Subcommittee on Environment and Energy | MINUTES

Meeting date & time *September 16-17, 2020*
Meeting location *Virtual Meeting*

Purpose	Develop Strategic Guidance for the FY2023 R&D portfolio
Facilitator	Jim Hileman, DFO
Note taker	Jim Hileman
Timekeeper	Jim Hileman

Minutes from Meeting

Presentation Chair Opening Statements | **Presenter** *Ian Redhead*

Ian Redhead welcomed everyone.

Presentation FAA AEE Update (AEE Update) | **Presenter** *Kevin Welsh*

Kevin Welsh noted that Jim Hileman has been acting for the last 8 weeks while Kevin was on leave. He followed by providing a few personnel updates. Becky Cointin is now the Deputy Director for National Engagement at the FAA, which oversees the work of the FAA Regional Administrators. Julie Marks will be joining AEE as the new Deputy Director starting later this month. He further noted AEE are in a good period of growth in filling slots in the office and that AEE have also been successful in getting funding to conduct research.

He continued by noting that this is our second subcommittee meeting during the COVID pandemic and that we are continuing improve how to work remotely effectively. We have had many meetings over this period and more coming up. This includes the ASCENT COE Meeting and the CAEP Steering Group meeting. Kevin also noted that we have also brought Dan Williams onboard as the Senior International Advisor. With Dan and Julie, we have a full management team.

A Subcommittee member commended the FAA for bringing onboard so many people during the pandemic. The DFO noted that the Division Managers of AEE have done a great job of hiring and for onboarding period during these unusual times.

Presentation Update on ICAO and CORSIA Implementation | **Presenter** *Dan Williams*

Dan Williams presented an update on what has transpired since the last Subcommittee meeting. He started by noting the challenges that have arisen due to the virtual workplace we now live in and not being able to negotiate face-to-face. A major outcome over the last 6 months is the council agreement to use 2019 as a baseline for CORSIA. He followed by noting that the FAA

has received reporting from airlines as needed for CORSIA and these reports account for 98% of the expected emissions.

He followed up by noting that Council considered the CORSIA sustainability criteria for Sustainable Aviation Fuels and asked for a State letter process on it. The results are in from that process and Council will be considering the sustainability criteria once more in a coming session.

Dan continued with a discussion on the coming CAEP Steering Group Meeting, which will be virtual. He noted that many things are going forward in a fairly normal manner in CAEP, but from home and not from the office. He mentioned the new effort to evaluate the feasibility of a long term aspirational goal for international CO2 emissions, and how this has led to an uptick in efforts within CAEP.

A Subcommittee member asked about resources as they are struggling to work on everything that is needed and appreciates the sensitivity of the FAA on this subject. Kevin noted that this is particularly hard for airlines, manufacturers and airports as they are all struggling to keep up with the growing asks of ICAO.

Kevin provided additional information with respect to the Council efforts on the CORSIA baseline. This led to a discussion with the Subcommittee Chair on CORSIA and increasing industry commitments to decarbonize aviation.

Presentation Industry Perspective | **Presenter** *Steve Alterman*

Steve Alterman discussed the challenges facing the industry and how no one in industry envisioned what has happened to the industry due to COVID-19. While cargo is up, TSA counts of passengers are still very low and Steve is concerned what will happen after support runs out on October 1.

Steve transitioned to environment and noted that GAO did a report on the potential of a Stage 3 phase-out. He recommended people find it. He also noted that comments to the EPA on the CO2 Standard are due on October 19th.

He continued by noting that the FAA Reauthorization asked the MAC to evaluate how the FAA works with stakeholders. The report will unfortunately not be done by October 1. The MAC have found the FAA communicates with people on noise very differently now than in the past and that the communications between the FAA and stakeholders has improved significantly over the last few years. In the past, FAA have been verbally attacked in person but in the time of COVID-19 the meetings are happening online with tens of thousands participating. The results are more civil and reach many more people. This indicates to him that we all might want to rethink how we do things and see how we can do business in better ways.

Steve noted that drones and urban air mobility will be coming much faster than anyone had expected. With this, he has heard about the concept of visual noise where people see things and that bothers them as opposed to hearing it.

As airlines resume business, the noise will be new noise as people have become accustomed to less noise. The industry will need to be prepared to deal with this reality.

Steve noted that he is encouraged that things are continuing within AEE in spite of the challenges facing FAA from the pandemic.

Kevin thanked Steve for mentioning the EPA rulemaking as that is indeed important and the FAA played an important role in making this happen.

A member asked for Steve's view on how airlines retiring older aircraft will affect aircraft manufacturing. Steve said he was not sure.

The Subcommittee Chair and Steve had a discussion about drones for package delivery and their potential impacts on society. Steve noted that the impact on the environment of new entrants namely drones, UAM, and commercial space should be an area of research for the FAA.

Presentation Budget | **Presenter** *Beth Delaroseby*

Beth Delaroseby began by giving an update on the RE&D budget for FY20. The FY20 budget was enacted on December 20, 2019 and received $192.7M for RE&D funds. She provided a detailed comparison of the ops, F&E, Grant-in-Aid, and RE&D accounts among the President's budget, subcommittee markups, and the final conference language.

Beth continued by providing an update on the FY21 budget. She noted that the House has provided its report, but the Senate has not as yet. She then provided considerable detail on the House report.

Regarding the $170M target for FY22 she noted that it was delivered to OST on June 26, 2020. Submission to OMB is expected for mid-September and delivery of the President's request to congress in February 2021. She also added that the targets established in February 2020 out to FY26 are still for $170M, but that changes can be expected.

Lastly Beth reminded the committee that the current Authorization signed by the president on Oct 5, 2018 extents the authorization through 2023.

A Subcommittee Member asked where funding would come from with the lack of aviation activity. Beth noted that the funds would be coming out of the general funds for FY2021 and the balances are being watched carefully.

The Subcommittee Chair noted that the out-year targets are unchanged from March.

Presentation Responses to REDAC Recommendations & Actions | **Presenter** *Jim Hileman*

Jim Hileman walked through the action items from previous meetings. Open action items are listed below. He then walked through the existing findings and recommendations from the spring 2020 meeting while noting that all of the responses are preliminary. All of the recommendations were left open.

Action items	Person responsible	Deadline
Share ASCENT NFO with REDAC E&E Subcommittee (on an annual basis)	J. Hileman	Ongoing

Action items	Person responsible	Deadline
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	J. Hileman	Ongoing
Develop a means to communicate successes from E&E Portfolio summary slide	J. Hileman	Ongoing
Leverage the road mapping efforts at NASA and FAA to update the White House National R&D Plan	J. Hileman	On hold
Monetize the air quality and climate benefits of having an alternative jet fuel with reduced sulfur and naphthalene content	J. Hileman	March 2021
Examine indirect environmental impacts from aviation that result from modifications to supply chains	J. Hileman	March 2021
Develop a means to communicate information on AEDT to the layperson. This could include its noise and emissions modeling capabilities and how it reduces the need for noise and emissions monitoring	F. Grandi	March 2021
Create ASCENT materials to include a list of the number of projects undertaken under the CoE, the value of the program in terms of the number of educated individual it contributes to the industry, and identify the entities that recognize the value of partnering on ASCENT projects.	Jim Hileman	March 2021

Presentation FAA R&D Update and Landscape Document | **Presenter** *Shelley Yak and Steve Summer*

Shelley Yak thanked everyone for joining the meeting in these changing times. She provided details on how the FAA Technical Center has been dealing with the COVID pandemic.

Steve Sumer presented on the landscape document. He started with a refresher, then went through the contents, and then provided more information on how it is being used. He provided more information on drivers and research challenges that are in the document. He also offered to share the document with anyone who is interested.

The Subcommittee Chair asked if anything is being pushed to the longer term due to COVID. Steve said it is premature to discuss this from his perspective. The DFO noted that we will cover this in some of the presentations decks.

Presentation E&E Research Update | **Presenter** *Jim Hileman*

Jim Hileman provided an update on the efforts of the Environment and Energy (E&E) Research Portfolio. The briefing included background on the Office of Environment and Energy (AEE), an overview of the E&E Research Portfolio, a summary of activities of the ASCENT COE, the budget profile for the E&E Research Portfolio. He concluded with a summary of accomplishments.

The briefing started with the organization chart for AEE as well as the E&E strategy being pursued by AEE. The overview of the E&E Research Portfolio provided high level details on the various aspects being considered by the portfolio, namely research related to aircraft noise, aircraft emissions, sustainable aviation fuels, aircraft technology, and analytical tool development. Jim provided a number of highlight from the portfolio and websites that have additional information on the efforts being supported by the portfolio.

Jim continued with an update on the ASCENT COE. In this portion, he noted that AEE have stood up 30 new ASCENT projects in the last 12 months and the office has spent $34.1 million over that time frame on 84 separate ASCENT grants.

In the section on the budget profile, Jim discussed the two budget line items that are used to fund the E&E Research Portfolio and how funding has varied over the last four years. In addition to a high level view on how AEE uses the funds in the two budget line items, he gave a detailed breakout of how funding has been used over the last four years.

Jim concluded the briefing with a list of recent successes that have been supported by the portfolio. He also provided an overview of the remaining briefings. At the end, he provided three questions for the subcommittee members to ponder as they review the portfolio.

The chair thanked Jim for the briefing and along with many other members, he commended AEE on the great progress made with the ASCENT COE in the last year.

Presentation NASA Update | **Presenter** *Barb Esker (NASA)*

Barb Esker gave an update on NASA Aeronautics efforts. She started by providing an overview of drivers moving NASA aeronautics and the overarching programs that comprise NASA Aeronautics. She provided the budget profile for NASA aeronautics and the goals for the coming years. She discussed how NASA has dealt with the COVID pandemic. The briefing covered details on work related to supersonics, vertical flight, subsonic transports, and hypersonic flight.

She provided an update on the work of the Low Boom Flight Demonstrator, including vehicle manufacture, acoustic measurements, and community testing, and how these will feed the development of international standards in ICAO where NASA is working with FAA. She followed by providing information on the advanced air mobility mission. NASA have been continuing to press forward on analytical efforts related to safety and noise from these vehicles.

Barb continued with a presentation on the four technologies being developed for subsonic transport technologies, namely electrified aircraft propulsion, small core gas turbines, transonic truss-braced wing, and high rate composites. She provided additional details on the electrified powertrain flight demonstration project. She gave an update on the acoustic measurements that were done with Boeing in the ecoDemonstrator program. With respect to hypersonic flight,

NASA have started two studies to understand the potential business case for these vehicles. She concluded with a discussion on the NASA University Leadership Initiative.

Presentation Emissions Research | **Presenter** Ralph *Daniel Jacob*

Ralph Iovinelli started the briefing and provided details on the annual Aviation Emissions Characterization meeting. Daniel Jacob followed this by providing emissions research efforts that are being done or contemplated by the office He provided details on a number of topics. In turn, he discussed each of the elements of the emissions research roadmap.

Daniel provided details on emissions measurements which will lead to improvements in the non-volatile particulate matter (nvPM) standard. This work will result in methodologies to correct measurements for ambient conditions and enable improved estimates for cruise nvPM emissions. The work will also identify means to reduce nvPM emissions from aviation.

He continued with a discussion on the development of an aviation specific dispersion model that could be used to replace AERMOD and the air quality monitoring and source apportionment efforts to support the model development. He also provided details on efforts that are underway to develop an improved method to predict volatile particular matter in areas near the airport perimeter. This new model is being developed to replace the current first order approximation. He also discussed efforts to mature in-line and in situ calibration techniques for nvPM measurements.

Daniel also presented on ongoing efforts to quantify the impacts of various sources of emissions in the upper atmosphere. He concluded with a presentation on potential work that could lead to an improved understanding of contrail formation and real-time predictability of the radiative forcing of contrails. This line of work would ideally lead to cost-effective solutions that could be used by industry to reduce the climate impacts of aviation.

A Subcommittee member asked if the FAA envisions nvPM emissions measurement equipment being needed at each facility and if the FAA plans to do on-site calibration. Daniel responded that the FAA are working on an in-situ method.

Based on a question from a Subcommittee member on the proposed contrails work, Daniel stated it is a notional plan that was developed in respond to the REDAC request. It presents what could be done. He noted that such a plan would require teaming with other agencies, (e.g., NASA and NOAA).

In response to a Subcommittee member question about the timeline associated with the emissions measurements efforts, Daniel noted that it is not clear at present and there is risk of further delays due to the COVID-19 pandemic.

Presentation Supersonic R&D Efforts | **Presenter** *Ralph Iovinelli and Don Scata*

Don Scata started the briefing with an overview of research efforts in ASCENT on supersonic noise to assist the ICAO CAEP process on en-route noise and to better understand the jet noise from supersonic engines. Ralph continued with a discussion on the ASCENT projects that are considering supersonic aircraft design, both using existing engine cores as well as with a clean sheet engine design. Ralph concluded by noting the collaboration between FAA and NASA.

The Subcommittee Chair asked about the collaboration of FAA and NASA and FAA stated that there is very close collaboration. Based on a question, the FAA also noted that ASCENT Projects 10 and 47 are providing technical support on supersonic landing and takeoff noise analyses in ICAO CAEP.

Presentation Alternative Jet Fuels Research | **Presenter** *Nate Brown and Anna Oldani*

Anna Oldani started the briefing with a reminder that the FAA does work on testing, analysis, and coordination. She noted that the briefing would cover the fuel qualification process, status of fuel approvals within the ASTM International process, supply chain analysis tools, the ICAO CAEP Fuels Task Group, and commercialization status.

She provided an overview of the ASTM International fuel qualification process and the work the FAA is doing to support it, including the ASCENT Clearinghouse. She continued by giving the current status of different fuels within the ASTM fuel qualification process and the amounts of fuel and time that have been required to get fuel approvals. She provided an update on the various efforts the FAA is pursuing to streamline the approval process, including the D4054 Fast Track Annex.

The Subcommittee Chair noted that there were concerns about funding being cut for testing, but now there are a lot of fuels in the approval process. Anna agreed and noted that we are getting support from a number of other agencies for the process, which is a recent development.

Nate continued the presentation with an update on the Freight and Fuels Transportation Optimization Tool (FTOT), which has been made publicly available and is already being used by the research community. He continued with an update on the publications that are being generated by the ASCENT Project 1 team. Many of these are identifying means to reduce costs of fuel production.

He provided a number of points relating to our efforts on coordination. This included efforts to ensure fuels are included in CORSIA through ICAO CAEP, which is being supported by the E&E R&D portfolio. He also provided a brief discussion relating to fuels within the Long Term Aspirational Goal (LTAG) Task Group of ICAO CAEP.

Nate updated the Subcommittee on the multi-agency initiative to implement the Federal Bioeconomy Initiative, known as the Biomass R&D Board. After a July 30 vote, the board agreed to create an Advanced Aviation Fuels Interagency Working Group under the board. He shared two efforts at DOE that have subsequently been announced to support SAF production.

He concluded with information on U.S. SAF use and noted that in the first half of 2020, there have been over 3 million gallons of SAF used in the U.S. He provided updates on construction of SAF facilities in the U.S. and global announcements of new facilities. He also gave an update on efforts in the business aviation community on SAF.

The Subcommittee chair noted that government procurements of SAF have gone down dramatically over time and Nate noted this is a function of the certification/qualification process becoming far more efficient.

A Subcommittee member noted the efforts of the business aviation community and the uplifting of fuels at San Francisco International airport.

Discussion | Lead *Ian Redhead*

The Chair noted that he is very impressed by the quality of the presentations and the positive trajectory of the efforts.

A Subcommittee member thanked AEE for continuing to work in spite of the pandemic. He said that he is tremendously impressed by what AEE have accomplished in the face of the pandemic. He noted that the aviation sector is in a better place because of the efforts of AEE.

A Subcommittee member mentioned potential issues associated with supersonic and hypersonic aircraft that are under preparation.

The Subcommittee Chair commended the FAA for their efforts to get $34.1M to the ASCENT COE in the last year.

Another Subcommittee Member commended the team on its staffing and execution during the COVID-19 pandemic.

The Chair closed out day 1 at 4:30 pm.

END OF DAY 1

Presentation Noise Research | **Presenter** *Don Scata and Sean Doyle*

Don Scata started his briefing by reminding everyone what the FAA is doing on noise. He followed by introducing people who have joined the Noise Division over the last 6 months. Sean Doyle followed Don by discussing the FAA reauthorization provisions that relate to noise and the E&E R&D portfolio.

A Subcommittee Member asked if the report that was developed in response to Sections 173 and 188 was released to the public and Sean noted it has indeed been published and the link to the report is in the slide deck.

Don noted that much of the AEE work on noise will be covered during other parts of the meeting and his briefing is dedicated to aspects that will not be included elsewhere. Sean then went through details on the individual parts of the noise research program. He started this discussion by showing how research is linked to policies and metrics. He then discussed research efforts to better understand the impacts of noise on the public.

The topic of the national sleep survey led to a discussion among Sean, the Chair and another Subcommittee member on how the drop in air traffic activity could lead to problems in getting data for the study. Sean clarified that the FAA are working with OMB to put in place contingency plans to deal with this challenge and this was the purpose of the information on slide 15.

There was also discussion around the work in Louisville to look at the opportunities for trees to reduce the impacts of aviation noise on communities. The FAA clarified that this is National Institutes of Health (NIH) funded work and that FAA have been helping to improve the research effort by providing FAA AEE expertise and Volpe support to ensure that high quality noise data is taken to support the effort.

Don followed with a short summary of work on commercial space noise. He also provided details on the noise portal that has been rolled out across the U.S. over the last few months. He further discussed the new FAA noise landing page, www.faa.gov/noise.

The Subcommittee had a brief discussion on the rollout of the noise portal with several members who represent airports expressing positive feedback to the FAA on the portal and their efforts to with respect to the rollout.

A Subcommittee member asked if there is a way to share the information from the impacts work as it becomes available. Based on this question, the DFO asked for specific suggestions on how the FAA could better share research results. There was discussion on the potential for ASCENT to do press releases with major studies when they are released, for example, the work of MIT to look at operational procedures could be shared in such a way.

A Subcommittee Member asked if there is a way to use the natural experiment that is taking place with decreased aviation activity. The Chair noted that the Subcommittee should come back to this topic during the discussions.

Presentation UAM/UAS Acoustics Research Status | **Presenter** *Eric Elmore and Don Scata*

Eric Elmore started the briefing with a summary of the motivations behind work on urban air mobility. Don Scata followed this with information on several projects that are being stood up to examine Urban Air Mobility (UAM) and how their noise could be reduced (ASCENT Projects 49 and 77) as well as to develop means to evaluate Unmanned Aerial System (UAS) noise.

A Subcommittee member asked if Don has had a chance to talk with NASA on UAM noise. Don said that he has not had a chance as yet, but this is a good idea.

Based on a recommendation from the DFO, Don also discussed issues associated with noise certification of UAS and UAM. This included a new effort in ASCENT to examine the overall noise certification process for both today's air vehicles as well as new entrants such as UAS and UAM. This led to a discussion on noise certification of UAS within members of the Subcommittee.

Based on a question from a Subcommittee Member, Don said that we are struggling on noise issues with respect to UAS as we are lacking data. He said that until we have a good database on their noise levels, we are unable to make a noise policy on these vehicles. This led to further discussion. The DFO noted that we have stood up a few UAS/UAM projects based on the inputs we received from the Subcommittee, but these are not sufficient to meet the challenge and the biggest challenge we in FAA face with respect to UAS/UAM noise is our lack of data. He implored the industry members of the Subcommittee to speak with their counterparts to get noise data released to FAA. This led to several suggestions for contacts that Don captured.

Presentation Operations for Reduced Noise | **Presenter** *Chris Dorbian*

Chris Dorbian provided an overview of the research FAA is doing to develop operational procedure concepts to reduce noise. He started by noting what the FAA can and cannot do with respect to operational procedures. He then gave an update on the research that MIT is doing through the FAA-Massport MOU. This included information on two phases of the MIT work

that are referred to as Blocks 1 and 2. He went through details on the procedures within Blocks 1 and 2 and their status. He also discussed the report that was developed in response to Section 179 of the FAA Reauthorization. He concluded with a summary of the ongoing efforts to examine how operational procedures could be modified to reduce noise.

Based on a question from a Subcommittee member, Chris explained details on how the technical work interacts with the community concerns with one of the Block 1 procedures. He also explained the challenges in getting dispersion within the Block 2 procedures due to the complexity of the airspace and the lack of specificity of what is desired by the communities.

Based on a question from another Subcommittee member, Chris said that some airports are more able to use open Standard Instrument Departures (SIDs) in different ways based on their runway configurations with it being easier for those with parallel runways, as opposed to the crisscrossing runways at Boston Logan.

Based on a question from a Subcommittee member, Chris explained that there are indeed challenges and that it would be best to get communities to agree on solutions before the FAA does the technical work to reach the solution. This led to a discussion on dispersion in terms of how to get communities to agree on a solution that would lead to winners and losers. The DFO noted that the work of MIT has led to a useful examination of how to use the number above noise metric to present the impacts of noise on communities with the use of dispersion and this may in the end be the most impactful aspect of the work.

The Subcommittee Chair revisited the discussion from earlier in the day on the potential to use the pandemic environment to understand the impacts of aviation on the public. This led to a discussion among the FAA and group on how existing health data being collected by entities such as Kaiser Permanente could be combined with noise data to take advantage of the unfortunate natural experiment that is taking place in the aviation industry due to the pandemic.

Action items	**Person responsible**	**Deadline**
Work with the Subcommittee to identify data sets that could potentially be used with noise data to better understand the health impacts of aviation noise and emissions. These data would take advantage of the large change in aviation activity that has accompanied the pandemic.	Sean Doyle	March 2021

Presentation Aircraft Technology Update | **Presenter** *Arthur Orton*

Arthur Orton provided a summary of the first two phases of the CLEEN program as well as the plans for the third phase of CLEEN, which will start with FY2020 funding. This included a summary of all of the technologies that have been matured by CLEEN, the status of those technologies that are currently being matured, and the impacts of the COVID-19 pandemic on the timelines for a few technology maturation efforts. He provided a number of accomplishments that the CLEEN program has achieved in terms of technology maturation as well as efforts to fund a few of the CLEEN Phase II options. He noted that Georgia Tech is making considerable progress on the benefit assessment of the CLEEN technologies and that there should be data available soon. He concluded the CLEEN Program portion of the briefing with an update on

Phase III of the Program, which is in the contracting stage with expectations of announcements this calendar year.

Arthur continued the briefing by summarizing the new work on technology that is being done under ASCENT. He started by noting that AEE has expanded the environmental technology research portfolio into our Center of Excellence and noted that much of this was presented at the last Subcommittee Meeting. He provided details on projects that were not briefed at the last Subcommittee meeting and noted the backup slides provide information on the full range of technology projects in ASCENT. He noted that ASCENT Project 64 is also providing technical support to work in ICAO CAEP.

He concluded by stating that (1) CLEEN Phase II is executing its fifth successful year; (2) CLEEN Phase III will continue our efforts to accelerate maturation of environmental aircraft technologies into the fleet (2020-2025) with awards planned for Q4 CY2020; (3) new ASCENT projects continue to expand our aircraft technology research portfolio; and (4) the program is supporting CAEP LTAG work.

The Subcommittee Chair asked about the CLEEN Program goals and Arthur noted that the goals are aspirational and provide direction for the Program. He further went on to show how the CLEEN goals compare to the current fleet and standards. An observer noted that NASA is working on redefining its goals and is looking at FAA CLEEN's goals to inform their work and that we are working collaboratively on this.

Presentation Analysis and Tool Development | **Presenters** *Fabio Grandi, Joe DiPardo, and Sean Doyle*

Fabio Grandi started his briefing with an update on the AEE overarching plan for analytical tool development, which is referred to in the briefing as Technology Welding and Deployment. This plan includes the development of infrastructure for reference data, data processes, and the analytical tools. The effort is being developed for use within the FAA Enterprise Information Management (EIM) system. He gave details on the databases being used, data processing algorithms that will be deployed, and their interconnectivity.

Joe Dipardo continued by giving a short update on AEDT development. This included efforts to fix a bug in AEDT3a that led to a re-release of the tool in June 19, 2020. He provided details on the AEDT User Review Group that is providing useful feedback on AEDT as well as an external audit of the AEDT development process. He gave details on the development plan for AEDT3d and noted that the focus of the 3d release will be on dealing with known bugs and code cleanup to improve functionality. He concluded with information on the future development of AEDT.

Based on a question from the Subcommittee chair about the membership of the AEDT User Review Group, some of the Subcommittee members noted that experts from DFW and Boeing were involved.

Fabio continued the briefing with an update on development and coordination of the Environmental Visualization Tool (EVT). Sean Doyle continued with an update on the development of a noise screening tool. Fabio, Sean, and Joe concluded the briefing by giving updates on a number of ASCENT projects that will result in improved analytical tools.

Priorities Discussion and Development of Findings and Recommendations | Lead *Ian Redhead*

The Subcommittee Chair started the discussion by informing the FAA that they have been able to make tremendous progress over the last six months and that AEE have not let COVID-19 slow them down. He noted that during this time, AEE have brought on many new hires, executed funds, made AEDT more user friendly, and added research on UAS/UAM/supersonics to address concerns previously raised by the Subcommittee. He noted that AEE have obviously worked hard to keep things going. He asked for Members to provide comments and several Members responded as recorded below (note that these are captured in chronological order).

A Subcommittee Member said that AEE and the E&E Research Portfolio are obviously a well-run organization all the way down to using best practices in tool development. He continued by noting that the Portfolio has excellent strategy, leadership, coverage, and a great balance among topics. The partnerships are also great. He noted that the recent grant approvals are a great relief for the universities. The tasks have a 3 year time horizon to provide stability to the students. He continued that because he is involved in the work of CAEP, he can vouch for the FAA providing leadership in ICAO and that others around the world are following the lead of the FAA. He noted that the Subcommittee are stretching to find things that are not included in the Portfolio as this is a good program. He did say that there are opportunities to find things that can take advantage of COVID and because there are few operations we can see what would happen with a large reductions in noise and emissions. He stated that we all need to ensure that as data is collected on the environment, it is shared with FAA AEE. With respect to the work of ICAO CAEP on the long term aspirational goal for international aviation CO_2 emissions, there will be advanced configurations that will need to be studied and if we want to do future stringencies on these vehicles, then we will need to ensure these vehicles can be evaluated within AEDT. He also noted that we need to think about how to do analyses more quickly. With respect to hydrogen, he noted that the FAA should not be doing research beyond the study that is already ongoing in MIT on ASCENT Project 52. In terms of open rotor and UAM efforts, the Subcommittee member noted that we need to understand the noise generation mechanisms better to enable design. He concluded by noting that drop-in fuels need to be the top consideration of the FAA within the E&E Research Portfolio.

A second Subcommittee Member started by noting that he is in agreement with the previous Member's comments and that the FAA did a great job. He noted that the slides were polished and he could see the passion and desire of the presenters to make an impact with their work. Watching the progress over time, he can see the team getting stronger and that the Subcommittee is getting good payback. He continued by noting that he does not think the FAA should spend money on hydrogen. Instead, the FAA should have a defensive play and not let it take away time from the FAA. A higher level of advertising to show what is already being done in ASCENT in Project 52 would be a good idea. He was not sure how to execute this and it will require some thought. He concluded by stating that AEE has done a phenomenally good effort.

A third Subcommittee Member followed by echoing the inputs provided by the others. He stated that the projects are very relevant and the new ASCENT projects are great and well aligned with what is needed by industry. He agreed with the others that the FAA is not the right place to do work on hydrogen. He noted that there is a lot of activity in Europe on hydrogen and that we can

just watch it for now. He concluded by giving kudos to everyone working on the Portfolio and stating that the work is on the right track.

A fourth Subcommittee Member started by stating that she agrees with her colleagues. She noted that she is impressed by the increased number of activities in ACENT and how they are laser focused on what is needed. She noted that she would work to ensure that the new tasks are aligned with efforts at NASA. She agreed that hydrogen is not the right fit for FAA and that any such work would be better for the NASA portfolio. She recommended that there be a US government response to hydrogen developed with inputs from FAA, NASA, and DOE.

Action items	Person responsible	Deadline
Develop materials on the use of hydrogen use by commercial aviation and work with others at NASA and DOE on the subject.	Jim Hileman	March 2021

A fifth Subcommittee Member noted that she is always amazed at how much gets done between Subcommittee meetings. She stated that she is very impressed with the direction of the Portfolio and the work on Noise Complaint Initiative. She asked the FAA to consider if the research portfolio should change in response to reduced operational levels. She noted that she was not sure if it is does, but it would be good for the FAA to look for opportunities based on the reduction in operations that are happening. She shared her appreciation for the ASCENT projects that have been stood up, and concluded by stating that the FAA had done a great job.

A sixth Subcommittee Member supported the comments from the previous Member and said that the Portfolio is on good paths. She also noted that hydrogen is of concern for airports. Based on the discussion, the DFO shared information with the Member on a DOE workshop that was coming up on hydrogen use at airports.

A seventh Subcommittee Member started by noting that the increased staffing in AEE is great and he encouraged the FAA to keep hiring top-quality people. He continued by noting that it seems the grant approval process seems to be working and that hopefully FAA can keep this going at a regular rate. He liked the big data initiatives being undertaken by AEE and that this new effort will be fundamental to AEE going forward. He continued by stating that AEE also needs to consider how to use data outside of the aviation world and he gave kudos to AEE for working in that direction as it will be a good investment over time. He noted that as an advisory committee, the Subcommittee Members need to ensure that the efforts within the Portfolio are supporting the right things and that they have the correct balance. He continued that the new investments are supporting the vision being established by AEE leadership with the right balance. He noted that balanced needs to be maintained between domestic and international topics (he supports doing both) and between the meat and potatoes of examining the existing fleet versus new entrants (he noted that AEE needs to resist the temptation to chase shiny objects). He also noted that the research of FAA is near term and applied, and the majority of the research in the Portfolio falls into this bucket. He noted that hydrogen is not something for the FAA to consider. He concluded by thanking the speakers for providing great presentations.

An eight Subcommittee Member agreed with the previous Members and declined to add anything new.

A ninth Subcommittee Member noted that the other Subcommittee Members have made good comments. He noted a discussion from past Subcommittee meetings about the continuation of efforts on SAF and that it should be a priority. He also noted that he liked seeing where SAF could be available on a map. He continued by noting that he tends to agree with the other Subcommittee Members on hydrogen and that it seems early to have R&D on this subject. He stated that he does not want to see efforts on hydrogen to take away from SAF work.

Based on the comments from the Subcommittee Member, the DFO clarified that the FY19 and FY20 President's budget did not have SAF included, it was zeroed out. SAF is though included in the FY21 President's budget.

A tenth Subcommittee Member stated that he was very impressed that AEE have not let COVID-19 get in the way of their work. He agreed on the points about data brought forward by previous Members and he noted that the FAA Administrator has said that data analysis should be an area of concentration going forward. He continued that data would be a major topic of the next FAA Management Advisory Committee (MAC) meeting. He also said that it is crucial that the FAA stay involved in international work and that the FAA has been under pressure for not providing leadership internationally and it is important to keep engaging with our international partners. He stated that the business of aviation is global and not within the US and he gave kudos to the FAA for our efforts on this. He stated that the Subcommittee should provide a recommendation on the topic of global leadership. He also noted that the environmental impacts of new entrants needs to be considered as it will be a major issue and he encouraged AEE to look more at this. He noted that this topic could also be a recommendation.

An eleventh Subcommittee Member stated that she was impressed by the progress made on executing ASCENT grants and the people who are joining AEE. She noted that it is great to see the work on environment coming forward and the leadership of the FAA at ICAO CAEP. She asked the FAA to continue providing leadership at CAEP. She said that UAM is going to be a big issue and we are all learning more about community reactions to them. She concluded by saying it is great to see the focus on UAM.

A twelfth Subcommittee Member agreed with everything that had been said previously and that he was very happy to see that the barriers have been dealt with in executing ASCENT projects. He noted that one project had been held up for two years due to the process. He also agreed that it is premature to look at hydrogen as there is nothing really going on there.

A thirteenth Subcommittee Member stated that international work is integral to not only the business case of aviation but also to environment. He said that we need to stay in it. He echoed the good work kudos from other Members.

A fourteenth Subcommittee Member agreed that everyone had done a great job. He continued that from the noise side, it is good to see the work of UAS/UAM and he was very happy to see the work on fan broadband noise being started within ASCENT.

Based on a question from a Subcommittee Member about UAM emissions certification standards, the DFO noted these vehicles might be certified as a helicopter, tiltrotor, or perhaps something else. He continued by noting the challenge with UAM certification is largely on noise, and not emissions, as the levels from these vehicles is not well known. He stated that this is why the E&E Portfolio efforts on UAM are focused on noise. He continued by noting that the emissions side should be more straightforward, especially if the vehicle is powered by batteries,

and there is not a clear need for research on the emissions side of UAM as yet. The DFO concluded by noting that AEE are continuing to monitor this area and will stand up emissions research efforts should they be needed.

The Executive Director of AEE concluded the discussion by noting that the staff in AEE have taken advantage of the opportunities of Zoom to connect people within FAA and across the world. He further noted that AEE are doing considerable work to support progress on sustainable aviation fuels and technology that will reduce fuel burn, noise and emissions.

Meeting Close-Out | Lead *Ian Redhead*

Ian thanked everyone for their participation. The dates for the coming meetings were shared as was the deadline for findings and recommendations from the meeting (September 30, 2020).

Subcommittee Discussion of Open Recommendations (Discuss status of FAA response and decide to close or remain open)

All of the recommendations from the Spring 2020 meeting were left open.

Next Meetings – Date/Location/Agenda Items to be Included

March 9-10, 2021 (location TBD)

September 14-15, 2021 (location TBD)

Adjourned at 3:30 pm on Thursday, September 17, 2020

FAA REDAC Subcommittee on Environment & Energy
Summer 2020 Meeting Agenda
Virtual Meeting

Purpose:
- Develop strategic guidance for the FY2023 R&D portfolio
- FAA provides deep-dive briefings on topics of interest to develop strategic guidance
- E&E REDAC to provide recommendations on R&D portfolio and direction

Remote Participation:
Click to Join:
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Password: 647184
If prompted, accept the Zoom application as instructed

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- Click the JOIN button
- Enter Meeting ID: 161 8204 5762
- Password: 647184
- If prompted, accept the Zoom application as instructed

For a camera enabled PC or laptop & Optimized for Google Chrome or Microsoft Edge M
- Download the 'Zoom Cloud Meetings' App
- Select 'Join a Meeting'
- Enter Meeting ID: 161 8204 5762
- Password: 647184

Phone Audio Only:
- Call 1-888-924-3239 or 1-571-302-4908
- Enter Meeting ID: 161 8204 5762
- Password: 647184
- Please remember you can mute or unmute yourself by pressing *6

Read Ahead Materials: http://redacdb.faa.gov/browse.cfm

Wednesday, September 16, 2020

Time	Duration	Title	Presenter
10:30	0:05	Welcome	J. Hileman
10:35	0:10	Chair opening statement & Introductions	I. Redhead
10:45	0:15	AEE Update	K.Welsh
11:00	0:15	Update on ICAO and CORSIA implementation	D. Williams
11:15	0:15	Industry Perspective	S. Alterman
11:30	0:15	FY20/FY21 Budget Update	Beth Delarosby
11:45	0:15	Responses to REDAC Recommendations & Actions	J. Hileman
12:00	0:30	Lunch	
12:30	0:30	FAA R&D Update & Landscape Document	S. Yak
13:00	0:30	E&E Research Portfolio Overview and Program Proposal	J. Hileman
13:30	0:30	NASA Update	B. Esker (TBC)
14:00	0:30	Break	
14:30	0:30	Emissions Research	R. Iovinelli & D. Jacob
15:00	0:15	Supersonic Civil Aircraft Research	D. Scata, R. Iovinelli, et al.
15:15	0:15	Sustainable Aviation Fuels Resarch	N. Brown & A. Oldani
15:30	1:30	Discussion	I. Redhead
17:00		End of Day-1	

Thursday, September 17, 2020

10:30	0:30	Noise Research	D. Scata
11:00	0:30	Discussion	I. Redhead
11:30	0:15	Helicopters, UAS, and UAM	E. Elmore et al.
11:45	0:15	Research on Operational Procedures	C. Dorbian
12:00	0:30	Discussion	I. Redhead
12:30	0:30	Lunch	
13:00	0:30	Aircraft Technology Resarch	L. Ileri & A. Orton
13:30	1:00	Discussion	I. Redhead
14:30	0:30	Break	
15:00	0:30	Analysis & Tool Development	F. Grandi
15:30	1:30	Discussion	I. Redhead
17:00		End of Day-2	

Attendance

Day 1	Day 2
Alonso, Juan J.	Alonso, Juan
Alterman, Steve	Alterman, Steve
Borener, Sherry	Borener, Sherry
Bradley, Veronica	Bradley, Veronica
Brown, Nate	Brown, Nate
Cohen, Abby	Cohen, Abby
Dassa, Ira	Cowan, Durre
Delarosby, Beth	Dassa, Ira
Dipardo, Joe	Dipardo, Joe
Dorbian, Chris	Dorbian, Chris
Doyle, Sean	Doyle, Sean
Dudebout, Rudy	Dudebout, Rudy
Ehudin, Mark	Ehudin, Mark
Elmore, Eric	Elmore, Eric
Esker, Barbara	Esker, Barbara
Etter, Charles	Etter, Charles
Fleming, Gregg	Fleming, Gregg
Grandi, Fabio	Grandi, Fabio
Hamburg, Steven	Hamburg, Steven
Hawthorne, Rangasayi	He, Bill
He, Bill	Hileman, Jim
Hileman, Jim	Hobbs, Chris
Hobbs, Chris	Iovanelli, Ralph
Iovanelli, Ralph	Kosanchick, Melvin
Jacob, Daniel	Lancaster, Sandra
Kosanchick, Melvin	Majeed, Mohammed
Lancaster, Sandra	Majjigi, Muni
Locke, Maryalice	Mavris, Dimitri
Maijjigi, Muni	McKoy, Jenine
Majeed, Mohammed	Moores, Roxanna
Mavris, Dimitri	Murphy, Andrew
McKoy, Jenine	Oldani, Anna
Moores, Roxanna	Orton, Arthur
Murphy, Andrew	Pagliarello, Melinda
Oldani, Anna	Pitman, Brian
Orton, Arthur	Preston, Katherine
Pagliarello, Melinda	Price, Laura

Pitman, Brian	Redhead, Ian
Preston. Katherine	Riley, Rick
Price, Laura	Roundtree-Coleman, Chinita
Redhead, Ian	Sabnis, Jayant
Riley, Rick	Scata, Don
Roundtree-Coleman, Chinita	Tan, Sam
Sabnit, Jayant	Tan, Samuel
Scata, Don	Upadhyay, Jeet
Schliefer, Jon	Van Zante, Dale
Shaw, Cecelia	Vitagliano, Lauren
Summer, Steve	Wahls, Rich
Upadhyay, Jeet	Walker, Judith
Wahls, Rich	Welsh, Kevin
Welsh, Kevin	Williams, Dan
Williams, Dan	Wuebbles, Don
Wuebbles, Don	Zelina, Joe
Yak, Shelley	
Zelina, Joe	