Applying Kerosene Duty to Aviation

What would the effects of different duty levels be?

November 2022

Summary

Unlike British drivers, airlines do not pay tax on the fuel they burn. Road fuel duty is currently levied at just under 53p per litre and this revenue accounts for 5% of Government revenues. It is used to pay for social costs incurred by burning fuel: air pollution, climate change, noise pollution, etc. In contrast, airlines do not pay anything, despite the fuel they burn causing the same problems.

The recently launched Jet Zero strategy envisaged that carbon pricing would play a large part in decarbonising the sector, but did not outline which policy mechanism would be used to make this happen. One of the obvious routes is to simply apply a duty, in a similar fashion to how the Government does so for road fuel. This study shows that, contrary to some claims, it is perfectly legal for the UK Government to apply a duty to some kerosene uplifted to planes in the UK. The study then calculates how much revenue would be raised if different duty levels were applied to fuel uplifted to different destinations.

The levels chosen are levels that match already existing duty levels: these are current and future road fuel duty, the normal level for avgas (which is the fuel used by small general aviation planes), and the European Commission-proposed level for kerosene duty.

The results are startling. **Had the UK taxed all jet fuel uplifted at the same rate as drivers were taxed that year, then the Treasury would have been £6.7 billion better off**. Whether or not fuel can be taxed depends on the destination of an aircraft though, and some air service agreements between the UK and other countries currently forbid this. However, fuel used for domestic flights and flights to the EU definitely could be taxed. It is therefore a political choice not to tax this fuel, and the UK Government should justify why it does not. If it was, then some billions would be raised.

1. Introduction

Aviation is a sector intrinsically linked with burning fossil fuel. Whilst other sectors of UK society are now moving at speed to reduce greenhouse gas emissions to zero, aviation is not. Furthermore, both Government and industry are not even planning to try and get to zero emissions by 2050: the Government's recently announced Jet Zero Strategy (JZS) envisaged the sector emitting 19.3 MTCO2e in 2050, whilst industry body Sustainable Aviation's Carbon Road Map envisages that UK aviation will emit 25.8 MtCO2e in 2050.[1] For context, this equates to 51% or 68% respectively of UK aviation's emissions in 2019.[2]

The JZS envisaged that carbon pricing will play a role in helping decarbonise the sector in the future, both through encouraging lower carbon alternatives to be adopted, and through increasing the price of fossil kerosene (and therefore reducing demand for it). However, at the moment very little of aviation's emissions are priced, and the JZS was not explicit in how this pricing would occur.

Currently, emissions from domestic flights and flights to the EEA, Switzerland and Gibraltar fall under the UK emissions trading scheme (UK ETS), where airlines have to submit allowances to cover their emissions - but affected airlines also currently receive free allowances, so that scheme is ineffective.[3] Incredibly, over the first year of the UK ETS, more allowances were handed out for free to airlines than were required to be submitted. This meant that some airlines were effectively subsidised for polluting. In future, it is envisaged that some emissions will also fall under ICAO's CORSIA scheme, but this scheme only applies to emissions over a (relatively high) baseline level, and the scheme stops in 2035 (for more details, see the below info box). Combined, this means that the vast majority of emissions from UK-departing flights will not be covered by either scheme, meaning there is a "policy gap" contained in the JZS.

There is an obvious solution. Crucially, and in direct contrast to road fuel, there is no tax, or duty, applied to any jet fuel uplifted in the UK. Applying a duty to fossil kerosene uplifted would have a number of effects, with the most obvious effect being that revenue would be raised for the Government. This revenue could be hypothecated back to decarbonising the aviation sector, bringing forward the date that the sector truly becomes net zero. Applying a duty would increase the costs of fuel, which would be passed through to ticket prices. and would therefore, all things being equal, reduce the demand for flying. This reduced demand would equate to some emissions 'saved', and these three effects are modelled below.

[1] Both roadmaps then use out-of-sector technologies to 'offset' these residual emissions, which thus allows both roadmaps to claim to be net zero.

[2] Using figures taken from Final Greenhouse Gas Emissions National Statistics 1990-2020. Broadly, the Jet Zero Strategy is targeting a 2050 emissions level equivalent to 1993's emissions from the sector (19.6 MTCO2e) and Sustainable Aviation is targeting a 2050 emissions level equivalent to 1998's emissions from the sector (27 MTCO2e).

[3] The UK Government has recently consulted on when dates for free allowances should be withdrawn, but has not committed to anything specific yet.

INFO BOX: CORSIA

CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) is ICAO's flawed flagship decarbonisation scheme. Under the scheme, airlines will have to buy emissions reduction offsets from other sectors, to compensate for their own emissions. However, it only applies to emissions levels above 85% of 2019's emissions: ie not the vast majority of emissions. The scheme is due to finish in 2035.

A study commissioned by the European Commission found major flaws in the scheme. The two largest flaws were that the quality of the offsets allowed under the scheme was poor, and that there would be a dramatic oversupply of credits. This means that the price of an offset will be very low (less than €1), which further means that airlines will never be incentivised to actually reduce emissions.

1.1. What is fuel duty?

In the UK, fuel duty is an excise duty levied on petrol and diesel used for road transport. It is currently a charge of 52.95p a litre[4] on all fuel purchased. Whilst not an explicit environmental levy (it was originally applied in 1908!), it is the obvious way of applying the polluter pays principle to road transport, and means that cars that are driven further, or cars that are less fuel-efficient (and therefore emit more greenhouse gases and cause more air pollution) pay more. Other fuels also have duty applied: for instance, LPG is charged 28.8p a kilogram.[5]

Fuel duty is not applied to fuel used in commercial aircraft, meaning the opposite is true: the airline that emits the most does not pay the most. Indeed, since all long-haul flights are excluded from the UK ETS, airlines actually pay nothing for the long-haul emissions they cause. In other words, the UK departing flights that emit the most pay the (absolute) least. Clearly, the polluter pays principle is not being applied to UK aviation.

1.2. Chicago Convention and Air Service Agreements

There is a misconception that taxing jet fuel is banned, due to the Chicago Convention. This is simply not true. The convention itself is very clear: article 24 states:

"Fuel ... on board an aircraft of a contracting State, on arrival in the territory of another contracting State and retained on board on leaving the territory of that State shall be exempt from customs duty, inspection fees or similar national or local duties and charges."

[4] This is a temporary price, and is due to rise back to 57.95p a litre in March 2023.
[5] This is due to rise back to its 'normal' level of 31.6ppkg in April 2023.

In other words, fuel uplifted to a plane in a country can be taxed by that country, whilst fuel already on a plane cannot be.[6] However, the Chicago Convention is not the only legal agreement governing the skies. Air Service Agreements (ASAs) are formal treaties between pairs of countries, and the UK has ASAs in place between itself and every individual country or region there are direct flights between. The contents of these ASAs, and whether or not the ASAs allow fuel taxation differ.

Crucially, the UK is able to apply duty to kerosene uplifted to planes that will travel to the EU because of *the Trade and Cooperation Agreement*, negotiated as part of leaving the EU. Article 430 (Fiscal provisions) of the agreement says (emphasis added):

"The following goods shall also be exempt, on the basis of reciprocity, from the taxes, levies, duties, fees and charges….. lubricants and consumable technical supplies ***other than fuel*** *introduced into or supplied in the territory of a Party for use in an aircraft of an air carrier of the other Party used in international air transport, even when those supplies are to be used on a part of the journey performed over the said territory"*

This is important as, in 2019, 65% of UK departing flights were to the EU. These flights were responsible for just under 30% of total jet fuel uplifted.[7]

The European Union is also considering implementing a kerosene tax. The European Commission proposed a tax level of €0.38 per litre in July 2021, and this is now in the negotiation stage with the European Parliament and Council (known as 'trilogues').[8] These negotiations should (although not necessarily will) conclude within the next six months. The justification for introducing a kerosene tax is to try and harmonise tax levels across all polluting fuels.

Furthermore, the Air Transport Agreement recently concluded between the UK and the USA potentially allows fuel to be taxed. The agreement exempts fuel from fuel duty *on the basis of reciprocity*, however this phrase is not defined. CE Delft previously undertook legal analysis on this and concluded that the phrase "would leave the door open for one of the two bilateral partners to go its own way as to tax exemption". This means that the UK could start taxing fuel uplifted to planes due to fly to its partner country without violating the agreement: ie that the wording is not a ban on fuel taxation, rather an agreement that if one party begins to tax fuel, the other party may too. In 2019, flights to the USA accounted for just 5% of flights, but 24% of fuel uplifted.[9]

Finally, the UK has always been free to tax fuel used for domestic flights, but the Government has never chosen to go down this route. In 2019, 19% of departing flights were domestic. These flights

[6] Further details can be found here: https://www.transportenvironment.org/sites/te/files/publications/2010_01_Briefing_domestic_fuel_taxation_briefing.pdf
[7] T&E calculations based on flight distance, frequency and aircraft type.
[8] Although as a "sensitive" matter, unanimity of voting is needed before any change will be enacted.
[9] T&E calculations based on flight distance, frequency and aircraft type.

were responsible for 4% of total jet fuel uplifted.[10] Domestic fuel has excise duties applied to it in (amongst others) Canada, the USA, and Australia.[11]

As can be extrapolated from above, in a 'normal' (ie pre-pandemic/pandemic effects) year, the UK Government could definitely apply taxes to approximately 84% of departing flights, covering approximately 34% of the fuel uplifted. Furthermore, should fuel destined to be burnt flying to the USA be included and taxed, then just under 90% of flights, covering 58% of total fuel burnt, would be included in the scheme.

1.3. Revenue Use

The revenue raised would obviously be spent by the Government. T&E has previously suggested that the money be hypothecated back towards decarbonising the aviation sector. In particular, this should focus on the only two routes that could bring the carbon emissions from aviation to net zero: accelerating the uptake of zero emission planes, and accelerating the uptake of sustainable aviation fuel. The JZS focussed on technological solutions, so the political will is there. However, whilst there will be a clear policy mechanism that will ensure sustainable aviation fuel is uplifted to UK aircraft (via the SAF mandate), there is no comparative mechanism that will require zero emission aircraft to be used. Furthermore, there are legitimate questions being raised by the UK SAF industry as to how to ensure UK plants are built.[12] A duty on kerosene would raise sufficient revenue to cover both some form of incentive payment to a UK SAF industry, and would increase R&D spending on zero emission aircraft (probably via the Aerospace Technology Institute) until such time that airlines would be required to use zero emission aircraft.[13]

2. Specific Duty Rates

T&E has modelled what the hypothetical effect of various rates of tax would have been, if applied in 2019. These rates have been applied to four groups: domestic flights, flights to the EU, flights to the USA, and flights to the rest of the world (ROW). This is based on the above analysis of ASAs. For the ROW flights, it is acknowledged (due to differing ASAs) that a tax could not be applied to every country that the UK flies to, so, currently, this is hypothetical.

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[10] Ibid.

[11] Whilst outside the scope of this briefing, it should be noted that VAT is applied to domestic tickets in many countries. In Europe, these include Austria, Finland, France, Germany, Greece, Italy and Spain. Globally, Australia, Canada, Japan and the United States also charge VAT on domestic tickets. For more information, please see: https://cedelft.eu/wp-content/uploads/sites/2/2021/03/CE_Delft_7M16_taxes_in_the_field_of_aviation_and_their_impact.pdf

[12] One solution continually put forward is for a contracts-for-difference type arrangement to be put in place.

[13] The ATI has already been allocated £685 million from now until 2025 to fund innovation projects. For context, Airbus spent €2.75 billion on R&D in 2021, although a large proportion of this would not have been spent on zero emission aircraft.

The tax levels have been chosen as they match existing duty levels on other fuels: current rates of petrol and diesel (which are temporary until March 2023); normal rates of petrol and diesel (which takes effect from April 2023), Avgas,[14] and proposed European Commission kerosene tax rates. These rates are:

Comparison Duty Rate	**Pence per litre**
Future (permanent) road fuel *(Future Road)*	57.95
Current (temporary) road fuel *(Current Road)*	52.95
'Normal'[15] Avgas *(Avgas)*	38.2
Current European proposals *(Europe)*	33

2.1. What would the effects have been if applied in 2019?

The table below shows what the effect would have been if applied to all flights in 2019:

Duty equivalent to:	Revenue Raised (£ billion)	Emissions Saved (megatonnes CO2)	Demand reduced[16] (%)
Future Road	6.73	8.5	22%
Current Road	6.30	7.7	20%
Avgas	4.87	5.6	15%
Europe	4.30	4.8	13%

As can be seen, whatever level of duty is chosen, the UK Government could raise some billions of pounds in revenue. However, this could not have happened due to the differing ASAs. The below chart shows how the effects are split between the different jurisdictions.

[14] Avgas is used by general aviation planes. In the UK, there are an estimated 27,000 individuals with a pilot licence, and 15,000 are estimated to fly at some point during a year.
[15] In common with petrol and diesel, the avgas duty rate is currently reduced from its normal level. The current rate is 36.29ppl. This is in place until April 2023.
[16] This assumes that all flights within a category were the same distance, and that a drop in passenger demand is equal to drop in the number of flights; this is a simplification.

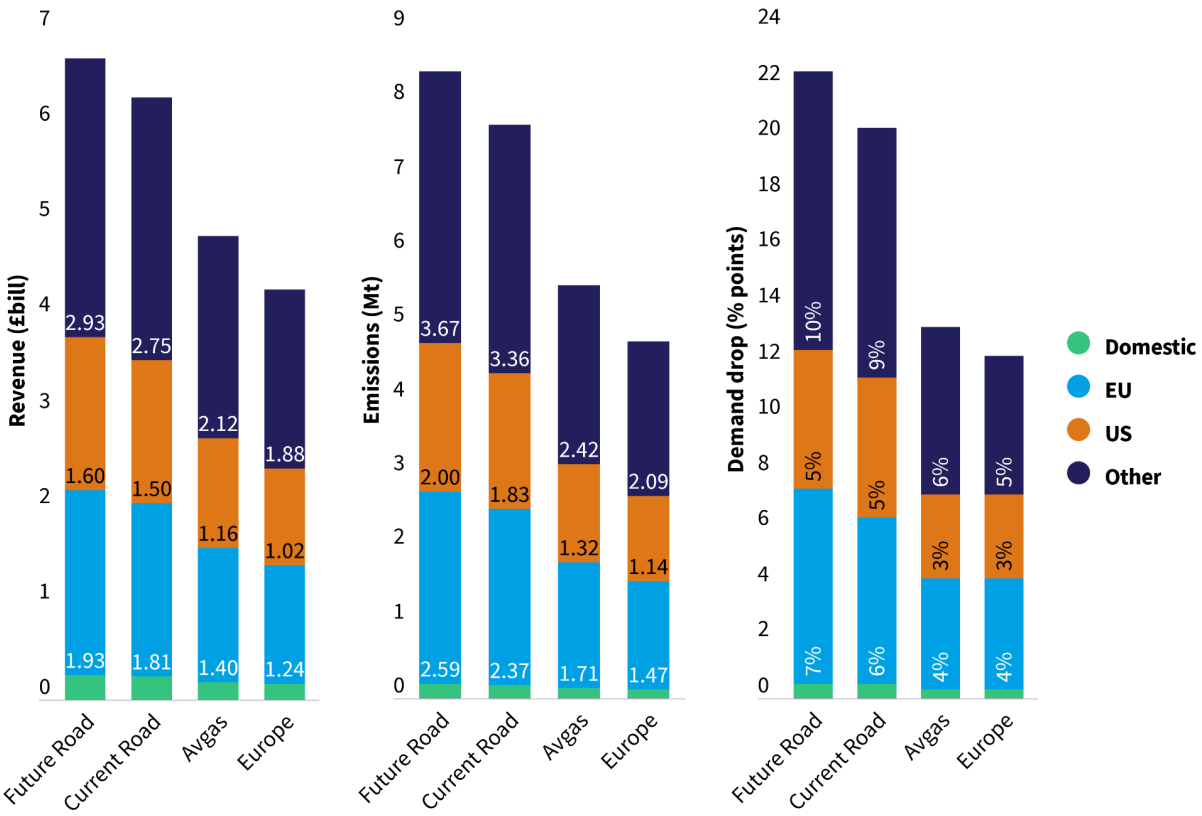

Figure 1: Revenue, emissions reduction and drop in demand that would have resulted had the tax been applied to UK aviation in 2019.

2.1.1. Effect on Domestic Flights

As described above, at least initially duty may only be applied to some fuel, depending on where the following flight's destination is to. Had a duty been applied at the above rates only to domestic flights, then the following would have happened:

Duty equivalent to:	Revenue Raised (£ billion)	Emissions Saved (megatonnes CO2)	Demand reduced (%)
Future Road	0.26	0.20	15%
Current Road	0.24	0.18	13%
Avgas	0.18	0.13	10%
Europe	0.16	0.11	8%

The demand reduction is based on applying a uniform demand elasticity (of which more details in the methodological note). In practice, due to the fact that some domestic flights can easily be substituted for another mode of transport, some flights may not be flown, whilst others will carry on as before. As can be seen, whilst the absolute number of flights is comparatively large, the absolute amount of fuel used by domestic flights is a relatively small percentage, and this means that only applying a duty to domestic flights would raise a relatively small amount.

2.1.2. Effect on Flights to the EU

The below table shows what would have happened if fuel used to fly to the EU had been taxed at the below rates:

Duty equivalent to:	Revenue Raised (£ billion)	Emissions Saved (megatonnes CO2)	Demand reduced (%)
Future Road	1.93	2.59	23%
Current Road	1.81	2.37	21%
Avgas	1.40	1.71	15%
Europe	1.24	1.47	13%

As can be seen, the higher the duty rate, the higher the revenue that would be raised by the Government. Applying a kerosene duty at the same rate as the nation's drivers currently pay would raise £1.81 billion. In addition, this would stop over 2 million tonnes of carbon being emitted.

2.1.3. Effect on Flights to the USA

The below table shows what would have happened if fuel used to fly to the USA had been taxed at the following rates:

Duty equivalent to:	Revenue Raised (£ billion)	Emissions Saved (megatonnes CO2)	Demand reduced (%)
Future Road	1.60	2.00	22%
Current Road	1.50	1.83	20%
Avgas	1.16	1.32	15%
Europe	1.02	1.14	13%

Again, should airlines flying to the USA simply pay the same amount of duty as UK drivers currently pay, then the UK Government would receive £1.5 billion in revenue, and 1.83 million tonnes of CO2 would not be emitted.

2.1.4. Effect on Flights to the Rest of the World

The below table shows what would have happened if fuel used to fly to all other global destinations had been taxed at the following rates:

Duty equivalent to:	Revenue Raised (£ billion)	Emissions Saved (megatonnes CO2)	Demand reduced (%)
Future Road	2.93	3.67	22%
Current Road	2.75	3.36	20%
Avgas	2.12	2.42	15%
Europe	1.88	2.09	13%

Whilst this scenario is currently hypothetical due to many of the applicable air services agreements banning fuel taxation, it does show that, should ASAs be renegotiated, the UK Government is forgoing some billions in revenue. If this tax were to equal the rate that British drivers currently pay, then airlines flying to the rest of the word destinations would have paid £2.75 billion to the Treasury.

2.2. When will Demand Rise to Equal 2019 Levels?

However, these figures are an indication of what would happen in a 'normal' year. The pandemic grounded flights in 2020 and, to a lesser extent, in 2021 - and the effects of the pandemic may last for another couple of years. Prior to the pandemic, aviation demand had been inexorably rising for decades, and in the long-term, this is not expected to change.

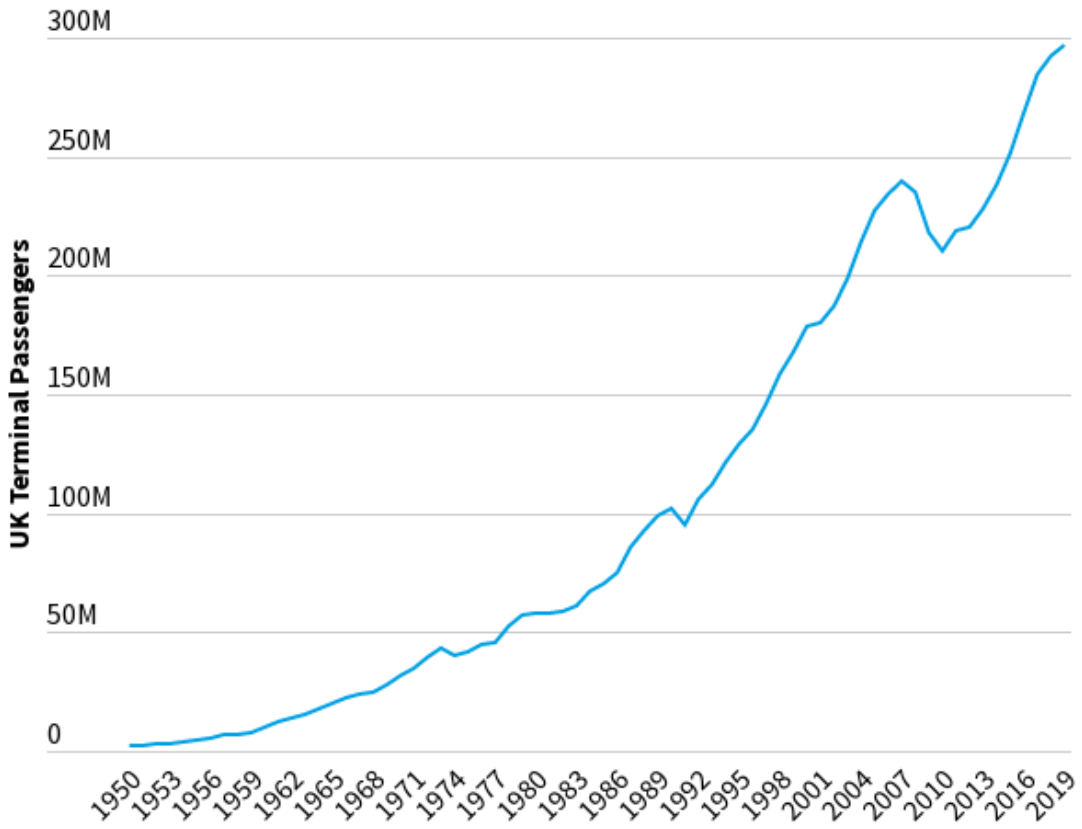

Figure 1: UK terminal passengers (source: AVI0101).

Airline trade body IATA expects European demand in 2024 to be 105% of 2019's levels - ie fully recovered from the pandemic by then. ICAO then predicts that, post Covid, intra-European demand will grow between 2.3% and 3.1% per year. This is backed up by the assumptions in the UK's JZS's "High Ambition" scenario, which was predicated on a 70% increase in terminal passenger numbers by 2050, or an annual increase of 6.2 million passengers per year. In short, whilst the figures in this document are based on pre-pandemic 2019, 'normality' is expected to return very soon, so, if a kerosene duty were implemented, the UK Government could expect to receive the above revenues very soon as well.

3. Conclusions

As has been explained in the initial part of this paper, there are no legal reasons why kerosene duty could not be applied to fuel used on the majority of flights. It is therefore a political decision as to if a tax should be applied, and at what level. Equally, if a tax is not applied, that is also a political decision and explanations should be given accordingly.

The European Union is currently in 'trilogues' - negotiations between the European Parliament, Council and Commission and one element under negotiation is if and at what level a kerosene tax should be

applied. It would be remiss, therefore, for the UK Government to ignore this reality and not consider applying one. A duty on kerosene makes sense not just environmentally, but economically too. It applies the polluter pays principle specifically to the product that, when burnt, causes the environmental damage planes cause. This therefore not only starts internalising some of the externalities, but also provides the Government with funds to decarbonise the sector. Motorists have seen the polluter pays principle applied to them, and have paid fuel duty for decades. It is now time for airlines to receive the same treatment.

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Annex - Methodological Note

Data sources and estimation of segment size

Fuel demand by market - domestic, EU, USA and other - was estimated according to the size of these markets in 2019, and it was assumed that the relative market sizes will remain the same. We made use of data on UK departing flights, from which it was possible to estimate the fuel burn on each route, and the number of flights on this route per year. This leads to an estimate of the total fuel burn from UK departing flights which agrees with official statistics to within 2.4%. Segments were allocated based on the destination airport as distinct trips, ignoring more complex routes with multiple legs as this was irrelevant to the amount of fuel uplifted in the UK. Destination switching or substitution was not accounted for.

It was also assumed that under a long running taxation scheme across all markets, increases in fuel costs were completely passed through to ticket prices and that market segments did not subsidise each other; so an increase in fuel costs for domestic flights was not passed onto the price of long haul tickets.

T&E is aware of the complexity of fare pricing and the impact of cost increases on the ticket prices in different markets, as well as the range of estimates of cost pass-through in the literature.[17] We have assumed 100% cost pass through in all segments.

For similar reasons, the share of fuel costs in ticket prices for different routes varies and is difficult to assume. We instead used IATA data to estimate the share of airline costs that come from fuel. In 2019, this method estimated fuel costs to be approximately 23% of the final ticket price.

Price elasticity of demand for airfares in the different market segments are consistent with the National Air Passenger Demand Model, and the updated values based on Department for Transport research.

	Domestic	EU	US	Rest of World
Price elasticity of demand	-0.6	-0.95[18]	-0.9	-0.9

[17] Wang et al. (2018). 'Modelling Airline Cost Pass-through within Regional Aviation Markets'. *Transportation Research Record*, Volume 2672, Issue 23, December 2018, Pages 146-157.
Dray. (2020). *AIM Documentation V9*. Retrieved from:
http://www.atslab.org/wp-content/uploads/2020/01/AIM-2015-Documentation-v9-270120.pdf

[18] According to the DfT elasticities, the elasticity for Southern Europe is -1 whilst for northern Europe it is -0.9. From our calculations, approx. 47% of emissions were on flights to southern Europe in 2019, therefore a value of -0.95 was used for the region as a whole.

Additionally, it was assumed that the same price was paid for fuel by all operators throughout the year, and that this price was unaffected by changes in demand brought about by implementing the tax.