

Draft Minutes
Nuclear Energy Advisory Committee Meeting (NEAC)
February 16, 2023
Hilton Washington DC National Mall Hotel, Washington, DC

Committee Members Participating:

Richard Arnold	Maria Korsnick, Acting Chair
Stu Bresler III	William (Bill) Magwood, IV, Chair
Michael Ford	Kemal Pasamehmetoglu
J'Tia Hart	Raluca Scarlat
Edward Kee	Sojna Schmid

Committee Members Absent:

Lake Barrett

Other Participants:

Tracey Bishop, Deputy Assistant Secretary for Infrastructure, Office of Nuclear Energy, USDOE
Luke Branscum, Special Assistant, Office of Nuclear Energy, USDOE & Designated Federal Officer, NEAC
Alice Caponiti, Deputy Assistant Secretary for Reactor Fleet and Advanced Reactor Deployment, Office of Nuclear Energy, USDOE
Aleshia Duncan, Deputy Assistant Secretary for International Nuclear Energy Policy and Cooperation, Office of Nuclear Energy, USDOE
Mike Goff, Principal Deputy Assistant Secretary, Office of Nuclear Energy, USDOE
Sal Golub, Associate Deputy Assistant Secretary for Nuclear Fuel Cycle and Supply Chain, Office of Nuclear Energy, USDOE
Kathryn (Katy) Huff, Assistant Secretary, Office of Nuclear Energy, USDOE
Steven Katradis, NEAC Recording Secretary, Allegheny Science & Technology
John Krohn, Deputy Chief of Staff, Office of Nuclear Energy, USDOE
Krystal Milam, Special Assistant, Office of Nuclear Energy, USDOE & Designated Federal Officer, NEAC
Kimberly (Kim) Petry, Acting Deputy Assistant Secretary for Spent Fuel and Waste Disposition, Office of Nuclear Energy, USDOE
Robert Rova, Office of Nuclear Fuel Cycle and Supply Chain, Office of Nuclear Energy, USDOE and Alternate Designated Federal Officer, NEAC
Apple Seibert, Office of the Assistant General Counsel, USDOE
David Turk, Deputy Secretary, Office of Nuclear Energy, USDOE
Jennifer Wachter, NEAC Support Staff, Allegheny Science and Technology

Physical Room Attendees:

Jon Carmack, Senior Technical Advisor, Office of Nuclear Energy, USDOE
Frances Chandler, Senior Executive Assistant, USDOE
Tom Fanning, Senior Advisor, Office of Nuclear Energy, USDOE
Frank Goldner, Nuclear Engineer, Office of Nuclear Energy, USDOE
Jac Goodman, Associate Deputy Assistant Secretary, for International Nuclear Energy Policy and Cooperation, Office of Nuclear Energy, USDOE
Gale Hauck, Senior Advisor, Office of Nuclear Energy, USDOE
Cheryl Moss-Herman, Senior Policy Advisor, Office of Nuclear Energy, USDOE
Melinda Higgins, Director of STEM Programs, Office of Nuclear Energy, USDOE
Dennis Miotla, Chief Operating Officer, Office of Nuclear Energy, USDOE
Billy Valderrama, Senior Advisor, Office of Nuclear Energy, USDOE

Virtual Participants: About 75 participants attended the meeting

Morning Session

Before the meeting, **Apple Seibert, Attorney-Adviser** of the USDOE's Office of the Assistant General Counsel for Ethics and Personnel Law remotely (virtually) conducted the Committee's annual ethics briefing.

At 8:53 a.m., **Special Assistant, Luke Branscum** called for a quick unscheduled break to be taken.

At 9:03 a.m., **Luke Branscum** opened the morning session of the meeting thanking everyone for joining this meeting and after making some quick announcements, he turned the meeting over to **Assistant Secretary, Dr. Katy Huff**.

At 9:05 a.m., **Dr. Katy Huff** welcomed everyone and provided opening remarks. She praised how much of an esteemed group this is, referring to the NEAC members that were present at today's meeting. She thanked Luke and others in the organizational team who have put together this meeting. She primarily expressed gratitude to the members of this committee who she said were dedicating their time and energy and have who have come all the way here to the DOE Forrestal Building to help advise what the Office of Nuclear Energy (NE) should do. She said that it's critically important that NE gets NEAC's guidance on the topics of the day at all times. She stressed that NE is looking for more guidance from a sort of objective perspective and that all members represented a handful of perspectives, so there was lots of value in this much-needed guidance. She acknowledged that members had already been meeting as subcommittees and said she was looking forward to hearing about how that had been going and that she was looking forward to everyone's input in that context. She mentioned that today's agenda is full and will cover the issues that are currently on the table and she was definitely looking forward to hearing about them, and she stressed to everyone in the audience that the NEAC members, of course, are going to be sort of tasked with asking the necessary critical questions and aiming for goals that will help NE to reach its mission.

Katy then went on to say that she had time to provide a full update on the Office of Nuclear Energy later, and took the time to briefly say a couple of things about what had been happening at NE recently. She mentioned that NE hired a Principal Deputy Assistant Secretary Mike Goff and even did some reorganizing, which will be discussed in more detail very shortly.

Lastly, Katy said that the special guest had just arrived and she was very excited to have such a great advocate for the Office of Nuclear Energy with us today.

At 9:06 a.m., **Dr. Katy Huff** introduced the **Deputy Secretary, David Turk** saying that he has been a fantastic supporter of everything NE does and that he has a very busy schedule today, but he is here today to say just a few words of welcome to all of you. After welcoming him, she turned over the meeting to him.

At 9:07 a.m., **Deputy Secretary, David Turk**, thanked **Dr. Katy Huff**, and provided warm remarks by saying that it was good to see Bill and Maria and many other longtime friends for many years, on this shared journey and some new folks as well.

David said that he will say a few words and then he will be happy to answer any questions about the broader perspective and how nuclear fits into it in the few minutes that we've got together and hopefully that's a good scene-setter for your other discussions that you'll have today. One is just a big thank you for your partnership including on this particular advisory committee for those of us who are lucky enough to be in these positions. I'm sure Katie feels the same way and the rest of our team you have to approach these jobs and opportunities with some humility, like we think we're smart. I think Katie's super smart I think we've got a really smart NE team but especially when Congress gives you, the American people, all of you as taxpayers give us a bunch of money whether it's on the advanced reactors. Whether it's on the different credits that we're trying to coordinate with existing reactors, etc. You try to do your best, you try to do your homework, you try to hire up really smart people but I think a strength of our country is, we have that back and forth. We have that feedback. We have that guidance in a very candid direct kind of way. I know that a lot of other countries don't have that and I think they're going to struggle because they don't have that feedback mechanism. So, I think it's incumbent upon us to have a sense of humility and a sense of Washington D.C. doesn't always know best in fact rarely maybe knows best. We have smart people but we need that feedback.

He stated how much NE needs NEAC's guidance and that it is NE's responsibility to listen and be home about it. And I think for all of you, if I can put some responsibility on your shoulders please do speak up, as I know you will. Please do let us know if we're doing something that makes sense and let us know maybe even more importantly if we're doing something that seems a little screwy and doesn't seem to make sense. We may have reasons for why we're doing what we're doing and we hope we can be transparent about that, but we need that guidance on an ongoing basis that feedback on an ongoing basis so thank you for your time and energy and all being part of this shared journey together. I think this is especially important because I'm firmly of the opinion I think we probably all share this that we have just a golden opportunity when it comes to nuclear. Many of you have devoted your lives to this. Decades and decades of time there's been headwinds at various times from different quarters whether in the U.S. or other countries around the world. It doesn't mean that every country is instantly going to embrace nuclear. Our German colleagues are not quite there yet and maybe some others but I know in my discussions with members

of Congress, with others here in the U.S. and certainly internationally it feels like there's a real tailwind, and when you have a tailwind and when you have momentum you want to seize that. You want to do what you can to advance the cause as much as much as possible. So especially at this moment in time where we have that tailwind, we have a not only bipartisan consensus but I would say an increasing breadth and depth of support in that bipartisan consensus here in the U.S. It doesn't mean that there aren't issues we need to work through and really tackle those head on and transparent kind of way but with that Tailwind this shared partnership this shared effort going forward. So, as I look at the different subgroups that this group is focused on, more generally the international engagement, huge opportunities Katie spends an awful lot of her time. The secretary is very passionate about this I'm trying to help the cause as well the workforce of the future again huge priority for us. We spend an awful lot of time here nothing happens because we just have cool technology. It happens because we have passionate people who make choices, career choices, we hopefully have an opportunity with that momentum to get more people in the field, which is incredibly exciting. The spent nuclear fuel and doing it in a consent-based way that is not an easy thing to do that requires an awful lot of skill diplomacy and Leadership and people stepping up for the betterment of their communities and the betterment of what we're doing more generally and then infrastructure. We are lucky in the U.S. to have the infrastructure that we've invested in for years and years certainly our Idaho National Lab, but beyond as well on that front, so thanks for all the work and those four sub committees and groups as well. So let me just end it there, but happy to answer any and all questions and try to do it very candidly and transparently and again hopefully a scene-setter for all the good robust candid discussion today but even more importantly the ongoing guidance feedback from you all the partnership from you all going forward. So great to be with you all.

At 9:12 a.m., **Deputy Secretary, David Turk**, entertained questions from the NEAC members.

Korsnick: One of the things that we've been really working on from an international perspective is to elevate commercial nuclear conversations within the government to appreciate the geopolitical significance of a long-term relationship with nuclear. Do you see a positive trend or staying the same or a negative Trend in that area?

Turk: So, I see a positive trend. I would think and hope there would be an even more positive trend than there is. Like to me, it's mind-boggling that some countries around the world still want to have a nuclear relationship with Russia of one kind like that just seems nuts to me that given what Russia has done. Why would you want to rely on a country that has shown itself to use energy as a weapon and to not be a reliable partner. Even if they do what you wanted to do in year one or two or three like what's to say that's not going to happen in year five or six or seven. And I think it goes not just from the current Russian regime but if you're an autocracy and you're at the whims of whatever Leader's in charge and there's not the back and forth and kind of checks and balances like we have in our government. Like that would make me nervous about a relationship that's a generational relationship or as one of our Eastern European colleagues, put it on a trip very compellingly a hundred-year relationship when you think about what's going on. To me that applies not only on Russia but China as well. I think there is a momentum in our favor but I would think and hope that there'd be an even bigger momentum, and part of that is us just stepping up and making sure that we're really leaning in on the public discussion and the private sector and all of those kinds of things. The other set of conversations was, I think is interesting is with our French colleagues, with our other Allied colleagues who are democracies who are allies there's competition out there but is there a way to the pie is growing bigger and if we do our part, we can grow the pie even bigger. And I'm not saying that all of a sudden, the U.S. and France and South Korea, just "Kumbaya", will work together and what not on that front but it seems like there's at least an interesting set of opportunity for discussion there. But we need to seize the moment too. Like when you have this momentum, when you have people in the back of their heads or front of their heads asking questions like we need to really step up.

Scarlat: I think just to build on this point when we think about relationships in nuclear energy there is the technology supply and the fuel supply, but there's also the waste, and I'm curious how you see maybe the role of the U.S. and considering the options that we provide to small countries that have small fleets that may have small fleets that operate for a while and then don't operate anymore. There's obviously an energy security dimension into it, but there's also a safeguards security dimension to it and I'm wondering how you see that role.

Turk: Yes, absolutely and you guys all know we've not only got Katy and her team doing phenomenal work, but we have our NNSA colleagues as well included on the non-proliferation front and I feel that I have to say that I feel really good about the NE-NNSA cooperation. I've been at DOE a couple times now and I'm not sure it's always been as good as it is now. I think it's good at least it seems like it based on the conversations we have had on the waste issue and the safeguards issue and what we can do from different parts of the U.S. government working with our state department colleagues and others along those lines. I would like to think and hopefully you'll all get into this I'm sure you will today. I know it's one of the four subgroups like to think well we can get a plan in place and have those kinds of conversations with local communities. I know there's a whole process that's been established and Katie and her team have done a remarkable job in thinking that through, working that through. It'd be nice to make some real tangible progress on that as quickly as we can because then I think it increases our leverage or flexibility to think about or do the kinds of things along your lines. It is difficult, like trying to go up to the Hill and saying we're taking care of our own waste and issues is one thing. Going up to the Hill and saying we're going to take care

of somebody else's waste and that's going into the community, that's challenging. It's not to say that it shouldn't be a conversation we should have and talk about the benefits of that just as you were inferring or implying. But hopefully I think all of it is aided by making progress on this whole process.

Ford: Just with that in mind, do you see opportunities internationally to make it a teaming approach in some of those areas where you would have either the need for workforce development institutional capacity for regulatory support for storage of waste and take back fuel, etc. that may broaden the opportunity and not just make it a U.S. only approach that might make it easier for us to be more competitive internationally.

Turk: So, I think the short answer is absolutely, and I know I've spent a lot of time, our secretary spent a lot of time, our President spent a lot of time on the broader solidarity with the Europeans, built with Japan, with Australia with Korea, and if you would have told me, almost a year after the Russian invasion of Ukraine, that the democracies, Western World, whatever you want to call us, is as tight as we are now, not just on the war effort and supporting Ukraine, but on dealing with the energy implications of it. I think it's been a remarkably challenging year but it's been a year in which I've never seen the level of our cooperation with the Germans. The way it is there's always been tension and what not, they're the big dog in Europe and we're a big dog globally, and like that manifests itself in certain ways. The French relationship is always a fascinating one having lived in four or five years in Paris, built and certainly attest to that and obviously we had some challenges after August. But the latest conversations we've had with our French colleagues I think have been quite robust and quite candid. The outgoing Ambassador has been a real ally trying to work with us, trying to work with the French, when Prime Minister Macron or President Macron was here one of the key issues was nuclear cooperation and a real robust way that I'm not sure the level of specificity in what we're talking about was the same. It would have been a year ago, or two years ago, or three years ago, so it feels like there's real momentum in opening and certainly on the workforce training part. I think a lot of our colleagues in Eastern and Central Europe, if we can find a way to work together and maybe we don't work everywhere. We have friendly competition in some spaces and work together in other spaces like it helps them as well because they're certainly getting challenging signals coming from other folks. I will say, like not just in Central and Eastern Europe, but elsewhere. Like the fact that we are leading this energy security effort from Russia Ukraine and the fact we're doing it in a non-arrogant partnership kind of way, I think is resonating with a lot of countries and they see that, they want that, they want to be our partners. So again, there feels like there's that momentum, but again the devil's in the details, like the specifics and how we do that and actually putting some points on the board, I think really matters more than just talking in the abstract.

Hart: So, I just want to say thank you for getting DOE's story out there in our partnership internationally and especially in the past two or three years and the things that we've been doing and just encourage you all to continue sharing the story. Not only doing so at a high level, but getting out in the communities, because I think a lot of time when people think of the work that we do, they think it's scary but we're actually saving lives and I think that story needs to be told. So, thank you for that and please continue to do so and if you have any plans about that I'd love to hear about them.

Turk: Well, it's saving lives and saving the planet too. Like I think the reason we've got such depth and breadth of support for nuclear, is that people appreciate what it brings to the table currently and appreciate what it can bring to the table going forward. And especially for those of us, and I would think I'd include everybody in this room who care about the climate and the climate challenge that we face and want to not look back on our careers and say we screwed up and we did and do what we were supposed to do and our kids and grandkids are going to suffer from it. Like there's an appreciation that existing nuclear is a big deal and we need to treasure that, but there's also opportunities if we can step up going forward as well. But all the momentum and all the tailwind doesn't matter, if we're not like leaning in and we're really putting points on the board and doing some things, and I think we are doing that, then I feel really good about what we're trying to do. But again, this doesn't work without partnership and that ongoing discussion and ongoing efforts in the real world. This is all real-world stuff we're after. Good, all right. Well, thank you again for all the efforts and thank you in advance for being very candid in the discussions and going forward. Thank you very much!

Katy thanked Deputy Secretary David Turk and turned the meeting over to NEAC Chair, Bill Magwood.

At 9:22 a.m., **NEAC Chair, Bill Magwood** provided opening remarks, welcoming everyone to the second of this particular iteration of NEAC meetings. He apologized for not being able to attend the first meeting, since he was under the weather. He said he's actually also under the weather today, but that he was not contagious (jokingly as was the case before the last meeting) so, not to worry, and if for some reason his voice gave out, that Maria will again take over the meeting. He begun by first thanking Maria for jumping in to the breach in the previous meeting and doing such a fantastic job. (Jokingly, he commented that: "I'm sure that as this meeting goes on, people will wonder why don't they just give the microphone back to Maria.")

Bill started to say that it is a pleasure to finally be here and that he greatly appreciated the Deputy Secretary's opening comments. He said that he agreed with everything he had to say and that he thought that we are at a very important juncture in the whole history of nuclear energy technology and that he thought that a lot of our conversation today will hinge on that. He begun by thanking all of the committee members for being here and

joining in this conversation. He said that it took a lot of time and dedication to lift up from wherever each committee member was located around the country and transport themselves to Washington, DC for these conversations for a day. This is greatly appreciated by all in the USDOE and he is looking forward to the conversation today. He specifically thanked Katy for taking the initiative to get the NEAC back in operation, since it had been quite some time since this committee really has had any momentum. He said that it's really a pleasure to know that Katy is interested in hearing from a perspective outside of the USDOE and NE. He also thanked the people of the Office of Nuclear Energy for their presence and participation. He acknowledged a few familiar faces in the audience; Dennis and Bob and Tom and Aleshia and Frank. He commented that Frank is still here with us, that he is the longest serving employee in the nuclear business, that he started in the days of the Atomic Energy Commission (AEC) and that he must be about the only one left from the AEC that's still around. He remarked: "Frank, we need you and Alice of course and all these people were here when I was here and it's really a pleasure to see you still here. Still pulling the wagon and supporting the cause and moving forward. So much enthusiasm!"

When this advisor committee was created back at the turn of the century, it was a very different period. We had assembled an advisory committee for the first time for nuclear energy because, as I think we all know the unfortunate history, we didn't have a program at the time, there was no nuclear act at the time, and the advisory committee's mission at that time was to help us rebuild the program from scratch. So, we set a board to create a process that was led by the advisory committee in large respect, which at the time was chaired by Jim Duderstadt, former president of the University of Michigan. He was a fantastic chair for a couple of terms. The advisory committee's role at that time was to begin putting together plans for what we should be doing and how we should be doing it and it was an easier task, in some sense back then, because we weren't starting with anything. It was really all new and it was very much invaluable input and it was input that had tremendous credibility on the Hill with OMB and earlier around the country. They really helped us put the pieces together for the new nuclear energy program. Some of the people who were serving on the committee back then, I remember in particular there was a someone was presented to me as this young and upcoming Professor Corradini, who was chairing a group that helped us down-select where we should focus our energies on and so, we ended up focusing on very high temperature reactors. So, we put a lot of effort in that area. We had Burt Richter, Nobel Prize winner from Stanford who led a subgroup that was looking at advanced fuel cycles. And I think the work of that group is still relevant quite frankly, if you haven't seen it, you should look at it, because it's still relevant today. We had Tom Cochran from NRDC. We had former CEOs of utilities. We had professors and experts and lab people. So, we had assembled this group to help us rebuild the program that had collapsed and they put a lot of effort and time into it and it was very valuable as we went forward.

However, the challenge today is somewhat different. It's very clear that this committee comes together in a time when there's a lot going on. The program is now probably three to four times bigger than when I left which is frustrating in some sense, but its positive in another sense. And there's a tremendous raft of programs that are moving in different directions, which I think we're going to hear a bit about this morning. And so, the mission of the advisory committee isn't to tell DOE so much what it should be doing. The question is, are there more gaps, are there things that are not connecting. It's looking at what's happening and providing advice about how to optimize what is proceeding and maybe there will be some areas where we'll say, you aren't working on this and you really should be. And I'm sure that input will be appreciated, but it's much more a nuance role than in the past. And I recognize, as I listened to many of the subcommittee discussions, that some of the subcommittees quite frankly, were struggling with what are we supposed to tell these people, what are we supposed to do with this. And I recognize that some of this will be a work-in-progress and I don't expect that any of the subcommittees will report today and have all the answers. That's not the point, this is the beginning of the conversation, it's not the end of the conversation and I encourage all of the subcommittee chairs to think about what other expertise might be valuable that they can add, because we can add people to the subcommittees to supplement those of you on the advisory committee. Burt Richter for example was never a member of NEAC, he was always the subcommittee chair, but he refused to join NEAC because he didn't want to be a special government employee. And you can imagine why. The work that we're undertaking, I think is important, it comes at the right time. But quite frankly, this work will be harder than what the advisory committee of the past had to face and we're going to have to be a lot more sophisticated and understanding what NE is doing and what the government is doing overall and how we can provide advice. From my personal standpoint, I have to reflect on the fact that in the years that I've been in this business, I don't think it's even close, that there has never been a time like this. I just had a conversation last week with a senior representative from Sweden who was telling me about the steps they'll be taken in the Swedish government to pave the way for new nuclear, to remove a restriction that said, that Sweden will be 100% on renewables by a certain date and replace that language with 100% non-emitting. And that's not being done in isolation of other things that are happening to encourage nuclear. Conversations with Japan, a country that endured the Fukushima Daiichi accident and whose population completely turned against nuclear energy, not that long ago, is now re-embracing nuclear energy. Not just talking about extending the lives of their existing plants, they're having active conversations about new construction of large light-water reactors and small modular reactors. Europe, which

has basically been quite frankly a nuclear dead spot for decades, simply could not have a conversation about nuclear in Europe and really be get any resonance. That has completely changed. Countries across Europe are having this conversation. At the nuclear energy agency, I recently hosted a country that has never built nuclear in the past that wanted to talk about what should we be thinking about? How do we analyze this? How can you help us? Countries that would have never considered building nuclear in the past, are now looking at it very seriously and in part because the new technologies provide the promise of flexibility, high levels of safety that were unachievable before, and a path to reduce carbon significantly by 2050 while maintaining energy reliability and security, which is important to countries around the world. So, we are at a very important juncture. But I will tell you as someone who has been through the wars on multiple occasions, doesn't mean that we will get there. We could quite frankly blow this very easily. There are so many vulnerabilities. There are so many places this could go wrong. It is not all within the control of the of the U.S. government. Is not all in the control of the Office of Nuclear Energy. It's going to be a team effort. It's going to require the universities. It's going to require the laboratories. It's going to require the industry and it's going to require the federal government including its nuclear regulatory body, to get on board to make this happen. And any one of those parties quite frankly could derail where we're trying to go and I think that we have to recognize the vulnerability and the fragility of this, as we go forward. And also recognize that the time is very, very, short. Whatever we're doing today, if it doesn't come to fruition within the next 10 to 15 years, probably won't matter. And so, with that sobering thought, I'm looking forward to the conversation today. I'm looking forward to hearing what Katy and her team have been up to recently and to really focus on where we, as outside parties with outside perspectives, can contribute to this important journey. Thank you.

Chair, Bill Magwood, turned the meeting over to Katy to provide the latest information and news on the Office of Nuclear Energy.

At 9:34 a.m., **Dr. Katy Huff** thanked **Chair, Bill Magwood** and then proceeded to provide a brief update on what the Office of Nuclear Energy has been doing. Katy begun by stating: "That Bill said it right, I think the kind of critical thing to note is that we have this great opportunity and it is ours to lose."

I'm really excited. I think the updates that are the most important in the context of the Office of Nuclear Energy right now are the new people. I started to say this but I think the most important thing that's happened since our last meeting is Mike Goff, who is now the new Principal Deputy Assistant Secretary. There are a lot of decisions that I make and I think this is the one I am the most confident about from this last two years. Mike is going to be just a fantastic partner. He has already proven to be a fantastic partner. If you don't know him, well you are missing out. And soon you will know him. And there are a few others. So, in our NE space, around the fuel cycle, Andy Griffith has retired. Right now, Sal Golub is leading that office. But very soon John Carmack will be taking on Andy's role and will be the new Deputy Assistant Secretary for the fuel cycle area. We're really excited about that. I'm similarly confident that this is an excellent choice. Bob Boston in Idaho will be retiring and in a couple of weeks his replacement is Lance Lacroix, who has been his Deputy for the last year. We have an opening right now for our spent nuclear fuel office, but in the meantime, Kim Petry is the Acting Deputy Assistant Secretary and is leading that capability. And as you all have gotten used to Luke Branscum, historically the only other political appointee in this office, our special assistant and the government official for this FACA, is also leaving. And while he's not old enough to retire, he's going on with his career in Seattle. We couldn't keep him here but we've been so lucky to have him, but we're even luckier to have his replacement here, Miss Crystal Milam, who is sitting behind Maria. She'll be your new liaison.

And what's the most important to me is these sorts of human updates. There are a lot more on the list, but I think these are the ones that are sort of top of mind for me. We have new senior advisors like, Dr. Tom Fanning from Argonne and Gale Hauck from Oak Ridge, who are sort of serving in our front office. We are still without a Chief of Staff, I will note, but we continue to have the excellent support of John Krohn, back there as our Deputy Chief of Staff, who has been serving the duties of the chief of staff for quite a long time now. Other updates we're contemplating are what we need to grow as an organization and this will require a little bit of adjustment of where our organizational structure lies. And so, we've been talking internally in NE about reorganizing a little bit. We have a whole separate line item for university and externally driven research now and that budget line item may deserve its own office. Right now, it's under Alice Caponiti's excellent leadership in the NE-5 office, but things like that we're sort of considering whether there's a natural different place for them that can help people focus on the things that they have on their plates because everything, as Bill said has been growing. So, we're looking at what looks like as a sort of reorg in NE and while it's not complete or even really officially totally started, it's a topic of active conversation in the office. And so, we should be seeing that in the coming months.

On the international front, the deputy is very humble but he really is an excellent advocate on the international stage for us. His history in Paris at the IEA has really given him an opportunity to speak on our behalf and to engage with central-eastern European interests in the wake of this Russian invasion of Ukraine. And there is a great deal of interest not just in Central and Eastern Europe, but also, in various nations in Africa and Japan and France. And Deputy Secretary Duncan has now left the room, but in this moment over there next to Jac Goodman, that international team in NE-6, is doing a fantastic job making sure that we reach out to those folks. We're lucky to have

folks in NE-6 leading that charge. I had the opportunity this year to spend a full hour with French President Macron and Deputy Secretary Turk. We discussed the details of our France U.S. cooperation. If you will, there's cooperation and there's competition between us, but the French President would like us to cooperate more and I've been really lucky to have partners in this. So, we're excited looking forward in the International Space, to CERAWEEK in Houston, and the G7 Energy Ministerial in Japan, which will be at Hiroshima, the G20 Ministerial and GOA, the Global Clean Energy Action Forum (GCEAF) and the Mission Innovation Forum also in GOA, as well as COP28, ending the year in the UAE. All of these have an opportunity to be particularly nuclear-focused for various reasons. In particular, I would say, and this is a clever insight from our NE-6 team as well, that it's been about 70 years this year since the Atoms for Peace speech and as we think about the importance of that in the context of today's geopolitical dynamics, I think we have a real narrative for these meetings coming up. The importance of Safety and Security around nuclear power plants but the importance of their use for peaceful nuclear energy, is perhaps even more important than it was during that time.

So, I'll sort of leave you with just one final thought as we think about the risks facing the Office of Nuclear Energy. There are quite a lot, and I think we're in a great place for growth as Bill said, but one component is, if you're watching closely, the budget cycle. It is certainly the case that our annual budget this year was strangely constructed and so it's important to note that we certainly do expect a continuing resolution in this Congress. I would be a bit surprised, but pleased, if they do come up with a budget on time. But since we can fully expect a continuing resolution, I think the impacts of that are worth mentioning. Our current Omnibus that was passed has 1.47 billion dollars in our office regular appropriations and it was increased by a 300 million dollar infusion that was placed into the Ukraine supplemental. Those 300 million dollars are focused on our regular programs, it wasn't sort of Ukraine-focused. They sort of moved some of our regular programs into that Ukraine supplemental to reach the 1.77 billion that was consistent with previous years. So, this is all a long way for me to say that if we face a continuing resolution, which I fully expect we will, it is worth noting that this represents approximately a 300 million dollar decrease in the Office of Nuclear Energy's annual budget. So just something to be aware of as we sort of look into a future. I'm not saying that this is fatal, it is all up to Congress how to handle this, but I do think that it's worth us knowing and collectively recognizing the impacts that this may have on next year's appropriations for NE, because while everyone else will probably experience what feels like a stable continuing resolution, we will experience what feels like a bit of a cliff drop, because of the strange accounting in this year's Omnibus plus the Ukraine supplemental. I just want to keep everyone aware that this is the kind of thing that keeps me up at night. And I think we're sort of working with Congress on solutions, but it's worth everyone knowing that this is the thing that's at the front of my mind. Okay, I will stop talking and turn it over to Tracey Bishop.

Luke then asked Tracey to join everyone on the table, in the speaker's chair.

Chair, Bill Magwood opened the meeting to questions for Katy.

Korsnick: I had one question, but Katy, if you don't want to go into this now, and maybe want to address it later let me just start there. I was just interested in the insight that you may have about that 300 million, because it did leave the department exposed to a continuing resolution and there's a high likelihood of a continuing resolution. So, I guess I'm just trying to appreciate maybe the intention.

Huff: Yes, this is gravely unhelpful for me to say it, but I really don't have a great deal of transparency into the negotiations that resulted in that and while I've heard a number of different narratives of how that came to be on the Hill, my understanding is that there was a lot of chaotic negotiation that night and the intent was to make sure that NE was fully funded and the way that they got to it was strange. But, Congress is fully aware of the position that puts our office in and I do think that we have allies in Congress if there's an opportunity to fix it. But I do think it's worth everyone just being aware that this is what's on the table. Thank you for that, but yes, I wish I knew.

Scarlat: You mentioned the growth and the reorganization. If the budget is dropping or staying steady then what is the scale of the growth that you're envisioning and what is driving that?

Huff: So, the growth that I'm sort of referring to is over the last 10 years or so, we've had approximately the same shape of organization. But it changed dramatically in the amount of budget. So, I'm talking about a longer term growth that we have already seen and we haven't reorganized to sort of reflect that.

Scarlat: I see.

Huff: Yes, right now for example, like the whole university program is in Alice's program which is already possibly, our most active research and development program. So, it's quite a lot for her team to sort of have their arms around this at all times. And it's quite cross-cutting and whatnot, so it's just a good example that there's a handful of things that over time and for historic reasons, have ended up in one office or another. But this work, may have a more natural home in a different office and so we're sort of cleaning up the edges of our organization and potentially making a more cross-cutting focus in a particular organization rather than sort of spreading it out. Thanks for the question.

Magwood: How many people?

Huff: About 260 people. Dennis, how many people are in that email?

Miotla: That's correct.

Huff: Yes, about 260 if you include the DOE.

Magwood: Yes, Okay. I don't see any more questions. Let me just ask a quick one because I know that a couple of the subcommittees had raised this issue and we're not talking about specifically, so I wanted to give you a chance to address this. Where do you see things going at this stage with the HALEU and really the LEU issue, overall. Can you give us your idea of where things are moving in that area?

Huff: Yes, it's pretty dynamic. Right now, in the department, we're focused on getting additional funding someday soon, for our total uranium strategy which is a collaborative effort between NE and NNSA to make sure that we have enrichment capability in the United States and amongst our allies to support a non-Russian solution to not just our existing fleet, but HALEU and the future fleet. We have some dollars coming out in a HALEU request for proposals that was supported by the Inflation Reduction Act, but in order to fund sort of the longest tail of that program, we would rely on annual appropriations in the future or an infusion of dollars to sort of make it the most robust it can over the course of the coming 10 years. There is currently no funding for expansion of ordinary low enriched uranium but the HALEU program itself will encourage the standing up of new capacity for enrichment up to five percent because you have to enrich up to five percent before you get to 20 percent. So, we are including that incentive in the HALEU RFP itself, but it will require additional funding. You may have heard that there is, and the Deputy was asked about this in his most recent hearing in front of the Hill, that there's interest in what it looks like to move the Civil Nuclear Credit funding into a more low-enriched uranium funding. Our position in DOE is that the industry deserves both and it's important enough that Congress should consider funding both. So that's where we stand. Thanks.

Chair, Bill Magwood then asked if there were any more questions for Katy, and turned over the meeting to the next presenter, **Deputy Assistant Secretary, Tracey Bishop**.

At 9:47 a.m., **Deputy Assistant Secretary, Tracey Bishop** provided an overview on the "Nuclear Energy Infrastructure".

Tracey begun her presentation by saying that she wanted to provide a short overview of how infrastructure supports the overall mission of NE. NE's approach with infrastructure is to leverage nuclear research and development (R&D) infrastructure to support its missions and that includes a wide range of conducting fundamental R&D that's conducted at universities with international partners and with industry facilities. Our applied R&D, which is much more complex and includes high-hazard work and access to special nuclear materials, is typically conducted at DOE-owned facilities.

NE is very privileged to be the DOE-designated program responsible for maintaining and operating nuclear R&D capabilities at the Idaho National Laboratory (INL). Those capabilities are important not only for NE but for the department and our many federal partners that receive direct Congressional appropriations to support approximately 85 key nuclear facilities (key irradiation, examination and demonstration capabilities) that are resident at INL. Our appropriations really reflect the investments necessary to maintain and refurbish the aging infrastructure that is not only in high demand by this office with our growing R&D capabilities but also within the department and also with some of our other Federal partners.

The way we manage and ensure that our infrastructure is aligned is that we closely link our investments in those facilities to what our R&D customers need. So we utilize our existing facilities to the maximum extent we can and then only focus on expanding or adding new construction as a last option (to close identified gaps), because we do recognize that it's a balance that to have infrastructure, the importance is the outcome of the infrastructure and that's the research and the demonstrations that result from having those capabilities.

And just to give you some perspective, our main infrastructure direct programs that support INL are reflected in orange and green (referring to the slide chart) and that's our facilities management and our site-wide safeguards and security programs and as you can see and as Dr. Huff mentioned, our total NE appropriations have significantly grown over the last several years while our base in-core infrastructure have remained relatively constant. Not only does the program have direct funds but our R&D programs also utilize other facilities and capabilities across the DOE complex and fund work that's resident at those laboratories within their R&D programs.

And just briefly if you haven't been to INL, it is a very large complex roughly the size of the State of Rhode Island. Not only do we fund the core nuclear facilities and capabilities there, but there's also several other infrastructure areas at this lab. We have roads, we have a power substation, lots of other capabilities and other federal agencies that have complexes within INL. The replacement plant value for the entire infrastructure is roughly 3.2 billion dollars and it's over 3 million square feet of capabilities. So, it's a very large complex that we help maintain on behalf of the nation.

Then just briefly what are some of those major capabilities? We do have some key major radiation capabilities for the country primarily the advanced test reactor which is a 250 MW light water thermal test reactor. It's one of the most versatile test reactors in the world that has the capability to adjust its conditions to accommodate various environments for not only fuels, but also materials. It also includes a smaller mock-up called the ATR critical reactor that allows experimenters to do some preliminary designs for their experiments before putting them into the larger reactor. We also have the transient reactor test facility this is 120 KW city-state air-cooled thermal spectrum

reactor that conducts testing of nuclear fuels and materials. Both of these reactors were built in the 1960s and have been refurbished over the years with the treatment facility being stood back-up in the mid-2010s to support the growing R&D needs that stemmed from the Fukushima event. Then we also have a small trigger reactor called the neutron radiography reactor that provides non-destructive capability for post-irradiation examinations.

And coupled with our irradiation capabilities, we also have materials and fuels capability to support examination post-irradiation that includes a series of hot cells, analytical chemistry capabilities, fuel fabrication, waste treatment and management, and material characterization, as well as radio chemistry capabilities. Most of those capabilities are resident at the materials and fuels complex at INL. (Bishop pointed to a picture of the hot fuels examination facility hot cell.) This is one of the largest hot cells in the world. And one of our new capabilities that we're bringing online and is about 70 percent complete, is our sample preparation laboratory which is currently in progress.

And our infrastructure evolution continues. NE was responsible for INL and assumed that responsibility in 2005 and has spent the last 15 years standing that capability up to support the current R&D needs, as we move forward into the next few fiscal years. From FY24 to FY27, we're really focusing on shifting our look ahead to identifying the next series of major capability gaps that are needed to enable the growing R&D mission needs. We will continue to modernize our infrastructure capabilities so that we can support advanced reactor demonstrations, new fuel development in post-irradiation examination, as well as investing in the basic infrastructure such as power, water, heating, and cooling, to meet clean energy and sustainability goals. And looking ahead to the next 20 years, I think it's an exciting time to look at what is going to be needed going forward. As I mentioned, most of our facilities are still in the 30 to 40 years or greater and as we move forward in supporting commercial nuclear power, what other capabilities are going to be needed. And so, focusing on things like what irradiation capabilities or transient testing capabilities may be needed to support that next wave of research or fuels activities as well. And then looking at how we're standing up and creating those test beds to support demonstration of those new and advanced reactors.

At 9:54 am, **Luke Branscum** suggested that the scheduled break be skipped (since an earlier unscheduled break had been taken earlier), and that the committee launch into the discussion and raise questions to Tracey.

At 9:55 am, the NEAC members began to raise their questions to **Deputy Assistant Secretary, Tracey Bishop**.

Ford: Thanked Bishop for her presentation and raised some questions. In your budget slide you showed fairly flat funding and obviously I understand the dip in the overall funding, based on what Katy talked about, but does that capture all the work that's going on in infrastructure in terms of work at Idaho? I think there was, if I remember, work that NRIC was funded to do to prepare certain facilities at Idaho and certainly there's other work around the lab complex that supports the development, so I just want to be clear what you showed is really only just for Idaho, in terms of the budget.

Bishop: Yes. So, within that budget slide in the blue area, NRIC is part of the NE R&D appropriations. And so, our R&D programs do utilize other capabilities that are not resident at Idaho because we do want to make sure that we're leveraging the Department's capabilities rather than building duplication because it is very expensive and costly to maintain those capabilities. So, our R&D test beds that are being funded in NRIC are reflected in the blue area of the total appropriations, under Alice's program. And any other work that the fuels program or the test bed programs are funding at other sites, they are treated as a tenant. Other programs within the department, are responsible for funding and ensuring that those base infrastructure is funded for their programs or their labs that are under their purview and any programs would come in and pay for the use of those facilities based on the charging allocation that's set by each laboratory.

Ford: So, do you have a good sense of roll-up of those programs across the complex to see that the utilization rate versus the investment that's going into them is balanced and is really targeting what the industry needs in a way that ensures that there's actual use of those things? The only thing I saw was whether or not there's actually going to be some use, for example, of the facilities that have been modified by NRIC at Idaho, because I think some of the other companies decide to go off and build elsewhere. So I was just curious how we're balancing that investment in Idaho infrastructure and elsewhere with what the industry is actually doing.

Bishop: Well, how we track infrastructure within the department is we have databases that all the programs get together and provide input to that track utilization and looks at things like how much maintenance and repair the foreign maintenance that are growing in those capabilities. And we look at that corporately to assess where those utilization rates are and what their capabilities are being over utilized or underutilized. And we do factor that in to looking ahead and determining whether or not there's a capability that's being underutilized, whether that's because it's not being maintained properly or it's just a capability that people are no longer interested in and they're shifting. We've really focused out at Idaho in particular looking at utilization rates and so many of our facilities are at that 90 plus percent utilization and that's when we start looking at those gaps. We go through and assess whether or not we start seeing choke holds within the flow of work and go in and try to fix, to modernize, to improve, that throughput and capacity, to align to what the customer demand is for those areas.

Ford: Thanks.

Magwood: Any other questions?

Scarlat: May be possible for the committee to review those reports on utilization of facilities and how the utilization is distributed across industry users versus lab users? Is that public information?

Bishop: I think we can get that information regarding utilization. I can look into seeing how we can do that with Idaho. I'm not sure how some of the other programs who are responsible for other infrastructure across DOE tracks that but I can look and see what we can do for what's within our purview, within Idaho.

Scarlat: The GAIN program is part of this funding that you list here or is that separately funded?

Bishop: GAIN would be within the blue area (on the budget slide).

Scarlat: Okay, and from the GAIN program is that a good way to get input on what are the gaps in capability or what are the big demands that industry would like to see more of for infrastructure?

Bishop: I think with GAIN, I'm going to reach out to Alice, if she is here because GAIN is under her.

Caponiti: Yes. Can you please repeat that question,

Scarlat: So, I was wondering what is the input from industry that has been received through GAIN for what are the big needs in infrastructure changes or in access to infrastructure?

Caponiti: Yes. I think that's answered not just with GAIN but also with our National Reactor Innovation Center (NRIC), which is also led by Idaho National Laboratory, but is a multi-laboratory resource. NRIC has a lot of interactions with industry in understanding their needs. So, some of our investments through NRIC are standing up infrastructure capabilities that address those needs that developers have, that they couldn't do on their own. So, examples are the test beds that we've mentioned, but also some capabilities of being able to perform measurements with the radiated salts that are important for molten salt reactor developers. Some capabilities of being able to test sodium fast reactor components in a prototypic environment. We have a facility at Argonne that's supported through NRIC, so NRIC's role is to have that pulse of industry on those kinds of capabilities that can be supported through NRIC and similarly, GAIN provides vouchers that provide direct access to industry to be able to tap into the expertise and capabilities at labs to address some specific challenges with moving their designs forward.

Scarlat: How does the U.S. compete internationally with facilities that vendors can use internationally?

Caponiti: I say one bad answer that question is, I think that a lot of our international partners look longingly to the U.S. and the programs that we've stood up because I think we're a bit unique in standing out in that regard. We do have a lot of conversations through international partnerships, like Generation IV International Forum (GIF) of how we can better use existing capabilities, whether it's in the United States or some capabilities with our GIF partners to get that better capacity use of unique infrastructure that's available. So that's an ongoing dialogue within that forum and with our bilateral interactions as well.

Scarlat: Thank you.

Magwood: I'll also note that there's this FIDES (Framework for Irradiation Experiments) Program of course which the NEA is sponsoring that coordinates research across a large number of international facilities including ATR and TREAT and other facilities in the U.S. and facilities in France, Europe and Japan. So there is actually not so much a competition among these facilities, it's really a question of what capabilities are present in order to do the experiments people want to do. And the real issue I think is we don't really have all the facilities we need to do all the experiments we like to do. And that's the bigger challenge and that's why the VTR project was getting started among other things and that's still a bit of a gap out there.

At 10:03 a.m., Bill Magwood asked if there were any other questions for Tracey? Actually, Bill said that he had a question for Tracey.

Magwood: The ATR is a fantastic facility but it's getting a little old now. What's your view of where the facility is headed long term? Is there a discussion about building an ATR2 or something like that? What's your understanding of the current thinking?

Caponiti: We're in a lot of discussions right now with our users, with ATR to look at what is it going to take. Right now, we're committed to maintaining ATR to and through the 2040s, but what's the next phase from the 2040s and beyond to the 2080s? Are there areas we're starting to look into and understand initially internally? What's the capability gap? What do we need going forward and then once we understand kind of from a federal perspective, where we are and what we need, then I think that that discussion can get broader into other areas. But we are actively looking at that currently, right now, since we are committed to maintaining ATR to 2040. We do have a plant health investment strategy there that's going through and identifying key subsystems and within the reactor to continue to refurbish that and maintain the capability to support not only the Office of Nuclear Energy, but our customers with the Naval reactors and then also industry, universities and other federal agencies.

Goff: Also to note, they just finished an ATR core internal changeout. They do that every five to ten years and this was just completed this past year. So, they are continuing to upgrade it and keep it with the internals or could last for an extremely long period of time.

Bishop: And we were also fortunate to receive IRA funding last fall of 150 million dollars that was applied to the Idaho National Laboratory. Approximately 85 million of that was targeted for replacement of key ATR systems such as underground piping, heat exchangers, and some of those key infrastructure components that are necessary to maintain the reactor going forward. As Mike mentioned, when we did go through and complete the core internal

changeout, and we also did some very intense inspections. We called some of the companies that support commercial industry, and they installed cameras down into the ATR to look at some of the areas that haven't been really examined since the reactor was built in the early 60s, in order to verify the age and the integrity of various components. Got a lot of good feedback that things look pretty good and so we're confident that we'll be able to continue to maintain the reactor into the 2040 time frame with continued investments.

Magwood: So just note that if the idea is that 2040 might be the limit, I'm not saying that it is, but it might be, then if a replacement is needed, you would probably need to have that pretty well figured out by about 2030.

Bishop: Yes.

Magwood: Actually, you would probably be needing to start construction by about 2030 and you're now preparing the Fiscal 2024 budget, correct? So, in the near future, you're going to have to submit multiple budgets to include this work? So, you really have to start thinking about that pretty seriously.

Bishop: Yes.

At 10:07 a.m., Bill Magwood asked if there were any other questions for Tracey. He commented that Luke suggested that we skip the break and asked the NEAC members as to whether or not to take the scheduled break, but the consensus was to continue on and start the discussion on infrastructure.

At 10:08 a.m., **NEAC Subcommittee Member, Stu Bressler** thanked **Chair, Bill Magwood** and begun the discussion on "Nuclear Energy Infrastructure". Good morning, everyone. Let me start out by saying that from a personal perspective I really have no choice but to take Deputy Secretary Turk's advice and approach this with a tremendous amount of humility because I am brand new to this entire area. So, appreciate everybody's patience with me. As I learned I also had a chance to read through the international subcommittee's update and I will say comparatively speaking I think we've gotten off to a bit of a slow start with the infrastructure subcommittee. We have managed to have one meeting where we did get some introductory presentations on the national labs similar to what you received this morning. So obviously they were very helpful, but I think infrastructure can mean a lot of things and I think at least speaking for me personally. I don't want to speak for my subcommittee members per se, but I think we would benefit from a bit of focus and a bit maybe of direction from the larger committee as to where we should kind of concentrate our efforts. Whether it be investigation or the kinds of recommendations that would be helpful for the larger committee and for the also nuclear energy. So I was kind of approaching the discussion this morning from that vein to see if we couldn't get maybe some help from the larger committee to help us again focus our efforts so we can come back with a bit more progress by the time we all get together again. So I'm going to stop my introductory comments right there Bill and really open it up for discussion with the rest of the committee, unless my fellow subcommittee members have comments to start us out.

Magwood: Anyone from the subcommittee want to add anything to that? Okay, how about other members of the committee, any thoughts?

Ford: Yes. I would just add, and it kind of dovetails with the comments that I had asked Tracey about, is what our strategy is for infrastructure for NE now and having a good understanding of that collectively across the complex and what we're doing to engage with industry? Having a better understanding of that holistically would be beneficial from my perspective. I can see a lot of the bits and pieces that are going on and some of the demand signals out there. VTR has always been out there, but it never really kind of fulfilled and has continued to be under at risk, most of the time in the budget. So, the question is where would the infrastructure, pathways may be better in terms of dollars, be better served? Are we doing the right thing with all the money, are we really getting the value for the dollar? I think we modified a couple of facilities added out of Idaho, assuming that there would be some prototypes put in those facilities. Do we have plans for that? Is the industry actually taking advantage of that? My sense is no, right now. And so then, the question is what can we do to ensure that we've got a really good understanding of what the industry needs and that the labs are doing was is necessary to support that or looking for opportunities to team with industry in a different way rather, than just making stuff available at one of the national lab sites? So that's really where I think we could use some help in understanding what the organization is doing right now, so that we could then maybe take a look at it holistically and help you look at that in a different way. Maybe look at other alternatives. That's where I think this group could have the most benefit right now, that is helping to understand what the future profile might help look like.

Magwood: I think that's a good thought. One place to start might be, we were talking about, indirectly having insights to what industry needs. Maybe one thing the subcommittee might want to do is to really have a detailed discussion with NRIC and hear what's been discussed and what's going on and what the future might hold. And quite frankly, you might also want to just start talking to some of the industry organizations that are really leading the charge, like X-energy and TerraPower and a few others like that, to determine if your needs are being met or where the gaps are. And I think that would be a way of getting some better insights.

Ford: Can I share one last thought? Being somebody who's at the national lab but one that focuses on a different kind of nuclear energy in fusion, there are a lot of opportunities I'm starting to look at, where we can have teaming approaches across offices in DOE and so, for example, looking at the metal lab at Argonne for an opportunity to work in liquid metals for fusion. They used to do that at Argonne they no longer do. They closed

down their lithium loop, but they still have a significant loop working in sodium. And so there they have a large facility, no need to rebuild that at Princeton, for example, so what things can be done to increase capability across office and then take advantage of having some of that funding balanced across DOE, not just be focused only on one area. We did the same thing with their materials test at Argonne, because there's obviously a lot of material issues in fusion. So, these are the things where I think it would be also beneficial to look at in the physical infrastructure side. Where do I already have capability in areas where there's cross office need.

Goff: I was going to engrave your comment Bill, it might be good to have a more detailed discussion from NRIC and GAIN for this because I think if they're conveying the impression those test beds at those facilities aren't being utilized, then I think that message hasn't been conveyed well. There's like on NRIC, we're having a battle between someone who wants to use that facility immediately and it's like getting the facilities stood up, like an exact time that MCRE will be going into the LOTUS test bed. So, it has a dedicated person who's going in there for first use. And its neck and neck, is the reactor ready first the facility ready first. So, they're really trying to get that done so they're not holding up. Similarly, there's a number of people looking at the DOME test bed utilization as well, as far as those two test beds. And in fact, I think another person wants to use their test bed outside as well that they're adding that, in fact the military is looking at doing that, so there are a lot of vendors that are lining up to use those facilities already. So, if that hasn't been conveyed well, I think you having a presentation to look at the difference, as much as they can talk about what different companies are coming in there and doing stuff. Talk about what's being used for going into those. So yes, I think that would be a good thing there as well.

Magwood: I think that's a really good direction to take. In fact, I'll add a mission to the FIDES Program that the NEA is facilitating. That's another briefing we could arrange if you like because it would give you a perspective of what people are doing kind of around the world and how the facilities are being used by different players in different countries. Kemal did you want to add anything to that conversation?

Pasamehmetoglu: As Bill said, that is a program that was born out of necessity when they shut down the test reactor in Norway and then people realized that, well now, we don't have any capability in one place where we can do those kinds of experiments. So, it started the thinking, okay, so now maybe we don't have it in one place but we may have it in multiple places. So different experiments can be done in different places and in less than a year. In the beginning I was quite skeptical that we were going to get there that quickly, but in less than a year the international community organized and they defined the experiments they needed, and they found the right places to do those kinds of experiments. So that meant we didn't have to build a new reactor or just to duplicate what Norway was doing, but we could start using the reactors that already existed and just do it in different places. So that's another example of what we are discussing. I know a lot of people don't agree with me, but I think they understand there's a crisis in the nuclear community. We find a solution to it so there's an opportunity in every crisis and FIDES was one of those.

Magwood: Yes. Never let a good crisis go to waste.

Branscum: Ken Keller from on the online web says that, FIDES stands for Framework for Irradiation Experiments.

Magwood: Thank you.

Goff: Now I know one other thing as well. So, if we talk about NRIC and GAIN have a discussion, having the national scientific user facility included in that as well, because they've actually done a pretty good job at it. It was focused on first stood up at ATR utilization but they quickly went out and said the MIT reactor, the Missouri reactor and then they started looking in Europe as well. So, they've done actually a good job going out and finding where irradiations need to occur. Where do the post-irradiation exams need to occur so you're actually getting more optimum utilization across those reactors especially the high-performance reactors out there as well, so their prop and they did a lot of stuff on the international side trying to see which international facilities could be used as well. So, including them in the discussion on utilization facilities is probably a good addition.

Pasamehmetoglu: The Belgian test reactor is part of that user facility. Another comment I wanted to make. I am not supposed to comment and for full disclosure on the Idaho infrastructure stuff because of the conflict of interest, but my comment has nothing to do with the idle infrastructure. One of the things is that we found out with GAIN and NRIC that this industry needs a discussion to be a two-way communication. When I was doing GAIN, when industry needs something, they need it right there and then and these projects are 10 years down the road. So when the industry says they need it, we are too late. So that needs to be kept in mind. And I think this may be a very good charter for the subcommittees too, because let's gather what industry needs but let's also start looking forward to what is going to be needed in the future.

Bresler: Glad that you said that Kemal, because one of the questions that was formulating in my head with respect to what will be most useful, is there a time frame on which our discussion should be focused? Because in the near term things may already be laid out and budgeted, so, feedback isn't all that helpful, but looking too far in the future isn't really helpful either. So, do you all have a sort of a time frame in mind that we should be thinking about as we gather input that we can provide back to the committee and to NE?

Magwood: There is an easy answer to that question.

Huff: Go ahead, I want to hear your answer.

Bresler: It's all positive feedback and I'm just trying to figure out what kind of mindset we should be adopting that's all.

Magwood: The reality is that, Kemal kind of answered it, it's now, it's immediately and it certainly is within the next five years. It's really immediate, it's not 20 years from now and that's the struggle because it takes a long time to put these things together and we need the capabilities now and in fact there's clearly work that if you had the right facilities, you would do it today. But you don't, so you can't.

Korsnick: Is there some Nexus here that we could, we talked earlier about the international interest and we have a lot of allies that are interested in nuclear this is sort of like a game-changing time for nuclear, it's not this sort of incremental growth, to me it's like sort of a real reshaping. So is there an element of getting that international interest in engagement on investing in our infrastructure because at the end of the day we can help everybody. There might be some infrastructure that other people aren't allowed to play with but there might be some infrastructure that they can play with. I don't know how you would sort of slice and dice that but because it's now, because it's needed yesterday, because we need to make progress just feels like we need to think about this one different.

Magwood: Certainly, you've had those conversations. I don't know, you can't talk to this or I guess because you would probably know what was talked about in the case of one particular project. But I can tell you that there certainly has been conversations about that kind of cooperation, but it really hasn't gone that far. In my view it could probably go a lot further. One thing I will tell you just from my personal conversations with people is that there is a little bit of a trust factor. I think that there are some countries that would dive into a project but they don't trust that the U.S. will stay the course on it and so they need to have some kind of way of guaranteeing that this will actually happen and they'll get to full access and everything will go according to plan. When we recognize that we're always sort of at the mercy of the waxing and waning of Congress and the appropriations process, there is a little trust issue there that certainly exists, because I think if it weren't for that you might have seen more full support for the VTR, internationally. I think that was a big factor, the VTR.

Korsnick: Again, if you can share this, I guess part of my challenge is that I'm not sure that folks on the Hill may appreciate the hunger and the interest that we would be willing to have these international partners and I think that also is a help to them to understand that this is needed, this is necessary. The problem right now is every appropriations process is going to get compared to the last one. That's fine if you're in an equilibrium place and we're at anything but equilibrium and so the thing that you're going to need to ask for is just sort of so outside of the bounds of what they are going to have an appetite for. It just seems that entering into a more demanding sort of international play I think sends some pretty strong signals that says, listen it's that needed and so we're partnering with this, this, this and this and if we say well there's some challenge and they're not coming through for this. I just feel like that whole signal doesn't come across to them as demanding or desperate. I don't know the right words to use, but I think that until they feel this level of desperation, I'm not sure we're going to convince anybody.

Ford: Great comment! What I was thinking in a separate way, I don't know we're getting feedback here, but for another area to look at in infrastructure is what are we not focusing on in the research area that's going to perhaps lead us to the need in the infrastructure down the road and so what I've been looking at is how much we're investing in technologies for plant construction. A lot of the companies talk about manufacturing profiles for how they're going to do this in a different way than we have deployed reactors in the past. Have we done sufficient work to look at the technologies that are necessary for deploying in the future for small modular reactors, etc., and have we looked sufficiently at the construction technologies and what might that mean for infrastructure down the road for NE or teaming with other offices that already do some of that whether it's BES or there's a Building Technologies Office. So, having some of those discussions and what that might mean for infrastructure for NE or for the lab system, would be important because I think we invested something like 28 or 30 million dollars, I think it was last year through NRIC, for like steel bricks and some other stuff that is in conjunction with industry, but there's probably room for more of that and since that's always historically been one of the most expensive pieces of deploying the technology, more emphasis on that might be beneficial.

Bresler: Should the focus there might be on small modular or not necessarily? And I'll tell you what popped into my head as you said that about researching construction technologies and that sort of thing, is there's some real world development that's going on right now within the United States. Are there any Lessons-Learned from what's actually happening today that could be applied in the near term?

Ford: Yes, I think there probably are like those that are coming out of Vogtle, where they tried to modularize some of the things but that's a large-scale reactor and so some of the ways that you might do those modules are going to be far different than you might do with a small modular reactor or a micro reactor. I see Alice got her hand up so she probably has something to say about this.

Caponiti: Yes, just building on the idea of having perhaps a deep dive on NRIC and the work being done and why NRIC is doing that work, so, for example, that advanced construction initiative that's partnered with industry is actually partnered with companies that are planning on using those methods in the demonstration projects that are moving forward and as a benefit of the work of NRIC and that kind of project, is they're integrating with the

regulator. So, NRC has embedded people to follow that work and be prepared to address it if these technologies appear in license applications. So, I think having a fulsome treatment of that topic would be useful.

Huff: So, you all have raised a couple of things I sort of wanted to just jump in on, so one was the Lessons-Learned from Vogtle. I will share that potentially you might be interested in a briefing from our loan programs office. They have been developing products that capture Lessons-Learned around Vogtle and I think you all would be not only interested in it because it's interesting, but also because I think it touches precisely what you're describing in terms of what they've learned about modular construction and what could actually be leveraged in future reactors. In addition to that and as a sort of pivot too, I'm hearing a lot about the interest in planning for infrastructure so the industry is supported and I think that's really important and I am happy to hear that, that's what you all are thinking about focusing on. I would flag that there's also infrastructure, maybe we haven't fully captured it nicely in the way that we've been presenting information to you, but there is also infrastructure capability that we in NE support at universities and perhaps that starts to come in more in your workforce discussion. But I would say, in a very basic level the infrastructure at universities can often rival the capabilities of the national laboratories in part because it's much cheaper and I think that may be one of the things you may want to keep on the plate as you think about what industry needs. It may be solvable by sort of partnering with what universities also see themselves as needing, whether that's reactors or simulators or test loops or materials testing, PIE can be done at universities, I mean there's a lot of really incredible stuff that a university is capable of. As you all know, fission itself began at a university and NuScale began at a university. We must not forget the infrastructure that exists in these places and I think as we think about the cheapest way to do things, not to be too like bottom line about it. I come at this as a professor, but I also come at this as like it can be really deeply expensive to build something on a lab campus, but pretty shoestring at a university with similar capabilities. So, this is something to consider.

Magwood: I agree with that. I mean I think similarly I would I think is very important to understand the international aspects of this and I don't say it just because of where I sit today but we looked at this even when I was in NE because it doesn't make sense to build similar facilities in all the countries. So, if there's a facility that we don't have, the Japanese are going to build it and maybe we just need to help them get that done and use that facility when we need it and so you have to look at this, really as a kind of global infrastructure to some degree. Something else I would point out is that it isn't just about reactors, there's also a lot of infrastructure needed just for fuel. I was just talking to Frank about the program on the accident tolerant fuels. There's going to be a need for some testing capability with some of those fuels. Some of them might just go into commercial reactors but some of them might need some special test bricks and maybe some of that can be done at the ATR, maybe some other can't. And one item we don't have today is a full assembly testing capability or even a full rod testing capability. So, I think you have to think about from that standpoint as well. Let me just sort of say that the elephant in the infrastructure is really the lack of a fast neutron capability in the U.S. I think that's been an obstacle to progress for decades, it's been a problem we haven't solved it yet and there's ways that we've tried to band aid this issue, but it's not fully sold. So that's one you should definitely try to get an appreciation of and I think talking to some companies like TerraPower would be a good place to start to understand that.

Hart: So, I am restricted from speaking since I am going to Idaho National Laboratory, which is why I've been mostly quiet during this conversation which is atypical for me. But I do want to also emphasize workforce development and infrastructure as well. So, that is a dovetailing issue. As a nuclear engineering student when they were shutting down all of their research reactors at universities, I can tell you that it had a dramatic impact having a facility even if it's not a research reactor at a campus normalize its reactors, normalize nuclear power as a whole. So, we need to talk about that and also the training and development aspect. We know we're facing some issues with human capital not only in nuclear engineering but also those support capabilities that we are going to discuss a little bit more later. But if you have those capabilities that are not consolidated in one area you're also developing that capability for years to come as well. So, I just want you to consider that it's not just the national laboratories, it's other places you also want to connect not only to research and development institutions, but community colleges and the trades, because again another thing that we talk about is how to make nuclear power equal, have this equality and have this access and not have it only be for PhDs or certain communities as well.

Magwood: Thank you for bringing that up because we lost a lot of facilities in the 90s, we saved a bunch too, but we lost some important ones and there has not been a new university research reactor built since the early 70s.

Huff: There has been a new one built in Austin in 1992. But it was moved from one place to another.

Magwood: Okay, that doesn't count (laughingly) and so this may be something that the group might want to take a look at some stage. Is it something that perhaps should be a program that NE could pursue in the future to foster some kind of university research reactor, a new one somewhere? That can be pretty exciting.

Ford: There are programs to point out. I was going to mention this in your discussion on workforce, but one of the things that we are doing for example in the fusion space is looking at apprentice programs and how you build some of that full-scale workforce development effort and that's with the states. In other words, starting to team with not just the federal government but with state governments in terms of developing programs for human capital development and especially with the trades that you're going to need to demand and operate and maintain these

facilities in the future. So, it can't all just be about training facilities that are only focused on a university, we ought to also think more broadly about how that factors into the trades and building and infrastructure and helping build those infrastructures as well.

Hart: So, I also want to point out, I said reactor, but there can also be other facilities other than reactors. So, looking at peripheral linear accelerators, those sort of things doesn't always have to be a reactor even though they are the coolest. I understand that, but you also want to talk about the breadth of facility so that might be a little bit easier to accommodate publicly or at other locations without the level of security and physical security and safeguards that you need with the full-blown reactor.

Goff: I just wanted to pile on the research reactor part as well. From the international perspective, I know one thing that we don't have when we're talking about developing relationships with other countries, is the U.S. is really not building research reactors anymore. We don't have a company that we can go and say country X you need a research reactor, we'd like to partner with you on that. So, yes, having that domestic capability to move forward on research reactors, would be very nice from the overall nuclear enterprise and from the overall export size as well. Because it's a capability we don't really have that much, that's active right now and other countries are building research reactors for different partners.

Hart: And it might be an easier lower risk. I don't know if there is a such thing as a low risk nuclear in entering into other countries with research reactors or Linux or other facilities, even material handling or even doing facility demonstrations with other international partners.

Magwood: Yes, I agree with that. But I think Mike's point is very important because you were talking about the 70th anniversary of Atoms for Peace, I mean we're in the Hallmarks in the Atoms for Peace, which some people don't like these days. That was a time when the U.S. government was building research reactors in countries around the world and I visited some of these facilities that are still there, a lot of them are still in operation, still doing a lot of work, in Latin America and in other parts of the world. And it's amazing when you go and you see these facilities that were built under AEC's auspices back in the 60s and that are still running along. We can't do that today, we're not able to, we don't have that, but other people (and Mike was being nice about this), who are basically the Russians that are building research reactors in other countries. That's a pretty nice lever to have if you're trying to get into a country that may not build a commercial facility for 10 or 20 years, but you're trying to lay the groundwork being able to do that. So, that's a tremendous advantage and it is one that the U.S. can't do right now. Thank you. Any other requirements on the infrastructure? I think we covered a whole lot of ground in that area.

Bresler: I got two pages worth of notes. This is great. You all are fantastic, so thank you. I do have a question, I think we have some good starting points, I mean step one except it sounds like for me and for our subcommittee is to get some education, to maybe ask for some presentations from some organizations. And I think I have really good places to start with respect to industry engagement, Lessons-Learned, etc. I also think Katy mentioned a loan programs office. If there is a starting point you all would suggest with respect to this research really like universities, is there some place to start there maybe?

Huff: Yes. An organization we rely on heavily for input from nuclear energy-focused universities is the Nuclear Engineering Department Heads Organization (NEDHO) and they will not be shy with their opinions, I'm sure they would be beyond thrilled to review some of course. Luke is familiar with the vast majority of them, they'll be excellent, they've thought hard about this question of infrastructure and frankly I would be really interested to hear what they tell you because it's probably the same as what they tell us, but who knows.

Bresler: Awesome!

Scarlat: And I think also NSUF. It would be great to have NSUF give us a briefing.

Ford: And certainly, NRIC, which was mentioned earlier.

Bresler: Yes, I've got NRIC.

Magwood: Anything else?

Caponiti: Yes, I just say for pulling together some topics for briefing, in addition to getting NEDHOs input, I think we haven't had a chance to brief you on the approaches that we're taking and implementing NEDHOs recommendations and I think that would be a good briefing to offer as well.

Bresler: Okay.

Magwood: All right.

Bresler: Well, thank you again for my fellow subcommittee members Raluca, Mike and Kemal. I don't think so. I will write all this up and get it out to you all with a suggested sort of next steps from where we go from here and Crystal and I will see if we can get a couple of sessions set up.

Magwood: Excellent!

Bresler: Thank you all for the kickstart. I appreciate it.

Magwood: Okay, it looks like we have beat this one to death. And Kim is here.

Luke Branscum suggested that since the meeting is a little bit ahead of schedule that perhaps this is a great time to take a short break.

At 10:40 a.m., **Chair, Bill Magwood** called for a short break.

At 10:58 a.m., **Chair, Bill Magwood** called everyone back into the room, commenting that he and Luke were talking during the break and that depending on how quickly Kim's presentation goes and J'Tia's conversation flows, that we might move the "International Engagement" discussion up and before the lunch break. Bill then mentioned that we will now start the conversation on the "Consent-Based Siting Funding Opportunity Announcement" update and turned over the meeting to the next presenter, **Acting Deputy Assistant Secretary, Dr. Kim Petry**.

At 11:00 a.m., **Acting Deputy Assistant Secretary, Dr. Kim Petry** provided an update on the subject of "Consent-Based Siting for Federal Consolidated Interim Storage". Kim thanked Bill and began her presentation stating that she knows that all of you were briefed by Sam at the last NEAC meeting and so she wasn't going to provide a full briefing, but only an update on where we are now.

So, you all know we're dedicated to the consent-based siting process for a federal consolidated interim storage facility. As an update I know you all know that we had a request for information that went out in December of 21 and that we received about 225 unique submissions. Since the last meeting we have actually published the analysis report on our website and that includes the comments from the 2017 process as well.

So, this one funding opportunity announcement closed on January 31st. We extended the timeline by a few weeks as this was the request of several individuals and groups. We started out at being a 16 million dollar funding opportunity announcement and then the Omnibus was passed so we had additional funds and it made sense to add it to this funding opportunity now instead of having to do another one later. As you can see and as I think you've already been informed that's a list of eligible awardees, all different kinds of groups, I think it was everything except for a lab, I think is what we essentially said. Our goal here is to have geographically and institutionally diverse awardees so that we have a good representation geographically across the United States, and also as the different kinds of groups and organizations. So, the goal of this funding opportunity is essentially to enable mutual learning between the government and all these communities that we want to interact with and having that focus on environmental justice and inequity. So, the funding opportunity recipients, they are going to represent consent-based siting consortia. They will be geographically dispersed, we don't know how many they will be yet, we did get a good response, but it's in the procurement process right now and we hope to have a list of announced awardees in May or June of this year. And so we are giving special consideration to environmental justice transparency and inclusivity and we do believe that the awardees will have a wider reach than the department currently does in any given community. That's one of the reasons for the institutional and geographical diversity. We expect to be a partner in this process and so the department will also be and to share information and communications, material, technical information and those kinds of things. So, there are three different tasks as a part of this funding opportunity that we're asking these consortia to actually do. One of them is to organize, lead, and maintain meaningful and inclusive community and stakeholder engagement processes related to nuclear waste management. The other one is to elicit and map public values, interests, and goals and concerns of communities to enable effective collaboration and community-driven feedback and lastly to develop, implement and report on outcomes and strategies that support mutual learning among the DOE, stakeholders, communities, and SMEs on nuclear waste related topics. So, our next steps public feedback is going to inform them. We're working on wrapping up our consent-based siting process hopefully which will be released very soon and we'll be awarding the cooperative agreements like I said in May or June time frame and kick off the consortia to go do great things and lastly, we'll be defining our broader strategy for integrated waste management because interim storage is just a part of the process and part of the issue. We need permanent disposal as well and then there's transportation, there's several aspects, that we're working on at the same time. So, we really do appreciate your perspective and experience and views on this stuff, again helping us develop this program as it evolves, since it's kind of the first of its kind in the United States. And we're using the experiences of other countries that have been successful in part but also taking into consideration that the United States is unique from those other countries, so we welcome your feedback and thank you for spending the time helping us. I can answer any questions if I didn't cover something you wanted me to address.

Magwood: Any questions?

Scarlat: Is there Synergy with consent-based siting for other fuel cycle facilities, reactors, or upstream?

Petry: So, we've had those kinds of conversations within the department actually because there are some examples, I mean for example, WIPP is a great example, it's very similar to what we're doing but they had to go through a very long arduous process in their community and that in that state to make it happen. And they're having to go through it again right now with trying to get the premature nude mode and what have you. The main difference is this stuff is going to be here for a long time, I mean a reactor eventually will be decommissioned right at interim storage, we're saying 40 to 100 years, but we really don't know. We have a good idea but, we don't know the exact time frame of how interim, interim is. What we do know is that we need a permanent disposal solution and so it's a little bit different than siting those kinds of facilities.

Scarlat: I appreciate the difference in time scale but I do think that there is the process of community engagement and is maybe not so sensitive to that time scale of impact, so I think that there might be synergy in

terms of new reactor sites and how those could be identified and developed and maybe that could help that area as well

Petry: I couldn't agree more. We had a consent-based siting booth at the National Association of Counties conference in DC this week and so I got to speak with lots of commissioners and local representatives and they wanted to know a lot about SMRs and advanced reactors and how those things could benefit their communities if they were interested in hosting an interim storage facility. So, they are very synergistic in that way because it could be an enticement for a community, it could be a long-term benefit that could be built alongside, so absolutely.

Magwood: Other questions?

Pasamehmetoglu: Yes, I have a good, very similar question but in a more general sense. In this funding opportunity announcement, is there a limitation on what the carrots could be for these communities or is it open that they come to the table and they can negotiate, if we do this but in return that's what we want. Is there any limitation in that regard and reactors is one of them, but the one that for a while it didn't take roots but 20 years ago some communities were interested in locating recycling facilities.

Petry: I had this question directly from two people at the NACo conference. My comment was that now it's a whiteboard that's completely clean that we're starting from scratch. So, nothing is off the table, it's a conversation about what makes sense for that community and whether or not it would solve our needs as well. And keeping in mind that this funding opportunity isn't actually asking for volunteers it's really just to start the conversation, it's just for learning. For the funding opportunity that we're planning for, which I think will be for 2025, that's when we'll start to actually ask for volunteers and that's when the negotiation stuff will actually start to be discussed. However, part of this learning process will be developing some of that kind of information that we currently don't have and building on those conversations that we have with the community. So, yes, that's a good point and thank you.

Magwood: For the applicants, how do you judge who's qualified to speak for a community?

Petry: That's really a tough question. One of the goals of this funding opportunity, which is going to be different in different communities, I mean it really varies from county to county and from state to state, about what kind of position or what kind of group or person has the authority to speak for others in their community.

Magwood: I mean if you get an application from some university professor who says I'm speaking for the community, I want a million dollars.

Petry: That really is one of the main points in this funding opportunity announcement, to start having those conversations so we can make some progress on getting answers to those questions. We don't want to presume anything we're walking in eager to listen to all points of view and figure out what makes the most sense to fulfill our mission, but also to meet the needs of the community that would eventually volunteer.

Magwood: How many applications did you receive?

Petry: I don't think I'm allowed to tell you.

Magwood: Is it hundreds?

Petry: All I can tell you is that it met our expectations.

Huff: We are confident that we should be able to get a nice distribution of awards.

Magwood: All right. Is the process going to be to have discussions with each of the applicants to understand who they are and what they are proposing?

Petry: As part of the procurement process, we're not allowed to talk to the applicants at all.

Magwood: So, you just have to go based on the paper

Petry: Yes, based on what they've submitted.

Magwood: Okay.

Arnold: What's the plan for how to synthesize all this stuff at the end? Okay, so you give out the grants to these people, they're going to have their findings, they're going to submit their reports, and then some are going to say this, some are going to say that, some are going to say it will take a little bit of this and that, etc., but what's the process for synthesizing all that at the end?

Petry: Well, okay, so part of it is the consent-based siting process, this document that we haven't actually released yet. As soon as we do, that will become a little bit more clear but the other parts of it are kind of unknown right now and this is going to develop as we start having conversations. Because it hasn't happened in the United States before, if we try and prescribe a specific process, we'll probably be wrong and we'll have to rewrite it anyway. So, it will be iterative, we will have to revise our consent-based siting process more than once, I imagine, as we learn more. I mean, since it hasn't been done successfully in the United States, we don't want to get it wrong. So, we're not going to go too far down the path until we have a pretty clear understanding of what the right steps might be. And so, I wouldn't want to presuppose anything right now without actually having more data. I just think we would probably base it on this data at some point. You have great ideas!

Arnold: I'm just also wondering with a discussion about amending the Nuclear Policy Act and all that and so what happens if they do change that in the midst of the process?

Petry: That's not part of what we are all working on. At least on the federal government side, we do have a cohesive strategy for moving forward. We know that interim storage is interim and we do need permanent disposal

and in order to get to those end states there are a series of steps that have to happen. And amending the NWPA is definitely one of them. So, we would want to work in conjunction with the Administration and our Congressional partners to have all those things happen in the right order at the right time. I mean that might not happen, but ideally it would, so they're supportive and we're all working towards the same goal.

Magwood: Are there any other questions?

Branscum: I was just going to say, can you maybe say something about where Congress is on that? I mean they did provide the extra 10 million in appropriations, so we have reason to believe that they are somewhat supportive.

Petry: Yes, there is definitely interest on the Hill, there is a recognition for sure that the NWPA needs to be amended. Several members have offered legislation, but this hasn't really gone very far, but that's a good first step to be talking about it. We think if the Department and if the Administration and Congress work together, we will be even more successful, because we're the ones who have to actually execute it. So, if we work with the people writing the laws, our goal is to come to the point where we do have a permanent disposal. And the only way to get there is through this series of steps and amending the NWPA is definitely one of them.

Magwood: That Congressional support you just spoke of was that in this Congress or in the previous one?

Huff: This Congress hasn't done anything yet, but in the previous Congress, there was support.

Korsnick: I know J'Tia is going to highlight some of this whenever it's the right time to talk about our subcommittee on used fuel, but in this process where you're gathering this information on the consolidated interim storage, is there a way to broaden the conversation around a community that might be interested in the broader sort of fuel conversation? In other words, you're asking me about interim storage, so maybe I'll answer you about interim storage, but if I get comfortable with interim storage I might also be interested in long-term storage because there could be some connective tissue between these. And are we sort of exploring leaving those little breadcrumbs?

Petry: Absolutely. One of our future strategies is to actually develop the consent-based siting process for a repository which would essentially be similar but it would also be different, because the end state is different and the commitment is forever instead of just maybe 100 years or 40 years. So, we've definitely had those thoughts and not only that, I mean how a co-location of facilities with interim storage or with a repository or interim storage and a repository, together, they're all part of the conversation and could be one of those things that go on that whiteboard. So, it will just depend on what the community is interested in.

Korsnick: So, part of our conversation went around sort of trust and building trust and how important it was to build trust and we ended up, kind of I think, in an interesting framework where we said, well, maybe putting the conversation out there up front that says guys at the end of the day we're looking for a holistic solution we're talking to you about this piece but just appreciate that sort of getting comfortable with this, etc., we are interested in this other piece not like you're forcing it down their throat so to speak, but to just appreciate that there is conversation around that and that it would be with their engagement, if this conversation sort of went fuller or something. Like that, I guess, we kind of framed it out as a sort of a trust-building way to be fully transparent and kind of landed on that trust in general being sort of preeminent in making any progress on this front.

Petry: Is there a question I was supposed to address?

Korsnick: I just wanted to stress, just for awareness, that people are appreciating how we did get to long-term storage when the conversation started around interim storage and exactly one of the most important things is how trust is either earned or not through the process that's happening now.

Magwood: Any other questions?

Arnold: Thinking back at Yucca Mountain, when that was going on, and earlier when you had made the comment about one option requiring a lesser time than the permanent option. And so, when Yucca Mountain was going on, there were discussions about perhaps storing stuff in a repository and then hopefully technology would come around at some point, so then we could do something so the waste wouldn't be there forever. At some point then, reprocessing resurfaced again. So, are these kinds of things being considered as part of the hope or the process?

Petry: Sure! Well first of all, you're talking about retrievability and that's really only important for a repository, because if it's permanent you have to be able to take it back out (that's one of the requirements). There is definitely renewed interest for reprocessing. We get to hear things all the time from companies and places around the United States who are interested in doing that. The U.S. policy hasn't changed, but that doesn't preclude us from having the conversation and combining that with a repository or that with an interim storage facility could be attractive if we were allowed to go down that path.

Huff: Right now, there's no current policy on recycling, on whether or not we should recycle our spent nuclear fuel. Our current forward movement is that while the United States government isn't actively pursuing a commercial recycling process, we will continue to do fuel cycle research and development to explore what possible recycling options there may be in the future and to improve the economics and feasibility as well as the safety, security, and nuclear non-proliferation concerns around those processes. So, yes, this issue has gone back and forth over the years. We actually have an interesting little memo about the history of it, but the most recent sort of public policies from a presidential perspective on reprocessing, sort of we're in the Bush era, around GNAP and whatnot, Obama kind of

amended it slightly, but only slightly, and we haven't really seen a particular policy since then. This Administration is interested in developing one but it's in development.

Arnold: Well, maybe perhaps that might be something for the infrastructure group to look into. I mean for something that may be needed relative to fuel, as a discussion point to think about maybe the needs of what might be useful for the DOE.

Magwood: Okay, all right. I don't see other questions.

At 11:20 a.m., **Chair, Bill Magwood** turned the meeting over to **NEAC Subcommittee Member, J'Tia Hart** to begin the discussion on "Consent-Based Siting of Spent Nuclear Fuel". Just to recap and I think we've touched on a lot of these comments already and we've been a busy bee subcommittee. We have met twice in December and in January. My fellow subcommittee members are Lake, Maria, Ed, Raluca and Arnold. So, during our first meeting we took some time to try to figure out what it is we could exactly tackle and so what we decided is that we would like to come out with a one to two page summary this spring detailing our direction of the subcommittee because it will take us a while to figure out what we're going to do. And then in late fall we are aiming to issue a more robust report with recommendations, that focus on an implementation timeline of two to five years. At our January meeting that was held at NEI (thank you Maria), we actually had identified some different areas that we wanted to have subject matter experts come in and talk to us about. So, we had Denia Djokic and Rod McCullum come and speak to us about their experiences. Denia is a researcher and she spoke about the social dimensions of nuclear facility siting and Rod McCullum has also had some experience in figuring out how consent-based siting (CBS) works in the kind of the roadblocks that we discussed. We had a very interesting presentation and our next steps are now to reach out to the Canadian nuclear waste management organization. Also we asked for a briefing from Kim (thank you Kim) about the status of the activities that are going on in DOE-NE and we are currently working on this one to two page summary and so that is our focus and what I want to talk about a little bit more. We want to bring questions to the larger committee about where we want to go and get your feedback on that before we go too far down the yellow brick road and then decide that we need to switch directions. So, there are kind of three larger questions that we'd like to discuss today. Our subcommittee, we really thought we wanted to focus on commercial spent nuclear fuel though our charter has us looking at our entire scope, which is spent nuclear fuel and high-level radioactive waste. We, thought it was better to down scope to commercial spent nuclear fuel to have some bounding and while the DOE strategy has cited interim storage and also long-term deep geological disposal, we believe that we want to focus on a CBS process that is facility-agnostic. So, that being not focusing on a specific type of site or a time frame whether that's near-term or long-term, but more of a focus on community development. So, community-centric, what do the communities want and then figuring out how that fits with something that DOE may be able to deploy or fits their needs. So, being focused on the community we thought that this was one of the things that we needed to flip around about CBS. And actually, Kim you've kind of hit on it a lot and from what we've heard that is the best practice, to not have a facility and then find where to site it. In other words, find a community that wants to partner with DOE and then find a facility that fits their needs. And we believe and I think this is no kind of surprise here, that the biggest obstacle to success in CVS and siting of these facilities is really public opinion and support. So, just looking at some of the feedback that we got from the latest requests and open public sessions, we saw words like distrust and fairness and the sort of importance they hold. So, distrust of the DOE and federal government nuclear waste management was of concern. People wanted an emphasis on fairness, both in the siting process and also outcomes from the siting process. And then also difference of opinions about types of facilities again, which is why we are leaning towards not focusing on the facility but focusing on the community because it seems apparent that people want to be heard and not bought. And I think that's the approach that's in the current climate as well. And so, in our report, we are aiming for "elite fall debut" and we want to focus on recommendations that address the current deficit of trust with the DOE, by making changes not only internally but also externally. And I think you hit on some of those things and ensuring that the consent-based siting process is fair and inclusive. And again, we think it's of primary importance to focus on the community and on fairness inciting outcomes that put the community's needs and well-being first. I think that is going to hinge on whether any of this is going to be successful or not. So, given that this was a lot of information, I'm more than happy to summarize the highlights of my discussion as focusing on commercial spent nuclear fuel, being facility-agnostic and really focusing on the needs of the community and what they would like. So, those are kind of the three main areas that I'll open up the floor for feedback or if my other subcommittee members would like to jump in and if I've missed any points.

Korsnick: While everybody's having a chance to think, just to kind of get a spirit of the conversation, I think J'Tia did a great job talking about it and she's very strong on keeping the attention of the committee on, sort of I'll just say something manageable. When you have a conversation around used fuel, in about 30 seconds it goes in 500 directions and it can just sort of quickly just take all the time that you've set up and you still wouldn't necessarily put your arms around it. So, she's been sort of really driven to sort of make us prioritize, kind of as we're thinking. And so, I thank her for that because we'll end up with a product that will be able to be useful I think to this committee as a result. But I would just maybe caution to say, we're not going to come up with sort of the Holy Grail to used fuel and it's going to have all the answers. So, she's being very deliberate to kind of take a chunk of this that can be sort

of manageable and useful. And that's why I created the conversation while you were speaking because there's a lot of hunger on trying to get to the longer-term solution and we kept going there and she kept pulling us back to say, okay, but like what can we do right now? And that's why we ended up landing on what it's not a different conversation it's the same conversation to let folks know as a country we need a long-term solution. You can play in that, you could play in the interim, let's create the dialogue and the discussion. So, I guess I just wanted to give folks the view of sort of the fluidity of that conversation. As opposed to sometimes when things come out maybe based on how they're written it has to be very specific you like only have a conversation on this and our discussion was we thought we would build more trust by talking about the broader conversation and then working with the communities to figure out which pieces they're comfortable with.

Pasamehmetoglu: Maria, on these subgroups, we are as I understand it allowed to invite other people into the subgroups for the discussions and all that. Do you think there is a value to have a discussion with John Kotek on this one of these days?

Korsnick: J'Tia brought up the same issue. We had one person from NEI present, so our decision was to not have two people from NEI and sort of broaden the network just for this meeting. John was on the Blue-Ribbon Commission and is personally very passionate about a user solution. So, we're not talking to him, we were trying not to double up on that particular meeting.

Hart: We do have one of our next also asks is to have somebody who is more familiar with governmental affairs and was involved with Blue Ribbon Commission and can maybe talk about things that we can particularly highlight, that need to be changed as far as policies, procedures, laws or regulations, as well. So, that's one of the things whether that be on the NWPA or other subjects. So, we are also reluctant to add actual subcommittee members because it's a lot. We are meeting once a month but we are fully using SMEs and getting them involved.

Ford: I wanted to ask if you're going to incorporate anything tied to international Lessons-Learned for siting and so there's been some success and some failures internationally in this area and some of it had to do with community engagement protocols and so I think it'd be value-added. I assume you're going to do that.

Korsnick: Yes, absolutely. We having some of the people from Canada that were successful in their journey or we've deemed them to be successful, as an example, doesn't mean there aren't others, but I think they're on our list.

Hart: That's who we knew first so that's where we're starting at home base and so the nuclear waste management organization just signed a contract with the South Bruce siting project. It has been a long-term process and we had some people who cited some of their studies and we've been reading through that. To have that success, it's a huge experience.

Ford: Can I ask one other question that ties to the briefing on this opportunity that's been out here looking at community engagement, etc., Are you also going to look at what other things you would recommend be funded from a social science study perspective I assume?

Hart: Yes, we are. This is great because one of the things that we wanted to do with the one to two page summary, is we don't want to wait too long for things that we feel like are obvious. Like with any community that you engage with you're going to need an ongoing community presence and a communication mechanism whether that be polling or doing that sort of thing and those sort of things. These are not necessarily things that us technical people excel at. But we need to have that and I'm not sure if that is resident in our capabilities in DOE and so it might be worth putting that to a subcontract, to have that ongoing engagement in communication aspects. So, we do want to put that out as soon as possible.

Magwood: Any other questions?

Scarlat: Maybe a connection to workforce and infrastructure. You mentioned trust and there's always value in having independent monitoring expertise and monitoring facilities. So, have you identified any gaps in terms of how do communities build trust, by say knowing, okay, I can go to DOE to have the monitoring data, but I can also develop my own monitoring capabilities or I have this in the independent organization, whether it's a university or it's some other form of independent organization that I can go to, to get an independent input. And I am also thinking of the Lessons-Learned from responding to the Fukushima Daiichi accident, where again there was a question of trust and then the communities being able to develop their own independent monitoring capabilities.

Hart: So, again this is something that we didn't want to mandate. We have some best case or best practices that we've seen that we want to highlight, but again we want it to be community-focused and community-led. So, I think again you have to have these different aspects that you can put in place, but we can't say what it's going to be because it's going to be based on what the community wants. So, it may be an independent organization, it may be a partnership with the university, like the things you said and those are things that we want to highlight in our report but not like say this is how you do it and it's a one-size-fits-all, because that's putting yourself up for failure. You have to be flexible! But thank you!

Magwood: Okay anything else, other questions? I'll offer, if you want to get more insight into some of the international success stories that Kim and I were talking about the foremost stakeholder confidence since operated by the NEA, that sort of collects the people that do this for a living. And there are very good success stories out of

Sweden, Switzerland, even in France. France, has actually made a lot of progress recently. Will be happy to have someone provide a briefing on that as well.

One question and maybe this might be more of a question for Kim. It occurs to me that this approach about taking a facility-agnostic approach to the community engagement, is really an interesting one and it makes sense on a lot of wavelengths, but it occurs to me that one step that I don't think that the U.S. has done in a long time, that other countries do sort of in advance, is that they look at which sites would physically be good for repositories and have kind of a map of here's where a repository could potentially go. It's not that we're saying we're going to put it here but the geology here is right, then we engage with these communities. If they're a community in the Florida wetlands, you're not going to put a repository there, so there's no point in having that conversation with that particular community about a repository. So, I'm wondering if that's a step that needs to happen? Do we need to or maybe this information is already available, do we just have to sort of package it and put it out there? Is that something that really should be done in this context?

Ford: Okay, can I jump in quickly? I ran the first phase of the advanced reactor siting study for NRC and then they followed on with the second stage with a team from Oak Ridge, Argonne, Idaho and the University of Michigan, which was the fastest path to zero. They developed a tool called the STAND tool, that they actually had resident on their site now and it actually looks at some of those factors. So, it couples all of the technical siting requirements that NRC has, for actually seismicity, water availability, etc. Then they tried to couple in a lot of the siting issues tied to the social science side of it using some survey data that they had from the University of Oklahoma, etc., about where they would be having acceptance. So, they're trying to build a tool that does that, so one of the things I would recommend maybe is get a brief on that and it does some of the things you're talking about Bill, which is to look at where you can actually put one. So, some of the requirements are the same and whether or not there's an opportunity there for a funding of a module for that tool. This is actually used by industry for industry, for how they would site those as a follow-on to what NRC is already funded.

Magwood: Okay.

Petry: We have an R&D arm of NE-8 that's run by Dr. Bill Boyle and so they're doing a lot of analysis on the geology of the United States. So, we know what's out there, we know where it would work and where it wouldn't work, but the more important thing is that we don't have the ability to go down that path yet until Congress says that Yucca Mountain isn't the path forward. So, until the NWPA is amended in some fashion, we can't really do anything.

Magwood: So, we can or can't issue a map saying where it will or won't go?

Petry: We can do R&D to the extent that we are already doing and studying, so we could put a map together and say it would work here and it wouldn't work here, but that's all we can do.

Magwood: I'm thinking that's kind of a necessary first step.

Petry: Oh, absolutely, but we've been doing that for a decade or two at this point.

Magwood: But make sure it's out there so people can see it so maybe it's part of the future funding.

Petry: Absolutely! And that's eventually our intention, because we know interim storage is interim, so we're going to have to go to that next step at some point.

Huff: That's definitely the kind of information we expect communities, as part of this existing voyage to ask us for, in their kind of engagements. It does sort of also potentially, keep us from where we to publish this map with no particular context, it might look like the first step in a siting process, which we're not allowed to engage in.

Magwood: So, having them ask where, keeps you out of trouble.

Huff: Maybe at the very least we should and would be happy to share it with them.

Korsnick: Going back to your agnostic-approach, rather than talk about where you could or couldn't maybe easily put some sort of a long-term storage, we're basically saying we're just interested in anybody that's interested in doing any kind of storage for used fuel. And maybe later we will determine, that one is a better candidate for interim storage for this reason or another and maybe somebody else is a better candidate for longer-term storage. But rather than first applying any kind of upfront filter, we're basically asking them to just tell us if they interested and we'll figure out how hard it is to put it on that particular site or not. Again, this is more focused on the community aspect and that's going back to sorting out the trust that you want to build to just say we just really want to hear from you and what your desires are and how interested you are. This is a subtle change but we kicked it around a little bit and decided to not sort of pre-filter.

Hart: Yes, we kicked it around a lot and I'd also say that I've spoken with some engineers and they said they can build anything anywhere so that's what they said. So, after listening to them, it appears that there are designs and there are sites that are favorable. But I think there's also a lot of leeway and it is easier to re-engineer a facility than find another site. So, you want to change what you can to deal with the situation you have.

Arnold: Okay, yes just thinking back again to some of the previous consolidated interim stories or the interim stories that were going on with Skull Valley at the time, when they were looking at private fuel storage and they were going to host some things there. And so you run into things, and I have to always go back to my dad saying about them decisions being made by budgets, politics, timing, and personalities. And so when you look at that and

you consider what was going on at Skull Valley, thinking okay we're going to have interim sites there because it was going to go to Yucca Mountain, when Yucca Mountain was on the table. And then although I'm having the license from the NRC to do such, but if the state intervened and said you can't use our roads to get in and out with the stuff. So, the bottom line is one consideration obviously, like what Maria was saying, I mean trying to figure out what best suits some people, there's always the notion of politics, Congress, where decisions will be made, jurisdictional issues, trust responsibilities with the tribes, etc. If a tribe says sure we want to do it and then the state says well no you can't or vice versa, if the state says we'll do it and the tribes said no, we don't want it there. So, it's just kind of an interesting ball of wax trying to sort through and figure out whatever the path going forward will be. But clearly, it's such a complex problem and that's why we're smart to do what we're doing now. I mean, trying to figure out a process at least and trying to get it out there and then maybe from there, whatever comes out in the wash, then maybe we can make something happen.

Korsnick: I'll just add that I know people have worked on this for three lifetimes, but a part of me says that the turning point for nuclear is also going to be a turning point for used fuel. I think there's going to be communities out there that are going to be excited to house a long-term money-making infrastructure facility. And I think once we sort of get past the history or the reputation or whatever you want to call it, and all of the negativity around used fuel, I really hope that five or ten years from now, some of us that are sitting in this room will be reflecting back on interestingly, how much that conversation changed. And I know that feels really far afield for some people that have been in this conversation for 40 years, but I really think that the conversation around nuclear and sort of bringing the whole cycle together, is a beautiful cycle. Nuclear looks good no matter what dimension you look at and I think getting people to say I love used fuel and I do, because there's people out there already that want to use some things that are in this used fuel. In fact, we should just call it sort of a "future resource" or something, or give it a new name because it is that. I'm just optimistic, maybe crazily so, but I'm optimistic that this new conversation around nuclear is going to buoy a renewed conversation in a more positive way for used fuel and we're doing everything we can to make that happen.

Magwood: Fantastic! Other thoughts? Okay, excellent!

Hart: So, thank you, your feedback has been very helpful because we have been kicking this around very passionately in our meetings and so we look forward to taking some of your feedback and producing a summary draft for you to give additional opinions on before we finalize it. So, thanks Bill!

Magwood: Thank you very much!

At 11:45 am, **NEAC Subcommittee Member (and Chair), Bill Magwood** suggested (after stating that the meeting was ahead of schedule) that the meeting continue on, before lunch, with the "International Engagement" discussion, that was planned for this afternoon. Bill then presented the NEAC International Subcommittee's initial report, highlighting the observations and major themes, based on the subcommittee handout that was transmitted at this meeting.

The Subcommittee launched its considerations by first attempting to clear-define what issues should be addressed. The members acknowledged and appreciated that NE has developed an active and productive international affairs program and that it coordinates with key players across the Federal government. It was not clear, however, what served as the U.S. Government's driving objectives and how these were articulated and managed.

To understand this matter more completely, the Subcommittee met with a range of senior officials to hear their perspectives and dialogue about the U.S.'s key policy objectives. They included the Undersecretary of State Arms Control and International Security, the DOE Assistant Secretary for International Affairs, the Deputy Administrator for Defense Nuclear Nonproliferation at the National Nuclear Security Administration, and the Assistant Secretary of Commerce for Industry and Analysis.

The Subcommittee was very appreciative of the time and insights it received from these senior officials and was impressed with the common understanding they represented regarding the importance of nuclear energy to U.S. foreign policy. Collectively, they clearly understood that the relationships established when one country exports nuclear energy technologies to another, are broad, deep, and enduring. In most cases, such an export creates ties of foreign policy, security policy, nuclear regulation, industries and finance that can persist for many decades. This understanding provides an important perspective in the current global context when Russia and China are both aggressively seeking to export nuclear energy technologies around the world and have gained significant ground in many parts of the world, including South America, Africa, and the Middle East.

We also found a strong appreciation for the domestic benefits of a strong nuclear industry and the jobs and economic activity it can generate at home, as well as supporting U.S. climate goals. This common understanding across so many agencies should be highlighted and applauded; this has not always been the case. Nor has it always been the case that DOE assumed an active role in supporting U.S. nuclear energy exports. It is also important to note the bipartisan nature of these policies; some of these developments

initiated in the previous Administration but have been enhanced and accelerated in the current Administration.

The Subcommittee observes that global energy security concerns and climate commitments have thrust nuclear energy to center stage in many countries around the globe. We are at a unique moment for the United States to help partners develop nuclear energy in place of either Russia (currently the dominant global supplier) or China, an emerging rival. Major opportunities are at hand to advance U.S. national interests in tandem with expanding U.S. exports and American jobs. U.S. competitiveness in nuclear energy markets, from new reactors and advanced technologies to supporting operating reactors to decommissioning and used fuel services, needs enhanced coordination, expanded cooperation and improved trade support from the U.S. Government.

The Subcommittee believes there is an important weakness in the U.S. Government's current framework. While the various agencies are doing quality, important work, they largely operate in their existing lanes. While it would be overstating the matter to say they are "stove piped", the Subcommittee does not see a clear organizing mechanism or strategic focus and vision with respect to U.S. efforts. There are gaps in the policy framework that are not well-addressed by any of the agencies despite honest efforts by some.

For example, agencies struggle with the fact that when it comes to financing projects overseas, the U.S. is largely overmatched by the competition. While in at least one case, heroic efforts have dealt with the financing issue, the officials with which we met noted it was highly complex and time-consuming and not likely to be repeated multiple times. This has been a well-known issue for many years and there is no clear path for the future.

Another gap is the lack of a long-term view in developing relationships with potential partners. When an African country which has had scores of young people educated in the best Russia universities issues a bid package, it is probably too late for the U.S. to show its interest.

The Subcommittee plans to explore the following themes in the future: (1) Strategic Vision - The White House should appoint a senior official to direct nuclear energy policy within the Executive Office of the President in order to provide strategic vision and oversight. To be effective, this would need to be an official with cabinet-level access and visibility. (It is interesting to note that earlier this month, President Macron of France activated a Nuclear Policy Council that he will chair that will lead that country's efforts in the nuclear energy arena.) (2) Long-Term Investment in Overseas Relationships - The U.S. should provide enhanced support (through Commerce, DOE and DoS) to identify and develop potential customer nations. Many countries that have the highest future energy demand growth are also less capable institutionally to support deployment and regulation of nuclear technologies. More should be done to develop programs (with international partners and agencies) that can build capacity (governance and workforce). Additionally, much more should be done to leverage U.S. capacities in research, development and demonstration to build and enhance overseas partnerships in joint exploration of longer-term technologies. (3) Financing of Overseas Projects - Financing is critical to U.S. nuclear competitiveness abroad. Congress and the Administration should ensure that the Export-Import Bank, the U.S. International Development Finance Corporation and the U.S. Trade and Development Agency have the necessary authorities and are key enablers of U.S. nuclear energy exports. Change is needed; EXIM funding authority, for example, is insufficient for longer term deals that are required for U.S. exporters to compete with state owned entities. (4) Export Policies - As the global market for nuclear exports rapidly expands and new countries work to develop nuclear energy programs, framework agreements for nuclear cooperation (Section 123 Agreements) will be needed with many more partner countries. In addition, efficient and streamlined approval processes are needed when specific authorizations under 10 CFR 810 are required. There is also a need to reassess the general approach taken by the U.S. with regard to how fuel cycle technologies are viewed within the nonproliferation establishment. Particularly in an era of heightened concern over energy security, there is a need to articulate a much more refined position of how we can manage rapid expansion of nuclear energy usage in parallel to strategies to minimize proliferation risk. Renewed interest in nuclear energy in non-weapon states like Japan and South Korea, which have urgent concerns over energy-security, makes it vital to address this issue sooner rather than later.

Finally, there are a range of important specific issues that the Subcommittee will further explore: (1) Ensure a U.S. solution for fuel supply, including LEU and HALEU. This is a threshold issue for both the near-term and the long-term and is essential in building the confidence of potential partners. (2) Consideration of back-end fuel leasing or take-back strategies to reduce nonproliferation concerns and improve economic

competitiveness. (3) Provide more comprehensive assistance to partner countries' training and development, including regulatory support. Russia, China, and other supplier nations offer more substantial capacity building linked to exports.

Bill mentioned that the Nuclear Regulatory Commission has a very small program to provide regulatory support. It's not nearly big enough for what's out there, it would probably have to grow five or six times to really meet the needs and they are not equipped to do that. And again, why not what are we waiting for? How often these opportunities come up? I'll sort of close and I know again I am trying to avoid mentioning specific countries, but I was involved in conversations with the DOE in the previous administration about a particular partner country and there was a lot of enthusiasm. Yes, we want to engage his partner and it took five years to mature that conversation to where we're actually on the threshold of getting something to happen. Why does it take that long when the country wants to do it, we want to do it, we've got the technology, why did it take five years to put this together? To me that's if every time we do this, it takes a heroic effort and five years of hard work to reach fruition, we're just not going to make it. So there has to be a smoother way for the government to get it organized to approach this. So, any subcommittee partners who would like to comment, if there's anything I left out that you want to emphasize, please go ahead.

Korsnick: I mean I think you captured it very well and quite frankly we sort of started the day with it because it's a bit of the conversation we started when David Turk kicked off the meeting just in terms of an appreciation of the power of the international conversation, the opportunity for the U.S. to exert leadership in this area and for our government to see nuclear as the strategic conversation that it is and not a tactical sort of deal by deal conversation. So, I think at least our DOE Team here is well aware and I think the challenge is making this holistic change happen.

Magwood: I appreciate that Maria, I think one of the lines of discussion that's probably worth bringing up and maybe Mike, you were the one that sort of phrase it this, that with the opportunity and the strategic importance of this, that the conversation about nuclear energy should be on the same level, as for example, military cooperation with a country. It should be at that level and at that level intensity and seriousness and we're not really seeing that.

Ford: I think we had a good conversation just as you said Bill that when it comes to international deals to even develop joint technologies in the defense space, we have NATO standard missiles and things like this that I'm familiar with from my past life. But all those discussions on the international arena happen at the very strategic and senior levels of our government in interactions with our partners and so I think that it needs to also be at that same level for our energy technology as well, that we bring into the discussion. I think we do in some cases, but perhaps with only the usual suspects but the large countries that we already do deals with otherwise. I think the key here is going to be identifying those countries where energy demand growth is going to be large and that have not historically been nuclear countries. So, those are the ones that we need to be looking at how we have those conversations early and have them at a strategic level in interactions and build those things that you were already mentioning that other countries, shall we say, are already doing through a Belt and Road Initiative, for one country or just their normal outreach for Russia. And we have to have some kind of other strategic view of that for this technology which has historically been a strength for us. But right now we're certainly not in the conversation in a lot of countries.

Pasamehmetoglu: Bill, I think you've captured a lot of the discussions, but one of my pet peeves, which I'm going to bring up that has not been mentioned, is when we listen to these different agencies and then let's say Commerce and all that, the thing that resonates or at least they start the talking points with that is how important U.S. leadership is in this area. So, everybody brings that up and apparently it's a unifying function between the agencies, but my pet peeve is that when I listen to the details one level below that opening sentence, I don't think we all mean the same thing in terms of what U.S. leadership really means. I think different agencies are touching the different parts of the elephant and they define it based on the part that they are touching, but I don't think we have defined the element. And I think that one of the things that NE can really do as a short-term goal is, let's just define it and get everybody unified on what we really mean by, when we say U.S. leadership. Especially when we are communicating with our allied partners, I mean to be honest with you, some of them are turned off when we start that conversation like that. So, that's one of the things that I think we can probably do in a fairly short order inside NE and then NEAC can probably help.

Korsnick: That's kind of interesting because if we take on that challenge Kemal it might go back to his comment around we don't maybe look at research reactors the same way because if we thought about what really is U.S. leadership well it's starting the conversation sort of very early on when a country is sort of not really in the nuclear conversation or maybe even thinking about nuclear well that's research reactor type space, potentially where you're laying some of the educational groundwork getting them engaged and that kind of stuff and then it leads into potentially the longer-term play. So, it's interesting that you bring it up like that, we'll probably connect more dots when we try to define the elephant and it might lead to some interesting additional actions.

Magwood: I mean I agree with that and I remember that comment. The one struggle I have with that and I don't disagree with it at all, but one struggle I have is, if we were to sit with NE and start developing NE's vision for what leadership is, one, we're back to that. And it's really the government overall that has to have that vision and NE is a part of the government to implement that vision. But I think if you ask NE for a vision, it just goes that far and that's not the whole picture.

Korsnick: I think he wants us to draw the whole elephant. So, we would have to vision with NE, would have to vision with Commerce, would have to vision with state, would have to vision with the Department of Defense, would have to draw the elephant piece-by-piece and then go back around and present what we drew.

Magwood: Well one interesting issue, it was like a sort of an accident of timing, but right after our subcommittee had this conversation, I got a copy of a press release in French, which I can read, even though I don't speak it that well, I can read the French, and President Macron reactivated a Nuclear Policy Council where he chairs personally and is meeting with all key parts of the government to get organized to make these big decisions. And it sort of reminded me, I mean because people of Frank Goldner's vintage always hearkened back to The Joint Committee that Congress had back in the old days, that basically set policy on everything related to nuclear. It was at the top, it was done in cooperation with the AEC, but it was like an all-government view; here's what we're doing, here's why we're doing it, and of course you'll never get that again because that was in the context of the Cold War we're not in the Cold War, at least well, I don't know. But the context is different today and another aspect which is different is that there is such a heavy commercial component to this and the government is not in control of all the pieces. And back in the older days it was really the thought that the government was going to establish the technology and decide which direction they were going to take. We're not doing that today. So, what now has to be done in cooperation with the private sector, which I think can be done, but it's just more complicated. You can't force companies to go build reactors in different countries you have to work with them you have to look where the opportunities are. But you do have to have this integrated approach and I think the innovative approach has to be with the industry as well as parts of the government.

Huff: I'm sort of obsessed with this question now, I thank you very much Kemal, I think this question of the elephant is like it's fascinating. You can think of Commerce sees it as economic superiority and NRC sees it as sort of establishing the safety standards and we see it as this technological expertise, probably, I mean who knows what we see in NE, but probably all of it. State sees it as diplomatic power and NNSA sees it as the volume of their voice in safeguard standard setting. And I think across the board we're all trying to set different standards or gain some certain kind of volume or power in a particular conversation internationally. But you're completely right, its different pieces, I think it's all enabled by deployment of advanced reactors internationally that the U.S. built and invented and regulated and trusts, but there's more to it than that too. Looking forward for your response.

Pasamehmetoglu: My suggestion is not necessarily for NE to go do this on their own. But just like what we are trying to do now, but the time is right on the non-proliferation side of things is for a need to put a strawman out there and have the other agencies come in and put in their input into it and if we have to argue about it let's have the right forums to argue about it, until we come to a resolution. But somebody has to take the lead and I think this will be a very good place for NE to take the lead.

Huff: I will say that while a lot of it is internal, some of the sort of the feeling that you got that a lot of the agencies are talking from a similar playbook it happens through this like internal and their interagency policy process where there are documents related to what it looks like to have U.S. leadership. I can't go any further than that, but I will say that you're right and I think this conversation is too cloistered, it's time for that conversation to be more public properly but that's just my opinion and the rest of the interagency will have to agree.

Magwood: So just without elaborating on what's there, but so you would say that the kind of strategic vision that we were talking about is out there somewhere.

Huff: It's in here somewhere. But I think you're seeing parts of it.

Magwood: But we should put it out, but I think there's also the question about who is the owner and the driver of that, isn't that part of it, is Aleshia the owner?

Duncan: Well, thank you. It's been very interesting to listen to the initial findings that the group has been discussing and I do want to comment on a few of them but first let me say having known you for 15-20 years I don't know, I definitely see some things that I have questions about related to the findings and specifically that I'd like to start with just interagency coordination. And you mentioned that it didn't look the way it looked back when you were in this business and I'm very happy to say while things are not always happy when we are coordinating that we are at a point given the time that we're in and the amount of work that we have to do, that we work very well together with our colleagues at States, Commerce, NRC, EXIM, the list goes on and on, NNSA, the list goes on and on and I don't think it's a function of we had nothing better to do but in fact we had so much to do that we needed to be able to be lockstep in our target and our mission. When you think about international engagement it needs to be home to the point of a primary market opportunities. So, it's not even a matter of we're just out there engaging, we really need to be synced up on what it is we're doing because most likely that's going to involve each of the agency partners that have work to do. State will have to do an agreement of some sort and NNSA will have to review the

non-proliferation and security concerns, NRC will need to see what needs to happen in terms of the regulatory support, if EXIM has a role in that then they're going to need to start doing some diligence, Commerce will need to be reviewing advocacy and all of that. So, there's a lot of lockstep in that in the international engagement that is nuanced down to where we want to have that leadership and what stage of the game in said country or said region so that we know what we're doing. So, this is a matter of need necessity and time frame and driving that this relationship in the interagency has become one of what it has. I think I'd also want to highlight the leadership of the NSC and the prioritization that they have brought to this, because they have definitely become more involved in all of the work that we are doing. They pay very close attention and they provide us guidance and help us when we have challenges with coordination and getting things done in a timely manner. So, they've helped us with our effectiveness and efficiency and the policy guidance. I also want to say that we consider industry an equal partner when we're talking about an interagency collaboration, because as we look at those market opportunities, we're doing that in support of industry and therefore we need to work closely with them to see what their priorities are. And so, we've worked with the NEI, the NEAC and having these conversations about where are you looking and what specific markets are you looking at and how can we help there. And then we've also looked at the regional implications. And so, when you talk about building facilities and training and doing all of that I think we need to broaden our mind to thinking that this is not just an individual country where we have to put all of our effort to do one thing at one time. There's plenty of opportunity to do things regionally and even support the continent as a whole and in a case like Africa and we've proven that easily in Central Eastern Europe with the work that we've done there multilaterally. But when you think about who that person is who owns and who can direct all of these government agencies, while we get along famously, I could never dare tell the State Department what to do or anyone else. We too, believe that, that is an important piece of the puzzle but that person alone is definitely not enough. That person has to have a staff, that person has to have a budget, because the work that has to be done to even begin to compare with the work of our maligned competition, it means that we need to offer basically some sort of concierge service and that's not going to happen if that's not fully resourced. And we're not talking about a few thousand or even a few million dollars for that, that takes a lot of money. And when we think about the needs about being able to work with countries and this is where I'm going to disagree with you on a strategic vision, because if we were resourced properly, we have enough countries to do projects with over the next three to five years. We'd be able to fund feed studies, we'd be able to fund equity placements, we'd be able to work with at least six countries in Central and Eastern Europe alone, countries that say to us we want to have the nuclear cooperation memorandum of agreements or intergovernmental agreements, these things that concretize commercial opportunities. So, we've done and are doing consistently the work we need to do in engaging, we're lining up these relationships because they take several years to develop, but then when it comes to where's the skin and the gaming from the U.S. and somebody framed it, but didn't use those words that we hear from the countries; where's the U.S. skin in the game? We need to be able to place that and be ready with our wonderful intergovernmental agreement. We need to be able to show that type of funding right away and you mentioned that financing piece and that's very important. But I think there's one piece of the points that you made and you mentioned SPEC Kerry and I should have added SPEC's Office in our cooperation of partners because they have been very vocal, specifically on SMRs which a lot of the countries have interest in and fortunately State has been able to leverage the first program and have that level of attention and the projects that come under that and SPEC Kerry's Office has been very supportive of the work that NE is doing as well. And I could not agree with you more that there needs to be that sort of central director of it all, but that person has to be at a high level, that person has to have a staff and that person has to have funding. But one of the pieces that's missing is the agencies also could benefit from more funding because there's early work that we can do with projects. We have scraped the sofa cushions literally to pull together 25 million dollars or so for our front-end engineering and design studies. Again, we could be doing at least one of those a year and this is really an effort with Poland as our first case. It took us more than 10 months to come up with that money and in 10 months I'm sure a check could have been written by one country, who I shall not name, and life would have gone on. So, we really need to be mindful that when we can execute with that type of efficiency because we know that we have the funds accessible and we're not subject to all of the restrictions that our export credit agencies are. And that's something else that could be looked at to be able to support the efficiency of being able to finance projects. EXIM has a two percent default rate and that is not helpful when we're looking to finance nuclear projects. DFC is still trying to find its footing there and perhaps technical support there to DFC could be helpful. So, we have to look at what the agencies who are doing the day-to-day work can do in order to be more supportive in this room, because it can't just be to export create credit agencies who are expected to carry the burden. Our colleagues at USTDA have done an amazing job at stepping up in this field to be able to provide some of that early front end work I mentioned to you. So, I think that there are a lot of things that we need to look at that go into this wholeness of having a holistic solution to this because we have learned, and you mentioned this is not the Cold War, the government wasn't in industry's business a good six to seven years ago. Industry was running industry's business by itself and now we're trying to play catch-up quickly. And so we're learning about all of the things that we have to have to be able to be competitive because as partners with industry this is not something we were even doing five

years ago. I know it certainly was not the mission of my office. So, with that I also just flagged because it was just so wonderful to be a part of and witness that we know we're not in the Cold War because I'm sitting next to a female assistant secretary, I'm sitting next to the CEO of a nuclear industry association, my colleagues who spoke today were Tracey Bishop, Alice Caponiti and Dr. Kim Petry and I of course am a woman as well. So, I know that we're not sitting in the Cold War anymore because we have J'Tia Hart who's up here giving reports on what we're doing. So, Dear D-G Magwood, and I will of course admit that you are a huge champion of gender parity in the workplace, I just wanted to offer some of those thoughts about some of the things you say. There's room for improvement. But I'm so grateful that we are where we are with the interagency and that we have industry as a partner in this journey.

Magwood: Thank you very much. I don't think there was any point where I disagree with anything you had to say. I agree with it all. And I particularly think that you should emphasize one thing which is very important, which is that if there is someone at the top who's acting as integrator it isn't just a matter of having that person be resourced to do their work, they need to be able to hand out large amounts of money to get things going and to spark this cooperative activity. And also, the agencies have to be well resourced to be able to pull all this together. So, that's an important point that we can highlight.

Hart: I knew better than to interrupt when you were on a roll, so, I've seen that happen it doesn't work well. But I had a few follow-up questions: On what level then, do you think this official who would lead this would be at and is there a structure that exemplifies kind of what you are putting out there that could be examined as far as a recommendation?

Duncan: Thank you friend. So, we used to have a sheet of paper when we tried unsuccessfully to stand something up like this at NE that had all of the agencies in the Office of the President in the center. So, we had all the seals and I used to just sit through those meetings and take my pen and just bang on the Office of The President and say that the only convener and director that exists within this structure sits there because none of us can tell our sister and brother agencies what to do. So, that person has to sit above all of our agencies to be able to take that direction and former Commissioner Magwood would also say nobody can tell the NRC what to do. So, then that's why he's the way he is today. But I think it's very important that we have someone that sits at that level and I don't know of a similar structure to that, but I think that's what we would need to see.

Hart: Would this be like OSTP or NSC or do you have any or all of the above?

Duncan: I don't. Dr. Mike Goff is here and used to be at OSTP, so I don't know if he has any thoughts on that, but I don't want to stick my neck out there further than I already have. Dr. Goff, do you have any thoughts?

Goff: Okay, I'll go ahead and stick my neck out. I had no disagreement somewhere in the Executive Office of the President's right place. Right now, as far as groups that have easy convening authority, the National Economic Council and the National Security Council, are the two that have easy convening authority. OSTP, can under some conditions do convening authority and if they're more clearly defined to have it, that's good. So, I think you need to be somewhere there and there needs to be someone that has again convening authority. As far as the right level, I mean there's been a lot of thoughts on that. Keep in mind, the lowest level of folks in the National Economic Council of the National Security Council or the directors. OSTP is an assistant director for OSTP. It needs to be at a higher level than that, so in the general structures you have kind of that director level, then the directors will report to the senior director, the senior director is often what's called assistance to the President. There's a number of those scattered out in the EOP, then the next level is a deputy assistant to the President and the next level is the assistant to the President, which is the National Security Advisor, isn't his Deputy. My general view, is it needs to be at least at the assistant to the President level. And again, that's not that horrible, in reality that's not that high of a level, but it's a senior director level. They generally have people that are working for them at that point, in fact I there was one deputy secretary who I felt described the work of the directors in the White House very well. That it's a nice position because you're real close to the top, but also there's no one below you as well. So, that means you do everything if you're at that directorial level. So, that's why they do really work hard when they're over there because they have no support staff so it needs to be up at that level like Aleshia says, that has some support staff. And generally you need to keep in mind no one has a budget over there. Most people that are over there are still being paid by whatever their home agency was. So, yes having a budget, and I know there's been some legislations that have been tossed around about having multi-million-dollar budgets. I think even one legislation did say they should be an assistant to the President. That's fine, but what we need to realize is that that's a real senior position at that point. The National Security Advisor is an assistant to the President. They're kind of capped and actually you have the same number of assistants to the President as you do deputy assistants to the President. So, any of those levels are good but it needs to be I think at least at the assistant to the President level. We've had some good nuclear czars in the past. Joyce Connery had served in that role, Aaron Weston kind of did a little bit of that role, but not exactly the same role Mike Whatley did. They were all doing it though pretty much at the director's level. So, I think it does need to be at a higher level than that so that they could not only be corresponding with the assistant secretaries in all of the different agencies, but also if they needed the deputy secretaries and the under-secretaries, as well, to make it a little bit more parity there. But that's my, that's not necessarily the whole view for all of nuclear energy, but that's my view of what

needs to be done. But and again I would think, that the NSC, the National Economic Council or OSTP, all could be good locations for that position.

Magwood: If you wanted to smoke something, you're not allowed to smoke in Forrestal Building, so you really have to be crazy, but you could certainly imagine an office in the White House on nuclear energy policy or something like that, that would be at the level of OSTP. That you can resource, that you can staff, that you have resources to actually do things. So, if you really wanted to do this seriously, something like that would probably be what you would do and not just have a person stuck at NSC or something.

Goff: Yes. You could make it its own component if you wanted to.

Huff: I would say that is a big request. As soon as you have a nuclear energy office, then there's a wind energy office, etc. This is the sort of conversation about any sort of equity across these technologies that we need to have, but I think it's a good idea. I would also certify you mentioned SPEC Kerry's Office. I think with a high enough official inside that office, adjacent to him, it could be helpful or within the climate policy office, which is a sort of new like piece of the White House that doesn't have this kind or same kind of convening authority exactly, but potentially it could play a role. I interrupted largely because I do have to disappear to precisely one of these interagency policy meetings over at the White House for the next two hours. I'm going to bring it with me why not but I'll be back in a couple of hours. Sorry for that.

Goff: In my time back doing this, there has been more engagement at the White House at a reasonable level, which has been increasing over the last three administrations. This positive engagement is currently on-going.

Magwood: I absolutely agree with that Mike.

Ford: I just have a quick question because I was an intrigued about your comment about "skin in the game" and what you hear from potential partners. And this is certainly something I've seen come up in your discussions with other countries. Does the issue of delivery of the technologies come up in terms of risk mitigation for them and being a partner with the U.S. and so certainly our history of delivery of product in the commercial space has not been wonderful and there's no secret there. So, there's been the discussions of those issues and it ties certainly back to the risk that DOE has and that they've put a lot of skin in the game for the DOE in helping forward a lot of these products now in the advanced reactor space. So, has there been a discussion related to that and how do you mitigate that risk?

Duncan: Absolutely. I don't know that I hear as much reference to the U.S.'s history of being able to deliver. I think that the countries have been very keen to watch what is happening now with our current actions and to look at both, in the case of Vogtle, in the case of NuScale, progressing through the licensing process and other demonstration projects that we have and how those things are going. And then the question becomes, is the X company going to be able to deliver on time or when they told us they would. And that's a very interesting question because in some of the cases some companies and advanced reactor technologies specifically talking about SMRs, have provided timelines that are in advance of domestic deployment here. And so and they are able to justify their reasoning and rationale for that. And then they also ask about delivery from certain companies that may have done a lot of engagement and have a lot of potential orders on the books. So, can they David Durham, I'll just use his name because I know he won't mind, can Westinghouse deliver in this country, in that country, in that country, with all of the planned contracts, that have been kind of discussed publicly or at least engagement. And I've of course traveled with industry a lot and the answer is absolutely! So, I think their questions are more not about the U.S. industry as a whole, they've nuanced it because they're actually following closely what the companies are doing and so they can recite where NuScale is, they can talk about where Hitachi and other companies are. They know what Westinghouse is doing and therefore, they are really focused on and researched really on those things. I think some of the other, the more common concerns that they express, because there's so much disinformation being spread by maligned competition, and I'll just talk about where Central and Eastern Europe, is about the safety of SMRs. And so that's something we've spent a lot of time addressing more so, than can a U.S. company deliver. Because there has been so much disinformation and when we think about maybe recommendations internationally, I think one of the things definitely should be considered, is the challenges that we have as the United States and being able to provide a holistic solution. And I'll again focus on Central and Eastern Europe because that's where we see the greatest need is going to be, given Russia's bad behavior. And we do want to provide a holistic solution with U.S. strategic partnerships and U.S. technology. What we need to be able to do there to make sure that those relationships are being able to be built and that we are providing the education and information to thwart that disinformation.

Magwood: Any other thoughts, comments? Okay. This has been a very energizing conversation. So, we'll have to go remodel the White House in order to make room for this and probably I'm thinking of a volunteer for this job. This is an extraordinarily important issue, but I also think there needs to be and this might be hard in today's environment, but there needs to be, and some may say well he's at the NEA so of course he'll say this, a very global look at how this works. And if you take this from the perspective of our job is to build U.S. industry and build and create U.S. jobs and that's all we care about, if you if you look at it that way it's almost self-defeating in a sense. It is certainly a huge motivation, a huge reason to do this, but the approach taken has to be in cooperation with the French and the Japanese and others in order to complete what we want to get completed. And I think that one of the

things that international partners look at, is they do look at buy America legislation and requirements to buy U.S. only and it really creates a barrier there. And their sense is to kind of do the same thing at home and then we're all on our own, we're all in camps and nothing gets done. And I think of when I look at where we are today, the one thing that worries me well (it's not the only one of the things that worries me), is that all the partners that should be, except for the Japanese (the Japanese haven't done this but the partners that should be working together in common cause) are all promoting their own favorite little technologies. This feels like a prescription for failure. If the UK has a technology and the only thing they're going to do is promote that technology and France has their technology and all they're going to do is promote that technology, if everyone goes off in that direction there's not going to be an opportunity to have a coherent international stance. And I'll close with noting that one thing that we have certainly been talking to people about is getting the regulators to work together, because these technologies lend themselves to large production quantities. If you want small margin reactors, if they're only built by three or four, you have failed. You want to build dozens of these things and you're not going to put them all in the same country necessarily, but if you have to go through the regulatory hurdles in each country every time, it's also a prescription for failure. And getting that working has not been the easiest thing to do, trust me. So, these are things I think that, and while I agree with Aleshia, NRC is an independent agency within the government. But the truth is the NRC, is the U.S. NRC and they are responsive to national policy, there is no question about that, the chairman of NRC will go on a plane tomorrow and go someplace that the President wants him to, so it's not that independent and it shouldn't be, but it does require the guidance and that guidance needs to come from the right place.

Duncan: So, you mentioned something that reminded me, I won't say triggered, but reminded me of something that's very important and I think Mike, you highlighted the importance of national security. And in Central and Eastern Europe we have definitely been, we were made, painfully aware of the importance of viewing energy security as national security. And I think that supports that argument that it really needs to be looked at in that way, because even from a financing perspective that opens up a lot of opportunities. And so, I think that that's one thing that hopefully the recommendations underscore. And I also wanted to speak just because you mentioned about other countries working together, again I believe that the events in Ukraine have really facilitated a lot of conversations with like-minded countries. And even some countries that we still need to see if we like their mind, but I think that that's really the opportunity that we've had to have conversations with the UK, Canada, France, and Japan and then maybe a few other countries when we have a very critical crisis to solve on the HALEU issue, etc. But also, as we look at how we support Central and Eastern Europe as they will have to undergo reconstruction at some points and again providing them resources. So, I think that while Russia's painful and abhorrent behavior, almost a year ago today, has been, it has been really an eye-opener. And highlighting the importance of the multilateral cooperation and the urgency of which we act as a global community.

Korsnick: I guess we're talking a lot about the White House position and the importance of it which I wholeheartedly support. But we talked about the elephant and the elephant doesn't mean that all those pieces are necessarily in the White House. That means the White House is there, but you need these, I'll call them satellite places, that also have to be very effective in order for that White House position to really function. And so, I guess I would just bring it home here just a little bit and I'll put you on the spot Aleshia, and I'll apologize to you later, maybe, but like maybe I got it wrong, but I don't think your office has funding as an example or certainty in funding might be the better way to say it. So, see I would just say that as close to home as we can get, which is right here in NE we're not even channeling the significance of this. And now, we're going to knock on the White House door and say hey how come you guys won't wake up and do something. Well, we're not even sending that message and we're like home base, so I know the elephant's bigger than us, but you got to start with demonstrating through your own mechanism and your own signaling that this is damn important and it's being undervalued and underplayed. But I feel like we're feeding into the narrative, which is the thought I wanted to get out. And I do think the White House position is important, but we should probably have that bigger ask of these satellite houses in wherever other parts of the elephant need a satellite house to make this whole thing work.

Magwood: I think Aleshia had highlighted the agencies need to be well funded to be able to carry out these missions and clearly the Austin Clear Energy is part of that. Mike, where you going to comment?

Goff: Well first, so Aleshia doesn't have to get on the spot, we definitely agree with you. We need to have something beyond program direction funds that we can funnel all from the international area to keep that moving forward. We agree with you, 100 percent on that it needs to be shown that it's a higher priority, so no argot on that. The other thing that I also would add to, as far as you talking about satellite stuff, I guess the one thing I might bring up too is again like SPEC Kerry's Office, it's a White House component. This actually headquarters the State Department, but they're not located there. So, there are options if something was set up, it could be headquartered in the DOE, but still be a White House component. So, there are all kinds of options for how to set that up, but I definitely agree with you that we've got to show it's a high priority in the international space. I'm real happy when we do put up our four priorities out there. One of those priorities is international engagement. So, I think that is important, as we're talking, it's not just existing fleet, deploying new reactors and the fuel cycle, it's international

engagement. We're not doing this just for the domestic use, it's for us and for our partners and we do have to continue to stress that to everyone. And it'd be nice if we had money to do that.

Magwood: Any other comments before we close for lunch? I have made a note, so more money for Aleshia. I have got that down, I'll let Katy know. Luke, can you instruct us what to do?

Branscum: Yes, absolutely. Thanks. So, folks on the WebEx thank you for joining us. We will take a 45-minute break.

Magwood: Why don't we just start at 1:30 pm.

At 12:45 p.m., **Luke Branscum** declared a lunch break requesting that the meeting adjourn at 1:30 pm.

Afternoon Session

At 1:38 pm, the meeting was called back into session by **Luke Branscum**. He turned the meeting over to **Chair, Bill Magwood** who mentioned that this will be the last of the subcommittee discussions and then there will be a general conversation with the Committee to see if there were any issues that were not addressed, other than what had already been discussed and that finally, the meeting would be opened to public comments. He said that it was pretty clear to him though that this meeting will be wrapped up sooner than the scheduled end time. Then Bill turned the meeting over to **NEAC Subcommittee Member, Sojna Schmid** so she can start the discussion on the "Workforce of the Future".

At 1:39 pm, **NEAC Subcommittee Member, Sojna Schmid** led the discussion on the "Workforce of the Future". Sojna began the afternoon session by stating that she was going to report on the work by the nuclear Workforce of the Future subcommittee which consisted of Richard, Bill, J'Tia, Raluca and myself. We met three times in November, December, and January. We heard from Lori Brady from the NEI on the industry's perspective on their strategic workforce plan. We reviewed a bunch of documents that were provided to us (thanks to Luke's detective work) from various National Labs. Oak Ridge for example, has a database called ORISE, on nuclear engineering program enrollments and degrees. We also consulted American Physical Society's, Report on "Readiness of the U.S. Nuclear Workforce for 21st Century Challenges" and several other documents and we structured our deliberations along the lines of, first, what do we know, what data do we have, second, what do we need, what information is missing, and third, based on what we learned, what suggestions can we make. And this is as in the other subcommittees, work in progress.

So, what we've learned is that workforce planning is a tricky business. It involves a lot of uncertainties both on the demand and on the supply side. What the demand for nuclear workers will be on various levels is the big question. What gaps do we currently have in preparing the nuclear workforce. How long will it take to train the required workforce. Are there communities that could be retrained and how do we address delays, surges, transient employment, etc. The industry's perspective data is a really comprehensively structured analysis around the following steps. And this is kind of mirrored also in the academic research on this. What is the current workforce situation in terms of supply and demand, what are the future requirements projected to be, what are the gaps, and then how can workforce action be planned, and then how can this be executed and monitored. A few observations, we learned about that in the U.S. the government intervened when the university nuclear engineering programs went under in the early 1990s and helped turn that trend around. Today the U.S. is among a few countries that still are training nuclear engineers. However, what is also needed for the nuclear industry are electrical, chemical, and civil engineers, along with trained trades people. So, the challenges are varied and manifold. Non-nuclear engineering students don't necessarily know about the possibilities and opportunities in nuclear engineering. Also, in this country the long-standing emphasis on college education as the only valuable form of education has resulted in a shortfall of skilled trades people. The nuclear industry has recognized this and has started working with community colleges and others creating training paths for young students as well as for mid-career workers interested in career changes. Ultimately the issue of a nuclear workforce may not be first and foremost about technology or technical skills but about community and that's kind of starting to connect in my head with the other subcommittees here. Similar for example to the consent-based siting approach perhaps workforce development needs to invert its approach and start from the community level. How are disadvantaged communities affected by technological changes and what is it they're hoping to transition into. These communities may or may not be interested in training up for specifically nuclear jobs but they may also be interested in skills that they can apply in a wide variety of areas and that are still needed in the nuclear industry. For example, construction, assembly, welding, repair, etc. So, in addition to skills and opportunities to be taught or to be acquired there are lots of questions about recruitment benefits and quality of life as well as retention, especially in small communities. Some of them where nuclear facilities are already located but some of which were nuclear community nuclear facilities might enter into. Most of the data we were able to review, focuses on college degrees relevant for the nuclear industry not so much on trades. There's also limited data on diversity, there's a little bit on gender but not on diversity at large. And we also noted that some of the partnership programs at HBCUs and minority serving institutions that existed a couple of decades ago have lapsed. Then there's overlap with the international committee as the U.S. could learn from for example programs in Russia and China, as

Bill mentioned earlier today that are actively recruiting and training students from abroad to establish these long-standing relationships. And then on the kind of the output level there's also international competition for trained nuclear experts at all levels.

So, in the second part, what we identified is, what do we need, better data on tech trades, what is available, where, how long does it take to implement, curricular changes, how long does it take to train, a picardia of skilled texts and what's the competition. We need more data and better data or data in the first place on diversity, in all careers including trades. We need a better understanding of the workforce needs, particularly for outage surges, but more generally for transient and migrant workers, for construction, and also for emergency response. And we would like to have more information on labor laws pertaining to the nuclear industry. What unions, if any, are there related to energy in general and nuclear in particular and what's their perspective on workforce issues. So, those are some of the areas where, going forward, we will request more information from subject matter experts.

And the third and final point, the subcommittee's plan going forward and our suggestions that we plan to work on and we structured that along the lines of DOE's and NE's strategic priorities. So, three of these areas were identified: (1) Improved diversity in the nuclear workforce. So, how can we further increase diversity in existing programs and produce better data on it and then also focus on job development in communities that are already either near nuclear facilities and also identify gaps. For example, if the opportunities won't be steady enough to support a particular community, what are the issues there. (2) An emphasis on environmental and energy justice, which relates also to what I mentioned earlier, to community building at existing nuclear sites, the development of social infrastructure to help recruitment and also retention of a diverse workforce and an engagement with tribal colleges. What content can be developed to help them learn about their own troubled history to empower them to choose their paths in and with nuclear and then (3) Advanced tech trades, how best to encourage, nurture, fund, and train up, existing trade school programs and also to focus in on what are specifically nuclear requirements and how are they different from more general tech skills and what if any additional training requirements and incentives could or should be offered. And I just wanted to note that all of these priorities would benefit from including social science insights be that in planning but also in or in curricular content. Ultimately, none of these priorities will succeed without exploring questions of conscience, history, and community. This is not simply about raising the numbers, filling the gaps and retaining specialists. Ultimately, the workforce is about perception and meaning. It is about people, their hopes, their needs, and their place in the world.

And I would invite my fellow subcommittee members to chime in and add anything that I forgot. Thank you.

Magwood: Anyone else in the subcommittee that would like to weigh in any other comments?

Scarlat: I just want to thank you Sojna for recapping everything so thoroughly and for putting it in the human framework too and also for highlighting the questions that we still have. There isn't a one go-to place for what is the strategy, what is the current status, so that in and of itself I think is a finding. So, I wanted to highlight those two points. Thank you Sojna.

Arnold: Appreciate the report and overview as well. I've been on travel and so I haven't been able to participate as much as I hoped. One of the things that is going through the process is trying to figure out not only what we want to do from the tribal point of view and what I hear from a lot of folks. I mean it would always be great when we hear about stamina, how nice it would be to get people engaged on many different levels. And clearly not everybody is cut out to be an engineer nor everybody is cut out to be a welder. And so, it goes from a whole diversity of occupations and needs. But once we get to figuring out how we can do it, (1) We'd like to see more on the tribal side and of having people plugged into at all different levels. I mean so nuclear engineers and civil engineers and a lot of other types, but what we find oftentimes is when people go and get an advanced degree, then go into some work area, oftentimes those people leave their communities. This is because you have to follow the work, but when you leave the community, then you've created a void now in that community. And so sometimes people are discouraged from going on and so that's a challenge that we have to look at. (2) It's the messaging and brokering of the conversations and that's why it's important for social scientists to be involved to understand maybe the complexities of interacting with people. Because you have to be able to articulate the words that will be meaningful to people and so they can see what the outcomes and potential can be. So, I think that the subcommittee is looking at this from many different levels. This is a very complex situation, but we're all aligned with trying to figure out how we can enhance the existing situation. Because we see a lot of times as generations are going on, projects have been going on, nuclear energy is going to be around forever or for a long time at least. So, we know that because of that we need to be better prepared to engage as much as possible in a diverse population. Just had a couple of side notes.

Magwood: Very interesting, off course. I'll just note I appreciate the concern about keeping communities together in this context. One interesting thing that I think Aleshia is going to be working with us on a mentoring workshop for young girls. It will be held in Canada for indigenous youth. First, we've never done anything quite like that, so, target it because it's going to be pretty interesting. I think this community aspect (we have been discussing), is an important aspect of this that we're going to be very conscious of. So, I'll be smarter about this next time we meet because we would have gone through that experience and watched that interaction.

Ford: This kind of dovetails with the last discussion we had on international. I think it's important for us to think about the workforce development issue in a way that we're thinking about the technology. Which is, think of ways that we can treat this in a broader context of energy security. Part of that can't just be about the technologies themselves, it has to also be the workforce that's going to manage the technology. And so how do we team with international partners or anybody else that can actually help and create opportunities for growth in the workforce by offering opportunities. Maybe they are government-funded opportunities. A good example would be a Job Corps of some kind that does work in the energy space and helps train that workforce in a way that's going to ensure that we have the proper scaling, if we really think that nuclear is going to be hundreds of more plants, we have to have the people that are going to populate those and maintain them and build them. And so right now, I'm not sure that that's tracking with the pace of the technologies being developed. Do we really have the people that are going to populate the workforce for that, both in the U.S. and internationally? And so, I think trying to dovetail this, is a little bit of work. We're talking about in terms of moving the technology forward with a kind of a czar (if you will, sorry I shouldn't use that term) in the White House or something like it. Can part of that be the education aspect of it and the workforce development piece of it, not just forwarding the technology?

Magwood: Let me just comment because I think there's a really important point here. Because the demand is important to drive the training and you can't train people for jobs that don't exist. And no matter what you think the future might hold, if people aren't convinced these are real, you're going to have a difficult time convincing these people to become skilled in these areas if there's no incentive for them to go into these training programs. So, I think this is really very much linked to what the industry's plans are and what's actually foreseeable in the future. And I know Maria has a flag up, and let me just ask you Maria. NEI had the experience of pushing for these trade training activities of community colleges which I thought was an excellent initiative from the industry and this was done all over the country. But we didn't build plants all over the country. So, do you have any insights as to what the outcome of all of that was back then, I think it was about 10 years ago this was taking place?

Korsnick: Yes. And so, as Bill said, when we thought there was going to be the Renaissance and plus we just looked at our own retirement rate as an industry and we said, we got to get people in the pipeline. And we in a coordinated way, worked across the industry for people to partner with community colleges. Some of the two-year degrees could be very interesting to some things at a nuclear plant. Like a chem tech, or an RP tech, a welder, that kind of stuff and so what we were trying to do is sort of in line with what he mentioned, keep people in the community. So, they were already there, they wanted a job there and provide enough skill that you'd have a partnership with the local plant that would say if you go past this class we'll offer you an opportunity for a job. So, some of that still exists maybe not as firm, Bill, as what you remember 10 years ago. But there's still vestiges of that and we're reinvigorating it. So, we're working on a strategic workforce plan for the industry that's looking ahead five to ten years. We should have phase one out in the next couple of months. It won't be perfect but it's intended to begin to create some conversations across the industry about what's needed and it'll be a strategic workforce plan for the current fleet as well as if more things are built. Because the current fleet needs it too and that's why you heard it and I think her comment is something about outages. So, our current fleet struggles in the outage time frame. Outages got shorter and they're overlapping. So, in that short outage you need sort of more people at more places for some specific technical skills. So, it's a challenge today and we'll just exacerbate that challenge because it won't only be those skill sets, it's also going to be are there enough unions (not jobs), are there enough union workers to fulfill all of these jobs. When we talk about not only construction but maintaining these assets so we are teaming. The unions are represented on our strategic workforce team as well as the Center for Energy Workforce Development. They're also doing some thinking in the space, so whatever it is we come up with, it's not going to be 100 correct. But we're just trying to get in the direction of goodness so that we can step back and draw some sort of big flick items. And it will to your point reinvigorate some of these partnerships with local communities. We're already working in Wyoming, for example, where they don't really have a thought, hadn't until they started thinking about building a plant. And so we're already working with some partnerships between like Wyoming, I think it's Idaho and Utah, that want to work together on sort of putting some schooling together that would make sense in that area. Because obviously likely there'd be more plants there. So, we have the beginnings of something but to the point that he made like this needs to be on full force, in order for it to have results in time for us to be ready when we think the uptick is really going to happen. So, think about that in the early 2030s. Well then the time to get started is right now. The one thing that I did want to think about though is as you were speaking and that is we have done some work on education. But I'm thinking two things. Some of that work might have passed you by and a part of this is my ignorance. But we had the ANS work with the DOE to come up with kindergarten through 12th grade education on nuclear. But I'm not sure that it gets to all of the indigenous people. And I don't know, but I mean I think that's a question we need to ask ourselves that when we invent some of these products that we think are helpful, I think we are ignoring more than 50 percent of the schools. But maybe your statistics are different so we should be thoughtful about making sure that when we think we're getting places that we're getting potentially to all the places that are needed. And then on his international point, when we invent those programs like we did, what about using that internationally, So, when we're working with Canada and their indigenous folks, are we offering, hey we have this

K-12 program that you could put in your own school system and create your own long-term pipeline. It's done with Discovery Education, it's trying to be like cool and interesting and not just kind of boring and let's read a textbook together. But my point is once it's invented, there might be strategic value to that and I don't hear us talking about it in that way. So, it kind of goes back to thinking about what kind of tools do we have in our toolkit to help us in this international space and training could be one of them.

Hart: So, I just want, to quickly piggyback. I heard you saying and I see Melinda is sitting here and she actually works in DOE's office that works with teachers and getting different engagement opportunities and tools deployed. So, that's also something that you can look into and we do have those resources and I have seen the discovery kit that you guys put together. But also making sure that we have an engagement act, an actual engagement plan, not just creating the materials and then hoping somebody picks them up. But I know we've done things like with the Girl Scouts and the Boy Scouts, where you have a badge that you can earn in nuclear. But even a deployed push as something that can do the K-12 pipeline and having specific partners who are in the community. Because the people who are going to deploy this are going to be the people in the community. We can't just pop up in the community and expect them to listen. We have to use the grassroot networks that are already there.

Branscum: I was just going to note that Dr. Huff, Dr. Petry and I, were able to visit the Millstone Generating Station in December and they have a great program existing with the Three Rivers Community College. And I think in the operating room three out of the five people in there were graduates of the community college program.

Magwood: I visited the Three Rivers Community College. (I actually still have their hoodie they gave me, it's a very good hoodie.) And yes, this is a very good example of the program that's up there. Thank you.

Ford: Some of your comment back indicated that maybe you're concerned that you'd be operating at risk a little bit. But I think that the skill sets as you were talking about here are fungible enough that you can do that. In other words, it's worth it for the country to invest in those, because even if they don't end up building as many plants as we would hope to build, those skill sets that they're going to develop are going to be transferable to a lot of other industries in our country. That I think is always going to have value. So, I'm a little less worried about that than I am about having the program in place that ensures that it's available because those skill sets are transferable.

Magwood: That's largely true. I mean welding is welding, pipe fitting is pipe fitting, might get a little dogger with RP techs and things like that, but most of them, I think you're right, they are very fungible.

Arnold: I had spoken to somebody, I can't remember who they were with, but they were making casks and things for nuclear power plants and things. And one of the things that they needed was welders and the welders that were working in that that nuclear facility, they were making a six-figure salary versus your basic Ocilla welder that was certified, maybe not for stainless steel, but when you get that certification, then your pay goes up exponentially. So, I think that that's an important note. The other is admittedly, I think nuclear has a bad rap too or it gets the bad rap, because a lot of times people just don't understand how it's used or they don't understand how important it is. All of us were touched by nuclear in one way or another. So, even when you're trying to educate people going into careers and you have communities like in Nevada, for example, I'm close to the NSS, formerly Nevada Test Site, and up the road you had a low-level radioactive waste and I remember other people coming around from various departments kind of joking about, how you guys must be glowing down there because of all the stuff going on or do you see any of weird-looking animals, etc. And so sometimes it's again getting back to the messaging. Somehow, we need to educate people to not be concerned about what people say and think about someone being a nuclear engineer because they just don't know and understand. We somehow need to change the general thinking that nuclear is just bad. So, we just need to figure out a process for how we can get some long-term changes. And it doesn't happen overnight, I understand that, but I mean it's something that we need to strive for because when you look at and hear about all the other international ventures that have been done, where people are on board or you look at the website down in Carlsbad, that they were able to garner enough support to get community support to have that. The website is in place, so it can be done again and we just need to figure out how to go about doing it.

Magwood: I can reinforce that point. It's a very accurate observation. One of the things that I'm so quite proud of that we accomplished and that was with NE, we had these partnerships between the large engineering universities and HBCUs around the country. Some of those partnerships still exist, they're still going on. But once I remember when we first started, the one in South Carolina and we were trying to draw these kids into the program. One of the things that we had to overcome was that the parent's thought that we were going to irradiate their kids and that it was dangerous. This concern with the parents in South Carolina was resolved by some hand-holding and explaining and promising reinforcements that we were not going to irradiate your kids. These steps had to first take place before they could break through the parent's concerns. And then of course once this mutual understanding and trust was established, everyone was fine with it. But you have to do it, it does take an effort to do that education and it's not much just education, it's really the reassurance and the hand-holding that you have to do with people to tell them, that look you've been misinformed about this, this isn't accurate, here's the reality and then get them over that hurdle. Because I think you're right, I think there are still places where the information has been so bad, I mean I'm still running this evening with very highly educated people in governments around the world, who think the nuclear

waste is this green stuff that gets pushed into the river somewhere. And still to this day you see that. So, NEI needs to get more commercials on out there.

Schmid: I just want to also suggest that rather than launching a full-fledged PR effort, it could be worth emphasizing that becoming a nuclear engineer enables you to be a critical nuclear engineer and to really engage with the technology on their own level, rather than being just a protester who chains themselves to a bulldozer or something like that. There are critical nuclear jobs as well out there and I think rather than always and only emphasizing the positives, I think that we just owe that to the communities we keep talking about, they need to come to their terms on their own terms with nuclear.

Magwood: Any other observations, comments?

Scarlat: I think also the observation that nuclear is a stand-alone field that doesn't mesh with other fields, that's not how we should be talking about nuclear. Every history class has some pace of it that will tie to nuclear technology or every literature class or creative writing class can abort the subject as any other subjects that it that is treated. But I think maybe that's the question of what role does DOE have in integrating curriculum that is relevant to the nuclear industry but not specifically into nuclear engineering training programs. And I think Sojna, that's sort of what you brought up too also, that it's not just the engineers that are needed. We need also the lawyers and the social scientists and the anthropologists and the cultural experts.

Magwood: I think that's an important observation but I also think that the point of the Discovery Channel exercise that Maria had talked about, which is a fantastic initiative, I remember when that was formulating, I was really happy to see you get off the ground, it goes to everybody, it goes through all the students, so students in high schools get this whether they're going to be engineers or something else. So, it really is a way of just providing better information, and I'm not going to start on this bandwagon, but one of the really frustrating things is the bad quality of technical information in a lot of U.S. high schools. I mean kids are just being told things are just sort of flat out not true and despite teachers who don't know what you're talking about but don't have any problem saying things that don't make sense and this gets perpetuated. The discovery initiative I think is a counter to that but we have to do more, I think as a country, quite frankly I think we do need a lot more with fixing these sorts of issues.

Ford: Yes, I'd just like to also just say that a lot of what we talk about probably sits at the federal level in some cases but the stuff that's really going to be driving things, is going to be at the local levels and state levels for education. And is there lessons out there in other industries where they've run into problems with being able to populate the workforce. Oil and gas in Alaska, for example, I was looking at proposal I was developing for an energy center. We look at that as a model, because they found that they had to go all the way back to the fifth grade to actually start developing the curricula that would build the number of people they would have that eventually get through their system to actually develop the proper either technical workforce or bachelor's master's degrees that will populate these oil and gas industry jobs in the state which are basically is their top industry. So, they actually have models like that looking at those kinds of structures. If we think that nuclear is going to be in that category in some states then we ought to be working with that as well as to help states figure out how to build these programs that are going to help start at a very early age, make sure they have the proper information and the tools to actually develop that workforce and find ways as an industry to help support that.

Magwood: Good point.

Scarlat: I wanted to bring up the migrant outage worker and the need for migrant workers in the nuclear industry. And this ties also to international engagement. Because who is available to join a workforce that requires sort of seasonal engagement at different sites will vary from country to country. And so if we're developing technology and training workforce that requires that subset of individuals and we also want to think about how do we establish communities that support that type of work. And so yes I think that there's a focus in the U.S. also. And how do we manage outage workers and Maria brought up that, that's already a challenge in today's plans. And maybe looking forward to the next generation of plans, how do we do better at planning for that. And I think that ties into maybe also some of the labor laws and the unions and it's something that I think as a subcommittee will be thinking more about.

Magwood: Yes, I think that when you don't get into that conversation you probably do want to talk to people who are familiar with how those systems work. I'm sure Maria could point to the right kinds of experts who can talk about how the workforce actually gets managed for outages or for other purposes. It's kind of complicated, so it requires some background to understand it because it's a network that no one would have ever created but this network didn't exist today because it's just the way it grew up over the period of time. But there are a lot of people just kind of running around the country providing different services because they have special expertise and special skills.

Goff: I was just going say yes, that's not an area I've worked in as much but I mean at one of the trips that I went to Vogtle we did have the unions talk to us about that and the issues that they are facing and this is maybe getting to your community issue as well, is how do they manage the workforce to make sure that they can go back home for extended period of times. But they are in fact I think they were noting with all the data centers being built

you're drawn under similar workforces. So, it has become more and more competitive to keep that workforce there and start looking at what the benefits are. And like say, I hadn't thought about the fact again how do they go home, how do they do set up different benefits for them so that they can go for a week, no questions asked, with notification. And they really haven't had that before, it's like you almost if you go you might lose all your benefits and seniority. But starting to set up those things and Vogtle has gone through that to make sure that they're a competitive site to keep their workers. So, they might be a group that would be worth talking to as well. The unions people at those sites and what the Lessons-Learned are, how do you attract and maintain that workforce and keep them where they can still not completely leave their community. Because they are transient workers, they kind of want to go home to see their families for periods of times. And thus, how do you set up a system to manage that. Yes, I can say those are not issues I had thought about in my career but it was interesting how they are going through that and are continuing to resolve how they work with those folks to make sure they can keep and attract those people on those sites.

Scarlat: And Data Center is a competitor? Is that where you run to.

Yes, that was that was one of the big issues that they found, that especially in the Southeast there's a lot of large data centers and they're using the same pipe fitters and welders that they need at the nuclear facilities. And if they start putting in better benefits to manage how they interact with their families and go home and see their families they're starting to lose more and more workers to data centers that are just being built up as well. Again not something that I would have thought about as being their major competition for a nuclear power plant construction but that was one of the major things that they're facing right now. This is true especially with the pipefitters.

Magwood: Other comments?

Arnold: Yes, I just had an observation and part of it is personal and then so, being by the former Nevada Test Site and looking and knowing how things would happen out there, anything nuclear was always under the cloak of secrecy and rightfully so. I mean there's definitely needs for it and understood but sometimes people just derive some misconceptions about because it's secret and that so what really is going on out there, why aren't you telling us and of course the need to know kind of basis kind of thing is what drives everything. But I think back of when they were doing the above ground testing and so when they were doing that it would always happen and again under the cloak of secrecy but it'll be done early in the mornings that's when they would do the shots and then they wouldn't tell anybody. But we would all see the government white vehicles coming around our communities and we knew that there was going to be a shot. Because here they come again, because they just we're checking to see if anything was going to happen. And so, we had that to endure and I remember when there were elders that were there (it's kind of a weird profound thing I guess), they were doing prayers when they would see this big flashlight going on up there and said they were playing with the sun over there. That they're trying to change night into day and that's what they were trying to strike a balance with a cultural balance and reconcile all that. And radiation is associated with the sun and so maybe there could be some parallels drawn from changing night into day and playing with the sun or manipulating that. But it was things that people thought were going to change the environment, change the balance only because they would see flocks of birds sometimes would fall out of the sky from fallout or you would see deer coming down from areas that would then die or they were sick and things. And so, people just saw that and then so many of those people are still living and thinking okay so that's a generation also that you need to enter into the equation. And we can't talk to everybody, we can't change everybody's mind, but I think it's part of just trying to educate folks on how things can be perceived. And I remember being involved one time in this perceived risk assessment, as opposed to a natural one, and when you deal with perceptions, it was just really intriguing and people said oh well we're going to get nuked every time this thing goes or drives by and then it was going to impact land and everything and so on. But those were perceptions until you started talking to people and explain to them and then comparing things like chlorine gas or being transported and things like that and the dangers of some of the hazardous materials that are out there versus the safeguards that are built in to the things on the nuclear end. But again, I think we sometimes don't get the information out and I know, recently like with just the various train derailments that have gone on, everybody says yes but what if that was nuclear stuff that was in there. Well chances are that it would probably still be there and everything will be okay. But they just don't know and it's just because they can only equate to what they see on the news and see how it's perceived. And I think the other part was in talking with the younger folks, is unfortunately you deal with this thing about the Simpsons (I've never watched the Simpsons), but I know when people would talk about, well they talk about the green ooze and the stuff in the barrels and stuff like that, that's associated with nuclear power plants. And so younger generations grow up with that, knowing and thinking that this is what it's really like out there, wherever there are 55 gallon drums with stuff. And I remember there was one movie at one time too that was supposed to be going into some nuclear place and it was basically a bunch of 55-gallon drums stored with radioactive placarding on it and stuff and it was like no it wasn't that but it just gave that impression. And people could be very easily influenced, unfortunately. And unfortunately, you don't have the critical minds to maybe think through some of this stuff. I don't know, these are just an old country boys' observation.

Magwood: All right I'm looking around I don't see any other comments. So, Sojna what do you think, do you have some food for thought there?

Schmid: Yes, we have some additional ideas and we'll just continue along on these priorities.

Magwood: Excellent! All right. Well, thank you.

Schmid: And also, maybe connect with the infrastructure and the international subcommittees at some point. We overlap already so that's already there.

Magwood: All right. Well, thank you. And thanks to all of you in all the subcommittees. Very good work. This is the first stage of this. I think the next time we meet, there'll be a lot of additional progress that will have been made. So, we'll look forward to continuing this effort. At this point I would like to open the floor just for General Conversation, to see if there are things you'd like to raise. Luke has indicated that if we think there's a gap, that we can then add a subcommittee. Are there any thoughts in that direction?

Scarlat: One topic that seemed to be a common thread among the subcommittees is the NWPAA Amendment. It has ties to the international engagement and consent-based siting and infrastructure areas. Is this an area where Katy would like maybe a focused attention or is that out of scope of what we're looking at?

Magwood: Are you suggesting whether to have commentary on whether the NWPAA should be amended?

Scarlat: No, but I think it seems like it's an ongoing effort that DOE and NE is contributing to and it seems to have important and present time implications on all of the topics that we're approaching. So, is it of value to make sure that we capture feedback on that topic specifically or is that really out of scope of what we're looking at?

Goff: I guess I would still view it as part of the consent-based siting activity. Yes, it is very much an important thing to us and I think it was noted that the NWPAA is the law of the land. If we are limited very much in what type of work we can do in that area by that act, we cannot look at characterizing any other specific sites or anything along that. So, it is limiting if we're going forward in an approach other than Yucca Mountain right now. So, yes, the department is looking at what are the recommendations on what do you have to do to modify that act to be able to go forward. So, yes, it is an important area, I probably would view again that this is still being addressed under the consent-based siting. But yes, as far as you want to on the international, you can still cover it if you're looking at fuel take-back in those-kind of issues which will also require some modifications to the walls and all, as well. But I view probably the existing subcommittees can probably cover it as they're structured right now. Were you suggesting though a new committee focused on that or just is it going to be addressed enough in the existing subcommittees?

Scarlat: No, I was thinking in the existing subcommittees. There seems to be already a lot of activity in that area so I'm wondering if feedback in that area from the committee is useful or if the ship has already sailed.

Hart: I'll tell you as far as our committee the back-end commitments consent-based siting we intend to address it explicitly, when we have recommendations that we feel like lead there. But I think just looking at how can we change the policy, the NWPAA, might be what we're saying that the elephant is too big. So, I think it'd be good if you had pieces from the committee where you see opportunity for action to address that. That would be a recommendation that you would put forward in your committee's report, as I would see it.

Ford: Well, I guess maybe it's a question for you and that is that one of the things we don't really cover in in our committees is the current research program that NE is doing. We started the day with a bit of a concerning question about what happens with the budget given that a significant portion of it was placed in a different category, shall we say right now. And what happens to the extent that we start to have more budget pressures and is there going to be value or does NE need assistance from NEAC in looking at the research portfolio and how you might manage that in a different way depending on what happens with the budget. Because the second part of that is that I know in speaking at the past, someone who sat in the chair in the past, the thought was that to actually do everything that NE wanted to do is going to cost about three billion dollars. This number was passed to me today by Luke, as the top line number that was really necessary if you want to do all of ARDP and all the other research that you would want to do and we're nowhere near that. It's only 1.77 billion and some of that now is at risk, so the question is there a balancing question that needs to get looked at where NEAC would be helpful in providing some feedback in terms of priorities or how you might manage down or differently some of the risk reduction parts of the ARDP or something like that. I'm just thinking out loud here. Is there something here that's worth looking at given that there's some budget pressure that may surface in the future?

Goff: I want to think about how we would go about doing that. Some of it is going to be a timing issue and discussion issue too. The budget formulation stuff we can't go into it until clearance is released and so let's take that under advisement on whether we want to consider doing some more thorough looking at the programs and all. I think it's probably worthwhile on us still giving presentation on here are the programs and all as well. I don't know that we need a subcommittee necessarily on that, but we could look at informing the committee more on here's the R&D activities of course, here's our four major initiatives we're focused on, and here's the key things that we're doing within those.

Magwood: Yes, I was actually going to suggest by the time we meet again, we would have gone through the budget process pretty much completely but going through enough so that we could get a presentation in full committee as to what the outcomes are so far or what you're hearing and what the prioritization is. So, we could

probably arrange that so we can add that to the agenda for the next meeting and then we can see whether there's a need to do anything further.

Pasamehmetoglu: I don't necessarily recommend that we do it but one of the things we need to look at if everything we are doing with nuclear energy is going to be successful and we are going to have the demonstration reactors, microreactors, etc., and all that stuff coming in. I think the next big issue is going to be recycling. So, I don't know whether or not it makes sense to have a subcommittee looking at closing the fuel cycles or having a general discussion with the big committee on closing the fuel cycles, what are the pros and cons and what needs to be done. Together we understand there are people, there are practices in place and some people call them policies, but I think we need to take a look at the existing recycling programs and if that is at the right level or do we need to go to the one step beyond that to get ready. Because it's another one of those where by the time somebody comes in and says I want to recycle we are going to be 10 years too late.

Korsnick: I agree I think this is maybe perhaps where we seek some advice because we actually kicked this around on the back end of the fuel cycle in terms of should one of our products be kind of a big flick of I'm sure there's interim storage and then there could be long-term storage and there's recycling but they kind of come up with maybe an integrated even picture of the like what's possible. We chewed on that for a little bit and then we also kind of stepped back and thought, if this is advice to Katy then are we trying to do something that needs to be put in place more in the near term in the next few years and so I guess my thought is we kind of came back to maybe seeking advice of what the department would like if that is a useful product or not. I'm not sure that it's solely our committee I'm just saying that we had we had conversation on it just because there's so many inner relationships if you do recycling and sort of what are you recycling, well once you do HALEU that also puts a new item in the mix because now the used fuel of HALEU is a little different. And then if we're going to do TRISO fuel, well taking apart TRISO fuel is different than taking apart the fuel that we have today. So, when you start really pulling some things apart it became more involved. And so I agree personally I think it would be helpful and useful to have maybe just the art of the possible and understanding the interrelationships between these pieces as a bit of a I don't know menu almost that from administration to administration or some here within the department that there's an agreement maybe on even what all the pieces of the picture look like. But the more we talked about it, it felt larger than what we can tackle, what our committee was trying to focus on. So, I guess I kind of feel like this is something maybe we would need some guidance on what's helpful or useful to the Department.

Magwood: I think this a myriad of points. This is a huge issue and there's actually an international group working at the NEA. I think John Carmack is on this group looking at (to actually answer the question), should we be doing recycling and what's the next step. And so, this group is going to report in the next couple months I think it's going to come out soon and that's been going on for about a year and a half or something so two years it's been over for two years so. It's not a trivial thing, it's a very complicated subject, so, what I would suggest is let's think about this a bit more, maybe we can do some iteration remotely on what might make sense rather than have a national subcommittee. Maybe we can have a subgroup kind of go off and adhere some briefings and get smart about the issue and then report back to the full committee on some recommendations on whether to take this on or not. So, let's think about that.

Goff: That sounds reasonable. And we could give you a lot of briefs on what is done currently. That could be part of a little overall R&D activities but also a lot of what has been done. I go back to the AFCI and the fuel cycle R&D program. I think it was in 2013 when we put out a fairly definitive report on all the fuel cycle options and went through a pretty strict methodology and here's the pros and cons associated with each of them. And what's the optimum and I think it was somewhere over 1300 fuel cycle options. It was a massive undertaking of that program and it even NNSA was involved as part of the review process of that as well. So, just going back and looking at all the things that have been done, is very important. But I'll also go back to that NWPA, one of the other issues and again, as I point out to folks, there is no prohibition against recycling in the United States, but one of the major issues is again the government is responsible for the spent fuel. So, it's hard for a private industry to go forward with recycling when the government is responsible for the spent fuel. So, it gets back to the NWPA and how do we manage spent fuel again. And if you're going to modify it, what do you do to look at all those other options as well.

Magwood: Let me suggest that we'll table it at this point. But if you have an interest to be involved in the subgroup to kind of investigate this further, just get back to me and Luke or rather Krystal, and we'll see if there's an interest in putting a subgroup together and then we'll start figuring out how to go forward with that.

Branscum: I'm just taking some notes from this conversation. I think it sounds like it would be useful at the next full committee meeting to have presentations from any staff on: (1) Our strategic priorities which we expect to be releasing publicly here in the next month or so, (2) The entirety of the R&D kind of enterprise to look at just the whole picture and see where we might want to go from there, (3) A presentation on the budget and what has happened by that point, and (4) Current recycling policy and what has been done in the past. Would that be useful to have those as presentations for the next full meeting?

Magwood: I think for the recycling, it'd be more useful to have a subgroup go get those briefings and then come back and make recommendations to the full committee. I think that's a better way to go because it's going to

take some time and you really have the one day meeting. So, I guess we're now saying we're going to do this so volunteers for the subgroup please let us know and we'll start organizing that. And I'll agree to participate in that because it's always a fascinating conversation.

Pasamehmetoglu: Yes, one comment I have is that I don't think that this subgroup should be looking at what was done in the past but should be looking at what should be done in with the new realities like HALEU and rapid expression of nuclear in the world. The past studies have always fallen short because we could never argue that we can go back and recycle 70,000 metric tons of fuel that already exists and it would probably be economically impossible to do that. But the world has changed and I think that this new subgroup (and I will volunteer to be presented too), should look at what's happening in the future, not what we are going to do with the 100,000 metric tons of legacy fuels.

Magwood: All right, so, maybe we can do this now. Who else wants to be on the subgroup? Okay, so it looks like Raluca, Maria, me and Kemal, anybody else? I think that's a good start. Okay, we'll organize, we'll get together at some point and organize some briefings and then get back to the full group. By the way, when would we likely meet the next time?

Branscum: We are open to suggestions, but by the schedule we're on, that would be in another six months, which is in August, so that's kind of how I was assuming we would operate. But if anyone has suggestions that it should be sooner or I assume not later than August, then the next full committee meeting will be in August and the general structure I think (and again we are open to suggestions) would be that (it sounds like) these four subcommittees will probably be ready at that point going to present at least some initial kind of recommendations. So, maybe expect to have kind of 30-minute presentations or something along those lines of initial recommendations from the subcommittees, along with now these three that I mentioned, presentations from NE for kind of moving forward from there. I'm not sure how long some of these subcommittees may make their recommendations and not need to continue or they may say these are our first recommendations and we're going to continue. So, there's some optionality there.

Caponiti: I have a question regarding some earlier discussions about useful deep dives and I'm wondering whether those would be useful deep dives for particular subcommittees. So, we talked for example about a deep dive on how we're interacting with industry, what we're doing with NRIC, how we're thinking about utilization and some of the capabilities we're standing up in the discussion of workforce development and everything. There's a lot that we're doing with fellowships and scholarships and expanding to two-year colleges and universities and thinking about workforce development. Would that be a deep dive of interest to a particular subcommittee? So, I wanted to pose that question.

Branscum: Yes, definitely. And I think all of the subcommittees are at least at this stage intending to meet monthly between now and August. So, I definitely I know the infrastructure subcommittee is going to want to be jumping in on some of those topics you mentioned. It sounds like Sojna and the workforce committee will be interested as well, so, Krystal we'll get those set up for you with those subcommittees and hopefully for March for the first subcommittee meeting along that path.

Magwood: All right. Any other new topics from the floor, this side didn't have a chance to speak. No. Okay. All right, we will let it rest with that, we have already created enough work for ourselves. So, I don't want to give anybody a chance to volunteer anything else.

At 2:35 p.m., **Chair, Bill Magwood**, indicated that at this point, we are near the time to wrap up the next order of business which was to see if there were any public comments and asked Luke to help facilitate this part.

At 2:36 p.m. **Luke Branscum** opened the meeting to "Public Comments", stating that we have a few folks physically in the room and we also currently have 40 folks online, which is down from a high of 75 earlier in the day. He commented that we lost some folks over lunch. Regardless, we are going to first ask folks that are physically located in the room to make a public comment and then ask the same from folks that are virtually participating online.

First, Luke asked if anyone in the room was interested in making a public comment to raise their hand. There was no response.

Lastly, Luke asked if anyone participating online was interested in making a public comment to raise their hand. He commented that those online should be able to use the "raise hand" function, at the bottom of their screen. One person, Bob Boston wanted to make a public comment.

Luke requested Bob to proceed with his comments.

Boston: Yes, thanks, very interesting discussion today. One thing that may be under the topic of workforce development may not be as important worldwide, but certainly, for the benefit of the Idaho National Lab and future nuclear facilities, especially rocket facilities, is as the safety basis approval authority, aka, the licensed official, I'm at the "bare bones" of what I can be comfortable with, with the federal staff needed, to ensure that we have reasonable assurance of safety for authorizing new reactors. So, that might be something to think about going forward into the future. Thank you.

Luke thanked Bob and repeated his question in general for those folks in the room who struggled to hear him. He said that Bob was talking about the workforce at INL and that his federal staff available for authorizing new reactors on the safety basis approval was being somewhat limited. So, this would be a good question to think about on workforce development.

Luke then asked if there were any others online with public comments. There were none.

At 2:38 p.m. **Luke Branscum** after checking to ensure that there wasn't anyone else online that was interested to make a public comment, returned the meeting over to **Chair, Bill Magwood**. Bill thanked Luke and commented that actually, the question that Bob Boston raised about the federal staff that will be used to authorize reactors is a really interesting question and that he would love to learn more about that and that this might be something that others may want to also hear more about in the future, because this is a very important topic. Then he officially closed out the public comments session and turned the meeting over to **Dr. Katy Huff**, who had just returned back to the meeting, just in time to make her closing remarks.

Huff: I am sorry to have missed the last part of the discussion but I think the initial part that I was present for was really interesting. I heard a lot of action happening in your subcommittees and those of you sort of spinning them up. I think there's a lot of ground that you can tread that will be extremely useful for us as we move forward. Getting your guidance on everything around, consent-based siting, workforce development, infrastructure, international engagement, it's all going to be incredibly relevant. We'll take some of the recommendations you've already made and think hard about how to implement forward movement on more strategic vision and across the interagency. And things like that I think we're really excited about your guidance and suggestions around consent-based siting and equity and whatnot involved related to nuclear waste. And I look forward to reading more of the details as we move forward. I would invite since he was here Mike Goff if you had any comments on what you heard in the last half that you'd like to sort of close with.

Goff: I just like that add my thanks as well and again appreciate the frank exchange. I mean yes, that's what we really need. We want to hear issues we really need to work on because I think we all have similar visions, so we want to make sure nuclear energy can move forward as a secure clean energy source for the U.S. and abroad. And so, we appreciate the input to know what can be done to change, to help improve the DOE being able to meet those goals. So, yes, thanks again very much for that exchange.

Huff: Yes. And also, just acknowledge Luke, who has been an excellent special assistant during this time and of course government official for this FACA engagement. I thank Bill for chairing this meeting, everyone else for physically being here, including the DOE team. We're all very grateful for all of you.

At 2:41 p.m. **Dr. Katy Huff**, turned the meeting over to **Chair, Bill Magwood**. Bill thanked Katy and provided his closing remarks. He started by thanking Luke, saying that he has gone through a great deal of effort to keep the NEAC members on track over the last several months very successfully. He's been an excellent task master and we appreciate his efforts. Looking forward very much to working with Krystal. So, you'll have to learn how to whip us into shape, and to keep us on track, and keep us on schedule, you're going to have to work hard at that because quite frankly we have day jobs and if you don't push us, we won't think about this when we wake up in the morning. So, we really rely on you to keep us on point. Again, it's always a pleasure to visit the Forrestal Building and to get lost in this building. It's good to see all of my friends and colleagues from the Office of Nuclear Energy. We've been hanging around here all these years. It's kind of terrifying when I think about how long it has been since I left this place. It's also interesting to note that I think that this committee is coming up on its 25th anniversary pretty soon and probably in the next year or two, so we'll have to have a celebration of that. But I really want to reflect on the fact that one thing about nuclear which is really different from all other energy forms, is that it takes a long time to do things. This is just the nature of the beast and you have to stick to it, year after year, decade after decade, to make progress and so, it is not something that can be done rapidly. But we are faced with a situation where we do have to do things faster than we're used to, so it does require new thinking and that's why I think this advisory committee is important, because most of you are not in the middle of this and you can look outside and say why are you taking this long and ask those hard questions. And maybe there's a good reason why things take as long as they do but sometimes it can be challenged. So, I encourage you all to continue thinking critically about what you're hearing, ask those hard questions and we'll just see if we can get answers for you as we go forward. Again, it's a pleasure to serve on this group and I'm looking forward to seeing all of you in August or thereabouts. In the meantime, travel safely, stay away from COVID, and other bad things, and look forward to seeing all of you here in the summer. And with that the meeting is adjourned. Thank you.

There being no further business, the meeting was adjourned at 2:44 p.m.

Respectfully submitted,
Steven Katradis
NEAC Recording Secretary
February 16, 2023