The Case for Expanding International Participation in the Versatile Test Reactor (VTR)

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Background

The Versatile Test Reactor (VTR) program aims to build a test facility with high neutron energies and flux that can be used to test new and innovative fuels, structural materials, components, instruments, and sensors, as well as validate advanced modeling and simulation tools. These capabilities are essential to the development of advanced nuclear reactors and concepts; for this reason, the program has garnered significant support from Congress, NGOs, private companies, etc.

Critical views of the VTR program have generally revolved around two main focal points: (1) the costs of constructing the VTR, which some allege would exceed initial cost estimates; and (2) proliferation and security concerns associated with the facility itself and the reactor technologies it would help to advance.

As part of addressing these concerns, it may be prudent for the program's stakeholders and overseers to consider enlarging international involvement in the project, in terms of both depth (i.e. increasing the roles and stakes of existing international partners) and breadth (i.e. including additional partner countries). *International cost and resource sharing arrangements may alleviate the cost burden shouldered by the U.S.* Furthermore, close international partnerships would create channels for open exchanges and information flows, *securing the United States' global leadership position in advanced nuclear reactors and mitigating proliferation and security concerns* related to the research and development of these technologies.

Alleviating Financial Burdens through International Cost Sharing

Detractors of the VTR program have expressed concerns regarding potential escalation of costs for the project--more specifically, that eventual costs for designing and constructing the test

reactor may exceed cost estimates. Whatever the current cost estimates are for the VTR, significant uncertainties do exist--numerous factors are likely to result in variances between present estimates and final costs.

In the end, any project of this scale will require a sizable input of time, capital, and other resources. One of the means by which VTR program managers are addressing this issue is through partnership development. For example, Idaho National Laboratory (INL) announced an Expression of Interest (EOI) seeking "industry stakeholders interested in forming a partnership for a *cost sharing arrangement to design and construct the VTR*."

Already, the VTR program has created a broad partnership network involving multiple U.S. national laboratories and numerous industry and university collaborators. While some of these entities may not be significant sources of financing and investment into the project, they nevertheless provide expertise, data, and human capital--ultimately reducing program completion time and cost through their contributions.

In much the same manner, potential international partners of the VTR program have the relevant expertise and infrastructure to be important contributors. Several countries that have already signed preliminary VTR agreements or memoranda (France and Japan have signed agreements, and South Korea has a pending MOU) have significant experience with fast reactor R&D that can prove invaluable for the program. Such partner countries can contribute human resources, data and information (e.g. technical documents and validation databases), infrastructure (e.g. fuel and component manufacturing capabilities), etc. Collectively, such contributions may reduce the time period (and thus also cost) for VTR development and construction.

Furthermore, international partner governments and entities can directly fund and contribute to the costs of the VTR program. In this regard, the Long Baseline Neutrino Facility (LBNF) may be illustrative. LBNF is an example of a research/science facility in the U.S. that is "internationally designed, coordinated, and funded" and has received considerable domestic political support as a successful case of international cooperation and cost sharing. While further investigation will be needed to determine whether LBNF could serve as a model for international cost sharing in the VTR program, experience from the development of the Fermilab facility will certainly yield lessons on how best to leverage international partnerships to diffuse cost burdens.

Addressing Proliferation and Security Issues via Multinational Involvement

Although some objections to the VTR have focused specifically on the challenges of safeguarding and securing fast neutron reactors, it is important to note that the VTR will ultimately be used to test and advance an array of fuels and materials that can be applied to a diversity of technologies, including molten salt reactors, gas-cooled reactors, and potentially even fusion concepts.

Extensive and in-depth multinational participation in the VTR would therefore promote international transparency in R&D activities for a broad range of new and advanced reactor types. This is particularly important as many of these technologies are in nascent stages and thus, further development of safeguards approaches/methods will be required. Additionally, the VTR will be used to develop sensors, monitors, and other tools needed to safeguard and secure reactor designs that may be deployed worldwide.

As a global advanced reactor R&D hub, the VTR alleviates pressures to develop/use test facilities abroad (e.g. Bor-60), encouraging testing to be conducted under the strictest nonproliferation and security protocols and facilitating direct U.S. leadership in the eventual deployment and use of emerging nuclear technologies.

Conclusion

Official rationales for the VTR program have tended to focus on the VTR's ability to support U.S. companies in their endeavors to test, develop, and commercialize advanced reactors and associated technologies--ultimately so that these companies can be competitive in potentially burgeoning domestic and international markets.

The full value of the VTR, however, extends far beyond its capacity to support the private sector. The VTR program is a matter of U.S. global leadership in an area with clear impacts on national security. Considering this, expanded international participation in the VTR:

1. Enhances the viability of the project by creating opportunities for cost and resource sharing arrangements.
2. Allows the VTR to more effectively serve as a vehicle for advancing U.S. global leadership in this space and agency to shape international standards and norms in the development, deployment, and use of next-generation nuclear technologies.

Regardless of U.S. decisions and policies on nuclear energy, the world is moving forward with advanced nuclear development. The outcome of the VTR program may be an important determinant of whether the U.S. will be an active leader and participant or merely a passive observer.

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