatt hour for natural gas.

Box

Reducing the climate dividend for median income households as a part of wage and income taxes¹

As an income concept for reducing the climate dividend, we suggest the net income per person in the household, as long as it has been included in the wage and income tax base. This makes it possible to use a standardized reduction function that does not have to be differentiated by household or family type.

Net income per person can be sufficiently accurately derived from income tax return or wage tax information (Figure).

We suggest the following reduction function:

- Based on median needs-weighted net household income (median income): With the commonly used needs-scale (new OECD scale), this is estimated to be 30,000 euros per year per person in 2024, so 2,500 euros/month (SOEP 2020, extrapolated to 2024).
- The climate dividend is reduced linearly over a surrounding income interval of 10,000 euros relative to annual income, i.e., from 25,000 euros to 35,000 euros per year.²

This way, the climate dividend will be significantly reduced for the median income groups: The bottom 30 percent of the population will receive nearly the entire dividend, while it will be almost completely reduced for the top 30 percent (Figure 3).

The additional bureaucratic effort required to reduce the dividend is minimal. Taxpayers do not need to provide any additional information as only existing information from the taxation procedure is required. Implementation requires moderate one-off expenses estimated at 250 million euros for the tax authorities and employers in the context of wage tax procedures.³

¹ For more, see Footnote 6 of Bach et al., "Ausgestaltung einer Klimaprämie in Deutschland."

² Reducing the climate dividend over a wide income interval avoids the "fall-back effect" of a fixed income limit and keeps the transfer reduction rate of the reduction low. For example, for a climate dividend of 150 euros per year, this means a marginal burden on net income of 1.5 percent within the tax reduction interval. The marginal burden on gross income (i.e., before deduction of social security contributions and wage/income tax) increases by 0.8 to 0.9 percentage points.

³ These costs are incurred for the technical adjustment of the taxation procedures and the disclosure of the burden in tax assessments and payslips, as well as for increased communication costs following the introduction of the climate dividend.

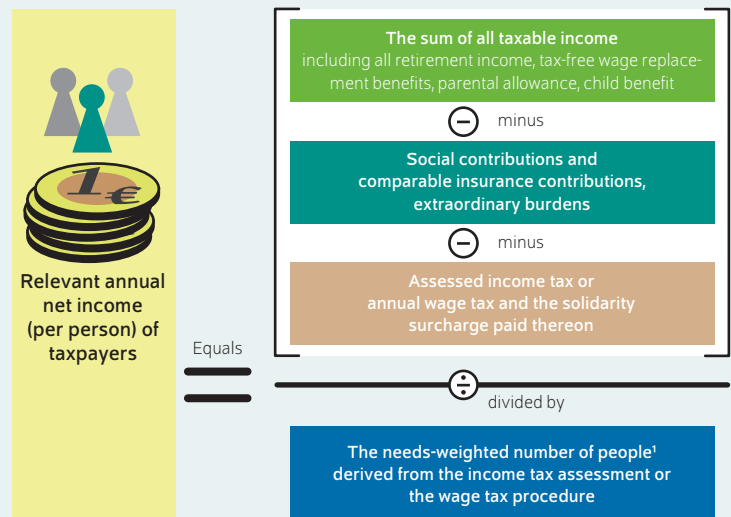
has a regressive effect—it makes the income distribution more unequal.

To offset the carbon burden and alleviate the associated social hardships, it makes sense to compensate households for the rising carbon costs in a general and unbureaucratic manner. To this end, the German Federal Government agreed to "develop a social compensation mechanism beyond the abolition of the EEG levy (climate money)" in its coalition agreement.⁴ Currently, the legal, administrative, and tech-

⁴ Dare more progress. Alliance for Freedom, Justice and Sustainability. Coalition Agreement 2021-2025 between the SPD, Bündnis 90/Die Grünen und FDP (2021) (available online).

Figure

Determining the relevant annual net income for the climate dividend reduction



¹ Taxpayers are weighted at 100 percent. Children, for whom a tax-free child allowance is taken into account, are weighted at 50 percent until they turn 18. Once 18, they are weighted at 100 percent.

Source: Authors' depiction.

© DIW Berlin 2024

Net income can be determined sufficiently accurately via the income tax assessment and wage tax procedure.

To avoid legal objections to taxing or reducing the climate dividend as a part of income taxation as well as effects on the federal fiscal equalization, the tax authorities could carry out the proposed procedures on behalf of the federal government. The additional revenue would then flow in full to the federal government, if necessary minus a reimbursement of administrative costs to the implementing tax authorities. This is unlike the case with income tax, where half of the additional revenue is paid to the federal states and municipalities.

nical requirements for paying a climate dividend automatically to all residents in Germany are being developed.⁵ Such a climate dividend would reduce the carbon pricing burden on the population as a whole, even overcompensating for it for many low-income earners. At the same time, it either does not or only marginally reduces incentives to save energy through the "income effect."

⁵ The German Federal Central Tax Office maintains a database of virtually all residents in Germany who have been assigned a tax ID (Steuer-ID). This database includes, in addition to personal identifiers, current or last known addresses. In cooperation with other government agencies and commercial banks, bank details or a valid IBAN are being assigned to all individuals registered in the database. Cf. Christian Ramthun, Bundesfinanzministerium kann 2025 das Klimageld auszahlen. Wirtschaftswoche, April 12, 2024 (in German; available online).

Table

Financial effects of carbon pricing for motor and heating fuels as well as relief in the form of social benefits and a climate dividend

In billions of euros

Sector	Households	Firms	Government (energy consumption)	Total	Government financial balance ¹
Carbon pricing revenue, other tax revenue, and social expenditure					
Carbon pricing revenue ²					
from unleaded gasoline	3.3	0.1	0.0	3.5	3.4
from diesel	2.3	4.1	0.1	6.5	6.4
from heating oil	1.7	0.5	0.3	2.5	2.2
from natural and liquefied gas	3.1	2.3	0.5	5.9	5.4
Total	10.4	7.0	0.9	18.3	17.5
Additional VAT revenue	1.8		0.2	1.9	1.8
Corporate income tax reduction		−1.6		−1.6	−1.6
Total government revenue	12.2	5.5	1.0	18.7	17.7
Additional expenditure on basic income scheme ³ and housing benefit ⁴	−1.0			−1.0	−1.0
Remaining government revenue	11.2	5.5	1.0	17.7	16.7
Flat-rate per capita climate dividend of 124.09 euros/year per person					
Scenario 1: Flat-rate climate dividend for the entire population					
Government expenditure on climate dividend ⁵	−9.5			−9.5	−9.5
Remaining government revenue	1.8	5.5	1.0	8.3	7.2
Scenario 2: Reduction of the flat-rate climate dividend					
Government expenditure on climate dividend ⁵	−9.5			−9.5	−9.5
Additional income tax revenue	5.2			5.2	5.2
Remaining government revenue	7.0	5.5	1.0	13.5	12.4

1 Total financial effects minus burden on government energy consumption.

2 Not including VAT. Energy consumption in 2024.

3 Basic income scheme coverage of heating costs.

4 Expenditure on the carbon and climate components of the housing benefit.

5 After offsetting against relief from basic income scheme and housing benefit.

Sources: Federal Ministry of Finance; Arbeitsgemeinschaft Energiebilanzen; Environmental Economic Accounting (Umweltökonomische Gesamtrechnungen, UGR); authors' calculations.

© DIW Berlin 2024

This Weekly Report is based on a study by DIW Berlin and the *Forum Ökologisch-Soziale Marktwirtschaft e.V. (FÖS)* on the possibilities and impact of a flat-rate per capita climate dividend.⁶ Concepts have been developed for reducing the dividend in which it is charged as a part of wage and income taxes for high-income households.

Limit the dividend to low and middle-income earners

A flat-rate per capita climate dividend for all residents would also relieve above-average and high-income earners. However, carbon pricing burdens these groups relative to their income considerably less and they generally have more opportunities for reducing their fossil energy consumption—opportunities that are generously supported by subsidy programs, which mostly have a strong regressive effect.

Therefore, it seems reasonable to concentrate the climate dividend on low and middle-income households and individuals. The funds saved by doing so can be used in a more targeted manner to relieve groups with above-average burdens or those experiencing particular hardship. Furthermore, according to European legal requirements, revenue from the EU-ETS2 may only be used for programs aimed at decreasing fossil energy consumption or leveling social disparities between low and middle-income households and higher-income households beginning in 2027.

Adjusting the climate dividend to recipients' income directly at the time of transfer would be too costly, as it would require an income assessment for all 84 million residents in Germany. Thus, we propose that the climate dividend be taxed retrospectively as part of wage and income tax procedures (Box), similar to the 2022 energy price flat rate (*Energiepreispauschale*). Instead of taxing the climate dividend at the existing income tax rate, we suggest a special tax rate function.⁷ For average net incomes, the climate dividend is

⁶ The study was conducted on behalf of the Federal Environment Agency (Umweltbundesamt, UBA). Stefan Bach et al., "Ausgestaltung einer Klimaprämie in Deutschland. Möglichkeiten und Wirkungen einer Staffelung nach Einkommen oder Regionen," *Climate Change* 45 (2024) (available online in German; forthcoming in November 2024). The responsibility for the content of the study lies with the authors.

⁷ Taxing the climate dividend at the applicable income tax rate like the 2022 energy price lump sum does not achieve the objective of low-income households receiving the entire dividend and the dividend being almost fully taxed for high-income households. Were the climate dividend to be taxed at the applicable income tax rate, it would be taxed at nearly 25 percent for full-time em-

reduced linearly over an income interval of 10,000 euros per year. This ensures that low-income households receive the full climate dividend, while it is reduced for high-income households. This indirect adjustment based on income can be integrated easily into existing taxation procedures without excessive bureaucracy.

Carbon pricing burdens poorer households more relative to household income

The revenue effects of carbon pricing as well as the relief for households are estimated based on current forecasts on energy consumption and overall economic development in 2024.⁸ We use a microsimulation model that is based on Socio-Economic Panel (SOEP) household data from 2020 to analyze the distributional effects. The data is coordinated with the macroeconomic information systems and extrapolated to the year 2024.⁹ The simulations assume that the carbon price is fully shifted to the final consumption prices of fuels and heating fuels. The effects of the European Emissions Trading System (EU-ETS1) are not observed. Economic effects of the reform scenarios investigated, especially energy consumption savings, are not considered in the simulation calculations. The carbon cost allocation for heating rented buildings, which divides the heating costs between landlords and tenants according to a graduated model, is also not taken into account.¹⁰

The following is based on a carbon price of 65 euros per ton, which is the upper price limit in 2026 under the existing regulations. Based on the estimated energy consumption for 2024, revenue from the German national ETS will total 18.3 billion euros (Table), not including an additional 1.9 billion euros in VAT revenue.¹¹ Corporate tax revenue fell by 1.6 billion euros, as the scenarios considered here do not provide any relief for firms; thus, higher energy prices

employees earning minimum wage due to the rapid increase in the marginal tax rate for low-income earners. The dividend would be taxed at a maximum of 42 percent (44.3 percent including the solidarity surcharge) for above-average and high-income earners in the top income deciles and at 45 percent (47.5 percent including the solidarity surcharge) for very high-income households (278,000 euros taxable income or more per year). This means that even top earners and the super rich may keep up to over half of the climate dividend.

8 We use data from the *Energiebilanz*, environmental-economic accounting (Umweltökonomische Gesamtrechnungen, UGR), energy tax statistics up to 2022, the official May 2024 tax estimate on energy and electricity taxes until 2028, der national accounts up to 2023, and the Spring 2024 Joint Economic Forecast.

9 We use data from the 2020 SOEP survey wave (v37), in which detailed information on energy consumption was collected. For more on the methods, see Stefan Bach and Jakob Knautz, "Hohe Energiepreise: Ärmere Haushalte werden trotz Entlastungspaketen stärker belastet als reichere Haushalte," *DIW Wochenbericht* no. 17 (2022) (in German; available online); Isabel Schrems et al., "Wirkung des nationalen Brennstoffemissionshandels – Auswertungen und Analysen. Grundlagen für den ersten Erfahrungsbericht der Bundesregierung gemäß § 23 BEHG im Jahr 2022," *Climate Change* 45 (2022) (in German; available online).

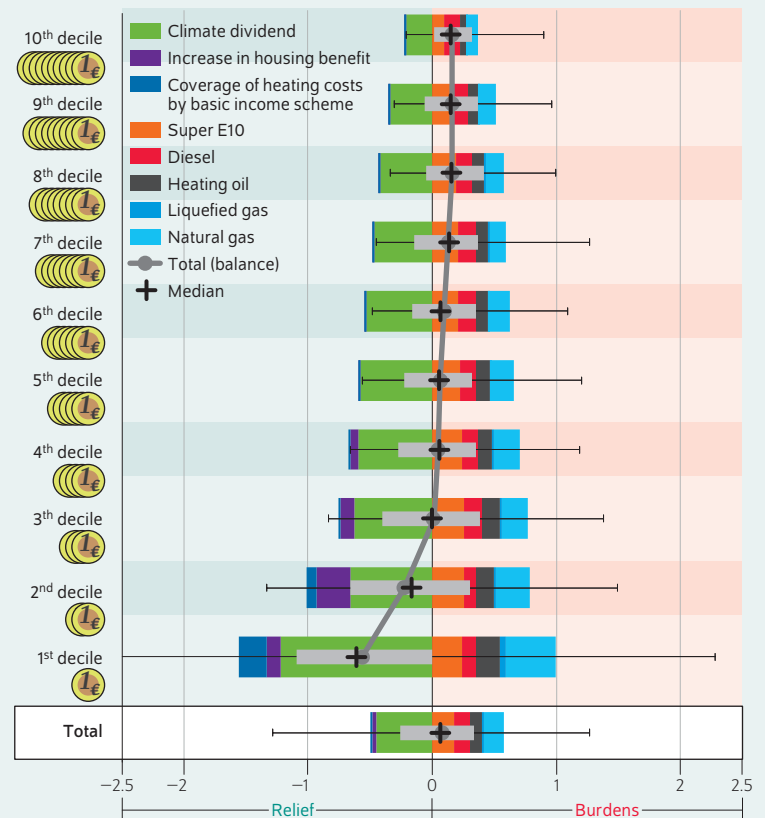
10 To the extent that this is actually implemented in rental agreements and landlords do not react with rent increases, the distribution effects shown slightly overestimate the burdens in the lower income range. At the same time, the income of landlords, who are primarily located in the two upper income deciles, will fall.

11 In addition to fully passing on the carbon price to the end consumer, we assume that the higher energy costs are not offset by savings in other areas. This is plausible in the case of households due to the relief provided by the climate dividend, basic income scheme, and housing benefit, which increase the real income of low-income households on balance.

Figure 1

Burdens (+) and relief (–) of households due to the national emissions trading system and social benefits, 2026:¹ Scenario with a climate dividend

In percent of net household income; by deciles of needs-weighted net household income²



1 Including VAT. Energy consumption and income extrapolated to 2024.

2 Needs-weighted with the new OECD scale, relative to the population in private households.

Notes: Scenario with a climate dividend of 124.09 euros. For the total: Box plot: 25th to 75th percentile. Box and whisker plot: 2.5th percentile to 97.5th percentile. +: Median, 50th percentile.

Sources: Microsimulation analyses with the Socio-Economic Panel (SOEP), v37.

© DIW Berlin 2024

Carbon pricing for motor and heating fuels has a regressive effect: Low-income households have a greater burden relative to their income compared to high-income households.

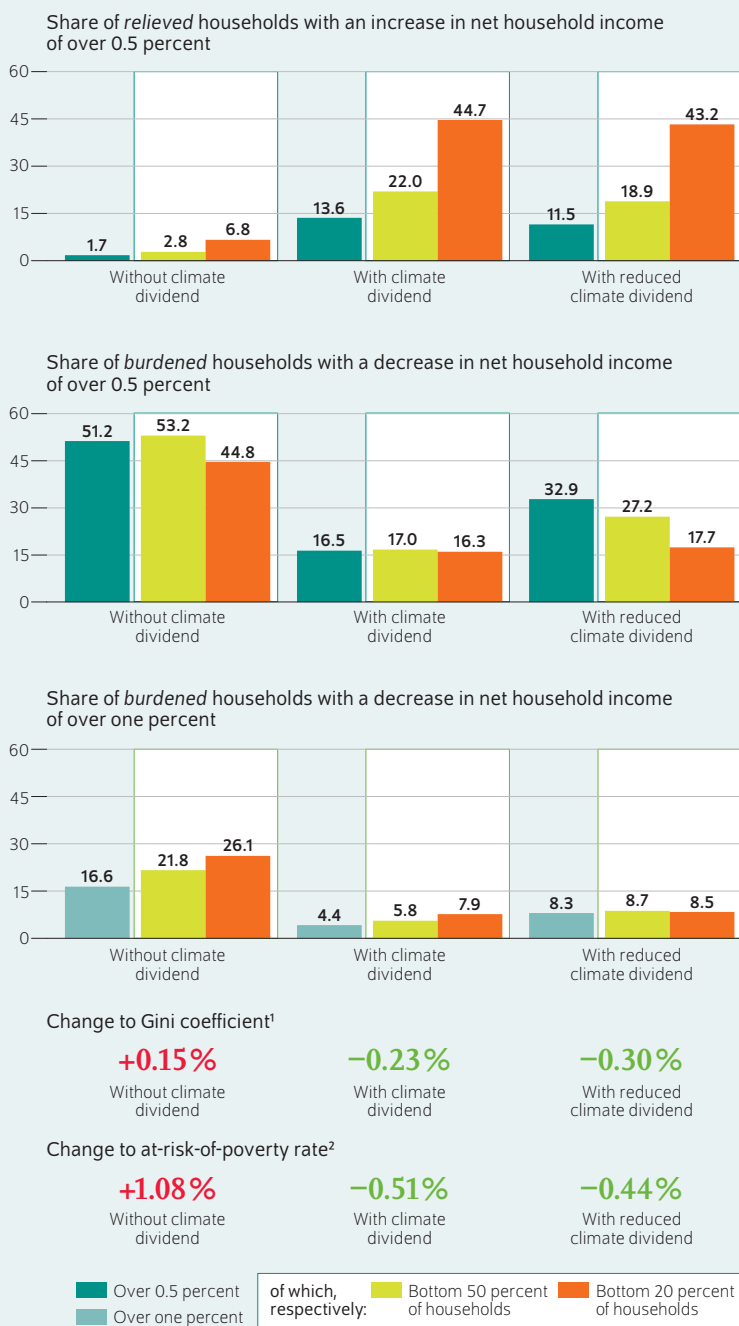
reduce corporate profits.¹² Overall, this results in additional revenue of 18.7 billion euros for the government. Taking VAT into account, households will be burdened in the amount of 12.2 billion euros. The public sector pays itself 1.0 billion euros for its own energy consumption. Government financial balance will increase by 17.7 billion euros, which is 0.42 percent of gross domestic product (GDP) in 2024.

12 This fails to consider that companies can increase their selling prices, especially for products that do not have international competition. In this respect, companies pass on some of the burdens they face to households.

Figure 2

Share of households with higher relief and burdens due to carbon pricing of motor and heating fuels as well as social benefits and a climate dividend

In percent



1 Needs-weighted net household income. Needs weighted with the new OECD scale. Reference scenario: 0.29.

2 Share of population with less than 60 percent of the median needs-weighted net household income. Needs weighted with the new OECD scale. Reference scenario: 16.5 percent of households.

Notes: Scenario with a climate dividend of 124.09 euros. For the total: Box plot: 25th to 75th percentile. Box and whisker plot: 2.5th percentile to 97.5th percentile. +: Median, 50th percentile.

Sources: Microsimulation analyses with the Socio-Economic Panel (SOEP), v37.

© DIW Berlin 2024

Despite the climate dividend, 16.3 percent of low-income households (bottom 20 percent) have a burden of over 0.5 percent of their net income on balance. Without the climate dividend, the share rises to 44.8 percent of low-income households.

The burden and relief effects of carbon pricing as well as the higher social transfers and climate dividend are expressed as a percentage of 2024 net household income, broken down by deciles of equivalence-weighted household net income (Figure 1).¹³ Therefore, the relative income effects are shown which are decisive for the effects on income distribution.

The simulations reveal the familiar picture of a regressive carbon pricing impact on motor and heating fuels. There is a considerably greater burden on low-income households relative to their income than on high-income households. For heating fuels (heating oil, natural gas, and liquefied gas), the regressive effect of carbon pricing is significant, while it is much smaller for premium grade gas and nearly proportional for diesel.

These distributional effects will become accordingly stronger if the carbon price reaches levels of 100+ euros per ton from 2027 in the EU-ETS2. The actual distributional effects may be even more severe, as poorer households frequently have fewer opportunities to react to high energy prices. In contrast, rich households are increasingly performing energy-efficient refurbishment on their homes, installing new heating systems, or purchasing electric vehicles.

Flat-rate per capita climate dividend relieves low-income earners

The simulations first account for the coverage of higher heating costs due to carbon pricing as a part of the basic income scheme as well as the carbon and climate components of the 2021 and 2023 housing benefit reforms as relief for households.¹⁴ To do so, we use a micro simulation model to estimate a relief volume of 1.0 billion euros in 2024. The remaining government revenue from carbon pricing that is available for compensation declines accordingly.

As additional relief, we simulate a flat-rate per capita climate dividend that is paid to all residents in Germany. We assume that the amount of the climate dividend is calculated based on carbon pricing revenue from households, excluding VAT revenue, which is estimated to be 10.4 billion euros (Table). With 84 million residents, this results in a climate dividend of 124.09 euros per person per year.

To avoid double subsidies, coverage of high heating costs via the basic income scheme and the increase in the housing benefit are offset against the climate dividend. This results in net costs of 9.5 billion euros for the dividend, which reduces the general government financial balance to 7.2 billion euros. Of this, households are burdened in the amount of nearly

¹³ To make the income situations of households of different sizes and with different compositions comparable, a needs-adjusted per capita net income (equivalized income) according to the new OECD scale is determined for each household member. See the entry for equivalized income in the DIW Berlin Glossary (in German; available online). Then the population is divided into ten groups of equal sized based on their income (deciles).

¹⁴ Bundesregierung, *Mehr Wohngeld für zwei Millionen Haushalte* (2023) (in German; available online).

two billion euros (Table). These funds are available for public spending programs or tax cuts that are not considered here further.

A climate dividend of 124.09 euros per person per year as well as the coverage of heating costs and increase in the housing benefit almost completely offset the carbon pricing burden, including VAT, on average, for households as a whole (Figure 1). The climate dividend counteracts and reverses the regressive burden of carbon pricing. Low-income earners benefit from this considerably on average, as the flat-rate climate dividend is much higher relative to their income than for above-average or high-income earners. In addition, many low-income earners have their heating costs covered by the basic income scheme and the housing benefit has been increased, which is partially offset against the climate dividend here. The increase in the housing benefit will make itself more noticeable in the second and third deciles, as the housing benefit mainly favors “top-ups” (low-income individuals also receiving the citizen’s benefit) and extends into the lower middle classes.

On balance, i.e., taking into account the carbon pricing burden and the relief provided by the climate dividend and social benefits, households in the lowest decile will be relieved by just under 0.6 percent of their net income on average. The relief and burdens balance each other out for middle-income earners, while the top 30 percent of households have a marginal burden of nearly 0.2 percent of their net income. Overall, the combination of carbon pricing and a flat-rate dividend reduce income inequality slightly. The Gini coefficient¹⁵ of the needs-weighted net household income, the standard measure of income inequality, declines marginally by 0.23 percent (Figure 2). The at-risk-of-poverty rate, i.e., the share of the population whose income is less than 60 percent of the median needs-weighted net disposable household income, fell slightly from 16.7 to 16.6 percent.

Climate dividend cannot prevent hardship cases

The analyses show a significant spread of net burdens around the mean, which is depicted using box-and-whisker plots (Figure 2).¹⁶ This spread arises due to the considerable heterogeneity of the households within the income groups in terms of energy consumption. In the two bottom income deciles, which are especially relevant to social and distributional policy, most households are relieved on balance due to

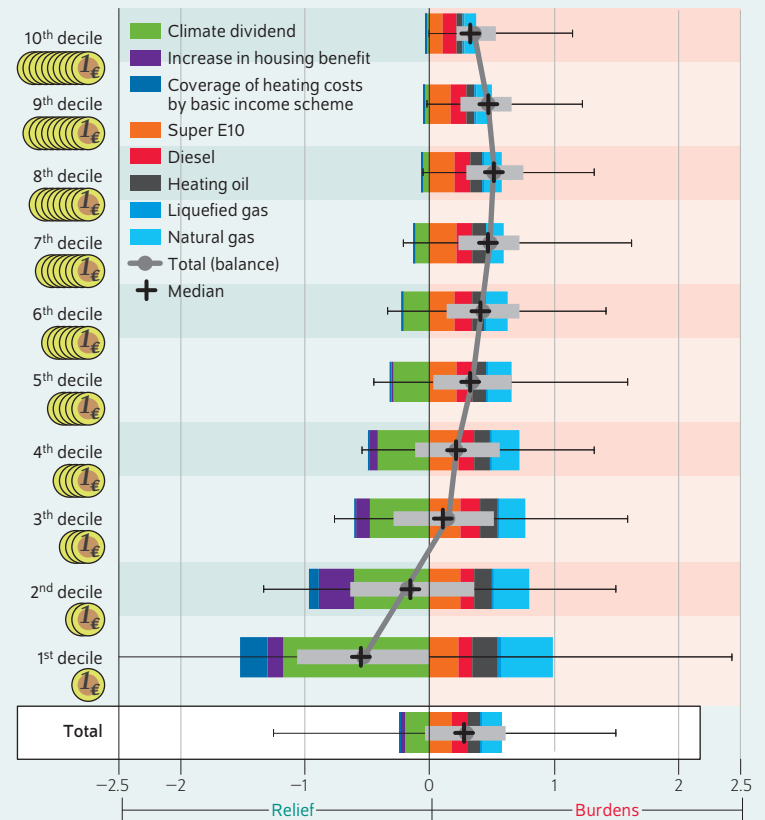
¹⁵ The Gini coefficient is a statistical standard measure of inequality of a distribution. It is most frequently used to determine income and wealth inequality and can take a value between 0 and 1. The higher the value between 0 and 1, the higher the measured inequality. For more information, see the DIW Berlin Glossary (in German; available online).

¹⁶ The box plots show the 25th percentile for the lower border and the 75th percentile for the upper border of the net burden, in line with the usual presentation in the literature (cf. the Wikipedia entry on box plots, available online). Thus, half of the respective group is within the bottom and upper borders of the box plot with their net burden. Similarly, the whiskers indicate the net burden for the 2.5th percentile and the 97.5th percentile, so that 95 percent of the respective groups are within this net burden. Furthermore, the 50th percentile is indicated, the net burden of the median household that is exactly in the middle of the distribution; half of each group has higher or lower net burdens.

Figure 3

Burdens (+) and relief (-) of private households due to the national emissions trading system and social benefits, 2026:¹ Scenario with a reduced climate dividend

In percent of net household income; by deciles of needs-weighted net household income²



1 Including VAT. Energy consumption and income extrapolated to 2024.

2 Needs-weighted with the new OECD scale, relative to the population in private households.

Notes: Scenario with a climate dividend of 124.09 euros, reduced for middle-income households. For the total: Box plot: 25th to 75th percentile. Box and whisker plot: 2.5th percentile to 97.5th percentile. +: Median, 50th percentile.

Sources: Microsimulation analyses with the Socio-Economic Panel (SOEP), v37.

© DIW Berlin 2024

The bottom 30 percent of the population would receive the full climate dividend, while it would be reduced to almost zero for the top 30 percent.

higher social transfers and the climate dividend (Figure 1). There are also numerous “losers” in this group: Sixteen percent of households have a burden of over 0.5 percent of their net income on balance despite the climate dividend, eight percent of households a burden of over one percent. This suggests there are hardship cases who require further aid beyond a flat-rate climate dividend—especially low-income households with high energy consumption. This group tends to have fewer opportunities to improve the energy efficiency of their home or vehicles, as they are more frequently renters or cannot easily finance investments in

environmentally-friendly homes and vehicles.¹⁷ Furthermore, it is generally difficult for them to compensate for the additional burdens by saving more, liquidating assets, or going into debt. This emphasizes the need for additional subsidy programs that are tailored specifically to vulnerable households.

If the climate dividend were not paid, over half of households would be burdened by more than 0.5 percent of their net income. This would be 45 percent for the bottom two income deciles. Nearly 17 percent of households overall and 26 percent in the bottom two income deciles lose over one percent of their net income. This emphasizes the significance of a climate dividend paid to all residents automatically, especially if the carbon price increases considerably and the share of the “losers” continues to increase.¹⁸ Although these groups are eligible, they often do not take advantage of the housing benefit or heating cost coverage via the basic income scheme due to a lack of information and bureaucratic application procedures.¹⁹ This applies to subsidy programs for decarbonization in particular.

Reducing climate dividend reduces fiscal cost

By reducing the climate dividend, half of the expenditure will flow back into the public budget through additional income tax revenue. Government financial balance from the reform increases to 12.4 billion euros per year (Table). Additional funds in the amount of 5.2 billion euros per year are available. These funds may be used for subsidy programs, such as ones that are tailored specifically to vulnerable households. On average, households overall are burdened in the amount of a good 0.3 percent of their net income. The climate dividend is noticeably reduced beginning from the fourth income decile.

The reduction in the climate dividend strengthens the regressive effect of the reform on higher incomes (Figure 3). In contrast, the climate dividend is not reduced or only minimally reduced for the lower and middle-income groups.

In these groups, the number of hardship cases with larger burdens increases only slightly (Figure 1). The Gini coefficient for income inequality declines minimally more than without the reduction (Table).

Conclusion: Climate dividend urgently needed, especially for low-income households

Carbon pricing for fossil and heating fuels is a key instrument for achieving German and European climate targets. Without a broad redistribution of revenue from carbon pricing to households, it has a regressive effect on the income distribution because it burdens low-income households relative to their income more than above-average and high-income earners.

If there is a considerable increase in carbon pricing, which is expected during the transition to the EU-ETS2, the introduction of a climate dividend will be all the more urgent, at least for low-income households. After all, many low-income households do not have their heating costs covered by the basic income scheme or do not receive the housing benefit despite being eligible due to a lack of information and bureaucratic application procedures. The same applies to subsidy programs for decarbonization.

Paying a climate dividend to the entire population entails a high fiscal burden for which there is not yet leeway in the Climate and Transformation Fund (KTF). This would require funding programs to be cut funds to be made available from the federal budget.

A flat-rate per capita climate dividend paid to all residents would also relieve above-average and high-income earners. These groups are less strongly affected by carbon pricing and generally have more opportunities to reduce their fossil fuel energy consumption. These opportunities are supported generously by subsidy programs, which also mostly have a strongly regressive effect. Therefore, it makes sense to concentrate the climate dividend on low and middle-income households in the long term, so long as it is technically and politically feasible.

Since determining each resident's income and adjusting the climate dividend individually per person would be too time consuming, taxing the climate dividend is a good option, as it can be done so unbureaucratically. The application of a specific tax rate function makes it possible for lower and middle-income households to receive the full climate dividend while it is reduced significantly for higher-income households.

The funds freed up this way can be used for additional aid and support programs for decarbonization, especially for “vulnerable” households with low incomes and higher energy consumption. This could contribute to increasing societal acceptance for noticeable carbon cost increases as well as societal support for an ambitious climate policy.

¹⁷ Cf. Katja Schumacher, Christian Nissen, and Sibylle Braungardt, “Energetische Sanierung schützt Verbraucher*innen vor hohen Energiepreisen—Vorschläge für eine soziale Ausrichtung der Förderung: Energetische Sanierung schützt Verbraucher*innen vor hohen Energiepreisen—Vorschläge für eine Sanierungskosten und Förderbedarf für vulnerable Hauseigentümer*innen,” (2022) (in German; available online); Johanna Cludius, Viktoria Noka, Hannah Galster, and Katja Schumacher, “Wie wohnt Deutschland? Wohnsituation, Wohnkosten und Wohnkostenbelastungen von Haushalten in Deutschland (2022) (in German; available online); Sophie M. Behr et al., “Sanierung sehr ineffizienter Gebäude sichert hohe Heizkostenrisiken ab,” *DIW Wochenbericht* no. 19 (2024) (in German; available online).

¹⁸ A scenario with a carbon price of 200 euros per ton is also simulated in the Bach et al. study that this Weekly Report is based on.

¹⁹ Studies estimate that over one third of individuals potentially eligible for unemployment benefit II or the citizen's benefit do not claim it, and 60 percent of people entitled to basic income support in old age do not claim it. See Hermann Buslei et al., “Starke Nichtinanspruchnahme von Grundsicherung deutet auf hohe verdeckte Altersarmut,” *DIW Wochenbericht* no. 49 (in German; available online); Jennifer Eckhardt, “Von wegen Hängematte: Zur Unzugänglichkeit von Sozialleistungen,” *WSI-Blog Work on Progress, Teil 3* (2024) (in German; available online). This is likely to be the case for “top-ups” (employed low-income individuals also receiving the citizen's benefit) in particular, who have a low entitlement to benefits due to their income).

CLIMATE DIVIDEND

Stefan Bach is a Research Associate in the Public Economics Department at DIW Berlin | sbach@diw.de

Mark Hamburg was a Student Research Assistant at DIW Berlin

Simon Meemken is a Research Officer at the *Forum Ökologisch-Soziale Marktwirtschaft (FÖS)* | simon.meemken@foes.de

Marlene Merker was a Student Research Assistant at DIW Berlin

Joris Pieper is a Student Research Assistant at DIW Berlin | [jpieper@diw](mailto:jpieper@diw.de)

JEL: Q41, D31, H23

Keywords: carbon pricing, climate dividend, redistribution