

FAA Environment & Energy Research & Development Update

Prepared for: CLEEN Consortium

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Federal Aviation
Administration

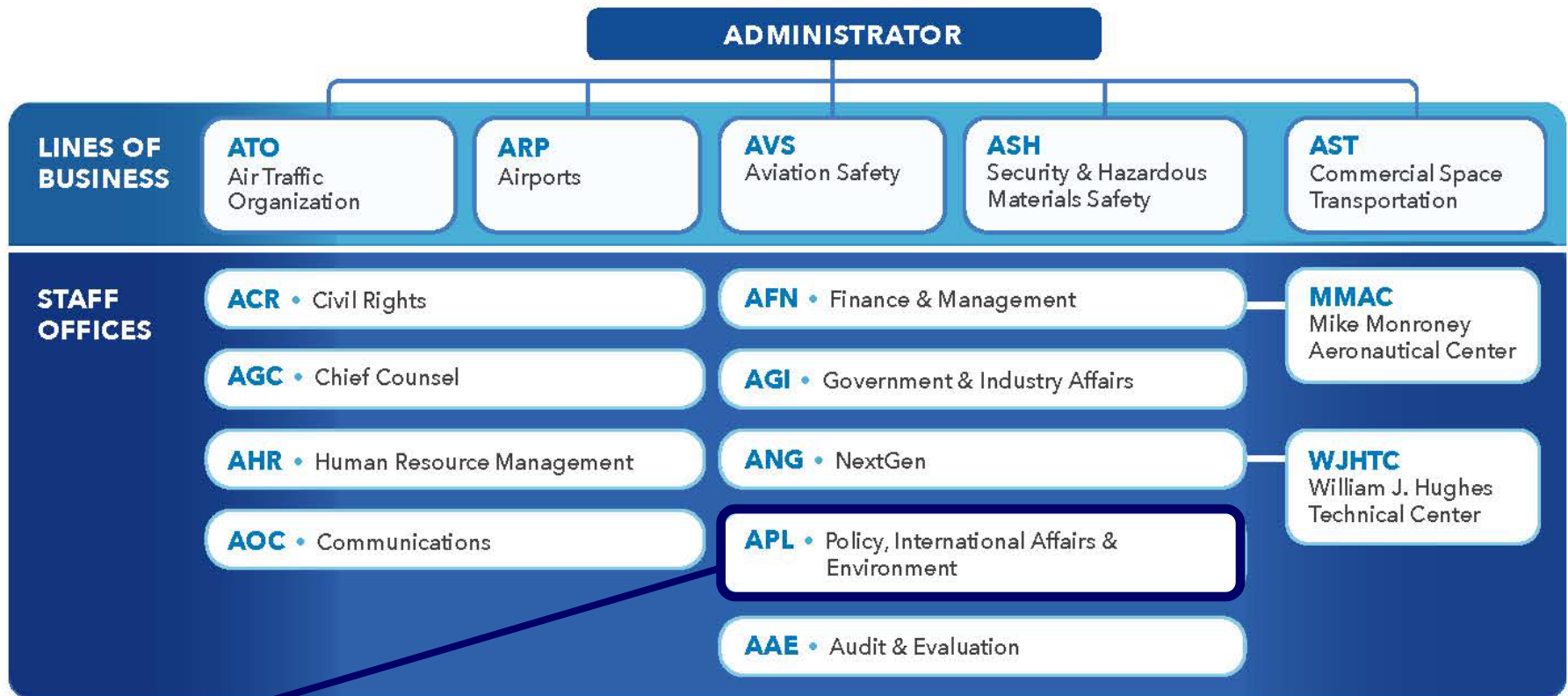


Presentation Outline

- **Office of Environment & Energy**
- **Environment & Energy Strategy**
- **E&E R&D Highlights/Updates**
- **FAST Grant Program**
- **Summary**



FAA Organizational Structure

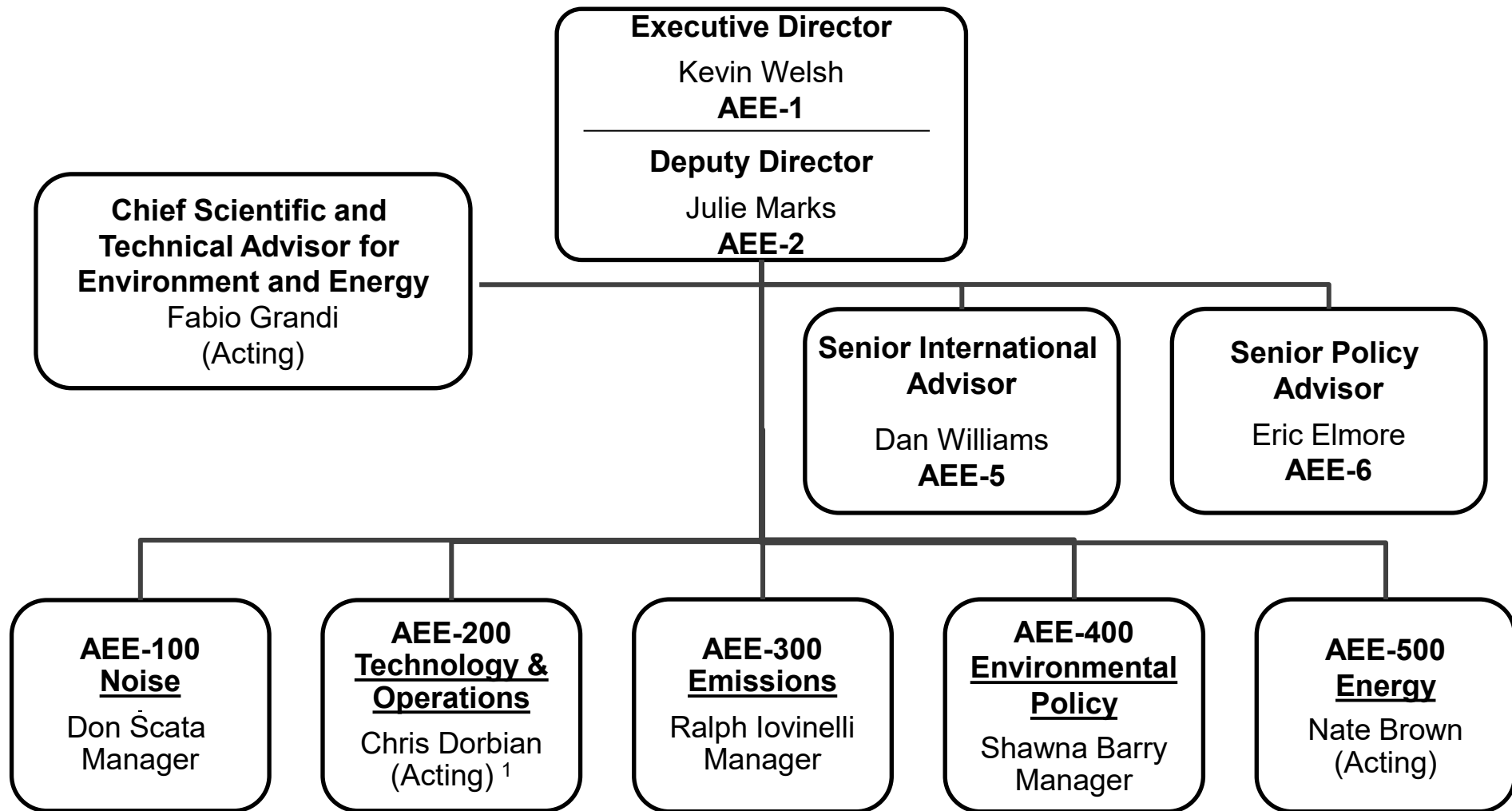


Office of Environment and Energy (AEE)

- Office within APL, responsible for broad range of environmental policies
- About 45 staff members (*in process of expanding*)
- *Responsible for roughly 1/3 of FAA RE&D Budget and I.R.A. Programs*



AEE Organizational Structure



¹ CLEEN Program Manager, as a subset of 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 Program:


ADVANCE UNDERSTANDING OF NOISE, EMISSIONS, AND THEIR IMPACTS



POLICY MAKING

- Domestic Policies
- Aircraft and Engine Standards
- CORSIA
- Long Term Climate Goal Development
- Community Engagement

DEVELOP INNOVATIVE SOLUTIONS TO REDUCE NOISE AND EMISSIONS

-  Aircraft and Engine Technology
-  Sustainable Aviation Fuels
-  Optimized Operations and Procedures



ASCENT Center of Excellence

For 18 years, FAA Office of Environment and Energy has relied on university centers of excellence to:

- Provide knowledge to inform decision making on environment and energy matters;
- Enable the introduction of innovative solutions to cost-effectively mitigate the environmental impacts of aviation; and
- Support the instruction of hundreds of professionals with knowledge of the environmental challenges facing aviation (*674 students supported and counting*).

ASCENT Research Portfolio

- In 2013, FAA established ASCENT to conduct research on environment and alternative jet fuels
- Portfolio covers broad range of topics on Alternative Jet Fuels, Emissions, Noise, Operations, and Analytical Tools
- Currently overseeing a large increase in the COE portfolio

Lead Universities:

Washington State University (WSU)

Massachusetts Institute of Technology (MIT)*

Core Universities:

Boston University (BU)*

Georgia Institute of Technology (Ga Tech)*

Missouri University of Science and Technology (MS&T)*

Oregon State University (OSU)

Pennsylvania State University (PSU)*

Purdue University (PU)*

Stanford University (SU)*

University of Dayton (UD)

University of Hawaii (UH)

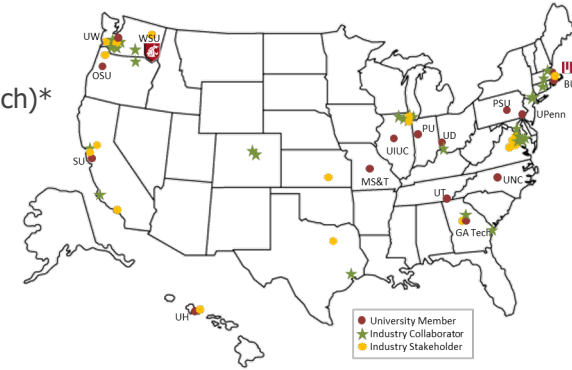
University of Illinois at Urbana-Champaign (UIUC)*

University of North Carolina at Chapel Hill (UNC)*

University of Pennsylvania (UPenn)*

University of Tennessee (UT)

University of Washington (UW)



Multiple international partners

Advisory Committee (57 orgs)

5 airports

4 airlines

9 NGO/advocacy

8 aviation manufacturers

10 feedstock/fuel manufacturers

21 R&D, service to aviation sector

ASCENT Support



Federal Aviation Administration



Transport
Canada



NASA



Environmental
Protection
Agency



Defense Logistics
Agency - Energy



U.S. Dep't
of Energy



U.S. Dep't of
Agriculture



Air Force Research
Laboratory



Technology R&D Overview

Through the Continuous Lower Energy, Emissions, and Noise (CLEEN) Program, FAA are working in a public-private partnership with industry to accelerate maturation of certifiable aircraft and engine technologies.

- Technological innovation will be essential to enable environmentally sustainable growth and maintain U.S. global leadership.
- FAA have been operating CLEEN Program since 2010 (initially set up during Bush administration)
- FAA announced CLEEN Phase III on Sept 9, 2021
- Summary of CLEEN accomplishments over first two phases (10+ years) available online
- Complementary ASCENT technology project portfolio

CLEEN Phase III Technologies



For more information on CLEEN program: <http://www.faa.gov/go/cleen>

For the CLEEN Phase 3 Press Release:
<https://www.faa.gov/newsroom/faa-awards-100m-develop-next-generation-sustainable-aircraft-technology>

For a summary of CLEEN Accomplishment:
<https://www.faa.gov/newsroom/continuous-lower-energy-emissions-and-noise-cleen-program?newsId=22534>



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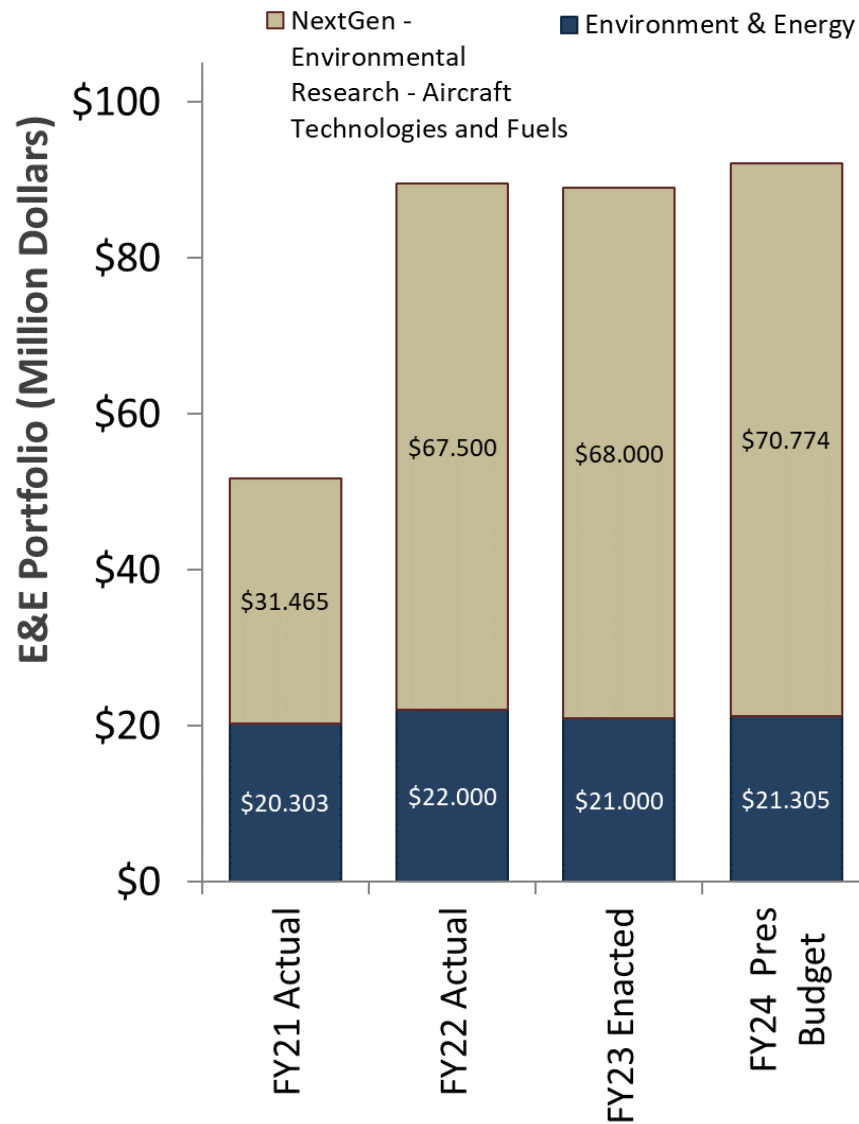
Highlights of Ongoing R&D Efforts (E&E R&D Portfolio)

- E&E R&D expanding with the FAST-SAF and FAST-Tech Grant Programs
- ASCENT and CLEEN have both doubled in size
- Executing actions in the U.S. Aviation Climate Action Plan to address CO₂ emissions – E&E R&D featured prominently throughout
- E&E R&D was at the core of the ICAO CAEP Long Term Aspirational Goal (LTAG) for international aviation CO₂ emissions
- E&E R&D central to the SAF Grand Challenge Roadmap and SAF Tax Credit development
- Research efforts continue to inform decision making on many fronts
 - Domestic efforts on noise, emissions, and fuel
 - International efforts in ICAO
- Released AEDT3e - executing long term vision for AEDT
- Rotorcraft noise research efforts continue: helicopters, drones and advanced air mobility
- Collaborating and leading research on contrails and aviation-induced cloudiness
- Continuing wide-ranging portfolio on supersonic aircraft
- Started work to understand climate and ozone impacts of commercial space ops



E&E R&D Program Undergoing Rapid Growth

- **FY10-FY21 enacted budgets:** ~45 staff and annual budget that varied from \$40M to \$52M for R&D
- **FY19-FY21 Pres Budgets:** Operated under possibility of reduced budget (FY19, FY20, and FY21 Pres Budgets - \$19M, \$27M, and \$27M (initial))
- **FY22 enacted budgets:** E&E R&D Portfolio funding increased to \$89.5M
- **FY23 enacted budget:** E&E R&D Portfolio funding maintained at \$89.0M
- **FY24 President's budget:** E&E R&D Portfolio increased to \$92.0M
- **Inflation Reduction Act (signed into law in August 2022)**
 - New FAST-SAF and FAST-Tech Grant Program - \$297M - Section 40007
 - SAF Tax Credit - Sections 13203 (IRC 40B) and 13704 (IRC 45Z)



Changes with Increased RE&D Budget in FY22/FY23

- ***Expanded third phase of CLEEN Program***
 - *Operating at \$38M per year (had been \$19M per year)*
 - *Increased overall funding to CLEEN Phase III from \$100M to \$125M*
- ***Starting work for fourth phase of CLEEN Program***
 - *Expect to use baseline appropriations to fund CLEEN Phase III*
 - *Intend to begin CLEEN Phase IV using FY24 funding*
 - *Market Survey closed February 2023*
- ***ASCENT Program growth***
 - *Operating at ~\$35M per year (had been \$16M per year)*
 - *Awarded ~\$35M of grants in 2022*
 - *Many new projects coming on line*



Inflation Reduction Act – New SAF Tax Credit and Grant Program

SAF tax credits

- **Section 13203 Sustainable Aviation Fuel Credit**
 - 2-year incentive for those who blend SAF (40B Tax Credit)
 - Sold or used starting on 01/01/2023
- **SAF must achieve >50% GHG reduction to be eligible**
 - Certified in accordance with CORSIA or similar methodology that satisfies Clean Air Act criteria
- **Tax credit starts at \$1.25/gallon of neat SAF and can increase up to \$1.75/gal**
- **Section 13704 Clean Fuel Production Credit**
 - Subsequent 3-year incentive for those who produce SAF (45Z Tax Credit)
 - Sold or used starting on 01/01/2025

Grant program

- **Section 40007 – New SAF Projects and Technology Grants**
 - \$297M to establish “a competitive grant program for eligible entities to carry out projects located in the U.S.”
 - \$244.5M for projects relating to production, transportation, blending, or storage of Sustainable Aviation Fuels
 - \$46.5M for projects to develop, demonstrate, or apply low-emission aviation technologies
 - \$5.9M for program oversight
 - FAA developing two programs – “Fueling Aviation’s Sustainable Transition” - FAST-SAF and FAST-Tech



FAST Introductory Meeting



Held program meeting on Dec. 14, 2022 at DOT Headquarters to provide overview of program and foster discussions across potential project participants

Over 150 in-person attendees and over 600 online registered attendees representing industry, government, academia and additional aviation stakeholders



Currently developing NOFO to define selection criteria and solicit applications



Summary

- **FAA E&E R&D leads domestically and internationally**
- **Program continues to grow**
 - Launching FAST Grant Program
 - Accelerating development of CLEEN Phase IV
 - Expanding ASCENT research
- **Aircraft technology research is a key pillar of U.S. E&E strategy**
- **Thank you for your continued R&D efforts!**

