

# Getting Back in the Game: A Strategy to Boost American Nuclear Exports



**Suzanne Hobbs Baker**

Former Visiting Fellow for Nuclear Security

[@SuzyHobbsBaker](#)



**Ryan Fitzpatrick**

Senior Director of Domestic Policy, Climate and Energy Program

[@rdfitzpat](#)



**Matt Goldberg**

Fellow, Clean Energy Program

## Takeaways

Since the dawn of commercial nuclear power in the 1950's, the United States has been a leading supplier of civilian nuclear technologies to countries around the globe. This has provided major benefits to the American economy and our foreign policy interests. But over the past two decades, the U.S. nuclear export industry lost its top spot and risks falling even further.

While our companies continue to offer top-tier goods and services, the low-cost, “sign and go” financing packages being offered by some of our state-owned foreign

competitors are slowly pushing America out of a multi- billion dollar global market. This has serious implications for U.S. commerce and global security. To reverse this trend, the U.S. must reprioritize American nuclear exports as a key element of its domestic and foreign policy. Here are some actions that can get the ball rolling:

1. Establish leadership within the White House to oversee and coordinate nuclear energy policy
2. Provide better financing options
3. Accelerate U.S. nuclear innovation to capture new markets

## BACKGROUND

Competing in the global civilian nuclear energy market should be a top economic priority for the U.S. The Department of Commerce predicts that global demand for nuclear energy technology will total \$500-\$740 billion over the next decade.<sup>1</sup> And that's just the beginning. Leading authorities including the International Energy Agency expect the world's nuclear capacity to double by 2050,<sup>2</sup> as developing economies try to keep pace with growing energy demand and most nations turn increasingly to low-carbon sources to meet emissions targets.<sup>3</sup> Capturing even a portion of a market this size would produce enormous rewards for American businesses and workers.

Also of interest for the United States, nuclear deals create strong geopolitical ties between the selling country and the host country—a commitment lasting as long as the life of the project (between 50 and 100 years). In essence, where you have civilian nuclear power deals, you have long-term partnerships and greater chances for international cooperation.

The U.S. was the dominant force in the global civilian nuclear trade for decades, enjoying both the rewards and responsibilities that come along with that. As pioneers in nuclear energy innovation, the U.S. was able to develop world-class products and establish a successful export regime in the 1970's and 1980's. We are still making profits off of some of those earliest deals. Today, America has a multi-billion dollar nuclear energy industry that employs a domestic workforce of more than 100,000 people.<sup>4</sup> At the same time, the U.S. has used its commercial leadership to establish global security standards. We have long been the largest contributor to the International Atomic Energy Agency, the United Nations' nuclear non-proliferation watchdog.<sup>5</sup> The U.S. government also helps other nations with regulatory, safety, security, and innovation needs—even when there is no commercial benefit involved. We consistently put the safety and security interests of the global community first. This is what being a responsible world leader looks like.

In recent decades, however, the U.S. has lost its edge as a global exporter. Our products have a harder time competing with all-inclusive deals offered by Russia's state-supported industry and may soon face additional challenges like lower-cost Chinese reproductions.<sup>6</sup> Losing this market share hurts more than just the bottom line for our producers and workers. It limits our ability to influence global standards. It also allows our competitors to lock-in long term, influential alliances with countries that are important to American foreign policy strategy.

To help our domestic industry adapt to the realities of today's market and regain global leadership, the U.S. needs a new policy strategy.

## **Russia And China: Playing By Their Own Rules And Winning**

In its heyday from the 1960's to the 1990's, the American nuclear export industry dominated global markets, providing much of the world's nuclear manufacturing and supply expertise. But in recent years, U.S. nuclear exporters have struggled as a new paradigm of government-to-government nuclear deals has been dominated by state-owned and state-subsidized companies.

For instance, Russia offers all-inclusive packages for new nuclear plants—covering the cost of constructing the reactor, training employees, and even operating the facility— sometimes known as the “Build, Own, Operate” (BOO) model. Meanwhile, China's state-supported industry has a unique capacity to finance nuclear deals around the world.

These shifts in the market will put increasingly intense pressure on American nuclear exporters, making it almost impossible for individual companies or even private consortia to compete on cost, ultimately putting the U.S. nuclear supply chain at risk.

Russian and China have another advantage in the competition for market share—they choose not to adhere to the same standards as the U.S. and other top producers. Neither Russia nor China are members of the Organization for Economic Co-Operation and Development (OECD), which sets guidelines that discourage larger, richer countries from taking unfair advantage of emerging nations in trade and business dealings. The fact that our competitors are not members of the OECD, and therefore play by a different set of rules, puts the U.S. at a structural disadvantage in the global marketplace.

## **Reactors Planned and Under Construction by Home Country Vendor**

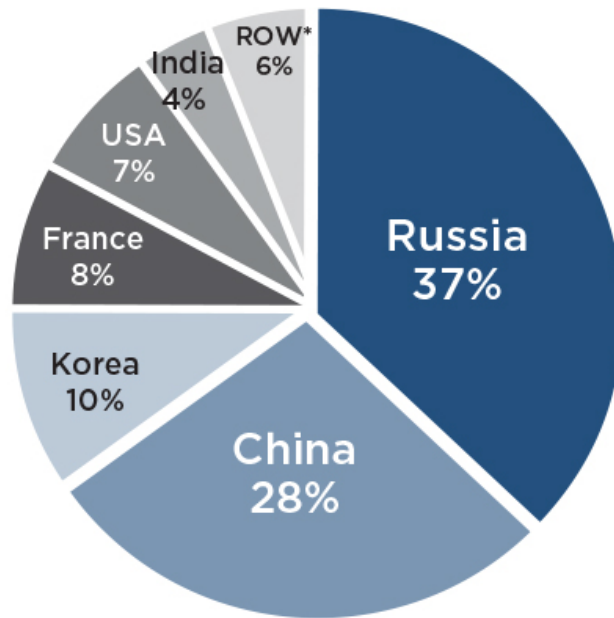


FIG. 2. Reactors Planned and Under Construction by Home Country Vendor, as of October 2015. Source: World Nuclear Association. ROW = Rest of World. <sup>7</sup> NOTE: These totals include reactor deals that are currently being negotiated as well as domestic projects.

## Russia

Russian energy policy explicitly views the export of all energy resources and technologies as geostrategic tools. <sup>8</sup> A good proxy for understanding Russia's civilian nuclear strategy is to look at the history of their oil and natural gas exports to Ukraine and the European Union via the Trans-Siberian pipeline. Once the pipeline was established as a major source of energy for the region in the early 1980's, Russia's influence grew exponentially. Russia has regularly used this influence to achieve diplomatic and economic goals, threatening to disrupt energy supplies and pricing across much of Europe and Eurasia. <sup>9</sup> Russia's illegal annexation of the Crimean Peninsula in Ukraine in 2014 was ostensibly driven by its desire to maintain this control and regional influence. <sup>10</sup>

At face value, Russia's all-inclusive approach to nuclear trade, which includes construction, operation, fueling and waste management, can look very appealing to countries with little existing energy infrastructure. However, when understood through the lens of its past efforts to bully its neighbors into energy dependency, the situation starts to look downright Machiavellian. The geopolitical value of these relationships is so significant for Russia, that the state-owned vendors are willing to cut into profit margins to strike a deal. Right now, Russia is locking-in relationships with countries that have great regional influence. And they happen to be in regions that are particularly important to U.S. diplomatic efforts—including Eurasia (Turkey) and Southeast Asia (Vietnam).

## China

China is in an even more competitive position than Russia, both financially and politically. Going a step beyond the standard debt financing, China has the cash in hand to make equity investment in

large nuclear projects. Like Russia, China has also developed a robust domestic civilian nuclear supply chain. And while it has so far exported its reactor technology only to its close ally, Pakistan, China has clearly signaled its interest in nuclear markets in wealthy western countries—like the new reactor project it is helping to finance in the United Kingdom—as well as in the developing world.<sup>11</sup> And the U.K. example is yet another instance of one of our competitors dropping a geopolitical anchor to build influence with a key U.S. ally.

Adding to China’s viability in the global nuclear market, they have designed a reactor specifically for export. The Chinese partnered with Westinghouse to design the CAP1400, a conventional large light water reactor, which is fully-owned by the Chinese but based on the design of Westinghouse’s popular AP1000, which has already been successfully licensed by western authorities. This lends credibility to China’s product. It is also reminiscent of the way that China quickly overtook the global manufacture of solar panels roughly a decade ago—leveraging U.S. intellectual property from companies seeking access to Chinese markets, undercutting competitors with low manufacturing costs, and ultimately pushing many U.S. producers out of the market. China continues to dominate the solar market today.<sup>12</sup>

With its nuclear manufacturing infrastructure already in place and a unique ability to make equity investments in projects around the world, China has positioned itself to be a serious competitor in the global market. There is every reason to believe that its emergence on the scene will be swift and dominating.

## **What We Need to Do to Get Back In the Game**

Our competitors are using a number of tactics to outcompete U.S. companies. Their state-backed industries are better able to offer easy “package deals” and preferential financing terms. In China’s case, its low manufacturing costs will be tough to beat. And both China and Russia are operating without the hindrance of certain international rules that promote ethical trade practices. But the economic and political opportunities of the nuclear energy market are far too lucrative for us to roll over and give up. For a variety of reasons, the U.S. will not be able to take advantage of the same tactics employed by China and Russia. So we must create our own strategy to compete for this valuable market. We need a comprehensive and forward-looking plan that allows us to play both defense *and* offense—protecting America’s dwindling share of the market for today’s nuclear reactors, while helping U.S. innovators commercialize new technologies that will allow us to regain our dominant position in nuclear exports. These three policy recommendations can help get the ball rolling.

## **Establish Leadership in the White House**

The White House must decide to make civilian nuclear trade a national priority, and provide clear leadership across the many programs, offices, and agencies that will need to cooperate if we are to succeed. There are a lot of complexities involved in meeting our own high standards for safety,

security, non-proliferation, and ethical trade practices. It is important that we adhere to these principles, but we must also be nimble and efficient in order to thrive in an increasingly competitive market. Striking this balance will require a level of coordination that goes far beyond what is currently in place.

There are several quick and straightforward steps that can be taken to resolve this issue, most notably the designation of a senior level position within the White House. This person would be tasked with coordinating all efforts within the Administration that impact nuclear exports—from various White House offices to inter-agency activities to national laboratories, as well as outreach to legislators, U.S. companies, and non-governmental organizations. Ideally, this position would have authority similar to or exceeding that of a Senior Director at the National Security Council. Given the number of issues that intersect with nuclear exports, there are several places within the White House for this position to reside. More important than its exact placement is that this individual is given ample and explicit authority to act on behalf of this important issue.

## **Develop a Suite of Financing Tools**

Once a designated champion is in place within the administration, his or her most urgent challenge will be to expand the suite of financing tools available to U.S. nuclear companies. Currently we only have one tool...and it's broken. The U.S. Export-Import Bank (Ex-Im) is a government agency that finances the export of American goods and services.<sup>13</sup> The Ex-Im Bank provides loans, loan guarantees, and insurance to help American exporters and their workers compete in highly competitive international markets.<sup>14</sup> Many other countries that export nuclear technology have the support of their own national export credit agencies, which gives them a significant leg-up in what they are able to finance.<sup>15</sup>

The Export-Import Bank (Ex-Im) was recently reauthorized and had a \$12.4 billion dollar budget in 2015, but it has three empty seats on its five-member board, which means it cannot reach a quorum. Without a quorum, the Ex-Im Bank can only lend up to \$10 million per project, not nearly enough to make a difference in terms of nuclear financing. For nuclear vendors to get the financing guarantees they need for overseas projects, the Senate must confirm nominees to for these empty seats as soon as possible. Alternatively, Congress could reduce the quorum to two board members.

But a functional Ex-Im isn't enough on its own. U.S. vendors need a variety of financing options to meet the various needs of global purchasers. At the federal level, Congress and the Administration should consider creative ways to use existing programs, like including nuclear financing in global development efforts at U.S. AID<sup>16</sup> and OPIC, as well as extending Department of Energy loan programs to international customers. Outside of the federal space, the U.S. should actively push development and climate banks to include nuclear projects in their purview. For example, as a member and major contributor to the World Bank, the U.S. is well positioned to encourage the organization to end its ban on financing nuclear plants. Defining nuclear as a clean energy source

and ensuring its eligibility for as many funding mechanisms as possible will help more countries meet their climate goals, while giving U.S. nuclear vendors a fair opportunity to compete.

Additionally, we should look to our fellow OECD member nations for partnership. France, the UK, Korea, Japan, and Canada are all nuclear exporters who share our safety, security and democratic values. While individually we will all struggle to compete with Russia and China, we can cooperate to put together appealing financing deals. Beyond collaboration, we should work with these allies to encourage Russia and China to comply with OECD rules moving forward.

## **Invest in U.S. Nuclear Innovation**

Innovation has long been America's greatest advantage over our global competitors. We win by delivering products that disrupt old markets and open up new ones. We lose, however, when we rest on previous successes. From cell phones to solar modules, U.S. industries have pioneered countless high-value technologies that were ultimately replicated by foreign manufacturers who could undercut the cost and overtake the market. We are beginning to see this same pattern play out with the LWR technologies that allowed the U.S. to reap huge financial benefits and shape global standards for decades. If we are going to succeed in this very lucrative market in the long-term, we have to keep inventing better nuclear technologies that consumers will want—and competitors will want to copy.

The good news is, we're well positioned to deliver these new technologies. Over 50 companies and organizations in the U.S. are working to commercialize advanced nuclear reactor technologies. From a technical perspective, many of our companies are further along than those in China and Russia, though both countries can overtake us if we fail to play our cards right. The federal government can help U.S. innovators maintain their head start by accelerating nuclear research, development and demonstration and helping to scale up deployment of small modular reactors (SMRs).

SMRs have a number of advantages over today's large GW nuclear reactors. Because of their size (under 300 MW vs. 1,000 MW for today's reactors), SMRs can be built in a controlled factory setting and installed module-by-module, enhancing the level of construction quality, increasing efficiency, and lowering cost. Their size, versatility, and passive safety features are also attractive to countries with smaller grids and less experience with nuclear power. Taken together, these features make SMRs more useful and easier to finance.

But to get SMRs ready for export abroad, the U.S. must first demonstrate readiness at home. Vendors have to gain experience with licensing and constructing SMRs so that the U.S. nuclear supply chain remains robust. The U.S. Department of Energy (DOE) is essential to this mission and has supported the development of SMR technology through the SMR Licensing Technical Support (LTS) Program. They are now working with companies to accelerate the licensing and siting process. DOE's SMR development efforts are making great progress, and they should be

continued and expanded to assist with manufacturing, assembly, and operation of SMRs at home and for export. A substantial ramp up of federal funding for SMRs beginning in fiscal year 2018 will ensure that U.S. technologies reach the global market ahead of our competitors and lock-in a significant amount of lucrative long-term contracts.

Beyond SMRs, the federal government must continue to incentivize even more advanced reactors that can use a variety of fuel types and provide other safety, efficiency, and non-proliferation benefits. This means building on the DOE's recently established Gateway for Accelerated Innovation in Nuclear (GAIN) initiative, which provides U.S. innovators with test facilities, computational resources, and assistance with licensing. Congress must also lend its support to nascent efforts at the Nuclear Regulatory Commission to modernize its licensing process, which is currently not structured to review innovative technologies in a timely manner. Policymakers will need to begin a conversation about how these new designs will be incorporated into international security and non-proliferation protocols. And within the next four years, partnerships between the federal government and private sector innovators will be needed to construct "first-of-a-kind" advanced reactors. Legislation addressing many of these needs moved rapidly through Congress in 2016 with broad bipartisan support. Policymakers should ensure that these legislative solutions make it across the finish line as quickly as possible in the new Congress.

## CONCLUSION

Almost 60 years ago, the United States gave birth to the civilian nuclear power industry. The exporting of civilian nuclear technologies and reactors gave the U.S. significant economic and national security leverage, and it enabled us to help establish critical and rigorous nuclear safety standards in much of the world. Now, as climate change and the emergence of energy-hungry developing countries make civilian nuclear power even more important, the U.S. is losing its ability to compete in the global market. This would have grave consequences for our country. We can avoid this risk, but only if we act swiftly. Re-establishing senior leadership to advocate for civilian nuclear power in the White House, providing new financing tools for civilian nuclear exports, and investing in nuclear innovation are vital steps to restoring U.S. competitiveness in this critical industry.

### TOPICS

**NUCLEAR** 198



## ENDNOTES

1. United States, Department of Commerce, International Trade Organization, “2016 Top Markets Reports Civil Nuclear, Executive Summary,” 2016 Top Markets Report, May, 2016. Accessed October 31, 2016. Available at [http://trade.gov/topmarkets/pdf/Civil\\_Nuclear\\_Executive\\_Summary.pdf](http://trade.gov/topmarkets/pdf/Civil_Nuclear_Executive_Summary.pdf).
2. Bobby Magill, “Nuclear Power Needs to Double to Curb Global Emissions,” *Scientific American*, January 30, 2015 . Accessed October 31, 2016. Available at <https://www.scientificamerican.com/article/nuclear-power-needs-to-double-to-curb-global-warming/>
3. “World Energy Needs and Nuclear Power,” World Nuclear Association. Accessed October 31, 2016. Available at <http://www.world-nuclear.org/information-library/current-and-future-generation/world-energy-needs-and-nuclear-power.aspx>.
4. “Why Nuclear Energy, Energy Growth and Job Creation,” Nuclear Energy Institute. Accessed October 31, 2016. Available at <http://www.nei.org/Why-Nuclear-Energy/Economic-Growth-Job-Creation>.
5. Susan Epstein and Paul Kerr, “IAEA Budget and U.S. Contributions: In Brief,” Report, Congressional Research Service, February 17, 2016, p. 2. Accessed October 31, 2016. Available at <https://www.fas.org/sgp/crs/nuke/R44384.pdf>.
6. “Preparations continue for initial CAP1400 units,” World Nuclear News, April 27, 2015. Accessed October 31, 2016. Available at <http://www.world-nuclear-news.org/NN-Preparations-continue-for-initial-CAP1400-units-2704155.html>.
7. “Plans for New Reactors,” Report, World Nuclear Association. Accessed October 31, 2016. Available at <http://www.world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.aspx>.
8. Russia, Ministry of Energy for the Russian Federation, “Energy Strategy of Russia for the Period up to 2030,” Accessed October 31, 2016. Available at [http://www.energystrategy.ru/projects/docs/ES-2030\\_\(Eng\).pdf](http://www.energystrategy.ru/projects/docs/ES-2030_(Eng).pdf).
9. European Union, European Commission, Press Office, “Antitrust: Commission opens proceedings against Gazprom,” Accessed October 31, 2016. Available at [http://europa.eu/rapid/press-release\\_IP-12-937\\_en.htm](http://europa.eu/rapid/press-release_IP-12-937_en.htm) AND Andrew Kramer, “Russia Cuts Gas, and Europe Shivers,” *The New York Times*, Accessed October 31, 2016, Available at <http://www.nytimes.com/2009/01/07/world/europe/07gazprom.html?pagewanted=all&r=0>
10. Dr. Frank Umbach, “The energy dimensions of Russia’s annexation of Crimea,” *NATO Review Magazine*. Accessed October 31, 2016. Available at <http://www.nato.int/docu/review/2014/nato-energy-security-running-on-empty/Ukraine-energy-independence-gas-dependence-on-Russia/EN/index.htm>.

11. Graham Ruddick, "China plans central role in UK nuclear industry after Hinkley Point approval," *The Guardian*. Accessed October 31, 2016. Available at <https://www.theguardian.com/business/2016/sep/15/hinkley-point-chinese-firm-to-submit-essex-nuclear-plant-plans>.
12. Where Are Solar Panels Made and Should You Care?, "Energy Sage News. Accessed October 31, 2016. Available at <http://news.energysage.com/where-solar-panels-are-manufactured/>.
13. United States, Export-Import Bank, "The Facts About ExIm Bank," Accessed October 31, 2016. Available at <http://www.exim.gov/about/facts-about-ex-im-bank>.
14. Ed Gerwin and Gabe Horwitz, "Why the Export-Import Bank Should be Reauthorized," Report, Third Way, May 2014. Accessed October 31, 2016. Available at <http://www.thirdway.org/memo/why-the-export-import-bank-should-be-reauthorized>.
15. The Ex-Im Bank helps level the playing field for U.S. exports with coverage up to 85% of the export contract and 30% of local costs.
16. United States, Agency for International Development, USAID Mission to India, "The USAID Contribution to the Economic Development of Maharashtra," Report, May 1970. Accessed October 31, 2016. Available at [http://pdf.usaid.gov/pdf\\_docs/pdacx904.pdf](http://pdf.usaid.gov/pdf_docs/pdacx904.pdf).