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AGENDA ITEM 7: AVIATION AND ENVIRONMENT

**EUROPEAN UNION EFFORTS TO SUPPORT CLIMATE
RESILIENCE AND ADAPTATION**

Presented by the European Union Aviation Safety Agency (EASA)

SUMMARY

The paper highlights the increasing importance of climate resilience and adaptation as essential components of aviation safety. It outlines the European policy framework, scientific activities and collaborative initiatives undertaken by the European Union, the European Union Aviation Safety Agency and European aviation stakeholders to improve the understanding of climate-related hazards, assess their implications for aviation safety, and strengthen the resilience of the aviation system through research, cooperation and evidence-based adaptation measures.

EUROPEAN UNION EFFORTS TO SUPPORT CLIMATE RESILIENCE AND ADAPTATION

1. INTRODUCTION

1.1 Climate change is expected to influence a range of weather-related hazards that are already well known in aviation safety management, including clear-air turbulence, severe convective storms, hail, heavy precipitation, low-level windshear, airborne icing, lightning strikes and high ground temperatures affecting aircraft and infrastructure performance. While these effects typically manifest over long timescales, they must be anticipated early to avoid future safety vulnerabilities.

1.2 This paper describes the efforts undertaken within the European aviation system to strengthen resilience and adaptation to the impacts of climate change. It highlights relevant policy developments, scientific activities, stakeholder cooperation initiatives and practical measures aimed at improving the understanding of climate-related risks and supporting their integration into aviation safety and operational planning.

2. DISCUSSION

2.1 Climate change adaptation and resilience is an essential component of maintaining and enhancing aviation safety in Europe and globally. While aviation has long addressed weather-related hazards, scientific studies and data from industry have highlighted that climate change is altering the frequency, intensity, geographical distribution and seasonal patterns of those hazards. This creates new challenges for safety risk management and requires a forward-looking, evidence-based and coordinated approach across regulators, industry and the scientific community.

European Union

2.2 At EU level, adaptation to climate change is recognised as being as important as mitigation. The EU Strategy on Adaptation to Climate Change sets out a pathway towards a climate resilient Europe by 2050, while the European Climate Law requires continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.

2.3 In February 2021, the European Commission adopted the new EU Strategy on Adaptation to Climate Change, establishing a long-term vision for a climate-resilient Europe by 2050. Recognising that certain impacts of climate change are already unavoidable, the Strategy seeks to strengthen resilience through improved climate risk knowledge, enhanced adaptation planning, accelerated implementation of adaptation measures, and stronger integration of climate resilience across all policy areas and sectors. The Strategy promotes a “smarter, swifter and more systemic” approach to adaptation, supported by improved data, nature-based solutions, resilient infrastructure, and strengthened international cooperation. It also highlights the importance of incorporating climate resilience into investment and decision-making processes, while supporting vulnerable regions and sectors in addressing increasing climate-related risks. Through these actions, the European Union aims to reduce vulnerability, safeguard economic and social systems, and contribute to global efforts to enhance climate resilience.

2.4 Recognising that the impacts of climate change extend across all areas of aviation, various organisations have strengthened cross-sector cooperation to support climate resilience and adaptation within the European aviation system. In this context, dedicated working groups have been established to facilitate collaboration among aviation stakeholders, promote the exchange of knowledge and experience, and support the development of practical adaptation measures.

European Union Aviation Safety Agency (EASA)

2.5 The European Union Aviation Safety Agency (EASA) has integrated climate change adaptation into its strategic safety priorities, as reflected in the European Plan for Aviation Safety (EPAS). It identifies “managing the impact of climate change” as a priority for the European aviation system and

includes dedicated research actions to review and assess scientific knowledge on trends in weather hazards relevant to aviation safety. It further highlights the need to ensure that safety risk assessments and mitigation measures remain sustainable in the face of long-term climate-driven changes.

2.6 EASA also prioritizes aviation resilience against climate change through its dedicated Top Safety Topic, TST-5 for Adverse Weather Hazards. This initiative proactively identifies emerging trends in extreme weather conditions that threaten flight safety. Because climate shifts alter the severity and frequency of weather hazards, current aviation regulations and historical assumptions may soon become obsolete. TST-5 directly addresses these gaps by evaluating future risks, ensuring safety frameworks evolve alongside environmental changes. Ultimately, this strategic focus helps the aviation sector adapt, modernize its baseline assumptions, and maintain high safety standards despite increasingly unpredictable and severe weather patterns worldwide.

2.7 To strengthen the scientific basis for climate adaptation in aviation, EASA has identified climate change impacts as a key priority of its Scientific Committee since its establishment in 2022. Initial findings, including research on severe convective storms, hail and clear-air turbulence, have been published in the Committee's annual reports. This work aims to improve understanding of how climate change may alter the frequency, intensity and distribution of weather-related hazards affecting aviation. It examines the potential implications across a range of aviation domains, including flight operations, pilot training, aircraft design and airworthiness, air traffic management and air navigation services (ATM/ANS), as well as aerodrome operations and infrastructure. The analysis also considers interdependencies with capacity, efficiency, economic and environmental performance, while supporting the identification of emerging safety risks and existing safety issues that may be exacerbated by a changing climate.

2.8 Recognising the growing importance of climate resilience for aviation safety, EASA established the European Network on the Impact of Climate Change on Aviation ([EN-ICCA](#)) in November 2023. The network brings together aviation authorities, industry representatives, meteorological and climate service providers, and members of the scientific community to support a coordinated and evidence-based approach to climate change adaptation in aviation. EN-ICCA focuses on the effects of climate change on weather-related phenomena and wildlife hazards that may affect aviation safety, while also considering implications for capacity, efficiency, economic performance and environmental sustainability. Its work contributes to the aviation sector's adaptation objectives under the European Climate Law.

2.9 Through structured cooperation among regulators, operational stakeholders and researchers, EN-ICCA supports the development of a common understanding of climate-related risks to aviation and the identification of appropriate adaptation measures. The network facilitates the exchange of scientific knowledge and operational experience, promotes coordination with relevant research initiatives, and supports the identification of emerging safety issues associated with a changing climate. In addition, EN-ICCA contributes to the prioritisation of adaptation actions and the dissemination of good practices to enhance the resilience of the aviation system.

2.10 Key outputs of the network will include assessments of climate-driven trends in weather-related hazards, analyses of their potential safety implications across aviation domains, and recommendations to address scientific knowledge gaps and support risk mitigation. The current work programme focuses on developing methodologies to assess trends in aviation-relevant weather hazards, including [airborne icing conditions](#), and the examination of severe convective storms and associated hazards. Through EN-ICCA, EASA aims to systematically integrate climate adaptation considerations into aviation safety management and support the development of a safe, resilient and sustainable aviation system.

2.11 Building on the work of the EASA Scientific Committee and EN-ICCA, EASA has launched a dedicated Safety Issue Assessment on turbulence encounters, with a specific focus on Clear Air Turbulence, Mountain Waves and Near-Cloud Turbulence. These phenomena are difficult to detect and forecast, and scientific evidence indicates that climate change may affect their frequency and intensity. The assessment aims to identify typical threat scenarios, evaluate the effectiveness of existing

barriers and propose mitigating actions to strengthen the resilience of the European aviation system.

2.12 Finally, EASA publishes the [European Aviation Environmental Report](#) every 3 years. This contains a Chapter on the latest understanding of the environmental impacts from the aviation sector, including measures linked to climate change adaptation and resilience.

EUROCONTROL and ACI EUROPE

2.13 The European Aviation Climate Change Adaptation Working Group (EACCA-WG) was established in 2022 and is co-chaired by EUROCONTROL and ACI EUROPE. The Working Group brings together around 40 organisations representing airport operators, air navigation service providers, aircraft operators, manufacturers and industry associations. Its objective is to support aviation stakeholders in assessing climate-related risks and implementing adaptation measures by providing guidance, peer support and examples of good practice. Through this collaborative approach, the Working Group contributes to building a common understanding of climate resilience challenges across the aviation sector.

2.14 The Working Group has already produced several practical outputs to support preparedness and adaptation efforts. These include [guidance](#) on preparations for adverse summer and winter weather conditions, providing [recommendations](#) to help aviation organisations strengthen their resilience to extreme weather events. In addition, it has published a [briefing](#) on adapting aviation to a changing climate, outlining key climate-related impacts on European aviation and presenting a structured approach to [climate risk assessment](#) and adaptation planning.

European Industry

2.15 European aviation operators and manufacturers have shared operational safety data with EASA to support the assessment of climate-related trends affecting aviation. These data complement scientific research and contribute to a better understanding of the changing frequency and characteristics of weather-related hazards. Building on this evidence, EASA and industry stakeholders are working together to identify appropriate mitigation measures and adaptation actions, ensuring that future safety frameworks remain effective under changing climatic conditions.

3. CONCLUSION

3.1 Climate change is expected to increasingly influence weather-related hazards that are relevant to aviation safety. Strengthening the resilience of the aviation system therefore requires a proactive and evidence-based approach that combines scientific knowledge, safety risk management and long-term adaptation planning.

3.2 The European Union, EASA and European aviation stakeholders have established a comprehensive framework to support climate resilience through policy development, scientific research, operational safety assessments and cross-sector cooperation. These initiatives contribute to a better understanding of climate-related risks and support the development of practical adaptation measures across the aviation system.

3.3 As scientific knowledge continues to evolve, international cooperation and the exchange of experience will be essential to ensure that aviation safety frameworks remain effective in a changing climate. Collaboration between regulators, industry, research organisations and international partners will play a key role in strengthening the resilience of the global aviation system.

4. ACTION BY THE CONFERENCE

4.1 The Conference is invited to:

- (a) recommend continued international cooperation, exchange of scientific knowledge and operational experience, and collaboration on climate adaptation initiatives to enhance the safety

and resilience of the global aviation system.

— END —



European Union Efforts to Support Climate Resilience and Adaptation in Aviation

Climate change is becoming an aviation safety issue, not only an environmental issue, requiring proactive, evidence-based adaptation across regulators, industry and research bodies.

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| 1 |  Why it matters | Climate change may alter the frequency, intensity and location of aviation hazards such as clear-air turbulence, storms, hail, icing, lightning, heavy rain, windshear and high temperatures. |
| 2 |  EU policy framework | The EU Strategy on Adaptation to Climate Change and European Climate Law set the direction towards a climate-resilient Europe by 2050. |
| 3 |  EASA safety focus | EASA has integrated climate adaptation into aviation safety priorities through EPAS, adverse weather safety topics, scientific research and safety assessments. |
| 4 |  Scientific and risk assessment work | EASA's Scientific Committee and EN-ICCA are assessing climate-driven trends, safety implications and knowledge gaps across aviation domains. |
| 5 |  Sector collaboration | EUROCONTROL, ACI EUROPE and around 40 organisations collaborate through EACCA-WG to develop practical guidance and good practice for adaptation. |
| 6 |  Recommendation | Continue international cooperation, data sharing, scientific exchange and practical adaptation planning to strengthen global aviation resilience. |



Understand changing hazards

turbulence • storms • icing • extreme temperatures



Integrate evidence into safety management

science • data • risk assessment • adaptation planning



Cooperate internationally

regulators • industry • meteorology • research

