UK Civil Aviation Authority

Consumer Environmental Information:

Framework for Implementation and Summary of Responses to the 2024 Consultation

CAP 3112

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Executive Summary

Purpose of this document and an overview of our plans for implementation

1. This document sets out our framework for the implementation of consumer environmental information as applicable to flights being sold or advertised in the UK which depart from or arrive at UK airports. This framework has been developed following consumer research,[1] the publication of our Environmental Sustainability Strategy,[2] a call for evidence (the call for evidence)[3] on this subject in 2023 and a consultation (the consultation)[4] on draft principles and options for implementation in 2024.

2. Our framework for implementation of this work is set out in Chapter 2 including:

   - updated Consumer Environmental Information Principles,
   - brief supplementary guidance and
   - our expectations where flights which depart from or arrive at UK airports ("applicable flights") are sold or advertised by airlines or other organisations in the UK. Within this document when referring to these airlines and organisations we collectively refer to "relevant airlines and organisations" or "relevant websites" or similar.

3. We also set out our plans to:

   - continue to engage with relevant stakeholders, including internationally,
   - monitor airline websites (and websites of other organisations that sell applicable flights in the UK) to assess conformity with the Consumer Environmental Information Principles and
   - report on that monitoring.

4. This document also sets out a summary of responses to the consultation as well as appendices covering a list of organisations that responded to the consultation, the consultation questions and a summary of our technical review of a range of existing relevant aviation emissions methodologies. That review helped to

[1] Britain Thinks – CAA Environmental Information Provision, April 2021 www.caa.co.uk/cap2205/

[2] CAA's environmental sustainability strategy, May 2022 www.caa.co.uk/media/egul5yds/2360-caa_env-susstategy_v6-2-front.pdf

[3] https://consultations.caa.co.uk/policy-development/environmental-information-call-for-evidence/

[4] https://consultations.caa.co.uk/policy-development/consumer-environmental-information-consultation/

support our decision making in this project and was considered alongside responses to the consultation.

Background to the development of the framework for implementation

5. In Q3 2024, we undertook a consultation seeking views and feedback on a set of draft principles and policy options for the implementation of standardised consumer environmental information in the UK aviation sector. The proposal was that these principles would be utilised by airlines and other companies providing environmental information to consumers when they look for or book flights.

6. The consultation sought the views of the aviation industry, consumer groups, academics, environmental groups, the public, and holders and users of aviation environmental information, amongst others. The consultation built on responses received to the call for evidence that we undertook in 2023.

The main themes from responses to the consultation

7. In general, respondents expressed support for the principles and options that we consulted on but noted certain areas needed additional clarity. There were questions around phrasing, and whether principles had been defined as well as they could have been.

8. Questions over voluntary/mandatory implementation and the inclusion of non-CO_2 impacts were divisive, the former due to concerns over costs of compliance and overburdening, and the latter due to scientific uncertainty. There was also disagreement between respondents on the financial/technical feasibility of integrating environmental information into booking platforms.

9. Respondents stressed the importance of wider systemic changes; the principles alone would be insufficient without regular data updates, access to validated data, and alignment with existing methodologies and metrics, such as Google's Travel Impact Model (TIM)[5] and the European Union (EU) Flight Emissions Label.[6] There were also calls to standardise emissions reporting between transport sectors.

10. Respondents also suggested emphasising accessibility for those with disabilities. This might include text-to-speech compatibility for screen readers, visual indicators like colour-coded labels, or simplified language.

[5] https://travelimpactmodel.org/ in collaboration with the Travalyst coalition: https://travalyst.org/work/aviation-industry/

[6] https://www.flightemissions.eu/ and https://transport.ec.europa.eu/news-events/news/eu-introduces-flight-emissions-label-more-informed-and-sustainable-travelling-2024-12-18_en

11. In total, we received 53 responses, representing a wide range of views.

12. The CAA trialled the use of AI to support us in analysing the responses received. However, in addition all responses received were read in full and considered by the project lead and outputs from the AI tool were validated by expert review and analysis.

Next steps

13. As set out above and in Chapter 2, we will continue to engage with stakeholders on this matter, as well as commencing our monitoring and review of relevant websites and reporting on that monitoring later in 2027.

Chapter 1
Introduction

Background

1.1 The Civil Aviation Authority (CAA) set out in its Environmental Sustainability Strategy its proposals for providing environmental information to consumers.[7]

1.2 Our objective for this work is to ensure that consumers get environmental information on emissions at the point of looking for and booking their flights. This information should be accurate, standardised, and accessible so that consumers can make informed choices about their travel arrangements.

1.3 We undertook and published research on what consumers want from consumer environmental information in 2021.[8]

1.4 We published a call for evidence in January 2023 to seek a range of views to inform our policy design and implementation options for aviation consumer environmental information. We aimed to receive responses from (amongst others) the aviation industry, consumer groups, academics, environmental groups, the public, and holders and users of aviation environmental information.[9]

1.5 We published a summary of responses to the call for evidence in July 2024, alongside a consultation on draft principles and options for implementation.[10]

Aims and objectives of the 2024 consultation

1.6 The aims and objectives of the consultation were to seek views from stakeholders:

i. on draft principles that we designed for airlines (and other organisations that advertise or sell flights) to follow when calculating and providing environmental information to consumers on their flight.

ii. options for policy implementation of those draft principles.

[7] CAA's environmental sustainability strategy, May 2022 www.caa.co.uk/media/egul5yds/2360-caa_env-susstategy_v6-2-front.pdf

[8] Britain Thinks – CAA Environmental Information Provision, April 2021 www.caa.co.uk/cap2205/

[9] https://consultations.caa.co.uk/policy-development/environmental-information-call-for-evidence/

[10] https://consultations.caa.co.uk/policy-development/consumer-environmental-information-consultation/

Overview of respondents

1.7 We are grateful to respondents to the consultation for their submissions and for their ongoing engagement on this subject. We look forward to continuing that engagement as this work progresses.

1.8 We recognise that since we consulted in 2024, there has been developments in consumer environmental information from other organisations. The responses summarised in this document are reflective of submissions provided in Q3 2024 and may not reflect the current situation in 2026 at date of publication.

1.9 It is clear from the responses received that there are a range of perspectives that should be considered when undertaking policy decisions in this area.

1.10 We received 53 responses to this consultation, of which 34 were from organisations and 19 were from individuals.

Framework for implementation

1.11 Following consideration of responses, we set out the framework for implementation of this policy in Chapter 2. The framework includes an updated set of Consumer Environmental Information Principles as well as brief explanatory guidance on those principles and our expectations where flights which depart from or arrive at UK airports (“applicable flights”) are sold or advertised by airlines or other organisations in the UK, around the provision of environmental information to consumers when they are looking for and booking flights. We also set out our plans to monitor airline websites (and other places where applicable flights are sold in the UK) to assess conformity with the Consumer Environmental Information Principles and report on that monitoring.

Chapter 2

Framework for implementation

Introduction

2.1 This chapter sets out a framework to support the provision of standardised environmental information for aviation consumers building on responses to both the 2024 consultation and the 2023 call for evidence. After considering responses to the consultation, particularly in relation to the options we consulted upon, we have developed this framework. We acknowledge the potential challenges for industry alongside the importance of accessibility and transparency to consumers on aviation's environmental impacts.

2.2 Below we set out an updated version of the CAA's Consumer Environmental Information Principles. We also set out our expectations of airlines and other organisations selling or advertising applicable flights in the UK.

2.3 Our overall aim is to ensure that environmental information provided to consumers as part of the booking process is accurate, understandable, comparable and useful.

2.4 Our expectation is that airlines and other organisations selling or advertising applicable flights in the UK (and package holidays that include applicable flights) should take adequate steps to publish environmental information for consumers on the forecast impact of individual consumers' flight choices. These steps should be based on the updated Consumer Environmental Information Principles set out below at paragraph 2.7 and the methodologies set out in paragraphs 2.9-2.18. This information should be available during the online flight search and booking process for applicable flights by April 2027. This includes where applicable flights are sold as part of a package holiday.

2.5 We will review a range of websites advertising and selling applicable flights in the UK during 2027, with the aim of publishing initial findings and setting out our intended next steps.

2.6 Relevant legislation that applies to this project includes the Civil Aviation Act 2012 and Part 4 of the Digital Markets, Competition and Consumers Act 2024.

Updated Consumer Environmental Information Principles

2.7 This list of principles has been updated following feedback provided by respondents to our 2024 consultation. An annotated version showing the amends made is in Appendix D.

The CAA's Consumer Environmental Information Principles

1. **Accessible** – environmental information should be easily accessible to all consumers wherever flights departing from or arriving at UK airports are advertised or sold in the UK. Accessible means that the information should a) be easy to find and obvious within the flight search and booking process before purchase and b) wherever possible it should meet the requirements of the Web Content Accessibility Guidelines.

2. **Transparent** – publishers of environmental data aimed at aviation consumers should publish or link to the methodology used to ensure that it is clear how calculations have been made.

3. **Accountable and accurate** – publishers of environmental information are accountable for the accuracy of the calculations and for ensuring the most accurate, up to date and credible sources of input data are used.

4. **Specific** – environmental information should be calculated using data that is as specific as possible to the passenger's choice of flight. This means that it should be based on input data that relates specifically to the airline in question (for example, aircraft type, route, seat choice, average load factor, cargo weight proportion etc.). Where specific input data is not available, the most credible alternative data should be used. All sources of input data should be clearly referenced.

5. **Timely** – the environmental information should be updated regularly to reflect any operational changes that may impact any input used in environmental calculations. Regularly means at least once a year.

6. **Consistent** – the same environmental information should be available wherever flights are advertised or sold. Airlines should seek to ensure that, where they publish environmental information related to a flight, that the same information is also available wherever else those flights are advertised and sold. Where third parties publish environmental information related to a flight, they should seek to ensure that it is (as a minimum) aligned with information provided by airlines.

7. **Standardised** – the publishers of environmental information should meet minimum standards for measuring and reporting environmental data to ensure consistency and comparability between different airlines and flight options.

8. **Comparable** – environmental information (when using a metric) should be shown using standard metrics – kg CO_2 or kg CO_2e per passenger journey.

9. **Comprehensive** – wherever possible publishers of environmental information aimed at aviation consumers should incorporate data on the use of Sustainable Aviation Fuel.

10. **Subject to continuous improvement** – publishers of environmental information should consider how publishing that information could encourage improvements to aviation sustainability performance and build in mechanisms to measure consumer impacts of publishing this information and enable this information to form part of business improvement decisions. Information should also include the full climate impacts of aviation, the impacts of new technologies and aircraft designs on emissions when the data is available.

Guidance on the CAA's Consumer Environmental Information Principles

2.8 Taking each principle in turn, we have set out below brief additional explanatory guidance on each principle.

1. **Accessible**. This principle seeks to ensure that all consumers in the UK looking for and booking applicable flights are able to find and understand consumer environmental information within the flight search and booking process. Accessibility in this sense means both that consumers who use (for example) screen readers should be able to have access to the information and also that the information should not be accessible only after clicking on several sub-pages from the booking process.

2. **Transparent**. This principle seeks to ensure that it is easy to find out how consumer environmental information has been calculated, what methodology has been used, where the data has been gathered from and any verification that data has undergone. We accept that this information may be lengthy and as such could be made available on a page linked from the top-level consumer environmental information rather than on a top-level page within the booking flow.

3. **Accountable and accurate**. This principle seeks to ensure that publishers of environmental information for consumers are accountable for that information and that they have a duty of care to ensure that the information is as accurate as possible.

4. **Specific**. This principle seeks to ensure that environmental information provided to consumers should be as granular and tailored as possible to reflect a consumer's individual flight choices. This means that, wherever possible, either CO_2 or CO_2e should be calculated using input data that are most representative of a given route operated by a given aircraft of a given capacity.

   Key data inputs that enhance specificity include, but are not limited to:

   - the most representative aircraft type and engine type, as different aircraft and engines will have different fuel efficiencies.

- Where possible, the most representative flight distance flown. For time-based methodologies, where CO_2 or CO_2e may be expressed in kg/min journey, these values would need to be converted in km per passenger journey. This conversion, where possible, should be performed using accurate flight distance data (actual kilometres flown) to maintain the precision of the CO_2/CO_2e estimates.
- Seat class and occupancy, since emissions per passenger vary based on seating configuration (e.g., business vs. economy class).
- Passenger load factor, (i.e., the proportion of seats filled, which affects per-passenger emissions).
- Belly cargo and distribution, since cargo carried on passenger flights contributes to total emissions and should be factored into proportional allocations.

When specific data is unavailable, the most credible and scientifically robust alternative data sources should be used, such as verified industry averages, emissions factors from recognised databases, or modelled estimations.

5. **Timely.** This principle seeks to ensure that consumers have access to information that is based on data that is regularly updated. We consider (following respondent feedback) that ensuring the data is updated at least once a year in alignment with other relevant reporting cycles will ensure that consumers have access to information that is as specific as possible to their flight. We consider that best endeavours to ensure the most recent available data is used would be appropriate if source data is updated less frequently than once a year. If operators change the methodology that they use for calculations, this change should be clearly indicated to consumers if there is a significant impact on the information that consumers are shown.
6. **Consistent**. This principle seeks to ensure that consumers do not see different environmental information for the same exact flight on different booking platforms. All relevant organisations that advertise or sell flights should make best endeavours to ensure that the environmental information they show to consumers is consistent with the information published by the airline. Where booking platforms choose to use a different methodology from that used by the airline this should be made clear to consumers.
7. **Standardised.** This principle seeks to ensure that environmental information presented to consumers should meet minimum standards.

8. **Comparable.** This principle seeks to ensure that the same or similar metrics are used for environmental information provided to consumers. This should enable consumers to be able to compare between information provided by different airlines or booking platforms and should help work towards alignment in this area.

9. **Comprehensive.** This principle was added following respondent feedback and seeks to ensure that best endeavours are made, within the constraints of the applicable methodology, to include information on the impact of Sustainable Aviation Fuel by an airline for an applicable flight or route. This should be done in a transparent, accurate and consistent way, ensuring double accounting of any environmental benefits is avoided when presenting this information.

10. **Subject to continuous improvement.** This principle seeks to ensure that publishers of consumer environmental information should use the process of publishing that information to improve aviation sustainability performance. In addition, the information itself should be improved and refined over time to include the full climate impacts of aviation when known, as well as improvements to performance enabled by new technologies, fuels, operations and aircraft designs when those impacts are understood.

CAA's decision on applicable methodologies

2.9 We have considered carefully the responses to our consultation on how the information should be calculated. As noted, there are already several different methodologies used and we are mindful of the need for harmonisation rather than creating further confusion for consumers and additional burden for industry by developing an alternative approach.

2.10 We have reviewed the methodologies suggested in the consultation responses and our findings are set out in Appendix C. We note that a truly accurate calculation for a passenger on a specific flight can only be calculated retrospectively, using actual fuel burn data for that flight. Information on future flights therefore needs to be calculated using data from similar previous flights to give an indicative result for each future flight. We consider that the best approach is to use averaged actual route specific data, including actual fuel burn and passenger loading. Where this data is not available, the information needs to be estimated either on the time the flight has taken or the distance it has covered, with assumptions made for the number of passengers and other factors. Whichever methodology is used, consistency of approach across flights is key to enable comparisons between flights.

2.11 Airlines and other organisations that advertise and sell applicable flights in the UK should, where feasible, use existing, internationally recognised

methodologies for their environmental impact calculations to ensure comparability and credibility. Specifically, the use of methodologies such as:

- The Department for Energy Security and Net Zero (DESNZ) estimates for UK aviation emissions,[11]
- the IATA Recommended Practice Per-Passenger CO_2 Calculation Methodology,[12]
- the EASA Flight Emissions Label[13] and
- Google's TIM[14] are encouraged.

The majority of these frameworks have been developed with wide stakeholder engagement and they all currently provide a consistent, science-based approaches that aligns with international best practice.

2.12 We acknowledge that these methodologies do use different approaches to estimating fuel burn where that data is not available, with some using a time-based approach and others based on the distance flown. These do result in different estimates, but we consider that (within each subcategory) these are within an acceptable tolerance for long-haul and medium-haul flights (which create the bulk of aviation's carbon emissions). We therefore do not intend, at this stage, to recommend one above the other. For ultra-short-haul flights, our recommendation is to use either distance or time based methodologies, with time-based approaches potentially providing more accurate estimates of fuel burn and consequently CO_2 or CO_2e.

2.13 It is clear, however, that using actual data removes this ambiguity and we encourage industry to work with us and methodology owners to further harmonise the different approaches and gain greater accuracy by sharing the relevant data as fully as possible. We will continue to engage directly with international organisations including ICAO, the European Commission and EASA, Google and Travalyst on this matter and will continue to monitor and review any changes to relevant methodologies as they develop.

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[11] https://www.gov.uk/government/publications/aviation-statistics-notes-and-definitions/technical-note-a-comparison-of-aviation-emissions-methodologies (scroll down to DESNZ in Comparison of methodologies section)

[12] https://www.iata.org/en/programs/sustainability/passenger-emissions-methodology/ and https://www.iata.org/contentassets/139d686fa8f34c4ba7a41f7ba3e026e7/iata-rp-1726_passenger-co2.pdf

[13] https://www.flightemissions.eu/ and https://transport.ec.europa.eu/news-events/news/eu-introduces-flight-emissions-label-more-informed-and-sustainable-travelling-2024-12-18_en

[14] https://travelimpactmodel.org/ in collaboration with the Travalyst coalition: https://travalyst.org/work/aviation-industry/

2.14 We acknowledge that there are some commercial and technical barriers to sharing information, but we note that some information is already shared, e.g. through CORSIA and various emissions trading schemes. We welcome engagement with airlines, travel agents and tour operators on their plans for implementation.

2.15 We have also considered the consultation responses in relation to the inclusion of non-CO_2 impacts of each flight (particularly contrails). We note the significant research being carried out both here and internationally, including climate modelling, aircraft contrail avoidance trials and better scientific understanding of the impacts. We will continue to work with the government, industry and academia to support and encourage this research so that more accurate information on non-CO_2 impacts can be provided.

2.16 We have also considered whether the information provided should also include comparisons to other modes of transport, noting that Google does already provide this information. Ideally, we would like to see this type of comparison available in one place, so that consumers can make fully informed travel choices. However, we do not consider that it is airlines' responsibility to have to acquire or calculate information on comparable routes on other modes, but instead this needs a coordinated cross-sector approach to ensure that the right data and assumptions are taken into account to give an accurate 'like for like' comparison. The CAA will continue to engage with the Department for Transport (DfT) and other organisations on supporting cross-sector work in this area as required. Progress in other sectors may be a factor in any decision the CAA makes on our future approach to this matter.

2.17 To ensure transparency and to aid consumers' understanding of the information provided, airlines (and others) should ensure that information on what methodology has been used to make the calculation is easily available on their websites / booking platforms.

2.18 We consider that by supporting the use of existing established methodologies that we are ensuring that consumers are able to access reliable environmental information about the impact of aviation at the point of looking for and booking flights whilst minimising burdens and costs to businesses.

Monitoring and compliance

2.19 Our expectations are that airlines and other relevant organisations will take adequate steps towards implementing this framework by 30th April 2027.

2.20 We will review a range of websites of airlines operating in the UK and booking platforms (including those of flight comparison sites) during 2027 to monitor uptake of this approach. We will aim to publish initial findings in 2027. Following that review, (and considering other developments in this area by other

organisations, including internationally) we will assess whether this approach is fit for purpose or whether the CAA should take further steps to ensure consumer receive transparent and accurate environmental data at the point of booking flights.

2.21 If airlines and other organisations that advertise and sell applicable flights in the UK do not take credible steps to work towards the display of environmental information for consumers using one of the above listed methodologies, (or provide reasons why they have chosen an alternative credible methodology) the CAA will consider additional actions and whether a mandatory approach is necessary. This may include using our information gathering powers under section 85 of the Civil Aviation Act 2012 to gather the relevant data and then carrying out the calculations and publishing the information ourselves.

2.22 The costs of this process would likely need to be covered by the industry through our charges. In addition, the CAA will continue to consider costs to industry alongside benefits for consumers, and we note industry views on the potential costs and burdens to industry in response to the 2024 consultation.

Chapter 3

Consultation responses - themes and key findings

Support for the draft principles

3.1 Respondents expressed strong support for the principles, emphasising their importance in empowering consumers to make informed choices. Most agreed the principles were robust but noted areas requiring greater clarity and actionable guidance.

3.2 Many stakeholders resisted ranking the principles, stressing that they are interdependent. Which? said that the combined implementation of the principles will have the greatest impact on consumer decision-making. Some respondents emphasised the critical role of comparability, transparency, and accuracy in building consumer trust.

3.3 Some respondents emphasised that the principles alone will not drive change, but that what is needed alongside the principles is a convergence of methodologies and increased access to the underlying data.

Suggestions for improvements for the draft principles

3.4 Respondents, including TUI Group, Skyscanner and the International Council on Clean Transportation (ICCT) gave recommendations on how to improve the draft principles.

3.5 TUI Group gave feedback that some principles were clearer than others and that the principles of accessibility, timeliness and standardisation could be better defined. Other respondents recommended that “accessibility” be amended to “clearly visible” in multiple locations and eye-catching.

3.6 Skyscanner recommended we improve the principles of “consistency” and “specificity” by including an expectation on the sharing of raw emissions data with third parties. Travalyst also echoed this call for data to be more widely available. Other respondents were clear that reporting of flight emissions should be done in a way that enabled commercially sensitive information from operators and original equipment manufacturers to be kept confidential.

3.7 The ICCT recommended that the CAA consider including other principles to reflect those set out in the Travel Impact Model (TIM) notably:

- Comprehensive in covering the full climate impacts of aviation
- Futureproof across new technologies and aircraft designs.

Standardisation of methodologies

3.8 Respondents, including TUI Group and Skyscanner, emphasised the need for alignment with international initiatives, such as the EU Flight Emissions Label and International Civil Aviation Organisation (ICAO) frameworks, to ensure consistency across jurisdictions.

3.9 The TIM received widespread support as a practical, scalable methodology. Other frameworks, including International Air Transport Association (IATA)-recommended practices (RP 1726 and RP 1678), were highlighted for their credibility.

3.10 Several submissions, including those from Which? and Richmond and Twickenham Friends of the Earth, called for emissions metrics that enable comparisons between air travel and other transport modes (e.g., rail, road).

Data availability and transparency

3.11 Respondents, such as Skyscanner and Online Travel UK (OTUK), advocated for airlines to share underlying environmental data (e.g., fuel burn and route-specific metrics) with third-party platforms to enhance transparency.

3.12 Stakeholders, including Richmond and Twickenham Friends of the Earth, highlighted the importance of independent verification to ensure the accuracy and credibility of emissions data, minimising risks of greenwashing. Other stakeholders highlighted reporting mistakes as another reason verification is essential.

Accessibility

3.13 Respondents emphasised the importance of ensuring that environmental information about flights is accessible to all consumers, including those who are blind, partially sighted, or have learning difficulties. Many highlighted that accessibility is critical not just for compliance with equality standards but also to ensure the widest possible audience can engage with and act on the information provided. Suggested approaches included providing data in multiple formats, such as text-to-speech compatibility for screen readers, visual indicators like colour-coded labels, and simplified language to support those with cognitive impairments.

3.14 Some stakeholders, such as Which? and Richmond and Twickenham Friends of the Earth, advocated for user-friendly presentation methods that avoid technical jargon, favouring tools similar to energy efficiency labels, such as environmental ratings. Respondents also stressed the need for consultation with accessibility

advocacy groups to develop inclusive solutions. While detailed proposals on specific tools were limited, there was a clear consensus that any information provided should be clear, adaptable, and designed with the needs of diverse users in mind.

Inclusion of non-CO_2 impacts

3.15 Opinions were split on whether to include non-CO_2 impacts (including the release of water, particulates and nitrogen oxides and, in certain atmospheric conditions, the formation of condensation trails (contrails)) due to scientific uncertainties.

- Proponents argued that omitting non-CO_2 emissions underestimates aviation's true environmental impact.
- Opponents highlighted the lack of reliable data and the complexity of accurately including non-CO_2 factors.

Voluntary vs. mandatory implementation

3.16 Opinions varied on whether the principles should be mandatory or voluntary. The voluntary approach was supported by stakeholders including TUI Group, and Skyscanner, who argued it encourages innovation without undue burden. The mandatory approach was supported by Richmond and Twickenham Friends of the Earth and Communities Against Gatwick Noise Emissions (CAGNE), citing concerns that voluntary schemes may lead to low compliance and greenwashing.

Frequency of data updates

3.17 Most respondents supported annual updates, aligning with existing reporting cycles under UK ETS (Emissions Trading Scheme) and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Some suggested event-driven updates for significant operational changes (e.g., fleet upgrades).

Integration into booking platforms

3.18 Several stakeholders, including Which? and CAGNE, stressed the importance of integrating emissions data into booking systems to present consumers with environmental information at the decision point.

3.19 Some respondents from airlines highlighted the operational and technical hurdles of implementing such a system.

Chapter 4

Consultation responses - metrics and methodologies

Summary of supported metrics

4.1 Respondents expressed strong support for a range of metrics with a consensus on ensuring accuracy, transparency, and comparability across platforms and jurisdictions. The most widely endorsed metric was CO_2e[15] per passenger journey, which captures the emissions impact of individual travel choices and enables direct comparisons between flights. Many stakeholders also supported CO_2e per passenger-kilometre for consistency with established international reporting frameworks, such as those used by ICAO and IATA.[16] Additional metrics, like marginal and total emissions, were suggested by some respondents to reflect both incremental passenger impacts and overall flight emissions.

4.2 Metrics tailored to specific flights received significant attention. Respondents called for emissions calculations to account for variables like aircraft type, cabin class, and passenger load factor, to ensure that results reflect real-world operating conditions. Several submissions highlighted the importance of including cargo emissions and employing fair allocation methods to distinguish between passenger and freight operations. Some respondents from airlines proposed incorporating sustainable aviation fuel (SAF) usage and other emissions reduction measures into calculations to better showcase airlines' sustainability efforts. These additions were viewed as essential to ensuring metrics remain relevant as the aviation industry transitions to low-carbon technologies.

4.3 The inclusion of lifecycle emissions (covering upstream impacts from fuel production and delivery) was another widely supported feature, with the TIM frequently cited as a credible framework that incorporates these factors. However, there was divergence on including non-CO_2 impacts such as contrails and nitrogen oxides emissions, with some stakeholders (e.g., Richmond and Twickenham Friends of the Earth) advocating for their inclusion and others (e.g.. TUI Group and respondents from other airlines) raising concerns about scientific

[15] The 'e' in CO_2e signifies that CO_2 plus the other Kyoto gases in CO_2 equivalent are incorporated into a conversion factor value. p3 Defra UK Greenhouse Gas Conversion Factors https://assets.publishing.service.gov.uk/media/5a7ed183ed915d74e6226a61/pb14075-ghg-common-queries-140401.pdf

[16] For example, IATA has published "Beginner's Guide to Airline Sustainability Reporting Handbook" https://www.iata.org/contentassets/77ec9a8c8a864daaa00bdb7f5de02902/beginners-guide-to-airline-sustainability-reporting-april2024.pdf

uncertainties. Overall, respondents emphasised the need for metrics to align with international standards while being adaptable to emerging data and evolving methodologies. This approach was seen as critical for fostering consumer trust and empowering informed decision-making.

Preferred methodologies

4.4 Respondents supported several established methodologies for calculating and reporting environmental information in the aviation sector. These methodologies were valued for their credibility, scalability, and alignment with international standards. Many stakeholders urged the CAA to align with existing frameworks like the TIM, EU schemes, and IATA recommended practices.

4.5 A +50kg furnishings adjustment was mentioned as being an important element of several methodologies to correct for potential over attribution of emissions to belly cargo. An unintentional bias in current methodologies towards airlines that offer First-class cabin service was also mentioned.

4.6 The methodologies that were supported were:

1. Travel Impact Model (TIM)

4.7 The advantages of this model mentioned by respondents include that it promotes consistency and comparability across platforms, that it is continuously improved to reflect the latest scientific developments, and that it is well-suited for consumer-facing tools.

2. IATA Recommended Practices (RP 1726 – Passenger CO_2 Calculation Methodology and RP 1678 – Cargo CO_2 Emissions Measurement)

4.8 The advantages of these models mentioned by respondents include that it is widely recognised within the aviation industry, that it ensures consistency and accuracy for passenger and cargo emissions reporting, and that it can integrate easily with existing reporting systems like CORSIA and ETS.

3. EU Flight Emissions Label Scheme

4.9 The advantages of this scheme mentioned by respondents includes that it promotes harmonisation across the EU aviation sector and encourages alignment with ICAO standards for global consistency.

4. ICAO Carbon Emissions Calculator

4.10 The advantages of this calculator mentioned by respondents includes that it aligns with international frameworks and that it is suitable for high-level emissions estimations.

5. UK Government Environmental Reporting Guidelines

4.11 This framework had mixed support with some stakeholders mentioning that it provides a foundational framework for emissions reporting and is widely used across industries in the UK, but that it would need updating and adapting before being used specifically for aviation.

Calls for consistency in emissions reporting across transport modes

4.12 Calls for consistency in emissions reporting across transport modes featured prominently in responses, reflecting a shared concern that consumers lack the ability to make fair and accurate comparisons between air travel and alternative options such as rail, road, or maritime. Several stakeholders emphasised that aviation emissions data should not be presented in isolation but should instead be contextualised within the broader transport landscape. This would allow consumers to understand the relative environmental impact of their travel choices, especially for domestic or short-haul journeys where alternative modes are viable. Metrics like CO_2e per passenger-kilometre or CO_2e per journey were highlighted as key to achieving this comparability.

4.13 Stakeholders also identified existing inconsistencies in how emissions from different modes are calculated. For instance, it was mentioned that rail emissions often exclude the significant environmental costs of infrastructure maintenance, while ferry emissions may be allocated differently between passenger and freight operations. Without standardising methodologies across modes, consumers may inadvertently be misled into underestimating the impact of one option over another. Respondents urged the CAA to collaborate with other regulators and transport authorities to harmonise reporting standards, ensuring a level playing field and fostering informed consumer decisions. The CountEmissionsEU[17] proposal for a single methodology for calculating greenhouse gas emissions from transport services to allow for fair comparisons between transport services (including aviation) was mentioned and the CAA was asked to consider the potential implications of that proposal for UK airlines as part of this project.

4.14 Additionally, respondents like Which? and CAGNE called for the inclusion of holistic lifecycle emissions - encompassing upstream impacts such as fuel production and infrastructure - across all transport modes. Respondents suggested that this approach would prevent aviation from being unfairly penalised due to more rigorous reporting requirements compared to other sectors. Some stakeholders suggested adopting visual tools, like colour-coded labels, that could easily convey emissions differences between modes at the point of booking. Ensuring consistent, comparable reporting across transport

[17] https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/757562/EPRS_BRI(2023)757562_EN.pdf

modes was seen not only as a way to inform consumers but also as a critical step toward encouraging more sustainable travel behaviours.

Chapter 5

Consultation responses - key challenges identified by stakeholders

Data accessibility and reliability

5.1 A key challenge raised by several stakeholders was the availability and accuracy of underlying environmental data. Respondents, including Skyscanner and OTUK**,** highlighted that emissions calculations often depend on airlines providing detailed operational data, such as fuel burn rates, load factors, and route-specific details. However, many airlines either do not share this data publicly or use differing methodologies, making it difficult for third-party platforms to provide consistent and reliable consumer-facing information.

5.2 Richmond and Twickenham Friends of the Earth and others noted that transparency in data is essential to build consumer trust and prevent greenwashing. Without mandatory data-sharing mechanisms or standardised reporting frameworks, achieving consistent reporting across the industry is challenging.

Cost and technical difficulties

5.3 Several airline respondents identified significant financial and technical barriers to implementing comprehensive emissions reporting systems. Developing the necessary infrastructure to collect, verify, and distribute environmental data would require substantial investment, particularly for smaller airlines and travel platforms. For example, integrating emissions information into global distribution systems (GDS) and booking platforms poses complex technological challenges. Some respondents from airlines also pointed out that operational factors, such as last-minute aircraft changes, could render pre-published data inaccurate, adding further complexity to maintaining real-time or event-driven updates. Stakeholders cautioned that overly burdensome reporting requirements could disproportionately affect smaller operators and potentially limit innovation.

International regulatory fragmentation

5.4 Some respondents, including Airlines UK welcomed efforts to move towards global alignment in emissions reporting frameworks. With the emergence of various initiatives like the EU Flight Emissions Label,[18] CountEmissionsEU, TIM, and national schemes (including in Switzerland), airlines operating across

[18] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14142-Flight-Emissions-Label_en

multiple jurisdictions face the risk of complying with overlapping or inconsistent regulations. This fragmentation not only increases administrative burdens but also creates confusion for consumers trying to compare emissions data across international markets. Respondents such as TUI Group urged the CAA to harmonise its approach with international standards, particularly with EU and ICAO frameworks, to minimise duplication and ensure that UK airlines remain competitive. However, some stakeholders stressed the need for flexibility within UK regulations to address market-specific nuances and avoid over-reliance on frameworks that may not fully capture local conditions, such as short-haul flights that cruise at lower altitudes, primarily during daytime in domestic markets.

5.5 In summary, stakeholders underscored the need for the CAA to address these barriers through collaboration with industry, international regulators, and other stakeholders. They advocated for pragmatic solutions, such as phased implementation, voluntary pilots, and leveraging existing reporting systems like ETS and CORSIA, to reduce costs and complexity while ensuring robust and reliable emissions reporting.

Chapter 6

Consultation responses - recommendations from respondents on next steps

Detailed guidance

6.1 Many respondents called for the CAA to provide more specific guidance on methodologies for calculating and presenting environmental information.

6.2 Respondents including airlines and the CAA's Consumer Panel recommended that the CAA develop guidance (with other regulators) on greenwashing.

6.3 Some stakeholders requested detailed supplementary guidance alongside the draft principles to clarify ambiguous terms like "timely" and "accessible."

6.4 Some respondents identified that the CAA should specify minimum data standards for CO_2 and CO_2e reporting.

6.5 ABTA asked for clarity on which organisation is responsible for providing information when flights are booked as part of a package holiday and suggested a more comprehensive consultation may be beneficial.

Pilots and phased implementation

6.6 Some respondents suggested that the CAA encourage voluntary adoption initially, with pathways to mandatory compliance if necessary. Some respondents offered to support a pilot consumer environmental information scheme, including Jet2, British Standards Institution (BSI), Which?, Travalyst and the ICCT.

International collaboration

6.7 Some stakeholders suggested that the CAA should work closely with the EU / EASA as well as ICAO, IATA and other international organisations and regulators active in this area.

6.8 It was also suggested that the CAA should promote international consistency through alignment or adoption of EU, ICAO, TIM methodologies or IATA practices.

Independent oversight

6.9 Some stakeholders suggested that the CAA should establish mechanisms for verification and auditing.

6.10 BSI suggested it could take a convening role in developing a pathway to standardised reporting of consumer environmental information.

Chapter 7

Consultation responses - conclusion

Recap of key findings

7.1 In conclusion, responses to the consultation revealed broad agreement among stakeholders on the importance of providing transparent, standardised, and accessible environmental information to empower consumers in making informed travel decisions. Respondents supported the CAA's draft principles but called for further clarity and detailed guidance to ensure their effective implementation. Standardisation emerged as a key priority, with widespread calls to align UK methodologies with international frameworks such as the EU Flight Emissions Label, the TIM, and ICAO standards. This alignment was seen as critical to fostering consistency, reducing regulatory fragmentation, and ensuring fair competition for UK airlines operating in global markets.

7.2 Stakeholders also emphasised the need for metrics that reflect real-world travel conditions and enable meaningful comparisons. Metrics such as CO_2e per passenger journey, lifecycle emissions, and route-specific emissions were widely supported, alongside features that account for aircraft type, cabin class, and SAF usage. While many respondents advocated for the inclusion of non-CO_2 impacts like contrails and nitrogen oxides emissions, others highlighted the scientific uncertainties surrounding these factors and urged caution before their inclusion. Accessibility was another key theme, with calls to present data in clear, relatable formats (such as visual labels or rankings) that cater to a diverse range of consumers, including those with disabilities.

7.3 Despite broad support for the principles, respondents raised concerns about the feasibility of implementation, particularly regarding data availability, cost, and technological challenges. Many highlighted the importance of independent verification to ensure data accuracy and credibility, while others urged the CAA to address barriers such as fragmented reporting standards and resource limitations. Overall, the consultation underscored a strong appetite for collaboration between the CAA, airlines, and stakeholders to develop pragmatic, internationally aligned solutions that prioritise both consumer empowerment and industry readiness. Respondents advocated for a phased approach, with voluntary pilots leading to broader implementation, ensuring sufficient time for the industry to adapt and achieve compliance as well as allowing for a review of the effectiveness of the EU Flight Emissions Label.

APPENDIX A

List of respondent organisations

A1 ABTA

A2 Airlines UK

A3 American Express Global Business Travel

A4 Aviation Environment Federation (AEF)

A5 Boeing

A6 BSI (National Standards Body)

A7 CAA Consumer Panel

A8 CAGNE

A9 Consumer Scotland

A10 easyJet

A11 Emirates

A12 Flight Free UK

A13 GATCOM

A14 Group for Action on Leeds Bradford Airport

A15 Heathrow

A16 IATA

A17 Institute of Acoustics

A18 International Council on Clean Transportation

A19 Jet2.com

A20 Lancaster University

A21 Loganair

A22 Manchester Airports Group

A23 No Airport Expansion

A24 Online Travel UK

A25 Renewable Transport Fuel Association

A26 Ryanair Holdings

A27 Skyscanner

A28 Stansted Airport Watch

A29 Stay Grounded

A30 The Centre for Climate Change and Social Transformations (CAST)

A31 Travalyst

A32 TUI Group

A33 Virgin Atlantic Ltd

A34 Which?

APPENDIX B

Consultation questions

Contact information

1. What is your name?
2. What is your email address?
3. What country are you responding from?
4. Are you responding from an organisation or as an individual?

Organisation questions

5. Which organisation are you responding from?
6. What type of organisation do you represent?

Publication of responses

7. Can we publish your response?

Draft Principles of Aviation Consumer Environmental Information

We consider that the environmental information given to consumers on the emissions of their flight should follow the draft principles set out below, so that information is:

1. **Accessible** – environmental information should be easily accessible to all consumers wherever flights within, to or from the UK are advertised or sold.
2. **Transparent** – publishers of environmental data aimed at aviation consumers should publish their methodologies to ensure that it is clear how calculations have been made.
3. **Accountable and accurate** – publishers of environmental information are accountable for the accuracy of the calculations and for ensuring the most accurate, up to date and credible sources of input data are used.
4. **Specific** – environmental information should be calculated using data that is as specific as possible to the passenger's choice of flight. This means that it should be based on input data that relates specifically to the airline in question (for example, aircraft type, route, seat choice, average load factor, cargo weight proportion etc.). Where specific input data is not available, the most credible alternative data should be used. All sources of input data should be clearly referenced.

5. **Timely** – the environmental information should be updated regularly to reflect any operational changes that may impact any input used in environmental calculations.
6. **Consistent** – the same environmental information should be available wherever flights are advertised or sold. Airlines should seek to ensure that, where they publish environmental information related to a flight, that the same information is also available wherever else those flights are advertised and sold. Where third parties publish environmental information related to a flight, they should seek to ensure that it is (as a minimum) aligned with information provided by airlines.
7. **Standardised** – the publishers of environmental information should meet minimum standards for measuring and reporting environmental data to ensure consistency and comparability between different airlines and flight options.
8. **Comparable** – environmental information (when using a metric) should be shown using standard metrics – kg CO_2 or kg CO_2e per passenger journey.
9. **Subject to continuous improvement** – publishers of environmental information should consider how publishing that information could encourage improvements to aviation sustainability performance and build in mechanisms to measure consumer impacts of publishing this information and enable this information to form part of business improvement decisions.

8. Please rank each of the draft principles from 1 (most important) to 9 (least important)

   Please explain the reasoning behind your ranking of the draft principles

9. To what extent, if at all, do you agree or disagree that the draft principles provide actionable guidance for airlines on data publication?

Please explain your answer

10. In relation to the draft principle that information should be timely, how often do you think the data should be updated?

More information on update frequency options

- Daily updates: Data is refreshed and modified on a daily basis to ensure accuracy and relevance.
- Weekly updates: Information undergoes revision and updates once a week to maintain its timeliness.

- Monthly updates: Data is reviewed and refreshed on a monthly schedule to keep it current.
- Quarterly updates: Information is revised and updated every three months to reflect changes accurately.
- Bi-annual updates: Data undergoes a review and update process twice a year to ensure it remains relevant.
- Annual updates: Information is refreshed and revised once a year to maintain its accuracy and relevance.
- Real-time updates: Data is constantly monitored and refreshed instantly as changes occur, ensuring the most up-to-date information.
- As needed updates: Updates occur whenever significant changes happen, without a predetermined schedule, to maintain relevance.
- Event-driven updates: Data is updated based on specific events or triggers, ensuring timely information delivery.
- Continuous updates: Information undergoes a continuous review and update process to keep it current and relevant at all times.

11. In relation to the draft principle that the information should be standardised, how would you define “minimum data standards” for measuring and reporting environmental data? Would the Government’s Environmental Reporting Guidelines provide an appropriate framework or can you suggest alternatives?

    Government’s Environmental Reporting Guidelines

Options for implementation of the principles

12. Please rank the following options for implementation of the principles based on your preference between 1 (most preferred) to 4 (least preferred).

The options

Option 1: The CAA publishes the principles as a guidance document, asks airlines and other organisations that sell or advertise flights to follow them and monitors uptake. This option is based on a light touch, voluntary approach.

Option 2: The CAA publishes the principles as a guidance document and uses its powers to gather relevant information from airlines and others, which in turn enables the CAA to assess how those organisations are conforming with them and use that information to publish a report on uptake. This reporting could be done through our existing annual reporting of the industry’s environmental performance and could also include verification of the information provided to passengers. **This is our preferred option** as it incentivises

industry to follow the principles without creating an overly complex data gathering and reporting regime.

Option 3: The CAA publishes the principles as a policy decision and uses its powers to gather relevant data from airlines. The CAA would then calculate and publish average CO_2e emissions for key routes only, using either an existing methodology or developing its own. This more direct approach would provide some limited baseline information to passengers which they could compare to the information provided by the airline or booking agency when searching for and booking a flight. This approach would involve detailed consideration of how that baseline information can be calculated and would require more intensive data gathering and analysis.

Option 4: The CAA publishes the principles as a policy decision and uses its powers to gather relevant data from airlines to calculate the carbon footprint of all individual scheduled flights, using either an existing methodology or developing one itself. The CAA could then either publish the information itself and / or ask airlines to publish it with their ticketing/scheduling info. This would be a more intensive approach for both airlines and the CAA that would enable consistency of information across flights booked in the UK but may not be consistent with approaches taken elsewhere.

Please explain your answer

13. For option 1, what is the likelihood that your organisation would participate in a consumer environmental information scheme that conformed to the principles if it were voluntary? Please answer realistically.
14. Would your organisation like to work with the CAA to pilot a consumer environmental information scheme?
15. Which, if any, of the following do you think are barriers to your organisation implementing such a scheme? (Please select from the list or specify “Other” with a brief explanation.)
16. When do you think any such scheme should commence?
17. Does your organisation currently undertake any verification for your emissions data internally?
18. To what extent do you think there is value in implementing a verification requirement for CO2 calculations for the information provided to passengers?
19. Should environmental information be integrated into the global distribution system alongside ticketing and scheduling information?

20. Do you think that airlines or other relevant organisations should be required to publish CO2e data or CO2?

21. Recognising the current scientific uncertainty, do you agree or disagree that non-CO2 emissions should be included in the calculations and verification?

22. Is there anything else you would like to share or any additional comments you have regarding the topics discussed in this questionnaire?

APPENDIX C

Summary of CAA's Technical Review of CO_2 and CO_2e Estimation Methodologies

Background

C1 We conducted a technical and policy-driven review of methodologies for calculating carbon dioxide (CO_2) and, where possible, carbon dioxide equivalent (CO_2e) emissions from commercial aviation.

C2 As set out in C11 and C26, this assessment was based on publicly available information and may not reflect recent changes to methodologies or other information not publicly available. We welcome engagement with stakeholders on existing and developing methodologies as this work develops as mentioned in C5 and C12.

C3 This review was directly linked to our objective that consumers are informed about the environmental impact of their flight choices at the point of looking for and booking flights.

C4 The review followed a 2024 public consultation on draft Consumer Environmental Information Principles and options for implementation.

C5 The core objective of the review was to analyse CO_2 and, where possible, CO_2e estimation tools recommended by stakeholders in response to the consultation, determining their alignment with the CAA's Consumer Environmental Information Principles. This included an assessment of their transparency, consistency, feasibility, and their technical capacity to produce flight-level emissions data as accurately as possible.

C6 The suitability of each estimation tool for converting data into passenger-level emissions figures was also considered and will be addressed in follow-on work.

C7 The review further assessed the extent to which each methodology's assumptions and approaches affected the validity and comparability of emissions estimates presented to consumers.

Our Objectives

CO_2 or CO_2e Evaluation Methodologies

C8 The primary objective of the work was to perform a high-level evaluation of CO_2 or CO_2e estimation methodologies to determine their alignment with the principles set out in paragraph 2.7 of this document. This evaluation was intended to inform recommendations on suitable approaches for presenting environmental information to consumers in a consistent, transparent, and technically sound manner.

C9 This assessment reviewed Google's Travel Impact Model (TIM), EASA's Flight Emissions Label, ICAO Carbon Emissions Calculator (ICEC), IATA's CO_2 Connect, and the Department for Energy, Security and Net Zero (DESNZ) estimates for UK aviation emissions. They were assessed on accessibility, accuracy, specificity, consistency, collaboration and timeliness, as set out in paragraph 2.7 above.

C10 The evaluation was designed with the following guiding constraints and focus areas:

C11 **High-Level Assessment**: No detailed comparative analysis between methodologies was performed at this stage. The current assessment is qualitative and focused on broad methodological characteristics.

C12 **Use of Publicly or Easily Accessible Data**: The research relied solely on methodologies that are described in the public domain to a sufficient level of detail that ensures transparency and reproducibility. Methods were classified as fully, partially, or not transparent depending on the level of detail available for reconstructing calculations.

C13 **Conversion from Flight to Passenger-Level Estimates:** Accurately converting flight-level emissions into per-passenger emissions for any given flight is critical. Amongst the assessed methodologies, there were differences in how per-passenger emissions were allocated based on cabin class and passenger weight, with some allowing bespoke assumptions for passenger weight. Whilst the impact of these differences was not directly assessed, we expect variation in CO_2e per passenger as a result. Going forward, we encourage a more aligned approach to per-passenger emissions calculations. In the short term, a standard passenger-and-luggage weight of 100 kg would support standardisation, consistency and transparency.

C14 **Alignment with the CAA's Consumer Environmental Information Principles**: Each methodology was evaluated in relationship to the level of alignment with the Consumer Environmental Information Principles, as set out in paragraph 2.7. Alongside these Principles, we have also considered:

C15 **Collaboration**: In our assessment we considered the level of collaboration and partnerships that a publisher has established for the purpose of methodology development and validation. We have also given consideration to the future development of methodologies and future level of aspirational collaboration.

C16 **Accountability**: Our research considered the level of accountability a publisher holds in relationship to maintaining robust analysis.

C17 **Consistency**: Consistent methodologies applied a unified process, while inconsistent ones risked variability depending on input types.

C18 **Accuracy and Associated Risks**: The study considered the accuracy of the CO_2/CO_2e estimates produced by each methodology. Accuracy was assessed based on the quality of input parameters, the robustness of the fuel burn estimation methods, and any assumptions or limitations that could affect the information shown to consumers.

C19 **Timely updates** were seen as essential to ensure methodologies remain aligned with fleet changes and evolving environmental data.

Time-Based and Distance-Based Methodologies

C20 Actual fuel-burn data provides the most accurate estimate for CO_2/CO_2e. However, where fuel-burn data is not readily available to the information provider, methodologies must instead estimate fuel-burn.

C21 Methodologies can be classified based on whether they utilise distance-based or time-based predictions to estimate fuel burn and consequently CO_2/CO_2e emissions.

Time-based Methodologies

C22 Time-based methodologies estimate CO_2/CO_2e using block time and block fuel flow. This approach captures real-world variations like fleet type and generation, rerouting and weather impacts, offering higher accuracy for individual flights, but rely heavily on voluntary operator data.

C23 EASA Flight Emissions Label methodology that is based on available block time and block fuel flow and IATA CO_2 Connect are time-based methodologies.

C24 Information on CO_2/CO_2e predicted using time-based methodologies can be displayed either in kg per minute of flight or can consequently be converted into a distance-based metric. This conversion should ideally be performed using accurate flight distance data (actual kilometres flown) to maintain the precision of the CO_2/CO_2e estimates

Distance-based Methodologies

C25 Distance-based methodologies calculate CO_2/CO_2e based on the great circle distance between airports (often adjusted with correction factors which differ

between methodologies). They are simpler and easier to apply at scale but tend to underpredict emissions as they do not fully account for real-world flight patterns and operational factors and differing correction factors will alter CO2/CO2e estimates.

C26 Google's TIM, EASA Flight Emissions Label, ICAO ICEC and DESNZ estimates for UK aviation emissions utilise distance-based predictions.

High-level observations

C27 Using publicly available information, we evaluated which of the listed methodologies align with the CAA's Consumer Environmental Information Principles and can be used for the purpose of prediction of environmental information either at flight or aircraft level.

Google's Travel Impact Model (TIM)

C28 Google's TIM uses a distance-based approach incorporating landing and take-off (LTO) and continuous climb and descent (CCD) cycles. Correction factors adjust great circle distance to approximate actual flight paths, but only partially. Additional correction factors account for some efficiency of some of the airframes. Google's TIM is a partially validated methodology that is developed in collaboration with airlines, research institutions and with the support of regulators (EASA, FAA). Due to the approach to CO_2e estimates, the methodology is less applicable to ultra-short flights, as the estimates are associated with high uncertainty.

EASA Flight Emissions Label

C29 CO_2e estimates are based either on 1) voluntarily provided block fuel flows and block times or 2) lower-accuracy distance-based predictions using take-off and landing weights with regression modelling. Block fuel and block time submissions are equally applicable for both domestic and international aviation.

ICAO Carbon Emissions Calculator (ICEC)

C30 CO_2 estimates are based on historical aviation data, using aircraft type, the great circle distance, and the ICAO fuel flow equation with additional correction factors. The current 'representative aircraft' model limits comparative assessments between aircraft operators operating on the same route.

IATA CO_2 Connect

C31 CO_2 estimates are based on block fuel and block time data, giving IATA CO_2 Connect (alongside the EASA Flight Emissions Label block fuel and block time approach) the highest accuracy. The tool was developed with input from aircraft manufacturers and operators. IATA does not own the input data but validates it using its own statistical sources. To date, IATA CO_2 Connect requires additional validation for domestic aviation.

DESNZ Methodology for estimates of UK aviation emissions

C32 DESNZ uses a similar method to Google TIM with applied correction factors that are aligned with the specifics of UK operations. Annual CO_2e discrepancies are adjusted using the UK bulk fuel. Based on the same approach as Google TIM, DESNZ methodology can be applied to the estimates of CO_2e at the time of flight booking. Similarly to the Google TIM methodology, the DESNZ methodology carries large uncertainty in CO_2e estimates for ultra-short-haul flights.

Final Observations and Risks

C33 Continued collaboration with stakeholders is essential to ensure methodologies that can provide environmental information to consumers at the time of looking for or booking flights continue to develop.

C34 Data validation remains a central challenge, with some methodologies relying on partially available fuel burn data.

C35 Additional challenges in distance-based methodologies are associated with high uncertainty in CO_2/CO_2e estimates for ultra-short-haul flights. This type of methodology would need to be developed further to achieve uncertainty reduction.

C36 Timely updates of the methodologies, in line with the latest operations and fleet replacement, is critical to ensure the scientifically derived factors are up to date.

Sustainable Aviation Fuels

C37 At today's relatively low SAF usage rates, the reduction of lifecycle emissions, and consequentially CO_2/CO_2e on lifecycle basis, may be within margin of uncertainty for CO_2/CO_2e estimates. As SAF uptake increases, overall lifecycle emissions reduction and differences in energy content between SAF and conventional jet fuel will need to be accounted for to ensure SAF benefits are considered.

C38 The EASA Flight Emissions Label is the only approach that accounts for sustainable aviation fuels (SAF). IATA CO2 Connect methodology will be able to account for the SAF uptake in the near future. Other methodologies mention SAF, but do not currently integrate reduced lifecycle emissions into CO_2/CO_2e estimates.

C39 We would like to see SAF usage reflected in environmental information at the time of flight booking, even if current emissions benefits are small. The batch-based approach, with specific energy content, is preferred.

C40 We suggest that there should be additional visibility or recognition for airlines that purchase SAF, especially during the early stages of SAF market development.

C41 We have set out in Principle 8 (paragraph 2.7) that wherever possible publishers of environmental information aimed at aviation consumers should incorporate data on the use of SAF.

C42 We would like to see consistency in reporting periods as flexible 12-month reporting periods could create uncertainties around SAF accountability, making it harder to ensure consistent reflection of SAF use across airlines.

C43 Methodologies should avoid double accounting environmental benefits from SAF. We will continue to monitor how methodologies integrate SAF into their calculations.

APPENDIX D

Annotated Updated Consumer Environmental Information Principles

Updated Consumer Environmental Information Principles

D1 This list of principles has been updated following feedback provided by respondents to our 2024 consultation. Additions are in *red italicised text*; deletions are in red text and struck through. The final Consumer Environmental Information Principles are available in Chapter 2 without the amends highlighted.

The CAA's Consumer Environmental Information Principles

1. **Accessible** – environmental information should be easily accessible to all consumers wherever flights *departing from or arriving at UK airports* are advertised or sold *in the UK. Accessible means that the information should a) be easy to find and obvious within the flight search and booking process before purchase and b) wherever possible it should meet the requirements of the Web Content Accessibility Guidelines.*

2. **Transparent** – publishers of environmental data aimed at aviation consumers should publish *or link to* the [~~ir~~] methodolog*y* [~~ies~~] *used* to ensure that it is clear how calculations have been made.

3. **Accountable and accurate** – publishers of environmental information are accountable for the accuracy of the calculations and for ensuring the most accurate, up to date and credible sources of input data are used.

4. **Specific** – environmental information should be calculated using data that is as specific as possible to the passenger's choice of flight. This means that it should be based on input data that relates specifically to the airline in question (for example, aircraft type, route, seat choice, average load factor, cargo weight proportion etc.). Where specific input data is not available, the most credible alternative data should be used. All sources of input data should be clearly referenced.

5. **Timely** – the environmental information should be updated regularly to reflect any operational changes that may impact any input used in environmental calculations. *Regularly means at least once a year.*

6. **Consistent** – the same environmental information should be available wherever flights are advertised or sold. Airlines should seek to ensure that, where they publish environmental information related to a flight, that the same information is also available wherever else those flights are advertised and sold. Where third parties publish environmental information related to a flight,

they should seek to ensure that it is (as a minimum) aligned with information provided by airlines.

7. **Standardised** – the publishers of environmental information should meet minimum standards for measuring and reporting environmental data to ensure consistency and comparability between different airlines and flight options.

8. **Comparable** – environmental information (when using a metric) should be shown using standard metrics – kg CO_2 or kg CO_2e per passenger journey.

9. ***Comprehensive*** *– wherever possible publishers of environmental information aimed at aviation consumers should incorporate data on the use of Sustainable Aviation Fuel.*

10. **Subject to continuous improvement** – publishers of environmental information should consider how publishing that information could encourage improvements to aviation sustainability performance and build in mechanisms to measure consumer impacts of publishing this information and enable this information to form part of business improvement decisions. *Information should also include the full climate impacts of aviation, the impacts of new technologies and aircraft designs on emissions when the data is available.*