UK Civil Aviation Authority

Summary of Responses:

2024 Consultation on the Future Direction of the UK Aviation Environmental Review

CAP 3151

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Executive Summary

In 2024 the UK Civil Aviation Authority (CAA) launched a consultation on the future direction of the UK Aviation Environmental Review (AER).[1] This consultation sought feedback on our proposed ambition and aims for the AER, alongside input on the current and future reporting framework. In total, we received 68 responses to the consultation.

The majority of respondents agreed with our ambition and aims for the AER; however, some felt this did not go far enough and suggested that specific, potentially mandatory, environmental improvement targets are included.

Similarly, the majority of respondents supported widening the reporting framework in relation to climate change, noise and air quality to include additional emission sources and areas of focus. Most respondents also supported disaggregating environmental information in future updates of the AER and suggestions regarding how to present this data were provided. In addition, there was appetite for additional environmental topics to be reported in future updates of the AER, such as biodiversity. Respondents also noted they would value the addition of an accessible data repository to the AER which would allow stakeholders to perform their own analyses.

Not all respondents agreed with the proposals outlined in the 2024 consultation. Rationale provided by stakeholders who disagreed raised concerns about the CAA's effectiveness at delivering meaningful environmental change. In addition, stakeholders questioned whether the CAA is best placed to report on all areas suggested in the consultation as some areas are already reported by other entities. If AER reporting requirements are to be expanded, respondents raised concerns regarding the potential burden imposed on industry stakeholders as a result of this.

We have published a roadmap[2] outlining how we intend to develop the AER over the coming years, taking into account the responses received to the 2024 consultation.

[1] AER 2024 Consultation Document

[2] CAP 3153: UK Aviation Environmental Review Roadmap

Chapter 1
Introduction

1.1 This document (CAP 3151) summarises the responses received to the 2024 consultation on the future direction of the UK Aviation Environmental Review (AER).[3] The document is set out as follows:

- Chapter 1: An introduction to the AER and the 2024 consultation on its future direction, alongside an overview of respondents to the consultation.
- Chapter 2: Summary of responses received regarding the AER's proposed ambition and aims.
- Chapter 3: Summary of responses received regarding current and future approaches to reporting and presenting climate change impacts.
- Chapter 4: Summary of responses received regarding current and future approaches to reporting and presenting noise impacts.
- Chapter 5: Summary of responses received regarding current and future approaches to reporting and presenting air quality impacts.
- Chapter 6: Summary of responses received regarding the inclusion of additional environmental reporting topics in future updates of the AER.
- Appendix A: Breakdown of responses received to each question.
- Appendix B: Summary of the abbreviations used within this document.

UK Aviation Environmental Review

1.2 The UK Civil Aviation Authority (CAA) has a legal duty[4] to report on the state of environmental protection relating to civil aviation in the UK. The duty also requires us to make recommendations which are intended to improve the level of environmental protection in the area of civil aviation in the future.

1.3 We are required to prepare this information, known as the UK Aviation Environmental Review (AER), with respect to the whole of the UK starting from the date the UK left the European Union (EU) on 31 December 2020. We published our first AER in December 2023.[5]

[3] AER 2024 Consultation Document

[4] Part IV of Article 87 of Assimilated Regulation (EU) 2018/1139

[5] UK Aviation Environmental Review 2023

1.4 This duty to report previously sat with the European Union Aviation Safety Agency (EASA), which prepares the environmental report on behalf of all EU Member States. We are now considering how best we can fulfil this duty for the UK, with the aim of expanding on the level of environmental information contained within the AER 2023 to provide a comprehensive and holistic overview of the impact of the UK aviation industry on the environment.

2024 Consultation on the Future Direction of the AER

1.5 In October 2024 we launched a ten-week consultation regarding the future development of the AER. This consultation sought input from stakeholders on the following areas:

i) Overall ambition and aims for the AER;

ii) Existing approach to reporting;

iii) Future presentation of environmental impacts; and

iv) Additional reporting topics.

Overview of Respondents

1.6 We are grateful to respondents to the 2024 consultation for their submissions and for their ongoing engagement on this subject. We look forward to continuing that engagement as this work progresses.

1.7 We used Artificial Intelligence (AI) to support us in analysing the responses received to this consultation. All outputs from the AI tool were validated by expert review and analysis.

1.8 It is clear from the responses received that there are a range of perspectives that must be taken into account when considering how best to fulfil our legal duty to report on the state of environmental protection relating to civil aviation in the UK.

1.9 In total, we received 68 responses to the 2024 consultation. This included:

- 45 organisations; and
- 23 individuals.

1.10 These responses have helped shape the AER Roadmap[6] which outlines how we intend to evolve the AER over the coming years.

[6] CAP 3153: UK Aviation Environmental Review Roadmap

Chapter 2

Ambition and Aims

2.1 In the 2024 consultation we sought views on our overall ambition and aims for the future development of the AER.

2.2 We stated that our overall ambition in coming years is to develop the AER into a comprehensive and robust tool that will be a trusted source of accurate and accessible aviation environmental data that can be used by Government, industry and other interested stakeholders[7] to inform and drive positive environmental change.

2.3 We also stated that we aim to develop the AER into a tool that will:

i) highlight the sector's environmental performance;

ii) measure the sector's progress against policy, targets and forecasts;

iii) hold Government, industry and ourselves to account where policy and targets are not being met; and

iv) provide recommendations on how to improve the environmental performance of the sector in the future.

2.4 We asked the following question regarding the AER's ambition and aims.

Question 8[8]

2.5 Please tell us to what extent you agree with the CAA's ambition and aims for the AER:

☐ Strongly agree

☐ Agree

☐ Neither agree nor disagree

☐ Disagree

☐ Strongly disagree

Please explain your reasoning. (*required*)

[7] Examples of other interested stakeholder groups include aviation consumers, community groups, academia and the general public. Note this list is not exhaustive.

[8] Note questions 1-7 of the 2024 consultation related to respondents' demographics.

Question 8: Summary of Responses

2.6 There was broad support from respondents regarding our ambition and aims for the AER; however, it was noted that the AER's ambition and aims may not go far enough to help drive positive environmental change. Some respondents desired more specific, potentially mandatory, environmental improvement targets as it is perceived that current policies and strategies aimed at addressing aviation's environmental impacts, and the CAA's regulatory powers in this regard, are too weak.

2.7 Multiple respondents stated the need for a standardised approach to environmental reporting, emphasising the need for transparent, easily accessible data that is presented clearly for a range of stakeholders to understand. To minimise duplication across reporting entities, the use of existing quality-assured data and methodologies was also proposed.

2.8 There were calls to broaden the scope of reporting to including aspects such as biodiversity, public health and climate resilience. In addition, it was suggested that the anticipated future environmental impact of the industry should be incorporated into reporting, alongside the provision of performance indicators to track industry progress.

2.9 Some respondents expressed doubt about the CAA's effectiveness to deliver meaningful environmental change. In addition, as decisions made by the CAA through its regulatory functions could enable industry growth, independent oversight of the CAA's environmental reporting framework was suggested. Concerns were also raised regarding the potential burden on industry if reporting requirements were to increase.

2.10 Some respondents disagreed with the ambition and aims, believing focus should concentrate on shifting demand away from aviation towards other modes of transport such as rail, in particular for journeys less than 800 km.

Chapter 3
Climate Change

3.1 To ensure stakeholders remain informed about the UK aviation industry's contribution to climate change we asked the following questions.

Question 9

3.2 In addition to reporting greenhouse gas emissions from domestic flights within the UK and international flights departing the UK, are there any other relevant areas we should consider reporting on with respect to climate change in future updates to the AER?

Examples of what we could consider reporting on with respect to climate change in future updates to the AER include:

- Greenhouse gas emissions emitted from additional sources, such as aircraft support vehicles and airport terminal generators;
- Greenhouse gas emissions emitted from aircraft manufacturing processes;
- Greenhouse gas emissions emitted from the production and use of new and emerging fuels, such as sustainable aviation fuels (SAF); and
- The impact of offsetting and carbon removal initiatives on global greenhouse gas emissions.

☐ Yes

▸ Please identify the additional relevant area(s) we should consider reporting on with respect to climate change in future updates to the AER and explain why this would be useful to you.

▸ If known, please provide examples of any relevant data sources and/or methodologies we could consider to inform your suggestion(s).

☐ No

Question 9: Summary of Responses

3.3 Additional reporting areas suggested by respondents included reporting on emissions from the production, maintenance, recycling, and scrappage of aircraft.

3.4 Respondents suggested additional scope 3 reporting, including emissions from journeys made by passengers and staff to and from airports, airport support vehicles, and airport infrastructure (terminal generators, construction etc).

3.5 Respondents requested additional reporting on in-flight emissions, including emissions from international arrivals, overflights, and military aircraft.

3.6 Additional suggestions included reporting on the effects of contrails, nitrogen oxides (NO_x) and other non-CO_2 emissions on the climate.

3.7 Reporting on the effectiveness and integrity of offsetting initiatives was also suggested by respondents. In addition, reporting emissions from the production, transportation and usage of sustainable aviation fuels (SAF) was also suggested. Some respondents cautioned that inaccurate reporting on these areas could mislead the public and that it should be noted that these are not the only initiatives that could help reduce the environmental impact of aviation.

3.8 Respondents also suggested that the net climate change impact of airports are made clearer in the AER by reporting both emission sources and sinks. In addition, it was suggested that plans developed by airlines and airports which aim to improve climate change impacts are outlined in the AER, alongside reporting on how industry is performing against the polluter pays principle.

3.9 There were also suggestions to align climate change reporting with international frameworks, such as the UK Emissions Trading Scheme, the International Civil Aviation Organization's (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and ReFuelEU.

3.10 Methodologies suggested by respondents to inform the additional reporting areas included the ACI (Airports Council International), PAS 2050, ISO 14000 series for lifecycle carbon assessments and the German Aerospace Centre's (DLR) CoCiP (Contrail Cirrus Prediction Tool) to assess the impact of contrails.

3.11 Data sources suggested by respondents to inform the additional reporting areas included the UK National Atmospheric Emissions Inventory (NAEI), the Climate Change Committee's (CCC) emission trajectories, UK Government multipliers for non-CO_2 emissions and automatic number plate recognition to understand journeys taken to and from airports. It was also suggested that the CAA continues to consult with the public regarding the development of new appraisal methodologies.

3.12 Some respondents raised concerns about expanding climate change reporting within the AER. Concerns were raised regarding the CAA's independent position as a result of decisions made via regulatory functions which have the potential to influence environmental factors. It was therefore suggested that environmental reporting undertaken by the CAA is independently verified to avoid bias and ensure transparency. Additional concerns were raised regarding the potential

burden on industry if reporting requirements were to increase, the risk of duplicating existing reports published by other entities and the availability of suitable data to inform climate change reporting.

Question 10

3.13 There are various ways we can present climate change data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination. (*required*)

	Not useful	Slightly useful	Useful	Very useful	Extremely useful
Option 1: National Total					
Option 2: Airport Cluster					
Option 3: Airport					
Option 4: Airline					

Please explain the reasons for your selections. (*required*)

Question 10: Summary of Responses

Option 1: National Total

3.14 Presenting climate change data as a national total was received positively overall. Respondents noted that reporting a national total is useful for understanding aviation's contribution to total UK emissions.

Option 2: Airport Cluster

3.15 Respondents were overall critical of reporting climate change data by airport cluster. It was noted that airports do not operate in clusters and that presenting information in this way could conceal individual airport's contribution to climate change.

3.16 Some respondents noted that reporting by airport cluster could facilitate comparisons between regions that could inform local emission reduction strategies but reservations were expressed that such comparisons may be misleading.

Option 3: Airport

3.17 Respondents were generally supportive of reporting climate change data by airport, as it could help communities better understand local climate change impacts and enable individual airport performance to be assessed and

compared. It was noted however that some airports already report similar information and that duplication could increase the reporting burden.

Option 4: Airline

3.18 Overall, respondents were supportive of reporting climate change data by airline, noting this would help consumers make informed decisions. It was noted that presenting data in this way could motivate airlines to adopt more fuel-efficient aircraft and low carbon technologies. Respondents outlined that some airports already report similar information as part of their scope 3 emissions; however, it was noted that CAA reporting of this information could allow for better consistency across the industry.

Question 11

3.19 Are there any other ways we could present climate change data which you think would be useful to include in future updates of the AER, outside of those already suggested?

☐ Yes

- Please identify the additional option(s) we should consider for presenting climate change data in future updates of the AER and explain why this would be useful to you.
- If known, please provide examples of data sources and/or methodologies we could consider to inform the additional option(s) suggested.

☐ No

Question 11: Summary of Responses

3.20 Respondents suggested the AER provides further contextual comparisons, such as the UK aviation industry's climate change impact in relation to the UK's total impact, and overall global impact of the industry. In addition, it was suggested that comparisons be made with other sectors such as rail, maritime and road transport.

3.21 Some respondents suggested more granular data is presented to allow for comparisons between direct flights and hub-and-spoke operations, alongside presenting emissions from take-off and landing to enable emissions comparisons between both phases of flight. One respondent suggested contextualising aviation emissions by comparing figures with equivalent emissions produced by everyday items, such as LED lightbulbs. Another respondent highlighted that airport emissions and climate change targets must be compared year-on-year for emissions trends to be clear to readers.

3.22 Respondents also suggested presenting emissions by flight (long, medium, short haul), by aircraft (large, medium, small), and by source (ground operations, aircraft manufacturing etc). Another suggestion included presenting emissions by; per passenger, per passenger mile, per movement, per revenue passenger kilometre, and cargo density.

3.23 Two respondents requested the AER provides an accessible data repository to allow stakeholders to undertake their own analyses.

3.24 Data sources recommended by respondents to inform their suggestions included using movement data from the United Nations Framework Convention on Climate Change (UNFCCC), fuel burn data from aircraft manufacturers or airlines, and flight data (taxi time, holding delays etc) from bodies such as EUROCONTROL. In addition, respondents suggested working with His Majesty's Revenue and Customs (HMRC), the Department for Energy Security and Net Zero (DESNZ) and the Climate Change Committee (CCC) to identify areas for policy alignment and as potential data sources to inform reporting.

3.25 Some respondents were not in favour of presenting climate change information in other formats as they believed that sufficient data is already being reported. Concerns were raised regarding the possibility of the AER duplicating data already being reported and as such it was suggested that cost-effective reporting techniques are adopted to increase efficiency and reduce any reporting burden.

Chapter 4
Noise

4.1 To ensure stakeholders remain informed about the UK aviation industry's noise impacts we asked the following questions.

Question 12

4.2 In addition to reporting the number of people exposed to aviation noise in the UK, are there any other relevant areas we should consider reporting on with respect to noise in future updates to the AER?

Examples of what we could consider reporting on with respect to noise in future updates to the AER include:

- The potential health impacts associated with noise exposure from aviation activities; and
- The effectiveness of noise abatement/reduction initiatives.

☐ Yes

▸ Please identify the additional relevant area(s) we should consider reporting on with respect to noise in future updates to the AER and explain why this would be useful to you.

▸ If known, please provide examples of any relevant data sources and/or methodologies we could consider to inform your suggestion(s).

☐ No

Question 12: Summary of Responses

4.3 Additional reporting areas suggested by respondents included reporting the health impacts associated with exposure to aviation noise. For example, reporting on sleep disturbance, cardiovascular issues, mental health impacts and annoyance. Many respondents recommended using World Health Organization (WHO) thresholds to assess health impacts, in addition to monetising impacts using metrics such as Disability Adjusted/Quality Adjusted Life Years (DALY/QALY). Some respondents cautioned that WHO do not consider 45 dB to be the Lowest Observed Adverse Effect Level (LOAEL) for night noise[9] and

[9] WHO Night Noise Guidelines for Europe (2009); '*The LOAEL of night noise, 40 dB $L_{night,outside}$, can be considered a health-based limit value of the night noise guidelines (NNG) necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.*'

therefore it was suggested that the AER reports the area and number of people exposed to 40 dB $L_{Aeq, 8hr}$, in addition to 45 dB $L_{Aeq, 8hr}$.

4.4 Respondents highlighted the relevance of reporting noise events based on the time of day and suggested reporting night flights. In this regard, respondents suggested using metrics that highlight the frequency and intensity of noise events at different times of day, including night-time and early morning periods. There was also interest in reporting low-level noise, for example, reporting on the impact of low-level noise on rural communities and tranquil areas.

4.5 Reporting on the effectiveness of noise abatement procedures and initiatives, such as continuous climb or continuous descent procedures, and how flights conform with such procedures, were suggested by respondents.

4.6 One respondent suggested reporting on the rate of fleet modernisation and uptake of quieter aircraft which could include reporting on the proportion of ICAO Annex 16 Volume I Chapter 14 aircraft that make up a fleet at a particular airport.

4.7 In addition to reporting aircraft noise, respondents suggested reporting noise from other operations, such as airport support vehicles, airport infrastructure, drones and space launches. Alongside these, reporting the number of noise complaints received by airports was suggested in addition to reporting the impact of noise on animals.

4.8 Respondents also suggested that noise forecasts are reported within the AER.

4.9 Methodologies suggested by stakeholders to support the recommendations included following the WHO Environmental Noise Guidelines for the European Region (2018), WHO Night Noise Guidelines for Europe (2009), and the Department for Transport (DfT) Transport Analysis Guidance (TAG).

4.10 Data sources suggested by stakeholders to support the recommendations included relevant Noise Actions Plans and other data reported by airports, The Countryside Charity (CPRE) Tranquillity Mapping, and EUROCONTROL data on air traffic and noise metrics.

4.11 Alongside the additional areas outlined, respondents suggested airports take greater responsibility with respect to noise impacts, suggesting the AER explores creating airport noise limits and establishes mechanisms for enforcement against these. One respondent also suggested making airports directly accountable for the collection of accurate noise data.

4.12 Concerns were raised by respondents from a coordination and resource perspective regarding the potential burden on industry to report additional data. Concerns were also raised over the feasibility of collecting granular data on the health impacts associated with exposure to aviation noise.

Question 13

4.13 There are various ways we can present noise data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination. (*required*)

	Not useful	Slightly useful	Useful	Very useful	Extremely useful
Option 1: National Total					
Option 2: Airport Cluster					
Option 3: Airport					

Please explain the reasons for your selections. (*required*)

Question 13: Summary of Responses

Option 1: National Total

4.14 Respondents were generally supportive of reporting noise data as a national total as it would show overall trends in noise impacts; however, some felt noise was too subjective to be reported in this way as it is a localised issue.

Option 2: Airport Cluster

4.15 Respondents noted that presenting noise data by airport cluster could be valuable for assessing cumulative impacts in regions served by multiple airports, for example London. One respondent supported grouping airports in line with the Airspace Modernisation Strategy[10] so that the impact of changes on specific regions and communities can be tracked. However, most respondents argued that cluster-level data had limited usefulness as airports do not operate in clusters.

Option 3: Airport

4.16 Reporting noise by airport level was favoured over the other options presented as it was viewed that reporting this data could drive progress to improve noise impacts more effectively as it would allow for comparisons to be made between airports, and thus hold them to account. In addition, it was noted that affected communities would value localised data for advocacy and planning purposes.

4.17 Some respondents raised concerns regarding an increased reporting burden as a result of reporting disaggregated noise data. It was noted that the AER should

[10] Airspace Modernisation Strategy | UK Civil Aviation Authority

leverage noise mapping data produced under existing environmental regulations and the CAA should not undertake additional noise mapping where it already exists. One respondent emphasised that it is essential for the CAA to undertake a cost-benefit analysis to demonstrate that the requirement to report, and any associated benefits reporting has, outweigh the additional cost. It was also noted that further consultation should be undertaken before expanding the CAA's reporting remit.

Question 14

4.18 Are there any other ways we could present noise data which you think would be useful to include in future updates of the AER, outside of those already suggested?

☐ Yes

- Please identify the additional option(s) we should consider for presenting noise data in future updates of the AER and explain why this would be useful to you.
- If known, please provide examples of data sources and/or methodologies we could consider to inform the additional option(s) suggested.

☐ No

Question 14: Summary of Responses

4.19 Respondents suggested that aviation noise impacts are mapped against population density, showing peak and mean noise levels by day and night. In addition, presenting time-lined noise data was suggested to provide a greater understanding of night-time noise and seasonal variations in noise. It was suggested that the influence of weather is factored into noise analyses.

4.20 Underpinning the AER with an accessible data repository was also suggested by respondents.

4.21 Respondents suggested using a variety of metrics to report aircraft noise, such as L_{max}, number above (e.g. N65) and sleep disturbance contours. Stakeholders also noted that these metrics could better reflect the impact of aviation noise on tranquillity and biodiversity.

4.22 Respondents suggested presenting noise data by aircraft type and airline, in addition to reporting noise impacts in relation to airport throughput, such as passenger volume. It was also suggested that noise exposure is presented by demographic, including the number of sensitive areas impacted such as schools, hospitals and care homes.

4.23 Presenting ‘noise hot-spots’ which highlight where aircraft tracks converge was also suggested which could be used to support airspace modernisation and aid the development of options that will enable respite.

4.24 Some respondents suggested including greater narrative when presenting noise data to better convey impacts. Examples included providing lived experiences of those exposed to aviation noise and introducing borough/ward-level data to compare health statistics.

4.25 Respondents outlined several data sources to inform their suggestions. These included using number of jet movement (NJM) data which is available for all airports. Raw noise and track keeping (NTK) data from airports, such as Heathrow. L_{max} and N65 metrics which are collected by some airports. One respondent suggested placing noise monitoring stations in Sites of Special Scientific Interest (SSSIs).

4.26 There were concerns over duplicative reporting between different agencies. One respondent noted that duplicative reporting could cause confusion if different population datasets or dose-response curves are applied.

Chapter 5
Air Quality

5.1 To ensure stakeholders remain informed about the UK aviation industry's air quality impacts we asked the following questions.

Question 15

5.2 In addition to reporting emissions from civil aviation flights and airport support machinery for the five damaging air pollutants outlined,[11] are there any other relevant areas we should consider reporting on with respect to air quality in future updates to the AER?

Examples of what we could consider reporting on with respect to air quality in future updates to the AER include:

- Reporting emissions from additional sources, such as airport terminal generators and airport-related road traffic;
- Widening the scope of air pollutants captured by our reporting; and
- Reporting air quality concentrations of air pollution around airports and assessing this against legal air quality standards.

☐ Yes

▸ Please identify the additional relevant area(s) we should consider reporting on with respect to air quality in future updates to the AER and explain why this would be useful to you.

▸ If known, please provide examples of any relevant data sources and/or methodologies we could consider to inform your suggestion(s).

☐ No

Question 15: Summary of Responses

5.3 Those who answered yes suggested reporting emissions from additional sources including airport generators, ground operations, and road traffic. Reporting emissions associated with transportation to and from airports was also suggested. Another respondent requested that health impacts on humans and animals near airports are reported.

[11] These included: nitrogen oxides (NO_x), sulphur dioxide (SO_2), ammonia (NH_3), non-methane volatile organic compounds (NMVOCs) and fine particulate matter ($PM_{2.5}$).

5.4 In addition to reporting emissions from additional sources, respondents suggested the AER reports air quality concentrations under flight paths up to 3,000 feet and assesses whether legal standards are being met. In addition, it was suggested that the AER aligns with the EU Ambient Air Quality Directive Standards (2024).

5.5 Respondents suggested the AER includes information on ultrafine particles (UFP). Rationale for reporting this information included concerns regarding UFP concentrations under flight paths and the potential health impacts associated with exposure. One respondent suggested UFP concentrations should be a consideration of the airspace modernisation strategy. Additional suggestions from stakeholders included reporting concentrations of black carbon, PM_{10} and microplastics within the AER.

5.6 Reporting the air quality impact as a result of using particular fuels, such as sustainable aviation fuels and diesel, was also suggested. In addition, some respondents requested that engineering improvements and emission reduction measures implemented by airports are acknowledged within the AER.

5.7 Reporting forecast air quality concentrations was also requested by stakeholders.

5.8 To inform the suggestions provided, respondents noted the CAA could leverage information from case studies and reports published by airports such as London Heathrow and Amsterdam Schiphol. In addition, it was noted that relevant data is available from the UK National Atmospheric Emissions Inventory (NAEI) and the UK Air Quality Network. To inform health impacts associated with exposure to poor air quality, WHO Air Quality Guidelines for pollutant thresholds was suggested. Regarding forecasting air quality concentrations, the European Union Aviation Safety Agency's (EASA) European Aviation Environmental Report (EAER) was highlighted.

5.9 EUROCONTROL's Advanced Emission Model (AEM) was suggested as a possible tool to estimate emissions during different phases of flight. The COPERT emissions calculator developed by the European Environment Agency, which can estimate road transport emissions near airports, was also suggested as a possible tool to estimate emissions. In addition, it was suggested that air quality monitors be installed at airports to provide real-time air quality data. One respondent noted that airports should be encouraged to monitor their own air quality.

5.10 Those who believed the AER should not expand upon its existing air quality reporting framework expressed concerns that additional reporting would result in more time, resource and cost for stakeholders. In addition, respondents noted that air quality data is already reported by Government (e.g. DEFRA) and local authorities and some respondents opposed a compliance-based approach to

reporting. Respondents also stated that all industries have associated emissions and pollutants, and that aviation is not a significant contributor. It was suggested that focus should remain on aircraft, rather than expanding air quality reporting more widely, as it is believed the latter does not warrant additional taxpayer funding.

Question 16

There are various ways we can present air quality data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination. (*required*)

	Not useful	Slightly useful	Useful	Very useful	Extremely useful
Option 1: National Total					
Option 2: Airport Cluster					
Option 3: Airport					

Please explain the reasons for your selections. (*required*)

Question 16: Summary of Responses

Option 1: National Total

5.11 Stakeholders noted that presenting air quality data as a national total could be effective at capturing national trends. It was noted this would enable comparisons to be made with other sectors which could help inform Government policy.

Option 2: Airport Cluster

5.12 On the whole, presenting air quality data by airport cluster was least preferred by stakeholders. It was noted that airports do not operate in a unified manner and that data could be misinterpreted if presented this way. However, one respondent noted that this data could support regional comparisons of airports and also aid decision-making in areas such as airport expansion.

Option 3: Airport

5.13 The majority of stakeholders supported presenting air quality data by airport. Stakeholders noted that presenting this data would be effective, with some deeming it as critical, for identifying and managing local air quality issues. It was noted that this data would hold airports to account with respect to their air quality impacts, and that the information presented would be useful for local communities. Some responses highlighted that as air quality impacts on people

and ecosystems are localised, presenting air quality data by airport would provide the most value.

Question 17

5.14 Are there any other ways we could present air quality data which you think would be useful to include in future updates of the AER, outside of those already suggested?

☐ Yes

- Please identify the additional option(s) we should consider for presenting air quality data in future updates of the AER and explain why this would be useful to you.
- If known, please provide examples of data sources and/or methodologies we could consider to inform the additional option(s) suggested.

☐ No

Question 17: Summary of Responses

5.15 Suggestions from stakeholders who expressed agreement that the AER should include additional ways of presenting air quality data included, presenting data by airline and aircraft type, in addition to presenting per passenger data. Some respondents noted that presenting data in this way could better hold industry to account, encouraging operational improvements and increased uptake of advanced technology.

5.16 There were also demands for greater use of visualisation methods to present air quality data, alongside the use of dispersion modelling, to enable a better understanding of aviation's contribution to air quality within a local area. Suggestions in this respect included the use of 'heat-maps' that highlight air quality concentrations in relation to population density and sensitive areas such as hospitals, schools and care homes. It was requested that wind direction is included within these analyses to provide a better understanding of the dispersion of pollutants, alongside the inclusion of peak and mean concentrations and an assessment of how these compare against legal limits. Presenting air quality data by time of day and season was also suggested by respondents to enable the identification of temporal changes in air quality concentrations. It is believed that presenting this information in a timely manner could help community stakeholders better identify air quality issues.

5.17 Respondents requested the AER provides further contextual comparisons with respect to air quality, such as the UK aviation industry's impact in relation to other sectors, for example rail and maritime, alongside presenting comparisons with other countries.

5.18 There was desire for a greater focus on presenting the health impacts associated with exposure to poor air quality. One respondent suggested contextualising this data in more relatable terms, such as comparing the health effects of exposure to poor air quality against the equivalent number of cigarettes smoked. It was noted that health impacts can vary depending on the emissions source (e.g. aircraft, support vehicle) and its time in mode (e.g. taxi, take-off). It was therefore suggested that health impacts are presented in relation to these categories to enable a better understanding.

5.19 Some respondents noted that they would value the addition of an accessible data repository to the AER so stakeholders can perform their own analyses.

5.20 Methodologies and data sources to inform the suggestions provided included the Government's Project for the Sustainable Development of Heathrow (PSDH) case-study as an example of best practice. Additional suggestions included placing isotopes in aviation fuel to understand the origin of pollutants, using surveys to collect data regarding the number of miles travelled to an airport and obtaining further data from airport carparks, taxis and coach companies.

5.21 Several respondents raised concerns regarding the CAA's ability to manage the potential increase in scale of reporting due to the associated costs and complexities that may arise as a result of more detailed air quality modelling. In the first instance, respondents suggested the CAA use datasets that are already available whilst also ensuring existing reporting mechanisms are utilised where possible to avoid duplication. Several respondents felt that airports should be solely responsible for managing and reporting on air quality issues, and that the CAA should focus on supporting these efforts.

Chapter 6

Additional Environmental Reporting Topics

6.1 The AER 2023 reported the level of environmental protection relating to civil aviation in the UK with regard to the following three environmental topics:

- Climate change;
- Noise; and
- Air quality

6.2 We sought views from stakeholders to understand whether there is appetite to expand on the number of environmental reporting topics we include within the AER.

Question 18

6.3 Not including climate change, noise and air quality, would you like to suggest any additional environmental topic(s) that the AER could report on?

If yes, please select from the options below:

☐ The UK aviation industry's impact upon biodiversity

☐ The UK aviation industry's impact upon tranquillity

☐ The UK aviation industry's impact upon water quality

☐ Other environmental reporting topic(s): *Please specify.*

- Please explain why the environmental topic(s) selected would be useful to you.

- Please provide examples of data sources and/or methodologies we could consider to inform the environmental topic(s) suggested.

☐ No

Question 18: Summary of Responses

Biodiversity

6.4 Respondents expressed interest in biodiversity impacts being reported due to concerns over the loss of green land, habitats and endangered species, and the aviation industry's contribution towards this degradation through activities such as bird culling. Suggestions for reporting biodiversity impacts included reporting on the number of hectares protected, maintained and enhanced. In addition, it

was suggested the CAA collaborates with conservation organisations such as the Royal Society for the Protection of Birds (RSPB).

Tranquillity

6.5 Respondents expressed interest in impacts upon tranquillity being reported due to concerns over the loss of access to green spaces. Areas such as Richmond Park and the Royal Botanic Gardens Kew were highlighted as areas needing greater protection. Reporting suggestions included measuring the number of overflights and the impact of aviation noise on tranquil areas.

Water Quality

6.6 Respondents expressed interest in water quality being reported due to concerns over effluent discharge from airports and pollutant deposition from aviation activities, such as per-and polyfluoroalkyl substances (PFAS) also referred to as “forever chemicals”, into water bodies. Suggestions for reporting included monitoring the concentration of pollutants from aviation in water bodies, such as de-icing fluids, lubricants, and fuel, and assessing these impacts against water quality guidelines. In addition, reporting on the impact of poor water quality on ecosystems, biological oxygen demand, and total organic carbon, alongside flooding risks were suggested. Potential data sources to inform reporting included obtaining data from utility companies and the Environmental Agency.

Additional Reporting Topics

6.7 Additional reporting topics suggested by respondents included the environmental impact of sustainable aviation fuels (uptake and feedstocks), vortex damage to roofs, waste management (waste to landfill), land contamination, community health impacts as a result of aviation’s environmental impact (e.g. mental health) and the impact of ultrafine particle emissions.

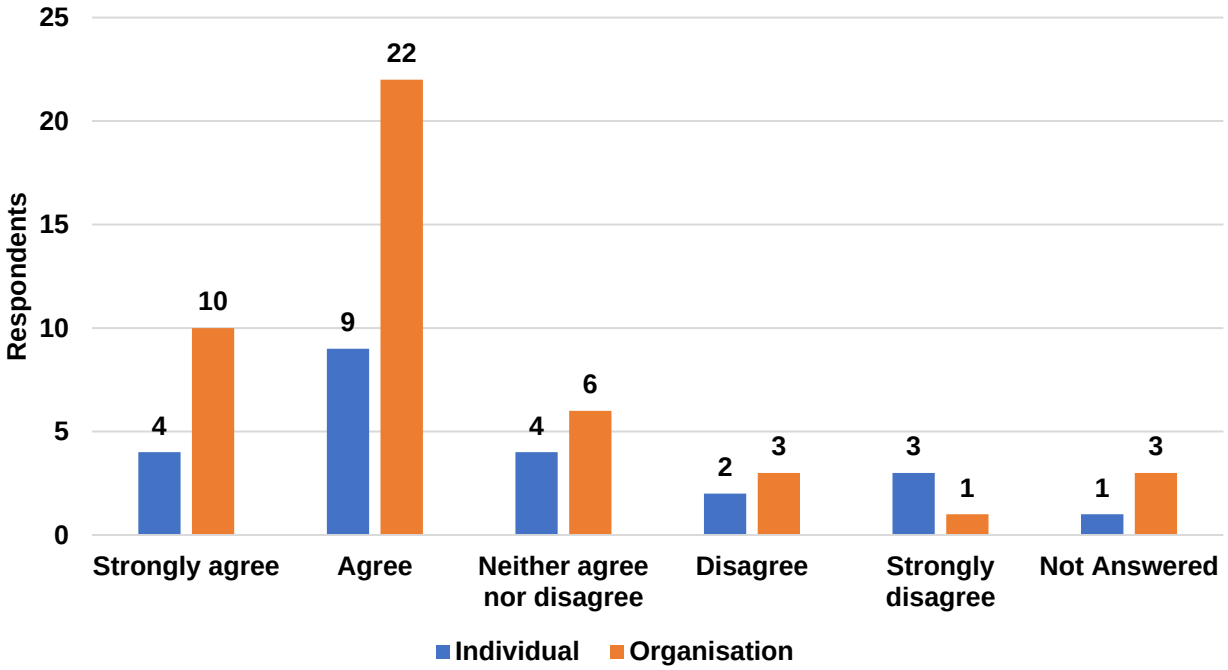
No Additional Reporting Topics

6.8 Respondents who did not agree the AER should expand on the environmental topics currently reported noted challenges with regard to isolating aviation’s impact from other sources, especially in areas such as biodiversity and water quality. Some respondents questioned whether the aviation regulator was the most appropriate body to undertake environmental reporting. It was noted that airports already report under environmental permits, and DEFRA or Natural England may be better positioned to report on topics such as tranquillity. Respondents emphasised that clear rationale should be provided by the CAA when considering expanding upon its reporting remit.

APPENDIX A

Consultation Responses

Figure 1: Responses to Question 8

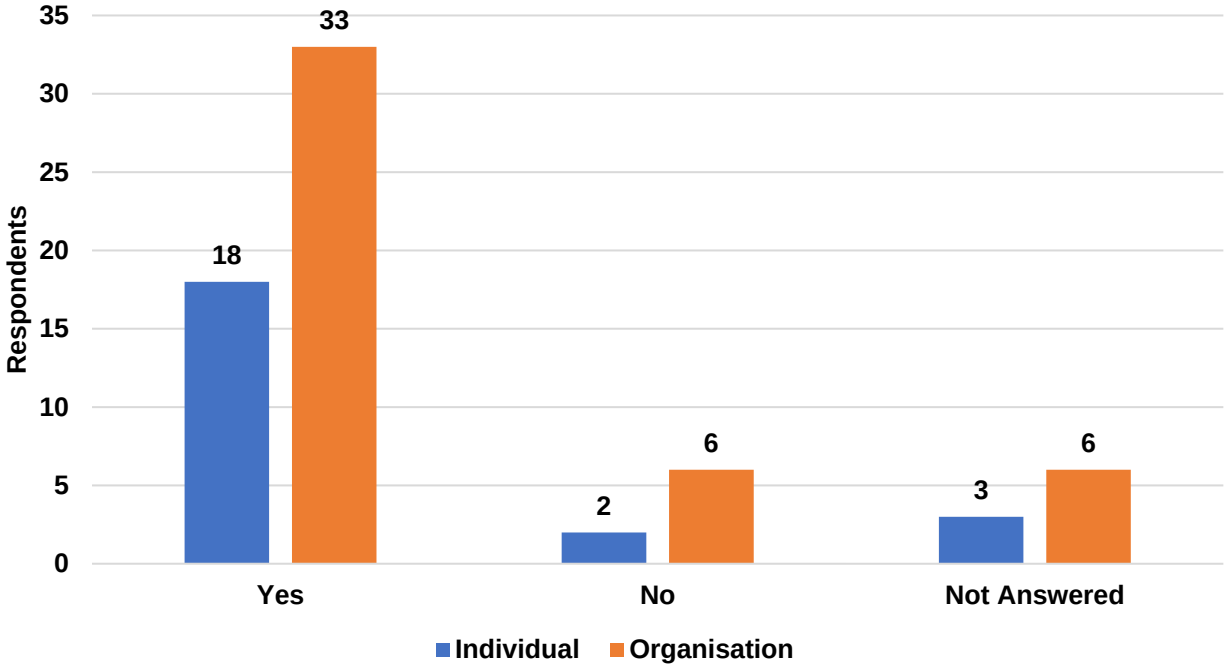


"Please tell us to what extent you agree with the CAA's ambition and aims for the AER".

Data Table: Responses to Question 8

Response	Individual	Organisation	Total
Strongly agree	4	10	14
Agree	9	22	31
Neither agree nor disagree	4	6	10
Disagree	2	3	5
Strongly disagree	3	1	4
Not answered	1	3	4

Figure 2: Responses to Question 9

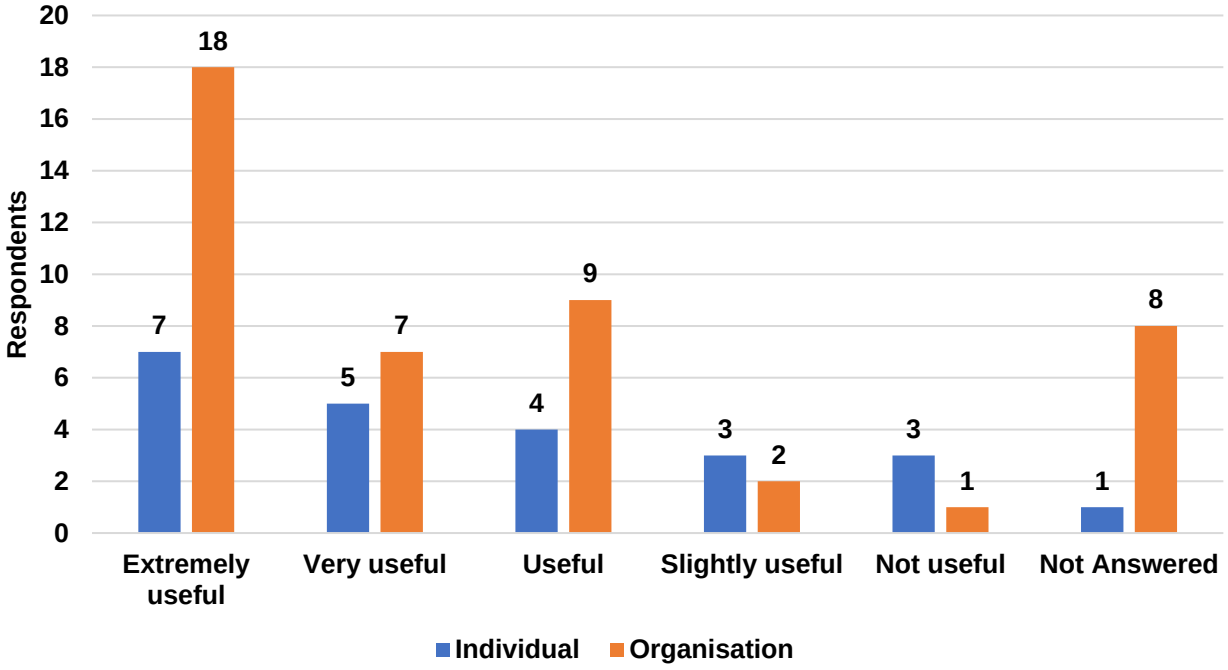


"In addition to reporting greenhouse gas emissions from domestic flights within the UK and international flights departing the UK, are there any other relevant areas we should consider reporting on with respect to climate change in future updates to the AER?"

Data Table: Responses to Question 9

Answer	Individual	Organisation	Total
Yes	18	33	51
No	2	6	8
Not Answered	3	6	9

Figure 3: Responses to Question 10 (National Total)

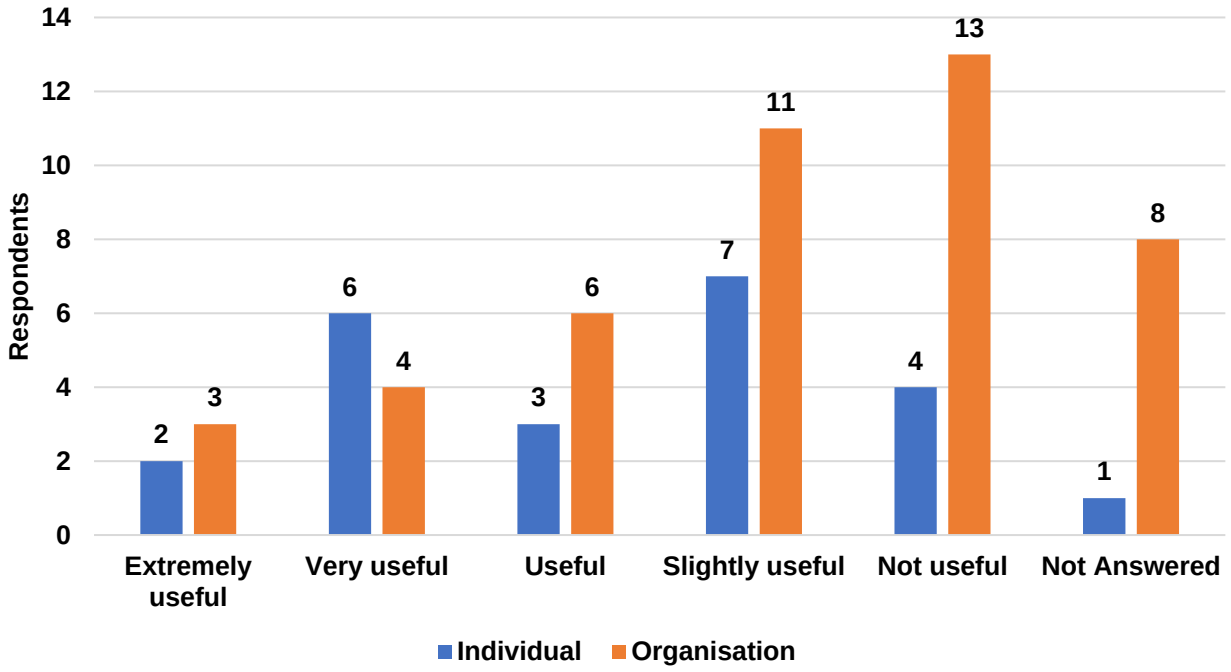


"There are various ways we can present climate change data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: National total."

Data Table: Responses to Question 10 (National Total)

Answer	Individual	Organisation	Total
Extremely useful	7	18	25
Very useful	5	7	12
Useful	4	9	13
Slightly useful	3	2	5
Not useful	3	1	4
Not answered	1	8	9

Figure 4: Responses to Question 10 (Airport Cluster)

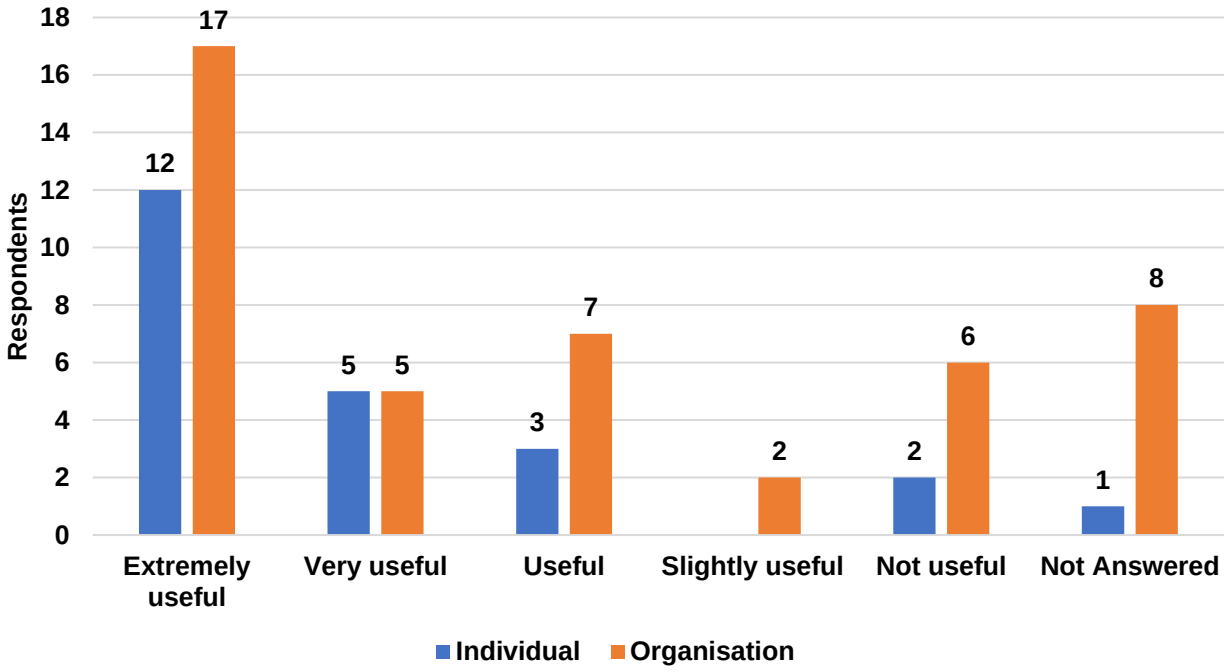


"There are various ways we can present climate change data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport cluster."

Data Table: Responses to Question 10 (Airport Cluster)

Answer	Individual	Organisation	Total
Extremely useful	2	3	5
Very useful	6	4	10
Useful	3	6	9
Slightly useful	7	11	18
Not useful	4	13	17
Not answered	1	8	9

Figure 5: Responses to Question 10 (Airport)

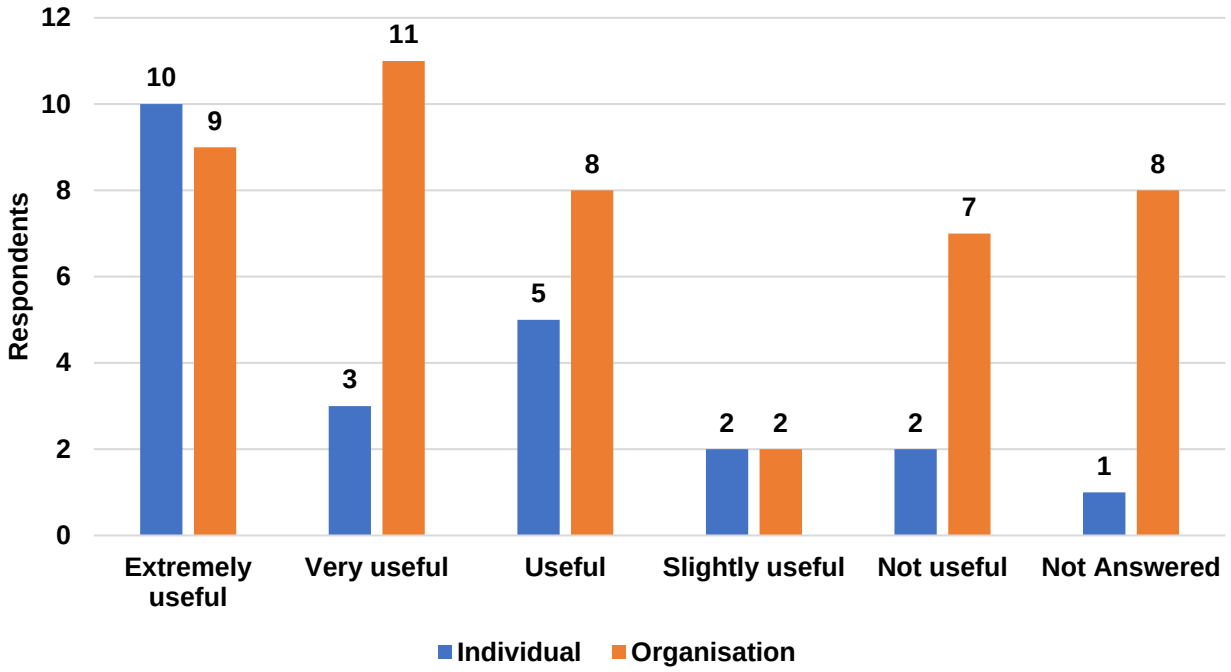


"There are various ways we can present climate change data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport."

Data Table: Responses to Question 10 (Airport)

Answer	Individual	Organisation	Total
Extremely useful	12	17	29
Very useful	5	5	10
Useful	3	7	10
Slightly useful	0	2	2
Not useful	2	6	8
Not answered	1	8	9

Figure 6: Responses to Question 10 (Airline)

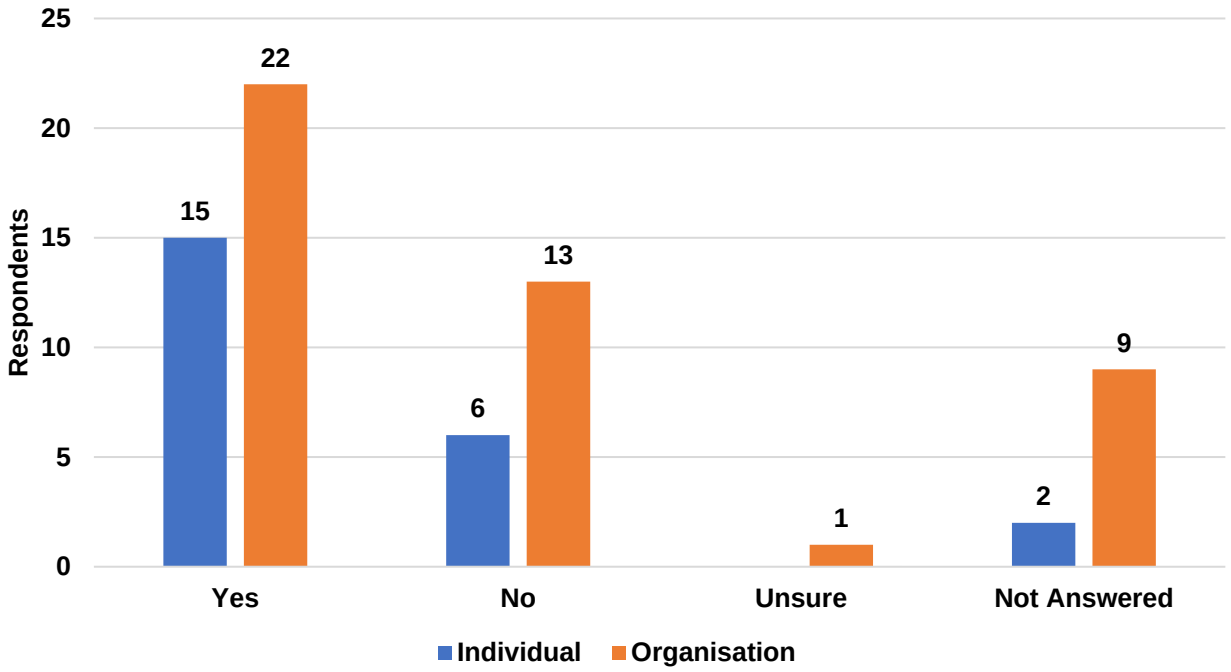


"There are various ways we can present climate change data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airline."

Data Table: Responses to Question 10 (Airline)

Answer	Individual	Organisation	Total
Extremely useful	10	9	19
Very useful	3	11	14
Useful	5	8	13
Slightly useful	2	2	4
Not useful	2	7	9
Not answered	1	8	9

Figure 7: Reponses to Question 11

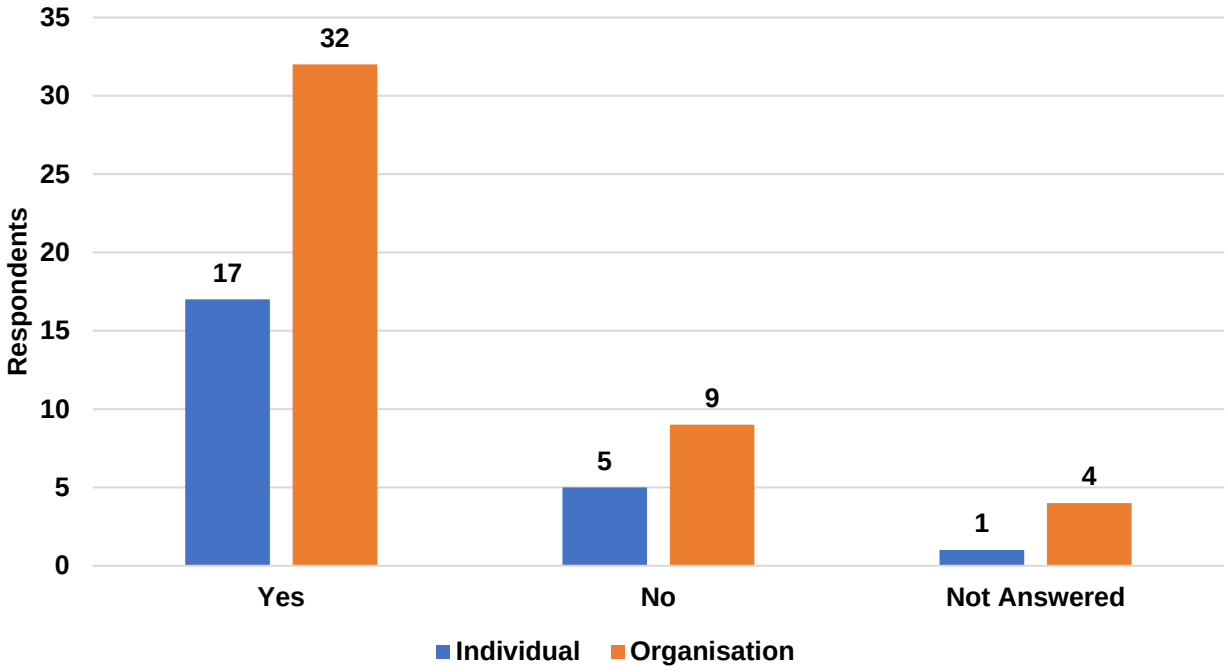


"Are there any other ways we could present climate change data which you think would be useful to include in future updates of the AER, outside of those already suggested?"

Data Table: Responses to Question 11

Answer	Individual	Organisation	Total
Yes	15	22	37
No	6	13	19
Unsure	0	1	1
Not Answered	2	9	11

Figure 8: Responses to Question 12

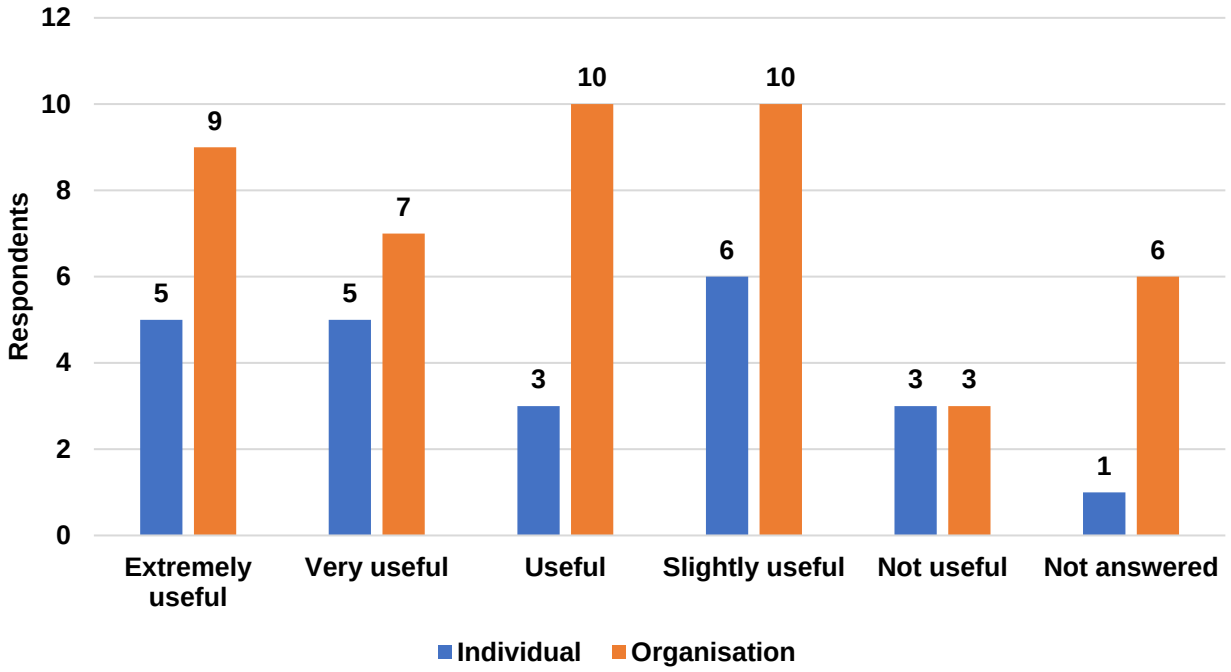


"In addition to reporting the number of people exposed to aviation noise in the UK, are there any other relevant areas we should consider reporting on with respect to noise in future updates to the AER?"

Data Table: Responses to Question 12

Answer	Individual	Organisation	Total
Yes	17	32	49
No	5	9	14
Not Answered	1	4	5

Figure 9: Responses to Question 13 (National Total)

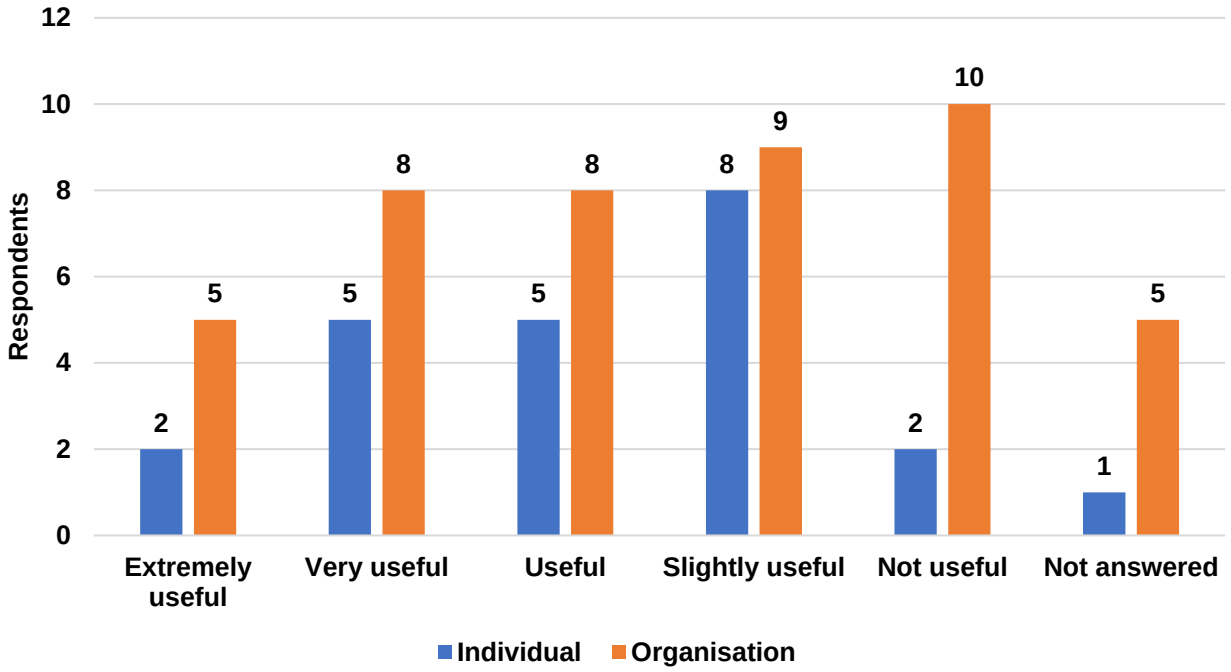


"There are various ways we can present noise data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: National total."

Data Table: Responses to Question 13 (National Total)

Answer	Individual	Organisation	Total
Extremely useful	5	9	14
Very useful	5	7	12
Useful	3	10	13
Slightly useful	6	10	16
Not useful	3	3	6
Not answered	1	6	7

Figure 10: Responses to Question 13 (Airport Cluster)

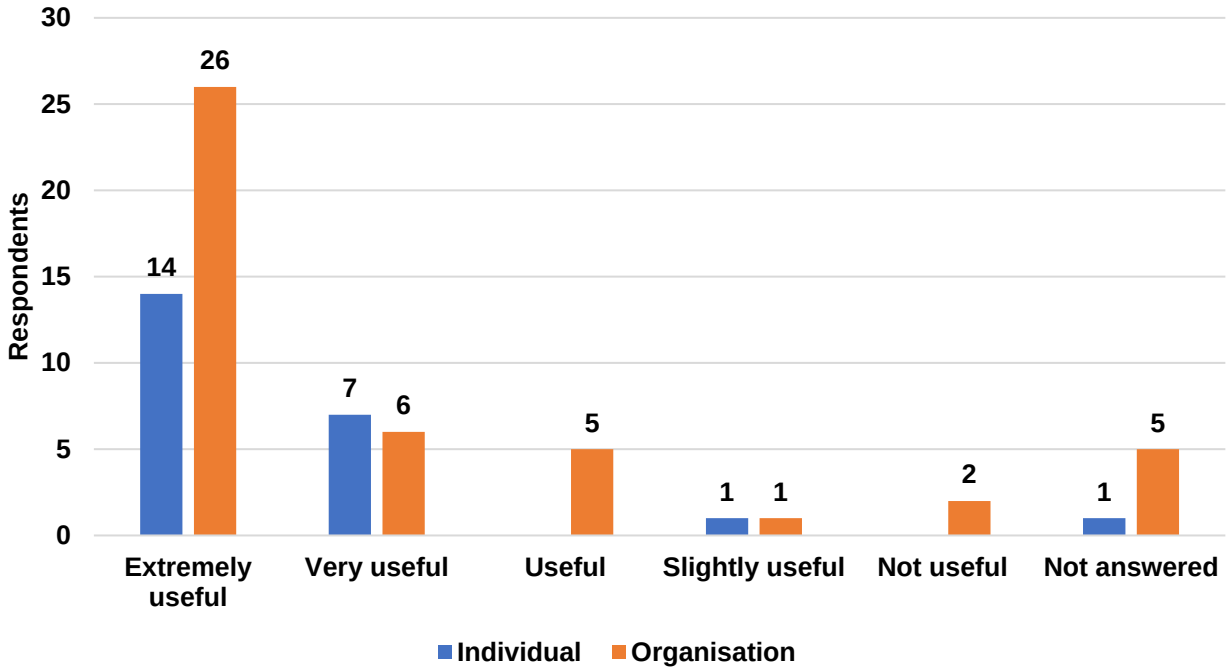


"There are various ways we can present noise data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport cluster."

Data Table: Responses to Question 13 (Airport Cluster)

Answer	Individual	Organisation	Total
Extremely useful	2	5	7
Very useful	5	8	13
Useful	5	8	13
Slightly useful	8	9	17
Not useful	2	10	12
Not answered	1	5	6

Figure 11: Responses to Question 13 (Airport)

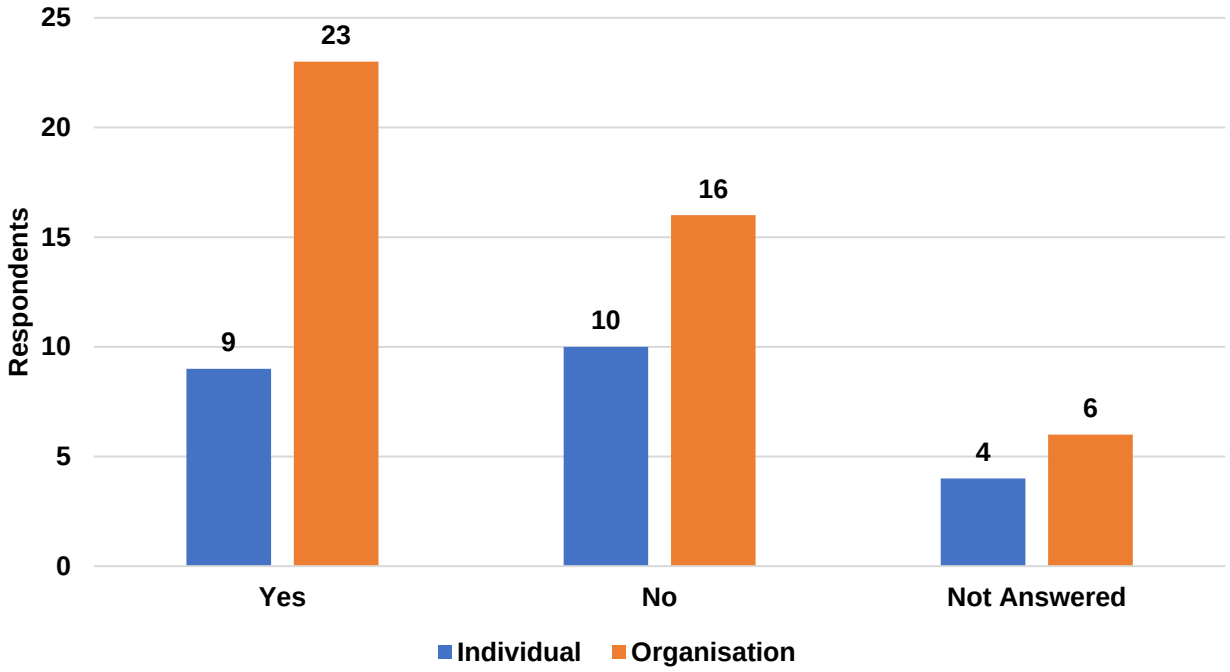


"There are various ways we can present noise data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport."

Data Table: Responses to Question 13 (Airport)

Answer	Individual	Organisation	Total
Extremely useful	14	26	40
Very useful	7	6	13
Useful	0	5	5
Slightly useful	1	1	2
Not useful	0	2	2
Not answered	1	5	6

Figure 12: Responses to Question 14

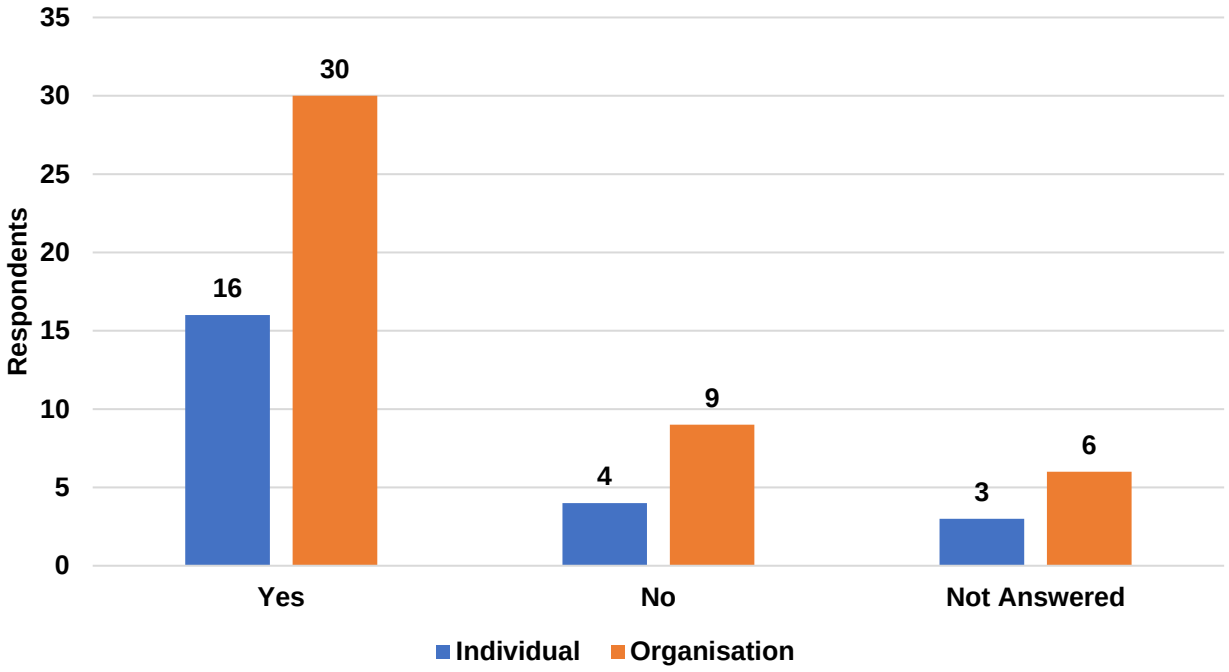


"Are there any other ways we could present noise data which you think would be useful to include in future updates of the AER, outside of those already suggested?"

Data Table: Responses to Question 14

Answer	Individual	Organisation	Total
Yes	9	23	32
No	10	16	26
Not answered	4	6	10

Figure 13: Responses to Question 15

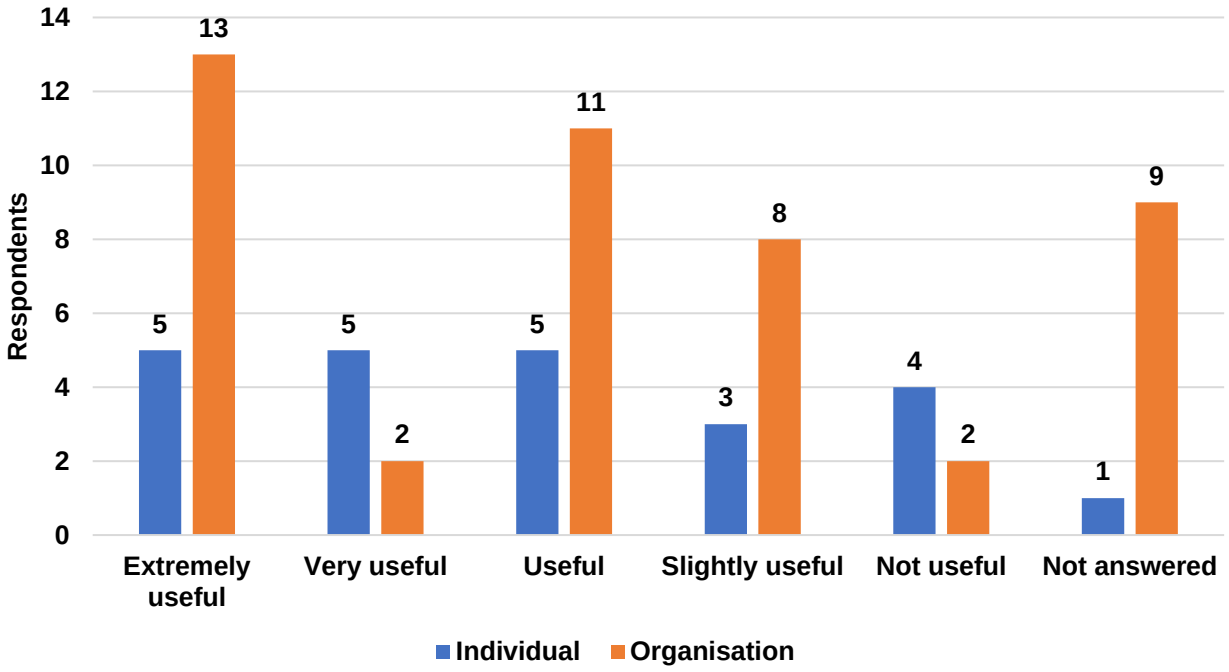


"In addition to reporting emissions from civil aviation flights and airport support machinery for the five damaging air pollutants outlined, are there any other relevant areas we should consider reporting on with respect to air quality in future updates to the AER?"

Data Table: Responses to Question 15

Answer	Individual	Organisation	Total
Yes	16	30	46
No	4	9	13
Not answered	3	6	9

Figure 14: Responses to Question 16 (National Total)

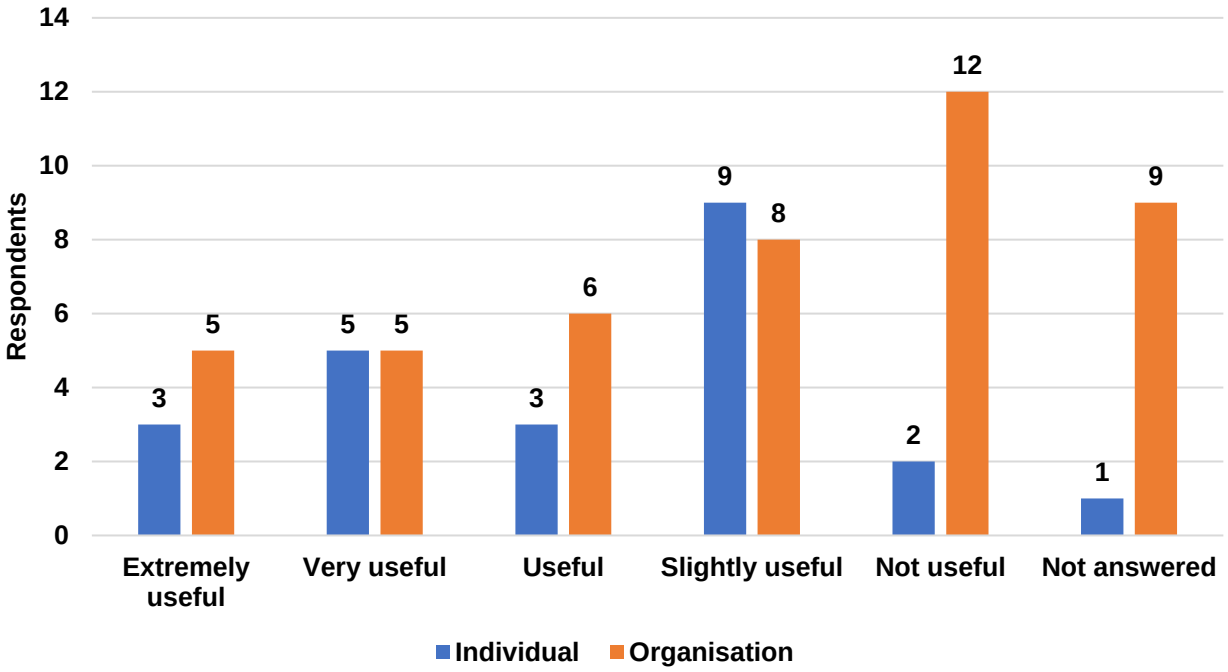


"There are various ways we can present air quality data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: National total."

Data Table: Responses to Question 16 (National Total)

Answer	Individual	Organisation	Total
Extremely useful	5	13	18
Very useful	5	2	7
Useful	5	11	16
Slightly useful	3	8	11
Not useful	4	2	6
Not answered	1	9	10

Figure 15: Responses to Question 16 (Airport Cluster)

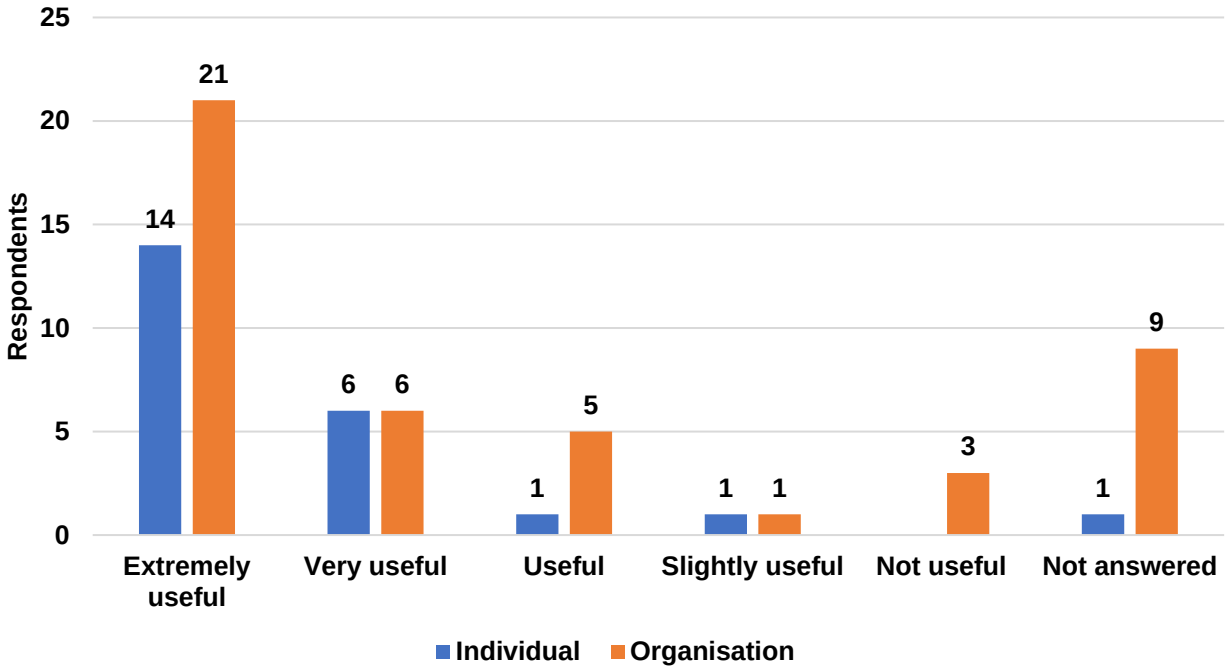


"There are various ways we can present air quality data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport cluster."

Data Table: Responses to Question 16 (Airport Cluster)

Answer	Individual	Organisation	Total
Extremely useful	3	5	8
Very useful	5	5	10
Useful	3	6	9
Slightly useful	9	8	17
Not useful	2	12	14
Not answered	1	9	10

Figure 16: Responses to Question 16 (Airport)

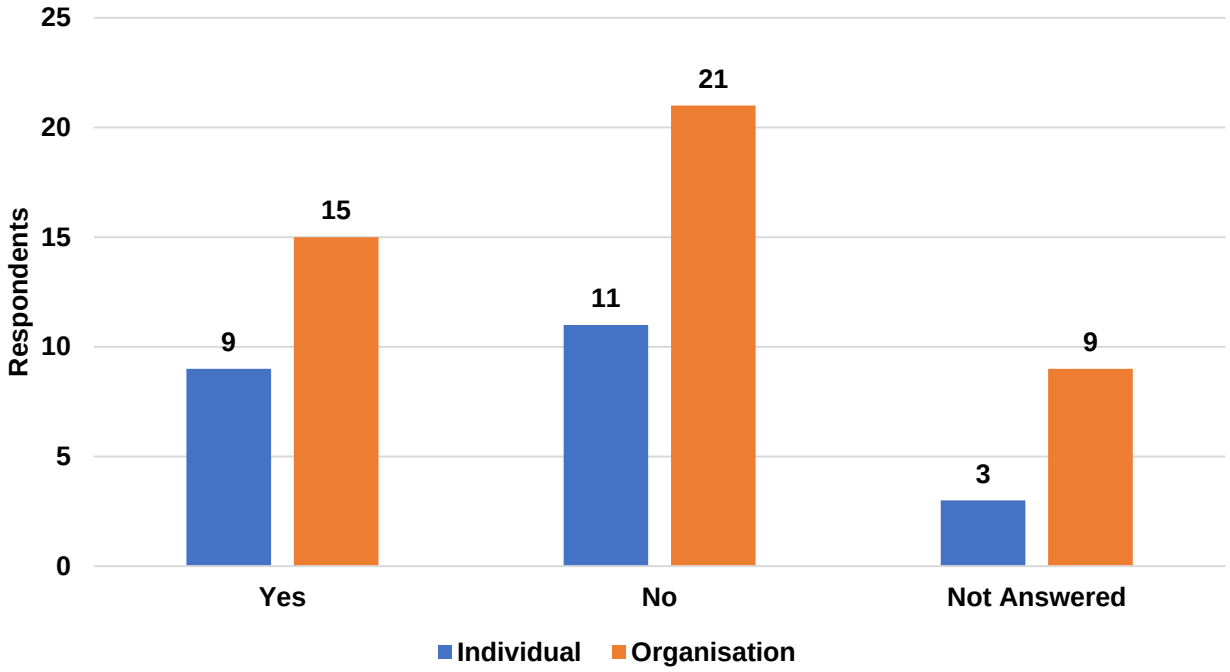


"There are various ways we can present air quality data in future updates of the AER. Please tell us how useful each of the following options would be to you. Note these options are not mutually exclusive and may be used in combination: Airport."

Data Table: Responses to Question 16 (Airport)

Answer	Individual	Organisation	Total
Extremely useful	14	21	35
Very useful	6	6	12
Useful	1	5	6
Slightly useful	1	1	2
Not useful	0	3	3
Not answered	1	9	10

Figure 17: Responses to Question 17

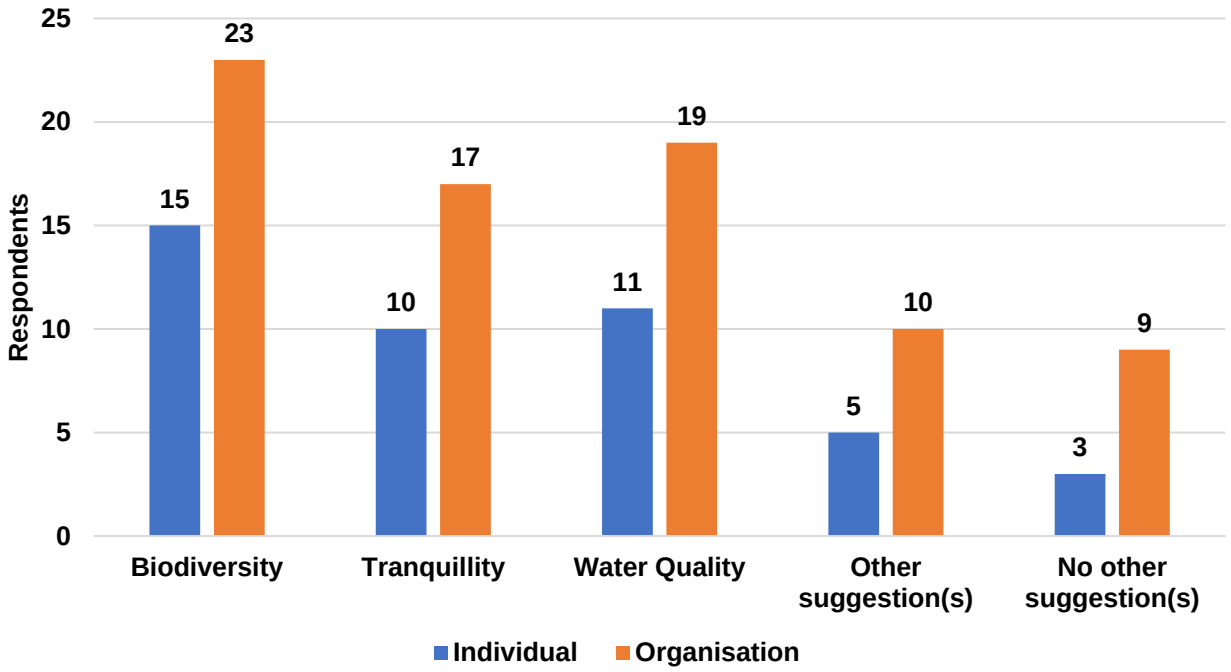


"Are there any other ways we could present air quality data which you think would be useful to include in future updates of the AER, outside of those already suggested?"

Data Table: Responses to Question 17

Answer	Individual	Organisation	Total
Yes	9	15	24
No	11	21	32
Not answered	3	9	12

Figure 18: Responses to Question 18



Not including climate change, noise and air quality, would you like to suggest any additional environmental topic(s) that the AER could report on?

Data Table: Responses to Question 18

Answer	Individual	Organisation	Total
Biodiversity	15	23	38
Tranquillity	10	17	27
Water Quality	11	19	30
Other suggestion(s)	5	10	15
No other suggestion(s)	3	9	12

Appendix B

Abbreviations

ACI	Airports Council International
AEM	Advanced Emission Model
AER	Aviation Environmental Review
CAA	UK Civil Aviation Authority
CAP	Civil Aviation Publication
CCC	Climate Change Committee
CoCiP	Contrail Cirrus Prediction Tool
COPERT	EU Standard Vehicle Emissions Calculator
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPRE	The Countryside Charity
DALY	Disability Adjusted Life Years
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DLR	German Aerospace Center
EAER	European Aviation Environmental Report
EASA	European Union Aviation Safety Agency
EU	European Union
HMRC	His Majesty's Revenue and Customs
ICAO	International Civil Aviation Organization
ISO	International Organization for Standardization
LED	Light-emitting diode
LOAEL	Lowest Observed Adverse Effect Level
NAEI	National Atmospheric Emissions Inventory
NJM	Number of Jet Movements

NNG	Night Noise Guidelines
NTK	Noise and Track Keeping
PAS	Publicly Available Specification
PFAS	Per-and Polyfluoroalkyl Substances
PM	Particulate Matter
PSDH	Project for the Sustainable Development of Heathrow
QALY	Quality Adjusted Life Years
RSPB	Royal Society for the Protection of Birds
SAF	Sustainable Aviation Fuel
SSSI	Site of Special Scientific Interest
TAG	Transport Analysis Guidance
UFP	Ultrafine Particles
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization