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APPEAL BY LONDON CITY AIRPORT LTD

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City Airport Development Programme (CADP1) S73 Application

(REF APP/G5750/W/23/3326646)

Topic Paper: Climate Change

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Glossary of abbreviations

Abbreviation	Definition
ACA	Airport Carbon Accreditation
ATM	Air Traffic Movement
CB6	Sixth Carbon Budget
CCC	Climate Change Committee
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DC	Development Case
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do Minimum
EEA	European Economic Area
ES	Environmental Statement
EU	European Union
EU ETS	European Emissions Trading Scheme
IAQM	Institution of Air Quality Management
IAS	International Aviation and Shipping
ICAO	International Civil Aviation Organisation
IEMA	Institute of Environmental Management and Assessment
KPI	Key Performance Indicators
$KtCO_2e$	Thousand Tonnes of carbon dioxide equivalent
LBN	London Borough of Newham
LCY	London City Airport
MBU	The UK Government strategy, "Beyond the horizon: The future of UK aviation: Making best use of existing runways", published 5 June 2018

MJ	**Mega Joule**
mppa	**Million Passengers Per Annum**
$MtCO_2e$	**Million Tonnes of carbon dioxide equivalent**
NPPF	**National Planning Policy Framework**
NO_x	**Nitrogen oxides**
ppm	**Parts Per Million by volume**
RTFC	**Renewable Transport Fuel Certificate**
RTFO	**Renewable Transport Fuel Obligations Order**
SAF	**Sustainable Aviation Fuel**
TCFD	**Taskforce On Climate-Related Financial Disclosure**
UK	**United Kingdom**
UK ETS	**UK Emissions Trading Scheme**
UNFCCC	**United Nations Framework Convention on Climate Change**
USA	**United States of America**

1. Introduction

1.1 Qualifications and Experience

1.1.1 This Topic Paper has been prepared by Matthew Peter Paul Ösund-Ireland. I hold a BSc(Hons) in Combined Science from the Polytechnic of Wales and a PhD in local air quality management and climate change tools for joined up policy from the University of Greenwich. I am a Chartered Environmentalist, a Member of the Institute of Air Quality Management (IAQM) and a Member of the Institute of Environmental Sciences. I am a Director of Susteer AB responsible for air quality, climate resilience and carbon management assessments undertaken by the company.

1.1.2 I have worked as a professional environmental scientist for 30 years. I have been responsible for conducting air quality and carbon studies for transport schemes, including road, rail, shipping and aviation, and schemes in the oil and gas, energy, industry, mining and commercial development sectors. I have worked on numerous airport projects including Birmingham, Bournemouth International, Bristol, Heathrow, London City, London Luton, the proposed airport at Cliffe in Kent and airports outside the UK. Most recently I was retained by London Luton Airport to advise on carbon matters concerning its appeal proposal to increase capacity from 18 million passengers per annum (mppa) to 19 mppa, and in 2021 I was appointed in a similar capacity by Bristol Airport Limited concerning its successful appeal proposal to increase capacity from 10 mppa to 12 mppa.

1.1.3 As a member of the IAQM, I am bound by its Code of Professional Conduct which requires that members "*maintain professional integrity at all times and be guided by the principle of applying the most appropriate science/practice for any given task. This requires members to display objectivity and refrain from being selective or partial when presenting data or facts for a written report or in oral form*."

1.2 Scope of this Topic Paper

1.2.1 Although climate change has not been listed as one of the main topics for consideration at the Inquiry by the Inspector in the post-CMC note dated 12 October 2023, this topic paper has been prepared in support of the planning evidence prepared by Mr Bashforth (APP/3) for the Appellant.

1.2.2 In referring to evidence provided by the aviation expert retained by LBN, the Statement of Case for LBN[1] states "*The evidence will show that consideration of passenger handling capacity at the other London airports indicates that the extra passenger demand of 2.5 mppa sought by this application could be accommodated up to at least 2031 at the other London airports. Although not a ground for LBN's refusal of the application, LBN does note that carbon emissions would be materially lower if this demand were handled at other airports at which aircraft with lower emissions per passenger operate and which LBN's aviation expert considers would have capacity to take up demand.*" (para 5.18). This is not addressed in this Topic Paper but in the evidence presented by Ms Louise Congdon (APP/1) for the Appellant.

1.2.3 The Statement of Case for LBN refers to the inclusion in the Core Documents of "*the officer's report to Committee in respect of this Appeal application, which provides additional background information and the Decision Notice*" (para 2.10). This is described further in the planning evidence prepared by Mr Bashforth for the Appellant.

1.2.4 HACAN East is registered as a Rule 6 party and identifies "*climate change impact of the Appeal Proposal is a material planning consideration, relevant in particular to compliance with the Development Plan*" (para 6.1) in its Statement of Case[2]. HACAN East summarises its case on climate change as "*… the Appeal Proposal has not adequately demonstrated*

[1] CD10.2
[2] CD10.3

that it is compatible with Development Plan policies around climate change or national and regional targets for the reduction of greenhouse gas ("GHG") emissions" (para 6.2). This is then followed by a series of statements, referring to Policy T8(B) of the London Plan, the Mayor's policy document 'London Net Zero 2030: An Updated Pathway'[3] and emissions in 2031 and beyond reported in the Environmental Statement ("2022 ES") submitted with the Section 73 Application ("S73 Application") which is the subject of this Appeal . Each of these points is addressed in the planning evidence prepared by Mr Bashforth for the Appellant.

1.2.5 The Mayor of London has not submitted a Statement of Case but has provided comments at the planning application stage. These are described further in the planning evidence prepared by Mr Bashforth for the Appellant.

1.2.6 Details of the climate change assessment for the Development Case are provided in the following documents:

a. Volume 1 Chapter 11 of the 2022 ES which includes an assessment of the significance of carbon emissions and the resilience of the development to climate change[4];

b. Appendix 11.1 of the 2022 ES which includes a description of the greenhouse gas footprint methodology[5];

c. Appendix 11.2 of the 2022 ES which includes the detailed greenhouse gas assessment results[6];

d. Appendix 11.3 of the 2022 ES which includes and an outline Carbon and Climate Change Action Plan (CCCAP)[7]; and

[3] CD3.9.6
[4] CD1.18
[5] CD1.49
[6] CD1.50
[7] CD1.51

e. A Revised Energy and Low-Carbon Strategy included in the S73 Application[8].

1.2.7 This Topic Paper follows the nomenclature of the 2022 ES, referring to the future operation of the existing Airport under the CADP1 planning permission as the "Do Minimum" (DM) and to the operation of the Airport with the amendments to the CADP1 planning permission proposed under the S73 Application as the "Development Case" (DC).

1.2.8 Although Volume 1 Chapter 11 of the 2022 ES refers to both carbon emissions and resilience to climate change, this Topic Paper is limited to the assessment of the significance of carbon emissions.

1.3 Structure of this Topic Paper

1.3.1 This Topic Paper has been structured to include:

a. Section 2: A summary of the policy and legislative context, including relevant guidance;

b. Section 3: A summary of the assessment results presented in the 2022 ES; and

c. Section 4: Conclusions.

[8] CD1.65

2. Legislative and Policy Context

2.1 Introduction

2.1.1 The construction, operation and decommissioning of the Airport will generate emissions of greenhouse gases (collectively referred to as "carbon") with the operation of aircraft also giving rise to "non-CO2 effects" which have an additional influence on climate change. There is a clear distinction between "aviation" (i.e. aircraft) and "non-aviation" emissions, with the former being subject to national legislation and policy and the latter also being subject to regional and local planning policy. Regional (Mayor of London) and local (London Borough of Newham) policies regarding non-aviation emissions are described in the evidence of Mr Sean Bashforth (APP/3) and hence, this section has been structured to consider the legislative and policy context of carbon in terms of:

a. National legislation regarding aviation and non-aviation emissions;

b. National policy regarding aviation emissions; and

c. National policy regarding non-aviation emissions.

2.1.2 Section 3 of this Topic Paper provide a summary of the assessment results presented in the 2022 ES, demonstrating how the S73 Application complies with national legislation and policies relevant to carbon.

2.2 National Legislation: aviation and non-aviation emissions

Climate Change Act and Carbon Budgets

2.2.1 Since 1 December 2008 when the Climate Change Act 2008 came into force, the Secretary of State for Energy Security and Net Zero has had a legal duty to progressively reduce

emissions in accordance with successive carbon budgets. In 2019 the Climate Change Act was amended, committing the UK to being carbon net zero by 2050[9].

2.2.2 The first three carbon budgets, for the periods 2008-2012, 2013-2017 and 2018-2022, were implemented via the Carbon Budgets Order 2009[10]. The fourth carbon budget (2023-2027) was set at 1,950 $MtCO_2e$ and the fifth budget (2028-2032) was set at 1,725 $MtCO_2e$[11]. All of these budgets formally exclude international aviation and international shipping, but were set at a level that took international aviation into account:

> *"Emissions from international aviation should continue to be allowed for by setting the budget on the path to meeting the 2050 target with international aviation emissions included. However, the accounting for these emissions remains uncertain, so they should not be formally included in the fifth carbon budget"*[12] .

2.2.3 The Climate Change Act 2008 also established the Climate Change Committee (CCC) whose advice the Government is required to consider but not follow when setting carbon budgets.

2.2.4 In 2009 the CCC published its Report on Meeting the UK aviation target – options for reducing emissions to 2050[13] in response to a January 2009 request from Government to provide advice on options for reducing CO_2 emissions from UK aviation (including both domestic and international flights) down to, or below, 2005 levels by 2050. UK aviation CO_2 emissions in 2005 were estimated to be 37.5 $MtCO_2$ on a bunker fuels basis[14]. This

[9] CD3.9.9
[10] CD3.9.10
[11] CD3.9.11
[12] ibid
[13] CD3.9.12
[14] Bunker fuel is a collective term for fuel consumed for international marine and aviation transport. Emissions from 'bunker fuel' used for international flights and sold in the UK are attributed to the UK.

aviation target for 2050 later became known as the '*planning assumption*' in the context of carbon budgets one to five.

2.2.5 The 2009 CCC Report goes on to state that:

> "*… given prudent assumptions on likely improvements in fleet fuel efficiency and biofuels penetration, demand growth of around 60% would be compatible with keeping CO_2 emissions in 2050 no higher than in 2005";*

and

> *"Future technological progress may make more rapid demand growth than 60% compatible with the target, but it is not prudent to plan on the assumption that such progress will be achieved".*

2.2.6 The sixth carbon budget, for the period 2033-2037, was set at 965 $MtCO_2e$ and, for the first time, includes emissions from international aviation[15].

2.2.7 Carbon emissions associated with aviation, including emissions from construction, aircraft, surface access, ground support services and buildings at the airport, are taken into account along with other sectors within UK commitments to reaching carbon net zero by 2050. Emissions up to and including 2032 are the subject of the relevant carbon budget and the planning assumption for international aviation. Emissions from 2033 to 2037 are subject to the sixth carbon budget with no separate planning assumption as emissions from international aviation are included within the budget. Emissions beyond 2038 are reasonably expected to be subject to successive carbon budgets up to 2050 with no planning assumption in relation to aviation as both domestic and international aviation emissions will be included within those budgets.

[15] CD3.9.13

2.2.8 The latest CCC Progress Report to Parliament was published in June 2023[16] and includes an appraisal of aviation emissions. The CCC reported that aviation emissions in 2022 remained below 2019 levels, reflecting the continued impact of COVID 19 and the rising cost of living. The Report refers to the publication of the Jet Zero Strategy in July 2022[17] which "*recommits to 70% passenger demand growth by 2050 on 2018 levels, relying heavily on technology to compensate for the increased emissions*" (p267).

2.2.9 In referring to airport expansion, the CCC reaffirms its Sixth Carbon Budget Advice which recommended no net expansion of UK airports to ensure aviation can achieve the required pathway for UK aviation emissions (p267). However, it is worth noting the full policy recommendation: "*There should be no net expansion of UK airport capacity unless the sector is on track to sufficiently outperform its net emissions trajectory and can accommodate the additional demand*" (Table 8.1, p162 of 'Policies for Sixth Carbon Budget and Net Zero', CCC, December 2020). This appears to remain the CCC position as the Progress Report 2023 goes on to state "*Net airport expansion should only proceed if the carbon-intensity of aviation is outperforming the Government's pathway and can accommodate this additional demand. Current Government policy is not delivering an outcome consistent with this. The Committee recommends that there should be no expansion of UK airport capacity until an airport capacity management framework is in place*" (Box 10.1, p276).

2.2.10 The UK Government response to the CCC Progress Report was published in October 2023[18]. This response includes five points relevant to the aviation sector:

a. "*Airport expansion: The Government has always been clear that the expansion of any airport must meet our climate change obligations. Any planning application submitted by an airport will be judged by the relevant planning authority, taking*

[16] CD3.9.2
[17] CD3.5.7
[18] CD3.9.23

careful account of all relevant considerations, including environmental impacts and proposed mitigations. We will review our Jet Zero Strategy every five years to ensure the aviation sector is on track to achieve net zero by 2050, and, if appropriate, we will consider reviewing our policy frameworks for airport planning to ensure they remain compatible with achieving our net zero target." (page 26)

b. "*Sustainable Aviation Fuel (SAF): The Government has previously committed to have the SAF mandate legislation in place by 2025 and we are on track to deliver this. The government will confirm its final sustainability criteria in the government response to the second SAF mandate consultation by the end of 202*." (pages 26-27)

c. *"Announced tighter limits on industrial, power and aviation emissions: The UK Emissions Trading Scheme (UK ETS) Authority responded to the consultation it held in Spring 2022 on the development of the scheme. The response confirmed the ETS cap would be tightened to align with net zero from 2024, there would be no reductions to industry free allocations before 2026 and that free allowances for domestic aviation would be phased out in 2026, and the scheme would be expanded to cover emissions from domestic maritime and energy from waste from 2026 and 2028 respectively*." (page 22)

d. "*Announced further plans for Greenhouse Gas Removals: Confirmed that the UK Emissions Trading Scheme (UK ETS) is an appropriate long-term market for GGRs. The UK ETS may also be an appropriate market for high quality nature-based GGRs, subject to further work to consider permanence, costs, and wider land management impacts.*" (pages 22-23)

e. "*GGR Business Models: In the Net Zero Strategy, we committed to developing GGR technologies at scale. Business model support will be crucial to overcome immediate barriers to deployment. We consulted at the end of 2022 and responded in June this year confirming we are minded to progress work on a GGR business model based on*

a 'contract for difference' structure to enable a portfolio of GGR technologies to deploy at commercial scale in the UK this decade subject to affordability and value for money. We also intend to include engineered GGRs in the UK ETS, subject to further consultation, a robust MRV regime being in place, and management of wider impacts." (pages 27-28)

UK Emissions Trading Scheme

2.2.11 As part of the withdrawal from the European Union (EU), the UK ETS replaced the UK's participation in the EU ETS on 1 January 2021. The UK ETS was established through the 2020 Greenhouse Gas Emissions Trading Scheme Order[19] . Both the UK ETS and EU ETS are 'cap and trade' schemes with the total number of allowances in either scheme being capped and reduced, year on year. When the UK ETS was established, the number of allowances was reduced to the equivalent of 95% of the UK 'share' of EU allowances.

2.2.12 The aviation scope for the UK ETS covers UK domestic flights, flights between the UK and Gibraltar, and flights from the UK to the European Economic Area (EEA). All airlines operating such flights need to secure sufficient UK ETS allowances equivalent to the carbon emissions from those flights.

2.2.13 On 26 May 2021, the Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021[20] came into force providing details of the requirements for monitoring, reporting and verification of emissions for the purposes of complying with the Greenhouse Gas Emissions Trading Scheme Order

2.2.14 The Explanatory Memorandum which accompanies the 2020 Greenhouse Gas Emissions Trading Scheme Order makes it clear that the UK Government's intention is that the UK

[19]CD3.9.14
[20]CD3.9.4

ETS and EU ETS can operate side by side, which could increase opportunities for. emissions reduction and cost-efficiency of emissions trading.

2.2.15 In March 2022 the UK Government launched a consultation on developing the UK ETS[21]. The consultation closed in June 2022 and culminated in two regulatory amendments[22] which include the following that are relevant to aviation:

a. Where necessary for free allocation for installations, allowances may be created from the flexible share (40,984,970 allowances) in addition to the annual cap. The Government committed to setting the annual cap in line with a pathway to net zero emissions in 2050, and wanted to make these changes no later than January 2024. This would have required a significant drop in allowances reaching the market in 2024 compared to previous years. This amendment enables a portion of 2021-2023 unallocated allowances and/or flexible share to auction to smooth the transition to the net zero consistent cap;

b. New values for the global warming potentials (in tonnes of carbon dioxide equivalent) of certain greenhouse gases covered by the UK ETS (i.e. nitrous oxide; N2O, carbon tetrafluoride; CF4 and hexafluoroethane; C2F6) are adopted for the 2023 and subsequent scheme years;

c. From 1 July 2024, verifiers of emission reports must be accredited to a new standard. Verifiers of aircraft operators' emission reports may, with the approval of the regulator, carry out "virtual" site visits whether or not force majeure prevents a physical site visit; and

d. Extending the scope of the UK ETS to include flights to Switzerland with no change to the overall cap.

[21] CD3.9.28
[22] CD3.9.30 and CD3.9.31

2.2.16 The UK ETS was established and continues to be regulated by the UK Emissions Trading Aurthority (UK ETA) which is made up of the UK Government, Scottish Government, Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland. In July 2023 the UK ETA published its decisions following consultation on the future of the UK ETS[23]. The opening sentence of the Executive Summary of this publication states clearly:

"When the UK Emissions Trading Scheme (UK ETS) was established in January 2021 our aim was to align it with the UK's world leading net zero commitment. This document sets out the important structural changes to the scheme that will deliver on this goal."

2.2.17 The UK ETA decisions include tighter limits for aviation emissions (CD3.9.3, p61), demonstrating clear controls on aviation emissions at the national level:

"The Authority has decided to phase-out aviation free allocation by 2026.

In order to ensure that aircraft operators are able to prepare for the transition, the aviation free allocation entitlement will continue to reduce at the existing fixed amount of 2.2% annually in 2024 and 2025 until full auctioning in 2026.

The Authority has decided not to update the aviation free allocation methodology and not to account for new entrants in light of the decision to phase-out aviation free allocation by 2026.

The Authority has decided to implement a cap on the maximum amount of free allocation aircraft operators are eligible to receive during the phase-out period. From the 2024 scheme year, aircraft operator's entitlement will be capped to 100% of their verified emissions."

2.2.18 The strengthening of the UK ETS is further referred to in the Government's response to the CCC Progress Report (see paragraph 2.2.10.c above).

[23] CD3.9.3

CORSIA

2.2.19 Emissions from international flights not included in the UK ETS are covered by CORSIA developed by the International Civil Aviation Organization (ICAO). In 2010, the 37th Session of the ICAO Assembly adopted two aspirational goals: (1) to improve energy efficiency by 2% per year until 2050; and (2) to achieve carbon neutral growth from 2020 onwards. These goals are to be met with the implementation of a basket of measures that includes technological innovations, operational improvements, sustainable aviation fuels, and market-based measures. At the 39th Session of the ICAO Assembly in 2016, States adopted a global market-based measure scheme for international aviation, CORSIA, to address the increase in total CO_2 emissions from international aviation above the 2020 levels (now revised, following COVID, to 2019 levels). CORSIA is being implemented in three phases: a pilot phase from 2021 to 2023, a first phase from 2024 to 2026, and a second phase from 2027 to 2035. For the pilot and first phase (2021 to 2026), participation is voluntary. As of 29 August 2023, 115 States, including the UK, are participating, representing more than 77% of international aviation. CORSIA requires all airlines operating a route between two participating States (e.g., UK and USA) to monitor, report and verify the emissions from flights on that route, and for those emissions to be offset using CORSIA eligible emission units[24].

2.2.20 At the 41st Assembly in October 2022, the ICAO agreed a Long Term Aspirational Goal (LTAG) for international aviation to be carbon net zero by 2050[25]. Starting with the goal for international aviation emissions to stabilise from 2020 (i.e. to be equal to or less than 2019 levels), the baseline has been adjusted to being equivalent to 85% of 2019 emissions, applicable from 2024 onwards.

2.2.21 LTAG includes three scenarios: (1) high readiness/attainability and low aspiration; (2) middle readiness/attainability and middle aspiration; and (3) low readiness/attainability

[24] CD3.9.4
[25] CD3.9.24

and high aspiration. Scenario 1 represents the 2021 expectation of future technology, operational efficiencies and fuel availability and includes the expectation that policy will support development in these three areas. Scenario 2 is described as an 'increased ambition' scenario and considers that these improvements will have a faster rollout. Scenario 3 "*represents the maximum possible effort in terms of future technology rollout, operational efficiencies and fuel availability. It assumes maximum policy enablers for technology, operations and fuels*."

2.2.22 The UK ETS as currently enacted is due to run until 2030 and will not run into the period of the Sixth Carbon Budget in 2033. Similarly, CORSIA runs until 2035. This indicates an offsetting gap beginning in the next decade. However, the UK Emissions Trading Authority is clear in providing a strong signal to the market on the Government's intent that the UK ETS continues[26]23:

> *"The Call for Evidence was the first stage of a two-stage approach to develop proposals on future UK ETS markets policy. Following the Call for Evidence we are currently reviewing future markets policy and aim to consult on detailed policy proposals in due course. As outlined in the Call for Evidence, we are considering future markets policy holistically. Our policy development in the coming months will therefore consider the future of market stability mechanisms, including the ARP [auction reserve price], the CCM [cost containment mechanism] and examining the potential merits of a supply adjustment mechanism, as well as broader market functioning. In stating our intent to explore these policy areas, we note that any changes proposed in a future consultation will depend on our assessment of policy options during policy development."*

[26] CD3.9.17

2.2.23 This signal by the UK Emissions Trading Authority and the adoption of the Long Term Aspirational Goal by the parties of ICAO[27][25]supports the view that mechanisms such as the UK ETS, CORSIA or similar will continue to be available to address aviation carbon emissions. This is also reiterated in the Government's response to the CCC Progress report (paragraph 2.2.10.c above).

SAF Mandate

2.2.24 In July 2021, the DfT issued a consultation on introducing a mandate to increase the use of SAF in aviation. Following a consultation launched in July 2021, the Government published its decisions in July 2022[28] which are summarised as follows:

> *"This response confirms that the Government will mandate SAF supply in the UK by introducing a bespoke SAF mandate, separate from the Renewable Transport Fuel Obligation (RTFO). In line with our original consultation proposals, the mandate will obligate aviation fuel suppliers to reduce the greenhouse gas (GHG) emissions intensity of jet fuel delivered to the UK. They will be able to achieve this by blending an increasing proportion of SAF into their jet fuel supply and will receive an incentive to do so in the form of a number of credits, proportional to the GHG emissions saved by the SAF supplied. These credits can then be sold or bought to meet the obligation."*
>
> *"We would like to introduce a SAF mandate that is world leading and as ambitious as possible. To that end, we can confirm that the obligation on suppliers to reduce the carbon intensity of jet fuel will start in 2025 and will grow to reach the equivalent of at least 10% SAF use by 2030. Our expectation is that this will deliver emission reductions in the order of 3 $MtCO_2e$ in 2030."*
>
> *Further analysis is required to ensure we set yearly targets before and after 2030 at an appropriate level to avoid creating any unintended consequences. We will consult*

[27] CD3.9.24
[28] CD3.9.1

further on our yearly mandate targets in the second consultation and review our SAF trajectory to 2050 within the first five-year review of the Jet Zero Strategy in 2027."

2.2.25 SAF can be blended with jet fuel and used in existing aircraft, resulting in reduced carbon emissions with little or no change in fuelling infrastructure required at airports. The UK Government is keen to develop domestic production of SAF as a means of increasing energy security as well as generating employment and extending the lifetime of fuel refining and distribution infrastructure. To date, The UK Government has committed to more than £600 million to support SAF[29][28].

Taskforce on Climate-related Financial Disclosure

2.2.26 The Taskforce on Climate-related Financial Disclosure (TCFD) was established in 2015 by the Financial Stability Board, an international body that monitors and makes recommendations about the global financial system. The principal aim of climate related financial disclosure is to promote the communication of how the physical and transition risks and opportunities of climate change are being managed by a business or organisation. From April 2022, over 1,300 of the largest UK-registered companies and financial institutions are required to disclose climate-related financial information on a mandatory basis. This includes many of the UK's largest traded companies, banks and insurers, as well as private companies with over 500 employees and £500 million in turnover. By 2025, this mandate will have extended across the economy[30] . For LCY this means annual disclosure of progress made in reducing emissions from its own operations, surface access and aviation, the effect of decarbonisation legislation and policy on its markets and the extent of climate change adaptation being considered.

2.3 National Policy: aviation emissions

[29] CD3.9.1 and CD3.5.10
[30] CD3.9.32

Making Best Use

2.3.1 *Beyond the Horizon – Making Best Use of existing runways*[31] (MBU) was published by the Department of Transport in 2018 and remains current UK Government policy on aviation and climate change.

2.3.2 Paragraphs 1.8 to 1.12 of MBU clearly differentiate between local and national planning requirements, with carbon emissions from air traffic being a matter of national policy.

2.3.3 The DfT considers two scenarios to illustrate how aviation emissions could be tackled if all regional airports are allowed to make best use of their existing runway capacity. The carbon traded scenario assumes the use of global offsets (i.e. the Carbon Offsetting and Reduction Scheme for International Aviation described in Section 2.4 below) which would enable growth in aviation to continue without impact on global emissions. The carbon capped scenario uses a combination of carbon pricing and specific measures (e.g. single engine taxiing and renewable aviation fuel) to limit emissions to within the CCC recommended 37.5 $MtCO_2$ limit. This is the so called 'planning assumption'.

2.3.4 In the 2021 Appeal Decision for Stansted[32], the Planning Inspectors noted in paragraph 18:

> *"The in-principle support for making best use of existing runways provided by MBU is a recent expression of policy by the Government. It is given in full knowledge of UK commitments to combat climate change, having been published long after the Climate Change Act 2008 (CCA) and after the international Paris Agreement."*

[31] CD3.5.3
[32] CD8.2, page 10

2.3.5 MBU was also referenced in the 2022 Secretary of State decision for Manston Airport[33] (paragraph 42), the 2022 Southampton Airport High Court judgment [34] (paragraph 111), the 2023 Bristol Airport High Court judgment [35] and in the 2023 Secretary of State decision for Luton Airport[36] (paragraph 8.18), reinforcing the view that MBU remains a most recent national policy statement and as such is a material consideration.

Airports National Policy Statement

2.3.6 Airports National Policy Statement for new runway capacity and infrastructure at airports in the South East of England[37] was published by the Department of Transport in 2018, on the same day as MBU. Paragraph 5.72 states:

"The Climate Change Act says that the Government must "take into account" the estimated amount of reportable emissions from international aviation for the budgetary period or periods in question "when setting carbon budgets". The Committee on Climate Change has interpreted the requirement to take these emissions into account as requiring the UK to aim to meet a 2050 target which includes these emissions, and has made its recommendations for the levels of the existing carbon budgets on this basis".

Decarbonising Transport: A Better, Greener Britain

2.3.7 Published by the Department for Transport in July 2021, *Decarbonising Transport: A Better, Greener Britain*[38] includes the following commitments to decarbonise aviation (p11):

[33] CD8.4
[34] CD8.10
[35] CD8.8
[36] CD8.6
[37] CD3.5.2
[38] CD3.5.5

a. To consult on our Jet Zero strategy, which will set out the steps we will take to reach net zero aviation emissions by 2050.

b. To consult on a target for UK domestic aviation to reach net zero by 2040.

c. To consult on a target for decarbonising emissions from airport operations in England by 2040.

d. To further develop the UK Emissions Trading Scheme to help accelerate aviation decarbonisation.

e. To aim to agree an ambitious long-term global emissions reduction goal in the International Civil Aviation Organization by 2022.

Jet Zero Strategy

2.3.8 On 19 July 2022 the Government published the policy paper Jet Zero Strategy: delivering net zero aviation by 2050[39] (Jet Zero Strategy), described as the framework and plan for achieving net zero aviation by 2050. This strategy follows 12 months of consultation with over 1500 responses received by the Department for Transport (DfT).

2.3.9 The Government acknowledges the challenge of decarbonising the aviation sector but states (page 8):

"*We will use the transition to Jet Zero to create new jobs, industries and technologies across the entire sector and the UK."*

2.3.10 The Government highlights (page 8):

"[We are] taking a leading role internationally, including negotiating for agreement on a long-term aspirational goal for the CO_2 emissions of international aviation that is aligned with the temperature goal of the Paris Agreement. The UK believes that it

[39] CD3.5.7

is paramount that ICAO adopt an ambitious long-term goal to help set the direction for future international and national policy, attract green investment, and show that the sector is taking credible action to tackle its emissions."

2.3.11 The Jet Zero Strategy includes the following:

a. Committing the sector to achieve Jet Zero by 2050, acknowledging there are multiple pathways to see it achieved.

b. Introducing a CO_{2e} emissions reduction trajectory from 2025, that sets ambitious in-sector targets of 35.4 $MtCO_2e$ in 2030, 28.4 $MtCO_2e$ in 2040, and 19.3 $MtCO_2e$ in 2050.

c. Setting a target for domestic flights to reach net zero by 2040.

d. Targeting airport operations to be zero emission by 2040. A Call for Evidence was made in autumn 2022 to gather information on the scope and implementation route to see this achieved.

e. By 2025, committing to have at least five UK SAF plants under construction and a SAF mandate in place with a target of at least 10% SAF by 2030.

2.3.12 The Jet Zero Strategy states that progress against the trajectory will be published on an annual basis, followed by a major review of the Strategy every five years.

2.3.13 The six key measures identified for meeting the trajectory are: system efficiencies; SAF; zero emission flight; markets and removals; influencing consumers; and addressing non-CO_2.

2.3.14 The Jet Zero Strategy also highlights maximising opportunities – to use the Jet Zero transition to deliver wider benefits in jobs, skills, and investment that these new technologies will bring.

2.3.15 The Jet Zero Strategy is supported by the *Jet Zero Investment Flightpath*[40] which seeks to encourage investment in the UK to deliver low and zero emission technologies to decarbonise the aviation sector. The Jet Zero Investment Flightpath provides a 2035 Delivery Plan with a clear timeline and key milestones to measure implementation. The timeline includes 2025, with the start of the SAF mandate and the CO_{2e} emissions reduction trajectory, 2030 with zero emission domestic flights within the UK and at least 10% of UK jet fuel being SAF, and five year reviews of the Jet Zero Strategy in 2027 and 2032.

2.3.16 Underpinning the Jet Zero Strategy are four illustrative scenarios to net zero, taking into account: carbon price; system (airspace and fuel) efficiency improvements; uptake of SAF; uptake of zero emission propulsion technologies; and updated projections of air traffic movements (ATMs) and passenger movements (in millions of passengers per annum; mppa). The assumptions for each scenario are summarised in Table 2.1 .

TABLE 2.1 : Jet Zero Scenarios

Scenario	[1]Demand	[2]Carbon Price	[3]Fuel efficiency improvements	SAF uptake	[4]Zero Emission technology uptake
Scenario 1 (current trends)	74%	[5] 'Mid' ETS price [6] 'Low' CORSIA price	1.5% per annum	2% by 2030 4% by 2040 10% by 2050	None by 2050
Scenario 2 (high ambition)	70%	'Mid' ETS price [7] 'Mid' CORSIA price	2.0% per annum	10% by 2030 22% by 2040 50% by 2050	None by 2030 5% by 2040 27% by 2050
Scenario 3 (high ambition, SAF breakthrough)	70%	As per Scenario 2	As per Scenario 2	10% by 2030 32% by 2040 100% by 2050	As per Scenario 2
Scenario 4 (high ambition, zero emission aircraft breakthrough)	70%	As per Scenario 2	As per Scenario 2	As per Scenario 2	None by 2030 11% by 2040 38% by 2050

Notes:
1. *UK Terminal, growth in passengers, 2018 to 2050)*
2. *2020 prices*
5. *£150/t in 2030, £378/t in 2050*
6. *£6/t in 2030*

[40] CD3.5.21

3. Efficiency improvement per annum, from 2017 to 2050	*7. £6/t in 2030, £378/t in 2050*
4. In terms of ATMs	

2.3.17 The first Jet Zero scenario "*represents a continuation of current trends in UK aviation*" with passenger demand increasing by 74% in 2050 from a UK total of 283 mppa in 2018. From a baseline of 34.83 $MtCO_2e$ in 2018, in-sector emissions in Scenario 1 would increase to 37.01 $MtCO_2e$ in 2050. The impact of carbon price, fuel efficiency improvements and SAF uptake would result in 37 $MtCO_2e$ of residual emissions to be removed.

2.3.18 The second Jet Zero scenario "*high ambition*" includes higher carbon pricing and greater improvements in fuel efficiency, SAF uptake and zero emission technology. Passenger demand increases by 70% in 2050. In-sector emissions in Scenario 2 would reduce to 19.29 $MtCO_2e$ in 2050. Scenario 2 was used in the Jet Zero Strategy to develop the in-sector carbon trajectory (see paragraph 2.3.21) and was also used as the basis for the GHG assessment presented in the 2022 ES.

2.3.19 The third and fourth Jet Zero scenarios build on Scenario 2, assuming greater uptake in SAF and zero emission technologies, respectively. By 2050, in-sector emissions in these scenarios would reduce to 8.55 and 11.28 $MtCO_2e$.

2.3.20 The Jet Zero Strategy dataset underpinning the development of these scenarios includes assumptions on airport capacity. These are reproduced in Annex A of this Topic Paper, including the footnote describing how this information should be interpreted. The Jet Zero Strategy assumes passenger numbers at the Airport could increase from 6.5 mppa in 2019 to 11 mppa by 2030 and this provides some context in terms of the S73 Application to increase capacity from 6.5 mppa to 9 mppa.

2.3.21 The Jet Zero Strategy also includes an in-sector trajectory of emissions, providing a benchmark for assessment. This trajectory is reproduced in Figure 2.1 below. The trajectory assumes emissions in 2050 would be 54% of those in 2027.

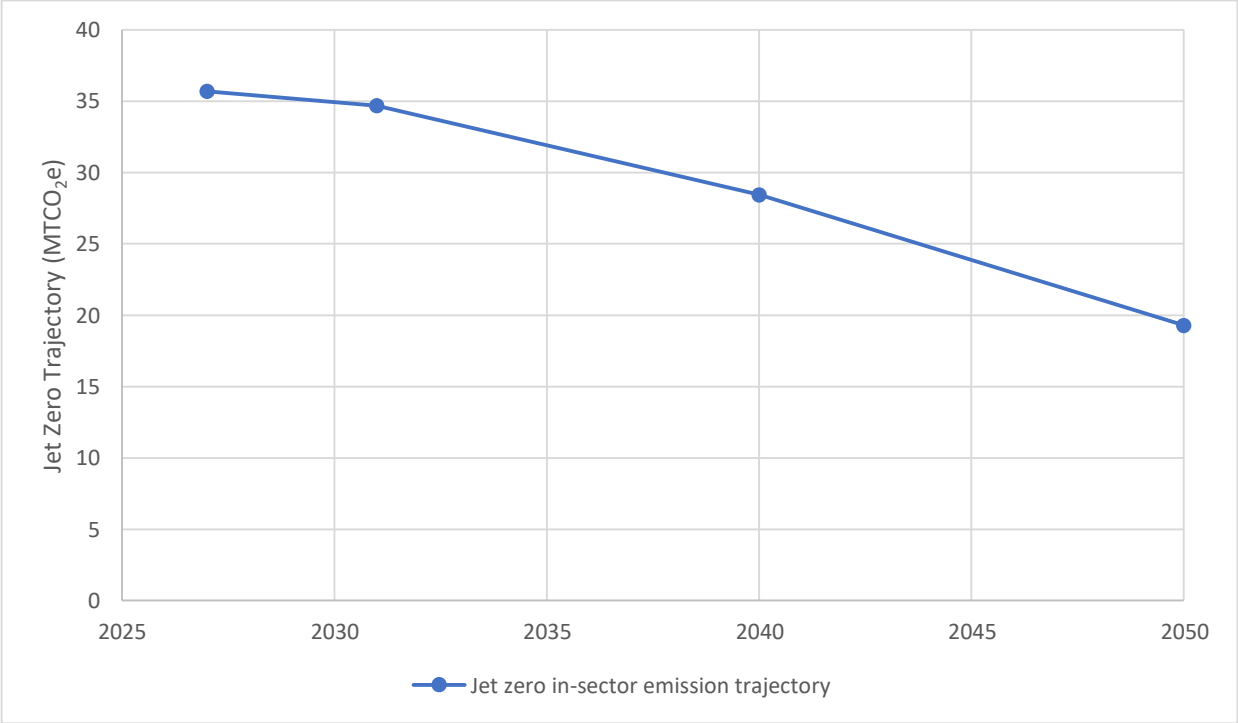

Figure 2.1 : Jet Zero Strategy in-sector trajectory

2.3.22 The Jet Zero Strategy includes a policy commitment to (page 74): *"support airport growth where it can be delivered within our environmental obligations"*. The approach to implementing this policy is clearly stated on the same page:

> *"The Government's existing policy framework for airport planning in England – the Airports National Policy Statement (ANPS) and Beyond the horizon, the future of UK aviation: Making best use of existing runways (MBU) – have full effect, as a material consideration in decision making on applications for planning permission. Our analysis shows that it is possible to achieve our goals without the need to restrict people's freedom to fly."*

2.3.23 In October 2021, the UK Government published its Net Zero Strategy to build back greener[41], drawing on the Jet Zero Strategy with respect to aviation. An independent review of the Net Zero Strategy was published in September 2022[42], concluding that the plan set out in the Net Zero Strategy was the right one and providing recommendations to strengthen delivery.

2.3.24 In July 2023, the UK Government provided a progress report on the implementation of the Jet Zero Strategy [43] highlighting the following achievements:

a. *[With the UK playing a leading role], the ICAO adopted the net zero 2050 CO_2 emissions goal for international aviation;*

b. *ZeroAvia reaches key milestone for zero emission flight;*

c. *Launched the 2040 Zero Emission Airport Target Call for Evidence;*

d. *[Announced] a significant package of announcements on SAF including: publication of the second SAF mandate consultation, outlining the proposed detailed design of a scheme that will seek to generate demand for SAF, provide an incentive to SAF producers and deliver carbon savings; launching a further round of the Advanced Fuels Fund, making a further £55.8m available to support UK SAF projects through to construction; and announcing the University of Sheffield as the delivery partner for the UK SAF Clearing House;*

e. *The [Jet Zero] Council published its Two-Year Plan showing the action needed in the coming years to support the delivery of Jet Zero by 2050; and*

[41] CD3.9.25
[42]CD3.9.26
[43] CD3.5.10

f. Published the government response to the Developing the UK ETS consultation, setting out a range of commitments including a tighter emissions cap and the future of aviation free allocation.

2.3.25 The Jet Zero – One Year On report also highlights (page 28) *"The New Aviation Propulsion Knowledge and Innovation Network (NAPKIN), a coalition of manufacturers, airports and universities, [who] published a report in November 2022 on the potential for hydrogen as a fuel for zero emission flight, with a focus on modelling the introduction of zero emission aircraft into regional and short- haul aviation within the UK."* London City Airport is one of three UK airports that are part of NAPKIN.

2.3.26 The Jet Zero – One Year On report also *"confirmed that we believe the UK ETS is an appropriate long-term market for GGRs, subject to robust monitoring, reporting and verification and the management of wider impacts."* (page 29) and *"continued to fund scientific research into aviation's non-CO_2 effects"* (page 33).

2.3.27 Chapter 11 of the 2022 ES (CD1.18) confirms (Table 11-2, page 6) that *"the GHG assessment (Part A) has taken into account key government policies set out in the Net Zero Strategy for decarbonising the economy including the transport and power sectors both of which are relevant to the proposed development. Details on assumptions adopted are presented in Appendix 11.1"*

2.3.28 The Secretary of State for Transport's decision on Manston Airport[44] published in August 2022 refers to both the Decarbonising Transport and Jet Zero strategies (see paragraphs 2.3.7 – 2.3.8 of this Topic Paper).

2.3.29 The Manston Decision highlights the conclusion reached by the Examining Authority that (paragraph 148):

[44] CD8.4

".. the Development's Carbon Dioxide contribution of 730.1 Kt CO_2 per annum (N.B. at full capacity on a worst-case scenario assessment), would according to the Applicant have formed 1.9% of the total UK aviation carbon target of 37.5 Mt CO_2 for 2050, will have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets [ER 8.2.74]. The Examining Authority concluded that this weighs moderately against the case for development consent being given."

2.3.30 The Manston Decision goes on to state (paragraph 149):

"However, the Secretary of State is satisfied that Government's Transport Decarbonisation Plan and the Jet Zero Strategy, which set out a range of non-planning policies and measures that will help accelerate decarbonisation in the aviation sector, will ensure Government's decarbonisation targets for the sector and the legislated carbon budgets can be met without directly limiting aviation demand. For this reason, he does not accept the Examining Authority's view that carbon emissions is a matter that should be afforded moderate weight against the Development in the planning balance, and considers that it should instead be given neutral weight at the most."

Non-CO_2 impacts

2.3.31 The UK Government acknowledges the non-CO_2 impact of aviation and recognises this impact is potentially greater than from CO_2 alone. In January 2021, research supported by the Department for Transport was published[45] , highlighting the contribution to climate change made by carbon dioxide (CO_2), NO_x, water vapor, soot, sulfate aerosols and increased cloudiness due to contrail formation. The results of this work are summarised in Figure 2.2 below which compares the effective radiative forcing (i.e. the potential to contribute to global warming) of CO_2 and non-CO_2 components of air traffic movements. Some of these components have a global warming effect and some have a global cooling effect. The impact of CO_2 emissions on global warming is long term (100+ years) whereas

[45] CD3.9.33

non-CO_2 effects are shorter-lived and largely depend on sustained aviation activity to maintain them. Moreover, the magnitude of these effects can depend on the conditions under which the activity occurs (e.g. the extent that contrails are formed depends on the temperature and moisture content of the atmosphere), unlike for well-mixed GHGs which affect the climate independently of where they occur. Overall, the non-CO_2 impact of aviation is potentially greater than from CO_2 alone.

2.3.32 There is considerable uncertainty in the data and, with reference to paragraph 3.95 of Aviation 2050[46], the Government's view on non-CO_2 remains that it:

"continues to support work on non-CO_2 emissions, their trade-offs with CO_2 and possible mitigation measures, none of which are yet well enough understood to be able to form policy with confidence that aviation's total climate impact would be reduced".

2.3.33 The January 2021 research cited in paragraph 2.3.31 above was part of a wider analysis of the non-CO_2 climate impacts of aviation[47] which identifies a number of technology and operational options for limiting or reducing non-CO_2 impacts and potential policy measures. This work advises against using a single CO_2 emissions equivalent multiplier to account for non-CO_2 impacts as: (1) the magnitude of the multiplier depends on the metric chosen, and mostly, the time horizon considered; and (2) the use of a multiplier does not incentivise reductions of non-CO_2 emissions independently of CO_2 emissions, neither at the global/regional fleet level nor on an individual flight-by-flight basis (pp 8-9). The key mitigation options identified in this work included: reducing NO_x emissions; avoiding the formation of contrail cirrus; and reducing soot particle emissions (measured by number rather than by mass).

[46] CD3.5.4
[47] CD3.9.34

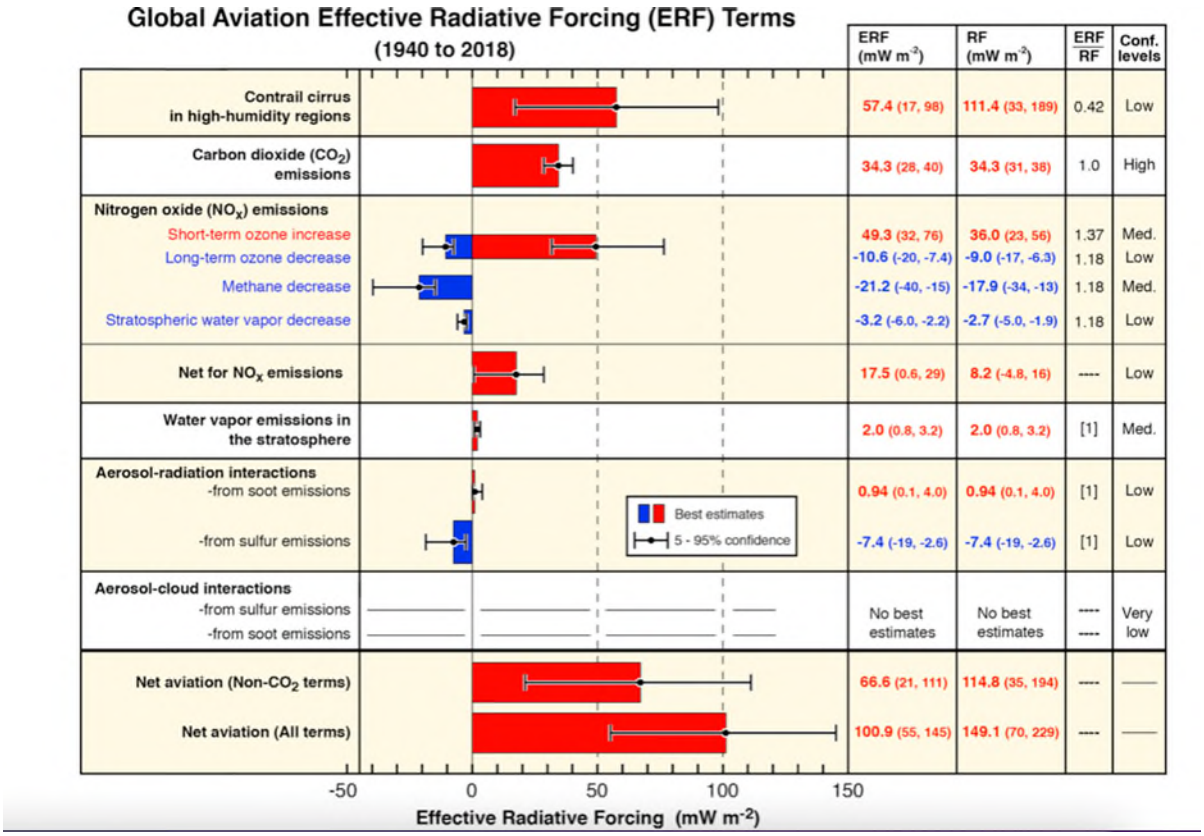

Figure 3.2 : Global Aviation Effective Radiative Forcing (ERF) Terms 1940 to 2018 (CD3.9.33)

2.3.34 In providing decisions on how to develop the UK ETS, the Government stated that[48]:

> *The UK Government is committed to working with industry and academia to explore a means of estimating and tracking the non-CO_2 impacts from the UK aviation industry, and is scoping out a research programme to support this commitment. Through the programme, we will look to improve scientific understanding of aviation's non-CO_2 climate impacts. We are also aiming to investigate methods for monitoring and modelling these non-CO_2 impacts and evaluate the suitability of existing and alternative CO_2 equivalent conversion metrics to inform future policy development.*

[48] CD3.9.3, p76

The UK ETS could play a meaningful role in better understanding and accounting for aviation's non-CO_2 impacts, for example, through introducing a monitoring and reporting system, and we will further explore the feasibility of this as an initial step towards pricing non-CO_2 impacts. The Authority would carry out a consultation exercise before bringing aviation's non-CO_2 impacts within scope of the UK ETS."

2.3.35 Examples of measures that can reduce non-CO_2 effects are listed in the CCC Sixth Budget report (p375) including: planning flight trajectories to avoid areas of meteorology that would give rise to increased contrail cirrus formation, although this requires consideration of the trade off with increased fuel consumption associated with route diversions; and the use of sustainable aviation fuels (SAF) which reduces volatile particulate emissions due to their lower aromatic and sulphur content[49].

2.4 National Policy: non-aviation emissions

Jet Zero Strategy

2.4.1 The Jet Zero Strategy[50] was published in July 2022 with policy commitments that include (page 65): "*our ambition remains for all airport operations in England to be zero emission by 2040*". Supporting this is a Government funded technical report by Mott MacDonald and Connected Places Catapult[51] which identifies how the top ten airports in England, including the Airport, could become carbon zero by 2040. Carbon zero specifically excludes the use of carbon removals or offsets (page 7, second paragraph). The scope of a carbon zero airport excludes flights and surface access journeys to/from the Airport (page 13, second paragraph, first numbered point). The plans to reduce carbon emissions at the Airport, based on the Airport's Net Zero Plan published in 2020, are listed on pages 26-27 of the Mott MacDonald / Connected Places Catapult report. These do not include

[49] CD3.9.13
[50] CD3.5.7
[51] CD3.9.35

the Outline Carbon and Climate Change Action Plan prepared in support of the Application.

2.4.2 The Mott MacDonald / Connected Places Catapult report also considers each source in turn, identifying how each of these sources could become carbon zero. In almost all cases, the technology is available, or expected to be available. However, the Mott MacDonald / Connected Places Catapult report highlights the role of the Civil Aviation Authority (CAA) and commercial factors, including access to finance and affordability, as well as the role of Government in providing a regulatory framework. These are factors beyond the control of the Airport.

Decarbonising Transport

2.4.3 Published in July 2021, the UK Government's transport decarbonisation plan[52] provides a series of commitments addressing: active transport (walking and cycling); zero emission buses, coaches, cars, vans, motorcycles and scooters; decarbonising railways; accelerating the decarbonisation of shipping and aviation, zero emission freight and logistics centres; local transport planning and funding; sustainable low carbon fuels; hydrogen; and research and development. A Progress Report has since been published, setting out what was achieved[53].

2.4.4 With respect to decarbonising aviation, the UK Government's transport decarbonisation plan includes the following commitments:

a. *We will consult on our Jet Zero strategy, which will set out the steps we will take to reach net zero aviation emissions by 2050.*

b. *We will consult on a target for UK domestic aviation to reach net zero by 2040.*

[52] CD3.5.5
[53] CD3.5.22

c. *We are supporting the development of new and zero carbon UK aircraft technology through the Aerospace Technology Institute (ATI) programme.*

d. *We will fund zero emission flight infrastructure R&D at UK airports.*

e. *We will kick-start commercialisation of UK sustainable aviation fuels (SAF).*

f. *We will consult on a UK sustainable aviation fuels mandate.*

g. *We will support UK airspace modernization.*

h. *We will further develop the UK Emissions Trading Scheme (ETS) to help accelerate aviation decarbonization.*

i. *We will work with industry to accelerate the adoption of innovative zero emission aircraft and aviation technology in General Aviation.*

j. *We will aim to agree an ambitious long-term global emissions reduction goal in the International Civil Aviation Organization by 2022.*

2.4.5 The Progress Report goes on to state that the Spending Review 2021 included announcements for: *£180m to support development of UK SAF for three years*; *a £400m partnership with Breakthrough Energy to support net zero technology, including advanced SAF*; and *£685m for the Aerospace Technology Institute (ATI) programme for three years*.

2.4.6 The Progress Report also states the Government's intentions: *to launch and deliver the new £165m SAF industry competition over the next three years and clarify our position on a SAF mandate and its development*; and *to work with other states to secure agreement at ICAO's 41st Assembly to an ambitious long- term aspirational goal for international aviation CO_2 emissions*.

Net Zero Strategy

2.4.7 In October 2021 the UK Government published its Net Zero Strategy[54] setting out policies and proposals for meeting carbon budgets, the 2030 Nationally Determined Contribution

[54] CD3.9.25

(NDC) and a vision for a decarbonised economy in 2050. The Strategy will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as the UK's second Long-Term Low Greenhouse Gas Emission Development Strategy under the Paris Agreement.

2.4.8 The Net Zero Strategy is based on a range of scenarios (p17, my emphasis):

> *"Whilst there are a range of ways in which net zero could be achieved in the UK, we set out a delivery pathway showing indicative emissions reductions across sectors to meet our targets up to the sixth carbon budget (2033-2037). This is based on our current understanding of each sector's potential, and a whole system view of where abatement is most effective. But we must be adaptable over time, as innovation will increase our understanding of the challenges, bring forward new technologies and drive down the costs of existing ones."*

2.4.9 Chapter 11 of the 2022 ES[55] confirms (Table 11-2, page 7) that "*the GHG assessment (Part A) has taken into account key government policies set out in the Net Zero Strategy for decarbonising the economy including the transport and power sectors both of which are relevant to the proposed development. Details on assumptions adopted are presented in Appendix 11.1*"

National Planning Policy

2.4.10 Chapter 2 of the 2023 National Planning Policy Framework (NPPF)[56] states that the purpose of the planning system is to contribute to the achievement of sustainable development, including mitigating and adapting to climate change, and moving to a low carbon economy.

[55] CD1.18
[56] CD3.2.1

2.4.11 Paragraph 152 of the NPPF states that:

> *"The planning system should support … shap[ing] places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience…"*

2.4.12 Paragraph 153 of the NPPF states that:

> *"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures."*

2.4.13 This paragraph also includes a footnote to explain that "*the risk of overheating from rising temperatures*" refers to being in line with the objectives and provisions of the Climate Change Act 2008.

2.4.14 Paragraphs 155 and 156 of the NPPF refer to increasing the use and supply of renewable and low carbon energy and heat, and to support community-led initiatives for renewable and low carbon energy.

2.4.15 In terms of national planning policy on carbon emissions, the UK aviation sector is responding to the need to decarbonise, with targets for UK airport operations to be carbon net zero by 2040 and the sector as a whole to be carbon net zero by 2050.

2.4.16 In the Appeal Decision for Stansted Airport[57], the Inspectors noted:

> *"The aviation emissions assessments of the ES and ESA are reported as CO_2 only rather than in the wider terms of carbon dioxide equivalent emissions (CO_2e), which also*

[57] CD8.2

includes nitrous oxide (N_2O) and methane (CH_4), and which the Government has adopted for its sixth Carbon Budget. While it may have been beneficial to have used CO_2e in preference to CO_2 in the ES and ESA, this was not a matter raised by the Council during scoping, nor at any other stage prior to the exchange of evidence. The approach of the ES and ESA, in this regard, is also consistent with the DfT's 2017 Forecasts and with the MBU policy. Consequently, the approach adopted in the ES and ESA is not flawed or incorrect as such. In any event, the evidence indicates that were N_2O and CH_4 to have been included in the ES and ESA assessments, the results would not change significantly on the basis that N_2O and CH_4 account for in the region of only 0.8 to 1.0% of total international aviation CO_2e emissions."

And

"*In addition to carbon and carbon dioxide equivalent emissions, other non-carbon sources have the potential to effect climate change. Nonetheless, they are not yet fully understood, with significant uncertainties remaining over their effects and how they should be accounted for and mitigated. There is currently no specific Government policy regarding how they should be dealt with and uncertainty remains over what any future policy response might be. Moreover, no evidence was put to the Inquiry which clearly and reliably establishes the extent of any such effects."*

And

"In this context, therefore, the potential effects on climate change from non-carbon sources are not a reasonable basis to resist the Appeal Proposal, particularly bearing in mind the Government's established policy objective of making the best use of MBU airports."

2.4.17 Non-CO_2 emissions cannot be ignored and need to be acknowledged today so choices made in the technologies used to reduce aircraft emissions do not result in non-CO_2 impacts increasing; as the scientific understanding increases, the choices of technology will become better informed. This is fully acknowledged by UK Government.

2.4.18 The CCCAP submitted as part of the ES[58] includes a commitment for LCY to track non-CO_2 emissions.

[58] CD/1.51

3. Environmental Assessment

3.1 Introduction

3.1.1 This section describes the assessment of aviation and non-aviation emissions of carbon presented in the 2022 ES. A brief overview of the methodology for calculating carbon emissions is provided with more detail given to describing the different tests for significance used to determine the significance of aviation and non-aviation emissions. The results are presented for aviation emissions with reference to these significance tests in the context of national legislation and policy. The results for non-aviation emissions are also presented with their significance in the context of national, regional and local planning policy being discussed within the planning evidence of Mr Sean Bashforth (APP/3) on behalf of the Appellant.

3.2 Methodology

3.2.1 The full methodology is described in Appendix 11.1 of the 2022 ES[59]. However, it is worth noting:

a. Emissions of seven key GHGs were modelled[60] and, with reference to their individual global warming potential over 100 years, expressed as carbon dioxide equivalent (CO_2e) and hence, collectively referred to as carbon emissions.

b. The assessment of carbon emissions is based on three future scenario years:
   i. **2027**, the year when the 6.5 mppa cap is forecast to be exceeded in the DC Scenario;
   ii. **2031**, the year proposed capacity of 9 mppa is forecast to be reached in the DC Scenario, and is the year when the net change in operational emissions between the DM and DC scenario is the greatest; and

[59] CD1.10 / CD1.18
[60] Carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

iii. **2050**, the year the UK is targeted to have reached net zero, and the timeframe for the Jet Zero Strategy.

c. Emissions were also modelled for each year between 2024 and 2050 to allow comparison to carbon budgets.

d. Two sensitivity cases are also considered within the DC scenario as described in Chapter 3 of the 2022 ES, a Faster Growth and a Slower Growth scenario. These are considered for the operational assessment only. The Faster Growth scenario sees the proposed 9 mppa capacity reached in 2029, and in the Slower Growth scenario, the proposed 9 mppa capacity is not reached until 2033.

e. Activities were scoped into the carbon assessment with reference to the GHG Protocol[61] and the Airport Carbon Accreditation Scheme[62]. Activities were scoped out with reference to IEMA guidance[63] (p19). The scoping is summarised in Table 3.1 .

3.2.2 In summary, the method of calculating carbon emissions follows published guidance and is of sufficient detail to differentiate between aviation and non-aviation emissions to determine compliance with relevant legislation and policy.

[61] CD3.9.27
[62] CD3.9.37
[63] CD3.9.36

TABLE 3.1 : Carbon Calculations - activities scoped in and scoped out

Scope	Construction / Decommissioning Phases	Operational Phase
Scope 1: These include emissions from activities owned or controlled by the Airport that release GHG emissions into the atmosphere. They are known as direct emissions and can be controlled by the Airport.	-	• LCY natural gas consumption • Airside vehicles and plant • Fire training activity • Refrigerant loss
Scope 2: These include emissions released into the atmosphere associated with the Airport's consumption of purchased electricity, heat, steam and cooling. These are indirect emissions that are a consequence of the Airport's activities. Whilst the Airport does not directly emit these emissions it can control them through its energy management and purchasing decisions.	-	• LCY electricity consumption (grid connection)
Scope 3: These include emissions that are associated with the Airport but occur from sources which are not owned or controlled by the Airport and are not classed as Scope 2 emissions. These are indirect emissions; the Airport can influence these emissions but not control them.	• Construction traffic • Construction plant and machinery • Embedded carbon on construction materials	• Aircraft Landing and Take Off (LTO) cycle • Aircraft Climb, Cruise and Descent (CCD) cycle • Airside Auxiliary Power Units (APU) • Aircraft engine testing • Tenant grid electricity consumption • Third party airside vehicles and plant • Waste management • Staff (surface) transport • Passenger (surface) transport • LCY business (surface) travel • LCY business (air) travel
Scoped out: individual activities with emissions that are less than 1% of total emissions and where the total of all such exclusions are no more than 5% of total emissions, can be scoped out of the assessment.	• Decommissioning	• Land use • Potable water supply and treatment • Surface water • Passenger consumables

3.3 Definitions of Significance: non-aviation emissions

3.3.1 The IEMA guidance provides examples of impact significance criteria which are summarised in Table 3.2 below. In environmental statement terms, impacts that are *major adverse*, *moderate adverse* or *beneficial* are considered significant. Impacts that are *minor adverse* or *negligible* are considered not significant. Note that the concept of local or regional budgets is not relevant for the assessment of aviation emissions.

TABLE 3.2 : IEMA examples of significance criteria

Significance level	IEMA example
Significant	
Major adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Beneficial	A project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.
Not significant	
Minor adverse	Minor adverse: the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	Negligible: the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.

3.3.2 The IEMA significance criteria refer to consistency with applicable existing and emerging policy requirements, good practice design standards and alignment with the UK's trajectory towards net zero.

3.4 Definitions of Significance: aviation emissions

3.4.1 In using the IEMA guidance, the 2022 ES includes five tests of significance for aviation emissions:

a. Comparing the net change in aviation emissions between the DM and DC scenarios with the "Planning Assumption" that was taken into account when setting the 4th and 5th carbon budgets;

b. Comparing the net change in aviation emissions between the DM and DC scenarios with the 6th carbon budget;

c. Comparing the net change in aviation emissions between the DM and DC scenarios with the DfT's Jet Zero Strategy's high ambition in-sector trajectory;

d. Consistency with national policy to reduce aviation emissions to net zero by 2050 (i.e. Jet Zero); and

e. Consistency with ANPS (para 5.82) which states that: "*Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets.*"

3.4.2 Table 3.3 refers to recently approved planning applications for UK airports. For each airport, the incremental increase is expressed as a percentage of the 37.5 $MtCO_2$ planning assumption, ranging between 0.175% and 1.950%. This provides a useful benchmark for assessing the significance of a net change in emissions.

TABLE 3.3 : Significance of aviation emissions – recent planning approvals

Airport	**Passenger Growth**	**2050 total aviation emissions (Proposed Scheme) $KtCO_2/yr$**	**2050 incremental increase in aviation emissions $KtCO_2/yr$**	**Increase in aviation emissions as a % of 37.5 $MtCO_2$ planning assumption**	**Status** *(all subject to S106 agreement)*
London Stansted	8 mppa (35 to 43 mppa)	1130 – 1860	70 – 120	0.187 – 0.320	Approved with 43 mppa cap
Southampton International	1mppa (2 to 3mppa)	367	Cannot be determined	Cannot be determined	Approved with 3 mppa cap
Bristol	2mppa (10 to 12mppa)	413 – 488	66 – 78	0.175 – 0.207	Approved
Manston	Not applicable (freight only)	730 (in 2040)	730 (in 2040)	1.95	Approved
London Luton Airport	1mppa (18 to 19mppa)	[1]208 - 955	[1]6 - 28	[1]0.017 – 0.074	Approved
Total	**12mppa**	**2848 - 4400**	**872 - 956**	**2.325 –2.551**	

3.5 Definitions of Significance: non-aviation emissions

3.5.1 Chapter 11 of the 2022 ES also refers to the IEMA guidance to assess the significance of non-aviation emissions in the context of:

a. Compliance with national policy;

b. Compliance with regional policy;

c. Compliance with local policy; and

d. The robustness, timeliness and efficacy of mitigation.

3.5.2 The results of assessing non-aviation emissions are reported in this Topic Paper only and addressed further in the planning evidence prepared by Mr Bashforth (APP/3) for the Appellant.

3.6 Results: aviation emissions

3.6.1 Projected aviation emissions are reported in Tables 3.4, 3.5 and 3.6, and in Figure 3.1 below.

3.6.2 For both scenarios, aviation represents more than 95% of total emissions associated with the airport in 2027 and 2031, and more than 82% in 2050. Similarly, aviation emissions represent more than 91% of total emissions during the fourth, fifth and sixth carbon budget periods.

3.6.3 Aviation emissions for the Do Minimum scenario are projected to fall by 25.4% from 2027 to 2050 and by 62.7% from 2027 to 2050. Compared to the same Do Minimum scenario emissions in 2027, the Development Case would see an increase of 2.2% in 2033 and a 49.2% fall by 2050 (see Table 3.4).

3.6.4 Aviation emissions associated with the Do Minimum scenario are projected to be less than 1% of the Planning Assumption applicable for aviation in the fourth and fifth carbon budget periods (see Table 3.5). This is also the case for the Development Case with the incremental increase being 0.14% of the planning assumption in the fifth budget period.

3.6.5 Projected aviation emissions and inclusion within the UK ETS are presented in Table 3.6. In both the Do Minimum and Development Case scenarios, 98.9% or more of aviation emissions are covered by UK ETS in 2027. This increases to 99.3% or more in 2031 and 2050. The remaining emissions would be covered by CORSIA.

3.6.6 Figure 3.1 compares the projected aviation emissions for the Do Minimum and Development Case scenarios with the Jet Zero in-sector trajectory. This is done by

normalising emissions relative to emissions in 2027[64]. This analysis reveals that in the Do Minimum scenario, projected aviation emissions would initially be behind the Jet Zero trajectory but would then outperform the trajectory with emissions in 2050 being 85% below the Jet Zero target. Aviation emissions in the Development Case would also start behind the trajectory, and to a greater extent than the Do Minimum, but would also end well below (81%) the Jet Zero target.

TABLE 3.4 : Operational Emissions in 2027, 2031 and 2050

Scope	Source	GHG emissions (CO_2e), tonnes								
		Do Minimum			Development Case			Difference		
		2027	2031	2050	2027	2031	2050	2027	2031	2050
3	Aircraft	314,326	301,683	24,772	344,090	374,727	34,381	29,763	73,045	9,609

TABLE 3.5 : Operational Emissions in 4th, 5th and 6th Carbon Budget periods

Scope	Source	GHG emissions (CO_2e), tonnes								
		Do Minimum			Development Case			Difference		
		4th 2023-2027	5th 2028-2032	6th 2033-2037	4th 2023-2027	5th 2028-2032	6th 2033-2037	4th 2023-2027	5th 2028-2032	6th 2033-2037
3	Aircraft	1,209,455	1,589,563	1,299,310	1,278,426	1,858,079	1,615,151	68,971	268,516	315,841
Aircraft emissions as a % of the planning assumption		*0.65%*	*0.85%*	*na*	*0.68%*	*0.99%*	*na*	*0.04%*	*0.14%*	*na*

[64] Normalising the data involves dividing the emissions for each year by a reference year, in this case 2027. The normalized emissions for 2027 are therefore one (1).

TABLE 3.6 : Aircraft emissions and UK ETS

Destination	GHG emissions (CO_2e), tonnes								
	Do Minimum			Development Case			Difference		
	2027	2031	2050	2027	2031	2050	2027	2031	2050
UK ETS : Domestic	41,127 (13.1%)	39,366 (13.1%)	3,232 (13.1%)	41,252 (12.0%)	41,804 (11.2%)	3,836 (11.2%)	124	2,438	603
UK ETS: International	269,767 (85.8%)	260,081 (86.2%)	21,356 (86.2%)	299,509 (87.0%)	330,695 (88.0%)	30,341 (88.0%)	29,742	70,614	8.985
Not covered by UK ETS (covered by CORSIA)	3,432 (1.1%)	2,235 (0.7%)	184 (0.7%)	3,329 (1.0%)	2,228 (0.6%)	204 (0.6%)	-103	-7	21
Total	**314,326**	**301,683**	**24,772**	**344,090**	**374,727**	**34,381**	**29,763**	**73,045**	**9,609**

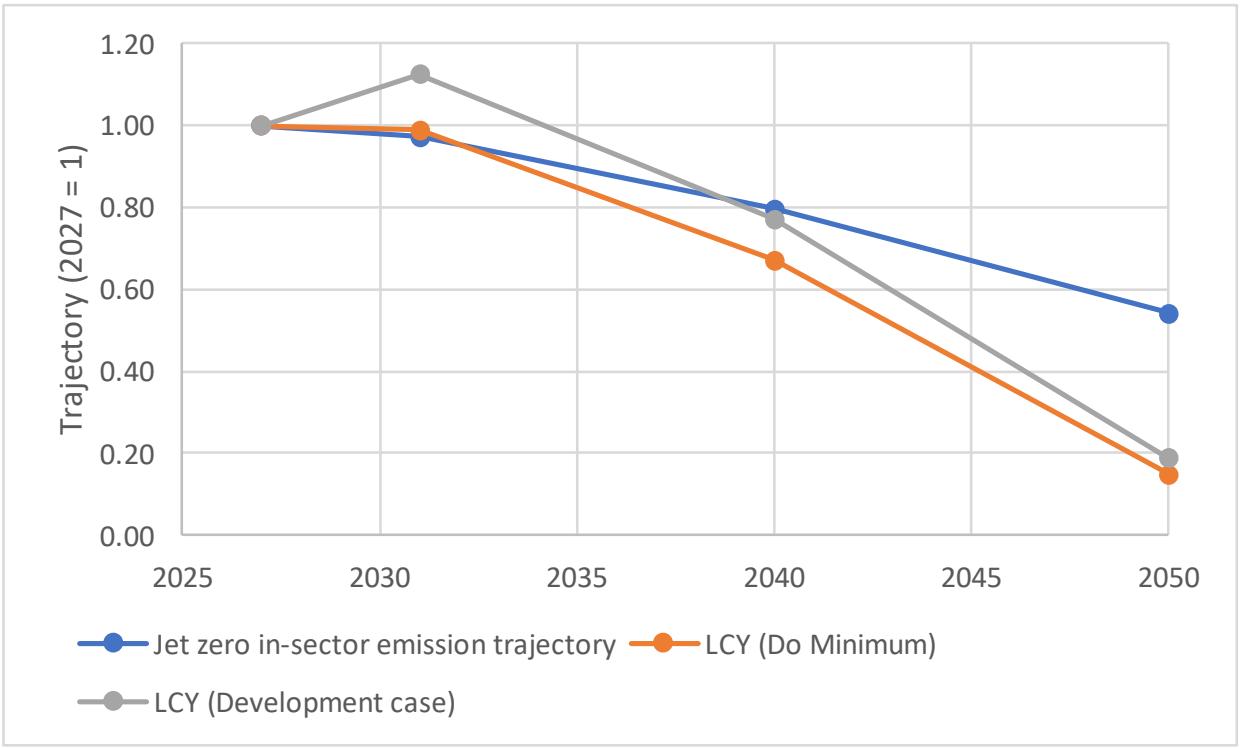

Figure 3.1: Comparison with Jet Zero In-Sector Trajectory

3.7 Results: construction emissions

3.7.1 Construction emissions were reported in the 2022 ES and are summarised in Table 3.7. Over the four year construction period, total emissions are estimated to be 47,148 TCO_2e during each of the fourth and fifth carbon budget periods with the majority (85.7%) associated with embedded carbon in materials.

TABLE 3.7 : Construction Emissions

Source	**Construction Emissions (2025 to 2030) CO_2e (tonnes)**	**%**
Construction site activity	5,156	5.5
Construction traffic	8,348	8.9
Embedded emissions in materials	80,791	85.7
Total	**94,295**	**100**

3.8 Results: operational emissions (non-aviation)

3.8.1 Operational emissions are reported in Chapter 11 of the 2022 ES and reproduced in Tables 3.8 and 3.9 below.

3.8.2 As the Airport moves to 100% renewable energy, operational emissions reduce to zero in 2031 and to zero in the sixth carbon budget period. Surface access emissions also decline as a result of increased electrification in the transport sector and the reduction in the carbon intensity of power generation.

In both the Do Minimum and Development Case, between 2027 and 2050, total airport emissions reduce by 63% and 59% in the Do Minimum and Development Cases, respectively.

TABLE 3.8 : Operational Emissions in 2027, 2031 and 2050

Scope	Source	GHG emissions (CO_2e), tonnes								
		Do Minimum			Development Case			Difference		
		2027	2031	2050	2027	2031	2050	2027	2031	2050
1 & 2	Airport Operational	1,634	0	0	1,911	0	0	276	0	0
3	Airport: other	264	207	74	321	265	100	57	58	25
	Surface access	12,597	10,604	5,336	15,851	14,527	7,258	3,254	3,922	1,922
Airport Total		**14,495**	**10,812**	**5,410**	**18,082**	**14,792**	**7,357**	**3,587**	**3,980**	**1,947**
3	Aircraft	314,326	301,683	24,772	344,090	374,727	34,381	29,763	73,045	9,609
All Sources Total		**328,821**	**312,494**	**30,183**	**362,172**	**389,519**	**41,739**	**33,350**	**77,024**	**11,556**

TABLE 3.9 : Operational Emissions in 4th, 5th and 6th Carbon Budget periods

Scope	Source	GHG emissions (CO_2e), tonnes								
		Do Minimum			Development Case			Difference		
		4th 2023-2027	5th 2028-2032	6th 2033-2037	4th 2023-2027	5th 2028-2032	6th 2033-2037	4th 2023-2027	5th 2028-2032	6th 2033-2037
1 & 2	Airport Operational	7,647	3,250	0	8,240	3,713	0	593	464	0
3	Airport: other	1,179	1,147	758	1,294	1,411	976	114	263	218
	Surface access	61,508	54,952	41,801	64,762	71,398	57,160	3,254	16,446	15,359
	Construction	0	0	0	47,148	47,148	0	47,148	47,148	0
Airport Total		**70,334**	**59,350**	**42,559**	**121,443**	**123,670**	**58,137**	**51,109**	**64,320**	**15,577**
3	Aircraft	1,209,455	1,589,563	1,299,310	1,278,426	1,858,079	1,615,151	68,971	268,516	315,841
All Sources Total		**1,279,789**	**1,648,913**	**1,341,869**	**1,399,870**	**1,981,749**	**1,673,287**	**120,081**	**332,836**	**331,418**
Aircraft emissions as a % of the planning assumption		*0.65%*	*0.85%*	*na*	*0.68%*	*0.99%*	*na*	*0.04%*	*0.14%*	*na*
All sources total as a % of the Carbon Budget		*0.13%*	*0.17%*	*0.13%*	*0.15%*	*0.21%*	*0.17%*	*0.01%*	*0.03%*	*0.03%*

3.9 Assessment of significance: aviation emissions

3.9.1 With reference to the five tests of significance for aviation emissions included in the 2022 ES:

a. The net change in aviation emissions between the Do Minimum and Development Case scenarios is 0.04% (2033) and 0.14% (2050) of the planning assumption taken into account when setting the fourth and fifth carbon budgets. This is considered very small and, when compared to the benchmark values in Table 3.3, not significant;

b. The net change in aviation emissions between the Do Minimum and Development Case scenarios is 0.03% of the sixth carbon budget. This is considered very small and, when compared to the benchmark values in Table 3.3, not significant;

c. The net change in aviation emissions between the Do Minimum and Development Case scenarios would extend the period that LCY would remain behind the Jet Zero in-sector trajectory but, by 2040, emissions would be increasingly ahead and, by 2050, would be 85% below the Jet Zero target. In the Development Case 99% of aviation emissions would be included within the UK ETS and the remainder within CORSIA. All of these emissions would be within the sixth carbon budget;

d. The Jet Zero Strategy represents national policy to reduce aviation emissions to net zero by 2050 and was based on assumptions regarding the expansion of a number of UK airports, including LCY expanding to 11mppa by 2030 (see Annex A), and a range of decarbonisation measures including aircraft fuel efficiency, airspace management, use of SAF and the introduction of zero emissions aircraft. Both the Do Minimum and Development Cases are consistent with the Jet Zero Strategy; and

e. Based on the above, the increase in carbon emissions associated with this development would not have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets, and hence is consistent with the test set out in the ANPS.

3.10 Assessment of significance: non-aviation emissions

3.10.1 This is addressed in the planning evidence of Mr Sean Bashforth (APP/3) on behalf of the Appellant.

4. Conclusions

4.1.1 This Topic Paper shows, by reference to relevant legislation and policy, the 2022 ES, the outline CCCAP and the Revised Energy and Low Carbon Strategy, that:

a. Aviation emissions are regulated at a national level, with reductions being driven by Government policies, incentives and participation in the UK ETS and CORSIA.

b. Government aviation policy is to embrace innovation for a sustainable future, realising benefits for the UK.

c. Government projections of how the UK aviation sector may reach carbon net zero include growth in passenger numbers, at London City and other airports.

d. Reductions in surface transport emissions are being driven by national, regional and local transport planning.

e. Using several tests of impact significance, the increase in airport capacity from 6.5 mppa to 9 mppa would not significantly increase carbon emissions and would not impede Government policy to achieve carbon net zero.

f. In terms of non-CO_2 impacts, the Government position remains one of monitoring the science although inclusion of aviation emissions of NO_x within the UK ETS is being considered.

4.1.2 Overall, this Topic Paper concludes that aviation emissions of carbon is not a proper ground for refusing the application and the proposal complies with all relevant parts of national policy.

Annex A : Jet Zero Data

The screenshot below is taken from the 'AirportCapacities' tab of the Jet Zero Strategy Dataset

(https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachmentdata/file/1091868/jet-zero-strategy-dataset.ods)

Air transport movement (ATM) and terminal passenger capacity assumptions by airport, 000s

	Runway ATMs (000s)				Terminal passengers (000s)			
Airport	**2019**	**2030**	**2040**	**2050**	**2019**	**2030**	**2040**	**2050**
Gatwick	291	346	383	386	0	0	0	0
Heathrow	480	505	740	740	0	0	0	0
London City	111	151	151	151	6500	11000	11000	11000
Luton	160	210	210	210	18000	32000	32000	32000
Stansted	259	259	259	259	35000	43000	43000	43000
Southampton	150	150	150	150	2500	3000	3000	3000
Southend	53	53	53	53	0	0	0	0
Bournemouth	150	150	150	150	0	0	0	0
Bristol	150	150	150	150	10000	12000	12000	12000
Exeter	150	150	150	150	0	0	0	0
Newquay	75	75	75	75	0	0	0	0
Cardiff	105	150	150	150	0	0	0	0
Norwich	175	175	175	175	0	0	0	0
Birmingham	206	206	206	206	0	0	0	0
East Midlands	264	264	264	264	0	0	0	0
Doncaster Sheffield	57	57	57	57	0	0	0	0
Humberside	150	150	150	150	0	0	0	0
Leeds-Bradford	150	150	150	150	5000	7000	7000	7000
Liverpool	213	213	213	213	0	0	0	0
Manchester	324	400	500	500	0	0	0	0
Newcastle	213	226	226	226	0	0	0	0
Teesside	150	150	150	150	0	0	0	0
Aberdeen	175	225	225	225	0	0	0	0
Edinburgh	150	225	230	261	0	0	0	0
Glasgow	226	226	226	226	0	0	0	0
Inverness	150	150	150	150	0	0	0	0
Prestwick	150	150	150	150	0	0	0	0
Belfast City	48	48	48	48	0	0	0	0
Belfast International	260	260	260	260	0	0	0	0

Note: All scenarios presented in the Accompanying analytical document to the Jet Zero Strategy use the same airport capacity assumptions, as set out above. These assumptions do not represent any proposal for limits on future capacity growth at specific airports, nor do they indicate maximum appropriate levels of capacity growth at specific airports for the purpose of planning decision-making. These figures do not represent expected passenger numbers, just the upper limit assumed for each airport as an input to the modelling process.

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