

Subcommittee on Environment and Energy

General Observations: The Subcommittee focused on reviewing the Research and Development (R&D) Portfolio for the Office of Environment and Energy (AEE) that was developed based on the Research, Engineering, and Development (RE&D) budget for FY 21 that was enacted on December 27, 2020. During the meeting, the staff from the Office of Environment and Energy (AEE) provided updates on all of the major research areas within the portfolio. Work on programs such as the Aviation Sustainability Center of Excellence (ASCENT); Continuous Lower Energy, Emissions and Noise (CLEEN); Commercial Aviation Alternative Fuels Initiative (CAAFI) and the Aviation Environmental Design Tool (AEDT) have been progressing. The updates highlighted accomplishments, since our last meeting, that have been realized both locally and on the international front directly linked to the ongoing research. These accomplishments further validate the need for sound research when developing regulations and policies and procedures.

Despite the COVID-19 concerns that we had expressed in our previous report, the Subcommittee was very impressed with the job the leadership and staff of AEE has been doing. The presentations were well done and reflected impacts and or potential impacts, because of COVID- 19, to the research that is being done and is proposed in the future. The presentations outlined a high level of communication between AEE staff and their partners to continue these necessary research efforts, but they also showed the challenges associated with COVID-19 restrictions and how they have impacted many projects, be it financial or time delays.

The overall impacts of COVID-19 on the citizens of the world are unprecedented! The aviation industry is currently going through a crisis of historic magnitude and the road to recovery and future growth still has many uncertainties. The dramatic reduction in air travel and aviation related activities has brought significant attention to the environmental impacts associated with the aviation industry. Members of this Subcommittee believe that the FAA and the aviation industry are at a unique point in history and AEE and its partners are well positioned to address the additional environmental questions that are being asked on noise and emissions. The answers to the questions can only be found through additional research and development with the financial support from the U.S. government. We have already seen where other governments have pledged support to their environmental research agenda.

The U.S.A must maintain its leadership position at the global stage in order to protect the U.S. aviation industry as we continue down the path of recovery and address new growth. This leadership position can be sustained by further expanding the Environmental and Energy R&D Portfolio using the proven blueprint that was presented to this Subcommittee. The expected results of current and future research under this portfolio will also help us address the concerns within the U.S.A as well. We know where we want to be, we need to use our partnerships with other federal agencies, universities and businesses and our research portfolio to get there.

The Subcommittee believes that AEE is doing a good job and has once again presented a balanced portfolio. We believe that the research priorities that the Subcommittee has previously identified, growth from Commercial Subsonic traffic, Urban Air Mobility (UAM), Unmanned Aerial Systems (UAS), Supersonic Civil aircraft and Commercial Space vehicles do not need to be adjusted. The Subcommittee was happy with the briefings we received on a number of new research projects have been added to address these priorities. The Subcommittee members realize that there is still additional research required to address ongoing areas of concern. There were additional discussions among the members on whether there are any research opportunities that currently exist because of the impacts that COVID 19 has had on aviation industry.

The Subcommittee is comfortable that AEE, the ASCENT Center of Excellence, CLEEN Program, CAAFI and others efforts, as well as, and their partners, including NASA, are working together to realistically address the impacts that the COVID-19 pandemic has had on continued research efforts. The long term impacts of this pandemic on the citizens of the world and the aviation industry are still not known, but we believe that AEE has a proven blueprint that can be used to address future research needs. Guided by the updates and presentations, the Subcommittee has proceeded with the following “Findings and Recommendations”. The recommendations offered are all for inclusion in the REDAC report.

Finding: Noise Research- Aviation noise is and will continue to be one of the biggest environmental impacts related to the aviation industry and it requires ongoing research in order to address the concerns of the citizens. The overall reduction in aircraft movements as a result of the pandemic has definitely increased the focus on noise. The Subcommittee realizes that there is much research that is still necessary to address the ongoing topic of aviation noise. Whether there are new technologies or new procedures that can be implemented to help reduce the impacts of noise as the aviation industry rebuilds needs to be evaluated. AEE has research projects that are looking at the impacts of noise on children's learning, sleep impacts, community annoyance and cardiovascular health.

AEE is looking at the certification requirements for Supersonic aircraft, as well as, Unmanned Aircraft System (UAS) and Advanced Air Mobility (AAM) vehicles. AEE is also examining how to reduce the noise from commercial aircraft and helicopters through changes in operational procedures. There are a number of new research projects that have been added to address issues related to new entrants into the aviation system. There also have been significant upgrades made to the Aviation Environmental Design Tool (AEDT). FAA has also launched an initiative to partner with airports to gather more noise data resulting from noise complaints. Finally, AEE is working with industry to accelerate the development of technologies that reduce noise through the CLEEN Program.

Recommendation (1): The Subcommittee strongly supports and recommends the continued prioritization of the noise research! Noise is a source of everlasting "headaches" for the aviation community and despite the great improvements made by the FAA, communities have become less tolerant of noise.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address it - The FAA is committed to developing meaningful and equitable solutions to the complex and nuanced issue of aviation noise. On January 13, 2021, we published an Overview of FAA Aviation Noise Policy and Research Efforts on the Federal Register. This Federal Register Notice ("notice") contained a comprehensive overview of FAA R&D efforts on noise and it sought input from the public on research activities to inform aircraft noise policy. We are currently in the process of reviewing the more than 4,100 submitted comments to inform the scope of additional areas of noise research. We will continue to support the R&D portfolio outlined in the notice while also looking for opportunities to expand our work including through the inputs provided by the aforementioned comments.

The notice also contained results from the Neighborhood Environmental Survey, which quantified the annoyance of those experiencing aircraft noise in airport communities. The results show there has been a substantial increase in annoyance levels compared to surveys conducted in decades past with roughly two-thirds of respondents to the survey reporting being highly annoyed at the level of noise used to define significance within the National Environmental Policy Act.

We are also taking steps to begin a policy review that builds on our work to advance the scientific understanding of noise impacts, as well as, the development of analytical tools and technologies. This effort will build on our partnerships with academia, industry, and government to better understand, manage, and reduce the environmental impacts of aviation, including but not limited to noise. This effort will incorporate the FAA's updated understanding of aviation noise and human response, so that we are able to promulgate well-reasoned, scientifically-grounded policies.

Finding: Public-Private Partnerships - The Subcommittee wishes to acknowledge and support the fact that the Office of Environment and Energy (AEE) have proven over decades to be very good stewards of taxpayer money. The leadership team at AEE has used their budgeted amounts to conduct and coordinate the research necessary to produce informed, data driven policies, facilitate technological advances in the aviation industry, and produced models and data that have positioned the U.S. as both a State leader at International Civil Aviation Organization/Committee on Aviation Environmental Protection (ICAO CAEP) and on the global aviation stage.

The execution of this research portfolio has been accomplished by working collaboratively with private industry, major universities through the ASCENT Center of Excellence, other federal departments and foreign governments. Three quarters of Environment and Energy research funds generate 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. In addition, we believe that government funding has been used and executed effectively to lower the risk of new and emerging technologies such that they can be adopted by industry. The benefits of these partnerships has clearly been proven over time and is very apparent in most of the current projects. To date, the CLEEN and CLEEN II programs sponsored by the FAA have been responsible for the maturation of aircraft technologies responsible for significant decreases in fuel burn/CO₂, decreases in NO_x emissions and noise reductions that would not have happened otherwise.

Recommendation (2): The Subcommittee continues to endorse Public Private Partnerships like the Continuous Lower Energy, Emissions and Noise (CLEEN), Commercial Aviation Alternative Fuels Initiative (CAAFI) and Aviation Sustainability Center of Excellence (ASCENT) programs to leverage resources and recommends that FAA should continue to allocate robust funding for these programs. Given the current drop in air traffic levels, now is the perfect time for Phase III of the CLEEN program to develop and mature technologies that would have an even more substantial impact on aviation environmental concerns.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address it - The FAA is maximizing the impact of taxpayer dollars by partnering with industry, academia, federal agencies, and other governments. The vast majority of the Environment and Energy R&D program has been leveraging resources from the private sector via public-private partnerships. CLEEN, CAAFI and ASCENT have all been successful because of their strong engagement with industry. Each of these programs have had strong partnerships with, and support from, industry for over a decade. The FAA is in the process of finalizing the awards for the third phase of CLEEN, which will ensure the continuation of this model of public-private partnership on aircraft technology development through 2025. The FY2022 President's Budget includes a new Aviation Climate Research budget line item which would expand the use of public private partnerships, such as ASCENT, CAAFI and CLEEN. This new effort would see the FAA invest in high-risk, accelerated research that has transformative impact potential to reduce greenhouse gas emissions from aviation in support of the 2030 and 2050 U.S. climate change goals. We are also working in partnership with the Department of Energy, the U.S. Department of Agriculture, and NASA on our research to ensure that our efforts are complimentary and directed toward the Administration's goals. Finally, we are also collaborating with a number of international research institutions through the ASCENT COE and CAAFI. We have worked diligently to develop all of these partnerships over many years and intend to continue to do so going forward.

Finding: Sustainable Aviation Fuels (SAFs) - Significant gains have been realized in the Sustainable Aviation Fuel (SAF) Program (including efforts in CAAFI, CLEEN and ASCENT. SAFs are a critical component of the industry’s emissions reduction strategy and must be developed if industry is to get to their carbon neutral growth goals after 2020 and their 50% emissions reduction goals in 2050. This research has helped with the creation of a number of companies that have the potential to benefit the rural economies of several states and the U.S. Aviation industry. In 2020, 4.6M gallons of SAF were used by the U.S. Aviation Industry, a 190% increase over 2019, and this increased consumption happened in spite of the current downturn in aviation traffic.

Business aviation has also seen significant interest in SAF. Based on industry data, there should be a significant increase in production and consumption in the coming years. Recent support from a number of agencies, including from DOE and USDA, will further support SAF production. The FAA is working through the International Civil Aviation Organization/Committee on Aviation Environmental Protection (ICAO CAEP) to ensure that a wide range of sustainable aviation fuels are included in Carbon Offsetting and Reduction System for International Aviation (CORSIA). The FAA has also been conducting research to examine whether other types of fuel besides SAF could be used in different kinds of air vehicles. This work should prove insightful for understanding how hydrogen could be used by aviation, both in the near and longer terms.

Recommendation (3): It is still the position of this Subcommittee that the work on Sustainable Aviation Fuels (SAF) is critical to the U.S. industry and the FAA should maintain a global leadership role in the development of SAF. Since the maturation of the Sustainable Aviation Fuel program will be a major environmental benefit for the public, will create a new industry within the U.S. that benefits rural America, and will benefit the U.S. aviation industry, we strongly recommend that the FAA AEE continues to allocate funds for the continuation of research on SAFs. This includes finding ways to use SAF as blending percentages above 50% and work towards the use of 100% SAF in today’s aircraft. The partnerships with the Department of Energy and the U.S. Department of Agriculture must also be reinforced.

FAA Response: The FAA concurs with the Committee’s finding and recommendation and is undertaking the following actions to address it - The FAA wholeheartedly agrees with the importance of Sustainable Aviation Fuels (SAF). As captured in the fact sheet from President Biden’s Leaders Summit on Climate, “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.” SAF are the most effective near term opportunity to reduce aviation carbon dioxide emissions and will be critical to achieving the Administration’s goals for economy-wide carbon dioxide reductions. The new Aviation Climate Research budget line item will augment our longstanding efforts by supporting the development of SAF that could be used in jet engines without blending with conventional petroleum-based jet fuel and by evaluating aviation fuel supply chains to reduce the cost to produce SAF and maximize their environmental benefits. We also continue to work closely with others agencies, and in particular with Department of Energy, the U.S. Department of Agriculture, and NASA, to work in a coordinated manner to accelerate the development and deployment of SAF.

Finding: Global Leadership - It is evident that the FAA AEE currently maintains a leadership role in ICAO CAEP and has been the driving force behind the push for data driven rule making. Because of the impacts of COVID 19 on aviation globally, and the continuing importance being placed on environmental issues around the globe, other governments have made commitments to their own research and environmental agenda. As a result, the Subcommittee firmly believes that maintaining the U.S. global leadership position at ICAO CAEP is not an option, it is essential and advantageous to the U.S. aviation industry. Work that has been done with ASCENT and the Volpe Center has clearly allowed the FAA to maintain a scientifically supported position at International Civil Aviation Organization/Committee on Aviation Environmental Protection (ICAO CAEP). The close collaboration with NASA at ICAO CAEP is also clearly supporting global leadership. Anything that jeopardizes ongoing research at AEE will impact the FAA/U.S. global leadership position at ICAO CAEP.

Recommendation (4): The Subcommittee recommends the continuing strong support of all research efforts/programs that will allow the FAA and the U.S. to maintain its global leadership position at ICAO CAEP. It is the belief of the Subcommittee that if the FAA/U.S. does not maintain its leadership position at ICAO CAEP it will not be able to influence policy/rulemaking and this could have a significant negative impact on the U.S. aviation industry.

FAA Response: The FAA concurs with the Committee's recommendation and is undertaking the following actions to address it - The FAA appreciates the support of the Subcommittee for our ICAO CAEP activities and the importance of continued U.S. leadership therein. We concur that it is critical for FAA to have robust participation in the ICAO CAEP process, and we have allocated resources such that we can provide leadership in many of the working groups of CAEP, as FAA leadership is critical to securing overall U.S. objectives at ICAO. FAA prioritized research efforts include developing the modeling capabilities and generating the data to support the decision-making process within ICAO CAEP. Under the direction of FAA, much of this work is being done by ASCENT COE universities and the Volpe Center, in close collaboration with NASA and industry. Over the past few years, we have been working with U.S. stakeholders and the international community to develop noise standards for supersonic aircraft with a focus on landing and takeoff noise. As AEDT is the primary tool for supporting decision making related to noise at ICAO CAEP, this has included working with the Volpe Center to enhance its capabilities to include supersonic aircraft. In addition to this broad effort related to supersonic aircraft, FAA is also utilizing the broad research portfolio of ASCENT and expertise at NASA and DOE to ensure that the evaluation of any long-term aspirational goal is based on robust scientific analyses that quantify the economic costs and potential benefits of any specific goal. We continue to advance work in ICAO to ensure that sustainable aviation fuels from biomass and wastes, as well as, lower carbon aviation fuels from fossil resources are appropriately credited within the ICAO Carbon Offsetting and Reduction System for International Aviation (CORSIA). Finally, we are examining what additional research efforts may be needed to support efforts that could come out of the CAEP/12 meeting in February 2022.