



# *Climate Change and Aviation*

## Session Co-Chairs

Tammy Flowe – FAA

Tim Rahmes - Boeing

## Fall 2023 FPAW Meeting, Tuesday November 13

9:30 AM – 9:45 AM	Opening Remarks: Matt Fronzak (MITRE), Matthias Steiner (NCAR), Tammy Flowe (r), Tim Rahmes
9:45 AM – 10:00 AM	Overview of the Climate Change and Aviation Session (Tammy Flowe, Tim Rahmes)
10:00 AM – 10:30 AM	Increased Turbulence Probability: Dr. Paul Williams (University of Reading) (r):
10:30 AM – 10:45 AM	Break
10:45 AM – 11:00 AM	Primer on Persistent Contrails: Tim Rahmes
11:00 AM – 11:30 AM	Contrail mitigation decisions: Ted Thrasher (MITRE):
11:30 AM – 11:45 AM	Open Discussion: And Now What?
11:45 AM – 12:45 PM	Lunch
12:45 PM – 1:15 PM	Climate projections and high impact weather: Dr. James Done (NCAR) (r)
1:15 PM – 1:45 PM	Use of Sustainable Aviation Fuel (SAF), Contrail Modeling, Measurements, and Mitigation: Nicole Didyk-Wells (FAA)
1:45 PM – 2:00 PM	Break
2:00 PM – 2:25 PM	Open Discussion: And Now What (Part Two)?
2:25 PM – 2:30 PM	Closing Remarks: Tammy Flowe (r), Tim Rahmes



*Climate Change*

*Aviation*

# United States 2021 Aviation Climate Action Plan

The United States is committed to making significant efforts to achieve the ambitious climate goals in this Aviation Climate Action Plan. Working in partnership with the U.S. aviation, agriculture, and energy industries, these goals are achievable, and will result in significant progress in addressing aviation's climate impact. Through this effort, we will drive innovation in aviation technologies, further streamline operations, and spur a massive increase in SAF deployment with a corresponding increase in the U.S. economic benefits and jobs. The United States looks forward to this challenge and will leverage the resources necessary to carry out the actions throughout this plan.

The actions identified in the Plan will decrease emissions through:

- Development of new, more efficient aircraft and engine technologies
- Improvements in aircraft operations throughout the National Airspace System
- Production and use of Sustainable Aviation Fuels (SAF) [***Includes contrail studies***]
- Electrification and, potentially hydrogen, as solutions for short-haul aviation
- Advancements in airport operations across the United States
- International initiatives such as the airplane CO<sub>2</sub> standard and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)
- **Support for research into climate science**



# FAA Environmental and Energy (E&E) Strategy

**E&E Mission:** To understand, manage, and reduce the environmental impacts of global aviation through research, technological innovation, policy, and outreach to benefit the public

**E&E Vision:** Remove environmental constraints on aviation growth by achieving quiet, clean, and efficient air transportation

- **CLIMATE**

- GOAL: Net-zero greenhouse gas emissions from the U.S. aviation sector by 2050

- **AIR QUALITY**

- GOAL: Reduce significant air quality impacts attributable to aviation

- **NOISE**

- GOAL: Reduce significant noise impacts attributable to aviation

- **SUSTAINABLE AVIATION FUEL**

- GOAL: Achieve 3 billion gallons of U.S. sustainable aviation fuel (SAF) by 2030 and 35 billion gallons by 2050



## Evaluation of contrail climate impact and potential contrail reduction through SAF use

NASA and FAA are working with international partners to characterize alternative fuel emissions in flight and to understand contrail formation

# EASA | European Union Aviation Safety Agency

*Meeting held last week in Cologne*

## Climate Change Adaptation – EASA actions (2023)

- **European network on impact of climate change on aviation (EN-ICCA)**
  - **Scope:**
    - **Safety** (airworthiness, flight crew training, flight standards, ATM/ANS, aerodromes)
    - interdependencies with capacity, efficiency, environment
  - **Objectives:**
    - Help aviation stakeholders to better understand the effects of climate change and to define actions to maintain safety;
    - Inform the scientific community of priority topics regarding impact of climate change on aviation;
    - Facilitate exchange of information and coordination between research projects on climate change;
    - Help EASA and other authorities to manage the effect of climate change on aviation.

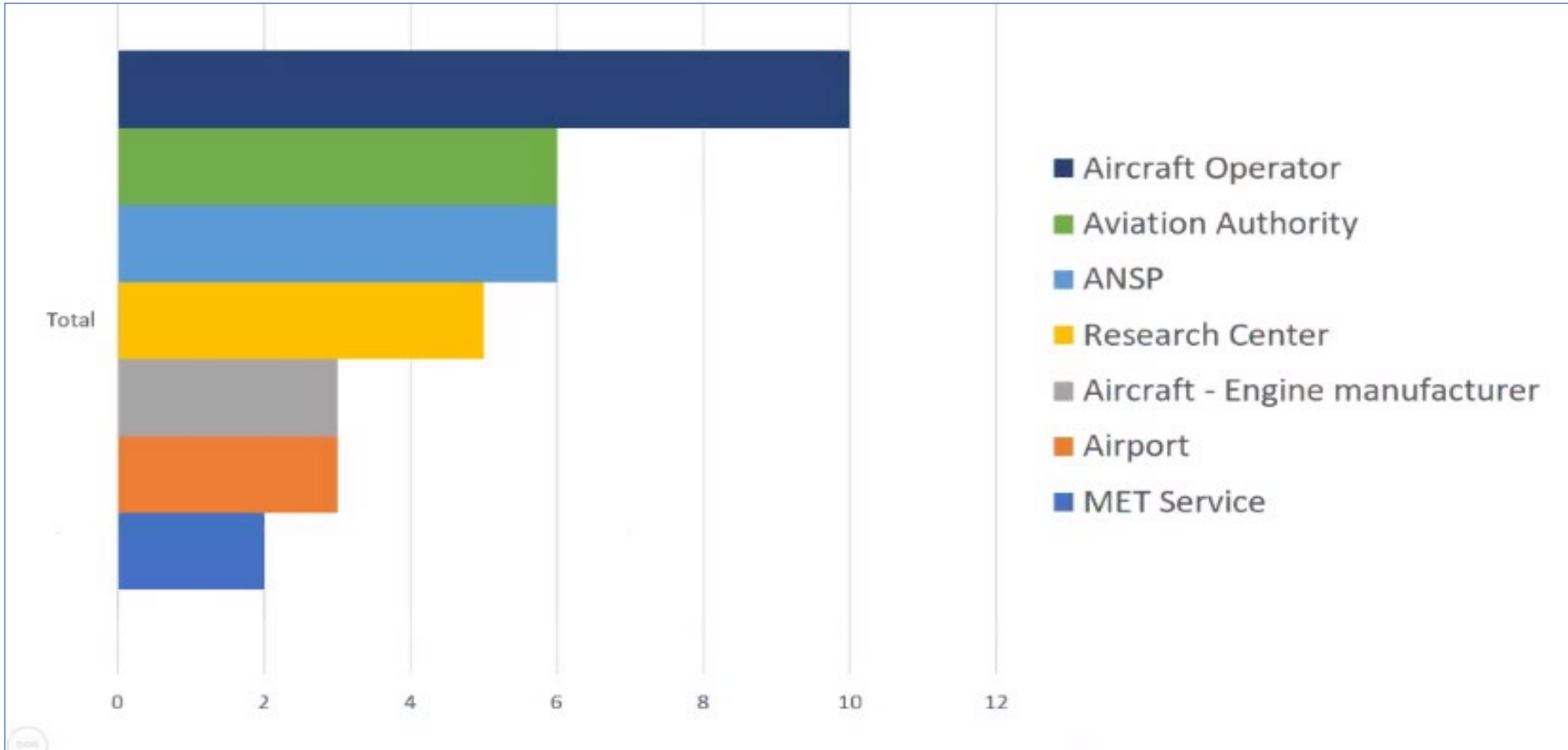
EASA is taking action to protect aviation from future climate change



## II. Main priority topics for EASA – high-level overview

Specific topics	Transversal topic 1	Transversal topic 2
Trends regarding severe convective storms and associated hazards (Hail; Lightning strikes; Airborne icing ; Wind and gusts; Heavy precipitation; Downbursts and low-level windshear; Updraft; Tornadoes)	Effects of weather trends on aviation safety And Actions (research, studies, etc.) to help progress knowledge.	Effective climate change adaptation measures to tackle the effects of weather trends.
Trends regarding jet streams, clear-air turbulence, and atmospheric blockings		
Trends regarding air temperatures and prevailing winds near the surface		
Trends regarding airborne icing conditions (including ice crystals)		
Trends regarding tropical and tropical-like cyclones		
Trends regarding storm surges		
Trends regarding dust storms		
Trends regarding bird strikes		
Trends regarding fog		
Evolution of atmosphere parameters (density, temperature, pressure) and the ISA model		

# Who is participating in EN-ICCA?





## Role of EASA

## Role of EUROCONTROL

	EN-ICCA	EACCA
<b>Objective</b>	<ul style="list-style-type: none"> <li>➤ Help aviation stakeholders to get a <b>science-based understanding</b> of the effects of climate change on safety and to define actions;</li> <li>➤ Inform the <b>scientific community</b> of priority topics for aviation stakeholders, and enhance <b>research projects</b> coordination;</li> <li>➤ Help EASA and Member States to <b>manage the effects of climate change on aviation</b> (as required by the <a href="#">European Climate Law</a>).</li> </ul>	<ul style="list-style-type: none"> <li>➤ support operational stakeholders in understanding the risks and adapting to the impacts of climate change</li> <li>➤ Provide aviation stakeholders with a <b>methodology, companion guidance and good practices</b> on adapting to the impacts of climate change.</li> </ul>
<b>Scope and focus</b>	<ul style="list-style-type: none"> <li>➤ Scope = effect of climate change on weather-related phenomena that have an <b>impact on safety risks, and associated interdependencies</b> with other types of risks;</li> <li>➤ <b>All aviation safety domains</b> (airworthiness, air operations, flight crews, ATM/ANS, airports, General Aviation, UAS);</li> <li>➤ Initial focus on <b>commercial aviation</b>;</li> <li>➤ Area of interest is <b>global and all altitudes</b>.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Scope = <b>all types of risks</b> (including non-safety risks);</li> <li>➤ Initial focus on <b>airports</b>, open to other operational stakeholders;</li> <li>➤ Area of interest is <b>(geographical) Europe</b>.</li> </ul>

# EN-ICCA: Where to begin?

Based on safety statistics? Examples of results when querying the European Central repository

- Majority of 221 accidents & serious incidents were **turbulence encounters [57]**
- Followed by:
  - **Windshear/microburst [28],**
  - Icing condition encounter [19], unexpected weather [19],
  - Crosswind [14], poor visibility [14], lightning strike [11], tailwind encounters [9]

Unique count of ECR\_FileName by EventType\_L4 and EventType\_L1

