Subcommittee on Environment and Energy | MINUTES

Meeting date & time *August 30-31, 2016*
Meeting location *A4A, Washington D.C.*

Purpose	**E&E Subcommittee Guidance**
Facilitator	**Jim Hileman, DFO**
Note taker	**Jim Hileman**
Timekeeper	**Jim Hileman**

Minutes from Meeting

Presentation Chair Opening Statements | **Presenter** *Mahendra Joshi*

Discussion: Mahendra welcomed everyone and established the meeting logistics. Everyone introduced themselves. Mahendra discussed the outcomes from the last full REDAC meeting which had a focus on UAS. The full REDAC also discussed the need for a comprehensive R&D plan for the FAA (there is a briefing at this meeting on this subject). The letter to the Administrator had a note commending the FAA on the ICAO CAEP CO2 emissions standard

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Presentation What's New in FAA and AEE | **Presenter** *Curtis Holsclaw*

Discussion: Lourdes is on leave this week and sends her regrets. Curtis briefed in her absence.

Curtis discussed the ongoing efforts to develop a global market based measure for international aviation CO2 emissions. The focus at present is to develop a global consensus in advance of the ICAO Assembly meeting later this year. Several States might require technical assistance with the implementation of the global market based measure and the U.S. is preparing for this. He noted other ongoing CAEP efforts.

Curtis noted that we continue to have challenges with aircraft noise. Areas with precision navigation procedures are receiving particular attention. The FAA and the Office of the Secretary are heavily engaged with this. We are developing a community involvement manual and a plan for air traffic procedure implementation that are undergoing review. There was a discussion about the implementation of PBN procedures.

Curtis noted that the US is hosting the first Steering Group meeting and AEE are expending much effort to arrange for this meeting.

There was a question about the workload in the office given the large number of items that are being addressed. Curtis noted that AEE does not have extra resources and these requirements are leading to staff being stretched further. Curtis informed the Subcommittee that Anne Christenson has been brought onboard to fill Lynne Pickard's vacancy.

Presentation R&D Executive Director Update | **Presenter** *Eric Neiderman*

Discussion: Eric presented on Shelly Yak's behalf. He discussed the ongoing effort to develop an improved version of the FAA National Aviation Research Plan (NARP) to better explain the FAA R&D Strategy as well as ongoing reviews from the GAO and DOT Inspector General. He also shared some of the observations that Shelly made based on her visiting the five subcommittee meetings in Spring 2016. These include: the subcommittees are varied in terms of how they interact, improvements in how the finding and recommendations could be developed and an independent REDAC program review is central to FAA R&D program governance.

Presentation REDAC and Subcommittees: Roles and Responsibilities | **Presenter** *Chinita Roundtree-Coleman*

Discussion: Chinita gave a refresher to the Subcommittee on the roles and responsibilities of the REDAC and its Subcommittees. The basis for the REDAC is Part 49 of USC Section 44508 and it provides several requirements for the REDAC. This includes a requirement to meet twice per year. The Administrator established five subcommittees: Human Factors, Aircraft Safety, NAS Operations, Environment and Energy, and Airports.

She discussed the direction for the two Subcommittee meetings. The summer/fall meeting provides strategic guidance based on reviews of past year activities and accomplishments, selected deep dives, and proposed FY+3 focal areas. The winter meeting provides a review of the R&D portfolio, which is developed based on strategic guidance from the summer/fall meeting. She presented the responsibilities for the DFO.

She provided guidance from the FAA on how the findings and recommendations should be written such that they could be readily acted upon by the FAA. She noted that the E&E Subcommittee is doing a good job with this.

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

Discussion: Mike presented budget details on budget for FY16. The budget was approved in the first quarter of the fiscal year. The Environment and Energy program received a plus-up with a requirement with regards to the COE Program.

The FY17 Presidents Budget has gone to Congress. Both the House and Senate appropriation subcommittees have approved the budget. Normally the House and the Senate would meet in a conference committee to resolve the differences as the House has not yet passed their bill.

Mike walked through the language from both the House and the Senate mark-ups. There is considerable uncertainty regarding the FY17 budget due to a host of issues and FY17 is most likely to start under a continuing resolution.

The FY18 policy budget is on hold until after the Presidential election and it will be developed with the winning transition team. There is a current services budget in place for FY18 that notes what is required to continue operations at their current level. Mike also gave the FY18-FY22 funding targets for the overall RE&D appropriation and he noted that these will almost certainly change with the change of administration.

He noted that the current FAA Authorization was approved by Congress on July 14, 2016 and signed by the President on July 15, 2016 which extends authorization through the end of FY 2017 (September 30, 2017).

There was a discussion about the FY18 and out year budgets as the winter meeting will discuss the FY19 RE&D budget. There is a chance that the FY18 and out year budget won't be ready in time for the winter REDAC meetings, but this is not expected to happen. There was also a discussion about RE&D funding not keeping pace with inflation.

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

Discussion: Jim walked through the existing findings and recommendations from the past two meetings (August 2015 and April 2016). The recommendation from the August 2015 meeting was closed. The April 2016 recommendations were left open. He also walked through the action items from previous meetings. Those items that are still open are copied below.

Action items (from previous meetings)	Person responsible	Deadline
Create ASCENT fact sheet for sharing with community	J. Hileman	February 2017
Share the ASCENT NFO with the REDAC E&E Subcommittee (on an annual basis)	J. Hileman	February 2017
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	February 2017
Carefully consider NARP milestones on noise metrics	R. Cointin	February 2017
Add a NARP milestone on supersonic aircraft	R. Cointin	February 2017
Monetize the air quality and climate benefits of having an alternative jet fuel with reduced sulfur and naphthalene content	J. Hileman	August 2017
Leverage the road mapping efforts at NASA and FAA to update the White House National R&D Plan	J. Hileman	August 2017

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

Discussion: Jim gave an overview of the Environment and Energy Research to refresh the Subcommittee on the research program. This includes the goals for the program, the overall strategy and plan, and where the money comes from to do the work.

He provided additional details on the CLEEN Program including recent accomplishments, alternative fuels testing, the release of the Federal Alternative Jet Fuel Strategy, the coming CAAFI Biennial General Meeting, and the recently completed operations research meeting.

There was considerable discussion on the subject of the environmental goals and a clarification on the historical nature of the goals. Jim noted that there will be much discussion on the noise goal throughout the day.

Jim presented information on the Noise Technology Workshops that are being developed by the INCE, NAE, NASA, Volpe and FAA. The intent is to raise awareness of aircraft noise issues and the need for new technologies to reduce aircraft noise. A subcommittee member asked whom would be the audience and Jim noted it would be a wide range of individuals that could include manufacturers, government agencies, congressional staffers, and community groups.

He summarized the efforts being supported with AIP funds on Airport Environment Research that are being led by the Tech Center, Office of Airports, and AEE.

The budget section of the briefing provided a breakout of the funding by research topic. Jim noted that roughly half of the R&D funds go to the CLEEN Program and that roughly $10 million go to ASCENT.

Jim provided recent accomplishments that were funded by the Environment and Energy program. A subcommittee member stated that the FAA should be proud of these accomplishments.

Jim closed with three questions that are being posed to the Subcommittee for the Day 2 Priorities Discussion.

Presentation Noise Research – Roadmap and Update | **Presenter** *Rebecca Cointin*

Discussion: Becky presented research being done on noise. This included the Noise Roadmap structure, an update on the Aviation Noise Survey, UAS Certification and other Environmental Considerations, and Quantifying Noise Impacts and Tracking Noise Trends.

A subcommittee member commended Becky for the Noise Research Roadmap chart as she finds it very useful.

There was a discussion about the survey and efforts to re-evaluate DNL 65. Becky noted that the research is going well. She noted that it is being conducted to understand if a change is warranted and to be prepared should the research indicate a change is indeed needed. Becky noted that there are a number of policies that would be affected by a change with the Part 150 program being among them. Becky presented related research that is supporting the evaluation of the DNL 65 threshold. A subcommittee member asked if the staff levels have increased with the size of this research effort. Becky noted that it has not but her staff has really stepped up to ensure the work gets done.

During the discussion on UAS, Becky clarified that a risk-based certification approach for UAS noise would focus on a consideration of the size and mission in terms of the noise requirements. In other words, the same UAS would have very different noise impacts if it was operating over a pipeline versus a busy city street. Becky noted that the recent ASSURE noise measurements showed that the UAS being examined was louder than was expected. There was considerable discussion on UAS implementation and the need to get in front of the issues that are coming.

Becky presented the historical trends on noise exposure to DNL 65 within the US. She noted that while noise exposure has decreased by a factor of 20 over the last 40 years, the noise trend is increasing of late. A subcommittee member asked the level of accuracy within the data and the

FAA noted that the population exposure data is indeed sensitive to aircraft flight paths in areas with high population data near airports.

There was a question about the costs of certification and the FAA noted that the Safety Subcommittee is carefully considering certification by analysis. A subcommittee member asked if it could work for noise. The FAA noted that this might be of interest but we should not underestimate the challenge in predicting noise via modeling.

Presentation Update on Aircraft Technology Assessment Efforts | **Presenter** *Arthur Orton*

Discussion – Arthur provided information on the efforts to assess aircraft technology at the aircraft and fleet levels. This included evaluations of CLEEN technologies, evaluations of how mission specification changes could impact aircraft design and environmental performance, and a long term aircraft technology evolution and the resulting noise, emissions and fuel burn in the future. These projects are all being done by COE universities.

Arthur presented the CLEEN technology evaluation results from PARTNER Project 36 and ASCENT Project 10. This included a range of technology introduction rates – for both CLEEN and NASA technologies that are available in the near term. The results show that CLEEN technologies could reduce fuel burn by 24 billion gallons between now and 2050 and lead to LTO NOx emissions being held at 2005 levels through 2050 (even with anticipated growth in aircraft operations). Further, the new technologies could reduce takeoff noise to a level that is below 2010 levels. A subcommittee member noted that the incorporation of new technologies is reducing noise during takeoff but is not having a commensurate reduction in approach noise.

He presented work on the mission specification from PARTNER Project 43. Reduced cruise Mach number has the potential to reduce fuel burn for all aircraft classes by 5 to 10%. Reduced design range has significant fuel burn reduction effects of 5 to 10+% in the longer range aircraft but it is not very effective in shorter range (RJ, SA) vehicles. Span increases are ineffective for larger aircraft and provide only modest improvements for smaller aircraft. Significant improvements (>10%) from span increases require unconventional configurations. Combinations of Mach, range, and span can further increase benefits.

The ongoing efforts of ASCENT Project 10 were also presented. The project has the objective to define a range of scenarios that bound the demand for future aviation activity and assess the effects of different fleet composition and aircraft technology on fuel burn, emissions, and noise from aviation. The focus of the effort thus far has been to conduct a series of workshops to solicit public information from industry, government and academia. The workshop outputs are being incorporated into aircraft and fleet wide assessment tools by the research team. The team intends to complete analysis and reporting by May 2017.

He finished with a discussion on the ongoing work of ASCENT Project 37 to evaluate CLEEN II technologies. This is going to be a joint effort between the research team and analysts at FAA AEE.

A subcommittee member commended Arthur for his efforts on the work.

Presentation Historical Noise Exposure and Analysis of Future Trends for Noise | **Presenter** *Fabio Grandi and Chris Dorbian*

Discussion: Fabio presented the historical noise exposure to assess the aviation system progress towards the goal of reducing the U.S. population exposed to significant aircraft noise. This effort results in an estimate of the number of people exposed to aircraft noise and is created by collecting the best fleet and operations information available for preceding years for input to the Aviation Environmental Design Tool (AEDT) model. He noted that we use the information generated over multiple years to visualize progress towards the goal in the form of a population noise exposure trend line.

A subcommittee member asked if AEDT could be used to model situations before and after the implementation of flight path changes. Fabio confirmed that we can indeed do this.

A subcommittee member noted that AEDT is being used by Hong Kong airport to restrict aircraft operations. Unfortunately, they are using an older aircraft model as a substitution for that aircraft within AEDT for modeling purposes. The FAA asked the member to provide the appropriate data as FAA would be happy to incorporate it into the AEDT model.

A subcommittee member asked how hard it is to re-run older years. Fabio stated there is work required, but the FAA are doing this to rerun the years from 2005 to 2013 to match the recent AEDT2b runs for 2014 and 2015.

There was a discussion about how the process to develop annual noise exposure could be changed from an annual basis to be run more often and more efficiently. The FAA noted that radar cleanup is the most difficult portion of the process and the one requiring the most time. A subcommittee member indicated that the ability to examine fuel burn and noise data in faster time could prove very useful and insightful to the FAA.

Chris presented the analysis to quantify the noise levels from the future fleet. The analysis is consistent with existing evaluations of projected aircraft operations and fuel burn levels (i.e., 'Goals' runs featured in 2015 US Climate Action Plan) to inform future (post 2018) noise goal planning.

A subcommittee member asked whether or not the analysis is considering population growth. Chris noted that the population is fixed within this analysis. The FAA stated that including population growth would add uncertainty to the results as the results are most sensitive to population fluctuations near the airport. The subcommittee member noted that if the work is to inform goal setting, then you should include population fluctuations.

Presentation CAEP Analyses Supported by FAA AEE Tools | **Presenter** *Maryalice Locke*

Discussion: Maryalice walked through the process to develop CAEP standards and how the FAA tools are supporting these analyses. She provided a historical perspective on the use of FAA tools in the CAEP process. She provided information on CAEP metric systems development, CAEP stringency option development, stringency option analyses, and evaluation of CAEP standard levels.

A subcommittee member noted that the analysis work done by the FAA team is amazing. They commented that FAA spends months with the various domestic and international stakeholders to

develop the inputs to the models. The result is a set of information that is used for standard setting. She wanted to know that the Subcommittee is very supportive of FAA efforts on this front.

A subcommittee member asked who provides tools to the CAEP process. The FAA answered that the majority of the tools are provided by the US and Europe but other States also provide their tools to be approved by CAEP for use. These models follow certain procedures including ICAO Document 9911.

Presentation AEDT Development | **Presenter** *Joe DiPardo and Mohammed Majeed*

Discussion: Joe and Mohammed presented an overview of AEDT efforts that includes the drivers behind AEDT development, information on AEDT usage, the AEDT development plan as well as varied research efforts that are supporting AEDT.

Joe and Mohammed presented details on the functionality that will be included in future service packs for AEDT2b and AEDT2c. They also presented an overview of what is expected for AEDT3.

A subcommittee member asked how the FAA handles backward compatibility with new releases of AEDT. Joe said that the team does a variety of checks to examine the stability of the results.

A subcommittee member asked about the emissions speciation profile that is used within AEDT. The FAA said that the work on speciation was completed a while ago when there were considerable efforts on hazardous air pollutants. The subcommittee member confirmed that no additional work is needed as the existing speciation is sufficient.

A subcommittee member asked who provides the underlying data within BADA 3 and BADA 4. The FAA clarified that industry provides the information as contractors to Eurocontrol. The FAA noted that it wants to include BADA 4 within AEDT but the agreement needs to be put in place with Eurocontrol to allow it. A subcommittee member asked if there is another way to generate the data that is in BADA 4. The FAA agreed it is possible to generate the data but it would require the FAA to contract with industry and perhaps academia to generate the data.

There was a discussion about the importance of appropriately selecting aircraft substitutions within AEDT.

A subcommittee member asked if the FAA has thought about the development of an AEDT light that has on-off switches. Other subcommittee members asked why we need a simple tool. They noted that we may be fine with the complicated tool. The subcommittee agreed that a light version is not necessary with the use of SQL databases underlying the tool.

A subcommittee member noted that the tool could benefit from a series of simple examples that would help with the simple problems of interest. The meeting agreed that the on-off switch ask is not needed and the FAA should examine the sample problems that are within AEDT.

The FAA noted that the development items listed in AEDT3 were largely derived during the December 2015 Aircraft Performance Module (APM) workshop and are meant to improve the quantification of noise and fuel burn. Such improvements are needed to properly quantify the benefits of NextGen and to examine new opportunities to further reduce the noise and fuel burn of aviation through operational procedures.

Action items	Person responsible	Deadline
Examine the sample problems for AEDT and see if they could be augmented with additional simple problems of interest.	Mohammed Majeed and Joe DiPardo	August 2017

Presentation APMT-Impacts for Air Quality and Climate – Development Update | **Presenter** *Ralph Iovinelli and Daniel Jacob*

Discussion: Ralph gave an overview of the work that is ongoing to develop tools to quantify the impacts of aviation emissions on air quality and climate. Daniel provided details on the air quality and climate tools that are being developed by the FAA.

Daniel presented details on the APMT-Impacts Climate model as well as the APMT-Impact Air Quality models. The APMT-Impacts AQ modeling effort has been extended to the local level to enable FAA to quantify the benefit of reduced fuel burn that is accompanying the introduction of NextGen.

A subcommittee member asked about the differences in various air quality tools and Daniel explained the relative uses of AERMOD and CMAQ.

A subcommittee member asked about the examination of cruise emissions on surface air quality. The FAA clarified that cruise emissions are examined for CAEP cost benefit analysis and the research team is currently quantifying the uncertainty that is due to the uncertainty in the background emissions inventory of ammonia.

Daniel noted ongoing work of ASCENT Project 18 to measure ambient particulate matter and to see if there is a correlation with aircraft operations around Boston Logan airport. This would help us know if individual aircraft operations are actually leading to increased exposure of PM.

The subcommittee was very supportive of the new direction of project 18 as it is a clear need in terms of helping understand the impacts of aviation emissions.

Daniel finished the briefing with a timeline of APMT-Impacts development.

End of Day Discussion

The DFO asked for feedback on the afternoon session. There was a lot of positive feedback on the afternoon tools session as it provided useful technical details on the work being done by AEE. The subcommittee especially appreciated seeing how the tools will be used and the practical aspects.

Presentation Elements of the Weather In The Cockpit (WTIC) Program Relating to Aug 2015 Recommendation #7 | **Presenter** *Gary Pokodner*

Discussion: Gary presented elements of the WTIC program that relate to August 2015 Recommendation #7. The WTIC program is conducting research to develop, verify, and validate

recommendations for incorporation into Part 121/135 and Part 91 Minimum Weather Service standards/guidance. The focus of the briefing was on WTIC efforts to enhance efficiency with a special emphasis on the WTIC WIND Study which is examining how to better utilize the wind. The efficiency enhancements are in reduced workload as well as fuel savings.

There was a discussion about how various efforts at FAA and NASA are linked in terms of utilizing weather information. This was prompted by a discussion on engine icing.

A subcommittee member asked who is involved in the effort. Gary responded that the work is done by FAA, MIT-LL, MITRE, the Pegasus COE, Delta Airlines (on EDR), American Airlines (on tactical turbulence efforts), among others.

There were several questions relating to how the weather data could be used with existing FMS systems and uploading information to the cockpit. Gary said that they have worked extensively with Honeywell and their FMS and that there is a limit to the amount of data that can be sent to the cockpit due to the datalink and you have to be very careful about what is shared with the pilots due to workload issues.

There was a brief discussion on contrails and Gary noted that the AWRP Program is the better group to engage on this topic.

Presentation Update on ASCENT Project 1 Efforts and Farm-to-Fly 2.0 | **Presenter** *Nathan Brown and Dan Williams*

Discussion: Nate and Dan gave an update on alternative jet fuel analysis efforts that are ongoing. This included an overview of the ASCENT Project 1 team structure and its work to examine alternative jet fuel supply chains and deployment. It also included an update on analysis efforts related to alternative jet fuels in ICAO CAEP.

Nate provided details on ASCENT Project 1. This included the efforts of Washington State University to develop siting benefits and strategies in the Pacific Northwest, the work of University of Tennessee to use the Polysys model to understand feedstock economics, the analysis of Volpe using the Alt. Fuels Transportation Optimization Tool (AFTOT) to model refinery locations that could meet future alternative jet fuel production levels and some recent results from the DOE National Renewable Energy Lab using their Biomass Scenario Model (BSM). He finished his part of the briefing with an update on the Farm to Fly 2.0 program.

There was considerable discussion around the NREL results which were created with the ASCENT Project 1 inputs and there was a request to consider how the inclusion of the California Air Resources Board Low Carbon Fuel Standard would impact the results.

Dan followed Nate and presented the work that is ongoing within ASCENT Project 1 to support the ICAO Alternative Fuel Task Force (AFTF). This includes the recently completed fuel production assessment that has forecast global alternative jet fuel production in 2050 as well as the ongoing life cycle analysis efforts to ensure that alternative jet fuels are included in the global market based measure.

There was a lengthy discussion on the relationship between alternative jet fuels and the global market based measure to inform the attendees about how the two are related.

Presentation Industry Perspective | **Presenter** *Steve Alterman and Nancy Young*

Discussion: The Subcommittee discussed the items listed below. There were no slides.

The recently passed FAA reauthorization only runs through September 2017 and there will be much work next year on this and the nature of the work will depend on the election results.

Steve mentioned that there is a report that was published by the Inspector General on R&D within the FAA. Steve stated that everyone is satisfied with E&E program so there is likely nothing in it on E&E.

There was a discussion on the EPA process for implementing the CO2 certification standard that was agreed upon at the CAEP/10 meeting. There was a brief discussion on how the new standard could affect the fleet of commercial and cargo airlines.

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

Discussion: Jay gave an update on NASA Aeronautics efforts. He focused on the NASA goals, structure of the aeronautics program, and key work areas. This included the New Aviation Horizons program, enabling tools and technologies, revolutionizing operational efficiency, fostering advanced concepts and future workforce, UAS and hypersonics.

A subcommittee member commended the efforts of NASA and the FAA on supersonics. Another subcommittee member said the collaboration is good but he does want to make sure that the end product is mutually understood. There was much discussion on how NASA and FAA are working closely together on issues of supersonics, helicopters, alternative fuels, technology maturation, UAS noise, and PM measurements.

A subcommittee member noted that FAA and NASA are working from common tools to do their analyses and the use of these tools has enabled greater coordination in their respective research efforts.

Priorities Discussion | Lead *Mahendra Joshi*

The Subcommittee was asked by the Subcommittee Chair to consider these three questions:

1. Are there R&D areas within the E&E Portfolio that should be lower / higher priority?
2. Are there R&D areas that AEE is not examining that should be added to the E&E Portfolio?
3. What do you see coming on the horizon regarding E&E that may require future R&D efforts?

The subcommittee had considerable discussions based on these three questions that led to the creation of the findings and recommendations that were submitted by the Subcommittee. Some of the discussion is captured below in relation to each of the questions that were asked.

Discussion on Question #1

A subcommittee member asked what was dropped due to the F&E funding reduction and what FAA would like to see reinstated from this. The FAA stated that the FMS effort in CLEEN,

research on operational procedures, and AEDT development have all been reduced and they would like to see funding restored for these as it could directly help noise efforts.

A subcommittee member stated that the airlines are dealing with noise and want to see alternative fuels developed. They also need the technologies being matured by the CLEEN Program to help with noise. Their priority order is CLEEN, Noise (noting that this is a broad area that includes noise research roadmap, operational procedure development, and AEDT development to help with noise) and Alternative Fuels.

In response to discussion within the Subcommittee, the FAA noted that we need a better understanding on fuel composition and its impact on emissions.

Discussion on Question #2

A subcommittee member noted that FAA could do more work on chemicals as it relates to TSCA. She noted that certain chemical requirements for safety are in conflict with environmental concerns. The FAA noted this is an issue that is being handled by AVS and reported to the SAS.

A subcommittee member stated it would be useful to know how population encroachment impacts noise. Specifically, she asked about the importance of population encroachment to the increased population exposure. The FAA noted that such an analysis could be performed using the existing data within the goals analysis.

A subcommittee member asked about perfluorinated compounds. The FAA noted that AVS is working on this subject and the work is reported to the SAS and that the issue is also relevant for the Airports Subcommittee.

A subcommittee member noted their concern that the Airport Environment Research projects are at the contracting stage. He suggested that FAA work to improve the speed of the contracting process.

A subcommittee member asked if there are ways that the FAA could improve the modeling experience with AEDT (e.g., by having it be able to better use varied input data and increase efficiency of AEDT runs).

A subcommittee member asked if the FAA could quantify the benefit or prove the disbenefit of alternative fuels on emissions that affect air quality. He noted that the California Air Resources Board (CARB) is interested in understanding the impacts of alternative fuel use on NOx emissions.

Several subcommittee members noted that there is much work ongoing within AEE and there was a discussion whether AEE has sufficient staff to handle the workload.

Some subcommittee members gave the FAA kudos for getting the PM measurements in place and to getting it done on time and budget.

A subcommittee member noted that his priorities were: NextGen support, ICAO CAEP support, and the CLEEN program. He noted that UAS should be a lower priority.

Another subcommittee member stated that the operations research technical review was useful. She also noted that many folks are not aware of the work of AEE and that we should increase our efforts to communicate the efforts. She also stated that the noise research roadmap and the planning for it are both good as are the AER projects.

Discussion on Question #3

A subcommittee member complemented the FAA and NASA for their cooperation as it is very good. He stated that it is as good as he has ever seen it. With that being said, he noted that there are some activities that will come up in the next few years where the FAA will need to take full advantage of the flight testing on supersonic aircraft. The FAA and NASA will need to think about microphone layout, propagation modeling, etc. to complement the low boom flight demonstrator. NASA noted that they are keen to make this happen.

The subcommittee agreed that the FAA should capitalize on tests that are being planned at NASA on supersonic aircraft and UAS.

The subcommittee member also said that there is a need for research to measure LTO emissions and LTO noise from supersonic aircraft. The emissions aspect of these aircraft is unique as the engine will be de-rated on takeoff. The FAA noted that some work will be needed to ensure that the probe will be able to work in the engine exhaust.

After being asked by a subcommittee member about it, the FAA stated that they are currently working on PM and GMBM in CAEP and there is work ongoing to consider certification for future supersonic aircraft. The FAA also noted that at some point in the future CAEP will again consider the stringency levels for NOx, noise and CO2 emissions. A subcommittee member noted that NOx could come more quickly.

A subcommittee member asked if the FAA could provide their view on what is driving the future. He noted that in some areas FAA are very proactive and in other areas FAA are being reactive to what we anticipate happening in the future. He further clarified that it would be good if FAA could provide a sense where they see big issues coming over the next 10 years. These could include issues arising from efforts at ICAO CAEP, new entrants, and/or environmental issues that are looming.

Action items	Person responsible	Deadline
Quantify the importance of population encroachment to increased population exposure over time.	Fabio Grandi	August 2017

Meeting Close-Out | Lead *Mahendra Joshi*

Dimitri agreed to map out the information from the open discussion and share with everyone. Mahendra agreed to create a draft of the Findings and Recommendations from Dimitri's notes, circulate it, and then that will go to the main REDAC. The subcommittee was highly complementary of the work that was presented. I agreed and said I would let AEE staff know this.

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

All of the recommendations from the August 2015 meeting were closed. All of the April 2016 recommendations were left open.

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

February 28-March 1, 2017 in Washington DC

Adjourned at 2:00 pm on Wednesday, August 31, 2016

DRAFT FAA REDAC Subcommittee on Environment & Energy
Summer 2016 Meeting Agenda
Airlines for America
1275 Pennsylvania Avenue, NW, suite 1300
Washington, DC 20004

Meeting focus: Analytical Tool Development and Analysis Efforts within E&E Research Portfolio

Tuesday, August 30, 2016

Start	Duration	Title	Presenter
8:00	0:30	Check-In	
8:30	0:05	Welcome	
8:35	0:10	Chair opening statement & Introductions	M. Joshi
8:45	0:15	FAA Update	C. Holsclaw
9:00	0:30	R&D Executive Director Update and REDAC Protocol Review	E. Neiderman
9:30	0:15	Budget Update	M. Gallivan
9:45	0:15	Responses to REDAC Recommendations & Actions	J. Hileman
10:00	0:15	Break	
10:15	0:45	AEE Research Update (including brief updates on CLEEN Program, Alt Fuels Testing, Operations, and Airport Technology Research)	J. Hileman
11:00	0:15	Discussion	
11:15	0:30	Noise Research Roadmap and Update on Efforts	R. Cointin
11:45	0:15	Discussion	
12:00	1:00	Lunch	
13:00	0:30	Update on Aircraft Technology Assessment Efforts	A. Orton
13:30	0:15	Discussion	
13:45	0:30	Historical Noise Exposure and Analysis of Future Trends for Noise	F. Grandi and C. Dorbian
14:15	0:15	Discussion	
14:30	0:15	Break	
14:45	0:30	CAEP Analyses Supported by FAA AEE Tools	M. Locke
15:15	0:15	Discussion	
15:30	0:45	AEDT Development	J. DiPardo and M. Majeed
16:15	0:30	APMT-Impacts for Air Quality and Climate - Development Update	R. Iovinelli and D. Jacob
16:45	0:15	Discussion	
17:00		End of Day-1	

Wednesday, August 31, 2016

Start	Duration	Title	Presenter
8:00	0:30	Check-in	
8:30	0:30	Elements of the Weather In The Cockpit (WTIC) Program Relating to Aug 2015 Recommendation #7	G. Pokodner
9:00	0:30	Update on ASCENT Project 1 Efforts and Farm-to-Fly 2.0	N. Brown and D. Williams
9:30	0:30	NASA Update	J. Dryer
10:00	0:15	Break	
10:15	0:30	Industry Perspective	S. Alterman (phone)
10:45	1:15	Priorities discussion	M. Joshi
12:00	0:45	Lunch	
12:45	1:15	Priorities discussion, continued	M. Joshi
14:00	0:45	Identify topics for subcommittee report	M. Joshi
14:45	0:15	Summary of Action Items and Findings & Recommendations	M. Joshi
15:00		End of Day-2	

Attendance List:

First name	Last name	Affiliation	30-Aug	31-Aug
Juan	Alonso	Stanford	x	
Steve	Alterman	CAA		x
Gonca	Birkan	FAA	x	
Nate	Brown	FAA		x
Becky	Cointin	FAA	x	x
Joe	DiPardo	FAA	x	x
Chris	Dorbian	FAA	x	x
Jay	Dryer	NASA		x
Charles	Etter	Gulfstream	x	x
Gregg	Fleming	Volpe	x	x
Mike	Gallivan	FAA	x	
Yuri	Gawdiak	NASA	x	
Fabio	Grandi	FAA	x	x
Mohan	Gupta	FAA	x	x
Jim	Hileman	FAA	x	x
Curtis	Holsclaw	FAA	x	
Levent	Ileri	FAA	x	
Ralph	Iovinelli	FAA	x	x
Daniel	Jacob	FAA	x	
Mahendra	Joshi	Boeing	x	x
Sandy	Lancaster	Dallas Fort Worth Airport	x	x
Maryalice	Locke	FAA	x	
Mohammed	Majeed	FAA	x	x
Dimitri	Mavris	Georgia Tech	x	x
Alex	Menotti	A4A	x	x
Eric	Neiderman	FAA	x	x
Arthur	Orton	FAA	x	
Gary	Pokodner	FAA		x
Katherine	Preston	ACI-NA	x	x
Ian	Redhead	Kansas City Intl Airport	x	x
Leslie	Riegle	AIA	x	x
Chinita	Roundtree Coleman	FAA	x	x
Jim	Skalecky	FAA	x	x
Ed	Smith	GAMA	x	
Rhonda	Solomon	FAA	x	x
Dan	Williams	FAA		x
Nancy	Young	A4A	x	x
Darcy	Zarubiak	Haley & Aldrich, Inc.	x	x
Joe	Zelina	GE	x	