GAO Highlights

Highlights of GAO-14-545, a report to the Chairman, Subcommittee on Energy and Water Development, Committee on Appropriations, U. S. Senate

June 2014

ADVANCED REACTOR RESEARCH

DOE Supports Multiple Technologies, but Actions Needed to Ensure a Prototype Is Built

Why GAO Did This Study

NE conducts R&D on advanced nuclear reactor technologies with multiple aims, including (1) improving the economic competitiveness of nuclear technology to ensure that nuclear power continues to play a role in meeting our nation's energy needs; (2) increasing safety; (3) minimizing the risk of nuclear proliferation and terrorism; and (4) addressing environmental challenges, such as reducing greenhouse gas emissions. External groups have been critical of NE for, among other things, how it prioritizes advanced reactor R&D.

GAO was asked to review NE's advanced reactor R&D efforts. This report (1) describes NE's approach to advanced nuclear reactor R&D and (2) examines how NE plans and prioritizes its advanced reactor R&D activities, including deploying an advanced reactor. GAO reviewed laws and reports concerning NE's efforts to develop advanced reactor technologies and interviewed NE officials and a nonprobability sample of companies developing such technology, selected because of their involvement with DOE's R&D efforts.

What GAO Recommends

To better prepare DOE to meet the requirement of EPAct 2005 to deploy the NGNP prototype reactor, GAO recommends that DOE develop a strategy for resuming the NGNP Project and provide a report to Congress updating the status of the project. DOE agreed in principle with GAO's first recommendation and respectfully disagreed with the second. GAO believes these recommendations remain valid as discussed in the report.

View GAO-14-545. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

What GAO Found

The Department of Energy's (DOE) Office of Nuclear Energy's (NE) approach to advanced reactor research and development (R&D) focuses on three reactor technologies—high-temperature gas-cooled reactors, sodium-cooled fast reactors, and fluoride-salt-cooled high-temperature reactors—but NE is also funding research into other advanced reactor technologies. NE's approach is to conduct research in support of multiple advanced reactor technologies, while collaborating with industry and academia, with the ultimate goal for industry to take the results of NE's research to the next step of development and commercialization. This approach provides several advantages, including flexibility in responding to changes in future U.S. energy policy. Many representatives that GAO talked to from the nuclear power industry and the National Academy of Sciences agree with NE's approach, saying that current policies on controlling greenhouse gas emissions and disposing of nuclear waste do not make a compelling case for choosing a reactor technology to develop. However, others GAO talked to are critical of some of the reactor technologies NE chooses to research, citing economic and technological challenges. The Nuclear Energy Advisory Committee has criticized NE's approach, recommending that NE focus its efforts on a smaller number of technologies to help ensure that a reactor prototype is deployed. To remain aware of industry's R&D needs and international nuclear energy developments, NE regularly collaborates with industry and international organizations.

NE uses internal and external reviews to set program and funding priorities for advanced reactor R&D activities and to evaluate progress toward program goals. For example, NE conducts internal monthly and quarterly reviews to discuss project status, budgets, and technical highlights. Furthermore, NE's R&D efforts are periodically reviewed by external entities, including the Nuclear Energy Advisory Committee. Among the advanced reactor technologies that NE's R&D currently supports, the high-temperature gas-cooled reactor is the technology that is most likely to be deployed and commercialized in the near term, according to an NE planning document. NE officials said this likelihood is based on the wide range of potential industry market applications and because of substantial government investments in the technology's development. NE has been pursuing this technology under the Next Generation Nuclear Plant (NGNP) Project, as established by the Energy Policy Act of 2005 (EPAct 2005). Under EPAct 2005, DOE is to deploy a prototype reactor for NGNP by the end of fiscal year 2021. However, in 2011, DOE decided not to proceed with the deployment phase of this project, citing several barriers. For example, NE and industry have been unable to reach an agreement on a cost-share arrangement to fund the deployment phase because of a disagreement on the applicable cost-share levels and how and when the cost-share would be applied to specific activities or project phases. Although NE continues to conduct R&D for the NGNP Project, it has not developed a strategy to overcome the cost-share issue and other barriers to resuming the deployment phase of the project. Furthermore, DOE has not selected initial reactor design parameters or reported to Congress on an alternative date for making this selection. Without doing so, it is not clear when NE is going to take this next step in deploying the NGNP prototype reactor and it risks the project not being completed by the targeted date in 2021.