Subcommittee on Environment and Energy | MINUTES

Meeting date & time *September 10-11, 2019*
Meeting location *800 Main St., Washington D . C .*

Purpose	Develop strategic guidance for the FY2022 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 and those in the room introduced themselves.

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

Jim Hileman walked through the existing findings and recommendations from the last two meetings. The findings and recommendations were left open for discussion at the end of the meeting. He also walked through the action items from previous meetings. Open action items are listed below.

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	March 2020
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
Develop a means to communicate information on AEDT to the layperson. This could include its noise	F. Grandi	March 2020

Action items	Person responsible	Deadline
and emissions modeling capabilities and how it reduces the need for noise and emissions monitoring		
Develop a means to communicate successes from E&E Portfolio summary slide	J. Hileman	March 2020
Examine indirect environmental impacts from aviation that result from modifications to supply chains	J. Hileman	March 2020

Presentation FAA Update (AEE and International Efforts) **| Presenter** *Kevin Welsh*

Kevin Welsh discussed progress that AEE have made in executing the research program. He expressed optimism in our continuing ability to conduct research on environment and energy matters.

Kevin continued with a discussion on international efforts including the coming ICAO Assembly. He noted that the European Commission has stated that sustainability would be the number one aviation priority going forward. He provided details on an information paper that will be presented by the United States to Assembly that highlights U.S. efforts related to climate change. He discussed the importance of CORSIA to international aviation. The Information Paper was provided to the Subcommittee via email.

Kevin concluded with a discussion about efforts on hiring. We have lost staff who are retiring. We have been given the green light to hire engineers and we are moving forward with this.

A Subcommittee Member noted that airports are also doing work to reduce their carbon emissions and they are happy to share this information with the FAA.

A Subcommittee Member asked about CORSIA and the availability of offsets. The FAA noted that we do not have all of the needed information on offset definition to enable this.

Presentation REDAC Season **| Presenter** *Shelley Yak*

Shelley Yak let everyone know that 2017/2018 National Aviation R&D Plan has been released. The FAA will share the link with the Subcommittee. Shelley provided information on the landscape process.

Presentation R&D Landscape Document – Report Out **| Presenter** *Steve Summer*

Steve Summer handed out the landscape document and provided a briefing on it. Based on a question from the Subcommittee, the FAA noted that the NARP provides strategic direction while the landscapes document provides drivers. They both inform the development of the work program.

Steve summarized how they requested input from the subcommittee on drivers and how the input was synthetized in the landscape. He reported that they combined all the inputs received into 25 drivers under 3 categories, with duplicate drivers being collapsed into single combined ones. He

also reported that each driver was listed with three areas of challenges and given an expected time to maturity.

Steve asked the subcommittee to review the document for missing items, and to provide any missing input in the form of the complete text to be added and not simply as a remark noting the omission. He also asked that the review be completed and comments provided by the end of the month.

A question was asked about the distribution of funds between near and long term items of the work program. The DFO remarked that NASA is the agency that handles long term research, but that the FAA works in partnership with them. In terms of distribution for FAA AEE has about 1/5 of the research portfolio directed toward longer term items.

A subcommittee member asked Steve to include a version number on future versions of the document to enable version control.

The DFO emailed the draft R&D landscape document with the Subcommittee and meeting attendees and solicited their input. FAA requested that the Subcommittee review the draft document and revise items that need modification, add items that are missing, and identify areas that will not be done by industry. The input should be sent to the Subcommittee Chair and DFO by September 30, 2019. They will then consolidate it prior to sharing with Steve.

Action items	**Person responsible**	**Deadline**
Provide feedback to the Subcommittee Chair and DFO on the draft R&D landscape document.	Subcommittee Members	Sept 30, 2019

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

Mike Gallivan presented details on the budget process for FY19, FY20, FY21 and the out-years.

The FY19 budget was signed on February 15, 2019 and received $191.1M for RE&D funds. He 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 report.

He shared information on the FY20 budget, including overarching progress in developing the budget. He provided details on the FY20 President Budget and FY20 House report. There has not been a report from the Senate yet.

Mike said that the FY21 budget target is $120M and the full budget will be delivered to OST in June 2019.

He said that the President signed the reauthorization on October 5, 2018 and that it covers through to 2023.

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

Jim Hileman provided an overview presentation on the overall Environment and Energy Research and Development portfolio. He began by reminding where the Office of Environment and Energy (AEE) is located within the FAA organization and by reminding the subcommittee

that as announced via email, Rebecca Cointin was selected as the permanent Deputy Director for AEE with Don Scata still remaining in the position of acting manager of the noise division.

Jim proceeded by providing an overview of the background context, aviation's economic and environmental significance, and how the E&E R&D portfolio and programs have been set up to serve the AEE Mission and Vision. He then continued by highlighting what are the emerging aircraft technologies the office has to take into consideration and provided more details on AEE's ongoing efforts on noise, emissions, jet fuel, aircraft technology, model development, and modeling activities in support of decision-making.

Jim then presented an update on the ASCENT COE activities. He first provided a breakdown of the FY18 funding allocation by mechanisms and updated the committee on the fact that in addition to having challenges on executing funding via contracts, grants, and Inter Agency Agreements (IAA) now there have also been challenges in providing funds via the CLEEN OTA. Jim continued by giving a background on the ASCENT COE as well as the FAA COE program as a whole and noting the FAA COE program difficulties in executing funding overall because of the expanded COE grants approval process. He then proceeded by summarizing the new process that was put in place to solicit project ideas for the ASCENT COE and to obtain their pre-approval. Jim reported that the effort resulted in 72 new ideas and 19 existing project continuations, divided into 10 categories, and that pre-approval was received for 37 projects for a total of $15.8M of funding, with an additional 14 projects ($4M) remaining under consideration. He then provided an overview of the projects to be funded with FY18 and FY19 funding. A question was asked whether the new grants process had improved the situation; Jim replied that while he is not sure it has made a difference in terms of projects funding throughput, it has made a difference in the project quality level and that once a decision is made on the remaining ideas we will proceed to initiate a new round of project ideas solicitation.

Jim continued the presentation with a review of the E&E R&D Portfolio budget profile. He first provided graphics reporting the historical and 6-year views of the funding sources and related amounts. He then proceeded with an overview of the intended target activities for FY19 funds by BLI, also noting that some funds for environmental research is provided from the Airport Technology Research (ATR) program in collaboration with the Tech Center and the Office of Airports. Lastly he gave an overview of the intended target activities for FY20 President Budget funds and a graphic of the breakdown of the E&E funded activities from FY14 to FY20.

Jim concluded the presentation by noting the program's recent successes in terms of capabilities and solutions that are helping today.

Presentation Emissions Research | **Presenter** *Laszlo Windhoffer*

Laszlo Windhoffer provided a briefing highlighting emissions research efforts that are being done or contemplated by the office. The briefing included an overview of the current work on the emissions research roadmap. He provided details on a number of topics.

He provided highlights of the aviation emissions research plan. This plan has work streams on emissions dispersion, emissions measurements, measurement technique calibration to ease compliance with the nvPM standard, supersonic technology and impacts, and emissions measurements.

He provided details on the particulate matter emissions measurements that have been done and are planned in the near term. He also noted planned work for the ASCENT Project 48 team.

Laszlo provided the five year plan for the development of a new dispersion model to replace the EPA Aermod model. This work is being done under ASCENT Project 19.

He presented details on the work being done to look at the costs and benefits of changing fuel composition. The DFO noted that once completed this information will be used to evaluate additional air quality and climate benefits that could result from the use of alternative jet fuels.

A Subcommittee Meeting member noted that we need to be careful with the term NEPA compliance. Instead this is really about NAAQS compliance.

Presentation Alternative Jet Fuels Research | **Presenter** *Nate Brown and Dan Williams*

Nate Brown started the briefing with a reminder that the FAA does work on testing, analysis, and coordination. He then showed a graphic of the annual production of alternative fuels over the last decade. He also presented the geographical locations for fuel production facilities in the United States.

He followed with a summary of the ongoing efforts to support the ASTM Intl process for fuel approvals. This includes details on the status of fuels working their way through the approval process. The DFO noted that the IHI fuel is going to use a fast-track process that has been enabled by the investments into streamlining the fuel testing process.

Nate provided information on efforts to examine alternative jet fuel supply chains and develop open source tools that would be available to the public. The team is considering the entire supply chain via multiple aspects: feedstock production, techno-economics of pathways, existing infrastructure, community assets, transportation routes and capacity, and economic impacts. Additionally, he noted that the team is also working on three regional studies in the Inland Pacific Northwest, Hawaii, and the Southeast U.S. In terms of developing open source tools for evaluation of supply chains, the team are considering: economics, community assets, supply chain risk sharing, and logistics. He gave additional details on the Fuels Transport Optimization Tool (FTOT) being developed by Volpe.

Dan Williams provided information on CORSIA. He also presented how Sustainable Aviation Fuels (SAF) can reduce an airlines offsetting obligations. He provided the high level work program of the ICAO CAEP Fuels Task Group (FTG), which is determining how fuels will be credited under CORSIA. He then tied the work of the FTG to the E&E R&D portfolio and the work of the ASCENT Project 1 team and Volpe Center.

A Subcommittee member asked if a business jet owner could get a certificate that says a SAF provided some level of benefit. The FAA noted that fuels being produced by World Fuels facility in the LA area are RSB certified with a defined life cycle carbon benefit. RSB might provide such a certificate. This question led to additional discussion on tracking the carbon benefits from the use of SAF.

Presentation Supersonic R&D Efforts | **Presenter** *Don Scata*

Don Scata started the briefing with an overview of interest from industry in supersonic civil transportation and the efforts of the FAA. He provided information on Section 181 of reauthorization that requires the US to provide leadership on supersonic aviation. He also gave a summary of efforts from FAA and NASA to advance supersonic civil transportation.

Maryalice Locke provide details on the emissions aspects of supersonic civil transports and some of the research being done. She provided several slides on the work of Georgia Tech and Purdue on ASCENT Project 10. She also gave a high level view of ASCENT Project 47, which has just recently started.

Sandy Liu provided details on the en-route aspects that need to be addressed to enable supersonic flight over land. He provided several slides on the work of Penn State under Projects 41, 42, and 57. This included details on efforts to examine the Mach cut off operational procedure concept.

The FAA noted that we also have a trades analysis to look at the impact of cruise Mach and payload on noise, fuel burn, and emissions. This will prove useful to the ongoing work in ICAO to look at LTO noise through the exploratory study.

Discussion Industry Perspective | **Presenter** *Steve Alterman (CAA)*

Steve Alterman started his remarks by noting that the biggest issues for the industry are noise and emissions. New procedures to reduce fuel and emissions are not satisfying the general public. In the past, people complained about noise because they lived near the end of the runway; now, those complaining are located far away from the airport. Another problem he identified is social media as there are now apps where you press a button and generate a complaint. As such, one can get a large number of complaints from a hand full of people. He noted there are multiple lawsuits because of noise. He also noted the challenge in conveying the facts on the situation. He noted that airlines want to fly new routes as they are efficient, but that they also want to be good neighbors too. He also remarked that there appear to be concerns in Europe with CORSIA.

Steve noted that a company has satellites and is selling space-based ADSB signals. With the use of space-based ADSB, one can significantly reduce spacing between aircraft. The US has not purchased this information and he thinks it is at a disadvantage as a result. He noted that the FAA is testing this now, but there is no long-range plan for this. He stated that there is a genuine chance that the US will fall behind if they do not adopt this technology.

Based on a question from FAA, a number of Subcommittee members engaged in a wide ranging discussion on the noise from UAS and UAM. This included a range of issues including who is responsible for the noise (e.g., airports or the operator), the noise from these vehicles, and how the noise could be reduced. A Subcommittee member noted that FAA and NASA need to continue to collect data on UAS.

Presentation AEE Efforts on Helicopters, UAS and UAM **| Presenter** *Eric Elmore and Don Scata*

Eric Elmore provided a broad view of UAS/UAM noise from policy and R&D perspectives. He discussed different types of vehicles and their unique aspects. He discussed the FAA authority on noise from 49 US CFR Section 44715 as well as the requirement of the National Environmental Policy Act. He concluded his part of the briefing by talking about ongoing efforts to acquire noise data from UAS operations.

Don Scata summarized the overall R&D work that is going done by other parts of the FAA and ACRP on UAS and UAM. Don provided a summary of ongoing work on helicopter noise being done by Penn State through ASCENT Project 38 and the Volpe Center.

A Subcommittee member asked for a clarification on the use of the helicopter research being performed, and Don noted that pilots were being provided with knowledge on noise levels and the lower noise procedures being developed.

A Subcommittee member asked what would happen if a company came to the FAA to certify an UAM with passengers, and specifically how would the FAA certify it for noise? The FAA said that they would certify it using an existing procedure, but if that does not work then the FAA would need to go to rulemaking. The member recommended that the FAA work with NASA to get the needed data to support this effort.

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. This includes work by MIT through the FAA-Massport MOU, ASCENT research, and Airport Technology Research (ATR) projects.

He provided an extensive update on the work MIT is doing in ASCENT under the FAA-Massport MOU. This included a description of the differences between the Block 1 and Block 2 upgrades, a table of the ideas for Block 1, and the processes being used by FAA to evaluate these procedures. He provided an update on the work that MIT are doing with NASA to understand whether or not reducing speed actually results in a change in aircraft noise. This includes a note that speed reduction on takeoff is not likely to provide a noise benefit. He also provided an update on the progress toward creating the Section 179 report on how speed modifications could impact noise. He gave an update of where the Bock 1 upgrades are in the 7100.41A PBN process. He also gave a brief update on work to develop the Block 2 upgrades. He provided details on the delayed deceleration approach concept which is showing promise for reducing noise on approach at areas well outside the DNL 65 contour. He concluded the MIT portion of the briefing with a slide describing the work to validate the noise benefits of operational procedure changes.

Chris provided details on two recently completed Airport Technology Research projects that were conducted by MITRE. The first was on noise abatement procedure usage and effectiveness. The second was on steeper approaches for noise abatement operational feasibility. Based on the results from the latter project, as well as recently completed work at MIT, FAA does not intend to do any additional work on steeper approaches.

He concluded with a slide on the noise risk of the NextGen Enterprise Risk Board and a summary of the work.

A subcommittee member asked for a clarification on the noise benefits from stepper approach and the FAA confirmed that the use of steeper approaches (those under 3.5 degrees) would provide less than 1 dB of benefit.

Discussion on Findings and Recommendations | Lead *Ian Redhead*

The Chair led a discussion based on the questions that were posed by the DFO during his morning briefing. The Chair started the discussion by noting that he is pleased to see the progress in executing grants. He asked for input on the questions from the audience.

A Subcommittee member said that he thinks more work needs to be done on UAS/UAM noise or else the FAA will not be in a position to address this key issue. The DFO noted that noise issues could potentially prevent the acceptance of UAS and prevent the timely certification of UAM. Another subcommittee member noted that subsonic aircraft noise is more important than UAS/UAM noise. There was a question on the remit on the E&E R&D work and it was clarified that privacy is not included in it.

END OF DAY 1

Presentation Aircraft Trajectory Data and Environmental Data Visualization |
Presenters *Fabio Grandi & Sean Doyle*

Fabio Grandi provided the rationale for doing work in analysis of aircraft trajectory data and the development of environmental data visualization. He explained that as higher quality aircraft trajectory data has become available, additional opportunities for analytical and communication purposes are possible. To take maximum advantage of these opportunities, an integrated data management and data visualization framework is needed. He walked through the benefit of moving to a single data source for aircraft trajectory data and that FAA are working with MITRE to further develop the MITRE threaded track product, a data source that integrates the various radar data streams into a single data set.

Sean Doyle provided an overview of the MITRE threaded track processing overview. MITRE has developed treaded track for the FAA to provide customized flight track processing to meet specific use cases. Threaded track provides the ability to manage overlapping radar coverage, data quality checks, and data completeness. The final timeline to completion is yet to be determined as the integrated system approach is still in development as is the Enterprise Information Management (EIM) platform (a computational platform that will support broad data management and analytics capabilities efficiently across the agency). AEE is exploring the EIM as a management tool to support environmental data visualization and modeling, but the full utilization of this capability will require further development of the AEDT architecture. The EIM

could provide a stable platform to explore options for AEDT architecture changes that were not previously feasible.

Fabio concluded the briefing with a discussion on data visualization needs and methods that are being considered by AEE and a conclusion slide.

A Subcommittee member noted that NASA also has issues with data visualization. They have focused on what the end user needs and to have that drive the work. The FAA said they are indeed thinking about the customer and usage. Another Subcommittee member suggested that the FAA think about the needs of other users like airports.

Another Subcommittee member strongly encouraged the FAA to focus on the end users and not the FAA. He used the NASA NPSS engine design code as an example and how it survives today because it has a broad external user base. He also said that managing regulatory requirements is obviously the FAA requirement.

The DFO noted that this briefing is providing a window into what could be done as we have improved radar data and computing capabilities. He said that the FAA could in the future automatically compute noise, fuel burn and emissions from the threaded track data and then use this data for any number of purposes, (e.g., NEPA analyses, Part 150 studies, inventories, research).

A Subcommittee member encouraged the FAA to reduce the barrier to entry to doing environmental analyses. He further encouraged the FAA to find ways to develop validated data in a streamlined manner. He did not want computations to be a barrier to the FAA doing environmental work.

The Subcommittee Chair asked for additional details on the process and timelines for doing the work. He requested an update on this work for the winter 2020 meeting.

The DFO noted that it will take a few years (maybe more than 5) to develop a fully automatic version of AEDT. The FAA stated it is something that could be included within AEDT5, but we have not made any formal plans for this yet.

A Subcommittee member asked about the relationship of AEDT to monitoring data. The FAA said that there are differences between these data sources and noted that comparisons are going to be made between these data sources through two new ASCENT projects.

Based on the support of the Subcommittee, the FAA agreed to explore the potential for a new architecture for AEDT that could be automated using threaded track data within an environment like the EIM. The FAA took an action to report to the Subcommittee on the efforts covered in this briefing and further thoughts on modifying the AEDT architecture at the next Subcommittee meeting.

Action items	Person responsible	Deadline
Provide an update on work to utilize threaded track data, develop visualization tools, and potential changes in the AEDT architecture that could streamline environmental analyses.	Fabio Grandi, Mohammed Majeed, Joe DiPardo, Sean Doyle	March 18, 2020

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

Mohammed Majeed and Joe DiPardo provided an update on AEDT tool development. The briefing covered the current focus of AEDT development, the current status of AEDT, AEDT Near-Term Development (FY19 – FY21) and AEDT Future Development (FY22+).

Mohammed talked about the need to develop a new dispersion model for use in AEDT as well efforts by the AEDT development team to identify and overcome issues that were identified during a recent analysis that was conducted at Chicago O'Hare. He continued with an update on the status of the AEDT3b release, which has been delayed due to additional time being required to get all of the legal agreements in place between the FAA and Eurocontrol to use the BADA4 database. He provided information on AEDT3c, which is planned for release in February 2020.

Joe continued the briefing by walking through the FY2020 development plan and its focus on addressing the AEDT maintenance backlog. The team will also launch a user feedback review, which will solicit feedback on AEDT 3c.

A Subcommittee member asked that people who don't regularly use AEDT because of its complexity also be included. The FAA said they would take this on, but will need help from the airport community to identify one to two people to help with this.

Joe provided more information on additional work that will be done on the 3 series of AEDT as well as the current plans for AEDT4. The development goals for AEDT4 will be higher fidelity noise characterization, incorporating an improved emissions dispersion tool, and update the GIS engine to reduce development costs. He concluded with the timeline for AEDT development and a short summary of what was provided in the slide deck.

Action items	Person responsible	Deadline
Identify 1-2 people from the airport community to help gain user feedback on AEDT	Mohammed Majeed, Joe DiPardo	March 18, 2020

Presentation Screening Tool Development | **Presenter** *Sean Doyle*

Sean Doyle provided an update on the development of a new noise screening tool at FAA. He started with the timeline which includes developing a methodology in FY19, scoping of the new tool in FY20 and implementation of the tool in FY21. He noted that the new tool will need to be consistent, conservative, and credible.

He provided the policy needs that will be addressed by the tool in terms of NEPA wherein a screening tool is often used to inform whether a CATEX is appropriate or whether an Environmental Assessment or Environmental Impact Statement must be considered (using a comprehensive modeling tool).

He concluded with some information on the current FAA noise screening tools and then provided the roadmap to finishing the new screening tool.

A Subcommittee Member asked about the involvement of NASA in this work. The FAA said that we are currently focused on getting the policy aspects right but would in the future reach out externally. The DFO noted that the screening tool has been a great example of AEE working closely with the Air Traffic Organization, The Office of Airports, and MITRE.

A Subcommittee Member noted that FAA should also consider developing a screening tool for air quality. The FAA commented that the EPA also has a role in this area.

A few Subcommittee members asked about what is meant by the terms accuracy and conservative with respect to the screening tool. The FAA clarified that the tool is being conservative from a NEPA perspective, and that the accuracy is from the point of view of ensuring that NEPA work is done accurately. There was also a discussion on the need for the FAA to carefully consider how visual communication is handled by the tool.

Action items	Person responsible	Deadline
Provide a briefing on screening tool efforts related to emissions and air quality.	Ralph Iovinelli	March 18, 2020

Presentation Noise Research | **Presenter** *Don Scata*

Don Scata started his briefing by noting that much of the AEE work was already covered during other parts of the meeting and his briefing is covering aspects that were not covered elsewhere. His briefing focused on how the E&E R&D portfolio is supporting the development of materials to respond to reauthorization requests. Many of these are focused on noise. He provided details on the work to examine the sleep and health impacts of noise. He also briefly discussed commercial space.

Based on a question from a Subcommittee member, the FAA stated that the community noise survey is still under review and that Section 187 of Reauthorization requires its release by October 2020.

Presentation Aircraft Technology Research (CLEEN) | **Presenter** *Levent Ileri*

Levent Ileri provided a summary of the first two phases of the CLEEN program as well as plans for the third phase of CLEEN, which will start with FY2020 funding. He summarized the expected benefits of the technologies which were matured under CLEEN Phase I as well as the technologies being matured under CLEEN Phase II. His slide deck provided considerable details on the draft solicitation for the CLEEN Phase III project, which was shared during the industry day in December 2018.

A member asked if we have a list of technologies that have been introduced into the fleet. He thought that a one pager describing this would be very useful. This led to a discussion on how to better communicate the successes of CLEEN to the lay person. There was also a discussion on the development of analytical tools that have resulted from the investments made in CLEEN.

Levent noted that the CLEEN companies have also taken an action to develop a condensed way to communicate the benefits of CLEEN.

Based on a question, the DFO confirmed that the CLEEN companies have made a two-to-one cost share match and the Subcommittee asked that this information be shared.

Action items	Person responsible	Deadline
Develop a short, one-pager that communicates the benefits that have come from the CLEEN Program.	Levent Ileri	March 18, 2020

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

Barb gave an update on NASA Aeronautics efforts. She started by providing an overview of drivers moving NASA aeronautics and then gave on update on budget profile for NASA aeronautics and how funding is being shifted to support NASA's testing infrastructure. The briefing provided details on work related to supersonics, vertical flight and subsonic transports.

She concluded by noting a few things. The overall support from key stakeholders is strong. She also said that NASA are on the verge of completing several projects: Advanced Composites, UAS in the NAS, and Airspace Demonstrations. Outreach and communications on the results from these will be ongoing. She also noted continued support for NASA's larger testing facilities at the Agency level. She also highlighted a few changes in NASA Aeronautics leadership.

The Subcommittee noted that the collaboration between FAA and NASA is exemplary.

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

The Subcommittee Chair led a discussion on the three questions that were raised by the DFO on day 1.

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

The Chair opened the floor to members responding to the questions and initiate discussion on the findings and recommendations.

Key points related to Question 1 on lower / higher priority

- UAS/UAM are both important but there is a distinction between the two and UAM need to be a higher priority (but they are still less important than continued work on the subsonic civil fleet). The importance of UAM should be raised, but it is not more important than subsonic.
- There was a discussion on the relative priority of subsonic, UAM/UAS, supersonics, and commercial space, and that the order of priority has not changed since previous meetings. The Subcommittee agreed that more nuance is needed on the recommendations related to noise and this prioritization.
- There was an agreement that a recommendation is needed to state that NASA and FAA need to work closely on both UAM and UAS such that noise is not a barrier to UAM vehicles being certified in a timely manner, and that UAS noise does not lead to a plethora of local ordinances which inhibits the growth of the industry
- There would also be a separate recommendation on noise from supersonic and subsonic noise.

Key points related to Question 2

- Subcommittee agreed the priority order does not need to change

Key points related to Question 3

- A Subcommittee member asked if there is something needed to facilitate certification of hybrid electric vehicles. The DFO noted that GA vehicles have few, if any, emissions certification requirements and therefore this is not an issue. These vehicles would of course need to be certified for noise, as has been discussed previously during the meeting.
- A subcommittee member asked about water issues. The DFO noted that the Airports Technology Research (ATR) is covering water issues. The Chair said he would talk to the Airports REDAC Subcommittee to ensure that efforts are ongoing to deal with existing airport PFOS contamination.
- A subcommittee member asked about non-CO2 emissions and their climate impacts. A second member asked about contrails. He suggested that there should be an expansion of the portfolio to examine contrails. The DFO explained that the climate impact of contrails and aviation induced cloudiness is likely of the same order of magnitude as CO2 but that contrails have a much shorter timescale in terms of their impact. The FAA has done much work on this subject in the past, but has not had much, if any, work on climate impacts within the last year. Two projects are currently in the queue to continue this work on climate impacts. The Subcommittee asked the FAA to identify potential research that could be done to understand and mitigate the climate impacts of contrails and aviation induced cloudiness.

Action items	Person responsible	Deadline
Identify potential research that could be done to improve our understanding of the climate impacts of non-CO2 emissions in general, and of contrails and	Ralph Iovinelli	March 18, 2020

Action items	Person responsible	Deadline

Aviation induced cloudiness, in particular, and means to mitigate these impacts.

After returning from lunch, the Chair asked the Meeting to go through the findings and recommendations that were still open.

Regarding REDAC recommendation 2019-03 #1, the meeting agreed to close the current recommendation and will write an updated recommendation on alternative jet fuels.

Regarding REDAC recommendation 2019-03 #4, the meeting agreed to close the recommendation. The Sub-committee agreed to write a new recommendation related to public private partnerships that captures improvements of the grant approval process. The meeting also noted that they would like to see additional streamlining of the process.

Regarding REDAC recommendation 2019-03 #3, the meeting agreed to close the recommendation. The Sub-committee will write a new recommendation using the previously discussed points (from Question #1 above here).

Regarding REDAC recommendation 2019-03 #5, the Chair noted that the FAA presented information on this and the meeting agreed to close this. The meeting requested the FAA provide information on the work on Aermod at the next meeting.

Regarding REDAC recommendation 2019-03 #2, the Chair noted that there needs to be continued work on the international front. The meeting agreed to create a new recommendation as AEE is working with a reduced work force.

In summary, the meeting agreed to write recommendations on the following: 1-2 on noise, international efforts, public private partnerships, alt fuels and workforce. Chinita clarified that the Findings and Recommendations need to be completed by September 25.

The Chair asked for additional topics.

A Subcommittee member asked if the FAA could provide a clear statement on the future direction of AEDT to ensure the work remains focused.

A Subcommittee member suggested that younger NASA staff be invited to the REDAC E&E meetings to make them more knowledgeable on the issues of noise.

The Chair asked for a briefing on what is happening with water. The DFO agreed to invite Michel Hovan to come talk about both the ATR environment work as well as efforts relating to water.

Action items	Person responsible	Deadline
Provide a clear statement on the future direction of AEDT within a dedicated AEDT briefing	Mohammed Majeed and Joe DiPardo	March 18, 2020
Invite younger staff at NASA to sit in coming E&E Subcommittee meetings	Barb Esker and Jim Hileman	February 1, 2020
Provide a briefing from the Airport Technology Research portfolio on the environmental efforts,	Jim Hileman	March 18, 2020

Action items	Person responsible	Deadline
including those impacting water at airports (e.g., firefighting foams)		

Meeting Close-Out | Lead *Ian Redhead*

Ian thanked everyone for their participation. The dates for the summer 2020 meeting were not decided.

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

All of the recommendations from the March 2019 meeting were closed. All of the recommendations from the September 2018 meeting were left open.

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

March 17-18, 2020 in Washington DC

July 22-23, 2020 in Washington DC

Adjourned at 2:00 pm on Wednesday, September 11, 2019

FAA REDAC Subcommittee on Environment & Energy
Summer 2019 Meeting Agenda
GAMA 1400 K St. NW #801 Washington, DC 20005

Purpose:

- Develop strategic guidance for the FY2022 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

TELECONFERENCE / WEBEX Information

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

Tuesday, September 10, 2019

Time	Duration	Title	Presenter
8:00	0:30	Check-In	
8:30	0:05	Welcome	A. Grose
8:35	0:10	Chair opening statement & Introductions	I. Redhead
8:45	0:30	FAA Update (AEE and International Efforts)	K. Welsh
9:15	0:30	Industry Perspective	S. Alterman (TBC)
9:45	0:15	Budget Update	M. Gallivan (TBC)
10:00	0:15	Discussion	
10:15	0:15	Break	
10:30	0:30	FAA R&D Landscape Document - Report Out	S. Summer
11:00	0:15	Responses to REDAC Recommendations & Actions	J. Hileman
11:15	0:30	E&E Research Update	J. Hileman
11:45	0:15	Discussion	
12:00	1:00	Lunch	
13:00	0:45	ASCENT COE - Project Development Process and New Projects	J. Hileman
13:45	0:45	Briefing on Supersonic R&D Efforts w/ Discussion	TBD (Cointin, Scata, Liu, Windhoffer)
14:30	0:30	Briefing on AEE Efforts on Helicopters, UAS and UAM	D. Scata / E. Elmore
15:00	0:15	Break	
15:15	0:30	Briefing on Ops for Low Noise	C. Dorbian
15:45	0:30	Analysis & Tools Briefing - Focus on Trajectory Evaluation and Visualization Efforts	F. Grandi & S. Doyle
16:15	0:30	Briefing on AEDT Plans & Screening Tool Development	J. DiPardo, M. Majeed & S. Doyle
16:45	0:45	Subcommittee Discussion on Ideas for Findings & Recommendations	I. Redhead
17:30		End of Day-1	

Wednesday, September 11, 2019

Time	Duration	Title	Presenter
8:00	0:30	Check-in	
8:30	0:30	Briefing on Noise R&D Efforts	D. Scata
9:00	0:30	Briefing on Emissions R&D Efforts	R. Iovinelli
9:30	0:30	Briefing on Fuels (including fuels aspects of CORSIA)	N. Brown & D. Williams
10:00	0:15	Break	
10:15	0:30	Briefing on CLEEN Program	L. Ileri
10:45	0:45	Briefing from NASA	R. Wahls (TBC)
11:30	0:30	Priorities discussion	I. Redhead
12:00	0:45	Lunch	
12:45	1:00	Priorities discussion	I. Redhead
13:45	0:45	Subcommittee Discussion on Ideas for Findings & Recommendations	I. Redhead
14:30	0:30	Agree on Draft Action Items and Findings & Recommendations for the E&E Meeting	I. Redhead
15:00		End of Day-2	

Attendance

Day 1	Day 2
Ian Redhead	Ian Redhead
Jim Hileman	Jim Hileman
Veronica Bradley	Chris Dorbian (phone)
Gregg Fleming	Cecilia Shaw (phone)
Fabio Grandi	Veronica Bradley
Sandy Lancaster	Gregg Fleming
Jayant Sabnis	Fabio Grandi
Charles Etter	Sandy Lancaster
Andrew Murphy	Jayant Sabnis
Melinda Pagliarello	Charles Etter
David Hyde	Andrew Murphy
Juan Alonso	Melinda Pagliarello
Barb Esker	Steven Hamburg
Melvin Kosanchick	Steve Alterman
Joseph Zelina	Juan Alonso
Kevin Welsh	Barb Esker
Rebecca Cointin	Melvin Kosanchick
Maureen Molz	Joseph Zelina
Chinita Roundtree-Coleman	Kevin Welsh
Jay Dryer	Rebecca Cointin
Shelley Yak (phone)	Maureen Molz
Laszlo Windhoffer	Chinita Roundtree-Coleman
Sandy Liu	Jay Dryer
Alex Grose	Laszlo Windhoffer
Nathan Brown	Alex Grose
Dan Williams	David Hyde
Levent Ileri	Levent Ileri
Don Scata	Don Scata
Chris Dorbian	Maryalice Locke
Maryalice Locke	Katherine Preston
Katherine Preston	Eric Elmore
Eric Elmore	
Steve Alterman	
Mike Gallivan	
Cecilia Shaw (phone)	
Rangasayi Halthore (phone)	
Roxanne Moore (phone)	