Summary Minutes of the

U. S. Department of Energy (DOE)
Secretary of Energy Advisory Board
Public Meeting

Advisory Board Members:

Present electronically: Vicki Hollub, Chair; Norman R. Augustine; Scott Campbell; Kay Coles-James; Marvin Fertel; Dan Guertin; Ankur Jain; David Lockwood; Sean McGarvey; Richard Mies; Pedro Pizarro; Samantha Ravich; Thomas Rosenbaum; Bill Samuels; Michael Whatley; Dan Yergin

Absent: Kirstjen Nielsen

Date and Time: October 20, 2020 1 p.m. to 5 p.m. EDT

Location: Virtual meeting with dial-in for SEAB member and the general public.

Purpose: Secretary of Energy Advisory Board (SEAB) Meeting

SEAB Staff: Kurt Heckman, Designated Federal Officer and Director of Boards and Councils; Allison Mills, Deputy Director, Office of Boards and Councils, Anushya Ramaswamy, Assistant Director, Office of Boards and Councils

Speakers: Secretary of Energy Dan Brouillette
Deputy Secretary of Energy Mark Menezes
SEAB Members: Dr. Samantha Ravich
Dr. Thomas Rosenbaum
Mr. William Samuels
Mr. Norman Augustine
ADM Richard Mies
Dr. Pedro Pizarro

Meeting summary

This is the fourth Secretary of Energy Advisory Board (SEAB) convened under Secretary Dan Dan Brouillette. Due to COVID-19 pandemic and travel restrictions, the SEAB meeting (originally scheduled to be conducted in Sarasota, FL) was conducted virtually with participants attending electronically, via Zoom, or by conference call. The call was monitored by many domestic and international press outlets. SEAB members heard from Secretary Brouillette, Deputy Secretary of Energy Mark Menezes, and SEAB members who Chair or Co-Chair SEAB working groups in the areas of Artificial Intelligence and Machine Learning (AI/ML), Branding, Space Science, and Innovation. The meeting adjourned after opportunity for public comment.

Public Meeting

Designated Federal Officer Kurt Heckman

Mr. Heckman opened the meeting promptly at 1 p.m. EDT and thanked the SEAB Members and the DOE Staff for their participation. He reviewed that the meeting was a FACA meeting, that members of the public and press were in attendance, and introduced the members of the SEAB. He noted that the meeting would include remarks by Secretary Dan Brouillette, Deputy Secretary Mark Menezes, NASA Administrator Dan Bridenstine who would sign the historic DOE-NASA Memorandum of Understanding, and reports from the Chairs of working groups in the areas of AI/ML (final report), Branding (preliminary findings), Space Science (preliminary findings), and Innovation (final report). Mr. Heckman thanked his staff, the Sarasota Chamber of Commerce and the Westin Hotel in Sarasota, noting that the pandemic had impacted the SEAB's ability to be there. He then called the meeting to order and introduced the SEAB Chair, Vicki Hollub.

SEAB Chair Vicki Hollub

Chair Hollub began her remarks, noting how each SEAB meeting proved to be always informative. She briefly discussed the scheduled working group presentations, commenting on the extremely high quality of the content in the reports, and how like DOE, all of the important topics relevant to our nation were being addressed. She thanked Secretary Brouillette for his untiring efforts to help the country maintain its energy independence. She then passed the floor to the Secretary for his remarks.

Secretary Dan Brouillette

Secretary Brouillette opened his remarks by thanking the SEAB Chair for her remarks and welcomed all of the SEAB members to the call. He, too, noted that COVID continued to present challenges for everyone, noting that two members of his immediate staff had tested positive for COVID-19, and out of an abundance of caution he, and those associated, were in self isolating for a small amount of time, in compliance with the CDC guidelines.

The Secretary continued by conveying his appreciation to the SEAB for their help in advancing the Administration's energy goals. He underscored the importance of maintaining the nation's independence relative to energy.

Secretary Brouillette then shared an update of his recent schedule and travels, noting that recent travel capped a very busy season of travel for him and that the travel had taken him to energy producing states such as Montana, North Dakota, Texas, Pennsylvania; energy-transport states such as Virginia; and to our National Labs in Iowa, Tennessee, Colorado, and Washington state. He commented that he was most struck by the incredibly innovative work that was being done by both the private and public sector. He likewise commented on visiting DOE cleanup sites, highlighting how much work was being successfully accomplished, well ahead of schedule and well under budget.

Continuing, the Secretary highlighted his visit to the Fermi and Argonne National Laboratories in the Chicago area to launch the DOE blueprint for a quantum internet. He explained the importance of the quantum internet to the nation.

Secretary Brouillette then commented on DOE joining NASA at Cape Canaveral in July for the successful launch of the Mars rover, Perseverance. Perseverance is powered by a special Plutonium fuel that was developed by DOE, and carried DOE-developed sensors as well. During the DOE visit to the Cape, the inaugural meeting of the NASA-DOE Executive Committee was held.

His final comment pertained to his excitement at the National Laboratories adding another Nobel Prize winner to the DOE total of over 115 Nobel laureates from the disciplines of physics, chemistry, physiology, and medicine, with the 2020 Nobel Prize in Chemistry being awarded to Lawrence Berkeley National Laboratory's Dr. Jennifer Doudna for her groundbreaking work in gene editing. He reflected on the irony of the Department's storied accomplishments and the fact that most people would not know that DOE has 17 award winning, ground-breaking laboratories. He was firm in his commitment to ensure that would change, and DOE would develop strategies to tell the story through the work product of the Branding working group. He again thanked the SEAB Chair for the Board's continued great work.

Mr. Heckman then introduced Deputy Secretary of Energy Mark Menezes's pre-recorded video message for the meeting.

Deputy Secretary of Energy, Mark Menezes

Deputy Secretary Menezes opened his remarks by thanking Mr. Heckman and his staff, as well as all of the SEAB members for the counsel and input provided to DOE leadership from the SEAB. He underscored the importance and continuity of the DOE mission, noting that perhaps no fields were more exciting than artificial intelligence (AI) and space exploration.

He noted that the AI/ML working group report painted a stark outlook for the future of the United States national security if DOE did not take a 'whole of government' approach to strengthen their capabilities in these fields, bolster our cybersecurity, and commit to workforce development. He also highlighted that the Trump administration and the Department were committed to winning the AI race, commenting as well on the reason for the formation of and purpose behind the DOE Artificial Intelligence and Technology Office (AITO). The Deputy Secretary cited that for Fiscal Year '21, the Department had requested over $250 million to support a variety of AI activities, and that in fiscal year 20 the Department's Office of Science supported nearly $71 million in AI related research. He further noted that the Department's research into AI will allow DOE to transform energy exploration and generation, increase energy efficiency, improve environmental sustainability, and strengthen the Department's and the Nation's cybersecurity. Importantly, Deputy Secretary Menezes noted the Department's use of AI in many other activies to medical diagnosis and COVID research. He used examples of AI in space to segue into his brief remarks concerning the historic signing of the Memorandum of Understanding between DOE and NASA, which was ceremonially accomplished later in the meeting. In amplification of the signing, he expounded on how DOE will support NASA in their

accomplishment of the Trump administration's goals relative to space exploration. Further, he described how the 17 National Laboratories would play a crucial role relative to AI and space exploration.

NASA Administrator Jim Bridenstine

At this juncture, NASA Administrator James Bridenstine shared brief remarks, thanking DOE for a great relationship over the past 50 years, and commenting on the importance of the Memorandum of Understanding (MOU). Administrator Bridenstine articulated some of the challenges NASA faces and how DOE will support NASA in deep space missions. He explained the purpose for the DOE's role in radioisotope thermal generator (RTG) support for NASA vehicles in space, and again underscored how important the DOE-NASA partnership had become over the years. He again thanked the Department of Energy for all that it had done and will do for NASA. The actual signing of the MOU had been accomplished several days earlier.

Mr. Heckman next introduced Dr. Samantha Ravich and Dr. Thomas Rosenbaum, co-chairs of the SEAB Artificial Intelligence and Machine Learning (AIML) working group, who presented the final report and recommendations.

Dr. Ravich and Dr. Rosenbaum

Dr. Ravich compared the full realization of AI to that of electrification as a means of describing how fundamental AI would be to the future of the country's health, welfare, and technological advances. She refreshed the SEAB members on the Secretary's tasking which was to examine how DOE should approach managing and utilizing all of the Department's AI assets and data products. She commented on the amounts of money being spent by DOE and the government as a whole on AI, and how that was not nearly what the private sector was spending. Before presenting the AI summary, she again thanked the members of the working group for their time and efforts in the endeavor.

The first observation was that DOE had no system in place to capture, analyze, and share AIML data, or its models and algorithms. One of the frustrations experienced by the National Laboratories was that every time they undertook a new AI project, they had to start anew because they were not AI experts. Rather, they are chemists, physicists, biologists, etc. They felt that they needed to be AI experts because there was no group that they could turn to for AI help with their projects. The recommendation here was that research and projects would proceed much more rapidly if there was a central repository of AIML expertise and data. Dr. Ravich opined that the group felt DOE could become that central repository for the government. She listed a number of examples across the federal government of various departments utilizing AIML.

The second observation was that numerous areas of government, DOE, and the National Laboratories were rushing toward an AI future without have secured the data, and the algorithms that are going to be based on that data. Her caution was that if the government and DOE did not get better at implementing cybersecurity at the base level, then we were literally creating

artificial intelligence for our adversaries. She commented on the DoD breach reported on in open source press, once again underscoring cybersecurity requirements.

The third observation underscored what the working group heard time and again from the National Laboratories with respect to the absence of a well understood career path for the AI professionals. Dr. Ravich used this point to underscore the notion that because of the lack of a career track for the AI workforce, critical talent would be extremely difficult to recruit and retain within DOE.

Dr. Ravich stated that if DOE did not take action on the above three observations, the Department risked becoming non-competitive with the private sector and with the rest of the federal government as well. She then passed the floor to the co-chair, Dr. Tom Rosenbaum for the recommendations.

Dr. Rosenbaum thanked everyone involved with the working group and the output of it. He stressed the formation of a Department AI Capability (DAIC), proceeded to talk about the extraordinary opportunities that are available to DOE, and that two major themes had emerged. First was that DOE has unique capabilities that place it in a position to have significant input into the future of AIML as well as to the country and its role as a leader in science, technology, and security. The second theme was that there is a roadmap for the Department, and that all of the recommendations need to be accomplished at once. Dr. Rosenbaum shared with the SEAB the following strategic overview:

1. DOE should become the indispensable partner for AIML with government and industry.
2. DOE should lead and shepherd the AIML effort across government, noting that now was not a time to shy away from that role.
3. DOE is uniquely positioned to undertake a leadership role because of the decades of investment in National Laboratories.

He then shared the working group's recommendations with the SEAB members.

- DAIC develop a process to account for all AI projects within DOE and the laboratories.
- That the DOE AI organization lead in reviewing data that would be made available for classified or sensitive information.
- That the Department establish a formal, coherent, and clearly articulated career path for the AI professionals.
- DOE must formalize a data governance policy.
- Cybersecurity best practices for the AIML mission must be shared across the enterprise.

Several members of the SEAB offered supporting comments on the working group's recommendations. A motion was made and seconded to accept the AIML working group's final report, with no objections.

Mr. Heckman next introduced Mr. Bill Samuels, Chairman Emeritus of Maker's Mark Distilleries and one of the Chairs for the Branding working group.

Mr. Bill Samuels

Mr. Samuels began his comments by sharing the Secretary's comments with respect to making the American public aware of DOE and its capabilities, as it is unacceptably misunderstood by them. The working group would be investigating ways to inform the American public of the amazing work being done by the Department. He stated that his intent for the SEAB was to ask for feedback relative to how the Branding working group would approach the charge from Secretary Brouillette.
He then shared with the SEAB members a number of observations made by the Branding working group. They included:

1. A review of DOE public documents showed them to be highly technical, targeted to very narrow audiences, with no meaningful effort to enlighten the general public.
2. There were a significant number of topics being investigated by DOE that, if communicated to the American public in an interesting and engaging way, clearly has the potential to create real excitement, causing people to want to know more. The measure of success would be the actions taken by the recipients of the information.
3. It was a positive (as opposed to a negative) that most of the really interesting work being done by DOE was unknown. This would open the door to discovery.
4. As a result of observations 1-3, the working group had adopted a go-forward strategy of managing the discovery.
5. Change the Department's public affairs offices' culture from a "telling" perspective to a "managing the discovery" perspective.
6. Since culture change is hard, there needed to be absolute clarity around how success will be defined, measured, and rewarded.
7. There were 3 competencies needed to execute a winning discovery strategy. DOE possessed the first, needed to develop the second, and can survive without the third so long as the Department became really good at partnering with others.
8. Successful execution of the above strategy would undoubtedly brand DOE as an organization that was doing an incredible amount of really interesting and important work.

He next defined that winning would look like the engagement of American people in the work of the U. S. Department of Energy to the extent that it aroused interest and created excitement sufficient to make them want to know more and share what they had learned with others. The intent would be to showcase DOE work as interesting such that the work is then attributed to DOE. The working group recommended that establishment of the position of Chief Marketing Officer (CMO), reporting directly to the Secretary, with the primary responsibility of achieving the defined statement of winning. All DOE personnel communication with the public would report to the CMO. He then described the necessary communications chain of competencies in order to execute the managed discovery strategy.

The Secretary commented that Mr. Samuels' presentation and the working group's content was incredibly insightful, particularly because Mr. Samuels had never served in the government. Members of the SEAB commented on the fullness of the report, and how on target the working group was with their line of study and potential recommendations. There was significant discussion over the title of Chief Marketing Officer and alternatives.

There was a 15 minute intermission.

Mr. Norman Augustine and Admiral (retired) Richard Mies

Mr. Heckman introduced the Space working group co-chairs Mr. Norman Augustine and Admiral Richard Mies. Mr. Augustine thanked his working and discussed that this was only an interim report for the Space working group. Mr. Augustine outlined his remarks and the fact that the working group looked predominately at NASA and how DOE could better support NASA. He noted that although there is a long history of DOE and NASA collaboration over the years, it had mostly been on an ad hoc basis. Likewise, he touched on the similarities and differences between the two organizations. Mr. Augustine provided the board with a summary of historical programs (by name) that DOE had supported NASA on, specifically with the radioisotope thermal generators (RTG) and radioisotope heating units (RHU), and various types of sensors. He noted the two types of missions on which DOE supports NASA: the science missions and the human space flight missions. His discussion of the NASA science missions touched on asteroids striking the Earth and how NASA was studying avoidance technologies and experiments. He went on to discuss solar electric propulsion and ion technology. He transitioned next to the human spaceflight program, with the goal of landing humans on the south pole of the Moon in 2024, as well as the logistical challenges associated with NASA remaining on the Moon. The mission to the Moon would be used to study the necessary technologies for the follow-on mission to Mars. Mr. Augustine then yielded the floor to Admiral Mies.

Admiral Mies outlined all of the briefing that the working group had received to date, focused on the Artemis mission, and no meaningful briefings from any other agency that engaged in space activities. Much of DOE's support to NASA has involved space nuclear energy, but has also ventured into the space nuclear propulsion systems and sensor development. Most all of the engagement between DOE and NASA has been done under the strategic partnership program (formerly work for others.) He then discussed the following areas of opportunities for DOE to support NASA:

- Cross-organization (DOE-NASA) engagement
- Nuclear electrical power in space
- Nuclear thermal propulsion
- Lunar surface fission power
- Advanced manufacturing
- Space data management through high performance computing
- Artificial intelligence in extreme conditions
- Space situational awareness and space traffic management
- Cybersecurity for space systems

The SEAB members discussed the space working group areas of support, noting that perhaps there should also be a counterintelligence aspect to help protect the space support mission. They additionally noted that while the establishment of the executive level working group was a good thing, there needed to be lower level connections between DOE and NASA.

Mr. Heckman next introduced Dr. Pedro Pizarro for a summary of the final report of the Innovation working group to the SEAB.

Dr. Pedro Pizarro

Dr. Pizarro opened his remarks by thanking all of the members of the Innovation working group for the tremendous effort, as well as thanking Mr. Heckman and DOE for the support received throughout the entire Innovation working group effort. He then revisited the original charge from then Secretary Perry, and endorsed by Secretary Brouillette, to visit the spectrum of potential innovative possibilities to help DOE pursue new and creative solutions to establishing a culture of innovation. The seven areas for investigation were:

- Identify ways the DOE can foster creativity in a way that turns ideas into mission solutions.
- Identify areas where innovation can make the biggest impact to the DOE mission.
- Identify ways the DOE organization can evolve based on innovations.
- Identify how the DOE can build an enduring culture of innovation.
- Identify serious steps in achieving the goal of enhancing innovation at the DOE.
- Identify innovation models and best practices from peer government and private sector institutions and benchmark these against the DOE.
- Identify strategically significant technology areas on which U.S. defense and national security depend and promote domestic innovation in those sectors.

He described the process utilized by the working group with respect to their recommendations in the five areas studied pertaining to innovation and the Department. The recommendations were substantiated by the working group's findings in their March 2020 interim report. As well, he presented the working group's 17 recommendations in the five areas reviewed for the Department's consideration. They five areas reviewed were:

- Innovation Culture
- Portfolio Assessment and Management
- Industry-DOE Collaboration and Communication
- Innovative Funding Approaches
- People

Dr. Pizarro then turned the floor back to Mr. Heckman and the SEAB members for comment. The members noted that through all of the day's presentations, there was a common theme regarding the idea that the Department become more systematic at what they are doing across all of the area reviewed. Admiral Mies highlighted the innovative capability of the National Laboratories relative to their Laboratory Directed Research and Development program, which was seconded by Dr. Pizarro. Mr. Heckman noted the Congressional funding challenges relative to 'buckets' of funding and how government organizations were often structured to mirror the funding from Capitol Hill.

Chair Hollub then asked for and received a motion to accept the final report. It was seconded, and the report was accepted by the SEAB.

Public Comment Period

There were no requests for public comment.

Meeting Adjourned

Prior to adjourning the meeting, Chair Hollub noted the degree of accomplishment of all of the working groups, and thanked everyone for their efforts. The meeting adjourned at 4:09 p.m., EDT.

Respectfully Submitted:
Kurt Heckman
Designated Federal Officer

I hereby certify that these minutes of the October 20, 2020 SEAB meeting are true and correct to the best of my knowledge.

Vicki Hollub
Chair, Secretary of Energy Advisory Board