Witness 4 of XXX, Climate Change
PCCA/W04/4 –Supplementary Proof of Evidence

Expansion of Bristol Airport to 12mppa

PINS Ref APP/D0121/W/20/3259234
Planning Application Ref: 18/P/5118/OUT

Supplementary Proof of Evidence Carbon and Climate Change
for PCCA

Tim Johnson

Supplementary proof of evidence of Tim Johnson on behalf of the Parish Councils Airport Association (PCAA): carbon and GHG impacts

August 2021

1. Introduction

1.1 My name is Tim Johnson, witness acting for the PCAA on carbon and greenhouse gas impacts relating to the expansion of Bristol Airport to 12mppa. This Supplementary Evidence covers recent publications by the Department for Transport that have relevance to the arguments set out in my main proof of evidence, and the summary of that document, submitted to the inquiry as PCAA/W04/1 and PCAA/W04/2 respectively.

2. Scope of supplementary evidence

2.1 This supplementary evidence covers the latest scientific assessment of climate change from the Intergovernmental Panel on Climate Change (IPCC) published in August 2021, and the Department for Transport's (DfT's) Transport Decarbonisation Plan and consultations on a net zero aviation strategy and a mandate for Sustainable Aviation Fuels (SAF), published in July 2021.

3. Latest IPCC evidence on the current state of the climate

3.1 *Climate Change 2021, the Physical Science Basis*[1] presents the IPCC's understanding of the current state of the climate, including how it is changing and the role of human influence. The report states that it is unequivocal that human influence has warmed the atmosphere, ocean and land, at a rate that is unprecedented in at least the last 2000 years, and that widespread and rapid changes in the atmosphere,

[1] INQ/032

ocean, cryosphere and biosphere have occurred: “human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened” since publication of IPCC’s Fifth Assessment Report in 2014.

3.2 IPCC’s future outlook for the climate shows that global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered. The stark warning to policymakers is that “global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.” Furthermore, “projected changes in extremes [of weather] are larger in frequency and intensity with every additional increment of global warming” and “many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.”

3.3 As every tonne of CO2 emissions adds to global warming, IPCC reaffirms the need to limit cumulative CO2 emissions, reaching at least net zero CO2 emissions, along with strong reductions in other greenhouse gas emissions. The advice is unambiguous, there is no room for complacency and we can’t afford to delay action. The evidence supports the assertion that climate policies around the world will need to be strengthened.

4. Transport Decarbonisation Plan

4.1 The DfT’s Transport Decarbonisation Plan (TDP) ‘Decarbonising Transport, A Better, Greener Britain’[2] sets out a series of Government’s commitments to decarbonise the transport sector. Specifically for UK aviation, the plan sets out the Government’s

[2] CD9.134

intent to consult on a strategy (the Jet Zero consultation) to deliver net zero aviation by 2050, net zero domestic aviation by 2040, net zero airport operations (excluding flight emissions) by 2040, and whether and how to mandate the use of sustainable aviation fuels. It also reiterates existing funding pledges to support R&D for technology, modernise airspace and to seek a global long-term emissions reduction goal at the International Civil Aviation Organisation (ICAO) by 2022. With regard to carbon pricing, the plan commits to further developing the UK Emissions Trading Scheme to help accelerate aviation decarbonisation by potentially reducing or withdrawing free allowances and expanding the scheme to other pollutants.

4.2 The TDP sets out potential pathways to reach net zero. For domestic and international aviation emissions, the projections show residual aviation emissions in 2050 of around 20MtCO2 in the central scenario, although the high degree of uncertainty regarding many of the assumptions results in possible 2050 outcomes ranging from 9 to 36MtCO2. The plan notes "the upper bound of the projection broadly reflects a continuation of current trends, including annual efficiency improvements of 1.5% and moderate uptake of SAF (5% of total aviation fuel usage in 2050) and the application of a universal carbon price to all flights. The lower bound is a speculative scenario with some zero carbon aircraft and a very high uptake of sustainable aviation fuels (75% of total aviation fuel usage in 2050) – the feasibility of this will depend on the availability of sustainable feedstocks, blending limits and the extent to which costs fall in future."

4.3 The plan also notes that "given the rate of technological advancement and uncertainty in the precise mix of future zero emission solutions, and the probability of significant changes in travel behaviour over the years ahead, this plan cannot precisely plot each individual step to fully decarbonising transport modes over the next 30 years. It does however set out a series of actions and timings that will decarbonise transport by 2050 and deliver against carbon budgets along the way. The government has committed to stretching carbon reduction targets up to the end of the Sixth Carbon Budget in 2037 and by 2050. As the largest emitting sector, transport will need to make a sizeable contribution if these targets are to be met.

Depending on progress in the sector at some points this may require additional targeted action (such as steps to reduce use of the most polluting cars and tackle urban congestion) to enable these targets to be met. We will regularly review progress against our targets, continue to adapt and take further action if needed to decarbonise transport. We will publish our progress and review our pathway at least every five years."

4.4 The plan leaves open the question of whether CORSIA will be a suitable policy tool for meeting UK climate commitments, noting that "Our Jet Zero Consultation will consider how existing market-based mechanisms such as the UK ETS and CORSIA, as well as innovative greenhouse gas removal technologies, can address residual emissions."

4.5 The TDP does not alter the policy framework for considering the emissions associated with BAL's proposed expansion, but the acknowledged uncertainties about future emission reductions are relevant to the consideration of the scale and costs of likely mitigation.

5. Jet Zero Consultation

5.1 Alongside the TDP, the Government has published its 'Jet Zero consultation – a consultation on our strategy for net zero aviation'[3] together with a supporting document setting out 'Evidence and Analysis'[4]. The consultation commits to the UK's share of aviation emissions reaching net zero by 2050 and proposes five policy areas namely "improving the efficiency of our aviation system, accelerating the deployment of SAF, supporting the development of zero emission aircraft, ensuring we use markets to drive down emissions in the most cost-effective way, and working to influence the behaviour of consumers."

[3] CD9.135
[4] CD9.136

5.2 The Jet Zero consultation does not represent final policy, but responses to the consultation, together with previous public engagement, will inform a Jet Zero Strategy to be published before the end of the year. The DfT's reply of 13th August 2021[5] to the questions relating to the Jet Zero consultation posed by North Somerset Council[6] (NSC) confirmed in Annex A that an "impact assessment was not deemed appropriate or possible at this stage given the consultation is on a broad strategy for achieving net zero aviation rather than setting out detailed policy proposals." Correspondence provided in Annex B shows the Department received advice that "if this is the last time you'll consult before going ahead and making the changes, an impact assessment is important and should only not be done in very specific circumstances". This implies the Jet Zero proposals are illustrative only and that any detailed policy plans will need to be subject to further assessment.

5.3 As with the TDP, the Government accepts the scale of the challenge and that achieving net zero aviation "will not be easy". For this reason, aviation is expected to be one of the few residual emitting sectors in 2050 under all the scenarios considered in the consultation. It notes "many of the technologies we need to achieve Jet Zero are at an early stage of development or commercialisation" so it is "too early to specify the optimal mix [of measures]". The Government expects to accelerate the development of sustainable aviation fuels, zero emission aircraft, and greenhouse gas removal technologies in parallel to provide a clearer picture of what is needed by 2030.

5.4 The consultation recognises that net zero 2050 must be achieved, and the Government must ensure that any growth in aviation is compatible with its emissions reduction commitments. To ensure it remains on track, the consultation proposes monitoring progress by setting net and/or gross emissions reduction trajectories for the sector from 2025 to 2050 (based on its 'high ambition' scenario), together with a strategy review every five years. The proposed trajectories are:

[5] INQ/042 Letter from the Department for Transport to North Somerset Council dated 13 August 2021
[6] INQ/009 Letter from North Somerset Council to Department for Transport regarding the Jet Zero consultation 23 July 2021

Trajectory for UK aviation emissions	2030	2040	2050
Gross emissions MtCO2	39	31	21
Net emissions MtCO2	23-32	12-19	0

5.5 These numbers correlate in general terms with the CCC's modelled pathway for aviation which I set out in paragraph 3.21 of my proof PCAA/W04/1 and which is presented again in the following table for ease of comparison:

Year	CCC gross aviation pathway MtCO2	DfT gross aviation pathway MtCO2	CCC net aviation pathway MtCO2	DfT net aviation pathway MtCO2
2025	37	-	37	-
2030	33	39	31	23-32
2035	31	-	21	-
2040	30	31	14	12-19
2045	25	-	7	-
2050	23	21	0	0

5.6 A notable difference between the two gross trajectories occurs in 2030. This is due, certainly in part, to the fact that the CCC's modelled pathway includes the effects of the pandemic on demand, producing a slower growth curve, whereas the DfT's proposed trajectory for benchmarking progress relies on its pre-pandemic demand forecasts produced in 2017.

5.7 Another significant difference is the future passenger throughput deemed to be consistent with the trajectories. While the CCC's modelling assumes that passenger numbers will need to be capped at 25% above 2018 levels, the DfT's modelling assumes that passenger growth, over a 2016 baseline, will increase by around 60%.

On this issue, the consultation states “Our analysis shows that there are scenarios that can achieve similar or greater CO2 reductions to those in the CCC’s Balanced Pathway (which limits growth to 25% by 2050 compared to 2018 levels compared to a baseline of 65% growth) by focussing on new fuels and technology, with the knock-on economic and social benefit, rather than capping demand.” This is based on an assumption that the estimated costs associated with higher levels of SAF and new technology could be lower than the carbon price needed to reduce demand (and the consultation limits consideration of measures to cap demand to carbon pricing only).

5.8 Based on the available evidence, it is difficult to have confidence in the consultation statement that the sector can achieve Jet Zero without the Government needing to intervene directly to limit aviation growth. While it seeks to be ambitious, the timing, scope and likelihood of potential policy measures that could justify a higher passenger throughput is unclear. For example, on efficiency improvements, the consultation only welcomes thoughts on whether there are wider changes to policy that might incentivise improved efficiencies, including the use of airport charges and slot allocation, or differential air navigation charges based on environmental performance within controlled airspace. The Government has not undertaken any formal assessments of efficiency improvements, or the costs of scaling up SAF, and relies on a limited range of existing studies to inform its assumptions.

5.9 The supporting analysis and evidence document is more guarded on whether demand management will be needed, stating “this analysis suggests that capping demand may not be necessary to reduce emissions to levels which can be offset by GGRs to achieve net zero (such as the level suggested by the CCC’s Balanced Net Zero Pathway, 23 Mt in 2050). There is much uncertainty however, and clearly there could be many combinations of technology improvements, GGR costs and demand growth which would achieve net zero.”

5.10 The consultation does signal that the Government is prepared to indirectly influence demand, stating that it will “strengthen carbon pricing for aviation to ensure we continue to apply the 'polluter pays' principle and consider incentives for

greenhouse gas removal methods. … We expect the approach set out in this draft strategy could impact demand for aviation indirectly. Where new fuels and technologies are more expensive than their fossil-fuel equivalents, and where the cost of CO2 emissions are correctly priced into business models, we expect, as with any price rise, a moderation of demand growth." With regard to market-based measures, the consultation offers no certainty that CORSIA units will be included in the net zero aviation pathway. Annex A of the DfT's letter to NSC states "No assessment has been undertaken as part of the Jet Zero Consultation on the extent to which CORSIA offsets could be used to meet UK carbon budgets. No assumption about CORSIA offsets was made as part of the Jet Zero Consultation illustrative scenarios."

5.11 With regard to airport expansion, the consultation notes that "the industry's need to rebuild from a lower base is likely to mean that plans for airport expansion will be slower to come forward." The reference in footnote 39 of the Jet Zero consultation to *Beyond the Horizon The future of UK aviation: Making best use of existing runways (2018)* (MBU) and *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England (2018)* being the most up-to-date policy on planning and airport development is a statement of fact since no subsequent policy documents have been published since this date. However, in the case of MBU, its relevance as a material consideration can only be interpreted as applying to its general policy in support of airports beyond Heathrow making best use of their existing runways[7], and subject to the further clarification in footnote 39, that "the government is clear that expansion of any airport must meet its climate change obligations to be able to proceed." MBU's assessment of carbon emissions to show consistency with the Government's (then) climate commitments can no longer

[7] Para 1.29 of MBU states: "Therefore the government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations. This policy statement does not prejudge the decision of those authorities who will be required to give proper consideration to such applications. It instead leaves it up to local, rather than national government, to consider each case on its merits.

be relied upon given the change in the UK's climate change law which means the 37.5MtCO2 planning assumption is no longer relevant.

5.12 BAL must prove that its expansion plans are consistent with the Government's plans for net zero aviation. In PCAA/W04/1, I argued that the CCC's modelled pathway would be an appropriate benchmark for such an assessment given the delay to the publication of the Government's proposals. The Government's suggested benchmarking trajectory in the Jet Zero consultation as set out above in paragraphs 5.3 and 5.4 reinforces this approach. In my opinion, therefore, BAL's proposal should be based on total UK aviation emissions not exceeding 21-23MtCO2 by 2050. With regard to the possible argument that the Government believes it can deliver this level of emissions reduction while catering for MBU levels of demand, revised to take account of capacities that are consistent with the planning applications that have been made by airports[8], it should be noted that the Government has only provided illustrative scenarios based on evidence gathered largely through a literature search. The analysis and evidence supporting document to the Jet Zero consultation (AEJZC) adds "The scenarios presented here are not prescriptive. The uncertainty surrounding the future costs of the measures mean that it is not possible to assess the relative cost effectiveness of the scenarios. The optimal mix of measures will become clearer over the coming decade as the relevant technologies mature and evidence of their relative costs improves."

5.13 There are also challenges to delivering the high ambition scenario used to demonstrate that the suggested emissions reduction pathway for benchmarking progress can be met, with AEJZC acknowledging that several things may need to happen for this scenario to materialise. These include prioritising the use of biomass

[8] The consultation supporting documentation states "The capacity assumptions that have been made are not intended to pre-judge the outcome of future planning applications. .. The modelling scenario that we have used should not therefore be seen as a prediction of what DfT thinks will happen with regard to future capacity expansion, but as a reasonable upper bound of possible future airport capacity levels and therefore associated emissions, in order to better test the potential of measures to meet net zero"

in aviation over other sectors in order to support the assumed level of SAF uptake, while achieving such a high rate of fuel efficiency improvement (2% per annum) will also be challenging, and may not be met if airlines cannot afford to invest in modernising their fleets at sufficient speed. Other challenges include the necessary technological progress in battery and hydrogen technology within this decade to realise the introduction of zero emission aircraft by 2035, and high levels of international cooperation to agree a common carbon price. In summary, there is a considerable margin of uncertainty associated with the Jet Zero consultation's illustrative 'high ambition' scenario that makes it unsuited to a formal appraisal of GHG emissions. Until new policies are developed and put in place to address this uncertainty, the 'Continuation of current trends' scenario in the Jet Zero consultation most closely reflects the pathway for UK aviation emissions. This scenario estimates that residual aviation emissions in 2050 will be 36MtCO2, 15MtCO2 higher than the DfT's proposed benchmark for net zero aviation and leaving no headroom for further airport expansion.

6. SAF Mandate Consultation

6.1 Following publication of the Jet Zero consultation, the DfT also launched a consultation on a sustainable aviation fuels mandate[9] with the aim of "being world leading and as ambitious as possible". It sets out a number of potential SAF uptake scenarios ranging from up to 10% by 2030 to up to 75% by 2050. The relevance of this consultation to the assessment of GHG emissions associated with BAL's proposed expansion relates to the extent to which sustainable aviation fuels may contribute to a net zero aviation pathway.

6.2 The consultation acknowledges that high targets (the upper end of the 75% SAF by 2050 is more than double the volume forecast by industry and three times that

9 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005382/sustainable-aviation-fuels-mandate-consultation-on-reducing-the-greenhouse-gas-emissions-of-aviation-fuels-in-the-uk.pdf

estimated by the CCC) will be contingent on "multiple technology and policy developments that could unlock a very rapid roll-out of several SAF plants in the short term, the quick commercialisation of SAF technology not yet proven at scale and certification of new production pathways."

6.3 Unlike the modelling in the Jet Zero consultation which assumed that SAF resulted in a 100% emission reduction, the SAF mandate consultation notes that SAF can achieve lifecycle emissions savings of over 70% compared with conventional jet fuel when fully replacing kerosene (at present, however, SAF is only certified up to a 50% blend with kerosene so net carbon reductions per litre of fuel can only deliver half the claimed saving) while the Government proposes a minimum GHG emissions savings threshold of at least 60% to be eligible under the mandate.

6.4 Despite its ambition for SAF in the Jet Zero consultation, the Government's approach to a SAF mandate is cautious. Only a small range of fuels pass the Government's proposed sustainability test: waste-derived biofuels, renewable fuels of non-biological origin (RFNBOs), SAF from nuclear energy and recycled carbon fuels (RCFs). There is also a commitment not to allow SAFs from food or feed crops, and not to divert renewable energy from other applications into making e-fuels (those produced from captured CO2 combined with hydrogen obtained by electrolysing water). Once these caveats are applied, the volumes available to airlines may be quite limited. This, coupled with the actual lifecycle emissions savings, means the Jet Zero consultation scenarios are likely to overestimate the potential emissions reductions from SAF.

7. Conclusion

7.1 This summer's extreme heat in North America, flooding in Western Europe and fires in Greece, have amplified the IPCC's warning on the unprecedented pace and consequences of climate change. While an increasing number of states and businesses have committed to net zero goals by 2050, action is needed now to

ensure that decisions taken today do not compromise future delivery of these goals. This applies to all sectors, including aviation.

7.2 The TDP and Jet Zero consultation provide a framework for monitoring progress, proposing an emissions reduction trajectory out to 2050 with five yearly reviews of policy to ensure that Government has the right policy mix to deliver net zero aviation. The initial choice of policy measures, however, is subject to many challenges and uncertainties which may result in changes to the final strategy which is expected to be published by the end of December 2021. A good example of this is the DfT's SAF consultation which, when faced with the reality of designing an effective and sustainable mandate, has rightly proposed policy that may limit the available supply of SAF needed to meet Jet Zero's ambitions. The DfT highlights that its Jet Zero scenarios are illustrative only, and based on the available evidence, it is my opinion that the sector will be unable to achieve net zero emissions without intervention to limit aviation growth, including the need to limit new airport capacity.

7.3 The Jet Zero consultation states that MBU remains up-to-date policy, but because the DfT's assessment of carbon emissions pre-dates net zero legislation, it adds a caveat that "the government is clear that expansion of any airport must meet its climate change obligations to be able to proceed". This means that the emphasis is on BAL to demonstrate that the associated increase in emissions from the proposed expansion is compatible with net zero. Given the similarities between the net zero trajectories modelled by the CCC in its Sixth Carbon Budget report and the DfT's proposed benchmark for aviation emissions, these should be used in the GHG assessment of BAL's application. The illustrative nature of the scenarios developed by the DfT for the consultation, the uncertainties regarding the nature and timing of any policies and measures, and the claimed emissions reductions, mean these scenarios cannot be relied upon (with the exception of the Continuation of Current Trends scenario which reflects policies and practices already in place and which overshoots the Government's proposed benchmark for net zero aviation by a considerable margin).

7.4 For the reasons stated above, the TDP and Jet Zero consultation have not altered my original conclusion set out in PCAA/W04/1 that the increased emissions associated with BAL's application will have a material impact on the Government's ability to meet its greenhouse gas reduction targets and its specific commitment to deliver net zero aviation by 2050.

TMJ, August 2021