

## Subcommittee on Environment and Energy | MINUTES

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**Meeting date & time** *August 6-7, 2015*

**Meeting location** *EDF, Washington D.C.*

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|--------------------|------------------------------------|
| <b>Purpose</b>     | E&E Subcommittee Guidance & Review |
| <b>Facilitator</b> | Jim Hileman, DFO                   |
| <b>Note taker</b>  | Jim Hileman                        |
| <b>Timekeeper</b>  | Jim Hileman                        |

### Minutes from Meeting

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

**Discussion:** Mahendra welcomed everyone and established the meeting logistics.

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**Presentation** *What's New in AEE* | **Presenter** *Lourdes Maurice*

**Discussion:** Lourdes discussed staffing within the office. Don Scata is now the Senior International Advisor for AEE. We have done fairly well in terms of recruiting and bringing people onboard. We have new hires and/or seeking people for all of our divisions. The primary focus of the office has been noise. We have been having many challenges throughout the country. With these challenges, we also have many new efforts that have started. As far as FAA goes, reauthorization is in people's minds as it expires September 30. There are other government-wide issues that are also coming at the end of the calendar year. We are a year out from the election and we are finding much political interest in noise and climate.

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**Presentation** *ICAO Update* | **Presenter** *Lourdes Maurice*

**Discussion:** We have many things ongoing in ICAO. There are two main issues of interest to the REDAC: the CO2 standard and global Market Based Measure.

We have been working on CO2 standard since it was first brought up in 2008. We expect that CAEP will make a decision on the CO2 standard in February 2016. R&D has been instrumental in making this happen. We are getting close to the answer but there are challenges remaining. We need to ensure that the stringency does provide benefit. We are seeking a standard that would apply to anything from a small Cessna to a large Airbus A380. We had a good Steering Group meeting. We have set up a process wherein the manufacturing states will be able to have a series of discussions to bridge our differences. We hope to have all of the elements in place to have an agreement in February 2016. With their endangerment finding, EPA have started the work to implement the standard at some point on or after 2020.

We have also been working on an offset system to achieve carbon neutral growth post 2020. We have been working to examine how to allocate obligations to different types of airlines. There are

various concepts being analyzed to facilitate this. We are also working on the Monitoring, Reporting and Verification (MRV) process. The COP meeting in Paris in December is influencing the discussions and there will likely be more movement after its completion. We see the global market based measure as being a gap filler and that technology, operations and alternative jet fuels are the primary means of addressing aviation CO2 emissions.

We continue to work on a PM standard. This has involved both the development of a measurement methodology and assembling the data from the measurements.

We have a new Secretary General of ICAO, who is from China.

The role of ICAO with regards to alternative fuels is to share best practices. More recently ICAO CAEP has been working on how to include alternative jet fuels within the GMBM. The group spent some time debating on whether or not to do the task but has more recently made progress. With the recent Steering Group meeting, the alternative fuels group will be examining sustainability. The group will first examine the scope of the sustainability aspects and then to conduct the work during the next CAEP cycle. The group is being rather conservative in their assessment of the carbon footprint of the fuels.

One Subcommittee member noted that it would be good for AEE to reach out to Tom Carpenter who is the DFO for the EPA's science board and see where things stand with the assessment of biogenic carbon.

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

**Discussion:** Noise is clearly the primary local issue politically. FAA needs to either be reauthorized later this year or to have an extension. Nothing will happen though before September 30. The industry is split on how to move forward on this. People are talking about restructuring the agency and not just reauthorizing. One way of doing this is to remove ATO and make it an independent entity that has stable funding and a board of directors. This is very similar to NavCanada. Such a change would have implications to safety and environment. There are several ideas regarding noise being considered for inclusion in reauthorization.

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#### **Presentation** *Budget Update* | **Presenter** *Mike Gallivan*

**Discussion:** Mike presented budget details on budget for FY16. There are mark ups from the House and Senate Subcommittee for the FAA budget. There is a new BLI for commercial space for commercial space in FY16 that was actually started in FY15.

The House and Senate moved funds around within the FY16 budgets and provided plus-ups to Unmanned Aerial Systems, Alternative Fuels for General Aviation, and Environment and Energy programs.

Mike presented the language from the House and Senate appropriation subcommittees from FY15 and FY16. There was positive language in these for Environment and Energy. There was also discussion around the positive language that was provided for the Environment and Energy programs in previous years.

The RE&D budget targets for FY17 through FY21 were presented as was the timeline for the development of the FY17 budget.

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

**Discussion:** Jim walked through the existing findings and recommendations from the past two meetings (August 2014 and March 2015). All of the recommendations were left open. Jim also walked through the action items from previous meetings. Those that are still open are copied below.

| Action items (from previous meetings)  | Person responsible | Deadline   |
|--|--------------------|------------|
| Present historical data on noise exposure – go back at least 10-15 years                     | Rebecca Cointin    | March 2016 |
| Create ASCENT fact sheet for sharing with community  | Jim Hileman        | March 2016 |
| Leverage the roadmapping efforts at NASA and FAA to update the White House National R&D Plan | Jim Hileman        | March 2016 |

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**Presentation AEE Research Update | Presenter Jim Hileman**

**Discussion:** Jim gave an overview of the Environment and Energy Research to refresh the Subcommittee on the research objectives. He also presented on the historical budget levels as well as the FY15 enacted budget, the FY16 Presidential budget, and the FY17 target. The budget section gave a breakout of the funding by research topic.

Jim walked the Subcommittee through handouts that present the FAA Environment and Energy Strategy and what is being done with regards to the environment. The Subcommittee was very supportive of the handouts and requested that these be distributed broadly. One member noted that it would be good to note that CLEEN and ASCENT are both cost-sharing programs. Jim requested that the Subcommittee provide feedback on the brochures to AEE.

Jim summarized the briefing by stating that noise, emissions and the need for a sustainable and secure energy supply remain critical issues facing the growth of aviation. He further noted that reduced funding limits our ability to develop solutions that could prevent environment from being a constraint on aviation growth.

There was much discussion about what was cut to meet the current budget levels and how AEE is leveraging the budget and efforts from other organizations. The Subcommittee discussed issues surrounding the decrease in F&E funding and how it is presenting challenges to the successful rollout of NextGen.

The Subcommittee requested that the FAA continue to work with EPA to increase their participation either at the meeting or via the phone.

| Action items (from previous meetings)     | Person responsible   | Deadline    |
|---|----------------------|-------------|
| Provide feedback on brochures to AEE      | Subcommittee Members | August 2015 |
| Distribute brochures broadly              | Jim Hileman          | March 2016  |
| Seek EPA participation at future meetings | Jim Hileman          | March 2016  |

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**Presentation Aircraft Tech – CLEEN Update and CLEEN II Status |**  
**Presenter Levent Ileri**

**Discussion** – Levent presented an update of progress in maturing technologies within the CLEEN program. He discussed the status of the CLEEN II Program.

There was a question regarding the cost of the technologies and the CO<sub>2</sub> benefit and how the efforts of CLEEN would compare to other measures for mitigating CO<sub>2</sub> emissions. It was noted that this would be difficult as such a calculation would require the estimation of full costs of the technology and the FAA only knows the R&D expenditures. The FAA will present the CLEEN technology assessment effort and the R&D costs at the next meeting.

The technologies under CLEEN are important to industry as they span a critical TRL gap. However, there is additional infrastructure that has to be quantified to get the costs as FAA efforts stop at TRL 7.

| Action items  | Person responsible | Deadline   |
|---|--------------------|------------|
| Provide fuel burn and CO <sub>2</sub> benefits of CLEEN technologies as well as the R&D costs that have been expended by the FAA. Seek input from industry on the full costs of these new technologies. | Levent Ileri       | March 2016 |

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

**Discussion:** Ralph presented on efforts to relating to the emissions research roadmap. He walked through areas of research in AEE. He presented on FY15 research efforts and plans for FY16/17.

He presented the draft emissions research roadmap with timelines for the research that we are currently considering. There was a discussion around the direction of the climate research and Ralph noted that AEE need to think about where to take our climate research in the future. There was also clarification provided on the time period over which guidance is updated.

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**Presentation CO<sub>2</sub> Standard Progress and Plans | Presenter Ralph Iovinelli**

**Discussion:** Ralph presented a timeline presenting the progression of the CO<sub>2</sub> standard development. He also presented what are the next steps that need to be addressed up to the CAEP/10 meeting in February 2016 as well as the efforts that will follow to ensure implementation. Ralph discussed the proposed endangerment finding from the EPA. A Subcommittee member noted that the proposed endangerment finding should go through the EPA Science Advisory Board (SAB) and he did not know if it had. The EPA member on the phone noted that the EPA SAB is a different office from the one that he represents and he did not know the answer.

| Action items   | Person responsible | Deadline   |
|--|--------------------|------------|
| In regards to expanded delegation / certification authority, confirm the ICAO Annex 16 and ETM | Ralph Iovinelli    | March 2016 |

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**Action items****Person responsible** **Deadline**

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language for CO2 standard will permit this.

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

**Discussion:** Becky presented research being done within the noise research roadmap and progress that has occurred in the national noise survey.

A member asked how an acceleration of the noise research work would reduce the pressure that is coming from communities. A long discussion ensued. In summary, the noise research roadmap is focused on understanding impacts and this is a relatively small part of the overall picture. We also need to have procedures to address any issues that are present. Of course, having these procedures also requires appropriate equipment in the aircraft. There was a discussion that ensued about whether the Subcommittee should have a recommendation to prioritize the development of ATM and/or operational concepts that will mitigate the noise impacts from PBN implementation.

The Subcommittee noted their support for leveraging existing health cohorts to examine the health impacts of noise. A member mentioned that recent developments in sensor technology could prove useful in reducing the expense of conducting the sleep study.

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**Discussion (no briefing) ATO Mission Support Services Community Involvement Program (ATO-AEE coordination)**

**Discussion:** Chris Sequeira (ATO) discussed the ATO Missions Support Services Community Involvement Program. Within this, FAA have developed a community involvement plan to improve the communication with communications about changes to procedures. A part of the overall effort is to capture lessons learned from past PBN implementation efforts. The initial focus of the effort is project-specific. There is not a lot to talk about at this point as this effort is just starting. The first step is to get a draft of the plan together and then it would be communicated with external stakeholders.

FAA AEE are also updating the community involvement manual. ATO are a part of this effort.

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

**Discussion:** Chris presented the operations research roadmap with a focus on ongoing efforts and our plans for FY15 through FY17 if funding were not an issue. He presented plans and results from AEE efforts on Cruise Altitude and Speed Optimization, Delayed Deceleration Approaches, Surface Congestion Management, and Continuous Climb Operations. He also discussed plans to examine UAS in FY15 as well as to stand up new work to explore steeper approaches.

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**Presentation Alternative Jet Fuels R&D Update | Presenter Nate Brown & Mohan Gupta**

**Discussion:** Nate gave an update on testing efforts to support ASTM approval of alternative jet fuels. He started by explaining the ASTM process and then outlining where various fuels are in terms of the approval process. Mohan followed this with results that are being produced by the National Jet Fuel Combustion Program as well as plans for the future direction of the program. Nate then gave a brief update on the direction of the ASCENT alternative jet fuel supply chain project. Nate finished the briefing by explaining recent coordination efforts regarding alternative jet fuels and he showed the large number of industry announcements regarding alternative jet fuels.

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| Action items  | Person responsible | Deadline   |
|---|--------------------|------------|
| Seek information from EPA on the work of the Science Advisory Board to account for biogenic carbon emissions from stationary sources as the feedstocks are the same regardless of end use, (i.e., bio-heat, bio-fuel, bio-electricity). | Jim Hileman        | March 2016 |

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**Presentation Modeling & Tools Update | Presenter Jim Hileman**

**Discussion:** Jim presented the broad outlines of the tools and analysis roadmap as well as efforts to develop analytical capabilities within AEE. He walked through efforts that will build on the release of the AEDT2b (which occurred on May 29, 2015). These include a number of ASCENT and ACRP projects as well as efforts being done by the AEDT development team of Volpe, Metron and ATAC. Jim also presented on several ASCENT projects that are examining rapid fleet-wide modeling, aircraft technology, alternative jet fuels and operations in a manner that will be integrated in the future.

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| Action items                                      | Person responsible | Deadline   |
|---|--------------------|------------|
| Provide details on the Tools and Analysis Roadmap | Jim Hileman        | March 2016 |

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**Presentation Overview of NASA Aeronautics | Presenter Jay Dryer**

**Discussion:** Jay gave an update on NASA Aeronautics efforts. He started with the six strategic thrusts that define NASA Aeronautics and how they relate to the Programs that comprise NASA Aeronautics. He gave an update on the FY16 budget as well as plans for how these funds would be used. He highlighted efforts within the Environmentally Responsible Aviation project and the efforts on supersonic flight.

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**Lead-in to Breakout Discussions | Lead Mahendra Joshi**

The Subcommittee divided into two subgroups that discussed the questions (listed below) that Jim presented during his overview briefing on Day 1:

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 report outs from the two subgroups are presented below.

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### **Subgroup 1 - Summary of Breakout Discussions | Lead *Jay Dryer***

#### **1. Are there R&D areas within the E&E Portfolio that should be lower / higher priority?**

So many projects with limited funding. Hard to have clear insight into each area to evaluate whether funding is adequate. No obvious changes needed to the balance, but it appears that all could benefit from increased budgets (especially in light of recent reductions). Given the resource level the portfolio is sound. We appreciate the ability to continue to evaluate the portfolio and feel the FAA has been transparent with the content. We are satisfied with changes we have seen from the AEE team (e.g. changing levels of tool funding).

Many areas of the portfolio are moving along well: e.g. PM, CO2, CLEEN/ CLEEN II, noise and tools. ASCENT has also been a success and good transition from PARTNER.

Good example of coordinating with other areas of the FAA (e.g. Airports support for noise surveys). It would be useful to have other FAA “sponsors” brief the committee on these activities.

Environmental concerns (especially noise) and failure to engage the community and airports are causing problems with the implementation of new operational procedures but overall the FAA is reducing funding to solve this problem. ATO, ANG, AEE, and ARP need to work together to develop solutions to facilitate the implementation of PBN or other operational procedures. Operational funding has essentially disappeared in this area, which is a concern because there are no FY16+ F&E funded projects.

Need to pay close attention to potential needs tied to results/ lessons learned from the noise survey because of the priority and sensitive nature.

2020 carbon neutral growth is important – ensure there is more focus on solution than fundamental science. This balance may be fine now especially considering that the FAA has the opportunity to leverage other foundational data (e.g. ACCESS 2) without having to pay to collect these data.

Need to be careful where we draw the line on FAA’s role on health impact research.

#### **2. Are there R&D areas that AEE is not examining that should be added to the E&E Portfolio?**

UAS noise is going to be a growing issue. We acknowledge that there is a small aspect of UAS noise research in the portfolio. Noise mechanisms and characteristics are different for smaller vehicles so tools and prediction methods may need to be re-evaluated. This is a growing area of public attention and may require quick reaction if UAS operations become more prevalent. It is clear that the FAA is starting to respond to the UAS need (increased budget) but not clear that any of these resources are being directed to understand and mitigate the potential environmental concerns.



Work needs to continue to understand how to ensure data analyses of large sets (“Big Data”) can guide clear policy recommendations. Could we pull in other expertise into COE work?

Sustainability of alternative fuels is a growing issue of concern. The focus is on environmental aspects.

Look at a deliberate process to help inform future calls for efforts such as CLEEN. For example, engage in a deliberate RFI process to engage the community (including industry and other government).

Operations related funding is needed to ensure that AEE operations research projects (e.g. PBN or DDA related) can continue that are important (see similar comment in 1 above).

### 3. What do you see coming on the horizon regarding E&E that may require future R&D efforts? (strategic input for 2018 and beyond program)

Many items being worked (e.g. noise) will continue to be evolving issues.

Ensure FAA remains engaged with the community to ensure priorities.

There will be increased opportunities leverage data generated from private entities and other countries. FAA needs to be in a position to do so.

Open area is climate effects of PM – currently not well understood. This may require additional investigation in the future but it is not higher priority than current portfolio. This could be true in other areas (e.g. contrail formation) where others may be leading the US in research. We need to have a position if we want to just let them lead or have a strong US position on the topic.

May be long term but supersonic transport, commercial space and/or hypersonic point to point may become an issue with regard to emissions in the stratosphere and noise.

Need to incorporate data driven guidance into operational decisions and tools.

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## Subgroup 2 - Summary of Breakout Discussions | Lead Jennifer Duke

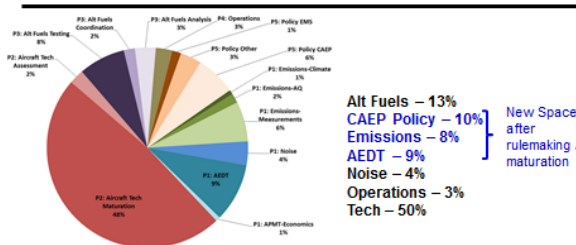
### Questions for breakout teams

Are there R&D areas within the E&D 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? (strategic input for 2018 and beyond program)

### CURRENT STATE



Portfolio has been aligned with the priorities this year and recent years past with good progress on initiatives. E&E organization has recently stepped up communication on progress with CLEEN fact sheets and new strategy brochure

Opportunity to focus future subcommittee report out sessions on breakdown of near terms vs long term task focus

Opportunity to document off ramp activities completed and articulate value they added toward "grand vision" roadmap outcomes

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## Are there R&D areas within the E&E Portfolio that should be lower / higher priority

Opportunity to lower funding priority in the following areas (2016/2017) after adoption of new CO2 standard and the maturation of PM emissions measurement procedures as less work will be required as they move toward sustaining efforts:

Policy / Emissions - 18% to ?

AEDT Model – 9% to ? - sustaining mode until future data gathering / enhanced modeling initiatives covered in questions 2/3 can take place

Place Higher priority to the following areas in support advancing current state and re-allocate funds to these

Operations – analysis studies to further quantify benefit and put procedures in place (noise focused)

Technology – is FAA and NASA investment enough for US commercial aviation advancement relative to China / EU investments. Suggest alignment and communication of the National E&E Technology Strategy with prioritization.

“What does it take” to be where we need in 2025 and beyond – quantify impact / investment for the above. A communication strategy must be developed.

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## ADDITIONS TO THE PORTFOLIO

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? (strategic input for 2018 and beyond program

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## Are there R&D areas that AEE is not examining that should be added to the E&E Portfolio

### \* CLEAN ACTIVITIES

Pursue a Collaboration vs Competition incentive in the future. Some examples:

Airframe and propulsion systems integration – optimize fuel / noise. Where do alternate configurations fit in?

Materials advancement - Light weight / High temperature / Additive (NASA for lower TRL, but need to accelerate into engine demos)

### NOISE

Campaign around Expectation Setting. Requires quantification of the impacts / new technology progress

Example: use of airport data to show progress - retiring to new / re-engine fleet transition

### ACRP – LEVERAGE EFFORTS WITH FAA E&E PROBLEM STATEMENTS

Propose statements of work aligned with FAA E&E. Examples are:

Enhanced Data gathering on noise and emissions impacts - including frequency of data collected (daily / seasonal / surrounding area microphones...)

Health impacts / epidemiology study – not necessarily FAA arena but further study may be required based on noise survey and data outcomes. Engage other organizations.

### Technology Certification Process – CO2 Similarity / Analysis

Some efforts in this area are being worked, but should broader initiatives be in play to support the CO2 standard. Example, when is analysis vs flight data acceptable for CO2 SAR metric when implementing changes and/or aircraft / engine upgrades after initial certification

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## What do you see coming on the horizon regarding E&E that may require future R&D efforts? (strategic input for 2018 and beyond program

\* UAS - FAA E&E will need to start getting involved on what this means for their future scope of work

Noise annoyance issues, complaints, and regulation outside of the airport environment

Life cycle environmental impacts – emissions / material waste (? FAA)

Part 36 certification – what is required?

### \* Big Data / Information Technology Integration Strategy

Real-time information-based control for improved operational efficiency and environmental impact of air vehicles (realtime weather, routing, etc... for reduced E&E impact)

Improvement in cost, benefit, and impact predictive models based on operational data gathered – achieve the next level of fidelity on data gathering. How to harvest all the information out there and the practicality? Is the statistical assessment best done by an outside source / company?

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## BACKGROUND INFORMATION

## LAST YEARS RECOMMENDATIONS

1. Low Emissions Aviation Alternative Fuels:
2. Advanced Technologies and Configuration Maturation
3. Technology Certification Process
4. Incorporation of “Growth / Diversification” Areas into NAS
5. Big Data / Information Technology Integration

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## Meeting Close-Out | Lead Mahendra Joshi

Mahendra agreed to create a draft of the Findings and Recommendations, circulate it, and then that will go to the main REDAC.

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

*All of the recommendations from the August 2014 and March 2015 meetings remain open.*

**Next Meeting – Date/Location/Agenda Items to be Included**

*March 2-3 in Washington DC*

**Adjourned at 3:00 pm on Wednesday, March 18, 2015**

**Attendance and meeting agenda are captured in the attached documents**