Nuclear Energy Advisory Committee Public Meeting (NEAC)

August 9, 2023

U.S. Department of Energy, James V. Forrestal Building-8E-089
1000 Independence Ave., SW, Washington, DC 20585

Committee Members Participating:

Lake Barrett	Michael Ford
J'Tia Hart	Maria Korsnick
William (Bill) Magwood, IV, Chair	Kemal Pasamehmetoglu
Raluca Scarlat	Sojna Schmid

Virtual Participants:

- Tracey Bishop, Deputy Assistant Secretary for Infrastructure, Office of Nuclear Energy, USDOE
- Alice Caponiti, Deputy Assistant Secretary for Reactor Fleet and Advanced Reactor Deployment, Office of Nuclear Energy, USDOE
- Paul Dickman, Committee Member, National Academy of Sciences, Engineering and Medicine
- 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
- Julie Kozeracki, Senior Advisor, Loans Program Office, USDOE
- 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
- Jennifer Wachter, NEAC Support Staff, Allegheny Science and Technology

Physical Room Participants:

- 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

Welcome and Opening Remarks - Dr. Kathryn Huff & William D. Magwood, IV, Chair

Office of Nuclear Energy Update - Dr. Kathryn Huff

- International Developments
  - The Russian Invasion of Ukraine has caused supply chain disruptions, increased nuclear power production costs, and affected construction outlooks.
  - Global efforts, including the EU, to replace Russia in nuclear supply chains, covering enriched fuel and fabricated fuel components.

    - Japan is restarting reactors and expanding nuclear power as part of its climate mission.
    - African nations and the global South are increasingly interested in nuclear power, with the U.S. aiming to expand its reach through the International Nuclear Energy Cooperation Office.
    - Support from international organizations aids these efforts.
- Domestic Challenges
    - The U.S. must maintain its existing reactor fleet, supported by the Inflation Reduction Act and bipartisan infrastructure bills.
    - Economic pressures on U.S. plants persist due to the contrast between nuclear's long-term strategic nature and the short-term capitalist decision-making processes.
    - The need to keep plants profitable annually despite nuclear's decade-long economic outlook.
    - Significant progress in research, like the molten chloride salt irradiation experiment and the Marvel reactor's milestones, shows ongoing national laboratory capabilities.
- Nuclear Infrastructure and Expansion:
    - Key U.S. nuclear infrastructure continues to operate.
    - The release of the Liftoff Report indicates a need to double or triple global nuclear power by 2050, requiring 100-200 new gigawatts in the U.S. alone.
    - Immediate action is necessary to avoid a steeper, more challenging build-out in the future, impacting supply chains and workforce needs.
- Concerns about Fuel Supply:
    - Ongoing worries about the provision and supply of enriched uranium products.
    - Russia's dominance in the enrichment market poses challenges for U.S. and allied enrichment needs.
    - Efforts are underway, including high-level commitments and G7 announcements, to eliminate Russia from the nuclear fuel supply chain.
    - The focus is on investing in HALEU and incentivizing the low-enrichment uranium market.
- **Question: Thank you for highlighting the fuel supply challenge. Are there other supply chain challenges that you see in the next decade?**
    - **Answer:** *Dr. Kathryn Huff,* "Yes, there are a number of supply chain challenges we've collectively identified. I think in fact, I'll be always thinking about sort of supply chains in general across a number of different energy sectors, including nuclear. We previously actually published a report about two years ago…."
    - Medium- and Large-Scale Component Forging:
        - Challenges mostly around N stamping, not forging itself.
        - U.S. has capacity for large-scale forging, but N stamping often needs to be done overseas (e.g., in Korea).
        - Forging is not the bottleneck; the final N stamping process is.
    - Workforce as a Supply Chain Issue:
        - Expansion to double or triple nuclear capacity requires approximately 300,000 new jobs.
        - Key roles include construction trades, skilled crafts, engineers, office workers, and digital experts like computer scientists.
        - Workforce development is crucial to addressing supply chain challenges.
    - Single Supplier Bottlenecks:
        - Vulnerability to disruptions in unique components essential for nuclear power plants.
        - The nuclear industry relies on a fragile supply chain for specialized, nuclear-grade certified components.
        - Potential reliance on weak partners, with risks not fully realized until failure occurs.
    - Modular Construction Needs:
        - Lack of existing factories for modular construction of nuclear reactors.

        - Establishing modular construction capabilities is critical for new reactor types.
    - Nuclear-Grade Graphite Supply:
        - Limited suppliers of nuclear-grade graphite, essential for High-Temperature Reactors (HTRs).
        - Variations in supply chains expected with new reactor types.
    - Concerns about Supplier Capabilities:
        - Suppliers may not fully understand the technical requirements for nuclear-grade components.
        - Risk of substandard parts being produced or installed, which can derail projects.
        - Emphasized need for rigorous oversight and understanding of supplier capabilities to avoid costly errors.
- **Question: Given the kind of the ongoing trend with budgets, how do you see if anything the budget playing out for any in terms of implications for you? Especially things like ARDP. What do you see it having an impact on supportability of all the designs that you're supporting through that program?**
    - **Answer:** *Dr. Kathryn Huff,* "I think you know at the most macro level the U.S. federal government over the next decade will be facing a constraint in flexible spending. Our mandatory spending is going to continue to grow because of inflation and just all of this, if we have a flat total spending requirement for any period of time that discretionary spending, which you know if you only have this much funding and are mandatory, spending for defense and other things is going to increase, then the amount of discretionary spending available to the entire U.S. government over the next decade is going to decrease quite dramatically, while simultaneously experiencing the same presence of inflation and other things that the mandatory spending component is facing. So that's the macro level and this means that the Office of Nuclear Energy is part of that discretionary spending that will get crushed over the period of the next decade unless we allow for an expansion of spending over time."
    - Micro Level
        - Bipartisan Support and Funding:
            - The Office of Nuclear Energy enjoys strong bipartisan support in the current budget years.
            - The Advanced Reactor Demonstration Program (ARDP) has $2.5 billion allocated through the Bipartisan Infrastructure Lab, ensuring project continuity despite minor spending lapses.
        - Carbon Free Power Project (NuScale Deployment):
            - Funded through annual appropriations, unlike ARDP projects.
            - Federal cost share requests are included in the annual budget, with expectations of continued Congressional support.
            - Current funding needs are at their peak, requiring hundreds of millions of dollars, impacting the overall $1.7 billion budget.
            - Importance highlighted due to its role in proving that a university-originated idea can evolve into a publicly traded company building a reactor.
        - Budget Oversight and Management:
            - Emphasis on maintaining rigorous oversight over all spending, regardless of the dollar amount or project scale.
            - Ensuring equal attention to small-scale funding (e.g., university programs) and large-scale projects.
            - Current Congressional oversight season presents an opportunity to reinforce accountability and transparency in budget management.
- **Question: What are your plans on how to restore some geologic disposal foundation to build upon our nuclear house that we desperately need in this world? How do you see that and how could we help you achieve that**

as you have to roll the card of the pretty steep political hill, but there are ways to do that. How do you see that going forward?

- Dr. Kathryn Huff agrees that the back end of the nuclear fuel cycle is critical. There is progress on consent-based siting for storage but stresses that interim storage isn't a long-term solution. There needs to be an emphasis in geological repository regardless of recycling efforts.
- Current U.S. law limits siting options to places like Yucca Mountain, which recent administrations haven't pursued. Expanding options requires congressional action, not something the administration can do alone. Open to solutions that allow considering new sites beyond Yucca Mountain.
- Dr. Huff has been working with the House's spent nuclear fuel caucus and supports legislative solutions. She is optimistic about potential legislative changes, noting ongoing consent-based siting efforts for interim and final storage. Believes the experience gained in interim storage siting will be valuable for final repository efforts.

- **Question: Emphasizes that while progress on nuclear waste disposal is crucial, current nuclear waste is safely managed and isn't a crisis. Taking the time to develop a proper solution is important. Raises a question about the role of advanced fuel cycles in the future, acknowledging there are small programs focused on this.**
  - **Answer:** Describes the fuel cycle group as focused on advanced waste forms and nuclear fuel cycle research, particularly recycling. Hopes to see growth in these programs as budget pressures ease, especially given the improved economics of recycling HALEU over LEU. Highlights concerns about relying on international supply chains, which may pose non-proliferation and security risks. Acknowledges the concerns and mentions close collaboration with the NNSA on these issues. Expresses confidence in creative solutions and mentions the role of international programs and the IAEA in managing non-proliferation issues, especially with small modular reactors.

Nuclear Energy Liftoff Reports - Julie Kozeracki, Loans Program Office

- Overview of the Report:
  - Focus on the "Pathways to Commercial Liftoff" report, with updates planned by early next year.
  - Report is a collaboration between several offices including the Loan Programs Office (LPO), which has over $300 billion in loan authority. First version in March, with updates planned for late 2024 or early 2025.
  - Collaboration: Loan Programs Office (LPO), Office of Nuclear Energy, Office of Clean Energy Demonstrations, and Office of Technology Transition.
  - Funding: Over $300 billion in loan authority post-Inflation Reduction Act.
  - Defining Advanced Nuclear:
    - Includes Gen III+ (e.g., AP1000) and Gen IV reactors.
    - Ranges from 1 MW micros to GW-scale assets, including Small Modular Reactors (SMRs) like those used in the Navy.
  - Need for New Nuclear:
    - Required to meet net-zero targets: 200 GW of new nuclear capacity by 2050.
    - Importance: 20-40% clean, firm capacity is needed, translating to 550-770 GW of new capacity to handle increased electricity demand.
  - Cost Projections: Clean firm sources (nuclear, solar with storage, natural gas with carbon capture) likely to have floor prices of $60-$70/MW-hour.
- Challenges:
  - Despite positive shifts in nuclear perception, the U.S. faces a stalemate in commercial nuclear orders.
  - Only Canada has committed to new nuclear projects, highlighting the need for U.S. signed contracts and commitments.

    - Need to address cost overruns and first-of-a-kind cost issues. Significant cost reductions are expected with repeat deployments.
    - TerraPower, X-Energy, and NuScale are progressing, but no new commercial orders in the U.S. (Canada's TerraPower Generation project is notable).
    - Gen III vs. Gen IV: Success of Gen III+ SMRs will support Gen IV reactors, but a balance between short-term and long-term deployment is essential.
- Strategic Recommendations:
    - Urgent need for committed orders, especially for Gen III SMRs, to build supply chains and reduce costs.
    - Importance of both SMRs and large reactors in achieving decarbonization goals.
    - Lessons from Vogtle must inform future projects to avoid past mistakes and cost overruns.
        - Lessons from Vogtle:
            - Issues: Construction delays and cost overruns not unique to nuclear but to mega-projects in general.
            - Improvements: Need for detailed design and construction planning, efficient resource scheduling, and better quality assurance
- Path Forward:
    - To catalyze further nuclear deployment, pooling demand, risk-sharing, and cost-overrun insurance are suggested.
    - Government and private sector collaboration is key to overcoming cost and commitment barriers.
    - Licensing & Workforce: Importance of NRC's role and scaling up the workforce for new projects.
- Nuclear Unique Value Proposition:
    - Firm Capacity: Provides reliable generation for days to weeks, including during extreme weather.
    - Land Use & Transmission: Efficient land use and less need for new transmission compared to renewables.
    - Economic Value: Maintains high-quality jobs and tax base in retiring coal communities.
- **Question: Is there an opportunity to raise the issue of nuclear energy's market advantages with the U.S. government?**
    - **Answer:** Yes. The reevaluation of energy compensation is critical for nuclear to compete in deregulated markets. Serious investments in reliability are necessary, ideally before potential blackouts occur.
- **Question: How important is it to recognize the dispatchability and reliability of nuclear energy in the markets?**
    - **Answer:** Very important. Note that markets currently do not recognize these advantages. Adjustments are needed to reward these factors, as without them, nuclear's advantages are outweighed by concerns like potential cost overruns.
- **Question: What lessons can be learned from the Vogtle and V.C. Summer projects?**
    - **Answer:** Contracts need restructuring to reward overall project success rather than individual milestones. Vendors should play a more active role in project success, not just act as suppliers.
- **Question: Are there any good contract models to consider for future projects?**
    - **Answer:** Yes, the refurbishment projects in Canada, particularly by Ontario Power, where a shared pool of funds rewards success collectively, could be a good model. TVA is also considering a similar integrated project delivery model.
- **Question: How should multiple utilities working on similar projects ensure efficiency?**
    - **Answer:** Ensuring a coordinated approach across utilities and contractors is key. Vendors, like GE in the example, need to play a central role in ensuring the success of parallel projects.
- **Question: Are there any adjustments to the loan programs for nuclear projects?**
    - **Answer**: Yes, significant adjustments have been made, especially with the introduction of the 1706 program. This program offers competitive interest rates without a risk-based charge and applies to projects repurposing existing energy infrastructure, among others.

- **Question: Has the analysis considered energy products beyond electricity?**
    - **Answer:** Yes, while the focus has been on utility-scale electricity generation, Kozeracki mentions that they are exploring microreactors and high-temperature gas reactors for other applications, such as providing high-temperature steam, which is critical for industries like Dow Chemical.
- **Question: What challenges exist with current regulatory frameworks for nuclear projects?**
    - **Answer:** Korsnick highlights that the Part 52 construction process, though intended to streamline licensing, has been inflexible and painful during construction. There's a likelihood that future projects will revert to using Part 50, especially for first-of-a-kind reactors.
- **Question: What is the timeline for ordering new nuclear units?**
    - **Answer:** There is urgency, as utilities face increasing demand and tighter timelines. The pinch point for new power is moving closer, with some utilities now needing solutions by 2030 rather than 2040. There is concern about whether orders will be placed by 2025.
- **Question: What external factors are driving the need for new power?**
    - **Answer:** Utilities are facing underestimated load forecasts, unexpected new loads, and commitments to close fossil plants. These factors are accelerating the need for new power, pushing timelines up significantly.

National Academies Advanced Reactor Report - Dr. Michael Ford

- Introduction:
    - Regrets passed on behalf of Dick Meserve, Chairman of the study.
    - Focus on advanced reactors in the U.S. and their role in achieving zero emissions.
    - The committee included former NRC Chairs and a broad group of experts.
    - Study Director: Kasia Kornecki, Board of Energy and Environmental Systems.
    - Primary question: What's needed for advanced reactors to contribute to decarbonization?
- Current & Future Context:
    - Nuclear provides 18% of U.S. electricity and is the largest low-carbon energy source.
    - Aging fleet of nuclear plants; license extensions are common.
    - Anticipated growth in energy demand over the next 30 years.
    - Need to assess nuclear role in meeting this demand.
    - Focused on deployment and personalization of advanced reactors, excluding fuel cycle issues.
    - High renewables deployment expected between 2020-2030.
    - Advanced reactors likely to be demonstrated by 2030.
    - Focused on new types of reactors, not existing Gen. III or Gen. 3+ reactors.
    - Potential for nuclear to meet non-electric needs, such as process heat and hydrogen production.
- Technology Gaps:
    - Research and development needed to close technology gaps for new reactors.
    - Emphasis on improving fuel and material performance.
- Financial Incentives:
    - Federal and state governments should provide financial incentives for commercialization.
    - Encouraged by recent funding initiatives like IRA.
- Workforce and Training:
    - Emphasis on addressing training programs for the nuclear workforce.
    - Use of existing programs, with a model like the apprentice program at Ford's lab.
- Regulatory Support:
    - Importance of ensuring adequate NRC funding for advanced reactor licensing.
    - Support for recent Part 53 regulations, though industry reception was mixed.

- Community Engagement:
    - Recommendations for best practices in community engagement for siting new plants.
    - Importance of transparency, funding independent analyses, and early engagement.
- International Markets:
    - U.S. vendors face competition from state-sponsored international vendors.
    - Need for financial and technical support to compete internationally.
- Conclusion:
    - A holistic approach is required across technology, finance, regulation, and community engagement.
    - Sustained effort is needed to advance the commercialization of low-carbon technologies, including nuclear.
    - Need for improved project management, especially in reducing civil works costs.
    - Proposal for joint ventures or consortia to manage construction projects.
- **Question: Did the study answer the original question about the role advanced technologies can play?**
    - **Answer:** The study showed that these technologies can play a role, but there are significant challenges such as technical, material, and regulatory issues. In the near term, existing Gen III+ light-water reactors may be the focus, while the potential for advanced designs will become clearer in the early 2030s.
- **Question: Why would utilities choose advanced technologies over light-water reactors?**
    - **Answer:** Advanced reactors may offer improved safety due to inherent designs, higher efficiency for decarbonization, and scalability. They can also provide advantages like operating at lower pressures and not requiring significant forgings.
- **Question: Where do we stand in developing non-steam cycle power conversion technologies tailored to nuclear reactors?**
    - **Answer:** Significant work has been done on traditional and advanced cycles like Rankine and Brayton, with commercial products available. However, adapting them for nuclear may require specific material changes.
- **Question: Are there partnerships between advanced reactor companies and power conversion cycle developers?**
    - **Answer**: Such partnerships are developing, involving companies already supplying the industry.
- **Question: How do community and state-level concerns differ, especially when it comes to reactor siting and waste management?**
    - **Answer:** The report addressed community-level engagement, emphasizing early interaction to understand concerns. Best practices for engaging local, state, and federal entities were discussed, with more details available in the workshop summary.
- **Question: How can the U.S. step up in the international nuclear market, especially in light of Russia's reduced role?**
    - **Answer:** The U.S. must offer a comprehensive package including faster regulatory processes and potentially improved financial incentives. The U.S. lacks some capabilities like full-cycle services offered by Russia, but there is strong international interest in U.S. partnerships.

National Academies on Fuel Cycle Report - Paul Dickman

- Background:
    - Paul Dickman is a member of the National Academy of Sciences Nuclear Radiation Studies Board.
    - The committee evaluated the merits of different fuel cycles, including reprocessing for existing and advanced reactor technologies.
    - The study involved 12 public meetings, 80 witnesses, and took 2.5 years to complete.

    - The committee recommended focusing on a once-through fuel cycle for the foreseeable future due to the high costs of developing reprocessing capabilities.
    - The increased use of HALEU will require enhanced safeguards and security measures.
    - NRC regulations need to be revised to address the expanded footprint of HALEU facilities and the associated security concerns.
- Existing Reactor Fuel Cycle:
    - U.S. relies heavily on imported uranium and lacks sufficient enrichment capabilities for the existing light-water reactor fleet.
    - Reprocessing of existing light-water reactor fuel was deemed unnecessary due to the ample supply of uranium and low enrichment costs.
    - The current fuel cycle ends with dry interim storage due to the absence of a geological repository.
- Advanced Reactors and Fuel Cycles:
    - Advanced reactors introduce diverse fuels and require facilities that don't yet exist.
    - A sustained financial commitment and collaboration across agencies is crucial for progress.
    - The lack of operating experience, unknown regulatory processes, and limited testing capabilities are significant challenges.
- Waste Management and Disposal:
    - Non-standard fuel will be discharged by advanced reactors, which current DOE contracts don't cover.
    - The committee recommended Congressional action to decide on the future of Yucca Mountain, as it currently impedes progress.
    - Advanced reactors won't "solve" the solid waste problem; a geological repository is still essential.
- Recommendations:
    - U.S. government and industry must determine which features of advanced reactors and fuel cycles align with national energy, environmental, and proliferation goals.
    - The committee emphasized the need for DOE, NRC, and EPA to develop a generic standard for waste management and disposal to guide reactor designers.

- **Question: Have you looked at processing the HEU fuel that we have tons of, which we are basically getting rid of, for the sake of getting rid of it?**
    - **Answer:** No, because the information we had at that time was not significant. The focus was more on the projects like what Idaho is doing, and it wasn't considered as a specific option.
- **Question: Did your committee consider what effect the introduction of a diversified reactor fleet with new technologies would have on emergency preparedness and response strategies?**
    - **Answer:** No, because the focus was on fuel cycle facilities, not reactors. The reactor-related emergency preparedness was not within the scope of our study.
- **Question: What were the recommendations for low-level waste?**
    - **Answer:** The key point was the lack of good understanding of what these reactors would discharge. The U.S. has a good low-level waste management program, but profiling for the back-end of these reactors is lacking.
- **Question: Is there capacity for low-level waste for all upcoming decommissioning activities?**
    - **Answer:** Yes, there is commercial capacity in the U.S. to manage low-level waste.
- **Question: Is there synergy between low-level waste streams from fusion technology development and other sources?**
    - **Answer:** This was outside the scope of our study.
- **Question: Did the report address the need for testing and demonstration facilities to examine proliferation risks from advanced fuel cycles?**
    - **Answer:** Yes, the report emphasized that the U.S. has an opportunity to lead in safeguards development and share them with the IAEA.
- **Question: What's the status of these reports?**

- **Answer:** The reports are final, accessible, downloadable, and have been debriefed.

Infrastructure Update - Dr. Michael Ford

- Comments & Recommendations from the NEAC Infrastructure Subcommittee
- Subcommittee Members: Stu Bresler, Kemal Pasamehmetoglu, Michael Ford, Raluca Scarlat
- The Subcommittee was established under the Nuclear Energy Advisory Committee to provide recommendations on infrastructure priorities for the Office of Nuclear Energy (NE). Their focus was on how to support the transition to decarbonization and commercialization of nuclear energy technologies.
- The Subcommittee's recommendations aim to streamline and focus efforts on critical areas of nuclear infrastructure development to support both immediate and long-term goals in the transition to a low-carbon energy future.
- Integration and Coordination:
  - The need for better integration of various infrastructure investments across different DOE offices and programs is highlighted. Effective coordination is essential to ensure that resources are used efficiently and that investments align with national priorities.
- Public-Private Partnerships:
  - The Subcommittee emphasizes the importance of public-private partnerships, particularly in the context of advanced reactor demonstrations and HALEU supply chain development. These partnerships can help bridge the gap between government initiatives and private sector capabilities.
- Workforce Development:
  - Beyond university programs, there is a call for broader workforce development efforts. This includes creating pathways for training and retaining skilled professionals across various levels of the nuclear industry.
- Nuclear energy is critical for achieving net zero carbon emissions by 2050.
  - Up to 200GW of new nuclear capacity may be needed.
  - Short-term focus should be on deploying existing technologies; long-term on advanced technologies.
- Infrastructure Priorities:
  - Develop a strong narrative on the benefits of nuclear energy, emphasizing long-term climate goals.
  - Infrastructure strategies should focus on:
    - Commercializing existing reactor technologies.
    - Developing advanced reactors.
    - Establishing clear goals, timelines, and benefits for infrastructure investments.
- Short-Term Recommendations (5-Year Focus):
  - Prioritize expediting the commercial operation of existing nuclear technologies through demonstration projects.
  - Invest in minor modifications to support existing light-water reactors (LWR) and associated programs like Accident Tolerant Fuel.
- Mid-Term and Long-Term Focus:
  - Emphasize materials development, construction technology R&D, and workforce development.
  - Promote joint development efforts and shared funding among various DOE programs to address overlapping needs.
- Infrastructure and Supply Chain:
  - Address the supply chain for High Assay Low Enrichment Uranium (HALEU) and consider reprocessing of highly enriched uranium (HEU) as a short-term solution.
  - Establish infrastructure for advanced reactor commercialization and recycling, acknowledging that this may take 15-20 years.
- Physical and Intellectual Infrastructure:

    - Improve coordination between universities and national laboratories.
    - Develop metrics to evaluate and optimize infrastructure use.
    - Assess and potentially repurpose or shut down underutilized facilities.
- Time-Scale and Industry Input:
    - Engage more with industry to refine infrastructure needs and priorities.
    - Address issues with existing R&D and demo infrastructure, ensuring alignment with national priorities.
- R&D Infrastructure:
    - Align R&D priorities with commercial deployment goals.
    - Foster connections between R&D programs and advanced reactor demo programs.
- Potential Follow-On Topics:
    - Further develop funding priorities and explore international R&D collaboration.
    - Address challenges in large-scale commercialization and explore new financing models for high-risk projects.

Consent-Based Siting of Spent Nuclear Fuel Update - Dr. J'Tia Hart

- NEAC Consent-Based Siting Subcommittee:
- Members: J'Tia Hart, Lake Barrett, Maria Korsnick, Richard Arnold, Ed Kee
- Consent-Based Siting Subcommittee Recommendations:
- Acknowledgment of Iterative Process:
    - The subcommittee emphasizes that the Consent-Based Siting (CBS) process is iterative. DOE should proceed at a pace determined by stakeholder trust and allocate sufficient time for this process.
- Funding Allocation:
    - DOE should allocate resources to support ongoing community and stakeholder engagement. This includes advocating for collaboration with consortia partners and extending timelines and funding as needed.
- Expanded Stakeholder Engagement:

  DOE should enhance engagement with civil society organizations, especially those representing marginalized communities. They should also facilitate access to expertise from various professionals and international organizations with successful experiences in nuclear power.
- Integrated Waste Management Strategy:
    - The subcommittee recommends expediting the publication of an integrated waste management strategy. Clear communication about storage, transportation, and geologic disposal plans is crucial for community understanding.
- Upcoming Considerations:
    - Creation of an independent organization to manage CBS.
    - Access to waste funding to support CBS initiatives.
    - Governance options for site management, including local, state, and regional partnerships.
    - Formation of an advisory panel with diverse stakeholders.
    - Review of previous recommendations from related studies and commissions.
- Conclusion: The subcommittee looks forward to feedback and next steps, and hopes the report will be reviewed by Dr. Kathryn Huff and her team at the Department of Energy's Office of Nuclear Energy.

Workforce of the Future Update Dr. Sonja Schmid

- Topic: Nuclear Workforce of the Future
- Objective: The subcommittee is focused on understanding the nature, size, and skill set of the future nuclear workforce required to meet the 2050 decarbonization goal. There's a recognized need for approximately 300,000 additional nuclear workers.

- Progress: Over the past year, the subcommittee has met regularly and received insights from various presenters, including Ken Czerwinski (SUSTAIN project), NEI (industry perspective), and Melinda Higgins (training initiatives).
- Preliminary Recommendations:
    - Funding and Programs:
        - Broaden funding targets to include community colleges, trade schools, non-traditional students, and certificate programs.
        - Support for mentorship and apprenticeship programs, emphasizing collaborations with faculty and community colleges.
    - Content Diversification:
        - Include social sciences and humanities in nuclear training programs to provide a comprehensive perspective on nuclear energy, environmental justice, and labor-related issues.
    - Outreach and Engagement:
        - Advertise existing study results and career opportunities, including available grants and fellowships.
        - Revitalize community engagement through public-facing infrastructure, leveraging universities and national labs as trusted community members.
- Future Steps:
    - Collaborate with the infrastructure subcommittee to identify necessary infrastructure for the nuclear workforce.
    - Coordinate with the international subcommittee to learn from successful nuclear workforce training models in other countries.
    - Develop specific suggestions to expand funding targets and explore the role of tribal colleges in workforce development.

- **Question: Raised a concern about the narrow language in appropriations, which seemed to limit funding to 4-year colleges and universities. They asked for feedback on whether broader training funding could be considered.**
    - **Answer:** The appropriations language is indeed restrictive, but there is room for advocating changes with Congress. Report language, though not law, can influence future funding and policy decisions. Engaging with Congress and exploring flexibility at the DOE level may offer some solutions.
- Magwood highlighted historical rigidity in appropriations language due to past issues and emphasized the importance of recent efforts to address gender disparity in the nuclear workforce. He praised the OECD's report on attracting and retaining women in nuclear fields and promised to share the report link for further reading.

International Engagement Update William D. Magwood, IV, Chair

- Summary of the NEAC International Subcommittee Update
- Objective and Context:
    - The subcommittee reviewed the U.S. Government's international nuclear energy policy and its effectiveness.
    - Recognized the growing global interest in nuclear energy, driven by energy security and climate commitments.
    - Observed that Russia and China are significant competitors in global nuclear energy markets, having made substantial gains.
- Observations:
    - Current U.S. Efforts: U.S. agencies are working well but lack a unified strategic vision. Coordination and a clear strategy are missing.
    - Domestic and Global Benefits: Strengthening the nuclear industry has domestic benefits (jobs, economic growth) and supports U.S. climate goals.

    - International Engagement: There is an opportunity for the U.S. to bolster its nuclear energy exports and influence, countering Russian and Chinese advances.
- Identified Gaps:
    - Financing: U.S. is outmatched by competitors in financing nuclear projects abroad. Complex financing issues remain unresolved.
    - Long-Term Relationships: Lack of proactive engagement with potential partner countries may be detrimental. Developing long-term relationships is crucial.
    - Policy Framework: Gaps exist in the policy framework across different agencies, lacking a coordinated strategic vision.
- Recommendations:

    - Strategic Vision:
        - Appoint a senior official within the Executive Office of the President to oversee nuclear energy policy, similar to France's Nuclear Policy Council.
    - Long-Term Investment in Overseas Relationships:
        - Increase support from Commerce, DOE, and State Department to develop potential customer nations.
        - Enhance capacity-building programs for governance, workforce, and nuclear safety regulators in partner countries.
    - Financing of Overseas Projects:
        - Ensure that the Export-Import Bank, U.S. International Development Finance Corporation, and U.S. Trade and Development Agency have adequate resources and authority to support competitive U.S. nuclear energy exports.
        - Consider equity investments to meet the demand from international customers.
    - Export Policies:
        - Develop more Section 123 Agreements for nuclear cooperation to facilitate U.S. nuclear exports.
        - Improve efficiency in the approval processes for specific authorizations and reassess U.S. nonproliferation strategies related to nuclear fuel cycle technologies.

Key Questions and Issues for Further Exploration:

1. Comprehensive Definition of U.S. Leadership:
    - What defines U.S. leadership in nuclear energy and how should each agency contribute to these goals?
    - How is U.S. leadership communicated to allies and how is progress coordinated?
2. Competitiveness and Financing:
    - What steps can be taken to enable U.S. industry to compete more effectively internationally?
    - How can U.S. lead changes in international financing and export guidelines?
3. Education and Training:
    - Can the U.S. increase programs to educate and train young people from newcomer countries at U.S. universities?
4. Risk Management and Technology:
    - What is the U.S. position on advanced nuclear reactor technologies and their associated risks?
    - How should the U.S. handle proliferation risks associated with advanced reactors and recycling technologies?
5. Nonproliferation Regime:
    - Is U.S. industry effectively supporting nonproliferation? If not, what additional measures are needed?

The subcommittee intends to address these issues through further deliberations, exploring short-term solutions like LEU/HALEU supply and financing, and organizing a strategic meeting to develop a cohesive vision for U.S. nuclear energy leadership.

Public Comments & Closing Remarks

- No public comments were made
- The meeting concluded at 2:45PM.