THIRD WAY

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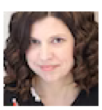
It's Time to Demonstrate Truly Advanced Reactors



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On December 20th, 2019, Congress funded the Department of Energy to create the Advanced Reactor Demonstration Program (ARDP). August 19th, 2020 marked the close of the application period for the program, which will provide a cost-share with developers, technical assistance, and host construction at federal facilities. This program presents an important opportunity to establish commercially viable advanced reactor technologies that can help us solve the climate crisis. There is growing agreement that the US should get the power sector to net-zero carbon pollution by 2035. To help make sure the two ARDP designs selected can be tools for carbon-free electricity generation, we believe **it is crucial that the Department chooses to develop two advanced reactor designs** that are cost-competitive, attractive to utilities, and able to flexibly integrate into a renewable-heavy grid. For these reasons, DOE should select at least one advanced, non-light water reactor for demonstration.

Over the past several years, light water small modular reactors (SMRs) received nearly three quarters of a billion dollars in federal funding to prove they can serve as a "bridge" technology while we waited for non-light water advanced reactor designs to develop. These SMR technologies have made real progress, and global market interest continues to expand. But as we take stock of the nuclear landscape in 2020, it is clear that advanced nuclear designs have evolved much more rapidly than predicted. While the investments the government has made in SMRs to date have made sense, it's now clear that **additional federal investments in nuclear demonstration projects should include a broader range of advanced nuclear designs**.

Since 2010, Third Way has supported the development and deployment of advanced nuclear power as one of the technologies that could help prevent the most harmful impacts of climate change. We need to realize significant emissions reductions over the next decade if we're going to reach net-zero emissions by mid-century.

Leading climate research, from the United Nations Intergovernmental Panel on Climate Change, the US National Climate Assessment, the International Energy Agency, and the Union of Concerned Scientists, tells us that we'll need a variety of low-carbon technologies to reduce global emissions in a meaningful time frame. It's simply too risky to count on only one technology—or set of technologies—to get us to net-zero emissions by 2050.

Like most others, Third Way long believed that it would be a difficult leap to transition directly from the large light water reactors in use today to smaller, advanced reactors that function with completely different coolants, such as liquid metal or high temperature gas. There were many outstanding questions related to licensing these advanced reactors, many of which will serve in brand-new applications outside of bulk power generation, such as process heating, remote microgrid power generation, supplying clean energy for water desalination, hydrogen production, and other processes that will be vital in creating a low-carbon economy. **We viewed small modular light water reactors as a technology that could bridge this gap.** In particular, we hoped these reactors would be easier for regulators to evaluate and for utilities to deploy and operate, while addressing some of the cost, safety, and scaling challenges of the large nuclear power plants operating today.

Throughout years of development, proponents of SMRs have envisioned the technology as a more flexible, economically competitive, and safer source of clean energy generation than conventional light water reactors. SMR designers have worked to incorporate novel safety features, such as 'passive' cooling, which could make smaller light water reactors inherently safer than conventional light water reactors. While SMRs have a generation capacity of up to 300 megawatts—smaller than conventional light water reactors' capacity of as much as 1000 MW—many have hoped that SMR units would reduce both costs and barriers to deployment.

In the past decade, Congress has appropriated over $700 million to help license and develop SMR designs. Recent reports suggest that the DOE has nominally approved an additional $1.4 billion to support the first commercial SMR project with Utah Associated Municipal Power Systems (UAMPS).

Despite this significant taxpayer support, SMRs appear to be facing some of the challenges that have confronted the development of traditional large light water reactors. They have run into scheduling delays and cost increases that, while unsurprising in a new and complex technology, have narrowed the gap between SMRs and more advanced designs. This means it no longer makes sense to spend the lion's share of new federal funding on designs that constitute a smaller, modernized version of light water technology.

This is not to say that the investments the federal government has made in SMRs have been unwarranted. There is a real market demand for new light water technologies. But there is also a renewed sense of urgency for getting cost-competitive nuclear technologies to market—specifically those that can integrate into grids with high penetrations of renewables and reach commercial viability by 2030. **The ARDP must serve to diversify the US nuclear ecosystem so that the future of the advanced nuclear industry does not hinge on one technology.** Therefore, we believe that one of the two ARDP demonstrations should be a non-light water utility-scale reactor that could bring significant amounts of carbon-free power onto the grid.

We also support microreactors, which can play a critical role in decarbonizing niche sectors like remote villages and communities not connected to the broader grid, or to generate heat for industrial processes. While the top prize for the ARDP will support the demonstration of only two reactors, the program includes a second pathway that will support up to five additional designs "resolving technical, operational, and regulatory challenges to prepare for future demonstration opportunities." We believe this pathway is best suited for microreactor concepts and should be reserved for these and other truly advanced non-light water reactor designs. Although small light water reactor designs address some of the cost, safety, and scaling challenges of the large nuclear power plants operating today, they don't incorporate the pioneering technical features that the second ARDP pathway would serve.

We don't have a lot of time to get this right.

Numerous countries, utilities, and manufacturers have plans to achieve net-zero emissions by or near mid-century; in the utility world, 2050 is just one investment cycle away. The average lifespan of a natural gas generator is 22 years, and plants that power industries like cement and steel production can run for 20-50 years, with proper maintenance. This means that net-zero technologies will need to be fully commercialized by the mid-2030s and backed by policies that support their deployment. The ARDP will pick the two most likely technologies to be commercialized by 2030—right inside the window when countries and utilities will be making new investments to meet their long-term energy needs. **The future of the US advanced nuclear industry could turn on the technologies chosen to participate in the ARDP.**

Congress made a strong, bipartisan statement of support by appropriating $230 million for the ARDP in fiscal year (FY) 2020. The House appropriations bill for FY 2021 continues this support with an additional $240 million for these activities. But Congress must enact legislation to codify the ARDP program and commit the funding needed to complete its mission.

The ARDP should only be the beginning. This is the time to be bold. We must diversify the pipeline of clean energy technologies so that over the next decade we can provide communities with affordable, carbon-free resources to meet their diverse energy needs. We innovate by building, learning, and then building again. To do this, we need to support a continuous cycle of clean energy innovation that demonstrates and deploys a variety of reactor designs, ensuring that the United States remains a competitive energy innovator far into the future.

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