

Written evidence from the Met Office

Introduction

The Met Office is the UK's National Meteorological Service (NMS), a Public Sector Research Establishment (PSRE) and an Executive Agency of the Department for Business, Energy and Industrial Strategy (BEIS). We are responsible for monitoring and predicting the weather and providing the National Severe Weather Warning Service (NSWWS). In addition, we host the Met Office Hadley Centre for Climate Science and Services, which delivers policy relevant climate advice to the UK Government.

Weather is one of the greatest hazards and causes of disruption to aviation and marine operations and the Met Office has a long history of engagement with the aviation and maritime industry. As the National Meteorological Service for the UK, the Met Office provides services on behalf of the Civil Aviation Authority (CAA), including aerodrome forecasts, en-route weather, real time weather monitoring and warning of adverse weather that may impact flight safety. Similarly, the Met Office initiates warnings and prepares routine forecasts for dissemination on behalf of the Maritime and Coastguard Agency, including the Shipping Forecast. This ensures the UK meets the UN International Convention for the Safety of Life at Sea.

The Met Office also has over 40 years of experience in providing specialist forecasts and weather window analyses to the Offshore Energy sector to help minimise weather-related risk and uncertainty, reduce operational costs, and ensure safety at sea.

The Met Office is designated by the International Civil Aviation Organisation (ICAO) as one of only two designated World Area Forecast Centres (WAFCs). The other WAFc is in the United States. The two WAFCs share responsibility for providing essential, global, en-route aviation weather forecasts for all civil aviation above 25,000 feet, to enable safe and efficient flight.

1. What contribution can operational efficiencies make to reduce emissions from aircraft / shipping vessels and over what timescale could these have an effect on emissions?

In addition to impacts on aviation safety, weather hazards such as turbulence, icing and convective storms can have a significant impact on the efficiency and timing of a flight. The provision of accurate and timely forecasts allows such hazards to be taken into account at the flight planning stage and efficient routing to be used. Likewise, marine forecasts such as the Shipping Forecast and High Seas forecast, provided by the Met Office primarily for safety also contribute to efficient operations by enabling avoidance of gale force winds and dangerous seas and a potential reduction in standby time.

The Met Office also offers a route forecast tool suitable for vessels of any size in open waters anywhere around the globe. This provides reliable weather information for planning routes safely and efficiently, as well as predicting vessel fuel consumption. Trained meteorologists can be available 24/7 to help companies with decision making and understanding risk, so operations can be planned efficiently. Through enabling the identification of potential weather windows, these services can be a powerful decision-making aid to reduce operational downtime and related emissions.

The Met Office provides on-site meteorologists to a range of customers in the aviation industry to support their operations, allowing them to take weather impacts into account and

ensure their operations run smoothly and efficiently. The Met Office has worked closely with NATS (the UK's provider of en-route air traffic and many airport air traffic services) for many years, providing a number of specialised services to assist with routing of air traffic over the UK and North Atlantic, and to minimise the impacts of adverse weather across UK airspace and ensure that the airspace is used efficiently. The Met Office also provides forecast services to airlines to improve planning and support operational efficiency, which is linked directly to reduced fuel consumption and emissions in most occasions.

As one of the two World Area Forecast Centres (WAFCs), the Met Office works collaboratively to ensure that the next generation of the World Area Forecast System (WAFS) datasets deliver accurate and improved meteorological data to support the aviation industry. These new data sets will provide much higher horizontal, vertical and temporal resolution (more detailed) forecast information, becoming operational in November 2023. As the aviation industry rapidly changes, these new and improved data sets will contribute towards limiting the environmental impact of air travel.

In addition to this, the Met Office provides specialist services to help airlines optimise route planning based on the expected conditions on their route. High resolution weather data builds a much clearer picture of what is happening on an aircraft's planned flight path. This can be used to inform more route planning and allow aircraft to select a route which maximises efficiency. Increased accuracy can reduce fuel burn and therefore how much CO₂ is emitted during a flight. In a recent collaboration with Swedish software company AVTECH, integrating Met Office high resolution data into AVTECH technology was shown to reduce carbon emissions of an airline by an additional 10-15,000 tonnes per year (based on pre-COVID 19 air traffic levels) and, if all airlines were to adopt similar technologies, this rises to 1.24M tonnes of CO₂ savings per annum¹.

2. How close are zero carbon fuels to commercialisation for aviation / shipping? How effective will the Jet Zero Council be in catalysing zero emissions technologies? What role should transitional fuels such as alternative hydrocarbon fuels play?

No response from the Met Office

3. What new technologies are there to reduce emissions from aircraft / shipping vessels and how close to commercialisation are they?

In April 2020, the Met Office signed a multimillion-pound agreement with Microsoft for the provision of a world-leading supercomputing capability that will take weather and climate forecasting to the next level, with the new capability due to be up and running in Summer 2022². The new supercomputer will enable the Met Office to provide more accurate forecasts of wind and temperature information for the aviation and maritime industry driving ever greater fuel efficiency and safety.

Services, such as that provided in collaboration with AVTECH (described in response to Question 2), are operational now and it is anticipated that the next supercomputing capability

¹ <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2021/weather-forecasts-could-save-aviation-industry-millions-of-tonnes-of-co2>

² <https://www.metoffice.gov.uk/about-us/press-office/news/corporate/2021/met-office-and-microsoft-announce-supercomputer-project>

will enable further improvements in resolution and accuracy, enabling an increasingly fuel-efficient approach to route planning.

There are definite synergies between aviation and marine, and scope to explore the application of technology used in aviation to shipping. With increased supercomputing capability, the Met Office is in a strong position to develop data offerings to companies offering shipping route optimisation, applying the blueprint of the successful collaborations in the aviation industry.

The Met Office has an interest in contributing to decarbonisation solutions such as reduced voyage speeds and wind-assisted technology. Improved forecast accuracy will further contribute to these future technologies in shipping. For example, a review of how environmental conditions over key shipping routes to/from the United Kingdom could be harnessed to improve operational efficiencies for the next generation of vessels.

4. How should the Government's net zero aviation strategy support UK industry in the development and uptake of technologies, fuels and infrastructure to deliver net zero shipping and aviation?

The Met Office has experience of translating cutting-edge weather science into services which support both the aviation and marine industries, these have often been developed in collaboration with experts in industry, academia or other parts of Government. The development of new technologies and services requires an adequate funding source to translate science into services, including a value cycle that delivers users' changing requirements. Any funding mechanism developed to support the R&D of new technologies to improve efficiency in these sectors should recognise the diverse range of organisations with expertise in this sector and seek to provide adequate support for such work regardless of organisational 'wrapper'.

5. What is the most equitable way to reduce aircraft passenger numbers (e.g. reforming air passenger duty and taxes, frequent flyer levies, bans on domestic flights where trains are available, restrictions on airport capacity)? Are there any policy mechanisms that could reduce our reliance on shipping?

No response from the Met Office

6. What further action is needed by the International Civil Aviation Organization and International Maritime Organization to drive emissions reductions? What can the UK Government do to drive international action on emissions?

As well as being a member of IMO and ICAO, the UK is also a member of the World Meteorological Organisation (WMO). As the National Meteorological Service, the Met Office represents the UK in WMO and is an influential member of the organisation. The Met Office Chief Executive is a member of the Executive Committee and Policy Advisory Committee; our Chief Scientist is a member of the Science Advisory Panel; and another staff member is President of the Commission for Weather, Climate, Water and Related Environmental Services and Applications (SERCOM).

WMO coordinates and collaborates closely with the ICAO and IMO through formal working arrangements, such as WMO expert membership of all ICAO Meteorology Panel activities. The UK can use its role in the WMO to support and influence activities that will improve communication and collaboration between the meteorological community and the maritime and aviation industries, to not only ensure the safety of life and property, but simultaneously increase the efficiency of operations and reduce emissions. For example, at a joint IMO and

WMO symposium in 2019, it was agreed that improved operational efficiency and reduced emissions would result from optimal voyage routing. Some of the changes developing within aviation meteorology, such as the new generation of datasets for WAFS, are a function of the ICAO regulatory development process. There is however, perhaps scope for further consideration of environmental sustainability aims with the development of all regulatory changes.

7. How effective will the global offsetting scheme for international airlines (ICAO's CORSIA) and the UK and EU ETS be at stimulating technology improvement and/or behaviour change to reduce emissions from aviation / shipping?

No response from the Met Office

8. How should the UK define its ownership of international aviation and shipping emissions (i.e. arrivals, departures or both) in order to include them in legislative targets?

No response from the Met Office