



SAVE OUR SHROPSHIRE CIO

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LONG-TERM DECISIONS FOR CONSUMERS'

BETTER FUTURE

**A paper on the moral wisdom of postponing decisions on car and
energy emissions reductions
and the value of taxes on red meat and air travel**

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INTRODUCTION

I have noticed that the decisions that ordinary householders must make with respect to climate change critically depend on long-term decisions. Thus, they may need to invest £ 5,000 in installing Solar Panels, but they will save £ 500 per annum. They need to work out their Return on Investment.

There are some simple things that people can do to save money and the planet, like switching their central heating temperature down from the typical 21°C to 19°C, which can save upwards of 10 % of their fuel bill. That is a “no-brainer”, not requiring calculations of the Return on Investment.

The UK Government has now announced (without parliamentary scrutiny) that they will change the policy on cars by delaying the switch from petrol/diesel from 2030 to 2035 and will go slow on the switch to air-source heat pumps for oil boilers in off-grid situations. They have also announced some (phantom) policies that they are going to scrap:

1. To control the number of people in a car
2. To change peoples’ diet by taxing meat
3. New taxes to discourage flying, or going on holiday
4. A proposal for seven different bins

I recognize these are possible policies, and indeed introducing taxes to support behaviour change is a well-proven option for a government – tobacco, sugar, and alcohol to name just three. But in this case, there is no proven evidence for the proposals being made by the government, such that they can scrap them.

Save Our Shropshire CIO delivers education with the aim that people will understand the value of changing lifestyles in order to save the planet – but also to reduce their cost of living. In fact, our line is “creating better futures through changing lifestyles”. We also recognize what is good for the planet is good for the pocket.

If people understand why they need to change, then they should not need government intervention in the form of taxes to change. Addiction to alcohol and tobacco invariably makes it difficult for people to change. Hence those might need additional taxes to discourage people. Does Climate Change?

As part of getting an MBA I learned how companies/organizations and individuals should make decisions based on long-term projections. Shareholders invest in stock markets in a similar way.

When I then worked in industry, I regularly produced reports and projections relating to investment projects, and after that worked in helping companies develop “Integrated Business Planning” and ran hundreds of workshops encouraging companies to take a longer-term view of the world, rather than chase after short-term gain. I have written a book on the subject¹.

The assumption behind the government’s announcement is that by the government helping people in making longer-term decisions, people will benefit. Thus, if people postpone their electric car purchases, then they will avoid having to make expensive short-term decisions to buy an expensive electric car (£ 5 to £ 15 thousand pounds). If people do not buy air source heat pumps (where indeed the government subsidy has been increased) then they will save the cost of the conversion.

It is important, therefore, to also calculate the long-term costs to individuals, in a similar way. It would be irresponsible to encourage people to make long-term decisions that are not in their interest to make, for the sake of short-term political opportunism.

¹ “Integrated Business Leadership” - [Amazon](#)

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Part of the problem, also, is that these short-term decisions may not take into account the impact on the climate.

This paper shows how and where these short-term financial recommendations to householders are inaccurate, and in particular why people need to understand the facts with which to test potentially politically motivated instant decisions provided by the UK Government. In particular, these decisions also need to be thoroughly thought through.

We believe that these considerations should be part of a process where consumers are educated properly to make the right decisions, which will support our educational activities.

The UK's Environmental audit committee has already clearly set out a series of concerns they have , following the announcements.²

We are concerned here to point out the clear merits of education as an essential means of creating behavioural change, in the absence of properly thought-out approaches to government intervention.

² Environmental audit committee letter 29th September 2023

<https://acrobat.adobe.com/id/urn:aaid:sc:EU:8fb852ff-3527-4b77-81f5-48b093df95eb>

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1. SUMMARY

Cars

1. The statement that electric cars are more expensive and therefore it makes sense to postpone the ban on new petrol/diesel cars from 2030 to 2035 is incorrect. When a longer-term view is taken for a consumer, a comparison of the total cost of ownership shows that it is cheaper to buy Electric. This is based on an example of a Peugeot 208. Hence there appears to be no real rational reason for postponing this date, and it is wrong for the government to propose it. Globally it makes sense to see the market with second-hand cars.
2. In fact, it will likely be cheaper for all to start down the road of using electric vehicles, as it will encourage the use of them, develop the infrastructure, and enable people to take advantage of cheaper cars in the future afforded by the volume increases that will happen.
3. Looking at the impact of this on the environment, and assuming that it leads to electric vehicles continuing to be sold at the current level, then this policy will cumulatively add 33 million tonnes of CO₂eq of noxious gases to the atmosphere by 2035. The actual outcome could be less than this as this is possibly an extreme assumption (but sadly may not be).
4. This will also choke off battery electric vehicles (BEVs) which is essential for seeding the second-hand market. New car sales are in the range of 1.5-2 million vehicles in a car parc of 33 Mn vehicles. (Parc refers to the total number of cars registered to users in existence.) Throttling down the source of supply is irrational.
5. Meanwhile Car manufacturers are being forced to sell to the same % of targets previously required to be sold which is unfair as the government has reduced the demand for BEVs. This is possible in a centrally managed economy as in East Europe, but unlikely to be possible in a market economy.

Off-Grid Oil Boilers

6. The announcement that the ban on oil boilers from 2026 in off-grid situations is sensible because the high cost of alternatives like Air Source Heat Pumps is not correct, when one takes into account the fact that oil boilers have to be replaced every ten years, and the fact that air source heat pumps (ASHP) - are cheaper to operate because of their greater efficiency. Depending on the costs, air-source heat pumps are likely to be the same or less over 10-15 years. This is based on reasonable assumptions. Increased efficiencies of ASHP (from 3x to 4x) and lower efficiencies of oil boilers (85 % not 90%) make ASHPs even better.
7. Extra costs may be required to improve the energy efficiency of a home to support ASHPs. But this is an option that will improve the usage of any heating system.

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8. It would also make sense to invest in solar panels to generate the electricity required for ASHPs and the rest of a household's requirements; these can also be used to support the electricity generation at home for electric vehicles, as well. This investment will pay for itself over 10-15 years, giving a net payback of at least £ 2,000.
9. These options require investment, which could indeed be a significant lump sum. However, effective green investment financing options would not only support the correct long-term decisions for householders but also generate investment in new jobs in the manufacture and installation of ASHPs and associated industries.
10. In terms of the impact on the atmosphere, this proposal will lead to the cumulative addition of 7.3 million tonnes of noxious gases to the atmosphere by 2035 just for oil-source heating for 1.1 million homes.
11. The government has also announced that there will be exemptions from current laws on the installation of gas boilers in new homes. But this is not clearly described yet.
12. 23 million homes in the UK have gas boilers. The implication that is conveyed by this announcement of saying investment in ASHPs and similar is expensive may well encourage people to cancel their plans to replace gas boilers with non-fossil-fuel boilers. This could increase the emissions of harmful gases by 2035 by 3.2 million tonnes.

Meat Tax

13. The government states it has “scrapped” the proposal for a meat tax because of the impact on farmers. There has been no such government proposal, as widely reported, and is a specious statement.
14. The reasons for creating taxes are that these are ways of raising money to share the cost of public goods (e.g. police or health service) or to interfere in the market to change behaviour – for instance, taxes on alcohol and sugar have been implemented for health reasons, and yield significant revenues. Alcohol and sugar have an impact on farmers, constraining the demand for the raw materials for UK farmers. Hence the statement made is inconsistent with current practice.
15. Red Meat is harmful to consumers in the UK costing the NHS significant amounts of money through bowel cancer. The NHS recommends moderating consumption, but a tax on red meat could be considered to manage demand for red meat.
16. The emissions from red meat (beef, lamb, pigs) cause around 120 million tonnes of CO₂ to be emitted each year. There is an “assumption” that these will be reduced by 20 % in the 6th Carbon Budget. There is no plan as to how this will be achieved.
17. It would be consistent with both health considerations and environmental considerations to investigate and implement the idea of a tax on red meat. It is trivial to “scrap” the proposal without properly investigating how it might be used for health purposes and achieving environmental targets.

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18. There are inadequate plans to address the recommended 20 % reduction in meat consumption.

Air travel tax

19. The government has dismissed the idea of creating a further tax that would cost consumers more on their holidays. Again, this is a specious statement, as there is no direct government proposal to create a new tax, such that the government can scrap it.
20. Air travel emits around 45 million tonnes per annum – based on UK travellers. Around 12 % is business travel and the rest is leisure travel. Very few in the UK account for a larger proportion of travel – around 10 % account for 75 % of Airline profits.
21. There is an existing Air Passenger duty. It is not directly seen as a tax to manage demand for environmental reasons but is structured around distance travelled and class travelled (economy v business/first class).
22. This tax can be used as a better way of reflecting the cost to society of harmful emissions, and it would make sense to investigate its use as an environmental tax, with appropriate levels to compensate for the economic social damage created.

2. Incremental emissions of harmful gases.

The fundamental environmental issue is that the emissions of harmful gases add to the atmosphere cumulatively, increasing the impact on our climate. If the government, for instance, increases emissions by 1 million tonnes per annum for 5 years, then an additional 5 million tonnes collect in the atmosphere, all other things being equal.

This will prejudice the ability to reduce the emissions from the atmosphere in the longer term.

The simplest analogy is of an obese person having a target to reduce from 18 stone to 13 stone over the next 70 weeks at the rate of 1 pound per week.

But if the person then declares that they will not start for another 6 months, and will continue to add weight before starting to lose weight, then this means that it is bound to be harder to reduce to the original target of 13 stone over the remaining 35 weeks.

The statement that the 2050 target is still achievable is hence made less credible by the plans to increase emissions up to 2035 from cars and boilers, and failing to reduce emissions from diets and travel.

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3. The role of taxation and government in an economy

My assumption in this is that as a general simple point, taxes can be used to raise money for an economy to pay for public goods and services.

An economy driven to use price and costs to balance supply and demand through a profit-maximization process (as is the case in the UK economy and many other economies) can find that the process does not take into account “externalities”. These are costs that society and individuals pay as a consequence of other peoples’ actions, which are in fact ignored.

Thus, a typical example is that a business knows the direct costs of doing business by adding up the costs of inputs into its business. It also knows the prices it can charge its customers through selling and marketing efforts. But a steel plant – for instance – may cause clouds of dirt and dust to fall on its local community. They have costs – like washing clothes on the line – for which the factory does not directly pay.

Similarly, cars may cause pollution which travels through the atmosphere to peoples’ lungs, and then they have to manage the costs to their own lives, without the intervention of the government. Government intervention, I assume, is there to protect all citizens and compensate citizens in these circumstances for the “failure” of the market.

As illustrated in this article, sugar causes obesity and diabetes. The cost of this is not reflected in the costs that the manufacturer pays, and hence society can levy a tax on sugar and sugar-product manufacturers to influence the price, and hence the demand for products. This is also true for items like alcohol and cigarettes as obvious examples.

But governments can also raise money to pay for public goods and services, In the UK this is done through income taxes, capital gains taxes, and VAT. The success of demand management through taxation depends on the “elasticity” of the demand for the product or service that is taxed, and it is all clearly a political issue. Elasticity is the volume change that occurs in response to a price change. An increase in tax may make no difference to volume (hence the demand is inelastic) or the demand is directly responsive to demand (e.g. a 10 % increase in demand causes demand to fall by 20 %). These considerations need to be calculated and worked through with respect to tax.

Through this paper, I believe that tax can play a demonstrably useful part in managing demand.

However, equally, education of people about the adverse effects of doing things should also take place, and can avoid the need for taxation to be a blunt instrument in forcing people to change behaviour.

Thus, assuming it is true that smoking is socially “dangerous”, if everyone understood the impact of smoking on their own lives and others, and the eventual impact on the health systems, they ought to give up smoking. But even with all the efforts over the last 50 years, around 17 % of the UK population continues to smoke. So, government intervention becomes required to create a social solution. The success depends on the level of tax, and education that is carried out.

There is a continuing balance to be had between the balance of individuals operating without respect to society, and individuals living, working, and breathing in society. The role of government is to play a responsible role in making balanced decisions, taking into consideration the impacts of issues like climate change on their own and other societies.

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We believe in the power of education to change behaviour if properly carried out. If you think education is expensive try the cost of ignorance.

We also believe It is morally irresponsible wrongly to advise citizens of the short-term and long-term actions they should take because that advice is likely to appear more appealing in the run-up to an election.

This is particularly true when this advice is likely to lead to a worse outcome for all citizens in the long term, where we assume that a government should take a balanced view of the efficacy of their intervention in the marketplace versus the overall impact on citizens' lives as members of a society.

There is such a thing as society, which represents how we interact with each other in some kind of social contract.

4. Methodology

Clearly, the consequences of decisions over the longer term are complex.

However, the key to any analysis is the assumptions one makes to get to a conclusion, and then the discussion should be about the assumptions.

The government statement on cars, for instance, moves the date from 2030 to 2035 for when it will become illegal to sell new petrol/diesel cars. This is 12 years away, and so I have looked at a horizon of 12 years as being long-term. This is not because I am accurately predicting what will be happening in 2035, but more to show what the result over a longer-term horizon looks like, based on a set of well-researched assumptions.

I have researched some figures that I believe are relevant to the subject area and used this as a basis for indicating the value to consumers of the decisions they can make.

Net Present Value is a useful way of adding up future values, discounted at a standard interest rate, to the present day to a single figure. I have used a rate of 5 % as the basis of the calculation, as a simple approach. In principle that says that if I have £ 10,000 in the bank, I can invest it at 5 % per annum. (I note that the 6th Carbon Budget uses 3.5 %, but this looks low in current circumstances). I should use this as a comparison when making decisions about two or more options.

This approach states that if – for instance - I can invest that in a new electric car and thereby reduce my total operating costs of running a car over 12 years, then I can compare that investment with the alternative of buying a petrol/diesel car while comparing that with the “time value” of money represented by 5 %.

Hence in this paper I compare the Net Present Value of various outcomes to demonstrate the impact of long-term decisions on consumers in their financial affairs, by reference to a single number for each option (thus investing in an electric car as opposed to a petrol/diesel car)

It is possible that not many consumers will go through this kind of analysis formally.

But here I am testing the proposition of whether the decisions on the longer term as stated by the government really do stack up against the facts when using a technique that is recognized in decision-making to evaluate long-term investments, assuming a rational financial decision is taken.

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I have also then looked at the consequences of the decisions on the environment with respect to CO2 equivalent emissions, by using standard factors (provided by the government) to calculate these emissions in various scenarios.

In this way we can explore the financial scenarios of individuals with the cumulative impact on the environment caused by the government.

5. Electric cars

Background Facts

1. As of March 2023, there were 33 million cars registered in the UK. Of that 0.7 million are Battery Powered Electric vehicles (around only 2 %). The purchase of new petrol/diesel cars vehicles will be banned under current government legislation by 2030. Of this group sitting in the car parc, around 8 % are company cars.
2. Around 1.6 million new cars were registered in 2022/23, and around 1.8 million will be registered this year. Around 50-60 % of new vehicles are registered by businesses, and there is a clear growth in electric car sales to businesses.
3. The total second-hand car market is around 7 million vehicles as shown in the following table:

Sales of Cars by Fuel Type		
No. of sales	2,021	2,022
Petrol	4,230,540	3,903,587
Diesel	3,046,751	2,691,293
Hybrid	134,653	155,055
Electric	40,228	71,071
Plug-in Hybrid	54,115	55,053
	7,506,287	6,876,059
Source: SMMT		

Thus, as far as consumers are concerned, the legislation in the government announcement of postponing the date on banning sales of new petrol/diesel cars in favour of electric vehicles affects a total market of around 0.8 million vehicles, out of a total of 7.5 million vehicles – which is only 10 %

The new car market feeds the second-hand car market of 7/8 million vehicles.

This revised proposal, which is likely to reduce the sales of battery vehicles (“because of cost to consumers”) will likely choke the needed increase in sales of new battery-powered cars, which if anything may well increase the price of second-hand battery cars – in the same way as the market has seen in the last couple of years because of shortage of components for new cars.

It will certainly constrain the availability of electric vehicles in the second-hand car market, which is where there are 7/8 million cars traded each year.

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Hence, in principle, 90 % of consumers' purchases each year are for second-hand cars, and the increase in the second-hand car market will have a critical impact on whether we can reduce our emissions from cars.

Analysis of the impact of the legislative change

Taking the 10 % who will be buying new cars – for whom the change in legislation is being made – I have looked at the difference it would make to someone who continues to buy a new petrol car in 2025, and thereafter changes it every five years (typical), and then compared that with switching to an electric car in either 2030 or 2035.

I have allowed for depreciation, maintenance, insurance, and taxation (and assumed that EVs will be taxed at £ 180 per year from 2025). Thus, a full view of all costs. The cost of charging the electric vehicle is based on the Octopus energy rate of 7.5 p per kWh, which allows for overnight charging.

I have made a comparison based on a Peugeot 208 petrol car and a similar Peugeot E-208; so similar models.

Clearly, this analysis depends on all the assumptions made, but I believe they are reasonable, but every person will need to make their own (long-term) decisions.

The result of the comparison is shown at [Appendix 1](#)

The Net Present Value (sum of all the costs from 2025 to 2039 including capital and operating costs) for the base scenario (being forced to buy an electric car in 2030 and keeping to petrol until then) works out at:

NPV @ 5%	£63,515
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The Net Present value of the alternative scenario of buying petrol cars until 2035 works out at:

NPV @ 5%	£63,373
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This is because the increased running cost of the petrol car offsets the increased cost of the electric car in the 5 years between 2030 and 2035.

Given, also, that electric cars will probably be cheaper in 2030 than now in real terms (I have assumed constant pricing) then it is likely that the option of buying electric in 2030 will be lower in the first scenario of buying an electric car in 2030

Hence stating that changing the law forcing all new cars to be electric instead of petrol/diesel from 2030 to 2035 because it will be cheaper for the consumer is very likely to be misleading.

The more worrying aspect is the message from the announcement that it is better to delay the purchase of electric cars, is that it will disrupt the market for new electric cars, and hence limit the availability of second-hand cars. It will also reduce sales for car manufacturers, who will see a reduction in the return on their £ billion investments.

I have not looked at the position with business cars, but I assume businesses will be keen to adopt electric cars, because of the savings these make. But they will clearly be looking for better infrastructure for their managers who travel extensively around the country. The following table,

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produced by Deloitte summarises the Total Cost of Ownership for a fleet car over its lifetime, which shows a 10 % reduction in cost for Electric vehicles:

Example: Hatchback	ICE	BEV	Difference (£s)	Difference (%)
List price	£31,275	£36,550	£5,275	17%
More visible/obvious costs				
Lease rentals	£18,348	£20,422	£2,074	11%
Maintenance	£2,076	£1,830	£246	-12%
Motor insurance	£2,100	£2,100	£0	0%
Sub-total	£22,524	£24,352	£1,828	8%
Less visible/obvious costs				
Employer Class 1 A NICs	£3,954	£330	£3,624	92%
VAT recovery	£1,875	£2,007	£132	-7%
Corporation tax relief	£5,138	£5,221	£83	-2%
Sub-total	£3,059	£6,898	£3,839	-125%
Total cost of ownership (TCO)	£19,465	£17,454	£2,011	-10%
Calculation assumptions: The example is based on a company car acquired in April 2023 and leased on a 36-month term with a contract mileage of 60,000 miles. It is assumed the employer pays corporation tax at the main rate and can recover VAT.				
Source: Deloitte				

I suspect similar considerations will apply to business – postponing purchase is not rational.

The other important aspect is that if consumers charge their cars at home using solar panels and batteries, then the running cost becomes close to zero. This makes sense in the context of building one's lifestyle around a low energy and low carbon environment.

We will deal with how consumers should be looking at energy costs in the next section. In the base case as above the cost will be:

NPV @ 5% £63,515

The advantage given by having solar panels will be:

NPV @ 5% £62,315

This shows an additional £ 1,200 saving to be made by having solar panels.

The detailed figures are shown at [Appendix 2](#)

The conclusion is that the legislative change will encourage a behaviour that does not lead them to save money in this way, which is totally the wrong outcome for those who are taking on board the need to reduce carbon emissions.

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Impact on the Environment

The impact on the environment is complex, and hopefully, the Climate Change Committee will come up with an authoritative assessment.

In principle, there will be two effects:

1. Each medium-sized car petrol emits around 2.7 tonnes per annum on average ³
2. Each new car carries with it an amount of embedded carbon when it is bought, which works out to around 10 tonnes. So, when people replace their cars, there will be a big hit when they do this. If some were now to put off replacing their cars as a result of this, then perhaps this proposal of postponing purchases would have a positive effect. However, I take the view that it has a zero effect as we will be only moving around the consumption by 2/3 years. We have got to do it some time and so it has a zero-sum effect in this respect on the atmosphere.

In addition, we need to speculate/forecast on the impact of new production on the size of the UK car parc, as a result of these measures.

The SMMT produced in 2021 a forecast of car registrations in the UK and the size of the car parc⁴. The word parc is used to refer to the total number of cars in existence. The relevant tables for new car registration and car parc are as follows (just up to 2035 which covers the period covered by the legislation)

Forecasts for Total Car Market and Car Parc by SMMT

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
BEV	350	450	575	700	850	1,000	1,200	1,425	1,575	1,700	1,825	1,950	2,150
PHEV	175	200	225	225	250	275	325	325	350	300	250	150	0
HEV	240	260	275	290	300	300	325	250	175	150	100	50	0
ICE	1,485	1,390	1,225	1,085	900	625	250	0	0	0	0	0	0
Total market	2,250	2,300	2,300	2,300	2,300	2,200	2,100	2,000	2,100	2,150	2,175	2,150	2,150

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
BEV	953	1,392	1,951	2,628	3,447	4,406	5,553	6,909	8,395	9,980	11,659	13,422	15,335
PHEV	673	865	1,079	1,291	1,524	1,778	2,075	2,364	2,671	2,917	3,101	3,173	3,080
Other	32,830	32,279	31,603	30,815	29,851	28,595	26,974	25,017	22,992	21,003	19,020	17,078	15,196
Total parc	34,456	34,536	34,633	34,734	34,822	34,779	34,602	34,291	34,057	33,899	33,780	33,673	33,610

EVs are Electric vehicles of different types. ICE are petrol/diesel Internal Combustion Engines.

These figures show that ICEs will stop being sold in 2030, and battery vehicles will rise to 2.15 Mn units per year by 2035. The total Car Parc will fall slightly to 33.6 Mn by 2035, and the build-up of sales of BEVs will lead to there being around 15.4 Mn BEVs in place.

It is this number that is threatened by the change in legislation.

From these numbers and standard emissions figures from RAC and the Department of Transport we can calculate the projected emissions from all of the cars on the road. They are as follows:

³ Government conversion factors <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022>

⁴ SMMT Report <https://www.smm.co.uk/2021/06/smm-new-car-market-and-parc-outlook-to-2035-by-powertrain/>

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Forecast Emissions for Total Car Market and Car Parc from SMMT figures

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
BEV	0	0	0	0	0	0	0	0	0	0	0	0	0
PHEV	0	0	1	1	1	1	1	1	2	2	2	2	2
Other	80	78	77	75	72	69	65	61	56	51	46	41	37
Total parc	80	79	77	75	73	70	67	62	57	53	48	43	39

Thus, the total emissions is forecast to reduce from 80 million tonnes per annum in 2023 to 39 million tonnes per annum by 2035.

In order to calculate the impact of the government's change between now and 2035 I have looked at two scenarios:

1. I have assumed that the forecast sale of BEVs remains as in the 2021 SMMT forecast of 350,000 vehicles per year (thus most people will be put off buying electric cars)
2. I have assumed that 50 % of the growth in sales has been lost through people being put off from buying electric cars.

I have then assumed that the difference between the forecast BEV sales and this figure becomes Internal Combustion Engine Sales. (It might be slightly better if they are Hybrid sales, but not much)

I have then simply assumed that all the new ICEs enter the car parc over that 10-year period (which covers the approximate lifetime of the car). This is slightly longer than the average figure of 8.4 years recorded by the AA but is a reasonable assumption for the purposes of this exercise.

From this, we can calculate the annual and thus the cumulative effect on the atmosphere, and this is shown in the following table:

Projections for Car Market emissions based on static BEV registrations

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
BEV Registrations	350	350	350	350	350	350	350	350	350	350	350	350	350
Sales going to ICE		100	225	350	500	650	850	1,075	1,225	1,350	1,475	1,600	1,800
Impact on Car Parc		100	325	675	1,175	1,825	2,675	3,750	4,975	6,325	7,800	9,400	11,200
Annual Emissions		0	1	2	3	4	6	9	12	15	19	23	27
Cum Impact on Atmosphere		0	1	2	4	7	11	16	21	27	34	42	50

Thus, the additional emissions will be 1 Mn tonnes p.a. in 2025 and rise to 27 Mn. Tonnes more than projected, by 2035, which is around 34 % of the current emissions, and the cumulative impact on the atmosphere over the next 11 years until 2035 will be 50 million tonnes!

This certainly could prejudice the 2050 net zero target.

In the second scenario, we look at a situation where sales of BEV's do not grow by as much as people continue to replace petrol and diesel cars with BEV's but are put off by the ban moving, and the messaging that electric cars are expensive.

The result of this is as in the following chart:

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Projections for Car Market emissions based on reduced growth (-50 %)

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
BEV Registrations	350	400	463	525	600	675	775	888	963	1025	1088	1150	1250
Sales going to ICE		50	113	175	250	325	425	538	613	675	738	800	900
Impact on Car Park	0	50	163	338	588	913	1,338	1,875	2,488	3,163	3,900	4,700	5,600
Annual Emissions		0	0	1	1	2	3	5	6	8	9	11	14

Cum Impact on Atmosphere													
		0	1	1	2	4	5	8	11	14	17	21	25

In this scenario the annual emissions will grow from 1 Mn. Tonnes per annum in 2025 to 14 Mn. tonnes per annum by 2035, with a cumulative impact of 25 Mn tonnes. 14 Mn. tonnes is around 3 % of current total annual emissions of CO₂ eq.

Meanwhile, the motor manufacturing industry is under pressure to maintain a target share of new BEV sales. The FT reported on 21st September that “the UK EV sales scheme involves manufacturers being required to sell an increasing proportion of zero-emission cars every year this decade or face fines of up to GBP15,000 a vehicle. It said an initial target requiring 22 percent of each carmaker’s sales in 2024 to be zero emission will remain, as will the goal of 80 percent in 2030”.

Sales of cars depend on the actual demand from consumers for cars.

We are not part of an East European market economy where centrally planned manufacture and sales can occur. If the government relaxes the requirements on consumers to buy cars, then manufacturers will be unlikely to sell them, and the % of BEVs sold will reduce. It appears that the manufacturers are being tasked with a contrary and illogical objective. On the one hand, consumers are being encouraged to buy less, but manufacturers are being encouraged to sell more. BEVs. Perhaps the government will be forced to buy the excess production?

In conclusion, the argument that it makes sense to save consumers money by postponing the date of compulsory manufacture of new cars is unsound. It will make no difference to consumers, because the extra cost of purchasing cars now, will be offset by the savings to be made from running an electric car (or could be made better if someone had solar panels).

In fact, it would be better to encourage people to get on the ladder of buying new cars now to expand the infrastructure and the sales of cars by car companies to feed the second-hand car market.

Further, the impact on the atmosphere could be dramatically worse by increasing emissions by up to 35 % in 2035 of what they would otherwise be each year!

The lump sum that some consumers may need can be offset by payment plans offered by vehicle manufacturers/retailers, or by a green financing initiative enabling loans at preferential rates to support purchases of cars.

Discouragement of the sale of BEVs will also put a brake on the development of infrastructure etc. which will prevent the ability of the government to meet its targets for net zero by 2050.

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6. Energy

Background information

With regard to energy, UK consumers emit around 70 million tonnes of CO₂e, which is around 2.5 tonnes of CO₂ per household for 28 million households. So, it is significant.

The government's announcement was confusing. The current position with respect to heating boilers is that:

1. All new homes from 2025 will not be allowed to use fossil-fuel boilers.
2. From 2035 there is a ban on fossil-fuel boilers being used in new boiler installations.
3. Houses using oil or LPG boilers are banned from using these fuels in new boilers from 2026.

The government announced that people who have oil boilers (item 3 above) would not have to replace their boilers with air-source heat pumps until 2035 so that they did not have to spend £10 to £15,000 in three years' time.

There was also a statement that there will now be exemptions to the rule in Item 2 above (ban on fossil-fuel boilers from 2035) for "households who will most struggle to make the switch to heat pumps or other low-carbon alternatives". What does that mean in practice?

Oil Boilers

Oil boilers are cheaper to install than air source heat pumps, but clearly run off fossil fuels which are bad for the environment.

Air source heat pumps have a life of around 25 years, whereas oil boilers last around 10 years. So, I have looked at the relative costs of installation of oil and air-sourced heat pumps. The figures for a typical installation of an oil boiler, assuming installation in 2024 are as follows:

BASE CASE	Replace Oil Boiler with new oil boiler													
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Boiler Cost		2,250											2,250	
Installation cost		1,250											1,250	
Heat Demand Kwh		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	
Litres of oil		1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	
Cost per litre of oil		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Running Cost		1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	
CASH FLOW		4,765	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	4,765	1,265	
NPV@ 5%		16,590												

This is based on current prices for oil and assumed efficiencies for oil boilers remaining the same. It also assumes the replacement of the boiler in 2034.

The result is that the total long-term cost up to 2035 will be around £ 16,600 including the investment cost and the running cost.

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I have then compared this with a net investment cost of £ 6,500 for an air source heat pump including the uplift in government grant to £ 7,500. This is based on the Energy Saving Trust figure for the installation of an Air Source Heat Pump of £ 14,000.

I have also based the running costs on the latest electricity prices for the air source heat pump, and shown a saving of running an air source heat pump (because of its increased efficiency). The figures for this analysis are as follows:

INVESTMENT CASE	Replace Oil Boiler with AIR SOURCE HEAT PUMP												
	ASHP	Efficiency	350%										
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
ASHP Cost		7,500											
Installation Cost		6,500											
Gov't grant		7,500											
Heat Demand KWh		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Demand for Electricity KWH		3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429
Cost per £/Kwh		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Running Cost		926	926	926	926	926	926	926	926	926	926	926	926
CASH FLOW		7,426	926										
NPV @ 5 %		14,395											

The net result is that the cost of installing an air-source heat pump will be £ 14,400, which is around £2,200 less than the cost of installing a new oil boiler. There may be some situations where the costs are a lot higher, and some where they are a lot lower. But this is a reasonable average case.

Hence the cost of installing an air source heat pump based on long-term considerations is – based on these assumptions – not cheaper as the government has announced. In fact, as it encourages consumers to lock themselves into more expensive ways of heating their homes it is morally wrong!

The assumptions are reasonable and based on an efficiency of 3 for ASHPS. However, it is possible for ASHPs to achieve a level of 4. This will make the case even more compelling for ASHPs.

The main running cost for an air-source heat pump is electricity, so the householder will be dependent on that source of energy for heating. That could be obtained from the normal grid source.

However, there is no reason why a householder could not install solar panels to generate electricity for their air source heat pump. Hence, I have also looked at the cost of adding solar panels into the equation, and this comes out as follows:

INVESTMENT CASE	Replace Oil Boiler with AIR SOURCE HEAT PUMP and SOLAR PANELS												
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
ASHP Cost		7,500											
Installation Cost		6,500											
Gov't grant		7,500											
Solar Panels		5,420											
Battery		4,500											
Heat Demand KWh		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Demand for Electricity KWH		3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429	3,429
Cost per £/Kwh		-	-	-	-	-	-	-	-	-	-	-	-
Running Cost		-	-	-	-	-	-	-	-	-	-	-	-
CASH FLOW		16,420	-										
NPV @ 5 %		15,638											

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Thus the £ 10,000 investment in Solar Panels and Battery would support the generation of electricity. On the face of it, the net long-term cost is around £ 1,000 more than running off the electricity grid.

But if we design our system to include charging an electric car, then the total cost of the investment is likely to be worthwhile. Note my comments above about saving the cost of charging cars at home.

The total investment is around £ 16,000 for these energy-producing options and is clearly a significant lump sum.

Financing it could be made possible from a financing initiative from the Energy companies, or a Green Bank, where people do not have access to savings to enable these changes.

Gas Boilers

Underlying these announcements from the government is also the thought that the installation of air-source heat pumps is not a suitable alternative to gas boilers, which are in use across most houses for central heating. The statements are not clear.

A new gas boiler costs around £ 3,000 with a £ 500 installation cost. These figures are the same as for an oil boiler, and hence similar comments above apply to this sector of the market for boilers and air-source heat pumps.

If we look, however, at the projected emissions for houses with gas boilers and project the number of houses by expected growth in the number of houses using government population projections, then we get the following figures:

GAS BOILER EMISSIONS	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Number of houses (000)	23,000	23,191	23,378	23,569	23,758	23,944	24,126	24,307	24,487	24,663	24,834	24,999	25,161
Gas usage for heating (kwh)	12,000												
Gas required	13,333												
CO2 Emissions / home has boiler	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Tes/Annum	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total Emissions (Million tonnes pa)	64	65	65	66	67	67	68	68	69	69	70	70	70

Thus the current base case is that emissions can be expected to rise from 64 million tonnes per annum to 70 million tonnes per annum by 2035.

Impact on the environment

Oil boilers

The government announcement appeared to suggest that this relaxation in the legislation would last for ever. There are approximately 1.1 million people affected by this legislation ⁵

Assuming:

1. Conversion factor for fuel oil is 0.29 Kg/ Kw hour,
2. A rate of installation of new boilers from 2025 to 2035 of around 100,000 per annum based on a lifetime of 10 years for boilers

⁵ Government consultation paper

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026356/domestic-offgq-consultation.pdf

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We can calculate the following level of annual emissions from off-grid houses if we stopped using oil boilers in 2026.

BASE CASE - 2026 BAN													
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CO2 emissions (Tes/house)		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Number of consumers (thousand)	1,100	1,100	1,100	1,000	900	800	700	600	500	400	300	200	100
New Boilers fitted			100	100	100	100	100	100	100	100	100	100	100
Remaining oil based consumers			1,000	900	800	700	600	500	400	300	200	100	-
Emissions		-	3.48	3.13	2.78	2.44	2.09	1.74	1.39	1.04	0.70	0.35	-
Cum		-	3	7	9	12	14	16	17	18	19	19	19

Thus, this policy could reduce emissions from 3.5 million Tonnes per annum to around 0 by 2035 – a cumulative emission of 19 million tonnes, between now and 2035.

If we then assume that this announcement effectively eliminated the demand for air-source heat pumps in off-grid locations, then we can calculate the following picture:

REVISED CASE - 2035 BAN													
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CO2 emissions (Tes/house)		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Number of consumers (thousand)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
New Boilers fitted			-	-	-	-	-	-	-	-	-	-	-
Remaining oil based consumers			1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Emissions		-	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Cum		-	4	8	11	15	19	23	27	31	34	38	42
Incremental emissions			0.35	0.70	1.04	1.39	1.74	2.09	2.44	2.78	3.13	3.48	3.83
Cumulative				1.04	1.74	2.44	3.13	3.83	4.52	5.22	5.92	6.61	7.31

The key figures are in the bottom two lines which shows the additional emissions that would occur, resulting from the government's announcement, with the total figure being 7.3 million tonnes being added to the atmosphere by 2035.

Thus, in conclusion, the assumption that air source heat pumps are an expensive alternative to just replacing with an oil boiler is something that should be challenged based on the facts, but also the environmental impact will be a significant addition of harmful gases from this delay.

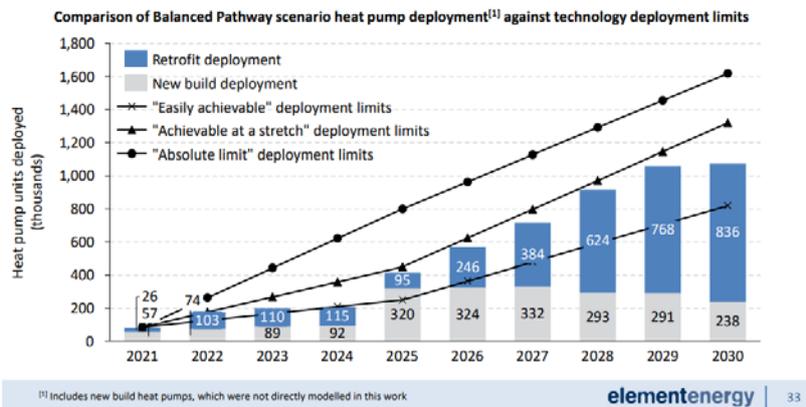
There is a technical alternative in Hydrotreated Vegetable Oil (HVO) which is in trials. The cost of conversion of boilers is around £ 500. The cost is around 10 % higher, and availability may be restricted. But it is worth thinking about!

Gas Boilers/ASHPs

The Climate Change Commission has estimated the number of ASHPs to be installed as follows:

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Using the central "Achievable at a stretch deployment" data we can then see how much CO₂eq is expected to be displaced by this roll-out to 2035 (there are further figures in the report for 2030 to 2035 which project around 1 million units per annum).

From this, I have calculated that the expected reduction in emissions is as follows:

GAS/OIL BOILER EMISSIONS	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Number of houses (000)	23,000	23,191	23,378	23,569	23,758	23,944	24,126	24,307	24,487	24,663	24,834	24,999	25,161
Gas usage for heating (kwh)	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Gas required	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333
CO2 Emissions / home has boiler	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Tes/Annum	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total Emissions (Million tonnes pa)	64	65	65	66	67	67	68	68	69	69	70	70	70
Planned Heat Pump rollout (CCC)	200	207	416	570	716	917	1059	1074	1000	1150	1250	1400	1400
Implied reduction in Emissions (Mtes)	0.6	0.6	1.2	1.6	2.0	2.6	3.0	3.0	2.8	3.2	3.5	3.9	3.9
Cum reduction in Emissions	0.6	1.14	2.30	3.90	5.91	8.47	11.44	14.45	17.25	20.47	23.97	27.89	31.81

Thus ASHPs will remove around 30 Mn tonnes by 2035, which is significant.

But if this announcement were to reduce demand for ASHPs by 20 % over this period (for gas and oil boiler replacement), then the cumulative effect by 2035 will be to add around 6 million tonnes of noxious gases to the atmosphere.

This will further prejudice the 2050 targets.

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7. Meat Tax

The Government has announced the scrapping of a Meat Tax to avoid harming farmers as a result.

There appears not to have been any specific kind of proposal as part of any government proposal or policy (which there definitely has been with respect to cars and boilers). Hence it is just putting up straw people to knock them down again.

However, food is an important part of the picture, which probably has not had the attention that it deserves.

In the 6th Carbon budget, it was said:

“Measures to release land.

Changes in consumer and farmer behaviour can release land from agriculture while maintaining a strong food production sector. We considered five measures that could release land covering societal changes and improvements in agricultural productivity.

Our analysis implies that these five measures could reduce annual agricultural GHG emissions by 8 MtCO_{2e} by 2035, rising to just over 11 MtCO_{2e} by 2050, with diet change the most significant:

Diet change. Our Balanced Pathway involves a **20% shift away from meat and dairy products** by 2030, with a further 15% reduction of meat products by 2050. These are substituted with plant-based options. This is within range of the Climate Assembly’s recommendations for a 20-40% reduction in meat and dairy consumption by 2050.¹⁸ Our pathway results in a reduction in livestock numbers and grassland area, delivering annual abatement of 7 MtCO_{2e} by 2035, rising to nearly 10 MtCO_{2e} by 2050.”

However, the focus of this report is UK Agriculture and Land Use, and looks at the impact of changing diets on UK Agriculture. It does not appear to look at our total food consumption patterns, and the impact of the total supply chain emissions, as for instance calculated by Poore and Nemecek, 2018.⁶

We need at least 50 g of protein per day. We can get that from a beef steak that weighs 180 g. If we buy that from a farm (e.g. in Brazil) where the cattle are managed intensively and which was created using deforested land (which removes a means of absorbing CO₂), then the emissions from that steak are a massive **25 kg of CO_{2e}**.⁷ This covers the methane, which the cow burps, and all the other inputs to the farming and distribution process.

Whereas if it is from a dairy herd in the UK it is 8.6 Kg.

Lamb causes 10 kg, Pork 3.8 kg, and Chicken 2.8 kg.

So when there is generic talk about not having a food tax “because of its impact on farmers” then this is inadequate.

We should be asking which farmers are we talking about. Is that Brazilian, or are they dairy farmers, pig farmers, or chicken farmers?

If Brazilian or Australian farmers, then an import tax might well help local UK farmers.

⁶ Poore and Nemecek <https://www.science.org/doi/10.1126/science.aaq0216>

⁷ “How Bad are Bananas” – Mike Berners-Lee p86.

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I have calculated, based on the supply of meat data from Defra Figures ⁸, the total consumption of meat in the UK, and then projected that forward with an increase based on annual forecast population projections.

Using the Poore and Nemecek figures for GHG gases per kg of meat, I have calculated the following emissions by type of meat:

Food : Projected Emissions of CO2e													
Mn Tonnes	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Cattle	72	73	73	73	73	73	74	74	74	74	74	74	74
Pigs	17	17	17	17	17	17	17	18	18	18	18	18	18
Sheep	11	11	11	11	11	11	11	11	11	11	11	11	11
Poultry	20	20	20	20	20	20	21	21	21	21	21	21	21
Total	121	121	121	122	122	122	123	123	123	124	124	124	124

(n.b. I have averaged the figures for Dairy and beef herds on a 50:50 basis in line with the beef population).

Thus, the current pattern of consumption of meat works out at around 1.8 tes per annum emissions of CO₂ per person – very significant.

The 121 million tonnes currently estimated above to be emitted is around 30 % more than the total emissions for cars, which is getting a huge amount of attention with respect to changing from petrol to electric vehicles etc. It is surprising that diet does not get as much attention.

The agricultural industry is a significant business, and the value of production has been around £ 10.3 bn per annum, as follows.

Value of production (£ million)			
Cattle	2,955	3,349	3,758
Pigs	1,481	1,461	1,727
Sheep	1,363	1,574	1,626
Poultry	2,829	3,031	3,149
Total value	8,628	9,415	10,260

The 6th Carbon budget looks at a recommended reduction of 20 % of meat consumption - which represents a reduction of around 24 million tonnes of CO₂e and a reduction in farming production of around £ 2 bn, if spread across all sectors.

Note that beef creates 67 g/kg of CO₂, but poultry creates 10 g/kg. Thus a 30 % reduction in Beef production would reduce emissions by 21 Mn. Tonnes. If transferred to poultry production, then emissions would increase from poultry production by only 3 million tonnes. Poultry output would increase by around 35%.

Hence the plan could be refined by encouraging a switch from beef to poultry consumption, for instance, or all red meat to poultry (or others). But it is clear that there needs to be a reduction in demand for red meat.

⁸ Defra database – AUK Chapter 8 - <https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom>

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Taxation on Food

There are examples where food and drink taxes have been imposed, in spite of the impact on industries.

Alcohol taxes are an obvious example. Increasing excise taxes on alcoholic beverages is a World Health Organization 'Best Buy' intervention for the prevention and control of noncommunicable diseases.

This is because consumers are sensitive to changes in the price of drinks; if an increase in duty raises the price of an alcoholic beverage, then they are likely to consume less of it.⁹ WHO says:

“An increase in excise taxes on alcoholic beverages is a proven measure to reduce harmful use of alcohol and it provides governments revenue to offset the economic costs of harmful use of alcohol.”

It is a significant source of revenue for the UK Government. The Office for Budget Responsibility (OBR) forecast that alcohol duties will raise £12.7 billion in 2022/23. This represents 1.3 percent of all tax receipts and is equivalent to around £450 per household and 0.6 percent of national income.¹⁰

The Spirits and the Beer industry both rely on barley as an input, and therefore taxes on alcohol affect UK Barley farmers.

Another example would be the sugar tax introduced in 2018. This was introduced to prevent the impacts on the provision of healthcare because of Cancer, Diabetes Type 2, and obesity.

As a result of the levy in the UK, more than 47,000 tonnes of sugar has been removed from soft drinks every year between 2015–19, raising £334m in revenue in 2021–22.¹¹

The food industry gets around 50 % of its sugar from Sugar Beet framers in the UK, who could have been affected.¹² It could affect 9,500 jobs in the UK.

So the statement that taxes should not be raised on foods because of their effect on farmers is not a general principle or policy in the UK. Current taxation policy suggests that taxes should be imposed where health is an issue.

Red Meat is already identified as a health issue.

The NHS states “*Red meat – such as beef, lamb and pork – is a good source of protein, vitamins and minerals, and can form part of a balanced diet. However, eating a lot of red and processed meat increases your risk of bowel (colorectal) cancer.*

That's why it's recommended that people who eat more than 90g (cooked weight) of red and processed meat a day cut down to 70g or less. This could help reduce your risk of bowel cancer.”

Bowel Cancer UK recommends eating 500 g/week (equals the NHS recommendation).

⁹ World Health Organization. Management of substance abuse – Raise prices on alcohol through excise taxes and pricing policies [SAFER project](#)

¹⁰ Alcohol taxation: government policy up to 2020 <https://commonslibrary.parliament.uk/research-briefings/sn01373/>

¹¹ World Cancer Research Fund <https://www.wcrf.org/looking-back-at-5-years-of-the-uk-soft-drinks-industry-levy/>

¹² British Sugar statement <https://www.britishsugar.co.uk/media/news/2021-07-15-statement-on-the-national-food-strategy>

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The Lancet magazine has an article that summarises these issues.¹³ It points out that “In the UK, research groups have suggested that beef consumption needs to decrease by 89% to stay within planetary boundaries.”

In addition to the GHG emissions consideration in relation to meat production and the processing of the various products into the food chain, there is another equally pressing argument for a reduction in their use with respect to the amount of drinking water these animals consume in their lifetime especially as water scarcity becomes a more pressing commodity.

The case for reduction with respect to climate emissions is made above. But a change in our consumption habits can only be achieved either through education (which is advertising, in-school education, and training through the community) or through economic persuasion. The sorts of levels required to meet a 20 % or more reduction in emissions arguably are unlikely just through the medium of “education”.

Hence it makes practical sense to investigate the use of taxation to change the consumption of red meat, in particular.

The Smith School of Enterprise and the Environment, for instance, explores this in an article dated 12 August 2022.¹⁴

It is also evident that a plant-based diet is cheaper, and therefore there could be cost of living reduction for households which adopt a plant-based diet.

But it does seem irresponsible to state that a proposal for meat tax has been scrapped before it has been properly thought through for the twin purposes of improvement of health, and reduction of carbon emissions.

8. Air Travel

The government announced also that the proposal for taxes on air travel would be scrapped. The reason was because it would cost ordinary people more to go on holiday. Again, this is a specious statement as there is no proposal in place for air taxes.

The recent letter from the Environmental Audit committee states in fact that “in June 2022 the then Minister for Aviation told us that he ruled out introducing new taxes to manage aviation demand”.

Air Travel is a complicated area – because it is not clear which country is responsible for the emissions. It also is complicated because some of the emissions occur as planes fly through the higher atmosphere.

Because of the space devoted to business-class and first-class passengers, the emissions are higher for this group of passengers, than regular passengers.

Air travel emissions are also not included in the formal targets agreed upon as a country internationally. However, the 6th Carbon Budget for the UK included aviation emissions for the first time.

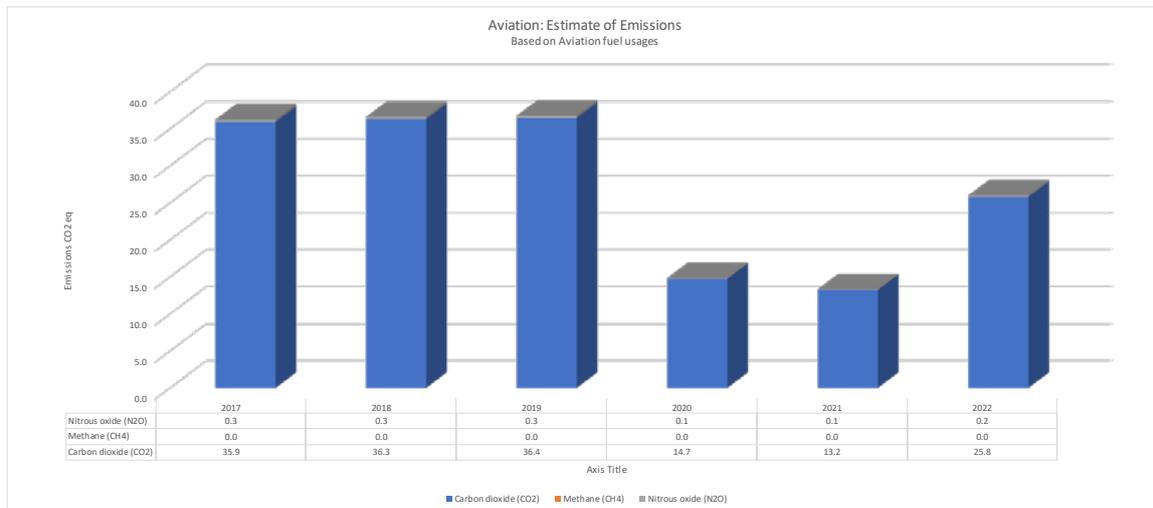
¹³ Lancet : Trends in UK meat consumption: analysis of data from years 1–11 (2008–09 to 2018–19) <https://www.thelancet.com/action/showPdf?pii=S2542-5196%2821%2900228-X>

¹⁴ The Smith School of Enterprise and the Environment - A meat tax is probably inevitable – here's how it could work - <https://www.smithschool.ox.ac.uk/news/meat-tax-probably-inevitable-heres-how-it-could-work>

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Estimates of emissions are around 40 million tonnes of CO2 equivalent based on figures of consumption of fuel, as shown in the following graph, which is a very rough estimate – so it is significant.



Another view of overall emissions can be reviewed for the UK from data on Passenger numbers, and distance flown. The following data is available from the Department of Transport. I have excluded the data for 2020 and 2021 as these were severely impacted by COVID

Passengers uplifted by UK registered airlines by type of service, from 2011
Department for Transport table code: TSGB0210b (AVI0201b)
 This worksheet contains 1 table.
 Figures are presented as the number of passengers uplifted by UK registered airlines in millions.
 The data in this table excludes sub-charter operations performed on behalf of UK airlines.
 Shorthand is used in this table. [x] indicates that data is not available.

Service Type	2011	2012	2013	2014	2015	2016 [Note 1]	2017	2018	2019	
International Scheduled		92	96	99	105	111	[x]	130	144	121
International Non-scheduled		20	19	17	16	15	[x]	11	11	11
International Total		112	114	116	121	126	[x]	141	155	133
Domestic Scheduled		19	19	19	20	20	[x]	21	21	21
Domestic Non-scheduled		0	0	0	0	0	[x]	0	0	0
Domestic Total		19	19	20	20	20	[x]	21	21	21
All Services Scheduled		111	115	118	125	131	142	151	165	142
All Services Non-scheduled		20	19	18	16	16	11	11	11	11
All Services Total		132	134	136	141	147	154	162	176	154

The following data documents the number of kilometres flown:

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Passenger kilometres flown by UK registered airlines by type of service, from 2011
Department for Transport table code: TSGB0210c (AVI0201c)
 This worksheet contains 1 table.
 Figures are presented as the number of passenger kilometres flown by UK registered airlines in billions.
 The data in this table excludes sub-charter operations performed on behalf of UK airlines.
 Shorthand is used in this table. [x] indicates that data is not available.

Service Type	2011	2012	2013	2014	2015	2016 [Note 1]	2017	2018	2019	
International Scheduled		234	242	251	268	275	[x]	314	347	335
International Non-scheduled		62	58	52	48	49	[x]	40	41	40
International Total		296	300	303	315	324	[x]	354	388	376
Domestic Scheduled		8	8	8	8	9	[x]	9	9	9
Domestic Non-scheduled		0	0	0	0	0	[x]	0	0	0
Domestic Total		8	8	8	8	9	[x]	9	9	9
All Services Scheduled		242	251	259	276	284	306	323	356	345
All Services Non-scheduled		62	58	52	48	49	39	40	41	40
All Services Total		304	309	311	324	333	345	363	398	385

From this we can calculate from Civil Aviation Authority data from 2023 on passenger types (UK and Foreign) and type of travel (Business/Leisure) the following approximate emissions from Air Travel. The calculation uses standard factors for International and domestic travel for emissions/km.

EMISSIONS BY SECTOR			
	2017	2018	2019
International Business			
UK	4.3	4.7	4.5
Foreign	3.1	3.5	3.4
International Leisure			
UK	36.0	39.8	38.4
Foreign	14.3	15.8	15.2
Domestic Business			
UK	0.7	0.8	0.7
Foreign	0.0	0.0	0.0
Domestic Leisure			
UK	1.3	1.3	1.3
Foreign	0.1	0.1	0.1
International	57.7	63.8	61.6
Domestic	2.2	2.3	2.2
UK	42.35	46.61	45.08
FOREIGN	17.59	19.42	18.76

The total UK Emissions correlate to the same order of magnitude as the numbers above measuring the amount of kerosene used.

Analysing this by sector we can see that on the face of it around 12 % of emissions are created by business and 78 % by Leisure:

BREAKDOWN OF EMISSIONS BY SECTOR FOR UK			
UK	2017	2018	2019
International Business	10%	10%	10%
International Leisure	85%	85%	85%
Domestic Business	2%	2%	2%
Domestic Leisure	3%	3%	3%

So on the face of it much of the travel is created by international holidays.

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However, it has been calculated that the business travel is enormously profitable – reportedly contributing to 75 % of airline's profits. Also, business travellers are normally serial travellers, travelling as much as 1/month or more, and therefore responsible for a high amount of emissions individually – traveling from meeting to meeting.

Air Travel Taxation

The government's announcement suggested that it would be wrong to impose new taxes on Air travel in the UK.

Of course, there is a tax already in place – Air Passenger Duty. (APD).

The rates and bands for travel are as follows:

Destination bands and distance from London (miles)	Reduced rate (for travel in the lowest class of travel available on the aircraft)	Standard rate (for travel in any other class of travel)	Higher rate (for travel in aircraft of 20 tonnes or more equipped to carry fewer than 19 passengers)
Domestic (only England, Scotland, Wales and Northern Ireland)	£6.50	£13	£78
Band A (0 to 2,000 miles)	£13	£26	£78
Band B (2,001 miles to 5,500 miles)	£87	£191	£574
Band C (over 5,500 miles)	£91	£200	£601

The duty raises around £ 3.8 bn. Most of this is raised from the lowest band as 80 % of flights are leisure flights. It is forecast to rise to £ 5.1 bn.

APD was introduced in 1994 by the then Conservative chancellor Ken Clarke because he thought it was inconsistent not to have it compared to the raising of fuels on other forms of transport. It was a means of raising money for the government.

Unlike a sugar tax, tobacco tax, or alcohol tax, there was and is no “health reason” or “public good reason” for creating the tax.

However, in 2011, under a consultation on extending the tax to business jets, the Treasury stated: "Air passenger duty is primarily a revenue-raising duty which makes an important contribution to the public finances, whilst also giving rise to secondary environmental benefits"

So, the potential for environmental benefits has been recognized, but is not a specific aim of the tax – it's just a way of extracting money from the UK population.

From a general point of view, taxes should be raised either because there is a direct “public good” benefit like a sugar tax, or as a way of raising money to pay for public goods and services because sharing the costs is a more efficient way than individuals having to find the money on their own.

But there is no need for a new air tax. The only question is whether the current tax should be seen as working for the general good of society by reducing emissions, and then whether it



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adequately reflects the costs of the emissions. At around 45 million tonnes per annum, they are a significant contributor to atmospheric pollution. They represent around 3 % of total emissions.

The current structure of APD based on class of travel and on distance potentially aligns with the idea that the longer the distance and the higher the class of travel the greater the cost in terms of emissions.

There is evidence that a frequent flyers tax would work, and thus would not penalize the occasional leisure traveller.

But in principle, I see that there is indeed no need for a further tax, but a need for making the current tax align with the need to manage demand for travel because of the huge emissions from aircraft.

The comments from the government on no taxing air travel is, nevertheless unhelpful, as it suggests it is unimportant to address the pollution from air travel.



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APPENDICES

This section contains the detailed data referred to in the text

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Appendix 1

The following table compares the choice between starting to buy Electric cars in 2030 or buying an Electric car in 2035 – which in principle is the decision being proposed by the change to the legislation. Thus, all those who have petrol cars will continue to buy petrol cars up until 2030 in the first scenario where they change to electric in 2030, and they continue to buy petrol cars until 2035 in the second scenario:

COMPARISON OF BUY NEW ELECTRIC CAR IN 2030 AND 2035

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	
Base Case - Buy New Electric car in 2030	24,428	2,358	2,358	2,358	2,358	20,149	1,159	1,159	1,159	1,159	20,149	1,159	1,159	1,159	1,159	
	NPV @ 5%		£63,515													
Decision : Buy New Electric car in 2035	24,428	2,358	2,358	2,358	2,358	15,708	2,358	2,358	2,358	2,358	20,149	1,159	1,159	1,159	1,159	
	NPV @ 5%		£63,373													

In effect, it compares the operational costs which are lower for an electric vehicle with the higher capital cost for the electric vehicle.

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Appendix 2

This analysis reviews the comparison of buying electric in 2030 or 2035 in line with government legislation, and also charging the vehicle up using solar panels, which will in principle (using batteries as well) enable the consumer to charge their cars at zero cost.

This shows the same result – that there is not much to be choosing – but that the cost is reduced by a further £ 1,200.

COMPARISON OF BUY NEW ELECTRIC CAR IN 2030 AND 2035

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Base Case - Buy New Electric car in 2030	24,428	2,358	2,358	2,358	2,358	19,950	961	961	961	961	19,950	961	961	961	961
NPV @ 5%	£62,315														
Decision : Buy New Electric car in 2035	24,428	2,358	2,358	2,358	2,358	15,708	2,358	2,358	2,358	2,358	19,950	961	961	961	961
NPV @ 5%	£62,846														