Subcommittee on Environment and Energy | MINUTES

Meeting date & time *March 7-8, 2018*
Meeting location *GAMA, Washington D.C.*

Purpose	FY20 E&E Portfolio Guidance
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 and those in the room introduced themselves.

Presentation What's New in FAA and AEE / ICAO UPDATE **| Presenter** *Kevin Welsh*

Kevin Welsh briefly introduced himself and then gave an update on what is happening at the FAA and AEE.

Kevin presented the new Mission and Vision for AEE that was developed by the AEE Management Team (shown below). These were developed for our internal efforts and to guide what AEE is doing. He asked for feedback on these as they are meant to reflect the full suite of what AEE are doing.

AEE Mission: To understand, manage, and reduce the environmental impacts of global aviation through research, technological innovation, policy, and outreach to benefit the public

AEE Vision: Remove environmental constraints on aviation growth by achieving quiet, clean, and efficient air transportation

Kevin gave an update on the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Earlier this week, the Trump Administration reaffirmed its support for CORSIA. He noted that the Administration views it as being in the best interest of the U.S. He further recalled that CORSIA came as a reaction to the EU Emissions Trading Scheme. Multiple Members noted that industry was grateful to the FAA for its work in making this happen and that industry is very supportive of CORSIA.

The research AEE does is the building block for the work on policy. We have much work to do on supersonic transport (SST) aircraft as the constraints on these vehicles are environmental. SST is a priority for the office as is addressing community noise issues broadly. We are working on this on many fronts including understanding what is driving the concerns. We are also doing much on noise and emissions certification. There has been a trend toward delegation of authority to manufacturers and overseas authorities which has been driven by non-environmental concerns.

Lastly, we are working to enhance and improve our environmental review processes as this is also an area of prioritization for AEE.

A Member asked where promulgating the ICAO CO2 standard falls on the lists of priorities. Kevin noted that this is a priority for AEE and that FAA is working closely with EPA on it. The FAA also noted that they had invited the EPA to this meeting, but they were unable to join.

A Member asked where we stand in regards to the PM standard and its promulgation. The FAA said that we have made considerable investments into PM and feel that we are adequately prepared.

Kevin discussed progress on ICAO. He said that in addition to CORSIA and the PM standard, we are coming to the end of the CAEP cycle. The last Steering Group meeting for the current CAEP cycle is coming up in June. We in AEE are thinking about what needs to be done in the next CAEP cycle as that will be discussed at the next Steering Group. We are thinking about how to develop the SST efforts and advance the carbon offsetting measure, but don't have much to say on this now and should have much more to discuss at the September REDAC meeting. A Member noted that the efforts of CAEP need to be tightly focused during the next CAEP cycle as budgets could be very tight.

A Member asked if the research agenda would be shifted by the budget. The FAA said that we have a challenge due to the uncertainty that comes with the FY19 budget. This includes a 50% cut to RE&D staff.

Kevin said that he is optimistic about the work in the long term and was complementary of the AEE Staff who are doing the work. The Subcommittee Chair said that he is also very complimentary of the AEE staff and shared that he is also frustrated by those recent developments that are posing challenges to the program. The Subcommittee Chair said AEE is working to protect the interests of the public.

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

Steve Alterman started by stating that the industry is fragmented in terms of its views on a great many things and that he is presenting his personal views. He talked about three areas: reauthorization, community noise, and the FY19 budget.

Steve noted that the FAA has not had a reauthorization bill. Instead, it has had short-term extensions. The most recent idea of privatization is no longer being pursued and it seems likely that we will have another short-term extension.

Steve stated that the biggest challenge to NextGen is noise. As NextGen is being implemented, it is affecting people and the Phoenix case is a result of this. He noted that community involvement in terms of where airplanes fly, based on the Phoenix decision, will become very difficult. Another Member asserted her agreement with Steve on these points.

Steve noted that the budget is being cut by a large amount and that this would result in the US ceding leadership at ICAO. He shared his view that CLEEN should be fully funded and perhaps more as it is a private public partnership that is helping infrastructure. He also expressed his concern about alternative fuels as there appears to be no funding in this budget for this subject. Steve said that he does not understand how the FAA can maintain its leadership with a 50% cut

in its RE&D budget and that this is an extremely important area and the President Budget level is unacceptable.

A Member noted that the lack of alternative jet fuels is a glaring hole in the President Budget and that it is a priority for U.S. Airlines. Alternative fuels are needed to ensure the continued growth of the industry.

The Member also stated that her organization has noted NextGen is not proceeding at the pace it could due to the nature of the appropriations process. She thinks that items that support NextGen need to be pursued with greater vigor.

Another Member remarked that we should avoid being bogged down by the Phoenix decision, but instead should focus on what brought us to that point. The FAA stated that we need to carefully consider what we are doing to address the noise challenges we are facing.

Presentation NARP Re-Design and FAA R&D Update | **Presenter** *Shelley Yak*

Shelley Yak joined remotely. She started by agreeing with Kevin on the efforts of the FAA and also commended the commitment of the E&E Subcommittee.

She discussed the FY17/FY18 NARP and the efforts that went into preparing it. It is a brand new design and she would like to get feedback on it at a future Subcommittee meeting. She said that the FAA still has more work to do on the Annual Review document as it is still in the old format.

She then went into a discussion of the FY19 budget which has a 50% cut relative to the FY18 President budget level. The cuts have resulted in the FAA needing to carefully reconsider its work efforts. The FAA has been briefing various Congressional subcommittees. One of the comments that we received was the concern about the workforce – the message was that the 50% reduction was not received enthusiastically. The FAA has also been invited to do a program review with the House Science Subcommittee on March 21.

The REDAC Chair (Dr. John Hansman) has asked the Subcommittees to look at the implications of the budget reductions on the FAA RE&D budget.

Presentation R&D Budget Status | **Presenter** *Mike Gallivan*

Mike Gallivan presented details on the budget process for FY18, FY19, FY20, and the out-years.

The Congress has a "Budget Deal" for FY2018. The FY18 RE&D request was $150M. The House Appropriation Committee and Senate Appropriation Committee funded RE&D in FY18 at $170M and $179M, respectively. We expect an omnibus funding bill in March of 2018.

The "Budget Deal" sets an overall level for the FY19 budget. The FY19 President Budget for RE&D is $75M. We expect to have the House and Senate markups from the Appropriations Committees by the Summer REDAC meetings.

The FY20 Target is set at $74M. This will be delivered to OST in June 2018 and then to OMB in mid-September. The President Budget would then be released in February 2020. The out-year targets for FY21-FY24 are set at $74M.

In response to a question from a Member, Mike noted that the broad areas were all reduced by 50% and then the various lines of business could decide how to use the funding allotted to them among their budget line items.

Mike also remarked that the current Authorization expires on March 31, 2018 and that we are awaiting Congressional action.

Mike concluded by stating that the future direction of the budget is uncertain.

The Subcommittee Chair asked for information on the FY18 budget levels including the President budget and the House and Senate markups. Mike said that he would send it to the DFO.

A Member asked when we will have clarification on the FY19 budget. Mike said that he thinks we will be operating under a Continuing Resolution as we begin FY19.

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

Jim Hileman walked through the existing findings and recommendations from the last two meetings. All of the recommendations from the February 2017 were closed and all of the recommendations from the August 2017 meeting were left open. He also walked through the action items from previous meetings.

There was a discussion around staffing in AEE. The FAA stated that they roughly have 10 vacancies at present (about 1/5 of their current total headcount). FAA also noted that they are following the processes as specified by the Administration to fill openings.

One Member encouraged the FAA to continue their summer internship program. The FAA noted that the summer internship program led to at least three hires in the recent past. There was also a discussion around the NASA Pathways Program and how it is being used by the FAA Tech Center. The DFO agreed to look into what has been done at the Tech Center.

Open action items are listed below alongside 1 new action item.

Action items	**Person responsible**	**Deadline**
Share ASCENT NFO with REDAC E&E Subcommittee (on an annual basis)	J. Hileman	Ongoing
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
Monetize the air quality and climate benefits of having an alternative jet fuel with reduced sulfur and naphthalene content	J. Hileman	August 2018
Leverage the road mapping efforts at NASA and FAA to update the White House National R&D Plan	J. Hileman	On hold until NARP revisions completed

Action items	Person responsible	Deadline
Examine the Pathfinder Program that is used by NASA and the FAA Tech Center as a potential means of attracting interns to AEE	F. Grandi	August 2018

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

Jim Hileman gave an overview of the Environment and Energy Research beginning by broadly covering the economic benefits provided by the industry and highlighting the associated environmental noise and emissions challenges resulting. He then highlighted the ongoing efforts in the E&E portfolio, the program's outlook based on the FY18 and FY19 President budgets, and the efforts towards ensuring that the work being done by E&E is properly captured and communicated for the benefit of the public. He then listed and briefly summarized the research program components: the ASCENT Center of Excellence (CoE), the Continuous Lower Energy, Emissions and Noise (CLEEN) program, the Commercial Aviation Alternative Fuels Initiative (CAAFI), the contract mechanisms, and the collaboration with the Volpe Transportation Center.

Jim then reviewed the ASCENT CoE members and distribution and provided an update on the 3 new projects that are being initiated. He then provided information on the Center's annual reports, changes in the CoE leadership, and the schedule for the upcoming meetings. He also highlighted the increased review requirements to which the grant approvals are now being subjected.

He then covered the newly redesigned NARP framework and terminology and covered where the milestones from the prior structure fall as outputs under the Goals 1, 2, and 5 of the structure. He then addressed the work items in the FY17 enacted budget and the FY18 President budget. Jim also gave a brief overview of the Airport Technology Research (ATR) program and AEE's collaborative efforts being undertaken under it.

Jim then presented the E&E Portfolio Financial summary through FY2020 and the out-year financial projections from FY2020 to FY2024. He then presented bar charts illustrating various aspect of the E&E Portfolio funding profile: the 20 years view from FY05 to FY24, the 5-year view showing the in-house and contracts funding for FY15 through 20, and the complete funding breakdown by E&E program from FY14 through FY19.

Lastly he presented the FY2020 13.a and 13.b RED Portfolio Quad Charts highlighting the FY20 milestones and the changes resulting from the FY19 President budget including what work will have to be stopped. He concluded the presentation listing the program's recent successes in capabilities and solutions that are already helping.

A Subcommittee Member asked if the FAA could put the aviation industry's economic impacts into context with other sectors of the U.S. economy. A Member noted that the Environment and Energy trifold that is being updated by the FAA should include information on how the E&E Portfolio is leveraging private sector funding. The FAA agreed to include this information.

A Member noted that there has been tremendous work already done on the impacts of aviation on the ozone layer. The DFO agreed and remarked that FAA may only need to "dust off" the

existing work. Another Member said that she would share information with the FAA on a high altitude program that is being conducted across the industry.

A Member stated that the ACI-NA AEEE Noise Conference in October 2018 would be the venue that has a session on ASCENT COE research (the briefing had captured the wrong ACI event).

There was much discussion on the impacts of the reduced funding in FY19, FY20, and the out-years as well as on the overall budgetary process. Several Members noted that the budget was in conflict with the priorities and goals of the FAA. The Subcommittee Chair noted that we would come back to these discussions at the end of the meeting. At the request of the Subcommittee Chair, the DFO shared an information request from the REDAC Chair with the Subcommittee (copied below). The Chair said that we would come back to this question at the end of the meeting.

> *As you probably know the recently released 2019 budget includes a significant reduction in FAA RED funding (from $175 M to $74). I have attached a summary DOT document and the full budget can be found at https://www.transportation.gov/mission/budget/faa-fy-2019-budget-estimates*
>
> *This level of reduction obviously requires a significant re-prioritization and reduction and you will be briefed at your upcoming subcommittee meetings on the plans to meet statutory obligations and maintain to the extent possible the critical research priorities for the agency.*
>
> *While it has been the REDAC policy to focus on the research priorities as opposed to the funding levels, I do think that we will be asked about the implications of this reduction as the budget process progresses.*
>
> *I would ask each of the subcommittees to evaluate the situation in your area to the extent possible and give me and the full REDAC feedback. In particular what are the impact of the changes. If there are there critical priorities which will not be addressed what are the likely consequences.*

Action items	**Person responsible**	**Deadline**
Update the E&E trifold to include information on how the E&E Portfolio is leveraging private sector funding	F. Grandi	August 2018

Presentation Airport Technology Research Overview & Airport Noise and Environmental Research Update | **Presenters** *Michel Hovan & Tom Cuddy*

Michel Hovan provided an overview of the Airport Technology Research Program and the variety of R&D work that is being done at the Tech Center.

Michael provided details on the work that is ongoing at the Tech Center to find firefighting agents that do not use compounds that would contaminate ground water. This includes building a full-scale facility at the Tech Center to ensure the new agents are effective in fighting fires. A Member noted that this is an important issue and it would be good to continue working together on this. The DFO noted that the Tech Center does work on safety issues that touch on environment – he gave the work on developing an unleaded aviation gasoline as an example.

Tom Cuddy provided details on the airport noise research funding that comes from the ATR funds over the next four year window. He touched on a number of subjects that are covered

elsewhere in the briefings. This included mining the noise annoyance survey data, sleep disturbance quantification, efforts to improve the sound insulation program (covered in noise briefing by J. DiPardo), and operational procedures (covered in operations briefing by C. Dorbian). He talked briefly about projects being planned. The DFO noted that AEE and the Tech Center have been working very well together on issues on noise for a number of years.

Tom also provided details on the environmental research program. This collective effort is smaller in scope than the noise efforts. He also presented on a 10 year plan that will help guide their R&D efforts. Some of the projects include the development of a geospatial data library, airport air quality screening methods, and a report that synthesizes information on sustainability.

Presentation Noise Research – Roadmap and Update | **Presenter** *Joe DiPardo*

Joe DiPardo presented an overview of the challenge that the FAA is facing in terms of noise. This included trends in certification noise for new aircraft and community noise exposure to noise levels above a day-night noise level (DNL) of 65 db. He discussed the nature of community concerns about noise today and the fact that complaints are being received from outside the DNL 65 contour.

He also gave an update on a wide range of research efforts that are ongoing on the topic of noise which included a summary of the current challenges that the FAA is addressing on aviation noise.

He presented high-level information on the work on noise impacts that is ongoing in terms of community annoyance, children's learning, sleep impacts and cardiovascular health. There was a discussion on the mail and phone surveys that were used and the fact that the phone survey was conducted on a subset of the people involved in the mail survey. There was a question on how airports would be sampled for the national sleep impact study and whether or not the same airports would be named. The FAA clarified that the two studies that have been done on sleep were conducted to develop the methods that would be used in the national study. In response to a question from a Member, the FAA further noted that they are still working through how individuals would be selected for the sleep study. This led to a discussion on the noise survey that was done to quantify community annoyance. The Subcommittee Chair noted that the Subcommittee would like airports to be notified in advance of the release of the information. The FAA clarified that they intend to be careful in the release of the report and it will come with considerable context.

Joe discussed the current direction and ongoing work on SST. He also presented the efforts on helicopters, UAS and noise. A Member asked if the work on UAS was on large or small vehicles and the FAA clarified that there is a particular interest in all vehicles larger than 55 pounds.

There was a discussion around the new efforts of the FAA in terms of its forthcoming noise website and the Noise Complaint Initiative (NCI). A Member stated that there is much utility in the NoiseQuest website as they direct questions to it. She noted that the FAA should continue to support it until they are sure the new website is providing the same utility. The FAA clarified that they want to work with a wide range of individuals to improve the Noise website and that the NCI will be useful in helping the FAA coordinate complaint information. A Member stated that airports will be helpful with the NCI. A Member asked how the NCI for the FAA would be coordinated with similar efforts at individual airports.

Joe provided details on the noise level reduction research that is being done with ATR funds. He also talked about research that is ongoing to improve our modeling capabilities. Based on a question from a Member, Joe noted that ASCENT Project 23 is actually providing improvements in both airframe and engine noise. A Member noted that it is important to capture interactions between the airframe and the engine as that is also an important noise source.

Joe gave examples of how the noise research by AEE is making a difference in the real-world and concluded with a brief summary.

A Member asked if small electric vehicles are being examined by FAA. Joe noted that they are indeed of interest. A representative from NASA indicated that they are doing work on this front in collaboration with FAA.

Presentation Emissions Research – Roadmap and Update **| Presenter** *Ralph Iovinelli*

Ralph Iovinelli began with a verbal update on the status of EPA and FAA collaboration on the ICAO CO2 Standard. He discussed the two year process for EPA, which is normal for its regulations. This will be followed by a direct final rule. In all, it will be a three year process. This process is still in effect, but it was delayed by a year relative to the decision being made at the CAEP meeting. If all goes well, we should have a rule from EPA by the end of the calendar year. We would then have the final rule by EPA a year after that. We will continue to provide updates on this going forward.

He started his briefing with a summary of what the R&D program has accomplished over the last five years. This includes much progress on particulate matter, the ICAO Aircraft CO2 standard, and the development of the APMT-Impacts tools which are informing decision making at ICAO CAEP.

Ralph presented the research that is currently being done and the plans for the coming years. This included work to measure ultrafine particulate matter from aircraft engines, including altitude measurements that were done in collaboration with NASA, DLR and NRC Canada. The FAA has also been heavily involved in measurements to understand the impact of fuel composition on particulate matter formation.

He covered information on SST research in ASCENT Project 10 and a new project that is going to be started in ASCENT this year. A number of Subcommittee Members provided inputs on the project idea to improve it. One Member noted that it is important to ensure the research team examines the full range of applications from small business jets to larger passenger vehicles as the engines will be different. Another Member also noted that there are advancements in industry in variable cycle engines that would need to be captured.

Ralph provided updates on the direction of ASCENT Projects 18, 19 and 20, which are advancing our knowledge about how aviation emissions contribute to ambient particulate matter levels. In response to a question, he noted that we do not have the ability to distinguish aviation PM from other sources and this is why it is so important to complement ambient PM measurements (from efforts such as Project 18) with modeling efforts (e.g., Project 19).

He provided an overview of the path for the ASCENT work on Projects 21 and 22 to advance the APMT-Impacts Climate tool. Based on a question from a Member, the FAA clarified that the

APMT-Impacts Climate tool uses inputs from GREET or CORSIA to get the LCA emissions values and then those are used to provide a time history of the climate impacts.

Ralph also provided an update on the work of Project 39 to understand the costs and benefits of modifying fuel composition as a means to reduce particulate matter. There were several questions from Members about the research. The FAA noted that there is more than one way to remove compounds from the fuel and that any fuel that results from this approach would need to meet fit-for-purpose properties in ASTM. The FAA also said that they started the project looking at naphthalene but that knowledge is growing and other aromatic molecules may be of interest in terms of their contribution to PM formation.

Throughout, Ralph noted which research projects would continue under the FY19 President Budget.

The Subcommittee Chair inquired about the use of FAA's models within ICAO CAEP. The DFO noted that AEDT is the bedrock for decision making in ICAO CAEP and the US has a clear lead in modeling capabilities. At present, modelers from the US are in the lead in terms of modeling and everyone else is trying to catch up. The DFO also noted that the US has the lead in terms of its abilities for aircraft design modeling and cost benefit analysis. After a comment from a Member, the DFO clarified that the cost benefit analysis tools are primarily used by the US to inform its decision making.

Presentation Alternative Jet Fuels – Analysis, Testing, and Measurement Efforts **| Presenter** *Nathan Brown and Mark Rumizen*

Nate Brown started his briefing with a historical chart of alternative jet fuel (AJF) use in the U.S. and a list of offtake agreements between airlines and fuel producers. He noted that there is a potential for 250 million gallons per year of alternative jet fuel production in five years. He then provided an overview of the efforts of the FAA in terms of coordination, testing, and analysis.

He stated that the FAA's coordination work supports the alignment of efforts and cooperation among all key stakeholders to enable AJF deployment. The primary coordination effort is the Commercial Aviation Alternative Fuels Initiative (CAAFI), founded by FAA, A4A, AIA, and ACI-NA. He explained how the FAA and CAAFI have been instrumental in coordinating efforts across Federal Agencies. He provided details on the Farm to Fly 2.0 initiative and the efforts that have resulted from it to support AJF. He also discussed the various international coordination activities that are underway.

A Member asked about funding levels for fuels research at DOE and USDA. The DFO noted that the DOE EERE budget for FY19 would be roughly 600 million dollars relative to the FY17 enacted budget, which is over 2 billion dollars.

Nate provided an overview of FAA testing activities that are supporting ASTM International evaluation of alternative jet fuels and improving the evaluation process. This included an update on the processes established by the FAA to facilitate fuel approvals and the current status of various alternative jet fuels within the approval process.

Mark Rumizen noted the importance of the OEM review process and then provided insights into how this led to the creation of the ASTM D4054 Clearinghouse Concept. Mark provided an overview of the Clearinghouse Concept and how fuels move through it. He noted that we moved

this to ASCENT to facilitate industry funding. The FAA further noted that this ability to get a variety of funding sources will be essential given the need for industry to take over the work under the FY19 budget. There was a discussion around how a variety of entities will need to participate and that industry is supportive of the concept.

Nate then discussed the development of a generic annex, which would allow AJF that are similar to jet fuel to be used at small blend percentages. The annex would include specific criteria to ensure compositional control and product quality. There is much work yet to do to implement the generic annex concept.

He concluded the section on testing with a summary of the impacts of the work that the FAA has done on AJF testing. This included a graphic that quantifies how as a result of the investments made by FAA and others, time and fuel requirements for AJF approval have fallen dramatically over time.

Nate provided an overview of the analysis efforts of the FAA to support better understanding of the environmental sustainability, economic costs and potential supply of AJF. This included analytical support to the Alternative Fuels Task Force of ICAO CAEP, techno-economic analyses of AJF, and future production scenarios. The work is utilizing National Laboratories from the Department of Energy. He summarized the work and its impact.

He concluded with a summary of how the FAA will handle the winding down of AJF efforts that is included in the FY19 budget.

There was considerable discussion about CAAFI and why the government must be involved in its execution. A Member noted that CAAFI would not be successful in the ways it is now without government engagement. The Subcommittee had extensive discussions on the importance of FAA continuing to work with industry to advance the development of alternative jet fuels. A Member noted that the U.S. aviation industry cannot meet its long-term environmental goals without alternative jet fuels and sustainable aviation fuels are critical to continued U.S. aviation growth.

End of Day 1

Presentation Operations Research - Roadmap and Update | **Presenter** *Chris Dorbian and Rick Riley*

Chris Dorbian began his briefing by highlighting community concerns about aviation noise and the need to ensure that airspace planners have knowledge, tools, and guidance to enable low noise procedures. He explained that the research portfolio is considering changes in where and how aircraft are flown. The ideas include route changes, thrust/speed management, vertical profile, and the introduction of systematic dispersion. He provided an overview of the multiple efforts that are underway to develop noise-abating operational procedures.

He provided considerable details on the work that is being done by MIT in partnership with Massport. In response to a question from the Chair, Chris noted that there should not be a throughput issue with the concepts that are being designed. However, he said that FAA will need to evaluate all aspects of the procedures including safety. In response to a question from a

Member, Chris noted that ATO typically takes 18 to 24 months to evaluate a new procedure concept. There was considerable discussion that ensued on the work.

Chris presented the proposed new project to acquire data to validate the modeling that underlies the procedure designs being created by MIT. Several Members were supportive of this project.

There was discussion on the level of collaboration between AEE and other lines of business. FAA pointed out that there is a high level Noise Steering Group that has executive participation across the Agency that meets every two weeks. This group discusses all noise issues facing the Agency. In addition there are regular meetings in FAA to discuss research being done by the FAA that involves AEE, ATO, AFS, and ANG. In December there was a deep-dive technical interchange among FAA, MIT and MITRE to discuss research progress to find ways to address noise with changes to operational procedure concepts.

The Subcommittee was supportive of the work presented by Chris, but there were also many questions from the Subcommittee about how these ideas and concepts could be fast-tracked into implementation. The FAA noted that there is a finite workforce that is handling air space design and they currently have a work backlog. The Chair noted that there will be a challenge in terms of managing the expectations of the community. The Chair asked if some of the concepts from Massport could be transported to other airports. The FAA noted that there is a challenge here and this is why the research has a focus on improving how the procedure design tools consider noise. The FAA also said that, in addition to ensuring that the operations meet safety requirements, research is needed to ensure that the calculated noise benefits are realizable and this is the primary reason for the new ASCENT project to gather noise measurements.

A Member asked if it is possible to quantify the costs to the community in terms of environmental costs of noise versus benefits in terms of reduced fuel burn. The FAA noted that this is possible, but it may not actually be useful as the results would be highly uncertain at best and it would take a long time to do it. A Member noted that people in communities are concerned about noise and are using social media to express this. The Subcommittee discussed the need for work on dispersion but was unsure of the direction to follow as there will invariably be many tradeoffs that have to be considered in choosing the flight paths.

The FAA clarified that the noise research that Chris presented would continue into the future as it is a priority. However, it would be done at a level that is commensurate with overall funding levels.

Rick Riley presented the work that is being done to develop operational procedure concepts that could mitigate noise from helicopter operations. The work is using a model developed by Penn State that is being validated with flight test data taken in collaboration with NASA. The validated model can then be used to develop operational procedure concepts that result in reduced noise. A Member asked if the analytical work will be directly incorporated into AEDT. The FAA said that it will not be directly incorporated, but there are plans to improve helicopter modeling with AEDT that will be discussed in the AEDT briefing. The FAA recalled the briefing from the previous day on noise by Joe DiPardo and that helicopter work might continue with FY18 funds, but would be stopped under the FY19 President Budget.

Presentation Analysis & Tools – Roadmap and Update | **Presenter** *Fabio Grandi*

Fabio Grandi presented the overall roadmap of tool development and analysis efforts through 2021. This includes tool development for AEDT, Environmental Screening Tools, FLEET-Builder, APMT-Impacts, and a new Noise Estimation Tool for New Entrants. It also includes analysis to support technology evaluations, forward evaluations of noise and fuels burn, and the annual inventories. He provided details on Fleet-Builder and a new project to develop a Noise Estimation Tool for New Entrants. He explained how there are a number of projects being conducted in ASCENT that are specifically designed to improve future iterations of AEDT.

He provided several slides describing the efforts that are ongoing within the E&E portfolio to develop tools that do screening level environmental assessments. This work is being done in coordination with AJV-114 (Airspace Policy and Regulations Group). Fabio stated that screening tools provide an initial assessment of the level of environmental review required to meet NEPA obligations.

Fabio provided a few points about the significance of the analysis and tools work. He also stated that AEE internal analyses have mostly stalled due to staff not having necessary uninterrupted time.

The Subcommittee had a discussion about the new project to develop a Noise Estimation Tool for New Entrants as well as the ideas for screening tools. The FAA noted that they are developing these projects to address issues that they have identified and that they are being tackled in a cost-effective manner that is in line with our budget reality.

Presentation AEDT Update | **Presenter** *Mohammed Majeed*

Mohammed Majeed provided an update on AEDT tool development. His briefing covered the development drivers for AEDT, the team, differences AEDT is making today, FY17 highlights, FY18 development, the future development plan, and challenges going forward.

He described how AEDT is making a difference today. AEDT facilitates environmental review activities required under NEPA by consolidating the modeling of aircraft noise, fuel burn, and emissions environmental impacts into a single tool. AEDT has also improved the efficiency and reduced the costs of computing key performance indicators for noise, fuel burn and emissions that are reported on an annual basis. AEDT helped to ensure U.S. leadership at CAEP in the development of international emissions and noise standards for the aircraft/engine as well as supporting the development of CORSIA. AEDT is used globally for computing environmental consequences of aviation for a variety of purposes, (e.g., evaluating noise for compliance at Hong Kong International Airport). The AEDT development team is continuing to release updates of the tool every six months. Recent updates incorporate improvements in usability, emissions capabilities, and noise capabilities.

Bill He presented the progress that is being made on AEDT3a, which will be released in September 2018. This new version of AEDT incorporates a new aircraft performance model as well as improved aircraft takeoff weight and thrust modeling. He also presented the long term AEDT work plan and the challenges that would have to be overcome with the FY19 budget.

The FAA clarified that the timeline on Slide 16 does not fully account for the FY19 and FY20 budget levels. In reality, the capabilities within AEDT 4 and AEDT 4X would likely be realized further in the future with the President FY19 Budget and FY20 Target.

In response to a question from a Member, the FAA said that the AEDT development team has been working on both improving usability and performance enhancements. The Subcommittee discussed how AEDT has increased U.S. leadership in a variety of areas including international standard setting and assessing noise at airports around the world. However, the FAA noted that the development team always prioritizes the needs of U.S. users.

Presentation NASA Update| **Presenter** *Jay Dryer*

Jay Dryer gave an update on NASA Aeronautics efforts. He started by noting the changing direction of the efforts and that the strategic thrusts will be revisited in 2018. He presented the budget for FY2017 through FY2023 and answered some questions from the Subcommittee on specific details involving flight demonstrations. He provided an update on the work to develop the low boom flight demonstrator. He also updated the Subcommittee on the subsonic transport technology strategy. He provided a short summary of NASA's work to support emerging aviation markets and the work being done to reduce noise that would be produced by these new entrants.

There was a discussion around the noise that would be generated from unmanned air mobility vehicles and the need for industry to work with NASA and FAA on this. A Member asked about industry engagement. Jay said that NASA have been working closely with some industry partners and would like to work with others. The FAA noted that they have been seeking industry partners to help with them with noise issues but have had little success.

Presentation Aircraft Technology – CLEEN Update | **Presenter** *Levent Ileri*

Levent Ileri gave an overview of the work to accelerate the maturation of aircraft technologies that is being done through the CLEEN Program. This included an evaluation of the benefits being derived.

A Member asked if they have goals for the third phase of the CLEEN Program. The FAA said that has not been done yet. There was also a discussion on the impacts of the FY18 and FY19 President Budget on CLEEN II. The FAA said that under the funding levels in these budgets, CLEEN II would likely be funded with funds through FY20.

Priorities Discussion | Lead *Ian Redhead*

The Subcommittee Chair led a discussion on the request from the REDAC Chair that included discussion on the work being done on the E&E Portfolio and whether or not it is appropriately designed to handle the FY19 Budget. This discussion included perspectives on the E&E Portfolio, the 2019 budget impact on U.S. global leadership (as well as impacts on economy, education of tomorrow's workforce and jobs). He also asked for thoughts on SST and commercial space vehicles.

The Subcommittee chair noted that we need to think about the industry participants that would be impacted by these cuts. He was also curious about the percent of the budget that is

collaborative with industry. A Member noted that CLEEN and CAAFI are not just government funded efforts; they are instead true partnerships that would be a shame to lose. The member stated the preference towards prioritizing them as they are important collaborations between industry and government to get things done. Alt fuels and technologies might be developed by industry, but it might also not happen. The environment will not be improving while we are waiting for them to come so these gains need to materialize soon. The FAA noted that over ¾ of the budget is collaborative in terms of either directly engaging industry (CAAFI) or having a 100% cost share requirement (CLEEN and ASCENT COE).

Another Member noted that we need to focus on US leadership of technology development. We need the models and data to lead in ICAO CAEP. This program is needed to ensure leadership on UAS and SST. This budget has a mismatch with these priorities. The R&D funding in this program is needed to ensure leadership in CAEP and pulling back funding will impact technology development as we will not have US CAEP leadership. CLEEN needs to continue as private industry will not pick up AJF at the rate that is needed.

Another Member noted that the portfolio is very well balanced. The materials are well presented, concise and well linked together. This is a well-oiled machine. It is unfortunate that we are facing such draconian cuts. The plans are good and AEE is well managed and thinking ahead. They have multiple scenarios in place to handle and they have appropriate contingency plans to handle the FY19 budget. It was asked if these cuts are acceptable and if deadlines are okay to shift. We cannot lose leadership in ICAO CAEP and it is very evident that the rest of the world is looking to the US for leadership. There are many interesting developments in our field and we need to be leading within the US. Regarding SST, the administration is supportive. Space launch emissions could be highly impactful but maybe this could be pushed to the future. AEDT has been a very large investment and AEE needs to identify the most important items for the current mission.

A Member noted from the government side that the FAA needs ammunition. The government inserts funding to lower the risk of technologies such that they can be adopted by industry. We are a review panel and can state that we agree/disagree with how the budget reduction was handled. Another member agreed that the E&E Program is a well-thought out program that is providing leadership. If these projects are reduced, then leadership will be ceded. The elements of this program need to be continued. The FAA did not spread the cuts evenly or bury the impact of the cuts. That is a good thing to do. The Subcommittee needs to point out the problems that will result from these cuts.

Another Member noted that government funding enables industry to take on risks that the private sector would never take on its own. This is essential for the fledgling alternative fuel industry.

A Member stated that SST development is contingent on the US leadership at ICAO CAEP. This loss of leadership will prevent the creation of a U.S. industry and of U.S. jobs from being created. The FAA will be at risk of not keeping up with NASA in SST and they will not be able to do the science and analysis to support this industry.

A number of Members contributed that the work on AJF is critical to the U.S. industry and should not be eliminated. The Subcommittee was adamant that funding for AJF must be maintained under all budget circumstances. The members said that industry will not be able to continue the work on AJF and that government funding is essential. The Subcommittee agreed

that there must be a recommendation that states that either A13.a or A13.b must have alternative jet fuels included within it.

A Member said that the top AJF priority needs to be expediting the ASTM review process and the next priority is to examine the AJF supply chain.

A Member stated that items that have demonstrated success need to be continued.

A Member summarized the points thus far into the following points and added some additional items. The Subcommittee thinks that the E&E portfolio is high quality, nicely balanced, and has provided many benefits. The Subcommittee has a profound disagreement with the budget cuts and direction (highlight AJF) which would impact the leadership in ICAO CAEP that is needed for SST. The budget would result in loss of US economic growth and it goes against the priorities of the administration. Some recent examples of US leadership are shown in CO2 standard, PM standard, and CORSIA. The Member noted that the Subcommittee needs to answer why all these items matter.

The Member also noted that collaboration with NASA is more important than ever; AJF collaboration with DOE and USDA is also key; and noise is hindering the introduction of NextGen and funding is needed for this. Integration of AEE within other parts of the FAA is critical in terms of knowledge sharing and common use of tools.

A Member noted that new entrants will not be able to exist unless noise standards are created. The Administration wants new entrants, but these will not be able to enter the NAS unless there are standards in place to enable them.

A Member said that 300 to 600 SST business jets would be built annually at a selling price of $200 million apiece. This is a significant industry. Several Members said that the FY19 budget cuts are worse than job killers, they are in fact industry killers.

A Member said that AEE is superbly managed, is of vital significance to the U.S. industry, and that staff reductions will hinder them from being able to execute their job. The Chair stated that current staff has provided significant U.S. leadership and reductions would hinder this.

A Member asked if the Subcommittee would be okay with reducing CLEEN to enable AJF. A Member said that under a reduced funding scenario, CLEEN might want to have a priority on noise. The FAA noted that noise technology maturation is often more expensive than emissions technologies. The Subcommittee agreed that the FAA should continue to prioritize the work within CLEEN in terms of the balance among noise, emissions, and fuel burn.

A Member noted the importance of technologies. As we have new entrants, these technologies will enter other parts of the industry. The Subcommittee Chair noted that AJF is a great example of government working with industry to make something that is a total benefit to everyone.

A Member noted that industry will not pick things up as there is a key governmental role in terms of research and technology.

The Subcommittee Chair said that he would develop a response to the request from the Chair that is based on the Findings and Recommendations that are developed by the Subcommittee. The FAA said that the responses are due within 2 weeks.

Two Members gave personal experience about the challenges in recovering a program from after being zeroed out and how it is incredibly difficult to do as it will take considerable time and

effort. A Member noted that because he was able to keep a hypersonic facility funded with a minimal amount of money, he was able to quickly ramp up the activity and now the facility is overbooked to ensure U.S. leadership on hypersonic vehicles. The Subcommittee noted that there is a similarity in terms of AJF, as efforts across the government are being reduced and therefore the U.S. is ceding leadership in an area that has been stated multiple times as a need of the U.S. industry. Industry is counting of AJF to meet their environmental goals and there is no plan B.

The Subcommittee Chair thanked everyone for their participation, the staff who is doing good work, and he closed out the meeting.

Meeting Close-Out | Lead *Ian Redhead*

Ian agreed to develop findings and recommendations based on the discussions for further development by the group.

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

All of the recommendations from the March 2017 meeting were closed. All of the recommendations from the August 2017 meeting were left open.

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

September 11-12, 2018 in Washington DC

March 19-20, 2019 in Washington DC

Adjourned at 3:00 pm on Wednesday, March 8, 2018

DRAFT FAA REDAC Subcommittee on Environment & Energy
Spring 2018 Meeting Agenda
GAMA
1400 K St NW #801
Washington, DC 20005

Purpose:

- Review the R&D portfolio developed based on strategic guidance from Fall 2017 E&E REDAC mtg
- FAA to brief the portfolio with a focus on FY + 2
- E&E REDAC to provide recommendations on R&D portfolio and direction

Remote Participation:

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

Wednesday, March 07, 2018

Time	Duration	Title	Presenter
8:00	0:30	Check-In	
8:30	0:05	Welcome	
8:35	0:10	Chair opening statement & Introductions	I. Redhead
8:45	0:15	What's new in FAA & AEE	K. Welsh
9:00	0:15	ICAO Update	K. Welsh
9:15	0:30	Industry Perspective	S. Alterman
9:45	0:15	Break	
10:00	0:30	NARP Re-design & FAA R&D Update	TBD
10:30	0:15	FY18/FY19 Budget Update	M. Gallivan
10:45	0:15	Responses to REDAC Recommendations & Actions	J. Hileman
11:00	0:15	Discussion	
11:15	0:30	FY20 Program Proposal	J. Hileman
11:45	0:15	Discussion	
12:00	1:00	Lunch	
13:00	0:30	Airport Technology Research Update & Water Research Overview	M. Hoven & L. Collins
13:30	0:15	Discussion	
13:45	0:45	Noise Research - Roadmap and Update	J. DiPardo
14:30	0:15	Discussion	
14:45	0:15	Break	
15:00	0:45	Emissions Research - Roadmap and Update	R. Iovinelli
15:45	0:15	Discussion	
16:00	0:45	Operations Research - Roadmap and Update	C. Dorbian
16:45	0:15	Discussion	
17:00		End of Day-1	

Thursday, March 08, 2018

Time	Duration	Title	Presenter
8:00	0:30	Check-in	
8:30	0:30	Analysis & Tools - Roadmap and Update	F. Grandi
9:00	0:15	Discussion	
9:15	0:30	AEDT Update	M. Majeed & H. He
9:45	0:15	Discussion	
10:00	0:15	Break	
10:15	0:45	Alternative Jet Fuels - Analysis, Testing and Coordination Efforts	N. Brown
11:00	0:15	Discussion	
11:15	0:30	NASA Update	Speaker TBD
11:45	0:15	Discussion	
12:00	0:45	Lunch	
12:45	0:30	Aircraft Technology - CLEEN Update	L. Ileri
13:15	0:15	Discussion	
13:30	1:30	Summary of Action Items and Findings & Recommendations	I. Redhead
15:00		End of Day-2	

Attendance List:

First name	Last name	Affiliation	7-Mar	8-Mar
Juan	Alonso	Stanford U.	X	X
Steve	Alterman	CAA	X	X
Gonca	Birkan	FAA	X	X
Ralph	Cavalieri	WSU	X	X
Lauren	Collins	FAA	X	
Tom	Cuddy	FAA	X	
Joe	DiPardo	FAA	X	X
Chris	Dorbian	FAA	X	X
Jay	Dryer	NASA		X
Jennifer	Duke	P&W	X	
Barbara	Esker	NASA	X	
Charles	Etter	Gulfstream	X	X
Gregg	Fleming	Volpe	X	X
Mike	Gallivan	FAA	X	X
Fabio	Grandi	FAA	X	X
Hua	He	FAA	X	X
Jim	Hileman	FAA	X	X
Michel	Hovan	FAA	X	
Levent	Ileri	FAA	X	X
Ralph	Iovinelli	FAA	X	X
Melvin	Kasanchick	Boeing	X	X
Sandy	Lancaster	DFW Airport	X	X
Mohammed	Majeed	FAA	X	X
Dimitri	Mavris	Georgia Tech	X	X
Alex	Menotti	A4A		
Maureen	Molz	FAA	X	X
Melinda	Pagliarello	ACI-NA	X	X
Tim	Pohle	A4A		
Katherine	Preston	HMMH	X	X
Ian	Redhead	Kansas City Intl Airport	X	X
Leslie	Riegle	AIA	X	X
Chinita	Roundtree Coleman	FAA	X	X
Jayant	Sabnis	MIT	X	X
Ed	Smith	GAMA	X	X
Shelley	Yak	FAA	X	
Nancy	Young	A4A	X	
Kevin	Welsh	FAA	X	X
Don	Wuebbles	U. Illinois	X	
Alice	Richard	Haley & Aldrich, Inc.	X	
Shelley	Yak	FAA	X	
Joe	Zelina	GE	X	X