WESTERN INTERSTATE ENERGY BOARD
2024 ADVANCED NUCLEAR IN THE WEST WORKSHOP
MEETING SUMMARY

INTRODUCTION AND BACKGROUND

The Western Interstate Energy Board (WIEB) hosted its 2024 Advanced Nuclear in the West Workshop on May 29-30, 2024, in Boise, Idaho. WIEB brought together utility regulators, state energy office officials, scientists, national laboratory staff, and industry experts from the US and Canada to explore the prospects and possible problems for advanced nuclear power in the Western Interconnection. Attendees spent two days discussing and sharing information on advanced nuclear power and ended with an interactive, scenario-based workshop.

The following summary includes key takeaways from the various presentations and panel discussions, as well as links to all the meeting materials.

WEDNESDAY MAY 29, 2024

THE HISTORY OF NUCLEAR POWER IN THE WEST

The Workshop began with a welcome by Richard Stover, Administrator of the Idaho Governor's Office of Energy and Mineral Resources and Treasurer of WIEB, who welcomed guests to Boise and provided some context for why the topic of advanced nuclear power in the West was particularly timely. He then commenced the two-day Workshop by moderating a panel on the history of nuclear power in the West. The story began with Alan Carr, a historian from Los Alamos National Laboratory, who joined the group virtually. Alan set the scene with a quick run-through of World War II and the Manhattan Project, which made nuclear power possible by way of nuclear weapons. Alan also highlighted the Western national labs that were key contributors to the Manhattan Project, including Hanford, Lawrence Livermore, and of course, Los Alamos itself. After Alan, Jonathan Grams from Idaho National Laboratory's (INL) Gateway to Advanced Innovation in Nuclear (GAIN) program took over the story, discussing the early nuclear power reactors, with a particular focus on those that were located in the West such as Fort St. Vrain and the Experimental Breeder Reactor II. With the US piece in place, the panel then shifted to the Canadian experience, bringing John Stewart from the Max Gill School of Public Policy to the microphone. John began with the history of radium and uranium mining in Canada, then covered the country's contributions to the Manhattan Project, which consisted of supplying processed uranium and conducting plutonium research. Lastly, John discussed Canada's past and future nuclear power reactors, describing the current fleet of CANDU reactors and Canada's Small Modular Reactor (SMR) Roadmap.

NUCLEAR POWER REGULATION

Next, Michael Furze, Assistant Director of the Washington State Department of Commerce, Energy Division, moderated a panel discussion on how nuclear power is regulated in the US, setting the stage by

discussing the shift in nuclear power's perception in Washington state, and also highlighting that the panel represented a "tale as old as time" with a federal, state, and industry representative. Ryan Alexander, the Regional State/Government Liaison Officer for Region IV at the Nuclear Regulatory Commission (NRC), stranded in Dallas due to inclement weather, joined the group remotely. Ryan provided some background on how the NRC and the Department of Energy branched out of the original federal nuclear authority, the Atomic Energy Commission, in the 1970's, and emphasized that the regulation of nuclear reactors is a power reserved for the federal government under the Atomic Energy Act. He then outlined how the NRC regulates nuclear power reactors under Parts 50 and 52 of the Code of Federal Regulations, highlighting the site-specific characteristics of these regulations. Taking up the state piece, Landry Austin, INL Oversight Program Manager from the Idaho Department of Environmental Quality, spoke next, discussing how his agency conducts environmental surveillance of INL, which covers most of the eastern Snake River Plain aquifer. Landry underscored how important the state's relationships with their federal and other partners are, and how their regular interactions with the NRC took place. Marc Nichol, the Executive Director of New Nuclear at the Nuclear Energy Institute (NEI), rounded out the panel, beginning with three main points: that the NRC protects the public health, safety, and the environment while also maximizing the beneficial use of nuclear power; that advanced nuclear technologies have enhanced, i.e., more intuitive and cost-effective safety features; and, that any regulatory framework should be tailored to the technology being licensed. Lastly, Marc took up the topic of the Part 53 rulemaking for advanced reactors that Ryan mentioned during his presentation, a new licensing framework that the NRC is developing that will attempt to be technology-inclusive and risk-informed.

NUCLEAR POWER ECONOMICS

After lunch, Stephen Goodson, a policy advisor with the Idaho Public Utility Commission, moderated this panel about one of the biggest unknowns associated with advanced nuclear reactor deployments: the cost. With him was Levi Larsen, an economist from INL, who set the stage for the discussion with an analysis of the construction and operating costs of the existing fleet of large light-water pressurized water and boiling water reactors that make up the commercial nuclear power fleet in the US. Levi then presented an analysis done by GAIN that offered cost projections for large reactors and SMRs under a variety of different scenarios. With this background in place, the mic was turned over to Kelly Lefler, who is the Deputy Director for Resource Adequacy in the Department of Energy's (DOE) Grid Deployment Office (GDO). Kelly shared market analysis information and described why some nuclear power reactors had closed in the last decade while others had been saved by state actions. She also described the Civil Nuclear Credit Program, run by the GDO, which aims to prevent premature retirements of existing nuclear reactors by offering special funding. Next, Greg Cullen, the VP of Energy Services and Development at Energy Northwest, offered an overview of the carbon and climate policies as well as the load growth and reliability needs that utilities in the Pacific Northwest are contending with as they make decisions about future electricity generation. This painted a compelling picture for why Energy Northwest has decided that SMRs will be a part of its future generating portfolio. Lastly, Emily Nichols, a Program Coordinator for GAIN at INL, provided an overview of the group's recent coal-to-nuclear plant transition study, which considers the potential benefits of siting new nuclear generation

on sites that previously hosted coal-burning generation. Emily pointed out that reusing these sites would save on construction costs, and that many in the coal workforce could be retrained to have high-paying nuclear jobs.

BUT WHAT ABOUT THE WASTE?

Fred Dilger, the Executive Director of the Nevada Agency for Nuclear Projects, moderated this last panel of the first day that focused on the past, present, and future of nuclear waste. Katrina McMurrian, the Executive Director of the Nuclear Waste Strategy Coalition, began with a brief overview of the different types of nuclear wastes associated with nuclear power activities. She then moved on to a history of the U.S. nuclear waste repository program, the consequences of the current stalemate, and possible paths forward for the program. Brendan McClughan, the Senior Advisor for External Relations at the Canadian Nuclear Waste Management Organization (NWMO), then took over to virtually provide an overview of the Canadian nuclear waste repository program. Brendan highlighted the NWMO's extensive engagement with Indigenous peoples, and shared the exciting news of how close Canada was to finalizing a repository site. Lastly, Paul Dickman, a retired Senior Policy Fellow from Argonne National Laboratory as well as a Member of the Nuclear and Radiation Studies Board of the National Academy of Sciences, Engineering, and Medicine (NAS), took the discussion into the future by covering the relevant findings from the NAS report on the Merits and Viability of Different Nuclear Fuel Cycle Options and the Waste Aspects of Advanced Nuclear Reactors. He emphasized the many unknowns associated with advanced reactors' fuel cycles, and pointed to strong indicators that advanced reactor developers are not considering the future waste that their projects will generate as they move forward with development.

THURSDAY MAY 30, 2024

ADVANCED REACTORS: WHAT ARE THEY AND WHAT CAN THEY DO?

Marc Nichol opened Day 2 by giving a brief overview of the plans for advanced nuclear deployment across the US. He then introduced Christina Walrond, the Stakeholder Engagement Lead of Advanced Nuclear and Industrial Demonstrations at the DOE Office of Clean Energy Demonstrations, who gave a virtual overview of DOE's Pathways to Commercial Liftoff report on advanced nuclear. She described the various categories of "advanced" nuclear reactors that are currently under development, the value propositions that the reactors offer, and some of the (mostly financial) challenges the industry is facing. Next, Benjamin Reinke, the Vice President of Global Business Development at X-Energy, discussed his company's work on the Xe-100, a high-temperature gas-cooled 80MWe reactor, and the advanced fuel known as TRISO-X [tri-structural isotropic]. He gave a detailed description of the safety and operational benefits of this unique fuel type. After Ben, John Jackson, the National Technical Director of DOE's Microreactor Program at INL, virtually discussed the DOE's work on microreactors, which are characterized by being factory fabricated, transportable, and self-regulating. John emphasized the possible deployment scenarios for microreactors, focusing on remote mining, and discussed work on MARVEL, a sodium-potassium-cooled 85 kWth microreactor being built at INL. Lastly, Josh Parker, the

Director of Business Development at BWXT Advanced Technologies, gave a virtual presentation on some of his company's projects, including BANR, a 50 MW reactor that could provide heat, electricity, or co-generation, and Project Pele, a high-temperature gas reactor that will provide around 1-5 MWe. Josh also discussed BWXT's long history as a nuclear company, coming out of Babcock & Wilcox and delivering over 400 reactors for the nuclear Navy.

NONPROLIFERATION, NATIONAL SECURITY, AND THE INTERNATIONAL ORDER

Melanie Snyder, Nuclear Energy Policy Program Manager at WIEB, moderated the last panel, which shifted the focus from the national to the international sphere. Cindy Vestergaard, the Senior Fellow and Director of the Converging Technologies and Global Security Program at the Stimson Institute, began by pointing out that every part of the nuclear fuel cycle was currently disrupted, often by armed conflicts, reviewing the limited options available worldwide for nuclear fuel conversion and enrichment. She then gave an overview of the international nuclear nonproliferation regime, led by the International Atomic Energy Agency. Next, she discussed how international transfers of nuclear material occur, and reviewed the various instruments of export controls.

ADVANCED NUCLEAR WORKSHOP

For the workshop portion of the two-day event, attendees were broken up into small groups and presented with a hypothetical that tasked them with deciding whether to approve an SMR project, depending on their assigned role (public utility commissioner, utility CEO, etc.). Once each small group had time to discuss the hypothetical amongst themselves and come to a consensus, Melanie asked each group to report out, and led a discussion about the factors that led them to make their decisions about whether or not to approve the SMR project. Each small group, regardless of their role, decided that there were too many uncertainties associated with the project, mostly related to its cost, for them to feel confident enough to approve moving forward with the SMR.