U.S. DEPARTMENT OF ENERGY

Achieving American Leadership in the Nuclear Energy Supply Chain

Summary

The United States is committed to achieving a 50 to 52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution by 2030, creating a carbon pollution-free power sector by 2035, and achieving net zero emissions economy-wide by no later than 2050.

Nuclear energy is essential to meeting those goals. That includes the existing fleet and advanced reactors that are moving forward for deployment and under development.

Nuclear power plants produce 20 percent of the total electricity supply in the United States today and are the largest source of carbon-free energy. However, we have an opportunity to expand significantly nuclear energy's percentage of electricity generated in the United States.

The U.S. Department of Energy (DOE) Office of Nuclear Energy (NE) report - developed in response to President Biden's Executive Order "America's Supply Chains" signed in 2021 - describes the nuclear supply chain and investigates challenges for continued operation of today's 93 reactors and construction of advanced reactors. The supply chain is critical for successfully enabling the continued operation of the existing domestic fleet of light-water reactors as well as supporting deployment of advanced nuclear technologies.

Key Findings and Opportunities

In addition to supporting the power sector, advanced nuclear reactors can provide low-carbon heat and/or electricity for facilities and processes outside the power sector, alongside other clean energy options for deep decarbonization.

Nuclear energy provides more local permanent jobs, and at higher average wage, than other energy sources. The industry's annual output value as measured by electricity sales is approximately $40 billion.

Nuclear reactors could be installed at retired or soon-to-retire unabated coal or fossil fuel plant locations to facilitate siting, utilize grid connection infrastructure and some of the internal

components (depending on details of the coal and nuclear plant types), reuse the cooling water intake system, take advantage of the local trained/skilled workforce, and provide continued availability of low-cost, reliable, dispatchable electricity.

NE's supply chain report focuses on the need to deploy advanced reactors and find solutions to their fuel requirements. There is a functioning supply chain for existing nuclear reactors, although not all components are domestically supplied.

Many advanced reactors use high-assay low-enriched uranium (HALEU) while others such as those under NE's Advanced Reactor Demonstration Program (ARDP) require TRISO fuel and uranium metal fuel. None of these fuels is commercially available.

Policy Next Steps

DOE's goals are to enable continued operation of existing U.S. nuclear reactors, enable deployment of advanced nuclear reactors, develop advanced nuclear fuel cycles, and maintain U.S. leadership in nuclear energy technology. Although there are challenges and risks in each of these areas, implementation of targeted policies would support achievement of all the goals and would strengthen the U.S. nuclear supply chain to meet the nation's energy, environmental, and societal needs. ■

Download the full document and the corresponding other documents that are part of the DOE response to the supply chain executive order at: www.energy.gov/policy/supplychains