

# What are the political opportunities and barriers to account for the UK's aviation footprint?

*A Report for WWF-UK*



## About

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# 1. Executive Summary

- 1.1. This report argues that UK aviation emissions (along with shipping emissions) should be accounted and mitigated as a matter of urgency.
- 1.2. It is highly likely that the UK Government will only account for aviation emissions from the first year of the sixth carbon budget in 2033 following the advice in the Committee on Climate Change's (2019) report *Net Zero – The UK's contribution to stopping global warming*,
- 1.3. 2033 – 14 years from now - is too late. UK aviation emissions must not grow in the next decade if it is to prevent the worst effects of global warming and remain consistent with the Paris Agreement. The IPCC has warned that we have 12 years to stay within 1.5 degrees of warming. Moreover, aviation travel is projected to double over the next 20 years.
- 1.4. Meanwhile, other approaches to accounting and mitigating aviation emissions are insufficient. The EU ETS and CORSIA take too little action in the short to medium term.
- 1.5. Moreover, Negative Emission Technologies (NETs) – which underpin the EU ETS, CORSIA and the CCC's (2019) net-zero budgets - are a high-stakes gamble which work to entrench inequities between countries.
- 1.6. The Climate Change Act (2008) allows for emissions from international aviation and shipping to be included from any future year.
- 1.7. There are numerous barriers to accounting for aviation emissions before 2033. The UK Government want to demonstrate leadership but are not willing to compromise short-term economic growth. Moreover, there is little other national precedent for urgently adopting aviation emissions accounting. Finally, the CCC do not present sufficient urgency to act on aviation emissions.
- 1.8. We identify numerous levers by which aviation emissions could be accounted for ahead of 2033. These include the Department for Transport's Aviation 2050 Consultation, lobbying on the long-term social and economic benefits of acting on aviation sooner, integrating consumption-based accounting in to the low- and zero-carbon economy, and incubating sub- and supra-national pressure.



## 2. Introduction

This report, completed for WWF-UK, considers the political opportunities and barriers to account for the UK's aviation footprint. It argues that UK aviation emissions (along with shipping emissions) must be accounted and mitigated as a matter of urgency.

On 2nd May 2019 the Committee on Climate Change released *Net Zero – The UK's contribution to stopping global warming*, responding to a request from the Governments of the UK, Wales and Scotland, asking the Committee to reassess the UK's long-term emissions targets. It advised that the UK should legislate as soon as possible to reach net-zero greenhouse gas emissions by 2050 and argued that the target should cover all sectors of the economy including aviation and shipping.

This suggestion is to be welcomed as reducing emissions from aviation and shipping urgently is imperative if we are to stop dangerous levels of warming. However, whilst the Climate Change Act (2008) allows for emissions from international aviation and shipping to be included from any future year, the CCC only recommends the inclusion of aviation and shipping in the first year of the sixth carbon budget (i.e. 2033). This recommendation is out of step with the urgency required. Given that we have 12 years to limit dangerous levels of warming it is crucial to account and mitigate the effects of aviation.

Whilst it is beyond the scope of this report to consider shipping emissions, it is crucial to note that action on shipping emissions is equally important in preventing dangerous levels of warming.

The following section provides the international and nation context of why action on aviation emissions is vital. Subsequently, we trace the history of political measures to account for the UK's aviation emissions. We then argue that the present measures are not enough. After identifying barriers to accounting for aviation emissions prior to 2033 we, finally, discuss possible opportunities for the earlier introduction of aviation emissions accounting.

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### 3. International Context

On a planetary scale, and with the exception of the diesel motor car, international aviation is the mode of transport responsible for the greatest amount of CO<sub>2</sub> emissions (Chapman, 2007). However, the projected growth of international aviation in particular is a major concern, holding the potential to make decarbonisation efforts across all sectors meaningless (Anable & Boardman, 2005). Due to the urgency required, technological improvement - such as improvements to engine efficiency - alone cannot address this problematic expansion of aviation at the rate required (Chapman, 2007; Owen et al., 2010). As such, it is integral that both producers and consumers play a role in effort to reduce demand and efficiency (Randles & Bows, 2009). The contribution of aviation to climate change must not be understated. The complex mix of other emissions released from aircraft directly in to the troposphere and lower stratosphere means that the overall radiative forcing of aviation is around 2-4 times greater than that of CO<sub>2</sub> alone (Chapman, 2007). As such, whilst aviation contributes to around 2% to 3% of total anthropogenic CO<sub>2</sub> emissions, aviation emissions more broadly considered may contribute to around 5% of radiative forcing (Owen, Lee, & Lim, 2010).

Aviation as a mode of transportation is growing worldwide, with supra-national bodies such as the United Nations' (UN) International Civil Aviation Organisation (ICAO) stating their vision is to "achieve the sustainable growth of the global civil aviation system" (ICAO, n.d.), indicating a worldwide desire to increase aviation between member states. This has been reflected by the statistics released by ICAO showing world passenger numbers almost doubling 2008-2017 (ICAO, 2017). This air traffic is also highly unequal, with around 1 billion passengers carried by European services in 2017, compared to 83 million by African services, around 1.5 billion by Asian services and 0.9 billion by North American services (ibid). Aviation is an activity of wealthy minorities and, though estimates vary, in 2016 it was estimated that only around 6% of the population travelled by plane that year (Negroni, 2016).

Emissions stemming from aviation engines become diffuse in the atmosphere, however the climate change consequent of these emissions lead to uneven impacts across the globe (Wolfe et al., 2014). The spatially and temporally distributed nature of emissions has created complexity in apportioning territorial responsibility. Aviation transport entails complicated networks of passengers, institutions, fuel, capital and carbon that span geopolitical borders. The Kyoto Protocol does not require international aviation emissions be published in national reports (Bows & Anderson, 2008) due to this complexity over responsibility and accounting mechanisms (Romera and Asslet, 2015). Meanwhile, the creation of inter-governmental frameworks for emissions mitigation has taken a long time (Larsson et al., 2019). There have been supra-national accounting and mitigation schemes created, such as the European Union Emissions Trading Scheme (EU ETS) at the European level and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme developed by the International Civil Aviation Organization (ICAO). These bodies are explained in more detail in section 4.

## 4. National Context

The inclusion of aviation within national inventories is useful in developing a baseline for mitigation strategies and to allow the comparison of aviation emissions with other emissions sources (Wood, Bows, & Anderson, 2010). However, as an international mode of transport, operating within and beyond geopolitical boundaries, allocating shares of transboundary aviation emissions to a given national and sub-national entity is invariably a contentious practice. As such, there is no one ‘correct’, or standardised, way to apportion responsibility for these emissions (Wood et al., 2010). Nonetheless, some possible approaches have been outlined in Figure 1, these range from not counting these emissions at all to sharing emissions between the source and destination country.

The UK prides itself on its long history of aviation, and its authoritative position within developing aviation standards and technology (DfT, 2018a). The UK is a founding member of ICAO, describing itself as playing “a leading role in the aviation sector’s action to address its impact on climate change” (ibid, p.71). Due to the UK’s long history of aviation, high standards of aircraft safety, and developed infrastructure to support the aviation network, aviation has been entrenched as an accessible and essential form of transport (DfT, 2018a). The UK’s geographic and socio-economic position have further brought about the uptake of aviation as a frequent mode of transport: being an island nation means flights for tourism are in high demand (Mayor and Tol, 2007) and the high wealth of the nation contributes to the desire for frequent international travel (WWF, 2017). Within the UK there is also a disparity between the wealthy and less wealthy in terms of flight frequency, with the rich undertaking the most flights and thereby contributing the most emissions (Cafaro, 2013). The UK, therefore, has historically contributed to a significant proportion of aviation emissions (The Tyndall Centre, 2018).

This large historical responsibility – which is exacerbated by past aircraft being less fuel and emissions efficient (Peeters, 2017) – has led to unresolved issues of equality and responsibility (Romera & Asslet, 2015), which are likely to continue through development and implementation of any present and subsequent agreements on apportioning national responsibility for aviation emissions (WWF, 2017). Meanwhile, the climate change impacts that arise from these historical aviation emissions have been demonstrated to impact developing nations considerably more than developed nations (Williams, 2007). There is urgency, therefore, for the UK to seriously consider ways to assume accountability for past, present and future aviation emissions and to reduce them as an issue of equity and environmental urgency (Higham et al., 2016; Williams, 2007).

The national scale is also increasingly argued as the appropriate scale for tackling aviation emissions. Larrson et al. (2019) have demonstrated an opportunity to count aviation emissions to be accounted and mitigated on the national scale, highlighting that the supra-national scale has been inefficient at undertaking emissions reduction. The Tyndall Centre (2018) makes it clear that the national scale is the most appropriate scale for accounting and apportioning aviation emissions.



International aviation emissions allocation method	
Option 1	No allocation, as is the current situation (any emission reductions delivered by the whole sector)
Option 2	Allocation of global bunker sales (fuels sold for international flights) and associated emissions to parties in proportion to their national emissions
Option 3	Allocation to parties according to the country where the bunker fuel is sold
Option 4	Allocation to parties according to the nationality of the transporting company, or to the country where an aircraft is registered, or to the country of the operator
Option 5	(a) Allocation to parties according to the country of (i) departure or (ii) destination of an aircraft, alternatively (b), the emissions related to the journey of an aircraft could be shared by the country of departure and the country of arrival
Option 6	Allocation to parties according to the country of departure or destination of passenger or cargo. Alternatively, the emissions related to the journey of passengers or cargo could be shared by the country of departure and the country of arrival
Option 7	Allocation to parties according to the country of origin of passengers or owner of cargo
Option 8	Allocation to the party of all emissions generated in its national airspace

Figure 1 – International aviation and shipping allocation options proposed by the UNFCCC’s Subsidiary Body for Scientific and Technological Advice (SBSTA), reproduced from Wood et al. (2010, p. 209).

## 5. A History of Political Measures to Account for the UK's Aviation Emissions

### 5.1 International Accounting

Under the Kyoto Protocol, the International Civil Aviation Organization (ICAO) was assigned responsibility for developing mitigation policy for emissions taking place within international airspace (UNFCCC, 1998). However, by the end of the commitment period in 2012, little progress had been made (Bows-Larkin, 2015). ICAO had introduced an annual 2% efficiency improvement target up to 2050 and was aiming for carbon neutral growth from 2020 using “economic instruments, improvements to technologies and operations, and the use of alternative fuels” (Bows-Larkin, 2015, p. 687).

Responding to the slow progress by ICAO in the 1990s, the EU sought to tackle aviation emissions through two components: making airspace use more efficient under the Single European Sky programme and including aviation within the EU ETS (Bows-Larkin, 2015). The latter of which occurred in the last year under the first Kyoto Protocol commitment period (2008-2012) and included all flights landing or departing within the EU member states. This was met with criticism, suggesting that there would be little impact on aviation demand and that the costs would be passed on to the consumer (Anger & Köhler, 2010; Bows & Anderson, 2008; Scheelhaase & Grimme, 2007). After the first Kyoto commitment period ended in 2012, ICAO had made their own progress in developing a global trading scheme, with revenue derived used to offset the impact of aviation emissions. Amidst a legal challenge from non-EU member nations - and framed a gesture of good faith to the ICAO developments - the EU suspended plans to include non-EU nation's flights with the EU ETS.

In October 2016, ICAO's deliberations on a global market-based measure concluded in the form of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA) (International Civil Aviation Organization, 2016), which is to be implemented as a pilot phase from 2021. The Resolution requires airlines to monitor their emissions on all international routes and aims to stabilise CO<sub>2</sub> emissions at 2020 levels by requiring airlines to offset the growth of their emissions after 2020. The pilot phase will be followed by the first phase, 2024-2026, both of which would apply to states that have volunteered to participate in the scheme. The subsequent phase (2027-2035) would see all States on board, with some exemptions including Least Developed Countries (LDCs), Small Island Developing States (SIDS), Landlocked Developing Countries (LLDCs) and States with low international aviation activity (BEIS, 2018).

### 5.2 National Accounting

The UK Climate Change Act (2008) commits to avoiding a 2-degree temperature rise, with a target to cut CO<sub>2</sub> by 80% by 2050 against a 1990 baseline. The Climate Change Act (HMG, 2008) states an obligation for the Secretary of State to take the advice of the Committee on Climate Change (CCC) to advise on setting carbon budgets (Part 1: 9.1 (a)), and on setting the limit on carbon units accredited to the UK (Part 1: 11.7 (a)). The emissions from international aviation are not included in the Act (Part 1: 30.1), “except as provided by regulations made by the Secretary of State” (ibid). As such, there is a provision within the Act for the Secretary of State to modify the carbon budget to include international aviation. The Act also states an obligation for the CCC to provide advice to the Secretary of State on

the scope of the carbon budget, including the sectors of the economy to be considered (Part 2: 34.1-3).

Until 2019, there was an unresolved debate around the inclusion of international emissions in these targets. The CCC had initially recommended that international aviation (and shipping) emissions should be included in the Climate Change Act's targets (Committee on Climate Change, 2012a). However, they revised this position stating that "[r]ecent changes to the EU ETS for aviation mean formal inclusion of international aviation emissions as we previously recommended is not now possible" (Committee on Climate Change, 2012b, p. np). This was reiterated in their recommendations for the fifth carbon budget (Committee on Climate Change, 2015, p. 12). In the meantime, UK policy has shown a preference for ICAO to preside over the mitigation of international aviation emissions. The former Secretary of State for Transport Patrick McLoughlin also commented that unilateral policies "risk [...] putting UK business at a competitive disadvantage" (Secretary of State for Transport, 2013, p. 10). As such, aviation's inclusion in the EU ETS remained the favoured mechanism (Bows-Larkin, 2015).

The CCC's planning assumption states their advice to the Secretary of State regarding how emissions should be around 2005 levels in 2050 (implying around a 60% increase in demand over the same period along with aircraft and fuel efficiency and the use of sustainable biofuels) (CCC, 2012c; CCC, 2018c). CCC's planning assumption was not initially taken up, with the Government stating that they have not reached a final view about acceptable emissions within the Clean Growth Strategy (HMG, 2017). However, the advice on reducing aviation to 2005 levels by 2050 was accepted by the Department for Transport in 2018 consultation documents (DfT, 2018a), with the aviation consultation strategy promising "[t]o set a clear level of ambition for the sector, the government proposes to: accept the CCC's recommendation that emissions from UK-departing flights should be at or below 2005 levels in 2050" (DfT, 2018a, p. 71). However, at the time there was no commitment to the inclusion of international aviation into carbon budgets in the near-term, with the document committing to adopt them by 2050 (ibid).

In 2017, the Department for Transport ran a consultation on their strategic approach to the aviation sector, which ultimately culminated in the publication of the draft Aviation Strategy at the end of 2018 (HM Government, 2017). The Call for Evidence simultaneously celebrated Transport Secretary Chris Grayling's first act of approving the expansion of London City airport and his leadership in working with ICAO to secure the CORSIA Resolution (Department for Transport, 2017b). This indicates the Government's preference for a no-compromise approach to growth and that action through ICAO over unilateral policies remains favourable, noting that emissions from international aviation are excluded from the legally-binding 2050 target (Department for Transport, 2017a, p. 57). It also claims, that "the UK's carbon budgets have been set at a level that accounts for international aviation and shipping emissions, so that the UK is on a trajectory that could be consistent with a 2050 target that includes these emissions" (Department for Transport, 2017a, p. 57). There have been recent suggestions, however, that the UK will not meet its fourth and fifth climate budgets (Shrestha, 2018), which itself necessitates deeper cuts in other sectors such as aviation.

In May 2019 the CCC published *Net Zero: The UK's contribution to stopping global warming* (CCC, 2019). It advised that challenges not yet confronted, such as aviation and shipping, can no longer be ignored. The report argues the UK should reach net-zero greenhouse gas emissions by 2050 and

include international aviation and shipping which should be met without relying on international carbon credits. The report advises that aviation is an obvious sector which might require removals through CORSIA or the EU ETS. It further suggests that whilst CORSIA offers a means to limit post-2020 aviation emissions, the cap at 2020 levels (committed until 2035) is incompatible with achieving net-zero emissions globally. It also argues that there should be a new long-term goal for global aviation emissions consistent with the Paris Agreement. However, crucially the CCC argue that emissions from aviation should not be included in the budget until 2033:

“The Climate Change Act (section 30) allows for emissions from international aviation and shipping to be included from any future year. Since the current carbon budgets have been set without these emissions, we recommend their inclusion from the first year of the sixth carbon budget (i.e. 2033)” (CCC, 2019, p. 263).

This suggestion has yet to be accepted by the UK Government but most fundamentally it is also too late. As the Tyndall Centre have recently argued, UK aviation emissions must not grow in the next decade if it is to prevent the worst effects of global warming and remain consistent with the Paris Agreement.

## 6. Why current approaches are not enough

It is evident that current approaches to accounting and managing aviation emissions risk dangerous levels of warming. The authors are of this opinion for the following reasons:

**6.1. The EU ETS and CORSIA take too little action in the short to medium term.** The EU ETS 'Full Scope' approach would have led to larger CO<sub>2</sub> compensations in the short and medium term. If the scheme were in place today, around 8% of the global CO<sub>2</sub> emissions from passenger traffic would be compensated, increasing to 16% around 2036. It is unfortunate, therefore, that this scope was reduced in 2012. Under the reduced scope, only 2% of emissions were mitigated in 2017 and 4% are projected to be mitigated in 2036. CORSIA will start with a small compensation rate of 1.4% in 2021 but will increase to 13% and then 18% in 2030 and 2039 respectively (Scheelhaase, Maertens, Grimme, & Jung, 2018). Had it remained at full scope; the EU ETS would have been in vital in the short-to-medium term. The revising of this scope is unlikely. There is an urgent need for action on aviation emissions in the short-to-medium term.

**6.2. Emissions trading is not able to bring about the speed of mitigation required for a 2°C future.** As Bows-Larkin comments "pinning so much hope on emissions trading to meet the 2°C challenge is misguided" (2015, p. 691). Two reasons are given for this, firstly if a global cap were in place, the carbon prices necessary to achieve the urgent cut in CO<sub>2</sub> would be in excess of fuel price rises witnessed previously (else they would have already resulted in emissions reductions). Secondly, the delay in waiting for ICAO to develop CORSIA, and the EU ETS not having aviation fully implemented means that cumulative emissions have continued – this is significantly worsened by the little action in the short to medium term which is highlighted above. Studies have also shown that UK citizens more strongly support policies that put a financial burden on industry rather than individuals (both directly and indirectly) and are also supportive of taxing aviation fuel to subsidise rail (Higham, Cohen, Cavaliere, Reis, & Finkler, 2016; Kantenbacher, Hanna, Cohen, Miller, & Scarles, 2018).

**6.3. Current approaches are irreconcilable with a 1.5 °C (or 2 °C future).** CORSIA falls short of achieving the deep reductions in emissions needed (Kuramochi et al., 2018). Peeters (2017) has demonstrated that even with highest levels of technological change and additional financial and infrastructure measures, aviation's growth cannot be compatible with sustainable development. Aviation should be reduced by 80% by 2050 against 2005 levels to remain within 2°C (Bows-Larkin, 2015). 1.5 °C pathways are not yet available, but it is clear that there is an urgent need for international agreement – and immediate action - on a long-term vision for the aviation sector in the context of decarbonisation (Bows-Larkin, 2015). As Bows-Larkin suggests, "[c]limate policy directed at aviation and shipping is currently woefully inadequate considering the scale and urgency of the 2°C goal" (Bows-Larkin, 2015, p. 691). A 1.5 °C goal only accentuates this. The CCC's net-zero 2050 target notes that aviation is expected to produce more emissions than other sectors in 2050 and that carbon capture and storage will be required to reach net-zero. As such...

**6.4. Negative Emission Technologies (NETs) are a high-stakes gamble which work to entrench inequities between countries.** Offsetting is oft criticised for its weakness in reducing aviation

emissions from source, which is seen as more publicly acceptable due to transparency and accountability (Tyndall Centre, 2018). CORSIA only tackles increases in emissions from its start date, which privileges developed nations with established aviation networks (WWF, 2017), thus causing an equity issue due to its perpetuation of global inequality of development and accountability of wealthy nation states compared to developing states (ibid). With aviation projected to be amongst the hardest sectors to decarbonise, speculation on the widespread introduction of NETs is increasingly part of carbon budgets such as the CCC's net-zero 2050 target. These technologies are unproven at scale and "the mitigation agenda should proceed on the premise that they will not work at scale" (Anderson & Peters, 2016: 183). As such, permitting aviation growth on the promise of offsetting at the future is a high-stakes gamble. It is vital that it is accounted, budgeted and managed now. It is for this reason that...

- 6.5. The CCC's (2019) suggested date of 2033 to include aviation in the carbon budget is too late.** 2033 is 14 years away. However, the IPCC has warned that we have 12 years to stay within 1.5 degrees of warming whilst the aviation travel is projected to double over the next 20 years (Garcia, 2018). This is clearly too late. The Tyndall Centre (2019) have argued that aviation emissions must not grow in the next 10 years to remain consistent with the Paris Agreement.



## 7. Barriers to the UK Government adopting aviation emissions accounting before 2033

Whilst it is clear that 2033 is not an early enough date to introduce aviation emissions accounting, there are numerous barriers to adopting an earlier date:

- 7.1. Demonstrating leadership whilst not compromising growth.** The Government's recent treatment of aviation emissions has demonstrated that they do not want to compromise economic growth (DfT, 2018a). The CCC's (2019) net-zero 2050 report is consistent with this, noting that any earlier date is 'very risky' to the economy (die, 2019). The target is even costed in to the 1-2% of GDP that the Government have already agreed to use to tackle climate change. Policy makers are influenced by aviation lobbies who are engaged in considerable efforts to implement an understanding that all mobility is good, whilst environmental problems can be resolved largely through technology (Gössling & Cohen, 2014). Technological change, however, will not be sufficient to deliver such a shift, necessitating demand-side intervention (Peeters, 2017).
- 7.2. There is little other national precedent for urgently adopting aviation emissions accounting.** France is the only other country to have proposed a net-zero target that includes aviation and shipping. Other countries have not set a precedent for accounting for aviation emissions, due to a desire to use supra-national accounting mechanisms such as CORSIA (Larsson et al., 2019). The Government have consistently expressed desire to scale responsibility up to the supra-national to minimise any potential limits to growth (DfT, 2018a). Without pressure from inter-country agreements such as the Paris Agreement and the Kyoto Protocol setting a standard for other countries to adopt aviation emissions accounting and with France also adopting a 2050 net-zero date, the UK is unlikely to face pressure to account for aviation emissions before 2033. The CCC (2008: 205) recognise this, and call for a "new long-term goal for global international aviation emissions consistent with the Paris Agreement".
- 7.3. CCC guidance does not provide urgency to account aviation emissions.** The CCC's advice has never promoted urgency to act on aviation emissions. The Climate Change Act (2008), for instance, stated that the CCC must give advice on the 2050 aviation target before 1<sup>st</sup> December 2008 (Part 2: 33.3), however the CCC did not provide this advice until 2012 (CCC 2012c). Even the CCC's (2019) net-zero 2050 report suggests that aviation emissions will be the last to decarbonise and that "[p]lausible options for how aviation could become zero-carbon, even by mid-century, are lacking" (CCC, 2019: 186). The CCC's suggestion that aviation does not need accounting before 2033 only continues the narrative that aviation is less of a priority than other sectors.

## 8. Opportunities for the UK Government to account aviation emissions before 2033

As it stands it is highly likely that the UK Government will adopt the net-zero 2050 target in the CCC (2019) report. The CCC have advised that aviation should be included in the carbon budgets in the first year of the sixth carbon budget from 2033. However, given the projected growth of aviation it is clear that this is too late to encourage mitigation required in the near-term. As such, we identify a series of levers by which the date might be brought forward:

- 8.1. The Climate Change Act (2008) allows for aviation to be included in inventories from any future year.** The Climate Change Act (2008) states that “regulations made by the Secretary of State” (HMG, 2008: Part 1: 30.1) act as provision for the Secretary of State to alter the inclusion of international aviation in the Act if the Secretary chose to. If the case is made for international aviation to be included in the carbon budgets, then it is well within the Act for it to be enacted.
- 8.2. Supra-national pressure.** Other opportunities could come from supra-national bodies who might require each country to account for their aviation emissions. This would create a level playing field such that no one country is unevenly detrimented in curbing aviation. This is an opportunity to lobby for a range of countries to begin accounting for their international aviation emissions, which could lead to inter-country pressure to cause UN-wide consensus of accounting.
- 8.3. Sub-national pressure.** Aviation emissions accounting and aviation emissions budgets can be conducted at a range of scales. The Tyndall Centre (2018) have recently set a science-based budget for both Manchester and Greater Manchester to play their part in the Paris Agreement. The accounting and emissions trajectory mechanism (‘SCATTER’) is to be rolled out amongst the UK Core Cities group. Crucially, the Tyndall Centre (2018) report makes it clear that the national scale is the most appropriate scale for accounting and apportioning aviation emissions and states that emissions must remain at 2018 levels until 2030 before decreasing linearly until 2075. Given that the Core Cities group is comprised of the large regional cities of the UK this could amount to significant political pressure for the Government to account for aviation emissions as a matter of urgency.
- 8.4. Consumption-based accounting and the low- and zero-carbon economy.** Claire Perry MP, the UK’s minister for energy and clean growth, has recently suggested that the UK should embark on a path to a ‘zero-carbon economy’ and discussions of a low-carbon economy have been around since the 1990s (Hudson and Blakey, 2018). In a call for evidence the CCC (2018b) has recently described the low-carbon economy as needing to cover “all sectors, including international aviation and shipping”. However, presently measures of carbon-intensity are currently constructed around direct (or point-source) emissions only (Hudson and Blakey, 2018). The Government has embedded the concept of the low-carbon economy in a range of publications, including the Low Carbon Industrial Strategy (HMG; 2009). However, there is little reflecting the consumption side of the economy which would include aviation and shipping (Hudson and Blakey, 2018). This is significant as The UK economy is primarily driven by its service sector and the value of its imports is roughly triple that of its exports (ONS, 2019).

However, the emissions consequent of the production and transport of these imported goods are a direct consequence of the UK's consumption. Reductions in these point-source emissions are more than off-set by increases in consumption-based emissions and this trend is projected to continue (Sudmant et al., 2018). Aviation and shipping emissions are a crucial component of this extra-territorial footprint. The CCC (2018A, page 41) stated exclusion of aviation from proposals in the Clean Growth Strategy was acting as a "gap in the policies and the proposals".

In 2012, growing concern about the effectiveness of policy to reduce planetary emissions led the Energy and Climate Change Select Committee to investigate the case for UK consumption-based GHG emissions accounting (ECCC, 2012). However, consumption-based emissions are currently accounted by DEFRA but do not feature in reports by BEIS. The Government monitors consumption emissions on an annual basis but there are no legislated targets associated with consumption-based emissions. Given the significance of imported goods to the UK economy and the push towards the low- and zero-carbon economy, the time is right to revisit consumption-based emissions and to introduce legislated targets.

**8.5. Economic and social benefits of accounting and mitigating aviation emissions earlier.** The inclusion of international aviation into accounting for the Climate Change Act is thought by many in government to lead to a competitive disadvantage of UK airports compared to other countries, leading to decreased usage of UK airports and an economic loss for the UK (DfT, 2018a). This is, however, a short-term perspective that fails to appreciate the longer-term social and economic benefits. There are strong alternate claims that accounting for aviation emissions will make economic sense in the long term, and save the country money (CCC, 2012d) through minimising spend on future abatement and mitigation costs. Delays in tackling climate change could cost companies about \$1.2 trillion worldwide during the next 15 years alone (Carr, 2019). Larsson et al. (2019) have made a clear case demonstrating how national accounting and regulation makes good economic and environmental sense, concluding "policymakers... need to work towards putting in place tougher international policy instruments in the long term, and simultaneously implement temporary national policy instruments in the near term". The paper also states how environmental policy can be used to increase national standing for environmental regulations and stimulate and inspire stronger environmental regulations in other countries due to inter-country competition (Larsson et al, 2019).

**8.6. The Department for Transport's Aviation 2050 Consultation (Deadline 20<sup>th</sup> June 2019).** One opportunity for lobbying around this deadline is the Department for Transport's Aviation 2050 Consultation. Accounting aviation before 2033 would help develop the UK's Aviation Strategy to make the new strategy more transparent, responsible and accountable than previous Government publications on the matter. This could be a way to reduce emissions leakage, and even set a precedent for national accounting which leads to other countries to follow suit. The Government will publish Aviation Strategy later in 2019. Moreover, the consultation commits to regular updates of the Aviation Strategy. These regular reviews will provide a further opportunity to lobby on the inclusion of aviation emissions accounting.

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