Western Governors' Association

ENERGY PERSPECTIVES

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C.L. "Butch" Otter
Governor, State of Idaho

Nuclear Energy's Future Requires National Commitment to R&D

Nuclear energy is an essential part of the U.S. energy mix. It now generates nearly 20 percent of the nation's electricity, including nearly two-thirds of all low-carbon electricity. That strengthens the case for making nuclear an important element of any effort to improve air quality and reduce the carbon footprint of electricity generation.

For these and other reasons – including the importance of baseload electricity supply and the impact U.S. leadership in nuclear energy can have in achieving economic and national security objectives – the U.S. government maintains a research, development and demonstration program focused on nuclear energy. This program is conducted primarily through the U.S. Department of Energy (DOE), with much of this work taking place at DOE's flagship nuclear research facility: the Idaho National Laboratory.

While the specifics of the Department of Energy program can vary from year to year, the focus in recent years has been on research and development of nuclear energy technologies for electricity generation, safety, waste storage and management, and security technologies to help meet energy security, proliferation resistance and climate goals.

The United States has the largest number of operating nuclear power plants in the world; however, the low price of natural gas – and the relatively low capital burden associated with building natural gas-fired electric generation capacity – is having a negative impact on investment in any other technology for U.S. electricity production, including nuclear energy. Despite a brief resurgence of interest in nuclear energy in the mid- to late-2000s, when various companies considered building as many as 26 new commercial nuclear power reactors in the United States, it now appears that only the two new reactors now under construction in Georgia and two that have been proposed in South Carolina are likely to proceed this decade.

Other economic issues for nuclear energy include high construction costs, long construction timeframes, and the failure of the federal government to implement a workable loan guarantee program for nuclear power as established under the Energy Policy Act of 2005.

Another significant concern for nuclear energy development also presents a potential economic opportunity for willing businesses, communities and states – the nation's failure to develop a long-term disposal solution for spent nuclear fuel.

While some have advocated reprocessing to extract reusable elements from spent nuclear fuel as is being done in France, Russia and Japan, the United States has rejected this option for economic, environmental and national security reasons. Instead, U.S. policy calls for the direct disposal of spent fuel in an underground repository. Under legislation passed in 1987, a single site at Nevada's Yucca Mountain was considered for such a repository, but the Obama administration halted work on the project in 2010.

Instead, the administration tasked a Blue Ribbon Commission (BRC) with developing recommendations for reformulating and reinvigorating the U.S. nuclear waste management program. The BRC issued a report in January 2012, and while legislation to implement its recommendations has been put forward, no bill has advanced very far in Congress. The administration likewise has submitted a strategy for implementing the commission's recommendations. At the state and local levels, communities in several states – most notably Eddy and Lea counties in southeastern New Mexico – have expressed interest in hosting nuclear waste management facilities and are gearing up to participate in a consent-based siting process.

Nonetheless, the decision to halt work on the Yucca Mountain repository – and the recommendations subsequently developed by the BRC – presents potential opportunities as well as risks for the State of Idaho, the West and the nation. For example, the Yucca Mountain decision means that spent fuel at locations across the country will remain in storage for much longer periods than initially anticipated; DOE's latest plan calls for a spent fuel repository to be available in 2048, decades after the repository at Yucca Mountain was supposed to be open. Until new waste management or storage facilities are established, spent nuclear fuel and high-level waste now stored at nuclear facilities and commercial nuclear plants has nowhere to go.

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Without a long-term nuclear storage solution, research is needed to better understand the performance of today's commercial reactor fuels in the conditions and configurations we have chosen for storage. The INL is ideally suited to host the new research efforts that will be needed to study the behavior of spent nuclear fuel.

Another facet of spent nuclear fuel storage is the landmark 1995 Settlement Agreement between the State of Idaho and the federal government. With this agreement, Idaho became the only state in the nation with a court order mandating that federal nuclear waste leave state boundaries by a specific date. Even today, no other state in the nation has such a legally binding commitment. The Settlement Agreement and the way that it has transformed the state-federal relationship between Idaho and DOE – from one based on mistrust to one based on partnership – represent a true paradigm shift.

Many of the concerns about long-term storage of waste and spent fuel can be overcome by developing new technologies and products that address the economic and other challenges facing nuclear technologies. That requires research, development and demonstration programs aimed at ensuring nuclear energy remains a viable technology for addressing energy demands and concerns about greenhouse gas emissions. Work at the Idaho National Laboratory has the potential to overcome many of these challenges.

One potentially promising option for capturing the advantages of nuclear energy while avoiding the high capital cost of new reactors involves developing and commercializing small modular reactors (SMRs). SMR designs may be able to deliver power with a shorter construction timetable and with less upfront financial risk, but their overall economic viability is uncertain. If the U.S. nuclear manufacturing infrastructure and regulatory framework can be adjusted for SMR manufacturing, this could offer an economic development opportunity to states with a favorable business climate and established nuclear capabilities.

Recognizing the significance of nuclear energy research and development in Idaho, I established the Leadership in Nuclear Energy (LINE) Commission in 2012 to assess and quantify the opportunities and challenges associated with hosting the INL and a significant nuclear manufacturing and services sector that has emerged as a result of the DOE site.

After nine public meetings, dozens of presentations and several hundred comments from the public, the LINE Commission's final report outlined six broad recommendations to help nuclear energy development:

- **Continue to work cooperatively** with the U.S. Department of Energy and other impacted states to address remaining environmental risks and continue cleanup at the INL site.
- **Exercise leadership** as the U.S. government formulates federal energy and nuclear waste management policies.
- **Capitalize on Idaho's nuclear technology competencies** by supporting the growth of existing nuclear-related businesses, the corresponding infrastructure, and the attraction of new nuclear-related enterprises.
- **Invest in infrastructure** to enable the INL and Idaho universities to successfully compete for U.S. and global research opportunities.
- **Develop and promote** the Center for Advanced Energy Studies (CAES) at the INL as a regional, national and global resource for nuclear energy research.
- **Strengthen and expand** nuclear education and workforce training offerings.

To continue the LINE Commission's work, I also established LINE 2.0 in early 2013. Its responsibilities also will include identifying and recommending appropriate actions on federal budget and policy decisions that could impact INL's long-term operations; identifying additional opportunities and investments that can be made in CAES, Idaho's universities and general research, transportation and communications infrastructure to advance the INL's mission; providing a means of continuing a robust and open dialogue with the public on the INL's future and Idaho's broader nuclear industries sector; and evaluating policy options for strengthening that sector.

Through the work of the LINE Commission and LINE 2.0, public involvement, the support of other impacted states, and utilizing the resource of the Idaho National Laboratory as a significant research and development tool, Idaho stands in a position to help develop policies that will enable nuclear research, development and commercialization in an energy field with the potential to significantly meet the demands of baseload power needs with low carbon emissions.