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Chapter 14: The Climate Crisis and Taxation – Paul Bridgen and Milena Büchs

Introduction

The UK government became in 2019 the first major economy to implement a legally-binding net zero target. By 2050 any greenhouse gas (GHG) emissions produced within the UK must be reduced as far as possible or offset (BEIS, 2019). Yet few believe the policy framework in place for meeting this ambitious target is sufficient. The Climate Change Committee (CCC), the UK government's formal independent advice panel, has called, for example, for stronger, faster action, highlighting a potentially increased role for taxation (CCC, 2019; see also NAO, 2021). The Johnson government's *Net Zero Strategy* (HM Government, 2021) was non-committal.

The economic case for carbon or energy taxation as a means to reduce GHG emissions is strong: environmental degradation is a negative externality justifying corrective fiscal actions by the state (Pigou, 1932) particularly if focused on the greatest polluters and/or those whose adaption costs are lowest (IFS, 2011). From a social policy perspective, however, because carbon taxes generally increase prices, they raise concerns about distributive implications whether levied on businesses or consumers. Most research suggests that where carbon taxation has been introduced it is highly regressive (for example, Wier et al, 2005; Feng et al, 2010), and modelling generally reaches the same conclusion (for example, Timilsinas, 2018). This is generally because such taxes are flat rate and levied on goods/services with a low or negative income elasticity of demand; that is, household staples, like domestic energy, the consumption of which does not change substantially as income falls, and that make up a larger proportion of household expenditure for poorer compared to richer households.

The UK does not currently have a specific carbon tax but has introduced incrementally over a long period a range of fiscal instruments on individuals and businesses that affect the cost/price of GHG emissions (see below). Most were not established specifically to address environmental objectives, but their impact on price signals mean they affect the market for carbon with behavioural and distributive implications.

Very little is known about these implications, individually or as a whole. This chapter will focus on their distributive impact (on the taxes' environmental impact and the optimality of these taxes, see for example, NAO 2021). Such knowledge is crucial for two main reasons. First, knowledge about the distributive impact of actually existing environment-related taxation and associated mitigating benefits provides a crucial context for assessing the distributive impact of a more generalised carbon tax. Viewed in isolation, as has been seen, the latter has been adjudged clearly regressive. But might the continuing incremental development of the existing system over coming years be a more regressive option than a more general reform? Secondly, if as seems likely the UK takes an incremental path towards greater carbon taxation, it is crucial from a social policy perspective to understand which parts of existing arrangements are most progressive and where greater mitigating efforts are required most. This chapter cannot for reasons of space consider these matters in depth, but it does provide evidence about existing arrangements on which such a venture can proceed.

To do this, the chapter begins by briefly detailing the incremental and halting rise of UK environment-related taxation, outlining the design, stated purpose and rationale of the various fiscal instruments introduced. The distributive impact of these instruments, individually and overall, is then assessed, with most shown as clearly regressive. The chapter finishes by discussing the implications of this assessment for current policy debates.

The development of UK environment-related taxation

The consideration by UK government of taxes with an explicit environmental purpose only began from the mid-1990s, much later than in many EU countries (Jordan et al, 2013). Before this date, while taxes were charged on some goods that had an environmental impact, particularly cars through fuel duty and the vehicle excise licence, they were primarily revenue-raising devices. Air Passenger Duty, introduced in 1993, and VAT on domestic fuel, introduced in 1994, fulfilled a similar purpose. Developments throughout have been characterised by a 'subterranean' (Hacker, 2002), opaque and

reactive incrementalism, with little or no systematic or coordinated analysis of the broader environmental or distributive impact or purpose of these taxes (Hayes, 2006; Jordan, 2013).

Concerted consideration of taxes specifically designed to fulfil environmental objectives mainly began under New Labour. The preceding Conservative governments had briefly seemed ready to move taxation in an environmental direction. Following the 1989 publication of the influential Pearce Report which made the case for tax rather than regulation to fulfil environmental objectives, Thatcher raised the issue of climate change in a speech to the United Nations General Assembly in November 1989 (Guardian, 2013) and a Department of Environment white paper supported environmental taxation (Dresner et al, 2006). But enthusiasm proved transitory. A tax on leaded petrol and a landfill tax were introduced, but both were small scale and the first was short-lived. New Labour's interest was stimulated by the rising international interest in climate change after the agreement of the Kyoto Protocol. In power a wide-ranging review of the potential of environmental taxation targeting household and business environmental behaviour was undertaken by the Treasury (Sorrell, 1999).

However, ultimately, these deliberations resulted only in a climate change levy, introduced in 2001, and an aggregates levy, introduced in 2002. In the same year, the UK set up an emissions trading system (ETS), as a prelude to joining the European Union ETS in 2005 (Dresner et al, 2006), and the Renewables Obligation (ROC) scheme was established to encourage the production of renewable energy. But the scope and scale of these initiatives was severely restricted. The incidence of the new taxes fell entirely on businesses, although not all were affected, with no new direct taxation on households. Instead, increased costs on households occurred indirectly, as businesses passed on at least some of their tax liabilities in prices. This was also the case for other initiatives that had an environmental purpose, such as Energy Saving Obligations (ESOs) introduced in 1992 (see below). In terms of new revenue raised the new initiatives were tiny amounting by 2019 to about 1.5 per cent of total UK taxes and social contributions (ONS, 2021a - the figure for 2019 is used over 2020 because of the distorting impact of COVID19 on tax take during the latter year).

Labour's caution was due in part to the strong political reaction against the Conservatives' introduction of VAT on domestic fuel in 1994 which it had pegged at five per cent once in power. An even bigger backlash followed in 2000, when massive fuel protests by haulage companies forced the Blair government to abandon a fuel duty 'escalator', first introduced by the Conservatives in 1993 (see below).

Thus by 2021 taxation designed specifically to address environmental concerns was still very limited. Only four taxes could be so characterised (table 13-1). In addition two taxes - motor fuel duty and Air Passenger Duty - fell under the ONS's more inclusive definition of environmental taxation in that they imposed a duty on goods or services with an environmental impact (NAO, 2021). VAT on motor and domestic fuel and vehicle excise duty were similar in this respect, but were not included in the ONS definition. Of these taxes, fuel duty was by far the largest in terms of revenue, providing more than 54 per cent of total revenue collected in environment-related taxation. In 2019, the revenue delivered by fuel duty amounted to 1.25 per cent of UK GDP, whereas no more than 0.3 per cent was collected from any of the other taxes. In the next section fuller details are provided of the structure and design of these taxes.

Table 03-1. Explicit and implict environment-related taxes in the UK – introduction date, incidence, administration and revenue implications 2021

	Year of introduction	Administration	Government revenue, 2020, £ millions	Government revenue, 2020, as % of GDP
Explicit environmental taxes (business)				
Landfill tax	1996	HMRC	711	0.03
Climate change levy including Carbon Price Floor	2001	HMRC	2091'	0.09
Aggregates levy	2002	HMRC	363	0.02
Renewables obligation	2002	BEIS	6,251	0.28
Contracts for difference	2017	BEIS	2,042	0.09
UK ETS	2002	BEIS	1,356	0.06
Total			*8,705*	*0.39*
Implicit environmental taxes				
Fuel duty (households)	1928	HMRC	14485'	0.65
Fuel duty (business)	1928	HMRC	13310'	0.60
Vehicle excise duty (households)	1919	HM Treasury	5026	0.23
Vehicle excise duty (business)	1919	HM Treasury	1999	0.09
Vehicle registration tax (households and business)	1919	Driver and Vehicle Licensing Agency	157	0.01
VAT on vehicle fuel (households)	1972	HMRC	6438''	0.29
VAT on vehicle fuel (business)	1972	HMRC	1931''	0.09
VAT on domestic heating fuel	1994	HMRC	1768''	0.08
VAT on business heating fuel	1994	HMRC	2021''	0.09
Air passenger duty (households and business)	1994	HMRC	3810'	0.17
Total			*50,945*	*2.30*

Source: ONS Environmental taxes in the United Kingdom 2021 for all other than VAT on domestic fuel and ESOs

' 2019 figures used due to distorting impact of the Covid-19 pandemic

" Author's calculations

UK Environment-related Taxation

Explicit environmental taxes

The Climate Change Levy (CCL)

This tax was introduced in 2001 after close consultations with business by the then New Labour government, overseen by Lord Marshall (chairman of British Airways) (Dresner et al, 2006). It is levied on business and public sector energy consumption and collected by energy suppliers who are exempt. In 2019, it raised just over £2 billion for the UK Exchequer (table 13-1). It is less a tax on carbon than a general price-based incentive for business to be more energy efficient (NAO, 2021). Electricity use, for example, is taxed at the same rate regardless of the mix of generation methods providers use (for example, gas, coal, nuclear power, renewable energy technologies), despite their very different carbon emissions.[1] Lower rates are charged on direct use of gas, solid fuel, or liquefied petroleum gas (LPG) (Seeley and Ares, 2016).

The CCL operates in conjunction with a system of negotiated Climate Change Agreements (CCAs) designed to protect the most intensive energy-users against any adverse effects of the levy on their competitiveness. In return for binding commitments to improve energy efficiency (Martin et al, 2009), these businesses can secure 80 per cent reductions in the levy. The impact of the CCL on business costs when it was introduced was also mitigated by a 0.3 per cent reduction on business National Insurance contributions. In addition, uprating decisions since this time have not always maintained the real value of the levy (IFS, 2011).

The ETS and Carbon Price Floor

The UK's carbon 'cap and trade' system opened in 2002 (Dresner et al, 2006) was subsumed into the new EU ETS in 2005 (IFS, 2011) and then 're-nationalised' after Brexit

[1] Technically, each kWh of electricity consumed from the grid has the same carbon footprint regardless of provider because it is drawn from the current electricity mix in the grid, but it could be argued that customers of providers that only feed renewable electricity into the grid should be rewarded with a lower tax rate.

in 2021. Throughout, the scheme has operated in fundamentally the same way. It has been targeted on energy suppliers and the most energy-intensive companies, often those with CCAs, with aviation included from 2012. These companies are subject to carbon emission caps, often initially based on historic emissions (Hirst and Keep, 2018). Allowances to emit up to this cap were in the first instance provided without charge, but increasingly they have been auctioned by government. This process raised just under £1.4 billion for the UK Exchequer in 2020 (table 13-1). Companies can also secure allowances through trading on the carbon market (Hirst and Keep, 2018).

The aim of the scheme is reduced emissions by imposing a price on carbon and gradually reducing emission caps. However, in most years the EU scheme has had excess allowances meaning prices dropped to very low levels (IFS, 2011). The solution to low prices in the UK was the introduction of a Carbon Price Floor (CPF) in 2013 (Hirst and Keep, 2018). While the UK was under the EU ETS, this operated by topping up the EU-designated allowance prices to the carbon floor price target. This was meant to rise annually but was frozen in 2014 and remained so to 2021. Since the introduction of the post-Brexit scheme, a temporary Auction Reserve Price on allowances has replaced the CPF, but the government has signalled this will be abolished in 2022 (BEIS, 2020a).

The Renewables Obligation (RO) and Contracts for Difference

The RO was introduced in 2002 and operated up to 2017. It made it compulsory for electricity suppliers to source an increasing proportion of their supply from renewables (Toke 2010). Suppliers proved they were doing so by purchasing Renewable Obligation Certificates from accredited generators. This supplemented the income generators received from the general sale of renewable electricity. Government revenue was generated by buy-out clauses which electricity suppliers could use if they did not meet their renewable target. This raised more than £6.2 billion in 2020. The money from these buy-outs was redistributed among those suppliers that did meet their target (Garton et al, 2016).

Since 2017 the scheme has been wound down, replaced by Contracts for Difference. This scheme provides eligible renewable generators with a guaranteed price for the electricity they sell, that is, they receive a top-up from the government if the market price falls below the guaranteed level but pay back the difference to the government if market prices are above the guaranteed level (BEIS, 2020b). The top-up and costs of operating the scheme are funded by a statutory levy on all UK-based licensed electricity suppliers (Supplier

Obligation and Operational Costs Levy). This raised just over £2 billion for the UK Exchequer in 2020 (table 13-1).

Other taxes

There are also two other, smaller scale explicit environment-related taxes, the Landfill Tax and Aggregates Levy. The first was introduced in 1996 based on tonnage of waste (Dresner et al, 2006; CCC, 2019). The Aggregates Levy was introduced in 2002 based on tonnage of aggregates extracted (Seeley, 2016). Both taxes involve compensation to the employers affected using reductions in National Insurance contributions. Combined the two taxes contributed just over £1 billion to government revenue in 2020 (table 13-1).

Implicit environmental taxes

Motor taxes

Tax on hydrocarbon oils, commonly known as fuel duty, is applied to all sales of hydrocarbon-based fuels such as petrol, diesel, biodiesel, biogas and liquefied petroleum gas (LPG). It is collected by fuel suppliers mainly before sale of fuel to vehicle owners.[2] There are different rates for different types of fuel.

Fuel duty was established at the start of the last century mainly as a revenue-raising device and this remains its central purpose (NAO, 2021). Duty rises became more regular after the Conservatives' 1993 budget which increased duty by 10 per cent and introduced a 'fuel duty escalator' under which duty would rise annually by 3 per cent above inflation. By 1997, this had increased to 6 per cent above inflation. The impact of these increases went largely unnoticed up to 1999 because oil prices were falling, but when they started to rise in 2000 massive fuel protests, with large public and media support, meant government was reluctant to increase duty even in line with inflation up to 2008 –2009 (Dresner et al, 2006). Under the Conservative/Liberal Democrat Coalition in 2012 the fuel duty escalator was officially abolished. Duty has been frozen ever since up to 2022 (HMT, 2021). Nevertheless, it raised almost £28 billion for the UK Exchequer in 2019, more than £14 billion paid by households (table 13-1). This dwarfed the amount raised by the other environment-related taxes.

[2] Fuel oil burned in a furnace or used for heating is also subject to the tax.

Indeed, vehicle taxes in the UK are comparatively high, particularly compared with Europe (Zahedi and Cremades, 2012). Combined with the current 20 per cent rate of VAT, added to fuel costs since 1973, taxes overall account for around 72 per cent of motorists' fuel cost (ONS 2016). Partly for this reason, tax reliefs have been introduced to reduce the cost of fuel for some users, particularly in business. Most significantly, these have applied to so-called 'red diesel', that is diesel fuel used in off-road vehicles such as in construction, which amounted to £2.4 billion tax foregone in 2019 (OECD, 2022). This figure will decline from 2022 as the scope of the relief is reduced (HMRC, 2021a).

In addition, most vehicle owners pay vehicle excise duty. Introduced as a revenue-raising device in the nineteenth century, it was a flat rate levy up to 2001. It was then banded in relation to CO2 emissions. In 2021, this banding operates using a progressively higher first year charge for vehicles emitting more with a standard flat rate levy thereafter. Non-emitting, electric cars, are not taxed (HMRC, 2015). There are separate bands for heavy goods vehicles based on their size (gov.uk, 2021).

VAT on domestic fuel

There is no explicit UK tax on the consumption of domestic energy and until 1994 it was excluded from VAT. In 1993 the then Conservative government's desire to levy the latter tax at the same 17.5 per cent rate applied at the time to most other purchases was strongly opposed (Dresner et al, 2006).[3] This focused on the tax's regressive impact and thus its implications for fuel poverty (Laurance and Myers 1993). Government was forced to limit the tax to 8 per cent and increase compensatory support for poorer households (Waterhouse and Schoon, 1993). Labour reduced the tax to 5 per cent when elected in 1997. It has stayed at this rate ever since, though in the context of spiralling fuel prices in 2022 serious consideration has been given to a zero rating (eg Reeves, 2022) . In 2020, it raised nearly £1.8 billion in government revenue (table 13-1).

Air Passenger Duty

Air passenger duty is the only UK tax on flying, although since 2012 aviation has been part of the ETS (Hirst and Keep, 2018). VAT is not levied. The duty only applies to flights that depart from UK airports (and hence not on return legs on flights from abroad). It operates on a per-person-per-flight basis and is banded in relation to the distance of the destination and the class of seat. Those travelling up to 2000 miles from London pay less

[3] It was also in line with EU policy.

than those travelling more. Rates for higher grade tickets are greater with those travelling in smaller aircraft, with fewer than 19 passengers, paying the most. In 2019, it raised just over £3.8 billion for the UK Exchequer (table 13-1).

The tax was not introduced for environmental purposes but primarily to raise revenue, particularly given the zero VAT rating for UK flying (IFS, 2011; NAO, 2021). Governments have argued international action is more cost-effective for addressing aviation emissions hence support for incorporating it in the ETS (HMT, 2005). Based on this argument, intermittent freezes in rates and consideration of cuts, particularly to domestic duty on domestic flights, have been justified, notwithstanding criticism from environmental lobby groups (BBC News, 2021).

Quasi-taxes

Energy Savings Obligations (ESOs)

ESOs are regulatory devices which involve an indirect state role and no direct, explicit increase in taxation with costs met by private actors in market exchange (Rosenow, 2012). However, because they increase consumer bills they have been considered quasi-taxes (Owen, 2006). The obligations set time-specified regulator/government-directed targets on energy producers for the provision of 'energy benefits' (that is, improvements in domestic energy efficiency such as wall insulation). Energy producers meet installation costs but can and do pass them on in prices.

ESOs were initially small-scale when first introduced in the early 1990s, never implying much more than a £1 per customer per year increase in bills (Owen, 2006). By the mid-noughties, however, re-packaged as Carbon Emission Reduction Targets (CERT), ESOs implied a five-fold increase in energy bills to £51 per customer per year (Rosenow, 2012; DEFRA, 2007). Protection for low income ESO consumers has increasingly become more systematic with energy companies obliged to target 'priority groups' for efficiency improvements (Powells, 2009). Under the Coalition and majority Conservative governments up to 2021 ESOs continued but in reduced form and targeted only on lower and vulnerable groups.

Tax relief

Operating alongside these environment-related taxes is a highly complex set of tax reliefs which also affect the cost/price of GHG emissions. Some of these reliefs, such as the CCL

and fuel duty rebates mentioned above, are directly linked to environment-related taxation, but many others are not. Some are designed to encourage behaviour that will reduce emissions, such as capital allowances on the purchase of electric cars (NAO, 2021), but much more significant in terms of revenue foregone, are tax reliefs likely to result in higher emissions. The most important are granted to fossil fuel producers, particularly the oil and gas industry. These amounted to almost £3 billion of tax foregone in 2019, 59 per cent of which was granted for capital expenditure to aid exploration and development of new fields (authors' calculations based on OECD, 2022). VAT exemptions also are not clearly aligned with the objective of reducing emissions. For example, the more resource-intensive process of building new houses is not liable to VAT whereas less intensive house renovation is liable to 5 per cent (UK Government, 2020). The tax foregone in relation to the former was £14 billion in 2020-21 (HMRC, 2021b: section 7.25).

The distributive impact of UK environment-related taxation: data and methods

The main consequence of this incremental and unsystematic introduction of environmental-related taxes in the UK is that little concerted consideration has been given to their impact, particularly their distributive consequences. It is on this issue that the rest of this chapter will focus. In what follows we assess the distributive impact on households of the taxes outlined above. We assess each tax individually, determining whether they are progressive, proportional or regressive, and then consider the overall impact of all UK environment-related taxes. Using ONS and UK Living Costs and Food (LCF) Survey data (ONS/DEFRA 2020)we calculate the average rate of tax for each decile group. We focus on the impact of the taxes detailed above as a proportion of *disposable* equivalised household income. Where the average tax incidence relative to income is higher for those on higher incomes, the tax is progressive; where it is lower, the tax is regressive; where it is constant, the tax is proportional.

Our assessment of the impact of air passenger duty, fuel duty (households) and vehicle excise duty is based on ONS data. These data are derived from the LCF and the UK Survey on Living Conditions and provide information on the average amount paid by households by equivalised decile group and also the average disposable incomes by equivalised decile group. From this information we calculated the average tax paid in relation to the average

disposable income of each decile. Disposable income is the most suitable income variable[4] for our purpose because it details the money available to households (after income tax has been paid and state benefits received) for purchasing the goods and services the prices of which are affected either directly or indirectly by the above taxes. It thus also includes some benefits (for example, cold weather payments) which directly compensate to a certain extent lower income households for the costs incurred from purchasing some of the affected good/services (for example, heating).

On VAT, the ONS only provides information on the total amount paid by households, not broken down in relation to the good and/or services on which it is levied. For this reason, we used LCF data directly to calculate this, using rates equivalent to 20 per cent of untaxed expenditure on motor fuel and 5 per cent on domestic electricity and gas. The UK Living Costs and Food (LCF) Survey is a voluntary, representative UK household survey designed to provide information on household income and expenditure representative of the UK population. Data are collected on income (including cash benefits received from the state), income and indirect tax payments, with imputations also included for the impact on household income of public services. Households are ranked by their equivalised disposable income, and then broken down into decile groups. Income is equivalised to adjust for differences in household size using the modified-Organisation for Economic Co-operation and Development (OECD) scale.

Information on the impact on households of quasi-taxes and environment-related taxation on businesses is more difficult to access. On the former, the amount paid by households varies annually depending on the cost of the schemes (for example, ESOs, the ROC, and contracts for difference, and so on) with no single or separate rate specified explicitly. We thus rely below on the National Audit Office's estimation of the cost of climate-change policies on domestic fuel bills (2016; See also Owen and Barrett, 2020).[5] It calculated this to be 13 per cent of average household bills in 2016, although this also includes the cost of initiatives not considered in this chapter (for example, Feed-in tariffs; NAO, 2016, p 16).[6] We used this figure to calculate distributive impact using LCF data, meaning our calculations slightly over-state the impact of the quasi-taxes covered in this chapter. On the impact of environment-related business taxes on households, even less information is available, meaning our calculations while plausible should be regarded as

[4] The others available are original, gross, post-tax and final income.
[5] We are very grateful to Anne Owen for her assistance with this calculation.
[6] In response to the 2022 energy crisis, the government decided to cover some of the cost of these 'green levies' for two years meaning the impact of 'quasi-taxes' on households will likely be lower during this period (HM Treasury, 2022)

illustrative. We assumed, like the ONS (2021b), that the whole cost of these taxes is passed on in prices. Based on this assumption, we calculated the impact of total environment-related business taxes (table 13-1) as a percentage of total household expenditure using ONS family spending data (2021). This gave us a figure of 3 per cent which we applied to the LCF and ONS data to determine the distributive impact of the taxes.

As part of our analysis we consider how the distributive impact of taxes relates to the income elasticity of demand for the good on which it is levied. As seen above, this concept refers to how demand changes as income rises or falls. For most goods/services, as income falls demand for a good also falls. However, for more necessary staple goods/services, demand can remain closer to constant. Since income elasticities for necessities tend to be lower, particularly for lower income groups, and because lower income groups spend a higher proportion of their income on necessities, the impact of flat rate taxes on such goods is generally regressive.

We first consider the distributive impact on households of each environment-related tax. We then compare the distributive impact of each tax before considering their overall impact.

The distributive impact of explicit and implicit environment-related taxation on households

Table 13-2 summarises the results of our analysis of the distributive impact of UK environment-related taxes on households. We can see that most taxes are clearly regressive and all of them impact disproportionately on the income of the bottom decile group. The only exception with regard to regressivity is Air Passenger Duty. The sections below consider each tax in more detail.

Table 03-2. The distributive impact of explicit and implicit environment-reated taxation on households by equivalised decile groups as percentage of equivalised disposal income, 2019-20

Equiva-lised decile group	Fuel duty	Vehicle excise duty	VAT motor fuel	VAT gas	VAT electricity	Air passenger duty	Quasi-taxes	Environment-related business tax	Total
1	4.73	1.78	2.35	0.46	0.48	0.46	2.40	0.13	12.80
2	3.34	0.93	1.40	0.25	0.27	0.31	1.31	0.09	7.88

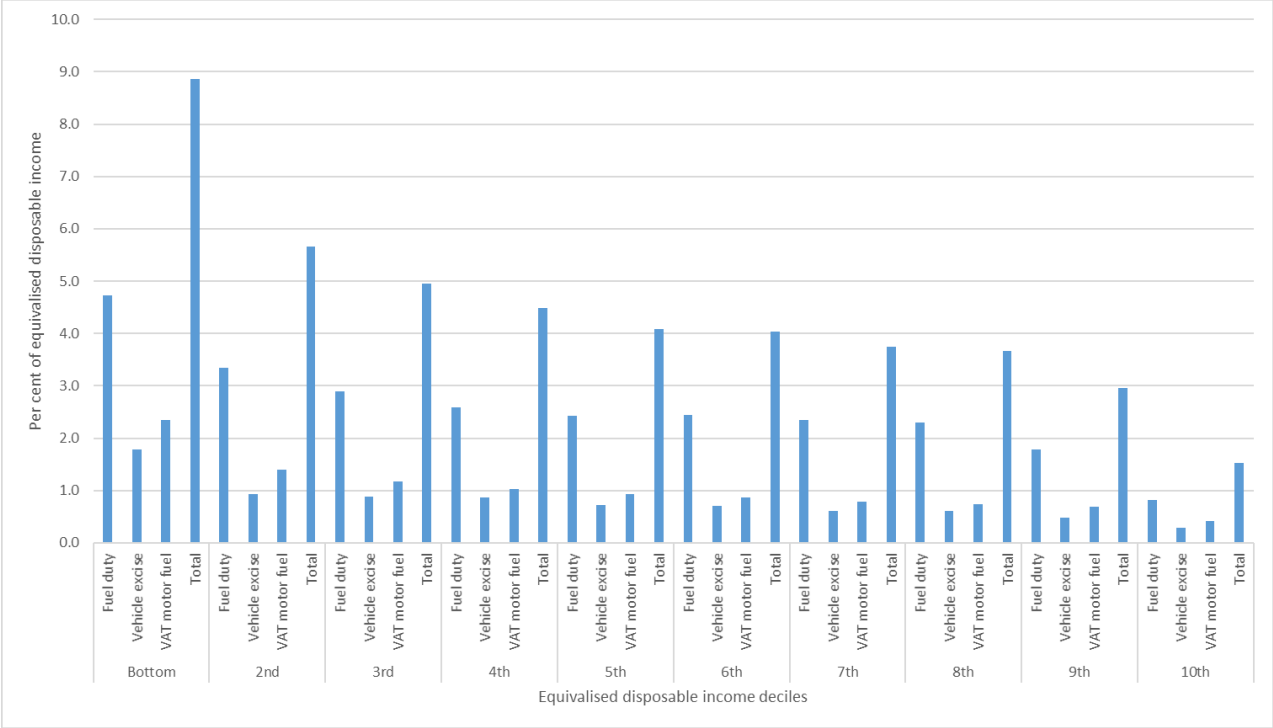
3	2.90	0.88	1.17	0.21	0.22	0.28	1.08	0.08	6.82
4	2.59	0.87	1.02	0.18	0.18	0.19	0.92	0.07	6.04
5	2.42	0.73	0.93	0.15	0.16	0.29	0.78	0.07	5.53
6	2.45	0.71	0.87	0.13	0.14	0.23	0.68	0.07	5.28
7	2.35	0.61	0.79	0.12	0.12	0.28	0.61	0.07	4.94
8	2.30	0.61	0.75	0.10	0.10	0.25	0.52	0.06	4.69
9	1.78	0.48	0.69	0.09	0.09	0.30	0.45	0.06	3.94
10	0.82	0.28	0.42	0.07	0.06	0.23	0.33	0.05	2.27

Source: our calculations using LCF and ONS data

Motoring-related taxes

Figure 13-1 details the regressive impact for households in 2019/20 of the two main taxes on motoring – fuel duty and vehicle excise duty – and VAT on motor fuel. As a percentage of equivalised disposable income, the average paid in fuel duty and vehicle excise duty declined consistently from 4.7 per cent and 1.8 per cent respectively for the bottom decile groups to 0.8 per cent and 0.3 per cent for the top groups. Given these results, it is not surprising that VAT on motor fuel, another flat tax, is similarly regressive, with the average amount paid as a percentage of equivalised disposable income also declining consistently from 2.5 for the bottom decile group to 0.4 for the top group.

Figure 03-1. Average motoring-related taxes paid by equivalised income deciles as a % of equivalised disposable income, 2019/20



Source: Our calculations using ONS 2021a and ONS/DEFRA 2020

The significant and uniformly regressive impact of taxes on motoring in 2019/20 is despite data suggesting car ownership is income elastic. Thus ONS data for 2018 (the most recent year available) show that, while only 35 per cent of households in the bottom decile owned a vehicle, in the top four deciles more than 90 per cent owned cars, with 26 per cent of the top decile households owning three (ONS, 2019). Lower income groups thus have less access to private transportation, emit less as a consequence, but nevertheless pay more in motor taxes as a proportion of their income than richer groups.

Results from previous research indicate distributional impacts are also likely to vary by gender. Men are more likely to own a car and drive than women, and hence have significantly higher carbon emissions for motor fuels than women (Büchs et al, 2013; 2018). Men therefore bear higher burdens of motoring taxes than women (Büchs et al, 2021).

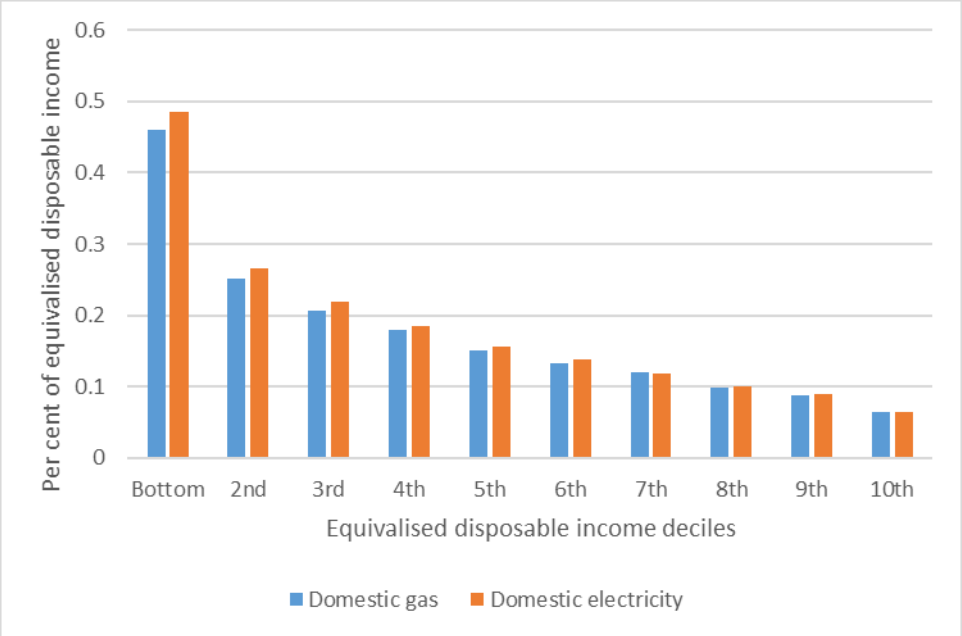
Domestic energy taxes

The overall impact on household income of VAT on domestic energy is lower than motor taxes for all income deciles, not rising in total to one per cent of equivalised disposable income for any decile groups (figure 13-2). It would be higher if it operated at the same

level of 20 per cent as other goods and services rather than the 5 per cent level set in 1997.

Nevertheless, the tax is clearly regressive. For both gas and electricity, the average amount paid as a percentage of equivalised disposable income declines consistently from 0.5 for both fuel types for the bottom decile to 0.07 and 0.06 respectively for the top income decile.

Figure 03-2. Average VAT on domestic gas and electricity paid by income deciles as a % of equivalised disposable income, 2019/20



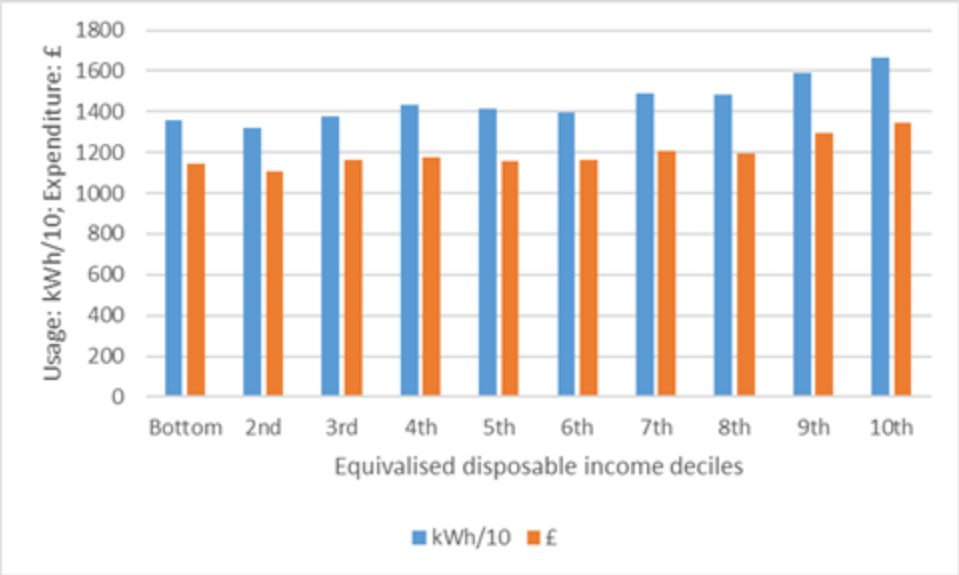
Source: Our calculations using ONS/DEFRA 2020

The regressive impact of VAT on domestic fuel is the product of levying a flat purchase tax on a good which has low income inelasticity, particularly for lower income groups. Thus, as can been seen in figure 13-3, the most recent data suggest the amount of domestic fuel used and the amount spent on it varies very little across the income deciles, particularly between the first and eight decile groups. As a consequence lower income groups spend a much higher proportion of their household income on this good.

Requirements for domestic energy also differ by gender. Previous research has shown that female-headed households (especially older single female households) use significantly more electricity and gas in the home than male-headed households (Büchs

et al, 2013, 2018). Taxes on home energy therefore put significantly higher burdens on female-headed households than on male-headed households (Büchs et al, 2021).

Figure 03-3. Gas and electricity expenditure and usage by equivalised income decile, 2019-20

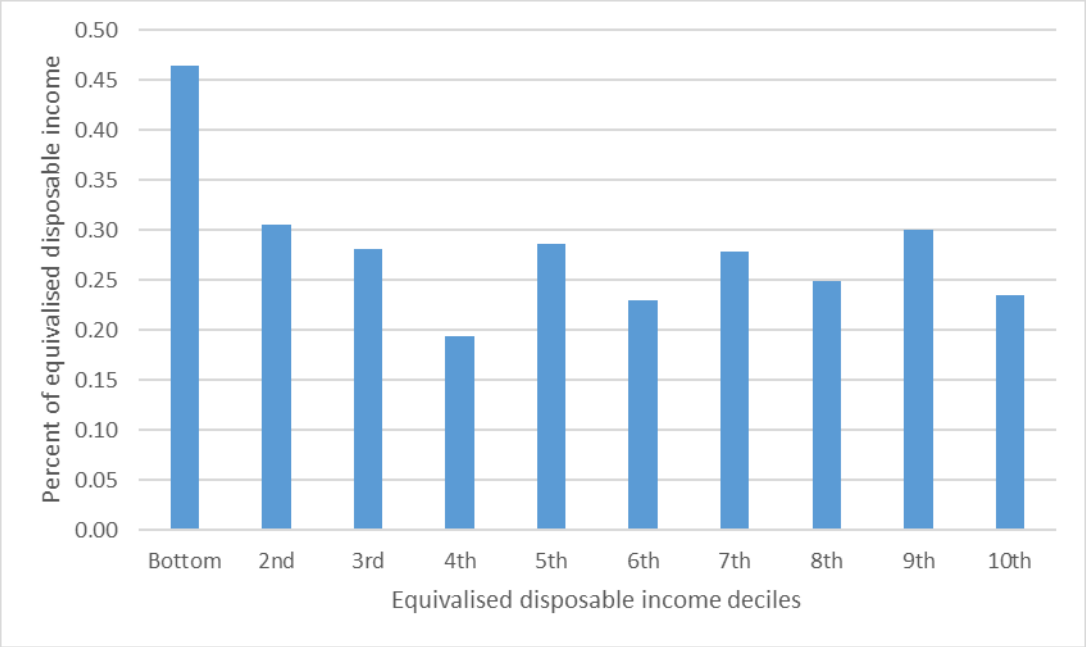


Source: Our calculations using ONS/DEFRA 2020

Air Passenger Duty

Of the taxes paid directly by households APD is the one which impacts least on household income, never rising above 0.5 per cent of equivalised disposable income for any decile group (figure 13-4). It is also the least regressive. A significant gap is still evident between the bottom and top decile and the bottom decile again pays markedly more than any other decile. But unlike the other taxes paid directly by households, the top decile group is not the one paying proportionately the least APD; both the fourth and sixth decile pay less.

Figure 03-4. Average Air Passenger Duty paid by equivalised income decile as a % of equivalised disposable income, 2019/20



Source: Our calculations using ONS 2021a

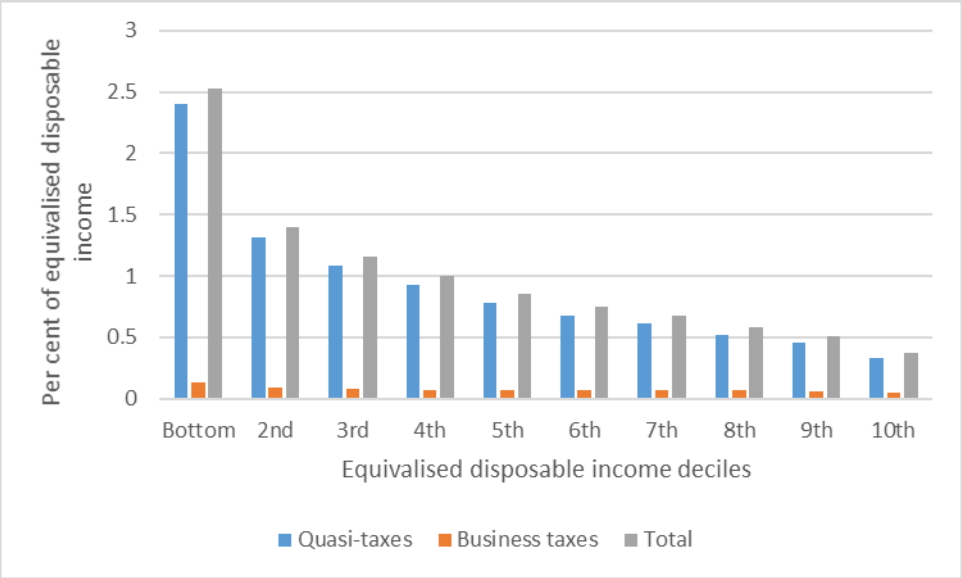
The main reason the overall impact of APD on households is fairly proportional is that flying is highly income elastic particularly towards the top end of the income distribution (Büchs and Mattioli, 2021). Over time the percentage of those in the lower income groups participating in flying has increased significantly (from 15 per cent in 2001-3 to 23 per cent in 2016-8), such that in relative terms they have contributed more to the general increase in flying. However, in absolute terms increased air travel by the higher income groups is the main reason for the overall increase in flying during this period. The impacts of taxes on air travel also vary by gender. Women are less likely to fly, and take part in fewer flights, than men (Büchs and Mattioli 2021). Men therefore bear higher burdens from taxes on air travel than women.

Quasi-taxes and impact of environment-related business taxes on households

The overall impact on household income of quasi-taxation, the cost of low carbon policies paid through energy bills, is greater than the impact of VAT on these bills (see figure 13-5). Thus, whereas the combined average impact of VAT on electricity and gas bills never amounts to more than 0.93 per cent of household income (that is, for the lowest decile), the equivalent figure for the average impact of low carbon policies is 2.4 per cent, also for the lowest decile. The average amount paid as a percentage of equivalised disposable

income declines consistently from the 2.4 per cent paid by the bottom decile to 0.3 per cent paid by the top income decile. This quasi-taxation is thus clearly regressive.

Figure 03-5. Impact of low carbon energy policy quasi-taxes and environment-related business taxes on households by equivalised income deciles as a % of equivalised disposable income, 2019-20



Source: Our calculations using ONS/DEFRA 2020

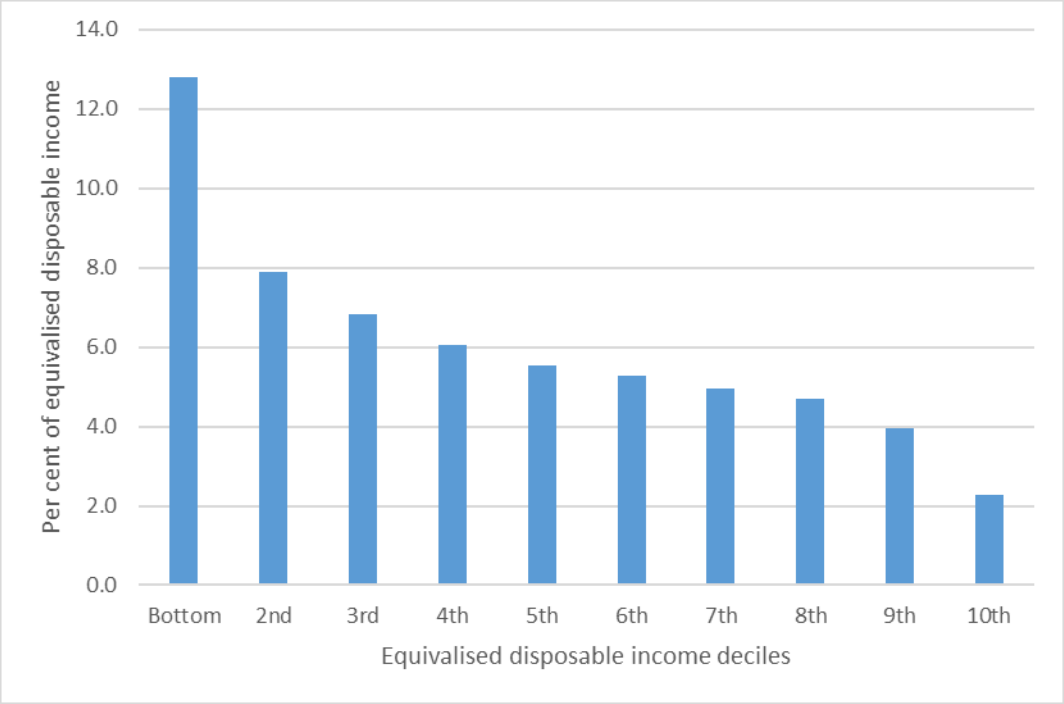
Figure 13-5 also shows the result of our illustrative calculation of the impact of environment-related business taxes (for example, the CCL, the ETS etc.) on households. This shows this impact is much smaller than quasi-taxes, given the relatively small amounts collected in these taxes as a proportion of government revenue (see table 13-1). The large majority of households do not pay more than 0.1 per cent of their income to cover these business-related taxes, assuming their cost is directly passed on in prices. Nevertheless, their impact is clearly regressive.

Overall distributive impact of UK environment-related taxes on households

In this section we compare the distributive impact of the different environment-related taxes on UK households and assess the aggregate effect of these taxes. In figure 13-6 the distributive impact of the taxes is compared. For each tax the tax incidence for the lowest income decile is expressed as a multiple of the tax incidence for the highest decile. The

higher this figure, the more regressive the tax. It is clear the most regressive taxes are those on domestic power, with VAT on electricity slightly more regressive that VAT on gas. Motoring taxes are slightly less regressive, with APD the least regressive tax.

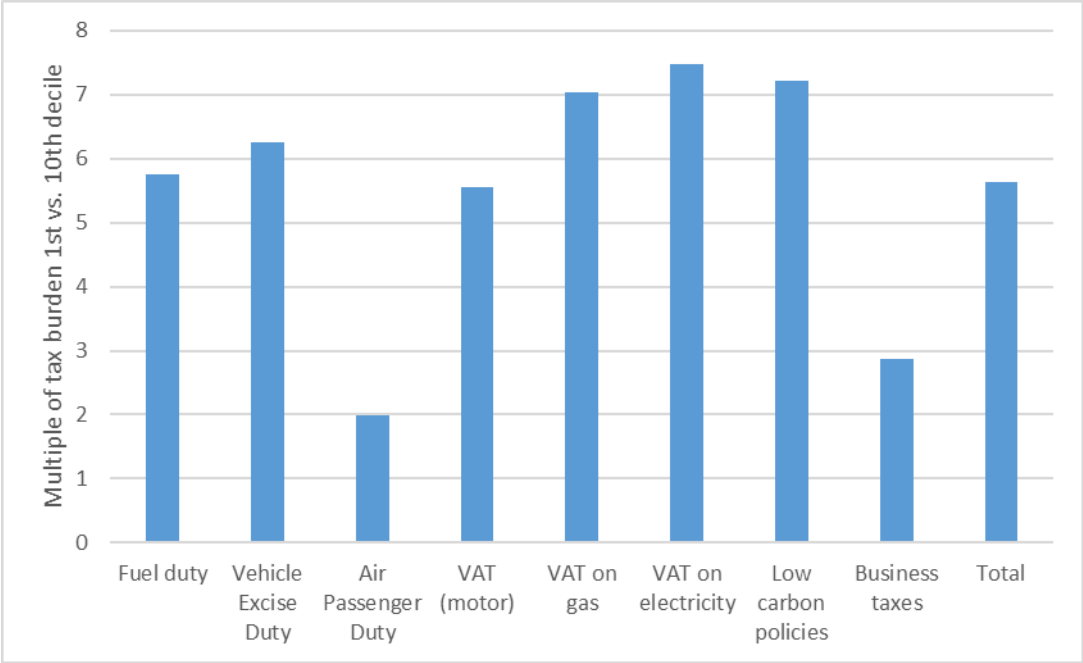
Figure 03-6. Overall distributive impact of environment-related taxation on households by equivalised deciles group as a % of equivalised disposable income 2019-20



Source: Our calculations based on ONS 2021a and ONS/DEFRA 2020

This figure also shows that in total the lowest decile households pay in excess of five times more in environment-related taxes as a proportion of their income than the highest decile. Figure 13-7 emphasises the particular incidence of environment-related taxes on the lowest decile. It shows that the gap between the lowest decile household and the next decile group is the highest between any neighbouring deciles. Thus, while environment-related taxation is clearly regressive at every point along the income scale, the burden on the poorest is disproportionately the greatest. In absolute terms, motoring taxes bear most heavily on this group. These account in total for more than nine percent (see figure 13-1) of the equivalised disposable income of the bottom decile compared to domestic fuel taxes which account for less than one per cent (see figure 13-3).

Figure 03-7. The incidence of environment-related taxation on the disposable equivalised income of the lowest equivalised income decile as a multiple of highest equivalised income decile



Source: Our calculations based on ONS 2021a and ONS/DEFRA 2020

Conclusion

Debates about the future development of environment-related taxes in the UK, particularly possible moves towards increased carbon taxation, have focused on the regressive impact of a carbon tax, generally considered in isolation. What this chapter emphasises is that carbon taxation already exists in the UK, but that its development has been characterised by the worst aspects of incrementalism; it has emerged unplanned and uncoordinated with very little concerted analysis of its distributive impact or the adequacy of benefit payments that mitigate to a limited extent its impact.

The chapter has shown the existing UK approach to be clearly regressive. This is particularly the case for VAT on domestic fuel, a situation exacerbated by the strongly regressive impact of quasi-taxation for climate change policies paid for by increases in energy prices. Taxes on domestic energy also disproportionally burden single-female households, older people and people with disabilities or long-term health issues due to their higher energy requirements. Motoring taxes are also strongly regressive but slightly less so. Only tax on aviation is close to proportional. Taxes on travel tend to have higher

impacts on men than on women, younger people, and people in employment. The main reason for these differences in regressivity is the varying income inelasticities of demand for the goods on which the tax is levied. Efforts to mitigate this regressive impact have developed in an entirely haphazard fashion and, as the above results suggest, are wholly insufficient particularly with respect to the lowest income decile households.

In such circumstances, in the face of a climate emergency, the question from a social policy perspective is less whether there should be carbon taxation, than which is the best way of making it as progressive as possible. A continuation of the unco-ordinated incrementalism that generated existing arrangements is in our view likely to make them even more regressive. On domestic fuel, for example, political sensitivities make highly unlikely charging VAT rate at the standard rate, notwithstanding repeated calls from some influential quarters (IFS, 2011; Preston et al, 2013). Indeed, as has been seen, in light of dramatically rising fuel prices in 2022, there have been calls for VAT to be lowered further (Reeves, 2022). This resistance to increasing VAT on fuel can be viewed as positive given such a change, introduced by itself, would be highly regressive. However, a better option might be a fuller re-consideration of domestic energy taxation encompassing the development of fully worked through compensatory mechanisms to make it less regressive (see for example, Büchs et al, 2021). At the least, such a process would involve a more transparent consideration of the funding and distributive issues underlying the government's Net Zero energy strategy. At present, it is generally left to Conservative neo-liberals to articulate such concerns, mainly it seems to resist *any* state-led action to mitigate climate change (Taylor and Horton, 2022).

A more encompassing approach would also create space for the consideration of more innovative, transformative means for protecting those on lower incomes. The provision of free green electricity at the level of basic needs, for example, has been shown to have greater potential for reducing fuel poverty than current arrangements because it reduces people's expenditure on necessities (Büchs et al, 2021). Other in-kind measures to support low income households to save energy, for instance free home insulation, energy efficient boilers or even solar panels and heat pumps, can also assist in cushioning regressive impacts of environmental taxes on necessities. They are also likely to have greater potential for emission reductions than recycling the revenue through equal per capita cash rebates because in-kind measures trigger greater demand for public and private investment in renewable energy (Büchs et al, 2021).

On motoring, policy-makers are equally reluctant to confront head-on the fiscal implications of reducing GHG emissions. The current government's focus is on tax-

supported electrification which is largely uncontroversial. However, in the short to medium term this development will also increase the regressivity of environment-related taxation. This is because lower income households generally hold on to older vehicles for longer and, when they do replace them, are put off purchasing tax-favoured electric cars by their greater cost (Hull, 2018; Tovar Reanos and Sommerfield, 2017). Increasingly, it will be these households who will be paying the bulk of motoring tax. This situation in particularly problematic given, as has been seen, it is on motoring taxes, particularly fuel duty, that the lowest decile groups pay by far the most overall in environment-related taxation. This is an issue that is barely mentioned in public debates and policy-makers seem equally determined to avoid discussion of alternatives to existing road levies (for example, road pricing), required as electrification reduces revenues (HM Government, 2021). In this policy area too, therefore, a more encompassing evaluation of tax options might create space for consideration of a broader range of compensatory mechanisms, for example, the provision of free public transport to the level of basic needs (Büchs et al, 2021).

Finally, lack of public awareness about the more proportional distributive consequences of aviation taxation assists those resistant to its extension. Discourses on the negative impact of higher aviation taxes on 'hard-working families' (Büchs and Mattioli, 2021) are frequently referred to by those resistant to such changes, leaving the highly unequal distribution of air travel emissions across income groups unchallenged. Meanwhile, the segregated and opaque nature of the UK's patchwork of environment-related taxation makes the progressive consequences of such a move harder to see. Yet, analysis shows that a range of approaches such as a flat rate tax per tonne of CO_2, frequent flyer levies, or combinations of these approaches, all have progressive distributional impacts, especially if the first return flight is excluded (Büchs and Mattioli, 2021). Indeed, higher taxes on flying could be introduced as part of a more general shift involving increased levies on "luxuries" to fund lower levies on necessities. Such an approach would have great potential to create a fairer environmental tax system and thus also increase public acceptance of such taxes.

In short, consideration of current environment-related taxes and their likely development over coming years provides a crucial and neglected context within which to assess the case for the role of taxation in the UK's Net Zero strategy. Policy-makers have hitherto largely avoided scrutiny of environment-related fiscal policy. A more broad-ranging, encompassing consideration of taxation's role would at least make more likely a fuller

assessment of its distributive consequences, and the variety of possible mechanisms for mitigating regressive effects, as part of a more general strategic reform.

Further reading

The most fully developed case for a fairer system of carbon taxation remains Preston et al (2013) though this is now rather dated. Büchs et al (2021) provides the most recent confirmation of the regressive distributional impacts of carbon taxes on home energy and motor fuels, considering 27 European countries. Büchs and Mattioli (2022) develops the case for taxes on air travel as the most progressive reform option as part of a broader, strategic approach.

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