# E&E Subcommittee Recommendations & FAA Responses

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# Outline

- Meeting Dates
- Recommendations from March and August 2017
- Action Item Status

# Meeting Dates

- Sept 11-12, 2018 - Washington DC

- Please fill out poll for March 2019 meeting dates

# REDAC Recommendations from Feb/August 2017

- **Research priorities**
  - Feb-2017 Rec 03: Public Private Partnerships
  - Aug-2017 Rec 01: Public Private Partnerships
  - Feb-2017 Rec 01: Outreach on Noise Research
  - Feb-2017 Rec 02: Aviation Environmental Design Tool Development Plan
  - Feb-2017 Rec 04: Operational Procedure Concept Development
  - Aug-2017 Rec 03: Supersonic, Unmanned and Commercial Space Vehicle Impacts
  - Aug-2017 Rec 04: U.S. leadership in ICAO CAEP
- **Workforce development**
  - Feb-2017 Rec 05: Filling Staff Vacancies
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- Water research
  - Feb-2017 Rec 06: Water Research

# 2017-02 REDAC Recommendation - 3

**Finding (3):**

In partnership with industry, the Continuous Lower Energy, Emissions, and Noise (CLEEN) Program is maturing new technologies that will continue to show significant engine and aircraft performance benefits (fuel burn and operations improvement, noise and emissions reduction). The Commercial Aviation Alternative Fuels Initiative (CAAFI) also continues to make significant progress in advancing alternative jet fuels as a private public partnership between the FAA and industry.

CLEEN and CAAFI are both very successful industry/FAA cost-share programs as is the Aviation Sustainability Center (ASCENT), the FAA Center of Excellence for Alternative Jet Fuels and Environment. Three quarters of Environment and Energy research funds are generating 100% plus cost matching from non-federal partners (CLEEN, CAAFI, and ASCENT). This leverages scarce FAA R&D funds to accomplish significant advances and improvements.

**Recommendation (3)**

The subcommittee encourages Public Private Partnerships like CLEEN, CAAFI and ASCENT programs to leverage resources and recommends that FAA should continue to prioritize robust funding for these programs.

**Response (3)**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We appreciate the Subcommittee's recognition that the vast majority of the Environment and Energy R&D program has been leveraging resources from the private sector via public-private partnerships. CLEEN and ASCENT account for roughly three quarters of the RE&D Environment and Energy funding. As such, three quarters of the RE&D budget is generating 100% cost share. CAAFI does not have a cost-share requirement so the non-government funds going toward it have not been tracked over time. However, the effort has considerable industry support – especially from the airlines – and has been successful in directing efforts across the federal government. CLEEN, CAAFI and ASCENT have all been successful because of their strong engagement with industry. We were excited to see that the work of the FAA and industry in CAAFI to advance alternative jet fuels was highlighted as a model for public-private partnerships in the UN Secretary General's 2016 report on Sustainable Transport.

# 2017-08 REDAC Recommendation - 1

**Finding (1):**

**Public/Private Partnerships** - Members of the E&E Subcommittee are very aware of the budgetary constraints that exist within the Department of Transportation and the FAA. The Continuous Lower Energy, Emissions, and Noise (CLEEN) program, the Commercial Aviation Alternative Fuels Initiative (CAAFI) and the Aviation Sustainability Control (ASCENT) program are successful industry/FAA cost-share programs that leverage scarce FAA R&D funds that have accomplished significant advances and improvements for the industry.

**Recommendation (1):**

The Subcommittee recommends that the FAA continues to prioritize robust funding for the Public Private Partnership programs like CLEEN, CAAFI and ASCENT.

**Response (1):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We appreciate the Subcommittee's continued support for the FAA's efforts to accelerate the maturation of aircraft technologies to lower noise, emissions and fuel burn via the CLEEN Program, as well as, to advance the development of alternative jet fuels via CLEEN, CAAFI and the ASCENT Center of Excellence. All three of these programs are conducted in partnership with the private sector through cost-sharing agreements and with considerable industry engagement. This engagement is a key reason for their success. CLEEN and ASCENT account for roughly three quarters of the RE&D Environment and Energy funding. As such, three quarters of the RE&D budget is generating 100% cost share. CAAFI does not have a cost-share requirement so the non-government funds going toward it have not been tracked over time. However, the effort has considerable industry support – especially from the airlines – and has been successful in directing efforts across the federal government. These are also longstanding efforts of the FAA: ASCENT is the follow-on Center of Excellence to PARTNER which was established in 2004, CAAFI was started in 2006, and CLEEN was started in 2011.

# 2017-02 REDAC Recommendation - 1

**Finding (1):**

Noise research is making substantial progress in studies related to the understanding of impact of aviation noise on annoyance, sleep, health, and children's learning and in the planning of studies related to noise from supersonic aircraft, Unmanned Aerial Systems (UAS), and commercial space. Some of the impacts of noise have become barriers to the implementation of NextGen.

**Recommendation (1):**

Since the results of some of these studies will generate significant public interest, the subcommittee recommends the FAA prepare a public outreach plan to proactively manage this public interest.

**Response (1):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. Noise continues to be our number one environmental issue and we appreciate the Subcommittee's continued support of our research efforts to address it. We agree with the need to effectively handle the roll-out of results from the aviation noise research roadmap. We have completed the airport community noise survey. This is a key component of our aviation noise research roadmap that is eagerly anticipated by our stakeholders. To facilitate the dissemination of results from the noise survey as well as our other noise research efforts, we are developing a public outreach plan to communicate noise issues more effectively using new and innovative ways to engage the public.

# 2017-02 REDAC Recommendation - 2

**Finding (2):**

In response to the action from the last subcommittee meeting, FAA provided clarity on improvements and further development needs for the Aviation Environmental Design Tool (AEDT). This will enable enhanced usability, improved airspace and airport design, continued support for analyses that support domestic and international decision-making. The FAA also identified key risks to AEDT development (e.g. availability of BADA 4 on airplane performance and noise) and has developed appropriate contingency plans.

**Recommendation (2):**

The subcommittee supports the simultaneous development of usability improvements and enhanced features in the near term.

**Response (2):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We appreciate the Subcommittee's support for the continued development of the Aviation Environment Design Tool. AEDT is the required tool for domestic environmental analyses and has been at the core of our efforts to support the ICAO CAEP standard setting process. The new developments will allow AEDT to more accurately capture fuel burn in the terminal area, which is important for the benefits assessment of NextGen, and to improve AEDT's ability to calculate noise at levels below DNL 65. Based on the Subcommittee's support, we will move forward with these efforts.

# 2017-02 REDAC Recommendation - 4

**Finding (4):**

The operational research program is an important and impactful program in the Environment and Energy portfolio. These projects are being worked (or planned to be worked) in collaboration with the FAA Air Traffic Organization (ATO), FAA NextGen Office (ANG), FAA Office of Airports (ARP), NASA, and MassPort.

**Recommendation (4):**

The subcommittee is pleased to see this research included in the portfolio after having been impacted due to the reduction and eventual elimination of F&E funds for this category. We encourage FAA to pursue this research while recognizing the potential for environmental benefits thru operational changes in all phases of flight.

**Response (4):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We are pleased with the collaboration that has developed around the FAA-Massport-MIT effort to examine how noise could be changed and potentially reduced via changes in aircraft operational procedure concepts. The collaboration with Massport is part of our overall effort to accelerate the maturation of low noise aircraft technologies and noise mitigation techniques for arrivals and departures that could reduce community noise exposure. While the CLEEN program will help to reduce noise from new aircraft, we know that we also need to find ways to reduce the noise from the current fleet of aircraft while maintaining safety. The FAA-Massport-MIT effort is using tools that were developed by MIT (as a part of the ASCENT Center of Excellence) with funding from FAA to evaluate procedures and procedure modifications with noise reduction potential. We have also begun efforts with UPS to identify and evaluate operational procedure concepts that could reduce noise, including those being developed in the FAA-Massport-MIT effort. Based on the Subcommittee's support, we will continue to conduct research to identify procedures and procedural changes that could mitigate noise from the current fleet.

# 2017-08 REDAC Recommendation - 3

**Finding (3):**

**Supersonic, Unmanned and Commercial Space Vehicle Impacts -** During the Subcommittee meeting, the FAA presented information that indicates that there has been a dramatic increase in the level of interest in supersonic aircraft under the current Administration. There is also potential growth in unmanned aerial systems and commercial space vehicles. There is a significant amount of research that needs to be done in order to understand the environmental impacts of these new entrants. Research is the key to establishing sound policy. The FAA/AEE should ensure that its research plans will address the noise, emissions and possible health impacts of these new entrants such that the FAA can make informed decisions in carrying out their responsibilities under various statutes.

**Recommendation (3):**

Based on increased interest in supersonic aircraft, the growth of unmanned aerial systems and the growth of commercial space vehicles, the Subcommittee encourages the FAA to advance our understanding on the environmental impacts of these entrants.

**Response (3):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. UAS, supersonic aircraft, and commercial space vehicles all present economic opportunities for the U.S. as well as potential concerns in terms of the environment, in particular noise. As such, the FAA is devoting resources to advance our understanding of the environmental impacts of these new entrants such that effective solutions can be found to overcome potential barriers to their entry into the NAS. There is indeed an increased interest in supersonic aircraft. Industry has put forward many design concepts for supersonic aircraft. Some are low-boom designs and some would result in a full boom like the Concorde. We are working in close collaboration with NASA to evaluate low boom technologies and conduct the necessary analyses to understand the noise and emissions impacts of these new designs. Supersonic aircraft will only be economically viable if they can take off and land in other countries. That will require international agreements at ICAO CAEP. Depending on the vehicle design, UAS could lead to noise concerns. We continue to seek partners to measure the noise from these vehicles to understand the potential issues and ensure we are well placed to deal with them. Commercial space vehicles could also present noise and emissions challenges depending on their design and where they are operating. We are leveraging efforts being funded by the Airports Cooperative Research Program to ensure our modeling capabilities can capture the noise and emissions from these vehicles.

# 2017-08 REDAC Recommendation - 4

**Finding (4):**

**Non-Volatile Particulate Matter -** The Subcommittee is very pleased with the work done by AEE on developing a non-volatile particulate matter (PM) emissions standard and in the development of the Carbon Offsetting and Reduction System for International Aviation (CORSIA). In regards to the CORSIA, it is important that proper credit be given for the use of alternative fuels. The Subcommittee is also pleased with the efforts of the FAA along with NASA to conduct and align research activities to inform the development of noise and emission standards for supersonic aircraft. The Subcommittee believes that United States leadership in the ICAO CAEP process continues to be an important priority.

**Recommendation (4):**

The Subcommittee highly recommends that the FAA continue their commitment for all of the necessary programs to support continued U.S. leadership in ICAO CAEP. This includes the non-volatile PM emissions standard, CORSIA, alternative fuels and supersonic aircraft.

**Response (4):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We appreciate the support of the Subcommittee for our ICAO CAEP activities and the importance of continued U.S. leadership therein. Robust funding is critical to not only ensuring that we have robust participation in the ICAO CAEP process but also to the development of our modeling capabilities and the generation of data to support the decision-making process within ICAO CAEP. Because of FAA leadership, the CAEP Steering Group reached an agreement in September on the CORSIA Package. The inclusion of alternative jet fuels within CORSIA is a direct result of many years of effort by the FAA and the ASCENT Center of Excellence. We have made considerable investments with industry to develop an engine PM test database and modeling capabilities. As a result of these investments, we have a solid foundation for making decisions in ICAO CAEP on an engine PM emissions standard. Efforts are also continuing in ICAO CAEP on supersonic aircraft. This is important as these aircraft will only be economically viable if they can take off and land in other countries and this will require international agreements at ICAO CAEP..

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# 2017-02 REDAC Recommendation - 5

**Finding (5):**

The workload of FAA AEE staff has been increasing driven by CO2 standard setting, global market based measure (CORSIA) development, non-volatile particulate matter standard settings, supersonic aircraft, and a broad range of noise work.

Staff vacancies within the organization are a big concern. These vacancies need to be filled. A lack of skilled personnel could delay completion of critical projects, and in the long term, prevent achievement of the core FAA mission, including improving efficiency of aviation system.

**Recommendation (5):**

The subcommittee recommends the FAA place a high priority on filling staff vacancies to manage the AEE portfolio and support the expanding workload.

**Response (5):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. We understand the Subcommittee's concern about staff availability within the Office of Environment and Energy. The work load in AEE has indeed increased due to increasing concerns regarding aviation noise and the continuing international efforts. AEE have had good success over the years in filling positions with highly qualified environmental professionals. This is due in part to the students and staff that have been trained as a part of PARTNER and ASCENT, the FAA Centers of Excellence for environment and alternative jet fuels. We are currently in the process of developing hiring plans in accordance with administration guidance.

# 2017-08 REDAC Recommendation - 2

**Finding (2):**

**Human Resource Allocations** - As has been highlighted in the past, there is serious concern over the number of vacancies that exist in the Office of Environment and Energy (AEE) and the increasing requests for answers. There are currently twelve (12) vacancies in AEE. In order for the dedicated employees within AEE to be able to properly manage the current portfolio, which we believe is well balanced, maintain the FAA's global leadership position in the International Civil Aviation Organization (ICAO), address the growth of other areas of commercial transportation and the development of smart policy, there is a need for answers. The answers to the many questions require the ongoing need for research.

**Recommendation (2):**

In order to provide the research that is needed to properly address the increased tasking of the Office of Environment and Energy (AEE), the Subcommittee recommends that the FAA commit the resources needed to hire additionally qualified individuals to be able to properly address portfolio needs. We would ask the FAA to not take away limited resources from current work in an effort to handle new work.

**Response (2):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The FAA appreciates the assessment that the Environment and Energy portfolio is well-balanced and we understand the Subcommittee's concern about staff availability as the Office of Environment and Energy (AEE) has been operating with vacancies for 1/5 of their positions. Qualified staff are needed to maintain FAA's leadership position within ICAO CAEP, to continue to manage the current research portfolio, and to overcome environmental challenges that could prevent the entry of UAS, supersonic aircraft and commercial space vehicles into the NAS. AEE have had success over the years in filling positions with highly qualified environmental professionals. This is due in part to the students and staff that have been trained as a part of PARTNER and ASCENT, the FAA Centers of Excellence for Environment and Alternative Jet Fuels. We are in the process of executing a hiring plan that was developed in accordance with administration guidance. To accommodate the evolving nature of the industry and the FAA's needs, we are seeking individuals who could cover a variety of needs to fill these openings.

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# 2017-02 REDAC Recommendation - 6

**Finding (6):**

The REDAC Environment and Energy subcommittee had believed that water issues were proactively being addressed by Airports and Safety REDAC subcommittees, but learned that water research was not a priority on the 10 year research plan for the Airport Technology Research (ATR) Program.

**Recommendation (6):**

REDAC subcommittees DFOs should communicate amongst each other and develop a list of research topics that they believe are priorities but feel are the dominion of a different subcommittee.

**Response (6):**

The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. Representatives from Environment and Energy, Airports and Safety portfolios have met to discuss water research items that are being addressed via the Airports and Safety Portfolios. These discussions have led to a better collective understanding of the water research that is being conducted by the FAA. In addition to airports and safety, much research on water issues is also being undertaken by the Airports Cooperative Research Program (ACRP). At present, it appears that water issues are being handled appropriately.

# Actions Completed/Underway – from Previous Meetings

***Ongoing***

- Share ASCENT NFO with REDAC E&E Subcommittee (on an annual basis)
- Leverage “right-to-left” thinking in developing roadmaps wherein we start by thinking about the endpoint (goal) that is desired and decide how to get there
- Monetize the air quality and climate benefits of having an alternative jet fuel with reduced sulfur and naphthalene content
- Leverage the road mapping efforts at NASA and FAA to update the White House National R&D Plan

# Actions Completed/Underway – from Previous Meetings

***Complete***

- Create a list of major accomplishments that have made an economic difference. Demonstrate how E&E portfolio has been proactive and has enabled economic growth. (covered in Hileman and Brown briefings)
- The FAA should work with EPA to develop a strategy for addressing emissions certification promulgation gaps and share it with the Subcommittee at a future meeting. (covered in Iovinelli briefing)
- Provide a briefing at the next meeting on efforts relating to water. (covered in Hovan briefing)
- Reach out to Allen Robinson of Carnegie Mellon University (CMU) to learn more about the PM mapping work that they are doing using multiple sensors for EPA. (done by D. Jacob)