

FAA Environment & Energy Research & Development Overview

Prepared for: ASCENT COE Meeting

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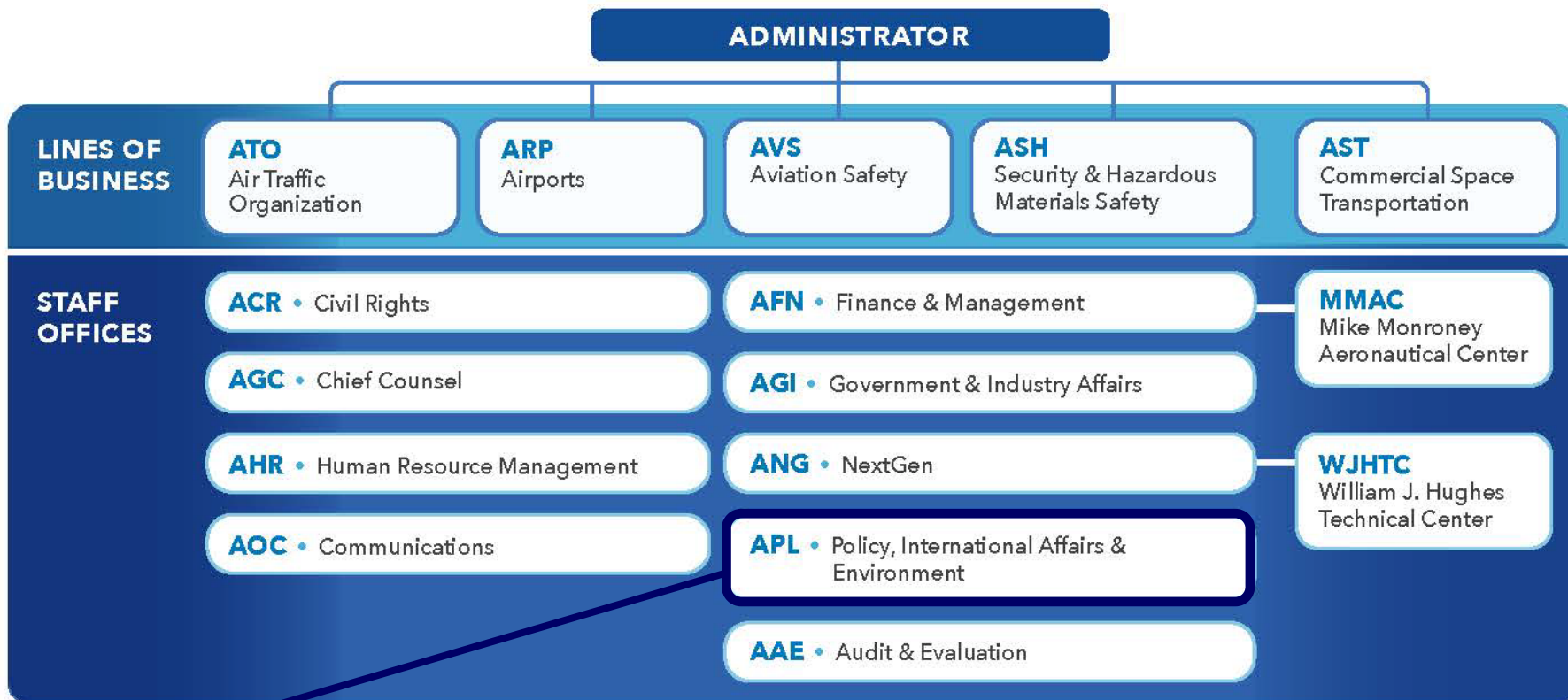
Date: April 27, 2021



Federal Aviation
Administration



FAA Organizational Structure



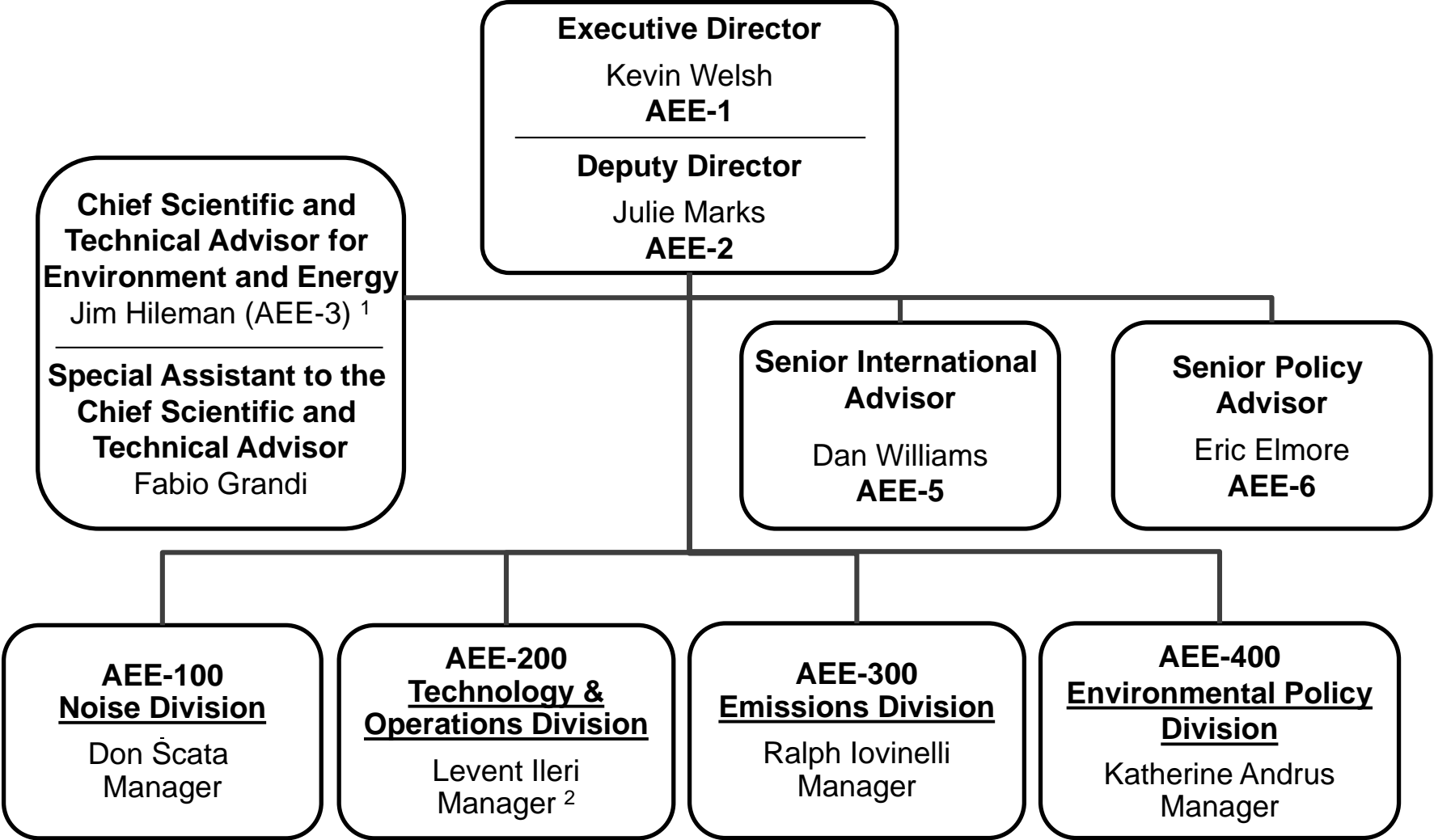
Office of Environment and Energy (AEE)

- Office within APL, responsible for broad range of environmental policies
- Roughly 45 staff members
- Responsible for roughly one-fourth of FAA RE&D Budget



AEE Organizational Structure

Effective 3/28/2021



¹ ASCENT Program Manager, as a subset of his Chief Scientist duties

² CLEEN Program Manager, as a subset of his Division Manager duties

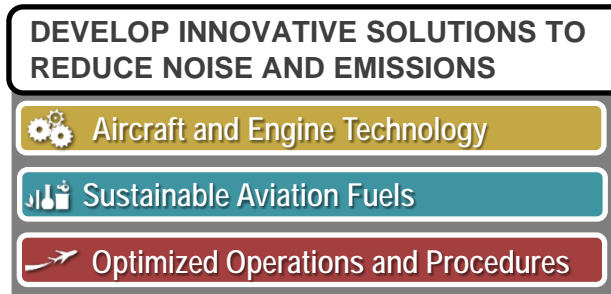
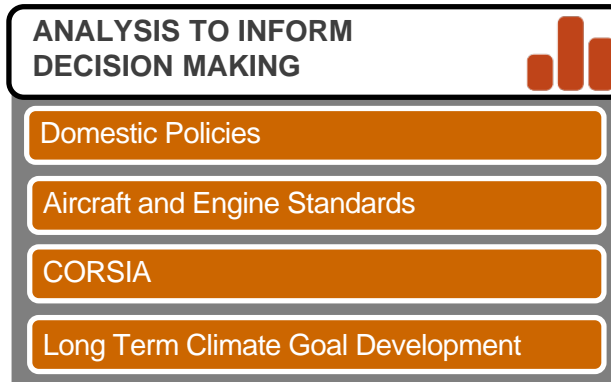
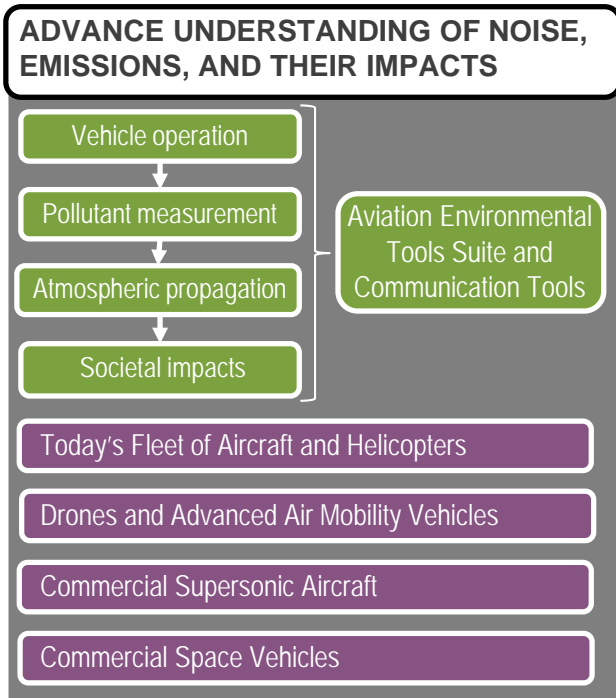


Environmental & Energy (E&E) Strategy

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*

E&E R&D Portfolio Activities & Programs



ASCENT COE Update



ASCENT Research Portfolio

Portfolio covers broad range of topics on Alternative Jet Fuels, Emissions, Noise, Operations, and Analytical Tools

Over last few years have stood up many projects to advance aircraft technology innovation and supersonic flight

Projects listed by topic: <https://ascent.aero/projects-by-topic/>

ASCENT Leadership

- Mike Wolcott of WSU - Director
- John Hansman of MIT - Co-Director
- Carol Sim of WSU - Assistant Director

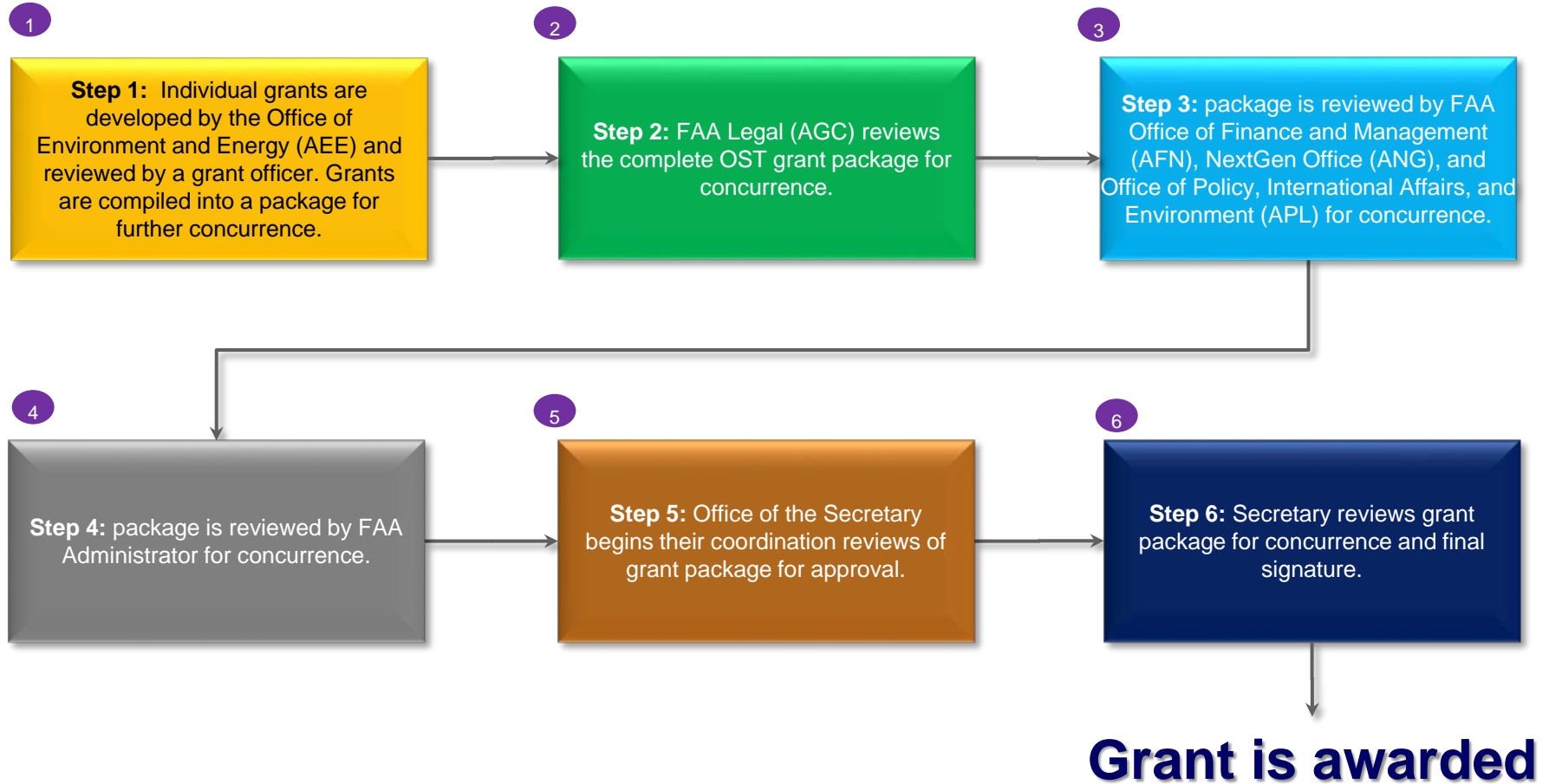
ASCENT Annual Technical Report Summaries*

	Report 1	Report 2	Report 3	Report 4	Report 5	Report 6
Time period	9/2013 – 9/2015	10/2015 – 9/2016	10/2016 – 9/2017	10/2017 – 9/2018	10/2018 – 9/2019	10/2019 – 9/2020
Research Projects	50	54	43	32	30	60
Publications, Reports, and Presentations	137	119	110	179	166	125
Students involved	131	112	105	116	236	186
Industry partners	63	70	72	72	76	57

* ASCENT Annual Tech Reports available for download at: <https://ascent.aero/resources>



COE Grant Approval Process



Highlights of Ongoing R&D Efforts (E&E Portfolio)

- Research efforts continue to inform decision making
- Developed innovation portfolio within ASCENT
- Sustainable aviation fuels: CORSIA, CAAFI, and ASTM
- Technology maturation in CLEEN continues and we are close to making awards for 3rd Phase of CLEEN
- Renewed efforts on impacts evaluation within ASCENT
- Exploring low noise operational procedures and means to improve communication among affected communities
- Released AEDT3d - executing long term vision for AEDT
- Have ASCENT projects on drones and advanced air mobility
- Work on helicopter noise is making good progress
- Have wide-ranging portfolio on supersonic aircraft



Noise R&D Update

Federal Register Notice

Provides comprehensive overview of FAA R&D efforts on noise

- Effects of Aircraft Noise on Individuals and Communities
- Noise Modeling, Noise Metrics and Environmental Data Visualization
- Reduction, Abatement and Mitigation of Aviation Noise

Includes neighborhood environmental survey results with a link to the full study

Expanded the aviation noise website to include details on the noise survey


https://www.faa.gov/regulations_policies/policy_guidance/noise/survey/

Have had extensive outreach on FRN including a public webinar on the Neighborhood Environmental Survey and Noise Research Portfolio on February 22, 2021.

Webinar link <https://www.youtube.com/watch?v=Mku13gL0xGc>

www.faa.gov/go/aviationnoise

Aviation Noise

 FAA conducted a nationwide survey regarding annoyance related to aircraft noise and seeks public comment. Please review the survey introduction, read the survey report, and provide your comments.



FEDERAL REGISTER

The Daily Journal of the United States Government



Notice

Overview of FAA Aircraft Noise Policy and Research Efforts: Request for Input on Research Activities To Inform Aircraft Noise Policy

A Notice by the [Federal Aviation Administration](#) on 01/13/2021

This document has a comment period that ends in 10 days. (03/15/2021)

[SUBMIT A FORMAL COMMENT](#)

[Read the 480 public comments](#)

PUBLISHED DOCUMENT

AGENCY:

Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION:

Notice of research programs and request for comments.

SUMMARY:

The FAA is releasing a summary to the public of the research programs it sponsors on civil aircraft noise that could potentially inform future aircraft noise policy. The FAA invites public comment on the scope and applicability of these research initiatives to address aircraft noise.

The FAA will not make any determinations based on the findings of these research programs for the FAA's noise policies, including any potential revised use of the Day-Night Average Sound Level (DNL) noise metric, until it has carefully considered public and other stakeholder input along with any additional research needed to improve the understanding of the effects of aircraft noise exposure on communities.

DOCUMENT DETAILS

Printed version:

[PDF](#)

Publication Date:

01/13/2021

Agencies:

[Federal Aviation Administration](#)

Dates:

Comments on this notice must identify the docket number and be received on or before March 15, 2021.

Comments Close:

03/15/2021

Document Type:

Notice

Document Citation:

86 FR 2722

Page:

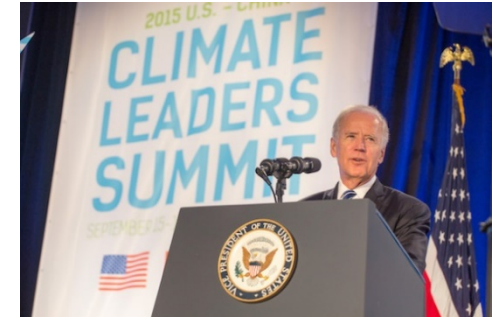
2722-2728 (7 pages)

Agency/Docket Number:

Docket No. FAA-2021-0037

Biden Administration Commitment on Climate Change

- **Day One:** Took action to re-join the Paris Agreement
- **Executive Order 14008 on Tackling the Climate Crisis**
 - *“put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050”*



- **Leaders Summit on Climate – April 23, 2021:**
 - “Reducing emissions from international aviation. The United States is committed to working with other countries on a vision toward reducing the aviation sector’s emissions in a manner consistent with the goal of net-zero emissions for our economy by 2050, as well as on robust standards that integrate climate protection and safety. The United States intends to advance the development and deployment of high integrity sustainable aviation fuels and other clean technologies that meet rigorous international standards, building on existing partnerships, such as through ASCENT– the Aviation Sustainability Center – and pursue policies to increase the supply and demand of sustainable aviation fuels. In the International Civil Aviation Organization, we will engage in processes to advance a new long-term aspirational goal in line with our vision for reducing greenhouse gas emissions in the aviation sector, and continue to participate in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA).”*

Climate Change - Direction of the R&D Portfolio

Background on Aviation and Climate Change

- Aviation has three primary contributors to climate change: CO₂ emissions, NO_x emissions, and aviation-induced cloudiness
- Need to take a holistic approach to de-carbonizing aviation (SAF, technology, operations, policy) and ensure international leadership from the U.S. on aviation climate issues

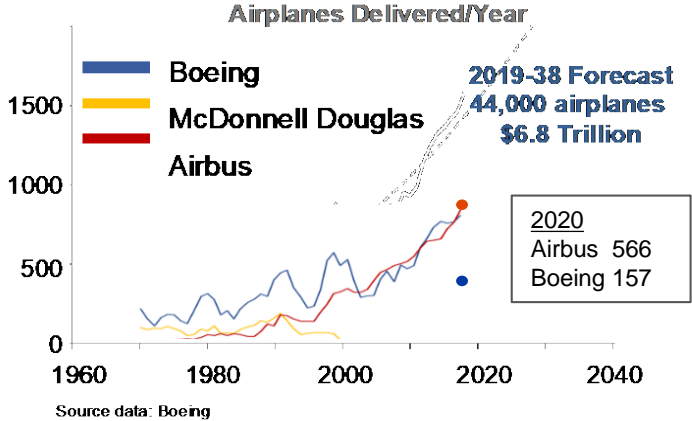
Climate Research Portfolio Direction

- Technology Development: required for both climate challenge and noise challenge
- Sustainable Aviation Fuels: most promising near to medium-term means to reduce aviation CO₂ emissions, will also be needed in long term
- Operational Procedures: seeking opportunities to reduce fuel use and laying ground work to develop decision support tools to address aviation induced cloudiness
- International leadership: R&D program provides the scientific data and analyses that are required for the U.S. to lead direction of international aviation climate negotiations
- Advancing Understanding: conducting research to better understand the impacts of non-CO₂ combustion emissions from all flight vehicles
- Analytical Tools: providing the models that are used across the globe to quantify aviation fuel burn and emissions
- Emerging Technologies and Energy Sources: need to give appropriate consideration to emerging technologies and concepts, but avoid looking for a “silver bullet”



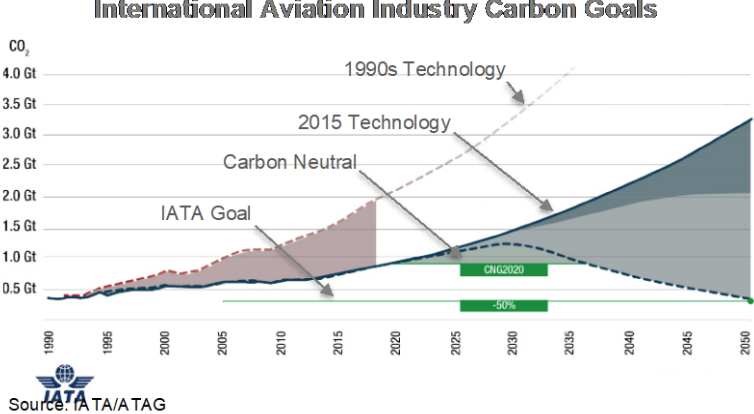
Global Competition and Environmental Pressure Increasing

Economic Perspective



- Airline industry particularly hard hit by COVID-19**
 - U.S. passenger airline traffic fell 60.1% in 2020 (lowest since 1984)
 - The nine biggest US carriers lost \$46 billion before taxes in 2020
- Global competition among manufacturers is growing
 - Airbus backlog exceeds Boeing by 2500 aircraft in 200 Pax class*
 - New competitors in key Asia-Pacific growth market
- Limited industry funding for needed R&D investments

Environmental Context



- Societal pressure growing on climate globally
- Primary contributors to climate change: CO₂ emissions, NO_x emissions, and aviation-induced cloudiness
- Broad community concerns in U.S. about aircraft noise
- Air quality continues to be a challenge in select areas
- Need to address environmental justice concerns

Technological innovation will be required to enable sustainable growth & to maintain U.S. global leadership

- Environmental performance provides competitive edge
- National economy-wide carbon neutral goals: 2045 in Sweden; 2050 in Denmark, France, Hungary, Japan, New Zealand, South Korea, UK, and United States; 2060 in China
- CO₂ goals publicly stated by: American Airlines, Delta Airlines, FedEx, JetBlue, United Airlines
- *Environmental challenges must be addressed if U.S. industry is to remain competitive in the global marketplace*

* <https://aviationweek.com/air-transport/aircraft-propulsion/opinion-will-boeing-become-next-mcdonnell-douglas>

** <https://www.reuters.com/article/us-health-coronavirus-usa-airlines/us-airline-passenger-traffic-fell-601-in-2020-dot-id>

Environmental & Energy R&D Portfolio

RE&D Environment & Energy

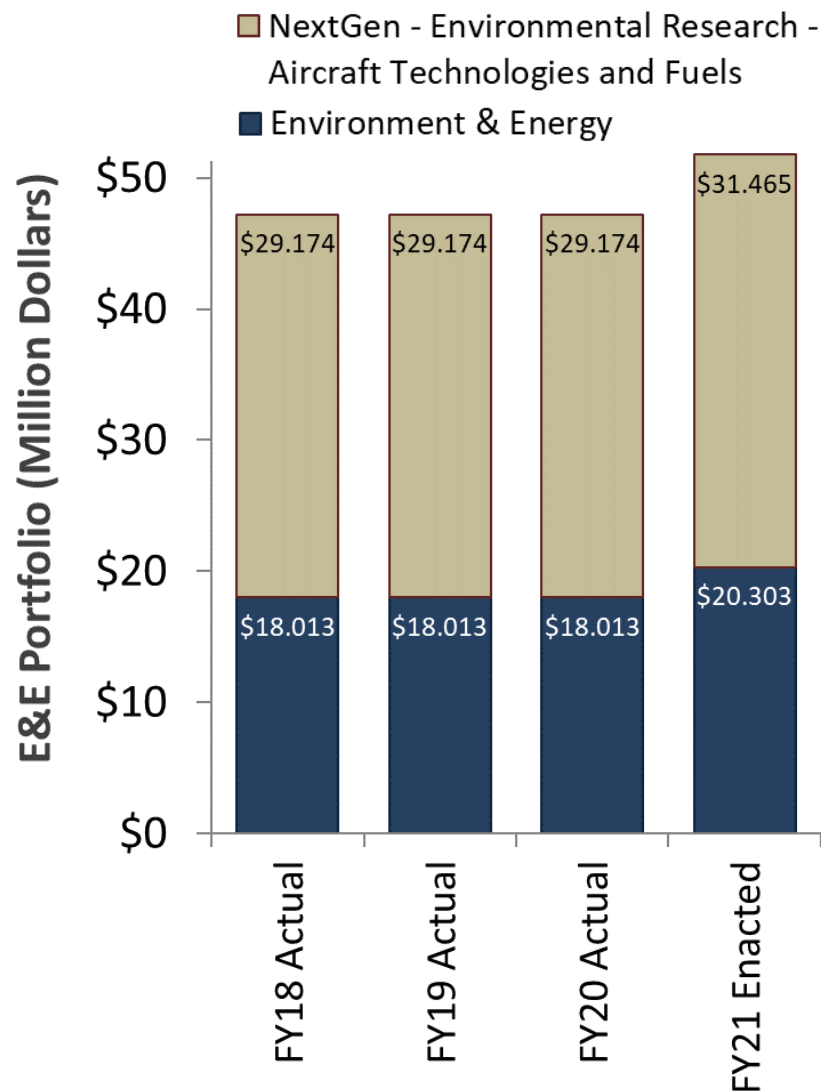
Budget Line Item*

- Advance understanding of noise and emissions
- Analysis to inform decision making

RE&D NextGen – Environmental Research – Aircraft Technology and Fuels

Budget Line Item**

- Develop innovative solutions to reduce noise and emissions



*Budget Line Items: A13.a (FY18 & FY19), A12.a (FY20), A.T (FY21)

** Budget Line Items: A13.b (FY18 & FY19), A12.b (FY20), A.U (FY21)



Recent Successes - Capabilities and Solutions Helping Today

Informing Decision Making to Support U.S. Leadership on International Aviation Climate Issues

- Research team at forefront of informing the development of a *long term aspirational goal for international aviation CO₂ emissions* within International Civil Aviation Organization (ICAO).
- Provided critical support to development of *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*.
- Analytical tools and data provided foundation for ICAO CAEP *Aircraft CO₂ Standard* being promulgated domestically.
- Measurement technique and data provided foundation for new ICAO CAEP *non-volatile particular matter engine standard* that will replace the existing smoke number standard in 2023.

Supporting the Development of Sustainable Aviation Fuels

- *Certification of eight alternative jet fuel pathways* enabling multiple airlines to buy and use sustainable aviation fuels in LAX, SFO, and elsewhere. Efforts have also *significantly reduced fuel volumes required for new approvals*.
- Research efforts were critical for the *inclusion of sustainable aviation fuels within CORSIA*.

Accelerating Technological Innovation and the Development of Improved Operational Procedures

- *CLEEN aircraft and engine technologies appearing in new aircraft* with some technologies retrofitted into today's fleet. These technologies and knowledge gained by industry will reduce noise, emissions, and fuel use for decades to come.
- Research efforts are supporting the *introduction of unmanned aircraft systems, advanced air mobility vehicles, and supersonic aircraft* into the air space.
- Developing operational procedure concepts and communication tools at Boston Logan that could *help address noise concerns nationwide*.

Advancing Our Understanding of Noise, Emissions, and their Impacts

- Released *Federal Register Notice on noise research portfolio* with comprehensive community noise annoyance survey quantifying community perceptions on noise. Work is ongoing to understand *impacts of noise on sleep and health*.
- Researchers are advancing our understanding of the impacts of aviation emissions on human health and welfare via *air quality, global climate change, and changes to the ozone layer*.
- Aviation Environmental Design Tool (AEDT) is being used extensively globally to quantify aviation noise and emissions.

