Policy Briefing
August 2022

Carbon Pricing And The Cost Of Living Crisis

A report from Citizens' Climate Lobby UK

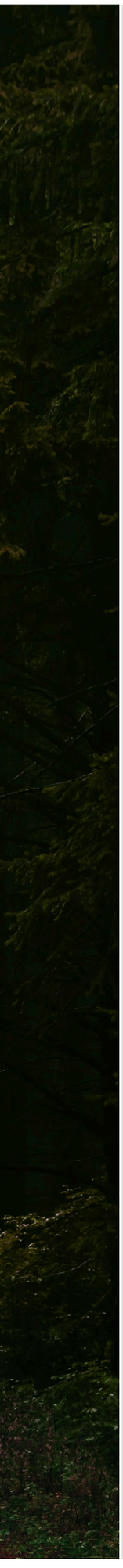
Citizens' Climate Lobby UK
"Building political will for a liveable world."

Citizens' Climate Lobby

How carbon pricing can combat fuel poverty:

AN ANALYSIS

Citizens' Climate Lobby UK Policy



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About CCL-UK and our policies

As a grassroots organisation, Citizens' Climate Lobby UK (CCL-UK) is well placed to help promote the environmental, social and economic benefits of carbon pricing.

Climate Income: A Universal Dividend

CCL is ideally positioned to accelerate the politically-sustainable introduction of Climate Income.

Citizens' Climate Lobby (CCL) originated in 2007 in the US and is now a worldwide civil society organisation with around 200 000 volunteer members. Our focus is on people-friendly carbon pricing, i.e. tackling climate change by making the polluter pay whilst protecting those least able to afford the resulting price rises for high-carbon goods.

We therefore advocate, worldwide, for **Climate Income.**[1] Climate Income is a universal dividend generated using a carbon fee levied on fossil fuels as they enter the economy. This transforms regressive carbon taxes into a progressive **carbon fee and dividend** scheme with most families benefiting financially overall. However, carbon leakage is a major problem for any carbon pricing scheme which therefore requires additional measures such as a **carbon border adjustment.**

Citizens' Climate Lobby UK Policy Team

1. Citizens Climate Lobby UK, 2022.

BROAD SUPPORT

This policy is supported by the left-leaning Green Party, the right-leaning **Centre for Policy Studies** [2] and by **28 Nobel Prize-winning economists.** [3]

WELL REPORTED BY MEDIA

Climate Income has also been sympathetically reported in newspapers ranging from **The Telegraph** [4] to **The Guardian.** [5]

RECOGNISED BY THE GOVERNMENT

Any policy with support this broad must have merit, as recognized by the UK government itself in its 2020 **response to the consultation on 'The future of UK carbon pricing'.** [6]

2. Centre for Policy Studies, 2021
3. Climate Leadership Council, 2019
4. The Telegraph, 10th February 2021
5. The Guardian, 4th December 2018
6. HM Government, 2020

Introduction

Tackling both climate change and fuel poverty

In this report, we discuss how to tackle the ongoing cost of living crisis through a fully-funded policy that will also encourage industry and consumers to switch to low-carbon products.

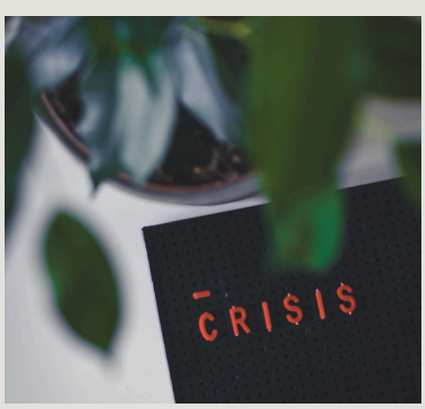
In other words, we show how to simultaneously tackle fuel poverty and climate change at no cost to the Treasury.

Unprecedented price increases are making energy unaffordable for many. In response, the UK government has subsidised household bills and cut council tax with the costs funded from general taxation, borrowing and windfall taxes on energy companies.

However, the cost of living crisis is unlikely to be short-lived and, even before the current crisis, too many households were already suffering fuel poverty. Furthermore, fuel poverty is more prevalent in some parts of the country than others and, hence, is an important component of regional inequalities. A more permanent solution is required that can alleviate fuel poverty and contribute to "levelling up" every year, not just this year.

At the same time, the UK government's Climate Change Committee has repeatedly expressed concerns that we are not on track to hit our legally enforced emission reduction targets. Excellent progress has been made in reducing emissions from electricity generation and plans are well advanced for cutting industrial emissions, but further action is required in transport, space heating and many other areas.

In this report, CCL-UK shows that revenue from taxing carbon emissions – to encourage more rapid reductions – can be used to alleviate fuel poverty. It may seem countterintuitive to use a tax on energy to reduce fuel poverty but the numbers stack up. A properly designed carbon tax plus energy bills support system ensures that less-affluent households receive more than they pay out in increased prices. Furthermore, it does so without committing the Treasury to unfunded expenditures.



This report demonstrates that financial support to households to pay their energy bills, at levels similar to 2022, can be funded by carbon prices widely regarded as necessary for reducing greenhouse gas emissions. Hence energy bills support, funded by a carbon tax, is a long-term approach to tackling both fuel poverty and climate change.

In depth

A look inside fuel poverty in the UK and how it relates to climate change.

Fuel poverty

Fuel poverty occurs when households spend more than 10% of their disposable income on energy for their homes.

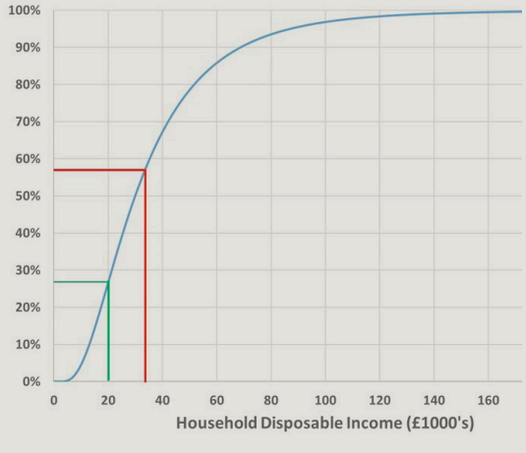
The calculations in this report are based on household disposable income, i.e. all income in a household after direct taxes. **The Office for National Statistics (ONS)** [7] quotes the average and median household disposable income, in the UK in 2020, as £36 900 and £29 900, respectively. These numbers (and an assumed log-normal distribution) lead to the income distribution shown in Figure 1.

Throughout this report, we take the widely used criterion that fuel poverty occurs when households spend more than 10% of their disposable income on energy for their homes. At the time of writing, the "price cap" of typical energy bills is around £2000 per year implying that households will be in fuel poverty if their disposable income is less than £20 000 per year. Figure 1 then shows that about 27% of households are currently in fuel poverty (green lines).

However, it is widely expected that the price-cap will be raised to at least £3 300 in the Spring of 2023 so that the income threshold for fuel poverty will also rise, to £33 000. From Figure 1 it can then be seen that 56% of households will be in fuel poverty (red lines).

Figure 1 can also be used to estimate the number of families that will escape fuel poverty as a consequence of government subsidies. For example, a total subsidy of £500 per year would bring typical spring bills down to £2 800 per year, with a corresponding fuel poverty threshold at an income of £28 000 per year (i.e. ~46% of households). Hence, the subsidy reduces the proportion of households in fuel poverty by about 20%. There are 28 million households in the UK **(ONS, 2021)** [8] and a £500 payment from government to each household would prevent almost 3 million households from becoming fuel-poor.

Figure 1 (right). UK household disposable income distribution in 2020. The graph shows a "cumulative distribution" so that, for example, 27% of households earn less than £20 000 per year (green line) whilst 56% earn less than around £33 000 (red line).



7. Office for National Statistics, Data and analysis from Census 2021

8. Office for National Statistics, Data and analysis from Census 2021

Increased food and fuel prices

Limited wage increases

Decreasing ‘real’ disposable income

Keeping warm - cost of living crisis

Fuel poverty

Cost of living crisis

Energy prices for heating homes have increased sharply since 2021. Alongside limited wages growth this has lead to a decrease in disposable income in real terms. Carbon pricing presents a way to approach the cost of living crisis by taxing carbon inputs and redistributing the funds to all households. Most households will be better off, especially the most vulnerable.

UK cost of living crisis

Carbon pricing

Lower-emission versions of goods and services would gain a competitive advantage.

The UK already has carbon pricing in the form of an **Emissions Trading Scheme (ETS).** [9] However, this only applies to large emitters, such as power stations and cement manufacturers, and therefore only covers 40% of UK emissions.

CCL-UK advocates for a more broadly based carbon price implemented through a levy on coal, oil and gas as they are imported into (or extracted within) the UK. The resulting price increases would then be passed down the value chain so that all goods and services would have a price increase that reflects their embedded emissions. Consequently, lower-emission versions of goods and services would gain a competitive advantage leading to steady and permanent reductions in total, national emissions.

An undesirable side effect of such a policy is that imports from overseas will outcompete UK businesses if imports have not been subjected to a similar carbon price in their

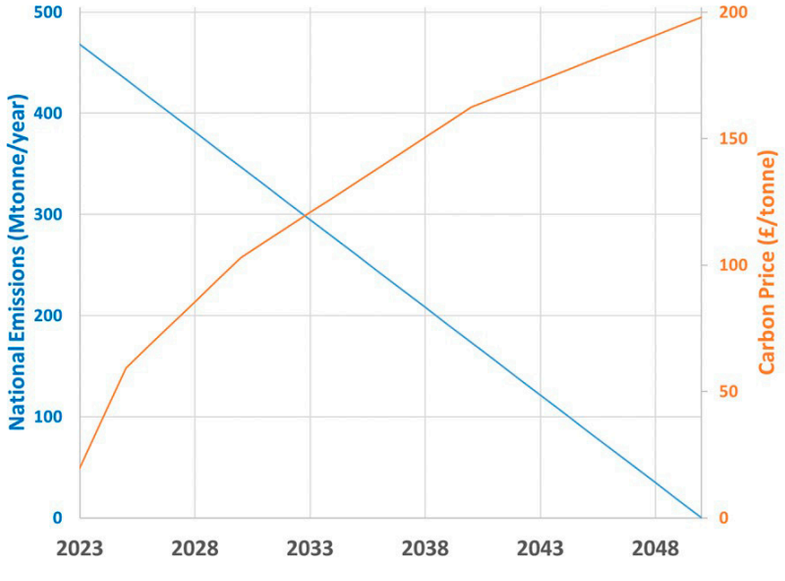


Figure 2 (above). The scenario assumed in this report. Net emissions decline to zero by 2050 (in line with government policy) whilst the carbon price follows the IEA's Net Zero Emissions by 2050 scenario.

In-depth analysis

9. Department for Business, Energy and Industrial Strategy, 2022

Treasury income increases, empowering the government to tackle fuel poverty alongside climate change.

country of origin. However, this can be tackled by appropriate border tariffs as, for example, currently **proposed by the European Union for introduction in 2023.**[10] A more detailed discussion of issues such as border adjustments and how an economy-wide carbon price would supplement and/or replace existing taxes (e.g. ETS, fuel duties etc) can be found on **CCL-UK's website** [11] and associated links.

Economy-wide carbon pricing has been discussed by many organisations such as the **International Energy Agency (IEA)** [12], the **Intergovernmental Panel on Climate Change (IPCC)** [13] and think tanks such as the **Centre for Policy Studies (CPS).** [2] To avoid undesirable price shocks — and to give industry time to plan low-carbon investments — the carbon price should not be introduced immediately at the full rate. Instead, it should be gradually but predictably introduced over several years. The pricing scenario used in this report is the one recommended by the **IEA** [12] and is shown in Figure 2.

Figure 2 also shows our assumed emissions trajectory. For simplicity, we start at 468 million tonnes/year **(UK government estimate for 2018)** [14] and reduce that linearly to zero by 2050. These reductions would be driven by the carbon price and by additional government policies (e.g. phasing out of internal combustion engine powered cars and the construction of low-carbon industrial hubs). We assume here that government policies will be adjusted to ensure that the UK meets its legally enforced commitments on emissions reductions and therefore do not explicitly model the impact of carbon pricing on emissions. Furthermore, household emissions are assumed to fall in proportion to the national trend.

Figure 2 directly leads to the resulting Treasury revenue as it is simply the result of multiplying the total emissions by the price (Figure 3).

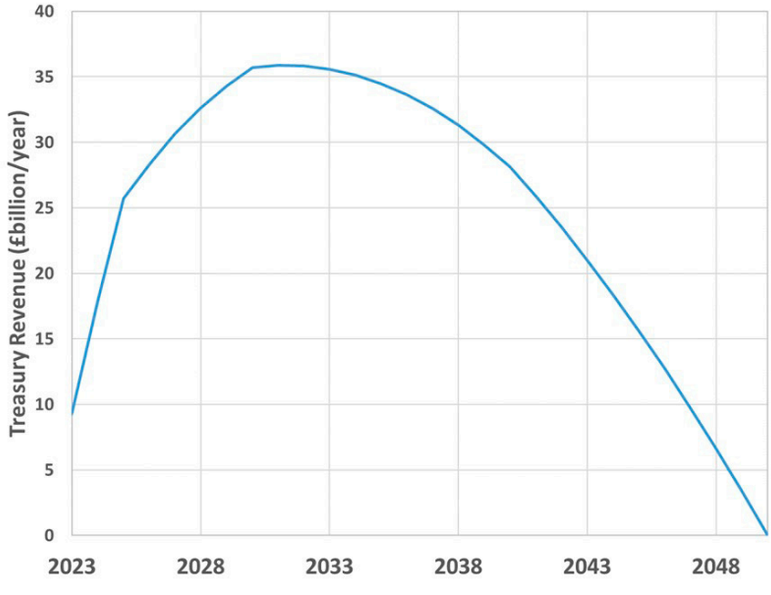


Figure 3 (above). Treasury income from a carbon tax if the scenario shown in Figure 2 is assumed. Total income is almost £700 billion.

10. European Commission, 2021

11. Citizens Climate Lobby UK, 2022

12. International Energy Agency, 2021

13. Intergovernmental Panel on Climate Change, 2022

14. HM Government, 2022

In-depth analysis

How carbon pricing can combat fuel poverty:
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The policy proposed in this report is capable of providing the level of funds needed for fuel poverty relief.

As Figure 3 shows, income peaks at over £35 billion/year in 2031. This is similar to the total spending on the UK government's cost of living support package in 2022 and demonstrates that the policy proposed in this report is capable of providing the level of funds needed for fuel poverty relief and can do so over an extended time.

Now the scenario is set, it can be used to investigate how households will be affected by the resulting carbon taxes. The mathematical details are given in the appendix. The key assumptions are that more-affluent households consume more goods, and are therefore associated with higher emissions and carbon tax-driven increases in their expenditure.

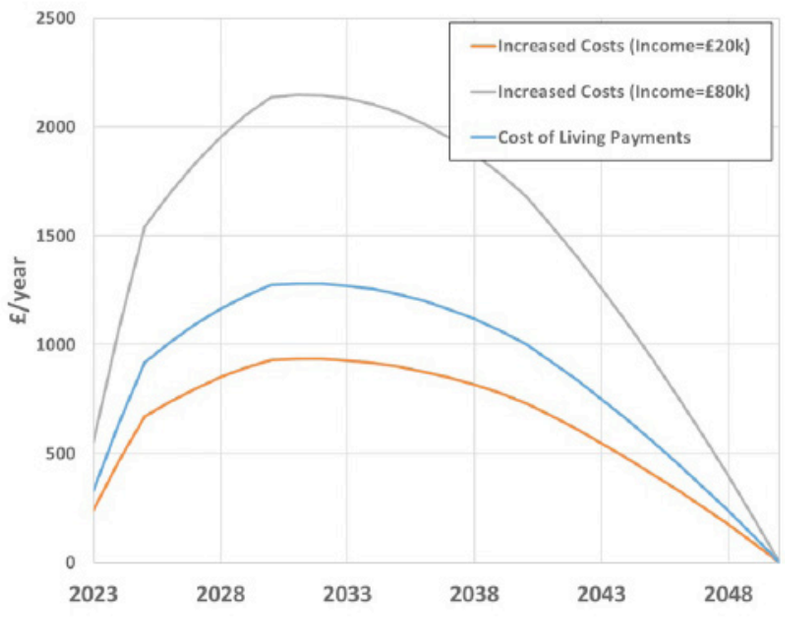

Figure 4 (above). Carbon tax-driven expenditure increases for a high-earning household and a low-earning household. The funds coming back into each household, as a result of a cost of living subsidy, are also shown.

Household expenditure patterns also change over time. This is because emissions are falling but, at the same time, the price of each tonne of emissions is rising. Figure 4 shows the resulting annual increases in expenditure for a high-earning household (in grey) and a low-earning household (in orange). As expected, affluent households have substantially higher expenditure increases throughout. As the cost of high-carbon goods increases, the balance of expenditure is moved towards low-carbon goods and so increases in household expenditure drop off after 2031. Households can choose how they spend the dividend, and they may choose to buy low-carbon goods. Thus, even affluent households can reduce their carbon tax-driven expenditure by making the switch to low-carbon alternatives.

In-depth analysis

Higher-income households experience higher absolute increases in expenditure as a result of carbon pricing compared to lower income households. However, by losing a higher proportion of their disposable income, lower-income households experience a greater impact. This is demonstrated in Figure 5 (below).

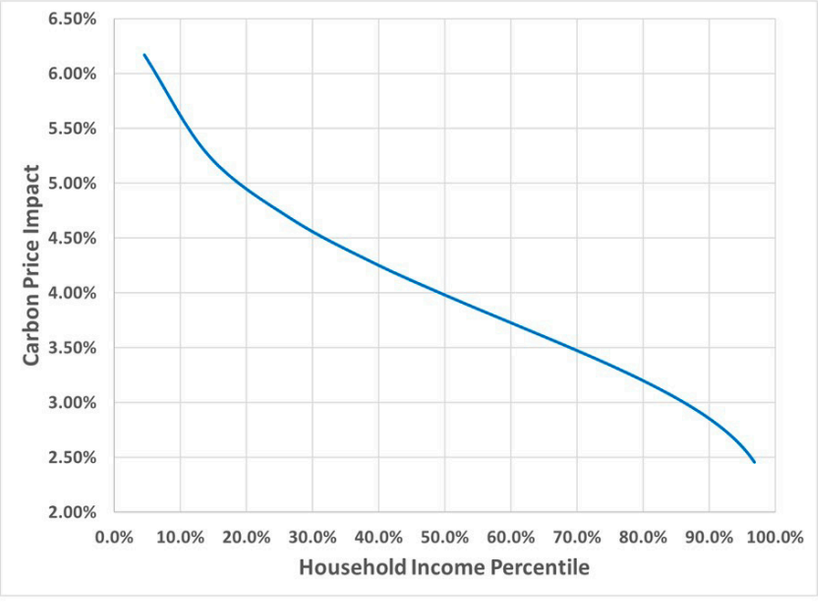

Figure 5 (above). The impact of carbon pricing on disposable income as a function of income percentile in 2031. The least affluent 10% of households (i.e. left of the 10% label on the horizontal axis) lose more than 5.5% of their income as a consequence of increased prices whereas the most affluent 10% (i.e. to the right of the 90% label on the horizontal axis) lose less than 3%.

As Figure 5 shows, in 2031 (when the impact is greatest) the least affluent 10% of households lose more than 5.5% of their income whereas the most affluent 10% lose less than 3%. Hence carbon pricing is regressive and will have the effect of making those already struggling to pay their bills even worse off in both absolute and relative terms.

The polluter-pays principle, when applied to tackling climate change, looks to be politically very difficult and socially divisive. The next section looks at how this picture is dramatically altered if the tax revenues are used to fund support for household energy bills similar to that already introduced by the UK government for 2022.

Carbon tax revenues can be used to fund support for household energy bills similar to that already introduced by the UK government for 2022.

In-depth analysis

Cost of living support

Treasury income increases, empowering the government to tackle fuel poverty and climate change.

Cost of living support for households

We can now assess the scale of possible cost-of-living subsidies for individual households made possible by the tax raised from carbon pricing. For simplicity, we assume that all revenues raised by the carbon tax are completely returned to households and that all households receive the same amount. However, the government could provide larger (or smaller) subsidies and could target less-affluent households. It could also smooth out fluctuations, or focus on the early years most likely to be impacted by the cost of living crisis. Hence, the figures produced in this report serve to indicate the approximate size of affordable energy bills support rather than provide a detailed year-by-year spending plan.

We should add that CCL-UK believes that 100% of revenues should be recycled and that this should be done as a uniform dividend for everyone. However, this is not the central topic of the current report and will not be discussed further here.

For the simple case of uniform payments to all households using all revenues collected, a household with average emissions will receive a payment precisely equal to its level of increased expenditure. All households will receive the same amount as this "average household" and the resulting payments are shown in Figure 4. For low-earning (and typically low-emitting) households the resulting payments will exceed the expenditure increase (note that the blue curve in Figure 4 is above the orange curve) whilst, for high-earning households, the payments will be typically less than the expenditure increase. In other words, the combination of a carbon tax and uniform payment results in a net transfer of funds to less-affluent families.

For a household currently close to the fuel poverty threshold (i.e. with a disposable income of £20k/year) the net payment (i.e. cost-of-living payment minus expenditure increase) is shown in Figure 6. The key observation is that they benefit by up to £350/year and, as noted earlier, this figure could be increased by more generous payments or more targeted energy bills subsidies.

The resulting net transfer of funds substantially benefits large numbers of less-affluent households whilst impacting relatively small numbers of more-affluent

In-depth analysis

The combination of a carbon tax and uniform payment results in a net transfer of funds to less-affluent families.

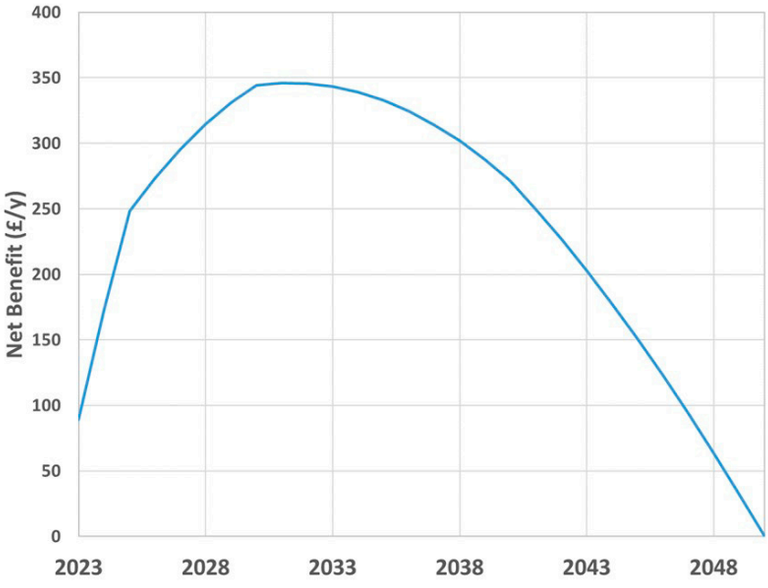

Figure 6 (above). The net benefit (i.e. subsidy expenditure increase) for a household with a disposable income of £20k/year (i.e. a family close to fuel poverty at the time of writing).

households in a surprisingly small way. This is illustrated in Figure 7, which shows how the impact on disposable household income changes with income level by the year 2031. Note that the least affluent 10% of households have their income boosted by 5% whilst the most affluent 10% of households only experience a 1% drop in their disposable income.

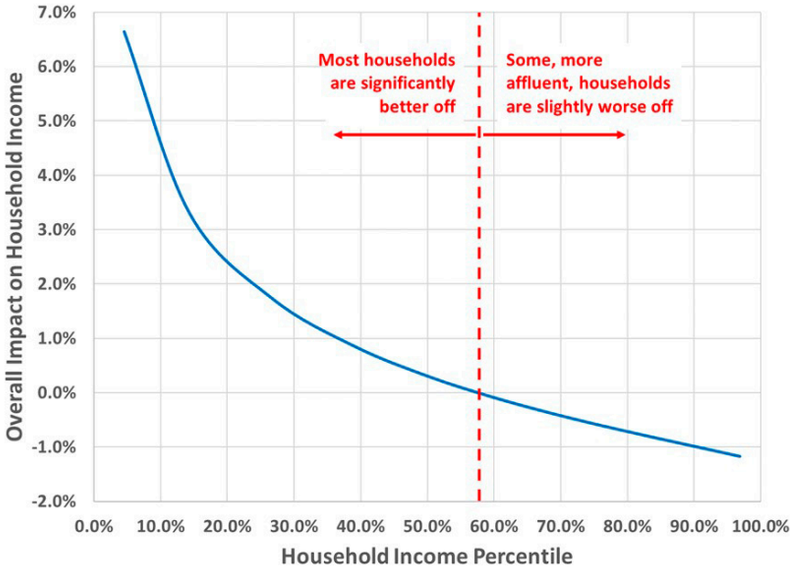

Figure 7 (above). Impact of our policy proposal on household incomes as a function of income level for the year 2031. The least affluent 10% have incomes boosted by 5% whilst the most affluent 10% have their disposable income reduced by around 1%.

In-depth analysis

How carbon pricing can combat fuel poverty:
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Regional consequences

Climate Income: Regional variation

Benefit across the regions from the combination of a carbon price plus uniform energy bills support.

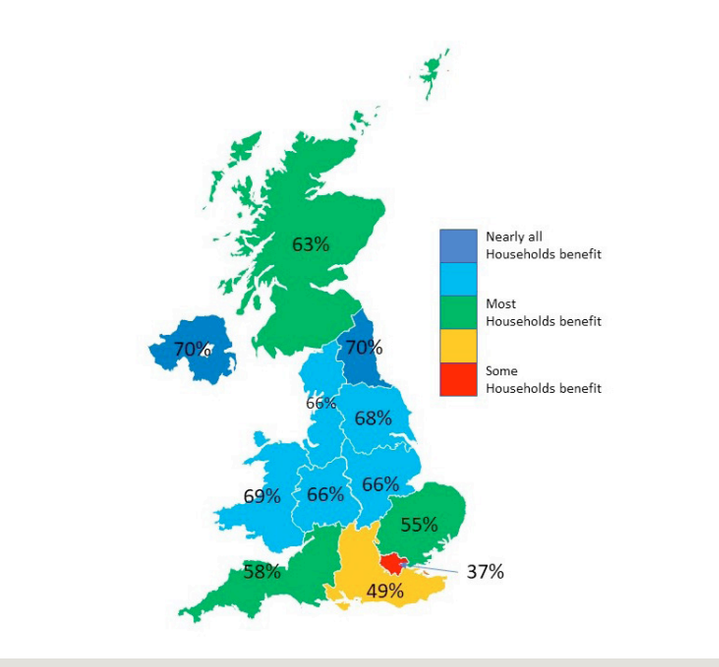

Figure 8. Regional variation for the percentage of households that benefit from the combination of a carbon price plus uniform energy bills support.

As shown in Figure 7, most households have a net benefit from the policy of energy bills support funded by a carbon price. Taking the UK as a whole, 57% of households would benefit if there was a uniform redistribution of the revenues. However, there is considerable regional variation.

The map shown in Figure 8 shows estimates of this variation. We constructed this using the **Office for National Statistics (ONS) data for per capita gross disposable income** [15] assuming that average and median household incomes scale by the same factor as per-capita incomes and that there are no regional variations in how emissions scale with income.

With these assumptions, in the northeast of England and in Northern Ireland, 70% of households stand to gain with the remainder of northern England and the Midlands not far behind. The only regions where fewer households benefit than lose are southeast England (marginally) and London. Thus, the benefits of using a carbon tax to fund energy bills support are particularly strong in less-affluent regions of the UK and this policy would contribute significantly to the UK government's levelling up agenda.

Uniform dividend

Northeast gains the most

Energy bills support

15. Office for National Statistics, Data and analysis from Census 2021

The benefits of using a carbon tax and dividend are greater in less-affluent areas of the UK and this policy would contribute significantly to the UK government's levelling up agenda.

Conclusions

The future of climate policy

Carbon pricing win-win

At the time of writing (August 2022), the Chancellor of the Exchequer has recently announced that all households in the UK will receive a one-off payment of £400 in 2022, to help them cope with the unprecedented rises in energy prices.

Carbon pricing is a win-win

More targeted sums have additionally been made available for vulnerable families and other similar groups with the entire package costing around £30 billion. About £7 billion of that will come from a windfall tax on oil and gas companies. The remainder will come from general taxation and borrowing. There is little doubt, across the political spectrum, that policies like these are essential at present to ensure both fairness and social stability.

However, these are one-off policies that no government could afford to implement repeatedly over a number of years. Instead, in this report, we propose a more long-term approach to fund the necessary subsidies using carbon pricing. In effect, we are suggesting that the current government policies should continue but with one small adjustment — the policy should be funded from a tax on the products, rather than the profits, of fossil fuel companies.

The key benefit of tackling fuel poverty and regional inequalities in this way is its widespread political acceptability. The prime purpose of the carbon price is to help tackle climate change — an aim supported by the vast majority of the British people. However, the problem with carbon pricing is that it is highly regressive — its impacts are felt most strongly by those who are already struggling to pay their bills.

Fortunately, as shown in this report, the revenues raised by carbon pricing are easily able to offset these effects; in fact, when used to fund a universal dividend, they substantially reduce fuel poverty.

Next steps

We would be pleased to meet with you to answer any questions you have about Citizens' Climate lobby UK's 'Carbon Pricing And The Cost of Living' Report.

Do you have any questions?

Contact us

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Citizens' Climate Lobby UK
Citizens' Climate Lobby -UK is a non-profit volunteer-lead organisation.

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Appendix A

An outline of our mathematical model

The following summarises the key features and assumptions of the mathematical model used for our calculations.

Model

Assume that household incomes are log-normally distributed, i.e. that the probability of income, I, less than x is

$$p(I < x) = 0.5 \left[1.0 + \text{erf}\left(\frac{\ln x - \mu}{\sigma\sqrt{2}} \right) \right]. \quad (1)$$

Emissions are assumed to vary nonlinearly with household income as discussed by Büchs & Schnepf (2013)[16], i.e. that

$$E = aI^b \quad (2)$$

where E is household emissions (tonnes/year) and $b \sim 0.6$. To estimate a, use the fact that eqn (2) implies

$$\bar{E} = a\overline{I^b} \quad (3)$$

where an overbar indicates the average value. The average value of I^b is obtained from

$$\overline{I^b} = \int_0^\infty p(I) I^b dI \quad (4)$$

which can be integrated numerically. Equations (3) & (4) then give a.
The carbon fees paid, per household, are

$$\text{Tax} = PE = PaI^b \quad (5)$$

where P is the carbon price. If all revenue is recycled then payments back to households must equal the average tax, so that

$$\text{Payment} = P\bar{E}. \quad (6)$$

16. Buchs, M, and Schnepf, S.V., 2013

Appendix B

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Citizens' Climate Lobby

Citizens' Climate Lobby UK

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