THIRD WAY

THIRD WAY TAKE *Published July 28, 2015 • 3 minute read*

Regulating New Types of Nuclear Reactors

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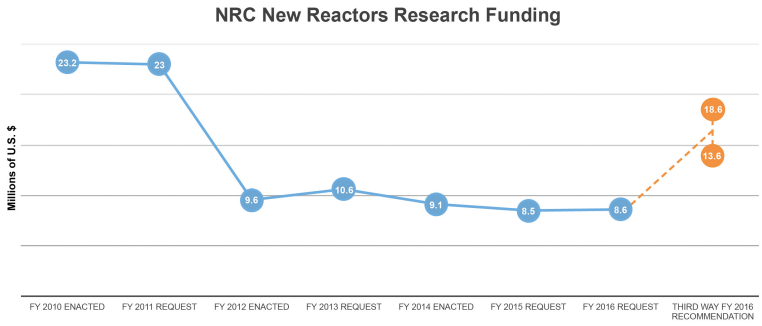
In response to climate change, economics, energy demand, and reliability, engineers in more than 50 companies and organizations in North America are hard at work developing an entirely new generation of nuclear reactors. This technology, known as advanced nuclear, is backed by $1 billion in private investment. Unfortunately, advanced nuclear today faces a significant regulatory roadblock; there is no timely pathway for the federal government to approve the license for these new, very different reactor designs. This is in part because the Nuclear Regulatory Commission (NRC) does not have the resources it needs to prepare to evaluate and license advanced nuclear.

The NRC is the premier nuclear licensing organization in the world. It has ensured the safety of over 100 reactors across the country for decades. But all these reactors are based on the same light water technology. The NRC knows does not yet have the processes or know how to regulate advanced reactors, which do not use light water. The NRC's Office of Nuclear Regulatory Research is seeking to address this challenge in order to fulfill the NRC's research program mission of supplying independent expertise, information,

and technical judgments to support timely and realistic regulatory decisions.

Researching emerging reactor technologies, however, requires funding and personnel. Just as the private sector has invested in advanced reactors, the Office of Nuclear Regulatory Research (and the Office of New Reactors, which it coordinates with) has had its research budget cut by more than 60% since 2010. [1] The $8 million currently budgeted to research under the Office of New Reactors is dedicated to a variety of reviews and analyses, with a very small portion aimed at advanced reactor reviews. This reduction in funding is starving the NRC of the resources it needs to evaluate how to license advanced reactors.



Advanced reactors are being developed. If there is not a pathway for these reactors to get licensed in the United States, they will be licensed and built in other countries, with less robust regulatory agencies. This is not in our best interest as a country. We must make sure the world's top nuclear regulatory agency is ready to evaluate and license them. This requires adding between $5 and $10 million to the research budget of the Office of New Reactors for FY 2016 with the express purpose of supporting the expedited review of advanced non-light water reactors.

The doubling of an extremely small budget would provide a critical path for the development of advanced nuclear reactors. This, in turn could help ensure that advanced nuclear technology is developed, licensed, and built, in the United States. Just as the staff of the NRC recently developed a list of potential policy and technical issues associated with

licensing small modular light water reactors, the staff could prepare a similar list of issues for non-light water reactors. With more staff time dedicated to studying advanced reactors, the NRC can be ready to license the new types of nuclear reactor when the industry is ready to begin building, testing, and deploying them.

RECOMMENDED FURTHER READING:

- The Advanced Nuclear Industry
- Nuclear's Continuing Evolution
- Brookings Essay: Back to the Future

END NOTES

1. Data was collected in the Congressional Budget Justifications of the NRC as follows:

   NRC Budget Justification FY 2016: http://pbadupws.nrc.gov/docs/ML1503/ML15030A093.pdf

   New Reactors Budget for Research: $8.6 Million in FY 2015 President's Budget and $8.5 Million in FY 2016 Request to "Provide research support for LLWR and SMR DC reviews and analysis, including the development of new reactor plant risk models, seismic and structural engineering reviews, independent assessment of flooding hazards, independent assessment of thermal hydraulics system responses and severe accidents, digital instrumentation and control capabilities, and control room habitability. Resources also support the development of guidance for human factors reviews and efforts to maintain existing codes and models."

   NRC Budget Justification FY 2015: http://pbadupws.nrc.gov/docs/ML1406/ML14064A167.pdf

   New Reactors Budget for Research: $8.6 Million in FY 2015 President's Budget and $9.1 Million in FY 2014 Enacted as "In FY 2015, new reactors research funding supports the resolution of technical issues in DC reviews and development of regulatory guidance for new reactor licensing. Activities include support for design certification reviews and analysis for large light-water reactors and small modular reactors, including the development of new reactor plant risk models; seismic and structural engineering reviews; independent assessment of flooding hazards; independent assessment of thermal hydraulics system responses and severe accidents; digital instrumentation and control capabilities; and control room habitability. Resources also support the development of guidance for human factors reviews and efforts to maintain existing codes and models."

   NRC Budget Justification FY 2014: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1100/v29/fy2014-cbj.pdf

New Reactors Budget for Research: $9.1 Million in FY 2014 Request and $9.6 Million in FY 2012 Enacted as "New reactors research funding supports the resolution of technical issues in DC reviews; development of regulatory guidance for new reactor licensing; advancement of the NRC's knowledge of, and infrastructure for, earthquake engineering; and development of new reactor plant models. Research resources also support the advanced reactors program, including the development of expertise, tools, and data in thermal-hydraulics, severe accidents, probabilistic risk assessment, and seismic and structural analysis. Advanced reactor program research will support the review of integral pressurized-water reactors."

NRC Budget Justification FY 2013: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1100/v28/fy2013-cbj.pdf

New Reactors Budget for Research: $10.6 Million in FY 2013 Request and $9.6 Million in FY 2012 Enacted as "New reactors research funding supports resolving technical issues in DC reviews; developing of regulatory guidance for new reactor licensing; advancing the NRC's knowledge of, and infrastructure for, earthquake engineering; and developing of new reactor plant models. Research resources also support the advanced reactors program, including the development of expertise, tools, and data in areas such as thermal-hydraulics, severe accidents and probabilistic risk assessment, human factors, materials performance, and seismic/structural analysis. Advanced reactor program research will support the review of SMRs."

NRC Budget Justification FY 2012: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1100/v27/fy2012-cbj.pdf

New Reactors Budget for Research: $23.2 Million in FY 2010 Enacted and $9.6 Million in FY 2012 Request as"Research resources also include the development of new reactor plant models and homeland security activities, such as aircraft impact analyses studies. Resources also support the advanced reactors program, including the development of expertise, tools, and data in areas such as thermal-hydraulics, severe accidents,

nuclear analysis, probabilistic risk assessment, human factors, materials, and seismic/structural analysis."

NRC Budget Justification FY 2011: http://pbadupws.nrc.gov/docs/ML1004/ML100490733.pdf

New Reactors Budget for Research: $17.0 Million in FY 2009 Enacted and $24.1 Million in FY 2010 Enacted and $23.0 Million in FY 2011 Request as "Research will also support advanced reactors and the development of new reactor plant models, fund homeland security projects such as aircraft impact analyses studies. Resources for advanced reactors support the development of expertise, tools, and data in areas such as thermal hydraulics, severe accidents, nuclear analysis, probabilistic risk assessment, human factors, materials, and seismic/structural analysis."