



**Nuclear Energy, the Production Tax Credit, and International Security**

*A Report to the Electric Reliability Coordinating Council*

by

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## **Summary**

Over the past few years, the nuclear power industry has come under sustained economic threat that directly undermines the dominant leadership position once held by the United States. Domestic nuclear infrastructure and the educational base that supports it directly contribute to our national security and are increasingly left out of plans to expand the nation's power base with a reliable and long-term clean energy source. Key to maintaining our primacy in the field of nuclear power is the pending extension of the nuclear production tax credit. The measure would be an unmistakable signal for the continued vitality of the nuclear industry and create an incentive for the American people to support and invest in our nuclear leadership for years to come.

### **I. Introduction**

Despite an ongoing effort to develop cutting-edge nuclear generation capacity, boosted throughout the 2000s by a confluence of factors, the nuclear leadership of the United States has fallen into a moribund status that jeopardizes our national security. The civilian nuclear renaissance now faces a crucial test. Before July 31<sup>st</sup> 2017, there were only two new reactor projects under construction in the United States. Now, however, after the recent decision by South Carolina utilities to abandon the twin-reactor project, V.C. Summer, there remains only one project in progress: Southern Company's venture in Georgia known as Vogtle.<sup>1</sup> Vogtle is now the make or break endeavor for advanced light-water reactors. Given the reality of current market forces, it needs to present a compelling economic case that defines its potential for success, directly impacting the need for future investment.

The nuclear power industry has faced a number of economic difficulties in the past few years including a drop in the price of natural gas, the declining relative cost of renewable energy, and a lack of market pricing mechanisms to value the carbon-free benefits of nuclear power. The decline, however, is not a result of technological inferiority. Indeed, nuclear power consistently boasts the highest capacity factor – the ratio of actual energy generated to the peak production level of a facility – of any energy source in the United States at over 90%.<sup>2</sup> Rather, the root cause of this decline is directly attributable to the unforgiving regulatory and tax environment which overwhelmingly promotes other zero-emissions technologies. However, unlike other sources of zero-emission power, only nuclear has a national security benefit beyond just power generation.

The disparity in tax-related incentives related to nuclear versus other clean-energy sources, is shocking. In 2016, nuclear and renewables accounted for a similar percentage of primary energy production – 10% and 12.1% respectively.<sup>3</sup> However, renewables received a total of \$11.4 billion in tax incentives while nuclear only received \$0.2 billion.<sup>4</sup> The gap cannot be explained solely

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<sup>1</sup> McLeod, Harriet, Utilities ditch reactors that launched U.S. nuclear renaissance, (July 31, 2017), available at: <https://www.reuters.com/article/us-usa-nuclear-south-carolina-idUSKBN1AG22S>

<sup>2</sup> Electric Power Annual, Capacity Factors for Utility Scale Generators Not Primarily Using Fossil Fuels, January 2013-December 2015 (Nov. 21, 2016), available at: [https://www.eia.gov/electricity/annual/html/epa\\_04\\_08\\_b.html](https://www.eia.gov/electricity/annual/html/epa_04_08_b.html)

<sup>3</sup> Sherlock, Molly, The Value of Energy Tax Incentives for Different Types of Energy Resources: In Brief, (May 18, 2017), available at: <https://fas.org/sgp/crs/misc/R44852.pdf>, at 3

<sup>4</sup> *Id.*, at 8

using environmental reasons because fossil energy received \$5.2 billion. When scaled based on their relative contributions to overall energy production, fossil fuel sources still received over three times as much tax support per unit of energy than did nuclear. This comes on top of a number of other policies like state renewable portfolio standards (RPSs), which only further encumber new nuclear projects.<sup>5</sup>

## **II. The Nuclear Production Tax Credit is Crucial to the Industry**

Policy decision-makers and legislators are presented with a binary choice – either support existing advanced light-water nuclear projects and sustained U.S. leadership, or accept certain and irreparable decline throughout the industry, with an exponentially negative effect on our national security. Projections from the Center for Strategic and International Studies Commission on Nuclear Energy Policy indicate that if the Vogtle project fails, nuclear capacity would precipitously fall and come close to zero by 2050.<sup>6</sup> The consequences of this are many, but are particularly grave in the context of international civilian nuclear leadership. One particular provision, the 45J Nuclear Production Tax Credit, has the potential to provide advanced light-water nuclear technology with a critical financial bridge to the future. It is more than a tax credit; it is an investment in the security of the United States.

The nuclear production tax credit is a program specifically tailored to compensate each kilowatt-hour of electricity produced by advanced light-water nuclear power plants. The provision significantly enhances a clean-energy source by improving the economics of nuclear power and has the ongoing potential to inaugurate a more diverse energy policy portfolio. Additionally, governmental support, both in the form of production tax credits and grant, provide a spectrum of mechanisms that can assist in addressing qualms regarding new nuclear development and the implications of shouldering the cost of capital investments.<sup>7</sup>

The provision, as currently written, applies only to plants placed in service before January 2021, a deadline threatening the only new nuclear power construction project slated to become operational.<sup>8</sup> Extending the tax credit's deadline or crafting the legislation to provide an ongoing tax incentive for current and future construction projects would provide enough time to finish the new reactors. Further, it would provide a clear commitment and sense of certainty to an industry reeling from the ongoing retirement of older nuclear power plants. The decision to shutter the projects in South Carolina demonstrates just how important the 45J credit is at this particular time. While the existing reactor fleet itself is under significant pressure, the U.S. is likely facing the last chance it has to promote concrete innovation in advanced light-water nuclear technology. This incentive is important not only for its immediate impact on nuclear power reactor projects, but also the ripple effect it will have on nuclear research more broadly.

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<sup>5</sup> Aspen Institute, The Future of Nuclear Energy in the United States, (Feb. 3, 2017), available at:

<https://assets.aspeninstitute.org/content/uploads/2017/02/2016-Nuclear-Energy-Forum-1-30-17.pdf>, at 6

<sup>6</sup> CSIS Commission on Nuclear Energy Policy in the United States, Restoring U.S. Leadership in Nuclear Energy: A National Security Imperative, (July 2013), at 6

<sup>7</sup> Frazier, Timothy, The Role of Policy in Reviving and Expanding the United States' Global Nuclear Leadership, (March 2017), available at:

<http://energypolicy.columbia.edu/sites/default/files/energy/The%20Role%20of%20Policy%20in%20Reviving%20and%20Expanding%20the%20US%20Global%20Nuclear%20Leadership%20033017.pdf>, at 29.

<sup>8</sup> 26 U.S. Code § 45J (d)(1)(B)

In order for the US to be an effective leader on nuclear issues, it must sustain a robust and diverse ecosystem of education, research and development, scientific innovation, and industrial capacity in the nuclear field. The domestic and international market for technology created by the tax credit would attract new investment in the industry; that investment would spark interest in research, supporting laboratories, and directing students into a growing and cutting-edge field of study. This cycle of investment and interest only functions if there is a vibrant market for nuclear energy to drive it.

The evolution and growth of the nuclear segment of the clean energy industry is a pressing requirement since nuclear power is expected to remain a viable energy source for the foreseeable future. To support this requirement, the U.S. nuclear industry must develop the resources necessary to support and sustain the academic research and development of next-generation power plants, small modular reactors, and supporting technology.<sup>9</sup> Without the continued investment into the brain power of our nation's youth to support the nuclear energy field of study, the U.S. risks a growing shortage in human capital, making us unable to compete with other countries.

Simultaneously, the United States worked for decades to ensure nuclear non-proliferation remained at the forefront of our national security policy. Nuclear proliferation issues still drive our national security actions today with the threats posed by Iran and North Korea. In conjunction with the education necessary to support a strong nuclear industry, many of the same facets of science and academia used to educate a new generation of nuclear engineers and educators is absolutely necessary to understand how to monitor, detect, and prevent the proliferation of nuclear weapons.<sup>10</sup> Only through the rigor of academia can a body of experts be developed that can ensure this component of our national security posture is maintained and expanded, especially in a world where the pursuit of nuclear weapons is being sought by rogue nations and terrorists.

### **III. Global Implications of U.S. Nuclear Leadership**

In order to reestablish the role of the United States as a leader in nuclear energy, the nation must leverage technological innovation in a variety of areas including research, safety standards, international cooperation, and non-proliferation. In choosing to lead, the US will send a signal that it recognizes the value that the nuclear industry contributes to national security. It will also show that our citizens support and are willing to invest in the future of nuclear power and education because of the attendant benefits accrued from our participation. One of the first benefits that stems from this commitment is the technical knowledge that will be acquired from a vibrant domestic research and development apparatus. This addresses two key security issues:

#### **a. Israel and other allies**

The decline in U.S. nuclear leadership is of specific concern to the state of Israel. After the Joint Comprehensive Plan of Action (JCPOA) – the Iran Deal – was signed, the United States began its

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<sup>9</sup> The Henry M. Jackson School of International Studies, *A New Nuclear Era: The U.S. Role in the Shifting Global Energy Landscape*, (2017), available at:

<https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/38701/TaskForceAReport-2017-Montgomery.pdf?sequence=1&isAllowed=y>, at 76

<sup>10</sup> *Id.*, at 45

first open dialogue with Israel on nuclear energy issues.<sup>11</sup> This development was particularly important as it underwrote critical ongoing security dialogues. Prior to the talks, the JCPOA created a large rift in the U.S.-Israel relationship. It signaled an about-face in policy from supporting an ally to nurturing the civilian nuclear program of its sworn enemy.

A study of broader bilateral strategic discussions before and after the agreement found that civil nuclear energy developments became an increasingly salient topic.<sup>12</sup> Decision makers on both sides agreed that discussions on nuclear energy and proliferation-related concerns had to be continuous in order to rebuild trust.<sup>13</sup> Today, the vitality of these dialogues is undergirded by concrete developments in domestic nuclear energy. If the U.S. government fails to signal support for the nuclear industry, Israel will question our credibility in ensuring safe nuclear power throughout the world.

Additionally, with President Trump's recent promise to Israel that Iran will never have a nuclear weapon,<sup>14</sup> the relationship now hinges on continued U.S. leadership in the nuclear arena. This demands something other than a passive attempt, rather it calls for a reaffirmation of our capabilities. The decline of the U.S. nuclear industry would likely see an increase in Iran's willingness to test the boundaries of the agreement in addition to a reduction in our ability to enforce it.

The perception that the US is not holding true to its promise would most assuredly call into question other pillars of our security alliance. It would throw in doubt our ability to ensure Israel's qualitative military edge (QME) in the region and potentially trigger an overreaction or buildup of military assets that could destabilize the region even further. The consequences of Iranian adventurism on the one hand and Israeli insecurity on the other, are not acceptable. This particular case is an example of what could occur in other regions of the world. Our ability to enforce non-proliferation norms is of great concern to our other allies in the Middle East, and in Asia as well.

## **b. Geopolitics**

For years, the U.S. supported a broad spectrum of federally funded research and development centers (FFRDCs) that enhanced the detailed but important study of nuclear energy, including power generation. The consequences of letting this capability atrophy have been immense – as the U.S. slowly abdicated its leadership role over the past several years, nations whose national security interests run counter to, if not outright oppose, those of the U.S. have consequently filled the void. The clearest example of this has been Russia and China actively seeking to control 90% of global enrichment of uranium and becoming the leading vendors of nuclear technology around the world.<sup>15</sup>

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<sup>11</sup> Joint Statement on United States – Israel Energy Dialogue, (October 20, 2015), available at: <https://www.energy.gov/articles/joint-statement-united-states-israel-energy-dialogue>

<sup>12</sup> Kane, Chen, Scoping Study of a U.S.-Israel Security Dialogue, (May 24, 2016), available at: <http://calhoun.nps.edu/bitstream/handle/10945/49188/PASCC%20US-Israel%20Final%20report%20May%2024%202016.pdf?sequence=1>, at 5

<sup>13</sup> *Id.*, at 3

<sup>14</sup> BBC, Trump tells Israel Iran will never have nuclear weapons, (May 22, 2017), available at: <http://www.bbc.com/news/world-middle-east-39973197>

<sup>15</sup> Aspen Institute, at 12

To remain a leader in the nuclear arena, however, the United States must remain relevant and as a study from the *Aspen Institute* points out, “The United States, however, has gone through a transition from zero dependence on foreign uranium in 1985 to overwhelming dependence in 2015.” It goes on to say, “Russia, meanwhile, sees nuclear energy (along with natural gas) as a way to win back Eastern Europe; it is consciously using nuclear as an instrument of geopolitical influence.”<sup>16</sup> The consequences of their mishandling nuclear material or the accidental proliferation of nuclear technology to the wrong nations is an unacceptable risk, especially in these fraught times where the specter of nuclear proliferation and conflict looms with the likes of Iran and North Korea.

In a counterbalance to those concerns, however, the United States continues to lead the world in energy production. Consequently, the nation must commit to a path that strengthens our national security by continuing and expanding the development of our energy sources. U.S. energy independence and the expansion of nuclear power is a critical component of these energy policies. While every form of energy has a national security component, nuclear energy, the attendant security concerns surrounding its myriad applications, and the academic and scientific foundations that support it must be maintained and expanded. Regrettably, the nuclear power industry has come under sustained threat, jeopardizing the infrastructure that directly contributes to a robust national security posture that keeps our nation safe.

#### **IV. Continued Support is Necessary for Nuclear Leadership**

The United States must remain the world’s leader in the development of energy sources. In the nuclear power industry, it is incumbent for that leadership to continue through public support of this clean energy source in order for it to remain a reliable power backbone for decades into the future. Unlike many nations who are abandoning nuclear power solely because of ill-informed political pressure, the U.S. must remain stalwart in the support and growth of this aspect of our energy security.

Maintaining and advancing the leadership role of the United States in nuclear technology will come at a cost. The U.S. currently has 99 operating reactors that make up 19.5% of the electricity generated in the country, and account for over 30% of the nuclear electricity generated worldwide. Nuclear energy runs at a capacity factor averaging 80-90% whereas fossil fuels run at 40-45%, and renewables much lower.<sup>17</sup> This leadership role comes through direct support of the government and the American people. The sustainability and reliability of nuclear power demonstrate its effectiveness compared to renewable sources of energy.<sup>18</sup> Even with government support, only an engaged private sector will make the large capital and infrastructure investments necessary to promote and enhance nuclear energy sources.

Seeing the need to be a leader in the field of renewable energy, our nation provided broad and comprehensive tax and infrastructure supports to build up this vital component of our energy portfolio. Now, to maintain, if not actually regain, that same leadership role in the nuclear field, a robust tax policy that provides an even more diverse level of subsidized power must be

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<sup>16</sup> *Id.*, at 11

<sup>17</sup> Jackson School, at 3

<sup>18</sup> *Id.*, at 3

incorporated as part of the tax reform effort currently under consideration in Congress. Support for the nuclear industry has long been enshrined in the tax code and has resulted in many benefits to our energy infrastructure.

Today, as the United States seeks to ensure a leadership role in global affairs, the field of nuclear science, technology, and energy must remain at the forefront of our investment in national security. The United States cannot afford to cede this critical field of expertise to the likes of Russia or China. The consequences of mishandling nuclear material or the accidental proliferation of nuclear technology to the wrong nations is an unacceptable risk. Given the significance that this technology holds for our energy and national security, continued and expanded support for the nuclear industry and academia must be enshrined as part of our national security policy for the foreseeable future.

## **V. Conclusion**

Leadership in the nuclear arena requires commitment. The United States has been a leader for decades and must assert itself at the forefront again. Unlike other energy producing segments of our economy, the nuclear industry requires a multi-faceted partnership between government, the private sector, and the academic and scientific communities. Each plays a part in the security of the nation, and each contributes to maintaining the high U.S.-set standards for non-proliferation. Through the best demonstrated monitoring practices and comprehensive international fuel agreements, the world should be able to look to the U.S. market; and countries trying to develop new reactors should be able to rely on the U.S. as a model for safety practices. Additionally, our allies should feel assured in our ability to remain at the head of international nuclear discussions. The only way to ensure this capability is to promote a market for nuclear energy in the United States. An extension of the production tax credit would be a critically important step in remedying the imbalance in the energy landscape and support the future of advanced light-water nuclear projects. Given the significance that nuclear technology holds for our energy and national security, continued and expanded support for the nuclear industry must be enshrined as part of our national security policy for the foreseeable future.