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Aviation tax reform: Consultation Response

Submission by the Graduating Students of the University of Bristol Aerospace Engineering Programmes.

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UNIVERSITY OF BRISTOL
DEPARTMENT OF AEROSPACE ENGINEERING

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Terms of Reference

This response is derived from the papers submitted to the University of Bristol's final year paper: Aerospace Commerce, Operations and Ethics. Our response reflects the views of graduating aerospace students at the start of our careers which will span the duration of the government's commitment to reach net zero emissions by 2050. Thus, although our career aspirations might be perceived to present a conflict of interest in our submission, we are committed to both the success of the aerospace sector and reduction of global emissions.

We have responded in the areas of the consultation where we believe there is most relevance and traction. As engineers we have endeavoured to find practical solutions and have made additional proposals for consideration where appropriate.

Executive Summary

We believe Air Passenger Duty (APD) should be retained both domestically and internationally. The overall approach proposed here is to reduce domestic APD though a lower tariff whilst increasing bands internationally. However, we believe that APD based on distance will become increasingly anachronistic with development in Sustainable Aviation Fuels (SAFs) and more efficient aircraft. Distance alone will not be an adequate proxy for climate impact. The link between distance and emissions will become disconnected and so **we propose APD to be based on airframe and engine efficiency thereby encouraging passengers, carriers and manufacturers an incentive to develop and use more efficient aircraft**. We provide a draft template on how an Aviation Emissions Tariff (AET) might be structured which should be the subject of a further discussion with industry and consumers.

The government's initial policy position on domestic APD

We recommend that domestic APD is retained – at a reduced level – providing a compromise between the clear Government commitment to reduce emissions and sustainability of the aerospace sector. Removal of domestic APD would be perverse in the light of both the government and industry's commitment to the 2050 emission reduction goals.

A return leg exemption

We do not support the reintroduction of the return leg exemption. Not only would this be logistically difficult to collect directly via Her Majesty's Revenue & Customs (HMRC) or the carriers themselves, but also would be inconsistent with international APD which can only be applied to the outbound segment from the United Kingdom (UK); the UK has no jurisdiction over European Union (EU) and International aviation taxation from overseas departure points.

A new band for domestic flights

We support a new domestic band for APD which is applied consistently with international banding. Although this would increase the number of bands the collection methodology would be consistent across all departures from and within the UK.

International distance bands

We support the proposition for three distance bands according to the "polluter pays" principle. However, we recognise that this will lead to some lost revenue by split journey ticketing and may lead to inconsistent practice between Northern and the Republic of Ireland. Through the inclusion of a domestic tariff, this would bring the combined Domestic/International bands to four.

Frequent flyer levy

We do not support a Frequent Flyer Levy (FFL) and propose that APD should remain as the principal tax on the aviation sector. Not only would a FFL be logistically difficult to collect when passenger journeys contain multi sectors using different airlines, but all frequent flyer programs allow accrued points to be used for other services; goods, food and beverage, entertainment etc., and hence would be subject to a plausible deniability challenge.

A: The government's initial policy position on domestic APD

1 Do you agree with the government's initial policy position that the effective rate of domestic APD should be reduced? In your view, what would be the positive and negative effects of such a change, particularly in light of the government's objectives for aviation tax?

We agree that Air Passenger Duty (APD) should be reduced for domestic departures in order to rebuild the sector after COVID-19, support the United Kingdom's (UK) "levelling up" agenda and encourage UK domestic business and leisure growth. However, we do not support the complete elimination of domestic APD as this runs contrary to the need to achieve long term climate goals.

A reduction of 50% in Domestic APD is recommended. This will drive an increase in consumer demand due to the lower effective prices of airline tickets and the resulting increase in 0.5% productivity corresponding to a £890 million injection into the economy. Many of the CO2 emissions associated with a greater demand in flights can be offset if substantial investment is directed into Sustainable Aviation Fuels (SAFs) within the industry.

1.1 Reducing APD for domestic flights within the UK may boost domestic connectivity and enhance regional economic productivity, but the declining market for domestic aviation may limit its success. Successful implementation will contribute towards meeting the UK Government's connectivity and finance contribution objectives for the aviation sector.

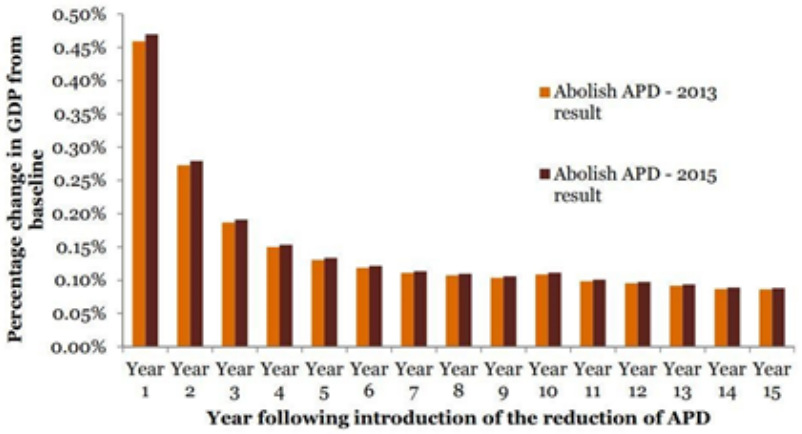

Figure 1[1].The impact on the level of real GDP of abolishing APD

According to the Association of UK Airlines (AUA), due to the APD charges on both flights of domestic return tips, and unlike international flights where only outbound flights from the UK are charged[2]; the effect of APD has been to reduce the interconnectivity of UK domestic flights. Inherently, they are less commercially viable than international short haul regional flights, and as such there are fewer city pairs and frequencies of flights as are perhaps possible in the UK. This is because of price elasticity effects; the higher prices reduce demand (particularly amongst tourists who are very sensitive to price

[1] https://airlinesuk.org/wp-content/uploads/2015/06/The-economic-impact-of-APD-analytical-update-PwC-May-20151.pdf
[2] AUA, "The Impact of Air Passenger Duty on Airline Route Economics", AUA, Sep 2018, [Online], Accessed from: https://airlinesuk.org/wp-content/uploads/2018/09/The-Impact-of-Air-Passenger-Duty-on-Airline-Route-Economics-4.pdf

changes). A PwC report found that APD was suppressing UK demand by up to 10%[3]. As airlines', particularly Low Cost Carriers' (LCCs'), economic models are governed by maximising utilisation and seat capacities on their carriers due to their low profit margins (~6%[4]), this reduced demand is a key contributor as to why fewer domestic routes are run – they are not economically viable.

An International Aviation Transport Authority (IATA) study suggested that a 10% increase in connectivity can improve labour productivity by 0.07%[5], or 0.5% for the UK[6]. The effect of reducing the APD would be to increase the profitability of "marginal" routes for LCCs; and via price elasticity there would be higher demand. The AUA report indicates that with a full abolishment of APD, although unlikely, could open up to 20 domestic routes including Bristol to Leeds and Liverpool to Southampton. The increased connectivity could contribute up to £890 million to the UK economy[3]. However, as highlighted by the consultation report[7], £3.6 billion in tax is currently generated annually from the APDs. As outlined by the consultation's objectives it remains important that aviation still contributes fairly to public finances; as the figures indicate above, APD cannot be fully abolished. A trade-off is required to determine any exact reduction values, because COVID-19 resulted in a 65% reduction in revenue passenger km and airlines such as Flybe going bankrupt[8] – a sizeable reduction in APD is required to improve the finances and resilience of British airlines.

As outlined by the Government, the key benefit to reducing APD will be the fostering of a more profitable and therefore larger domestic air travel market. This will help achieve one of the central aims to "level-up" all parts of the UK and share the economic gains of London and the South-West. This would be politically favourable, subduing the nationalist and independence movements that have been seen in UK's devolved administrations in response to Brexit. YouGov polling demonstrates that the further away from London British residents are, the more likely they are to think London gets more than its fair share of public spending, demonstrating the need to spread success away from the SouthEast[9]. However, with the continued decline in domestic air flights over the past decade from ca. 425,000 in 2006 to ca 290,000 in 2019, pre-COVID[10], this is a market that has already declined by 25% in just over a decade. The authors of this report therefore believe a reduction in APD, if these savings are mirrored in costs of tickets, would not significantly reverse this trend.

After the abolishment of Ireland's APD in 2014; flights to Northern Ireland increased by 37% and tourism increased by 14% in 2015[4]. This indicates there are tangible secondary benefits, above the 10% increase in connectivity, due to the reduction of APD. Particularly with regards to tourism, the impact in Ireland, indicates that LCCs will be the principal beneficiaries as there will be more travel from hub and spoke airports such as Heathrow to the regional airports. This growth in regional airports will have tangible benefits to the supply chain which already contributes up to £6.3 billion to the UK economy[5]. These factors indicate that the financial revenue could be found elsewhere to compensate for any

[3] https://airlinesuk.org/wp-content/uploads/2015/06/The-economic-impact-of-APD-analytical-update-PwC-May-20151.pdf
[4] B. Pearce, "State of the Airline Industry" IATA, Apr 2017, [Online], Accessed from: https://www.iata.org/en/iata-repository/publications/economic-reports/state-of-the-airline-industry/
[5] AUA, "The Impact of Air Passenger Duty on Airline Route Economics", AUA, Sep 2018, [Online], Accessed from: https://airlinesuk.org/wp-content/uploads/2018/09/The-Impact-of-Air-Passenger-Duty-on-Airline-Route-Economics-4.pdf
[6] Oxford Economics, "Economic Benefits from Air Transport in the UK", Oxford Economics, Nov 2014 [Online], Accessed from: https://www.iata.org/en/iata-repository/publications/economic-reports/state-of-the-airline-industry/
[7] HM Treasury, "Aviation tax reform: Consultation", Crown Copyright, Mar 2021.
[8] KPMG, "The Aviation Industry Leaders Report 2021: Route to Recovery", KPMG, 2021 [Online], Accessed from: https://assets.kpmg/content/dam/kpmg/ie/pdf/2021/01/ie-aviation-industry-leaders-report-route-to-recovery.pdf
[9] Kcl.ac.uk. 2021. More devolution may be key to solving the UK's London-centric imbalance. [online] Available at: [Accessed 19 May 2021].
[10] Ft.com. 2021. Johnson backs cut in air passenger duty to aid UK domestic flights. [online] Available at: [Accessed 19 May 2021].

losses from a reduced APD income. Increasingly environmentally aware customers may, however, prefer more sustainable forms of public transport.

1.2 A decrease in APD would have a significant medium-term environmental cost, with future renewable and sustainable technologies unlikely to be implemented in this decade. It is conceivable that in the future with the introduction of new sustainable fuels and with electric/hybrid planes, these technologies would be ideally suited to the needs of short-haul domestic flights. Therefore, this would mean any increase in domestic flight consumption would not result in increased UK emissions. However, with these technologies at least a decade away, an increase in flights would only mean a short-term increase in emissions. This therefore directly challenges the UK's commitment to be net zero by 2050. Moreover, as domestic flights emit 253g of emissions per passenger, compared with 41g for domestic rail and 43g for a 4-person passenger car, many customers on the island of Great Britain might be reluctant to takes air transport for these reasons, and would be willing to pay higher prices for it as 75% of Europeans said they would fly less in 2020 for environmental purposes according to the European Investment Bank.

1.3 SAFs have the potential to reduce the UK's aviation sector emissions by up to 32%[11] and offset the greater emissions increases from the larger demand in flights. In order to achieve this, it argues that the UK Government must contribute a minimum of £500 million in the next five years (a substantial increase up from the £15 million currently pledged) to ensure that the infrastructure across the UK is adequate[10]. If the tax revenue from APDs is reduced, then there should be a realignment of the budget to ensure these funds are made available for supporting this growing sector of the aviation industry. This is because the benefits of connectivity will be towards regional economies and local businesses and less so to the manufacturers supporting this technological advancement. Alternatively, if SAFs are not funded, it will be a significant challenge to meet the UK's aviation carbon targets.

1.4 Regional airports are already saturated and would require significant investment in runway infrastructure following an increase in demand. A 2018 IATA report indicates that 99% of UK runway infrastructure is saturated[12]. Nationwide runway expansions would therefore be required to respond to increased flight volume. However, expansions for Bristol, Heathrow and Stansted airports have all been rejected in recent years due to environmental concerns and lack of consideration of environmental commitments in planning processes[13]; although notably the decision preventing Heathrow expanding has since been overturned. The main causes of concern for these airport expansions to meet the potential increase in demand is due to noise and NOx emissions. The former has been shown to cause a number of effects including increased risk of diabetes. The UK Government has already failed to tackle illegal levels of pollution levels in the UK cities[14]; so it is unclear whether the environmental impact of airport expansions should be tolerated. Yet it is worth noting that forecasts have predicted UK air traffic demand to grow by 49% regardless, which may be delayed slightly by the impact of Covid (return to pre-pandemic levels of travel by 2023-2024) meaning that airport expansions are a necessity for continued growth of the aviation sector. In fact, there are substantial benefits this brings to the economy with a Bristol Airport expansion bringing £430 million to the local economy[15]. Also,

[11] Sustainable Aviation "DECARBONISATION ROAD-MAP: A PATH TO NET ZERO", Sustainableaviation.co.uk, Feb 2020. [Online] pp.10-51. Available: https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf

[12] IATA, "The United Kingdom, Air Transport Regulatory Competitiveness Indicators", IATA, 2018, Accessed from: https://www.iata.org/en/iata-repository/publications/economic-reports/united-kingdom-regulatory-competitiveness/

[13] R. Harrabin, "UK found guilty of dirty air breach by EU court", BBC, Mar 2021, [Online], Accessed from: UK found guilty of dirty air breach by EU court -BBC News

[14] D.Hirst, Aviation, decarbonisation and climate change, House of Commons Library, [Online], Accessed from: https://commonslibrary.parliament.uk/research-briefings/cbp-8826/

[15] D.Lees "Covid Recovery and Sustainable Growth", Bristol Airport, May 2021. [Online] Accessed from: https://www.ole.bris.ac.uk/bbcswebdav/pid-

Sustainable Aviation's climate modelling already accounts for this growing demand so CO2 emissions should not be a problem.

1.5 Whilst HS2 satisfies the north-south axis between London and Birmingham and the north, lateral routes and those that are not served by similar point-to-point infrastructure can be met by aviation services.

2 What evidence can you provide about the impact of an effective reduction in the domestic rate of APD on Union and regional connectivity?

Historically, APD has been increasing; for Band A (defined as ≤2000 miles from London on economy class), it went from £5 in 1994, to £11 in 2009, then £13 from 2013 until the date of this paper. Airline ticket prices increase with APD, impacting passenger demand which in turn influences the viability of routes. On average, APD represents 16% of short-haul ticket prices and 18% for long-haul[16]. Passengers on domestic return flights pay APD on both legs of the flight, while for international flights, APD is only charged for flights departing the UK. The total APD for domestic return flights is £26 compared to £13 for short-haul international return flights.

2.1 Airlines UK modelled scenarios where APD is abolished – the two extremes that were modelled were defined as:

a. **0% cost pass through: For routes that are making loss due to low demand, a decrease in APD will not correlate to lower ticket prices** i.e., the cost savings due to lower APD are not "passed through" to passengers. Due to the already low demand, airlines will want to make a higher profit and therefore by maintaining ticket prices and reducing APD, these routes can turn profitable.
b. **100% cost pass through: The reduction of APD correlates to a fall in ticket prices.** The increase in demand is then estimated using a Price Elasticity of Demand (PED) of 0.7, with these further market effects accounted for:
    i. Load factors: Load factors are the capacity utilisation of airlines. If the increase in demand increases the load factor by more than 100%, the ticket prices are gradually increased in the model until demand no longer exceeds capacity. Therefore, in certain circumstances, there can be less than 100% cost pass through.
    ii. Cost variability: The total cost of APD increases with passengers, along with variable costs like ground handling fees. The model estimates how costs change driven by increased demand.
    iii. Revenue: Estimated revenue is compared with the estimated costs to determine the viability of the route.

Out of 8 routes, Table 1 shows the number of routes that could be viable with £0 APD. The model highlights that the number of viable routes increases with lower APD.

5298656-dt-content-rid-20235153_2/courses/AENGM0070_2020_TB-2/Aircraft%20COE%20-

[16] Airlines UK; Frontier Economics, "The Impact Of Air Passenger Duty On Airline Route Economics," September 2018. [Online]. Available: https://airlinesuk.org/wp-content/uploads/2018/09/The-Impact-of-Air-Passenger-Duty-on-Airline-Route-Economics-4.pdf. [Accessed 19 May 2021]

Table 1: Airline routes that could be viable without APD

0% cost pass through	4 to 8 out of 8
100% cost pass through	3 to 7 out of 8

2.2 A case study by the Association of British Travel Agents (ABTA) and Airlines UK found a correlation between APD and connectivity. The connectivity of Scotland was compared with other European countries, including ones with smaller populations such as Norway and larger populations like the Netherlands. Table 2 shows the APD of the countries studied, whereby the UK has the highest APD.

Table 2: Comparison of APD for countries studied by ABTA

Scotland (UK rates)	£13
Austria	€7 (Around £6.05)
Norway	NOK 82 (Around £7)
All other countries studied	£0

As per Figure 2, Scotland ranks 7th out of the 11 countries[17] in terms of short-haul destinations served, with a majority being UK domestic flights[18]. All the countries with fewer destinations than Scotland either have smaller populations or smaller geographical areas. Generally, the larger a population of a country, the more destinations it will be connected to. For example, Iceland has a smaller population than Scotland, so there are fewer Icelandic passengers leading to a smaller number of destinations. Additionally, domestic flights in Scotland serve destinations throughout the UK, while domestic flights in a smaller country such as Austria only serve six destinations, so most Austrian short-haul flights are international. After accounting for population and geographical size, **the overall trend in Europe shows that better-connected countries have lower or no APD**.

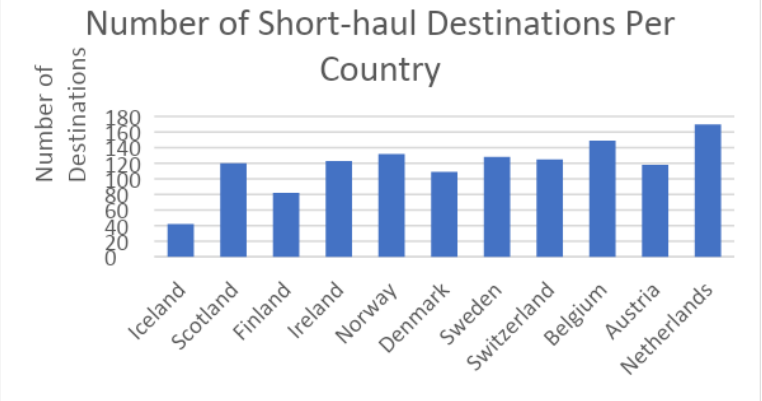

Figure 2: Number of destinations per country

A decrease of 50% in APD increases the number of passengers by 3% in Scotland; 98% of these new passengers travel specifically on the reduced APD band. Lowered APD thus improves both the number of destinations and the number of passengers.

[17] *Airlines UK; ABTA, "Reaching Out To The World - How Scotland's Aviation Connectivity Compares," September 2017. [Online]. Available: https://airlinesuk.org/wp-content/uploads/2017/09/AirlinesUK_Report2017.pdf. [Accessed 19 May 2021].*

[18] The Scottish Government, "Estimate of the Impact On Emissions Of A Reduction In Air Passenger Duty in Scotland," 22 October 2014. [Online]. Available: https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/. [Accessed 19 May 2021].

2.3 Although the model in 2.2 and case study in 2.3 show that APD rates improve domestic connectivity, there is a caveat that the improvement could be marginal with the impact of COVID-19. COVID-19 has decreased the number of domestic flights, as per Figure 3 – despite a steady decline from 2005 to 2019 due to increased land connectivity on rail and coach, the rapid dip from 2019 to 2020 was due to COVID-19.

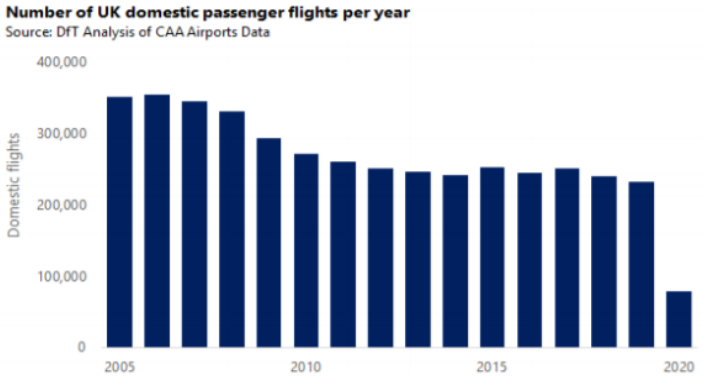

Figure 3: Number of UK domestic flights per year[19]

Reduced APD will not increase domestic connectivity directly post-COVID, as airlines will be overcoming the economic impacts of the pandemic. McKinsey & Co projections show that airlines will raise profit margins to offset losses and debt, so a decrease in APD will neither cut ticket prices nor create more viable routes for airlines in the short-term[20]. Despite the lack of immediate improved connectivity, reduced APD will aid airlines in economic recovery, as airline Direct Operating Costs will decrease. Additionally, connectivity will still likely improve in the long-term.

Recommendations

2.4 As per 2.4, a reduction in APD will not immediately bring better domestic connectivity. **It is recommended that the Government reduce the domestic rate of APD as part of a wider strategy to aid the aviation industry.** The Government is currently developing the Aviation Recovery Package, which cannot depend solely on APD reduction. Recommended additional measures are as follows:

a. Temporarily waiving airport charges for key domestic routes: This will make it cheaper for airlines to fly these routes as the Direct Operating Costs are cut.
b. Incentivising airlines to serve key domestic routes: Incentives can be in the form of cash offset or reduction of debt post-COVID.
c. Enhancing coordination between airports and airlines: Through increased information sharing of passenger movements, airlines can optimise routes that are profitable while looking at potential routes for the long-term, leading to improved and efficient connectivity (although commercial practice may act as a barrier to this approach).

2.5 APD is currently applied on both legs of a domestic return flight, and one-way for international return flights. For domestic flights to be competitive with short-haul international ones, there should be a significant APD decrease. **The Government proposal of lowering APD from £13 to £7 should be**

[19] UK Government, "Aviation Tax Reform: Consultation," March 2021.
[20] McKinsey & Company, "Back to the future? Airline sector poised for change post-COVID-19," McKinsey & Company, 2 April 2021.

sufficient. This will especially encourage more domestic flights for Low-Cost Carriers (LCCs) that operate both domestic and international routes.

3 How would a reduction in the effective rate of domestic APD affect airlines? Will the benefits be passed onto consumers in ticket prices or retained by airlines?

3.1 It is implausible that airlines would absorb a reduction in the effective rate of domestic APD. The recent demise of Stobart Air (2021), Flybmi (2020) and Thomas Cook (2019) indicate that even well established carriers struggle to maintain viable operating margins. Note, the UK already provides support for airlines through Public Service Obligation (PSO) flights to encourage regional connectivity, so absorption of APD by the airlines themselves is infeasible.

4 Which domestic air routes, if any, are likely to be introduced/restart following any effective reduction in the domestic rate of APD, and what wider benefits would these routes provide?

4.1 With the existing rate of APD for routes within 2000 miles from London, approximately £1300 will be required to cover the APD if an airline wants to open a new short-haul route with an average load of 100 passengers. If this new route is opened as daily operation, then at least £1 million needs to be generated to level the cost on APD payment. This figure will be multiplied by 6 if an airline plans to open a daily long-haul (>2000 miles) flight with an average load of 200 passengers per flight[21]. The high level of cost on APD and its impact on the route viability has restricted the development of some domestic flight routes with great potential and even led to the closure of flight routes due to loss-making.

4.2 Research (Frontier Economics) has been carried out to find potential new connections within the UK. The influence of reduced domestic APD on ticket prices, passenger demand and the overall profitability has been studied based on the cost, revenue and demand data of the routes that actually dropped in recent years, to see whether a reduction in APD would make these routes profitable. Meanwhile, some high-level benchmarking analysis have been conducted to find out potential new domestic routes which will be viable if the APD is reduced.

4.3 For the re-opening of the previously dropped routes, as the connections have been continued, this would bring positive effects towards the passengers who want to fly on those routes, without being time-consumed by land transportations anymore. In addition, the connectivity and economics of relative regions can be significantly boosted by these flights.

4.4 With regards to the potential new connections, 20 largest airports in the UK have been analysed as the candidate airports to identify any routes satisfying the listed criteria below: (Airport size is determined by the total number of movements at the candidate airports).

- There is no flight connection between the destination and the 20 largest airports in the UK, or the airports in the same city (for example, London and Belfast).
- There are flight connections between the destination and the airport apart from those 20 largest.

[21] Frontier Economics. The impact of APD on airline route economics. [pdf] Available at: The-Impactof-Air-Passenger-Duty-on-Airline-Route-Economics-4.pdf (airlinesuk.org)

- The candidate airport is larger than at least one airport in the UK which already had the connection with the destination. If a smaller airport already built up the connection with the destination, then a larger airport can have flights as well.

This approach can effectively identify some of the potential new routes, but not all of them can be identified because other factors influencing passenger demand have not been considered e.g. regional demographics, industrial sectors, and tourism density. Moreover, there are many other airports not on the candidate list or do not meet the selection criteria and will not be considered in this report, which do not represent the lack of potential or viability of these destinations and routes.

4.5 The potential new routes meet the selection criteria include:

- Bristol - Leeds
- Edinburgh - Guernsey
- Glasgow - Guernsey

Clearly this list is incomplete and the routes included here have not been subject to rigorous financial due diligence and so are provided as examples. However, the first route will connect two historical industrial areas in England, boost the development of specific industries such as the aircraft and engine production. It can largely reduce the travelling time from 3 hours 30 minutes (CrossCountry service which often delays) to less than 40 minutes.

5 Which existing domestic air routes, if any, would benefit from an increased number of services following any effective reduction in the domestic rate of APD, and what wider benefits would these routes provide?

See response to Q4.

6 By how much would you estimate that the number of passengers currently flying domestically increase?

See response to Q2.3 and Q2.4.

7 What could the environmental impact of reducing the effective domestic rate of APD be? How could any negative impacts be mitigated?

- **Establishment of a robust supply chain and scaling up the production of SAFs.**
- **A more robust method of quantifying total emissions generated per flight, through an Aircraft Emissions Tariff (AET).**

7.1 The reduction in the effective domestic rate of the APD poses significant environmental impacts. Decreasing the APD could allow air connectivity of areas in the UK to improve with the inclusion of new domestic routes to smaller regional airports and increasing the frequency of existing routes. There is a need to consider the environmental impacts as a result of the reduced APD causing a surge in domestic air travel in the UK and the consequent negative environmental impacts must be considered.

7.2 Policy Options to Mitigate Negative Environmental Impacts

Compulsory utilisation of SAF:

- This mandate specifies the use of a set percentage of SAF in aviation fuel on all domestic routes in the UK
- SAF are made of compounds with lower aromatic concentrations hence allowing a cleaner burn with reduced non-volatile Particulate Matter (nvPM) emissions which are directly related to negative environmentally impacting contrail formation and radiative characteristics[22]
- In 2018, the UK Renewable Transport Fuel Obligation Scheme[23] was extended to aviation and will provide the regulatory framework, alongside the Renewable Energy Directive (RED II) 2018/2001/EU [2] for the specific percentage of aviation fuel that must be made up of SAF
- With the UK government making an investment of £15m into SAF production, incentives have been provided for manufacturers to scale up production, thus lowering the cost per unit of fuel and minimising the cost to airline operations as a result
- Liaison with UK DEF STAN (91-091) will be vital when outlining fuel requirement specifications and standardisation for the domestic routes to ensure minimal aromatic compounds in the fuel
- The lower sulphur content and ability to be carbon neutral through the use of biomass during production provides the added benefit of reducing sulphur dioxide emissions and reducing the lifecycle of CO_2 emissions by up to 80%, compared to fossil fuels[24]
- However, SAF will require further research in specific areas:
  - A more comprehensive evaluation of the economic and environmental costs to produce SAF is required
  - Greater research is necessary to determine the set percentage of SAF in aviation fuel to ensure there is a cost-benefit balance between production and emission reduction
  - Method to check compliance of SAF fuel with pre-determined standards to ensure emission targets are met
- A balance must be met for using land to grow SAF crops with minimal impact on the food production capacity locally
- Although SAF considers CO_2 and sulphuric emissions, NO_x emissions are not mitigated by this approach
- As stated in the ICAO Chicago Convention[25], limits on the taxation of domestic aviation fuel does not exist hence providing the opportunity for non-SAF fuel to be taxed further to incentivise aircraft operators to switch to SAF even though it may already be more expensive than Jet A-1 fuel. However, this poses the risk of operators pushing additional charges to the passengers.

[22] 2020. Updated analysis of the non-CO2 climate impacts of aviation and potential policy measures pursuant to EU Emissions Trading System Directive Article 30(4). [ebook] Brussels: European Union Aviation Safety Agency, pp.6-21. Available at: [Accessed 19 May 2021].
[23] Soone, J., 2020. Sustainable aviation fuels. [ebook] European Parliamentary Research Service, pp.3-10. Available at: [Accessed 19 May 2021].
[24] What is SAF?. [ebook] IATA, pp.1-3. Available at: [Accessed 19 May 2021].
[25] GOV.UK. 2021. Participating in the UK ETS. [online] Available at: [Accessed 19 May 2021].

Inclusion of All Emissions in UK ETS:

The UK Emissions Trading System (ETS) is applicable to 'energy intensive industries'[26], which includes the aviation industry to provide a 'cap and trade' approach[25] for carbon emissions generated by UK domestic flights, however, this can be further extended to include all emissions in addition to CO_2.

- In doing so, the UK government would incentivise key stakeholders such as aircraft operators, aircraft manufacturers, and engine developers to reduce emissions of other polluting compounds such as NO_x to ensure the UK meets its emission targets outlined in the Paris Agreement[27]
- Research is required:
  - To reduce non-CO_2 emissions, such as NO_x, greater research is required in the quantification of non-CO_2 emissions through the adaptation of pre-existing emission estimation methods, such as the Boeing Fuel Flow Method2 (BFF2)[28] to account for modern technological advances in engine design
  - To quantify non-CO_2 emissions in an equivalent format to determine total emissions of the aircraft during all phases of flight

Aircraft Emission Capping and Charges

- This fiscal policy places a charge on the emissions over the course of a total flight from gate-to-gate through the approximation of emissions, both CO_2 and non-CO_2.
- This fee proportional to emissions would encourage aircraft operators to switch to more energy efficient alternatives on its domestic routes, such as the Airbus A320NEO, however poses a significant capital cost to airlines as a result.
- By creating a market for hyper-efficient aircraft, manufacturers and engine developers will be further incentivised to reduce emissions during the design process and within the designs to increase revenue.
- Aircraft emission caps will also encourage the UK aviation industry to further look into alternative fuel sources such as hydrogen and electrically powered vehicles, benefitted by the UK's investment into FlyZero for reduce knowledge gaps to achieve the targeted date of zero-emission flight by 2030.
- However, greater research is required into developing an accurate metric for non-CO_2 emissions, as opposed to using equivalent CO_2 emission measures to accurately determine the cost incurred to the airline during operation on domestic routes within the UK.
- Having made a legal assessment, ICAO's Chicago Convention[29] places no preventions on taxing domestic emissions.

7.3 Recommendations

- **Establishment of a robust supply chain and scaling up the production of SAF** will be vital to reduce the overall cost of SAF through economies of scale thus allowing its wider implementation into the UK's domestic aviation market

[26] 2021. Convention on International Civil Aviation. 9th ed. [ebook] International Civil Aviation Organisation. Available at: [Accessed 19 May 2021].
[27] 2016. Aviation emissions and the Paris Agreement. [ebook] Transport & Environment, pp.1-4. Available at: [Accessed 19 May 2021].
[28] DuBois, D. and Paynter, G., 2006. "Fuel Flow Method" ; for Estimating Aircraft Emissions. Journal of Aerospace, 115, pp.1-14.
[29] 2021. Convention on International Civil Aviation. 9th ed. [ebook] International Civil Aviation Organisation. Available at: [Accessed 19 May 2021].

- There are gaps in the knowledge of aircraft emissions that need to be addressed:
  - **A more robust method of quantifying total emissions generated per flight**, including the landing and take-off sequence, is necessary to better evaluate the environmental risks associated with reducing APD on the UK's climate change targets outlined by the UK ETS and in the Paris Agreement. For the Civil Aerospace sector we propose an Aircraft Emissions Tariff (AET)
- Collaboration of airframe manufacturers and engine developers with the Department of Transport is vital to determine targets required to be achieved for emission reductions to mitigate the environmental impact of reducing the APD domestically in the UK.

8 What could the impact of reducing the effective domestic rate of APD be on other modes of transport (e.g. road/rail)?

8.1 Domestic airlines compete with three main forms of transport, road, rail and marine in the case of island connections. Aviation has the advantage of speed and relative cost on trunk routes, with rail frequently highlighted as a more expensive way to travel than aircraft. Domestic aviation competes with two forms of road transit, long distance coach journeys and long-distance car journeys. In terms of rail the lack of a current high speed rail infrastructure means aviation competes with a rail network that is comparatively slower and centred on London, this gives aviation advantages in terms of connectivity and transit time, partially offset by time taken to get to the airport, clear security and board and deboard the aircraft. Road and rail complement as well as compete with aviation. Airport transport links are frequently provided by both road and rail and most aviation journeys are in effect 'completed' by further onward travel by another transport type. This is necessary as most airports in the UK are situated outside the urban conurbation that the airport serves. Therefore, assessing the interaction of domestic aviation, rail and road is a complex task which is further complicated by the impact of COVID-19 on travel habits and the demise of rail franchising. The ramifications of the change of the administration of rail privatisation are yet to emerge and the interactions of those effects with airline transport are currently unknown.

8.2 Competition with rail is complex[30], in an urban environment and connecting cities close-by rail and aviation do not in essence compete as operating aircraft over short distances is not viable. Whilst Urban Air Mobility may change this, the weight and passenger capacity of such aircraft is thought to be such that APD will not apply, and therefore not relevant to this discussion. By effectively reducing APD there would be a limited or beneficial effect on urban rail services as further rail connections are utilised to make use of cheaper flights or flights that would not be viable without the reduction in APD. The same is true for road transit with use of city bus services and other urban public transport predicted to increase as connections with flights are further utilised.

8.3 The effect on intercity rail travel is thought to be a small transfer in passengers from rail to aircraft along certain routes. In Spain, the advent of a high-speed train network is thought to have contributed to a 17% reduction in domestic air transport operations[31], this suggests that passengers will transfer between the transport types, depending on time, cost and convenience. On trunk routes already flown by low-cost carriers, north-south and across the Irish sea, aircraft already compete very

[30] J. Preston, "The UK passenger rail system: how and why is it changing," Government Office for Science, 2018.
[31] L. Budd and S. Ison, "The UK domestic air transport system: how and why is it changing?," Government Office for Science, 2019.

effectively in terms of price and timing, the main advantages of rail from a consumer perspective remaining convenience and comfort, further reductions in cost compared to the cost of the ticket is thought to have limited effect on the utilisation of rail. However, it has been highlighted by domestic carriers that a reduction in APD[32] will allow for increased competition with rail, if correct, an effective decrease in APD would result in a movement of passengers from rail transport to aircraft on routes where airlines are not already dominant. As rail is generally regarded as a low carbon transport solution with a clear route of further decarbonisation via electrification, such a change is unlikely to be in common with government policy on the environment unless such effects can be offset, as explored in the response to question 7.

8.4 The effect on road transport is thought to be limited, the convenience of personal car use for travel and extensive UK road infrastructure and the nature of the hidden costs of car ownership makes direct competition with aviation difficult. Aviation must deal with the inconvenience of travel to and from airports as highlighted above. Against intercity coach travel, aviation competes well, including on price for routes where a low-cost airline model is feasible. Further reductions in ticket price as a result of reduction in APD would result in increased price competitiveness and an expected movement of passengers from coach to airline. It would also increase the proportion of routes where competition is viable, as highlighted in the answer to Q4.

8.5 However, in both the case of rail and road a reduction in APD aligned with an integrated transport system may stimulate use rather than curtail it, especially journeys that link up transport solutions or by reducing overall costs of travel within the UK promoting overall use of the complete transport infrastructure. i.e. the UK solution for inter-regional travel should be considered at system level via the integrated transport system rather than using APD as a metric in isolation.

Balancing these effects is challenging, however it is likely that a reduction in APD will yield an increase in rail and road use connecting airports to urban centres and result in migration of passengers from road and rail to aircraft on some longer routes, this will not have a significant effect on the overall use of road or rail on a national scale.

9 If the effective rate of domestic APD is reduced, would you favour the introduction of a return leg exemption or a new domestic rate? What would you see as the comparative risks and benefits of these options?

Recommendation: A new domestic APD rate is favoured over a return leg APD exemption.

The APD reform focuses on improving domestic connectivity across the UK in response to a declining number of domestic passenger flights since 2005[33]. An integrated domestic flight network serves to reach areas otherwise disconnected from the Union, as well as foster economic growth and local development. Regional airports act as hubs for other industries and an improved domestic network would facilitate further growth in local economies through inward investment and employment.

[32] Calder and Simon, "Flybe Collapse: What went wrong and what happens next?," 05 March 2020. [Online]. Available: https://www.independent.co.uk/travel/news-and-advice/flybe-collapse-flights-passengers-virgin-atlantic-grant-shapps-air-passenger-duty-a9376571.html. [Accessed 19 May 2021].

[33] DfT Analysis of CAA Airports Data

9.1 Consumer benefits of a reduced effective rate domestic APD will be reflected in either ticket prices or broader domestic services. A reduction in the effective rate of domestic APD could boost Union air connectivity by establishing new domestic routes or increasing frequency on existing routes. This benefit could be passed onto the passenger either in lower ticket pricing or broader service options. The expected overall increase in domestic travel frequency as a result of reduced domestic APD will relieve the existing PSOs as current domestic air routes become commercially viable[34]. This would allow the capital released from these subsidies to be utilised to fund vital services elsewhere.

9.2 The return leg APD exemption could have an insignificant effect on improving domestic connectivity due to the strict eligibility criteria. The proposed reintroduction of an APD exemption on return legs of domestic return flights involves a restrictive set of criteria, and as such it is difficult to assess the number of people that would benefit from it. The eligibility for the exemption could be undermined by a passenger's decision to travel with an alternative carrier or to a different airport due to the nature of a competitive market. As such, whilst the intention of the return leg exemption is to support domestic connectivity, it could have an insignificant contribution.

9.3 The exemption is incohesive with some airlines due to their limited domestic routes or with low-cost carriers as a result of their business models. The information required by the airlines to evidence their exemption from APD liabilities is extensive and their ability and willingness to integrate it into their operating systems is dependent on their scale and air routes. A carrier with few domestic routes will not benefit from the exemption savings compared against the capital investment required to implement the criteria into their systems. The exemption is also not cohesive with low-cost carrier business models, where return flights to different airports, particularly in London, are often cheaper to reflect the additional inconvenience[35]. As such, it could arise that the exemption is beneficial for neither the passenger nor the carrier, which is considered a substantial risk for the implementation of an exemption.

9.4 The exemption could be viewed as serving the Union's interests ahead of the global climate crisis. An exemption risks being perceived as the aviation sector making an unjust contribution to public finances. This will become increasingly highlighted as the sector's greenhouse gas emissions reduce at a largely slower rate than other industries, resulting in an increasing percentage of the UK's total emissions[36]. Whilst the sector does make a substantial contribution to the UK economy and workforce, any bias towards a high-profile carbon emitting industry could add tension to international agreements and relationships.

9.5 A domestic flight band will allow APD revenues to recover whilst also supporting domestic connectivity. The proposed alternative of a new domestic flight band continues to tax passengers for their flight emissions but at a lower rate to reflect the smaller distance travelled, meaning all flights will contribute to public finances, unlike the return leg APD exemption where a proportion of flights will make no contribution.

9.6 The new domestic APD band can balance both carbon emission reduction and improves Union connectivity during the post COVID-19 recovery. The post COVID-19 recovery could be utilised

[34] DfT, "Public service obligation: regional air access to London", Department for Transport, 2013.
[35] C. Schlumberger and N. Weisskopf, "The Low-Cost Carrier Business Model", Ready for Takeoff?: The Potential for Low-Cost Carriers in Developing Countries, pp. 3-21, 2014.
[36] Department for Business, Energy & Industrial Strategy, "2019 UK Greenhouse Gas Emissions, Final Figures", National Statistics, 2019.

as a platform to substantially reduce carbon emissions whilst simultaneously supporting Union growth through improving domestic flight connectivity. The new band for domestic flights balances both, by advancing the Union flight network whilst ensuring a duty remains in place for every departing flight. The domestic APD band doesn't undermine other transport sectors by undercutting ticket prices, which could potentially be the case for the return flight exemption. This policy option allows the Government's objectives to be realised in the short-term in the build-up to the Union Connectivity Review when the transport sector can take a more holistic and cooperative approach.

9.7 Airlines can efficiently integrate the new APD band to immediately realise the benefits of domestic connectivity and carbon reduction whilst still contributing to public finances. Airline carriers will be receptive and better equipped to an additional APD band than the return flight exemption. The new band could be integrated more efficiently as the evidence required for this policy is minimal, requiring only a Union category within the airline coding system. As such, APD revenue should be largely unaffected by the change, as the policy is simply an adjustment to APD rates rather than an exemption for an entire category of flights. Therefore, it is viewed that the new APD band is beneficial for the Government without hindering the airlines.

9.8 It is concluded that a new domestic APD rate is favoured over a return leg APD exemption. This is a result of the exemption being perceived as unfair for a high-profile carbon emitting sector as well as potentially having an insignificant effect on improving domestic connectivity due to the strict eligibility criteria. The exemption is considered incohesive with some airlines as a result of their limited domestic routes or with low-cost carriers due to their tight business models. Passengers will benefit from a reduced effective rate domestic APD either in reduced ticket prices or broader domestic services. Furthermore, the new APD band can be immediately integrated into airlines operating systems to instantly realise the benefits of domestic connectivity and carbon reduction whilst still contributing to public finances.

10 Is there an alternative approach to reducing the effective rate of APD on domestic flights, that you think would be more appropriate than either of the options identified?

See response to Q1, we support a reduced APD on domestic flights.

B: A return leg exemption

11 What are your views on the way a return leg exemption could operate as set out in paragraph 2.8? What are the benefits and risks of this proposal? What amendments would you suggest, if any?

Recommendation: We propose that the Return Leg Exemption is replaced by a domestic APD which will be easier to administer and avoid complications of "open jaw" travel.

11.1 In order to decrease the APD there are a few approaches to take. Simply placing domestic travel into the lowest tax band would be one approach but another would be to provide "Return Leg Exemptions" (RLE). The RLE would operate as follows, **domestic flights continue to operate in the lowest band of APD, but airlines are not liable to pay for passengers on the return legs of flights.** The airline would only be able to benefit given they were able to provide proof that it is in fact a return flight that meets several conditions. Although there would be no time limit on what constitutes a return leg the flight would have to be to and from the same UK airport and the flight would need to be domestic. This system has been used before as when Air Passenger Duty was introduced in 1994[37]. There was a RLE when APD was first introduced to the UK.

From the Figure 3 below the effect of decreasing APD can be seen as the taxes associated with buying a seat on an airline is almost a quarter of the total ticket price.

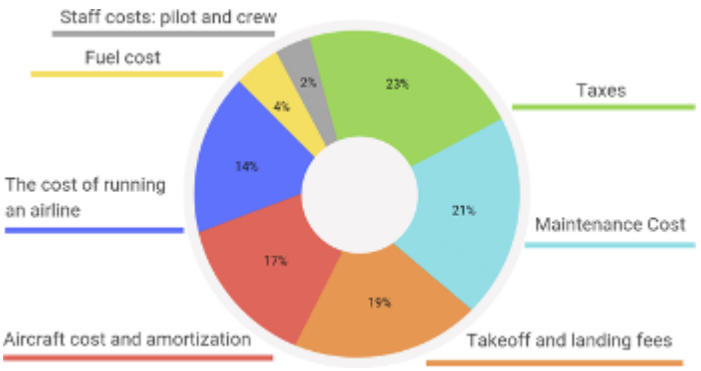

Figure 3: Price breakdown of a seat on a commercial aircraft[38]

In the simplest case of a customer booking a return flight from an airport to the same airport within the UK the system would operate simply. However, there are several factors at play and not all flights would be as simple to categorise as the aforementioned booking.

This system would put great strain on the airlines and on HMRC to regulate what exactly constituted and who was taking return flights. For the airlines it would be simple for the customers booking outbound and return flights simultaneously but due to the carriable price costing model many customers choose to book one-way tickets even when travelling to and from the same airports on what

[37]https://commonslibrary.parliament.uk/research-briefings/sn00413/#:~:text=The%20tax%20was%20introduced%20in,%C2%A310%20on%20flights%20elsewhere

[38] https://skyrefund.com/en/blog/airline-industry-price-wars

would be a return Journey. This could lead to an increased amount of fraud both accidental and malicious as airlines label flights that are one–way as return flights. Also, it would be possible that if airlines are overly cautious in claiming the RLE on flights the APD may not be decreased to a degree where the benefits of increased regional connectivity could be reaped[39].

11.2 The current conditions also fail to consider cities like London with multiple airports and so the journey may be carried by the same airline from two separate 'home' airports and would otherwise qualify as a return journey, though it would fail to meet RLE conditions. This could, especially in larger cities, cause monopolies to develop as customers choose to fly into and out of the same airport negating the need to diversify their travel. This is also true of the airlines. Hypothetically under a flat APD rate for domestic travel it would be more likely to find cheaper one-way flights from different airlines to and from destinations. However, with the RLE system this would allow monopolies to develop again as the cheapest airline would be more much likely to dominate the market share of flights to and from that destination.

11.3 The benefit of RLE would be that it would lead to an increase in regional connectivity which would be beneficial for more remote airports and the economies surrounding those airports. As the airline industry already contributes £22 billion and almost a million jobs the more this can be developed the better. As well as this benefit, the RLE would encourage holiday makers to remain within the UK and in the context of a global pandemic this would be beneficial as well as being beneficial for the local tourism industry[40].

11.4 The alternative proposal for a new, separate band of tax on domestic flights between UK airports lower than the lowest international band is a much simpler idea. The new band would allow all domestic flights, one way included, to benefit from a lower APD.

11.5 One possible amendment could be to put an even lower APD on specific routes which are popular over land to provide a competitive alternative to rail or coach travel to and from those destinations, e.g., London to Newcastle. Were there an affordable alternative via air this would decrease the carbon emissions as opposed to car or coach travel over the same distance per passenger and this would also stimulate the airline and airport industry. However, this approach would be open to challenge and difficult to implement equitably.

11.6 In conclusion, of the two systems proposed to **decrease effective APD the latter system of a new band below international travel seems the simplest and would cause the least strain to the airlines and to HMRC** in regulating the correct payment of APD. This decision is not taken lightly as the APD is the single greatest effect the government has on air travel regulation.

[39] https://www.gov.uk/guidance/exemptions-from-air-passenger-duty#emergency-or-public-service-flights
[40] https://www.gov.uk/guidance/air-passenger-duty-for-plane-operators

12 Do airlines currently differentiate between single and return tickets in their booking systems and, if so, how?

No response.

13 What evidence could airlines provide to HMRC to demonstrate that a passenger was travelling on a return ticket?

No response.

14 If the return leg exemption were to be introduced, how quickly could airlines integrate it within their operating systems to allow them to provide evidence to HMRC on their APD liabilities?

Not applicable, we support a ubiquitous domestic APD which will avoid the administrative challenges of the RLE approach.

15 Are there any particular considerations around the application of a return leg exemption to business jets, in light of how business jets are operated?

No response.

C: A new band for domestic flights

16 Do you agree with the government's initial position that a new domestic band would be the most appropriate approach to reducing the rate of APD on domestic flights?

16.1 The introduction of the new band for domestic flights is an effective and appropriate way of incentivising the growth and recovery of the industry. Whilst the previous band aimed to decrease the tax rates only for return flights, this new band simplifies the process and guarantees better support to all types of flights[41].

Although the reduction of tax for the return domestic flights might seem like an adequate solution, the requirements to provide evidence that proves that the passenger has used their return ticket is extensive and complex. In order to check whether the passenger has travelled on a return ticket, the airline must have a large data bank that will store the information of the passenger for as long as needed, which increases the need for an effective data storage system. The issues related to this might be related to the sharing the information amongst different locations and the information privacy of the customer[42].

When compared to the different approach, one of the main benefits of this solution is the decrease in data storage needs, which reduce the number of efforts from the airline and decrease the need of a work force specialised in checking and controlling the type of ticket. It also reduces the need for specific technologies to store and control the booking data and passenger information. Moreover, this approach reduces the concerns of information privacy once the company is not required to store that data and decreases the legal requirements of each booking.

Moreover, considering the current COVID-19 crisis, the reduction of taxes for all kinds of domestic flights incentivises the demand and decreases the operational costs of the airlines, giving a better margin of profit. This increased profit can be relevant for the recovery from the economic problem.

Here follows the SWOT and the PESTEL analysis for the reduction of the APD rate approach in tables 3 and 4.

Table 3: PESTEL analysis for the reduction of the APD rate approach

Factors	Implications
Political	Promotes the development of the local industry
Economic	Decrease the expenses of data storage Promote the domestic flights of all kinds
Social	Fewer customer issues with ticket control

[41] Airlinesuk.org. 2021. [online] Available at: <https://airlinesuk.org/wp-content/uploads/2018/09/The-Impact-of-Air-Passenger-Duty-on-Airline-Route-Economics-4.pdf> [Accessed 19 May 2021].
[42] Boeing.com. 2021. *Securing Airline Information on the Ground and in the Air*. [online] Available at: <https://www.boeing.com/commercial/aeromagazine/articles/2012_q3/5/> [Accessed 19 May 2021].

Technological	Less technology required to store the data of customers No need of equipment to control and different the different types of thicket Promote the domestic flights of all kinds
Environmental	Increase in short-haul flights of all types supports the advances in greener technology
Legal	Issues with data storage and privacy of customers Reduce the legal requirements

Table 4: SWOT analysis for the reduction of the APD rate approach

Strengths All types of domestic flights are incentivised Support for COVID recovery	**Weakness** It does not focus on the environmental side
Opportunities Possible growth of the domestic flight sector Increase of short-haul flights	**Threats** All the domestic flights are incentivised and that might lead to an increase of air transport instead of different modes of transport

17 What are your views on the way a new domestic rate could operate as set out in paragraph 2.11? What are the benefits and risks of this proposal? What amendments would you suggest, if any?

No response.

18 If a new domestic rate were to be introduced, how quickly could airlines integrate it within their operating systems to allow them to provide evidence to HMRC on their APD liabilities?

No response.

D: International distance bands

19 Do you agree with the government's initial policy position that the number of APD distance bands should be increased? In your view, what would be the positive and negative effects of such a change, particularly in light of the government's objectives for aviation tax?

This paper agrees with the Government's initial policy position that the number of distance bands should be increased and also recognises that other forms of APD band changes such as in-class and aircraft efficiency could also have a positive effect on the Government's objectives.

19.1 Increasing the number of bands for distance will enable the Government to discourage direct travel over large distances. As the distance bands are split at more regular intervals, the APD can be raised with increased granularity for the flights in the highest bands. As this charge is generally passed from the airline to the consumer, this should discourage consumers from taking these flights. This could lead to passengers breaking longer journeys into shorter flights. This leads to lower carbon emissions and helps push the UK towards carbon neutral. However, the direct cost of these long-haul flights is already a more significant proportion of the overall cost, and a price increase may not discourage many of the consumers who demand these tickets.

19.2 The Government aims to improve the international connectivity of the UK allowing UK citizens to access more areas of the globe. **Increasing the number of APD bands may reduce global connectivity as it becomes more expensive to access wider regions of the world.** However, this policy could encourage people to take shorter trips by air and encourage stopovers in a range of countries. This may enhance connectivity with some nations with adjacent borders as an outcome could be more people visiting the area before resuming their onward travel. These consumers may take other modes of transport to their final destination which are more environmentally friendly, once again showing the policy's importance for a green future.

19.3 An increase in the number of distance bands may also lead to the aviation sector making a larger contribution to public finances. Pre-pandemic, international travel was of greater magnitude in terms of passenger demand and total revenue than domestic travel. Alongside this, most international travel demanded a larger APD rate than domestic levels meaning it was the largest contributor to the UK aviation sector's tax revenue. If more distance bands are added, and current APD rates are not decreased, greater revenue will be collected. This will allow for increased government spending in the areas needed to aid the UK's recovery from the pandemic. While this may be true in the long term, the current demand for international travel is well below that of 2019 and is currently below that of domestic travel. This is due to both international travel restrictions and an increase in uncertainty in international travel causing a fall in consumer confidence. It could be argued that this policy should not come into immediate effect as it conflicts with the Government's wish to increase consumer confidence and get people travelling again.

19.4 Whilst increasing the number of distance bands may help reduce aviation emissions, an increase in the number of bands for seat class may also have the same effect. Currently, there is a band for the lowest class, a band for any other class, and a band for aircraft with fewer than 19 seats. This means that everyone from premium-economy up to first-class is being charged the same APD. As each class increments, the amount of space they take up on the plane increases, meaning fewer people can fit on each flight and causing an increase in the frequency of flights. As the 'polluter pays

principle' is enforced within the distance bands it could also be reinforced further in the class bands. A higher APD could be charged for the higher classes discouraging demand and perhaps leading to configuration changes by airlines wishing to avoid the higher cost, therefore fitting more seats per plane. This would help the Government's objectives in providing greener travel and collecting fair tax revenue from the aviation industry.

19.5 As technological improvements are made in the aviation sector, pushing aircraft to alternative fuels, the band system will need reimagining to take into account these innovations. As aviation fuel is not taxed, APD provides the only financial discouragement against flying. **As bio-fuels, hydrogen, and hybrid aircraft become employed in the future, these will likely run at higher costs due to the immaturity of their technology.** Current banding would have a hybrid aircraft paying the same APD as an avgas aircraft. This will be discouraging the consumer from choosing the more expensive greener option, therefore the band system will need altering to account for this. This could begin implementation now as rates could be varied based on the fuel economy of the aircraft as is proposed by this document's proposition for an Aircraft Emissions Tariff (AET). This would pass on a direct environmental cost to the consumer, based not only on the choice of route but the choice of their aircraft. The report recognises this is hard to implement in current aircraft as often there are trade-offs made between CO2 production and NOx production meaning a lower carbon emission plane is not necessarily the best for the environment.

19.6 The UK already has the highest aviation tax in the EU and any increase would make the UK less competitive. Not only this, high aviation taxes stop airlines from investing in greener aircraft potentially having a damaging effect on environmental aims. This perception may well be mitigated by the AET which encourages understanding and adoption of relevant technologies.

19.7 This paper agrees with the Government's initial policy position that the number of distance bands should be increased, but also recognises that other forms of APD band changes such as in-class and aircraft efficiency (AET) could also have a positive effect on the Government's objectives. Increasing the number of bands will help reduce the demand for longer distance, higher emission long-haul flights while having the potential to increase tax revenues from the aerospace sector. In addition, the increase in the number of distance bands will improve the international connection to some destinations but may also have negative consequences with nations at the furthest distance to us.

20 What could the impact on the environment of a change to the banding structure? How could any negative environmental impacts be mitigated?

Background

With a change from the two-distance-band structure for charging APD to an alternative of either three or four bands comes the risk of environmental impact within the UK and Europe. This is because of increased incentive provided to travel either domestically within the UK or within Europe to limit the cost of APD to the consumer. As a result, there is the potential for increased passenger traffic in the region thus leading to environmental implications that must be mitigated.

Policy Options to Mitigate Environmental Impacts

20.1 Minimising Contrail Formation and Route Planning

- Contrails form as a result of aircraft flying at altitudes where low-temperatures cause ice particles to form due to impurities such as sulphuric compounds from the exhaust of jet engines
- Persistent contrails are those that remain present in the atmosphere for long periods of time thus leading to cloudiness and causing warming of the global surface
- Minimising contrail formation would require Air Navigation Service Providers (ANSPs) to use relevant data to avoid climate regions in the atmosphere that would cause contrails to form
- However, this can lead to detours being required both in the horizontal and vertical direction thus leading to greater pressure on Air Traffic Controllers; as well as causing increased fuel burn to navigate around the region which could eventually negate the original benefit of the diversion to avoid contrail formation
- Increased congestion due to greater incentives to travel within the UK and Europe by the distance- banding of APD can lead to increased use of holding stacks at airports and ground handling time increasing thus causing increased emissions, and contradicting the purpose of the distance bands
- To minimise emissions, the utilisation of the Single European Sky (SES) initiative is recommended to prevent fragmentation and cope with increased demand and to reduce emissions by preventing the need for diversions of select airspaces
- Additional research is required in the following areas:
  - A more detailed study is required to investigate the implications of persistent contrails for CO_2 and non-CO_2 emissions in comparison to horizontal and vertical diversions to avoid specific air spaces
  - Specific identification of regions where there is a high frequency of contrail formation will allow for better route planning to ensure avoidance of the regions and mitigating the environmental impact of the flight
  - In the development of specific flight departure time strategies such that the need for landing sequence stacks can be minimised at destination thus reducing the carbon footprint of the total journey significantly by minimising fuel burn

20.2 Alternative Fuel Propulsion Methods for Aircraft

- This policy option is an extension of the UK's investment of £15m into FlyZero to design and develop a carbon-neutral aircraft for 2030
- Collaboration between UK and European airports with aircraft and propulsion manufacturers such as Airbus and Rolls Royce will be required to determine the logistics of an alternative fuel aircraft through the development of the aircraft and supporting airport infrastructure
- Due to distances involved between London and the rest of the UK, Europe and North Africa being within 2000 miles, there is the possibility for shorter trips to be carried out using small electric vehicles such as Airbus' E-Fan X [11] or using other vehicles powered with alternative fuels such as hydrogen
- However, the immaturity and capital costs associated with such methods mean these provide long- term solutions as opposed to more immediate changes thus requiring the need to focus on other developments in route planning and contrail avoidance
- Further research is required in developing an alternative propulsion method to SAF and Jet A-1 fuel that is rapid to replenish between flights and carbon neutral to mitigate consequences of increased demand due to distance-banding

- The design and manufacture process should also incorporate sustainable methods to ensure continuity of carbon emission reduction to allow the UK to meet targets outlined in the Paris Agreement[43] and by the UK ETS.

20.3 Aircraft with Greater Efficiency

- Changes to the distance bands structure require offsetting to take place to operational costs of aircraft to ensure airlines remain competitive to generate revenue and profit
- To achieve this, operational costs can be reduced using more fuel efficient aircraft combined with SAF usage
- The introduction of ultra-efficient aircraft such as the Airbus A320NEO, Airbus A350XWB and the Boeing 787 Dreamliner continue to improve fuel efficiency of routes thus reducing fuel burn by up to 15% on ultra-long-range routes such as London to Perth
- However, this requires a large capital investment that may not be possible by airlines, particularly as a result of the COVID-19 pandemic where revenue loss has been severe due to travel restrictions causing reduced global demand for air travel

Recommendations

- Strategic route planning will be essential to avoid excess fuel burn due to aircraft waiting in stacking sequences prior to landing and due to contrail formation avoidance
- There are knowledge gaps in contrail-prone airspace detection and monitoring; as well as determining the actual carbon footprint offset of diverting an aircraft to prevent it from forming persistent contrails
- Although alternative fuel aircraft provide ideal solutions to the challenges faced by increased local demand due to the changes of the distance-bands, technology is immature and requires substantial development prior to implementation into the network.
- With current progress within the industry and support from government to find an alternative solution to fossil fuel combusting engines, the goal can be reached within the next 15-20 years.

21 What evidence can you provide about the impact of an increase in the number of APD distance bands on international connectivity?

Background

Two policy options for different band structures are considered to restructure current APD charge applications. The two options are Option A, with four distance bands, and Option B, with three distance bands.

Methodology

As seen in Table 5, scoring the related impacts of the two options whilst conducting the PESTLE analysis provides an effective way to evaluate and determine which of the two options is most appropriate. The scoring criteria selected has been based on the minimal additional data available

[43] 2016. Aviation emissions and the Paris Agreement. [ebook] Transport & Environment, pp.1-4. Available at: https://www.transportenvironment.org/sites/te/files/publications/Aviation%202030%20briefing.pdf; [Accessed 19 May 2021].

preventing a more comprehensive evaluation.

Table 5: Scoring Criteria for the PESTLE analysis of Options 1 and 2

Impact	**Score**
Negative Impact	-1
Neutral	0
Positive Impact	+1

Political Impacts

- Option A: With the increased number of bands, the potential for limiting UK international connectivity is present due to the definition of distances being based on capital-to-capital distance. Connections between developed and developing countries are not consistent with the use of four bands and would be better established based on the distance from key cities such that Mumbai and Los Angeles would be in the same bracket due to their similar distances from London. This causes limitations to the multilateral and bilateral activities between the UK and other nations, thus limiting its accessibility (*Score: -1*)
- Option B: Reducing to three bands enables greater alignment with the government's initial motive of charging greater APD rates for passengers travelling further away from the UK. The reduction in bands also allows greater international connectivity as several emerging countries are bracketed in the same as higher income nations thus preventing the impression of political bias of the UK (*Score: +1*)

Economic Impacts

- Option A: Aviation allows the arise of a globalised market such that interdependencies are present between the UK and nations across the world. The four band APD allows greater revenue to be generated due to the greater differentiation of the bands, however, poses negative effects in terms of economic cohesion between long-haul destinations due to higher rates of APD reducing the incentive for the more price-sensitive visit friends and relatives (VFR) and holiday-maker customer. *(Score: 0)*
- Option B: The reduced bands provides a larger catchment area of each of the APD rate brackets thus incentivising greater globalisation of industry between the UK and emerging regions such as India and China; as well as developed regions such as the west coast of USA. Opportunities for greater GDP growth is made present due to better accessibility of the UK with other nations, however, less revenue is generated by the APD from passengers travelling further. (*Score: 0*)
- Options A & B: Both options provide the ambiguity when considering multi-stop trips to a final destination. Clearer distinguishment of regulations are vital when defining the distance for which the band of APD is chosen for either the flight departing from a UK airport or the final destination of the trip that starts from a UK airport

Social Impacts

- Option A: The four-band structure limits accessibility of the middle-class passenger within the

VFR and holiday-maker bracket significantly thus leading to reduced revenue generation by the airline. Humanitarian aid can become more costly due to the greater number of bands present. Exemptions would need to be made available when flying for humanitarian causes to allow the UK to support crisis-stricken regions. (*Score: 0*)

- Option B: The increased accessibility using the three-band system with strong socio-economic benefits, as discussed in the Economic impacts, would lead to demand on routes with minimal seasonal sensitivity allowing revenue generation and increasing load factor of flights. (*Score: +1*)
- Options A and B: However, with 70% of flights originating from the UK being made up of the wealthiest 15% of the population [8], the use of the band system may limit the access of destinations for those less able to afford the APD rate thus reducing the VFR customer base for ultra-long-haul destinations.

Technological Impacts

- Option A: The greater number of bands could cause the increased incentive for airframe manufacturers and engine developers to further develop modern efficient aircraft such as the Airbus A350XWB and the Boeing 787 Dreamliner to aid airlines reduce operational costs to offset the increase in APD thus allowing competitivity. As a result, the UK would benefit from this due to the increased competition causing ticket prices to reduce and increasing revenue generated, particularly by the price-sensitive VFR and holiday-maker price bracket. *(Score: +1)*
- Option B: Similar to Option A, the bands provide the motivation for ultra-long-haul flights to be as efficient as possible to ensure airlines remain competitive. The Boeing 787-9 introduced on routes from London to Perth by Qantas has permitted a 15% reduction in operational costs. *(Score: +1)*

Environmental Impacts

- Option A: The use of the four-band structure allows a higher APD to be charged to passengers travelling further away from the UK thus providing the incentive for travelling locally and reducing emissions generated to aid in meeting targets outlined in the Paris Agreement [6]. As mentioned in the Technological Impacts, the bands would encourage more fuel efficient aircraft to be deployed to offset APD. (*Score: +1*)
- Option B: The three-band structure would provide the same environmental benefits as Option A. (*Score: +1*)
- Options A and B: Although the distant band structures would help deter long-haul travel, there is an increased incentive to remain within the UK and Europe, thus leading to increased air journeys in the region. As a result, a greater risk of congestion is posed with targets of the UK ETS being challenged due to domestic aviation being included in the emissions budget.

Recommendations

- Option B is the most appropriate with a score of +4 (versus Option A with a score of +1) due to its better justified band structure and improved political and social impacts while still promoting the reduction in emissions through the disincentivising long-haul travel.
- Greater consistency needs to be found when defining the distance bands with greater emphasis needing to be placed on destinations individually rather than countries as a whole, particularly

for the USA.

22 Which of the policy options for increasing the number of international distance bands do you think is most appropriate? Please explain your answer.

Recommendation: A three band international APD structure is favoured over either a two band or four band system.

A three band APD structure is the most appropriate of the proposed policies. As seen in Table 6 it presents a trade-off between the environmental objectives of the UK and the want to support international connectivity, while still contributing to public finances.

Table 6: Summary of impact of different band systems on the objectives of the consultation.

APD Band/ Objective	Connectivity	Environmental	Financial Contribution
2 Band System			
3 Band System			
4 Band System			

22.1 The current two band system is inadequate at considering the environmental impact of international flights. Under the current two band system, although the international connectivity is good as there are minimal discrepancies between countries, the emissions and environmental impact of such flights are not taken into consideration. A journey from London to Perth (14,449km) releases nearly 50% more CO2 than a journey from London to New York City (5,536km)[44], however they are in the same APD band and incur the same cost.

22.2 Improved consideration of environmental impact is provided by both the proposed changes. In contrast to the current system both the three and four band systems have more sensitivity to the environmental impact of the flight. The four band system is more sensitive to the distance and therefore the emissions released and therefore aligns itself more closely with the environmental objectives of the government.

22.3 The four band proposal, while aligning well with the environmental objectives, may cause issues with international connectivity. Other objectives still need to be considered aside from the environmental objectives and the four band system has the potential to cause issues around international connectivity. Of particular concern previously was the banding of the United States of America in Band B and the Caribbean in Band C due to the location of their capitals. This issue would still need to be considered if the four band system was to be re-introduced. One proposal would be to split the United States of America, however this could set a precedent leading to a much more complex

[44] HM Government, "Aviation Tax Reform: Consultation", 2021. [Accessed 19 May 2021].

system if other countries also wished to split, as well as potential diplomatic issues caused by charging higher rates to part of a country.

22.4 The current system is inadequate at representing the amount of CO2 released in a flight. Table 7 shows some representative locations and how the CO_2 released per passenger varies for different bands. It can be seen that whereas under the current system a flight to Cairo and a flight to Perth would incur the same APD, with the three and four banded system a larger amount of APD would be paid for a trip to Perth to represent the longer distance travelled and the larger amount of CO_2 that is released.

Table 7: Emissions of respective flights to London[45]

London to	Distance (km)	CO2 (kg/passenger)	2 Bands	3 Bands	4 Bands
Rome	1442	136.7	A	A	A
Cairo	3529	230.5	B	B	B
Beijing	8150	339.1	B	B	C
Perth	14,490	498.6	B	C	D

22.5 The three band system could provide a sensible trade-off between the environmental goals and the need for international connectivity. The three band system, although less sensitive than the four band system, still provides a more sensitive system than is currently in place. It is worth considering that long haul flights release less CO_2 per km than short haul flights as a large proportion of the emissions are produced at take-off and landing. A less sensitive system for very long journeys could still provide better alignment to the environmental objective of the government than the current system. The four band system has previously been used but was dropped due to connectivity issues as previously mentioned. While a 3 band system is not as sensitive to the environmental objective, it could provide a sensible compromise in the trade-off between the environmental and connectivity objectives.

22.6 The higher cost of APD in the higher bands would promote the environmental objective with the 'polluter pays' principle. Whereas in domestic flights the reduced rate is the most common, for international, and particularly long haul flights, more people are willing to pay to fly first class resulting in more APD charged at the standard rate. This means that for long haul flights in bands C and D, APD could become considerably more expensive. As the fewer passengers there are on the aircraft the less efficient the aircraft is in relation to kg of CO_2 produced per passenger, this extra cost would be helping to meet the environmental objective as well as helping aviation to ensure it is contributing a fair amount to public finances.

22.7 The rates charged in the new bands need to be carefully considered to maintain international connectivity. The effect that the band system will have on the financial contribution of the aviation sector depends dramatically on the prices for each band. If the current band B costs remain the same and bands C and D cost more, the financial contributions will increase. It should be noted however that

[45] ICAO, "ICAO Carbon Emissions Calculator", *Icao.int*, 2016. [Online]. Available: https://www.icao.int/ENVIRONMENTAL-PROTECTION/CarbonOffset/Pages/default.aspx. [Accessed: 19- May- 2021].

too much of a price increase could result in less international connectivity, particularly to countries in higher bands, and so the levels of taxation should be carefully considered. Both new systems will provide an increase in the financial contribution of the aviation sector to public funds, however, which system would result in a larger increase would depend on the exact costs applied.

23 Is there an alternative banding structure that could better meet the government's objectives as outlined in paragraph 1.1?

23.1 As outlined in our response to Q25, we believe that APD based solely on distance does not reflect changes in technology or provide any incentive for passengers to consider alternate flight options which may be more environmentally more efficient. Therefore, we propose a system - an Aviation Emissions Tariff (AET) - which reflects the true climate emissions by aircraft at the time of booking and aircraft allocation to flight number.

24 If a new international distance band structure were to be introduced, how quickly could airlines integrate it within their operating systems to allow them to provide evidence to HMRC on their APD liabilities?

No response.

E: Frequent flyer levy

25 Do you agree with the government's assessment that APD should remain as the principal tax on the aviation sector? Would you propose any alternative tax measures which could further align the aviation tax framework with the government's environmental objectives?

Recommendation: We agree with the government's assessment that APD should remain the principal tax, however it should be modified to closer align it with the government's objectives, primarily by considering the efficiency of the aircraft.

We believe that the principal tax on the aviation sector should be more closely aligned with environmental objectives than APD currently is. APD should be restructured to represent the environmental impact of flying more closely. The timing of such changes need to be carefully considered given the current climate of COVID -19 and a global recession.

25.1 APD was not originally designed as an environmental tax and as such is inadequate in helping the aviation sector and the UK meet the environmental targets that have been set. The current system with only two bands does not sufficiently consider the emissions released during flight. A flight that releases 335.4 CO2 kg/passenger is charged the same as a flight that releases 498.6 CO2 kg/passenger. However, taxing as a method for meeting environmental targets should be very carefully implemented as there is evidence that it doesn't make aviation any more environmentally friendly and can even have a negative impact[46].

25.2 COVID-19 has pushed the civil aerospace industry into crisis and too much taxation could limit the rebuilding of the industry. High levels of tax can reduce passenger numbers, resulting in less business and tourism. This has a negative impact on the local economy. This is particularly important as alongside COVID-19 there is a global recession, further reducing passenger numbers even when it is legal to fly.

25.3 High levels of taxation could also cause more emissions in the longer term as the industry has less money to invest in newer technologies. IATA say that high levels of taxation are not only bad for the local economy, but also for meeting environmental targets. If only the UK were to raise taxes there is the potential for people to travel to cheaper locations to fly from, causing more carbon and greenhouse gasses to be released into the atmosphere as they travel to airports that are further away.Airlines also suffer from too much taxation as they have less money available to invest in newer and more environmentally friendly aircraft, resulting in more emissions being released in the long term.

[46] IATA, "Taxes & the environment: Fact Sheet", *Iata.org*, 2020. [Online]. Available: https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet---green-taxation/. [Accessed: 19- May- 2021]

25.4 Incentives may be a better way to improve the environmental impact of the aviation industry, however they may not be possible in the current economic climate. IATA suggest that incentives are a much more effective way to encourage the aviation sector to meet its environmental objectives, however given that public spending in the last year has been extremely high due to the pandemic, and a multi- billion pound bailout was agreed to save the aviation industry in the UK last year[47], providing incentives may not be a viable option as they are expensive.

25.5 This suggests that **a careful balance between taxation to ensure that the aviation sector is fairly contributing to public finances, and stimulating the economy needs to be struck.** Currently APD is charged per passenger on a two band system, to align this system more with the environmental objectives of the government more sensitivity to the environmental impacts of flight need to be considered. These could include how full the flight is, how efficient the engine is, as well as the distance travelled and the emissions emitted.

25.6 A system that considers the age and efficiency of the aircraft used would incentivise the use of newer and cleaner technologies. In much in the same way as the CO2 emissions of cars are taxed currently[48], by reducing the tax required for newer technologies there is a clear incentive for airlines to invest in more environmentally friendly systems. As most airlines only operate certain routes with certain aircraft, once the tax amount for a route had been calculated, it would likely not change.Whereas APD is charged per person, if the tax were charged per flight there would be an added incentive to fill flights up as much as possible, reducing the amount of CO2 released per passenger.

25.7 We believe that the tax system requires change to align more closely with the environmental objectives of the government. Although modifying the current APD structure could result in some improvements a new tax structure is suggested. The recommendations made for this new tax are as follows:

a. The new system does not come into effect until the immediate crisis caused by COVID-19 has been dealt with and passenger numbers are back in-line with at least 2010 levels.
b. The new system considers the efficiency of the aircraft being used as well as emissions produced due to distance as part of the band system (an example is shown in Table 8) to promote the use of newer and more environmentally friendly aircraft.
c. The new system charges per flight as opposed to per passenger to encourage aircraft to fly with fuller aircraft further increasing efficiency (subject to COVID-19 laws at the time).

[47] M. Kleinman, "Ministers close in on multi-billion pound airline bailout plan", *Sky News*, 2020. [Online]. Available: https://news.sky.com/story/ministers-close-in-on-multi-billion-pound-airline-bailout-plan- 11960528. [Accessed: 19- May- 2021].
[48] HM Government, "Vehicle tax rates", *GOV.UK*, 2017. [Online]. Available: https://www.gov.uk/vehicle-tax- rate-tables. [Accessed: 19- May- 2021].

Table 8: Example banding system considering both distance flown and engine efficiency (A is the lowest band and D is the highest)

Distance/Engine Efficiency	**< 50%**	**50% - 70%**	**70% - 80%**	**80% +**
< 2,000	C	C	B	A
2,000 - 5,500	D	C	B	A
>5,550	D	D	C	B

25.8 Addressing the issue of a FFL as a direct form of taxation, we believe it will be difficult to difficult to collect when passenger journeys contain multi sectors using different airlines, but all frequent flyer programs allow accrued points to be used for other services (goods, food and beverage, entertainment etc) and hence would be subject to a plausible deniability challenge. **Therefore, we do not support an FFL.**