**Constructing a Rational Approach to Promoting U.S. Civil Nuclear Power**

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A large percentage of the U.S. commercial nuclear sector is in trouble with the near term closure of a number of reactors increasingly inevitable. Much has been written about the impact of cheap shale gas on the economics of nuclear, but poorly structured, deregulated markets and market distortions– mainly in the form of subsidies and mandates for other power generation – are severely undermining the competitiveness of much of the nation’s existing fleet, particularly smaller reactor units.[[1]](#footnote-1) At the same time, foreign competitors, which are mostly state-run enterprises, are capturing a greater share of the export market for nuclear technology and services. The problems that U.S nuclear vendors face are compounded by an antiquated export regulatory regime and a nonproliferation policy[[2]](#footnote-2) that fail to take into full consideration the current political realities and dynamics in the global market. Moreover, the United States no longer enriches uranium with its own technology, which increases U.S. dependence on nuclear fuel imports and foreign technology.

Nonetheless, the long-term outlook for a true nuclear renaissance in the United States remains positive, determined largely by the likelihood of increased regulation of greenhouse gases, traditional pollutants, and hydraulic fracturing. This regulatory scenario, however, will play out slowly and may take decades before nuclear becomes economically competitive with other generation sources. In the meantime, the United States is at risk of losing much of its domestic manufacturing capacity for a technology that is clearly indispensable to promoting U.S. national and energy security interests.

Unfortunately, many energy analysts compare nuclear power to other forms of generation, using the cost of producing electricity as a deciding standard. However, nuclear cannot simply be compared to natural gas, coal, or renewables because of its inherent link to national security concerns, including defense needs and the U.S. ability to help shape global safety and nonproliferation standards. The U.S. nuclear Navy, for example, relies heavily on the domestic commercial sector – not only for supply chain reasons but also to aid in recruitment efforts, which would be complicated by a reduction in employment opportunities in the private sector. Accordingly, there are a number of significant public policy interests – outside of diversity of electricity production and climate mitigation – that policymakers should consider when determining the need to protect the existing fleet of reactors and promote U.S. nuclear manufacturing.

The window for making a positive, meaningful impact to help reverse or slow the decline of the U.S. nuclear sector is narrowing, however. Consequently, legislators, policymakers, and thought leaders should act now. This paper examines a suite of near-term policies and measures that promote a more rational view to electricity, trade, and non-proliferation policymaking. Taken together, the successful implementation of such measures could help bolster the U.S. civil nuclear sector until the economics of the industry improves.

**State of the Commercial Nuclear Sector in the United States**

Nuclear Operators

Despite moving forward with the construction of five new reactors in non-merchant markets in the South,[[3]](#footnote-3) last year’s announced shutdown of five reactors reflected the industry’s actual state – one of contraction. Operators decided to retire two small reactors (Kewaunee and Vermont Yankee) prematurely because of cheap shale gas, subsidized renewables, and poor market structure that devalue base load power. Because these externalities and distortions are unlikely to change or be corrected in the near term, we are more likely than not to see a greater number of premature shutdowns or operator decisions not to pursue relicensing.[[4]](#footnote-4) Further, the decommissioning funds for reactors will almost certainly provide an incentive to reduce costs in the short run, given rising operating and maintenance (O&M) costs.[[5]](#footnote-5) In some cases, the fund could generate much needed cash for operators.

With roughly 50 percent of the nuclear fleet located in merchant markets that also have renewable portfolio standards (and in many cases, energy efficiency/demand destruction mandates), of particular concern is the impact of these policies, including subsidies for non-nuclear generation, [[6]](#footnote-6) on the continued profitability of merchant market single units that have much higher per unit costs.[[7]](#footnote-7) Four of the five announced retirements last year were single reactors – Kewaunee (556 MW), Vermont Yankee (620 MW), Oyster Creek (680 MW), and Crystal River 3 (860 MW).

Given current government policy and market structure, the future of all single units in merchant markets is in doubt – putting at risk an additional 8,767 MW for early retirement. Even some larger merchant dual units are threatened – particularly those located in western PJM that are also close to MISO,[[8]](#footnote-8) which has a large amount of subsidized, intermittent wind power.[[9]](#footnote-9) Combined with other potential losses to the nation’s nuclear fleet, U.S. nuclear generating capacity could fall to about 80 GWe by 2030 – down from roughly 100 GWe at the beginning of 2013.[[10]](#footnote-10)

Nuclear Vendors

With few nuclear build opportunities at home, U.S. vendors are increasingly dependent on foreign markets to preserve or expand their capacity. Access to overseas nuclear markets is also crucial to the maintenance of the U.S. private sector’s research and development programs. Despite the contraction of the civil nuclear fleet in Japan, Germany, and the United States, the sector is rapidly expanding globally. The World Nuclear Association reports that China plans to have 58 GWe of nuclear capacity by the end of this decade, compared to less than 3 GWe in 2000.[[11]](#footnote-11) In total, 70 reactors are currently under construction with about 170 on order or planned – with over 60 percent located in China, India, and Russia.

Over the next ten years, the global market for nuclear goods and services has an estimated value of $500 to 740 billion, according to the Department of Commerce. At first glance, U.S. companies should benefit substantially from this expansion. The reputation of American firms in operational excellence, combined with the “gold standard” stamp of approval from the U.S. Nuclear Regulatory Commission (NRC), provide major competitive advantages. Moreover, U.S. industry remains a leader in advanced and innovative nuclear technologies and designs, including safety features.

However, available data for exports indicates that these advantages are not the deciding factor for many potential foreign buyers. According to a 2010 report published by the U.S. Government Accountability Office (GAO),[[12]](#footnote-12) American vendors are losing global market share on a number of fronts, despite the increase in the value of related U.S. exports from 1994 through 2008.

* The U.S. share of global exports of sensitive nuclear material (e.g. enriched uranium) decreased significantly from 29 to 10 percent.[[13]](#footnote-13)
* Despite an almost doubling in the value of exports of nuclear reactors, major components and equipment, and minor reactor parts, the market share enjoyed by U.S. firms declined from roughly 11 to 7 percent.
* GAO found that U.S. firms were not involved in the majority of new foreign reactor construction projects during the period, having only participated in only eight builds when over 60 reactors came on line.

While the report’s data is somewhat dated, anecdotal evidence suggests that the trend has continued with a troublesome trajectory. American firms clearly face intense competition from state-owned or state-aligned enterprises that enjoy significant government political and financial support, which often includes favorable financing, subsidies, turnkey services, and fuel take-back options. Moreover, state-owned competitors are located in many of the largest markets for nuclear goods and services, creating an additional obstacle to U.S. exports. The awarding of the $20-billion United Arab Emirates (UAE) contract to the South Korean-led consortium in 2009 serves as probably the best example of the changing dynamic in the global nuclear marketplace.

Nuclear Fuel

As of May 2013, the United States no longer enriches uranium with U.S.-source technology. The decline of the U.S. enrichment industry has occurred rapidly; twenty years ago, U.S. nuclear operators purchased 85 percent of their enriched uranium services from U.S. sources, falling to 15 percent by 2011.[[14]](#footnote-14) USEC, an American company, is working to commercialize its new centrifuge technology but current market dynamics threaten to shut the project down.

The closure of a number of reactors in a several countries – mostly in the aftermath of the Fukushima disaster – and the economic downturn has substantially softened the demand for nuclear fuel. Moreover, foreign markets, including the European Union, place significant restrictions on the import of nuclear fuel.[[15]](#footnote-15) In Russia’s case, Moscow requires domestic reactors to use Russian fuel. These policies are in stark contrast to the relatively open market of the United States, which has the largest civilian nuclear fleet in the world. The possibility of resuscitation of this industry, which plays a vital role in U.S. defense needs, remains an open question.

**Why Subsidies, Mandates, and Carbon Policies Can’t Help Nuclear in the Short Run**

Many proponents for U.S. nuclear power argue for subsidies and mandates or for market mechanisms for reducing greenhouse gases – such as carbon trading or a carbon tax – that would incent investment in the sector. This menu of policy options, however, is unlikely to help ease the challenges faced by the existing fleet for several important reasons:

* Even with subsidies, new nuclear is unlikely to be built in the near term in deregulated markets because of cheap shale gas, low economic growth, and excess capacity. Industry is faced with the more pressing problem of maintaining *existing* reactors, which are threatened by externalities and market distortions, including government subsidization of other power generation.
* Redefining renewable energy mandates to include *new* nuclear as a compliance option would face substantial opposition from the renewable industry, which depends on existing government policy to preserve its artificial market. The competitiveness of *existing* reactors would benefit from participating in renewable or “clean energy” mandates, but the renewable sector and other industry that have already moved to comply with existing requirements would oppose such efforts, severely complicating any effort in state legislatures to change those laws.[[16]](#footnote-16)
* Carbon trading and taxes – though more efficient than EPA regulation and more likely to preserve a greater role for coal in the coming decades – would never gain a critical mass of political support from conservatives without EPA preemption on a number of fronts, including the Clean Air Act, Clean Water Act, and other existing environmental law and regulation. Most Democrats and their environmental allies would not back such a transformation of policy when current conventional thinking holds that implementation of existing environmental law is more certain to achieve climate change goals.

Impact of EPA Regulations

Natural gas is poised to benefit more than any other power generation source from current EPA regulation of mercury and air toxics,[[17]](#footnote-17) which is helping displace 30 GWe or 8 percent of the nation’s coal fleet from the grid. Even as natural gas prices increase – most likely modestly – over the next ten to fifteen years because of fuel switching in the electricity sector, an expansion of the chemical industry, and a growth in exports, we do not see the economics of nuclear improving enough to stop the further contraction of the sector between now and 2030.

The proposed rule on carbon pollution from new power plants, which was released last fall, and the forthcoming proposal on existing plants could force an additional 100 GWe of coal from our electricity mix over the next few decades. If those rules survive litigation and are then implemented, we expect a slight expansion of nuclear power in regulated markets, given advanced cost recovery and the value placed by state regulators on future diversity of generation in those areas of the country.

However, the slow unfolding of this round of EPA greenhouse gas regulations will not salvage a number of troubled nuclear reactors in merchant markets, given the immediate problems that these units face. Moreover, these rules will not fix the fundamental structural problems in those markets nor will they level the playing field vis-à-vis subsidized and mandated renewables. Further, renewable targets across the country will ramp up between now and 2025 – thus capturing an increasingly large share of the generation market that is closed to nuclear.

Over the longer term, natural gas generation will likely face greater regulation of air quality emissions and hydraulic fracturing. At the Copenhagen climate conference in 2009, the United States pledged a reduction in its greenhouse gas emission of 83 percent by 2050, compared to a 2005 base line – a target that requires a significant role for nuclear power.[[18]](#footnote-18) In addition, an official announcement of a mid-term reduction target at next year’s meeting in Paris is expected, building on President Barack Obama’s 17-percent target for 2020.[[19]](#footnote-19) If realized, the next phase in carbon regulation, aimed at achieving the U.S. long term target, would fundamentally change the economics for nuclear power. When total life cycle emissions are considered, the average intensity from nuclear is 28 metric tons CO2e/GWh, compared to 500 metric tons CO2e/GWh for natural gas.[[20]](#footnote-20)

While stricter greenhouse gas regulation would eventually drive significant amounts of natural gas from the nation’s grid, this scenario is unlikely to begin shifting the economics in nuclear power’s favor until after 2030. In the meantime, the federal government and the states – given their dominant role in electricity legislation and regulation – should explore and implement regulatory and market reforms that do not distort the market and recognize the contribution of nuclear power to grid reliability and security.

**Promoting Rational Approaches to Nuclear Policymaking**

Many nuclear power advocates typically discuss the need to expand the role of nuclear in the U.S. electricity mix for environmental, energy diversity, and national security reasons. However, their concentration is largely on the commercialization and deployment of advanced nuclear that incorporates lessons learned from Fukushima, produces minimum or no waste, and is proliferation resistant. While long-term thinking for the sector has value, it does little to address the sector’s current problems – which left unaddressed would certainly negatively impact the investment community’s views on the future of nuclear in the United States, including advanced platforms.

This section looks briefly at policy recommendations that would help maintain the operation of troubled reactors and improve the competitiveness of U.S. vendors in the global market.

**I. Recommendations for Protecting the Existing Fleet of Reactors**

Maintaining the current fleet would help stabilize the domestic industry and improve the outlook for investment in the sector, including small modular reactors and U.S. enrichment technology.

1. ***States should reform or repeal Renewable Portfolio Standards (RPS),recognizing the impact of EPA regulations – current and projected – on utility emissions***

The adoption of renewable energy mandates at the state level was justified mostly to reduce greenhouse gas emissions in the absence of federal climate legislation. Now, however, with EPA carbon pollution regulations on new and existing power plants moving forward and carbon advocacy on the verge of a major victory, states should begin plans to phase out renewable portfolio standards, which force consumers to spend more for less reliable power generation. Utilities are best positioned to pick the environmental compliance pathway for their electricity mix. If deployment of renewables is a better, more efficient pathway to reach emissions reductions targets than building nuclear reactors or investing in nuclear uprates, utilities should make that decision – not civil servants.

If these laws are not reformed or repealed, government-mandated renewables will increasingly take a larger share of a state’s electricity generation, thus shutting off that part of the market from nuclear power and increasing the financial difficulty of some reactors. A phase out or repeal of renewable portfolio standards would send a positive market signal that government is taking a *technology-neutral* position to achieving emissions reductions targets.[[21]](#footnote-21)

Reform or repeal of renewable portfolio standards would certainly face major opposition from the renewable energy sector because of that industry’s dependence on mandates and subsidies for preservation of its artificial market. Further, some industry stakeholders would be concerned with changing the rules midstream after significant investments have already been made for compliance. However, the world of federal environmental regulation has changed drastically since the adoption of most – if not all – of these mandates – a fact that should weigh heavily in justifying reform or actual repeal.

1. ***Congress should not renew the federal wind production tax credit (PTC)***

The federal wind production tax credit (PTC) should not be renewed because the policy objectives of supporting the PTC have been widely achieved. The wind PTC of $23 per MWh has been highly successful in encouraging the deployment of wind power across the country and helping the wind industry reach maturity. Over the past decade, wind facilities have increased 10-fold to over 60 GW.[[22]](#footnote-22) Even if Congress does not renew the PTC, wind developers will benefit from the credit because it remains in effect for ten years – which serves as a built-in phase out.

A continuation of the wind PTC would add to the financial difficulties facing a number of existing reactors in areas of the country with significant amounts of subsidized wind power. Recent studies have shown the negative impact of the PTC on baseload power, particularly because of its link to negative pricing for electricity (i.e., when power providers must pay “congestion” charges to the grid to take their electricity).[[23]](#footnote-23)

The PTC incents wind farm operators to produce power regardless of market demand. Because the wind blows mostly during the late hours of the night and early morning, wind farms produce significant amounts of electricity when demand is at its lowest. Receiving the tax credit, however, allows wind power generators to pay “congestion” charges to the grid and still earn a profit, as long as those charges are not greater than the credit. In some parts of the country, negative pricing accounts for up to 13 percent of all hourly prices, and this number is growing as more subsidized wind comes on line.

Nuclear facilities, which attempt to run at a set level of output for technical, safety, and cost recovery reasons, must pay the “congestion” charge without benefitting from the tax credit. Thus, baseload plants, including nuclear, face increased operation costs for no real policy justification, given the fact that the PTC has already achieved its objectives.[[24]](#footnote-24)

Clearly, a shutdown of a nuclear reactor because of subsidized wind would undermine *the actual intent* of the wind production tax credit – to reduce emissions by increasing deployment of clean energy generation – because wind generation requires back-up power, most likely in the form of natural gas, to produce electricity when the wind is not blowing.

The wind industry, of course, opposes an end to the PTC because the tax credit creates an artificial market for wind that would not otherwise exist. However, wind advocates ignore the fact that the PTC creates a disincentive to private sector investment in storage technology – a breakthrough in which is necessary for the transition of wind power from an intermittent source of generation to baseload. As long as wind power cannot be used as baseload, wind will never be as widely deployed as more reliable forms of generation.

1. ***The Federal Energy Regulatory Commission (FERC) should ensure that capacity markets adequately compensate assets that provide critical services to the grid***

Currently, capacity markets do not sufficiently value baseload, resulting in a trend of growing dependence on less reliable generation in merchant markets. In fact, less reliable resources, such as demand response, and intermittent renewables *are valued as much as* baseload, including nuclear reactors, in some capacity markets.

We have already seen the implications of these structural problems. Last August, Entergy announced the retirement of Vermont Yankee, in part because the wholesale market did not value the reactor for its fuel diversity benefits.[[25]](#footnote-25) Exelon CEO Christopher Crane echoed this point in early February, warning that a number of the company’s reactors may be shut down soon because of market defects.[[26]](#footnote-26)

Deregulated markets face a widespread problem with the lack of investment in new generating capacity. The only viable new build options in these markets are natural-gas fired plants and subsidized renewables. Given the historical unpredictability of the price of natural gas and the intermittent nature of renewables, deregulated markets are clearly rolling the dice on price volatility.

Left unaddressed, these flaws are likely to harm future grid reliability, according to some credit market analysts.[[27]](#footnote-27) Consequently, these structural problems should be addressed as soon as possible. Policymakers need to work with the markets, including Regional Transmission Organizations and Independent System Operators, to find a way that ensures the maintenance of adequate baseload generation. Specifically, deregulated power markets should reflect the value of generation assets based on key criteria, such as providing critical reliability services, including VAR,[[28]](#footnote-28) and fuel on site, which is not subject to hourly price spikes.

1. ***Congress needs to conduct effective oversight of the Nuclear Regulatory Commission to ensure beneficial post-Fukushima regulation and a transparent process for determining fees charged to the private sector***

The Nuclear Regulatory Commission (NRC) serves as a model of regulatory excellence to other nations. While ensuring safe operation of the U.S. reactor fleet is critical to the future of nuclear power, there are growing concerns that post-Fukushima regulation will be pursued without adequate consideration of costs and benefits. Regulatory requirements and costs that are not accompanied by real benefits only add to the nuclear industry’s financial woes.

The NRC’s budget has grown considerably over the past decade – from roughly $585 million in 2003 to $986 million in 2013. Full-time staff has increased over the same time period from 2,906 to 3,931.[[29]](#footnote-29) The private sector, mostly operators of nuclear plants, cover 90 percent of the NRC’s budget by law.[[30]](#footnote-30) With a contraction of the nuclear fleet, the private sector’s contribution to the NRC budget will fall. Accordingly, the NRC will either need to reduce its staff and costs or increase fees on other services that it levies on existing operators. Some industry leaders already speculate that the NRC, for instance, will increase its staff hourly rates in responding to operators to help fill the funding gap. Transparency in work performed and achieved by the NRC, along with fee structure could help address these concerns.

Over the past several years, the NRC has issued rules in silos without recognizing their cumulative impact or ranking them in order of importance. The Commission – with stakeholder input – needs to prioritize regulations, focused on those actions that have real safety or public health benefits that can be realized more immediately. Some ongoing industry and regulatory activities, outside of the post-Fukushima recommendations, for example, carry more near-term benefits to the public.

Moreover, Congress should consider changing the percentage of the NRC budget – at least temporarily – covered by industry, in the context of a contracting sector. The NRC needs adequate resources to help ensure safety and security for the nation’s fleet of reactors, but increasing fees on a shrinking pull of operators would worsen the economics for operators – particularly smaller units that play an important role in grid reliability but have higher costs per MWh.

**II. Recommendations for Increasing U.S. Nuclear Exports**

Improving U.S. vendor access to global nuclear markets would help maintain domestic manufacturing capacity during a time of few nuclear builds in the United States. Though the United States cannot reasonably address directly the significant competitive disadvantage that its industry faces vis-à-vis state-owned enterprises and entities, Washington can pursue a more rational approach to nuclear trade policy that reflects the current state of the global market, including the recognition that formidable competitors will continue to seek greater market share to the detriment of U.S. national interests.

1. ***The federal government needs to reform its antiquated export regulations on nuclear trade while promoting an effective global nonproliferation regime***

Compared to their U.S counterparts, foreign suppliers have streamlined procedures for nuclear exports – aided by firmly established deadlines for review. Moreover, decision making rests in the hands of fewer governmental entities. For example, Japan’s Ministry of Economy, Trade and Industry (METI) and the Russian Federal Service for Technical Export Control (FSTEC) are responsible for all export licensing. Such a concentration of regulatory authority eliminates inefficiencies that result from the involvement of multiple actors and produces faster application processing. In the case of Japan, South Korea, and Russia, the review of an export license application can be completed within 15-90 days with many licenses good for multiple exports.[[31]](#footnote-31)

U.S. nuclear exports are certainly subject to strict conditions, overseen by several different agencies and departments. The Departments of Energy (DOE), Commerce, and State, as well as the NRC, all play significant roles, though each enjoys different regulatory authority. The review and approval process can take about three months to over a year, depending on the type of export and which federal agency or department has the lead:[[32]](#footnote-32)

* The DOE’s National Nuclear Security Administration (NNSA) grants Part 810 authorizations (10 CFR Part 810), which allows technology transfers and technical assistance involving any part of the fuel cycle. For approval, a foreign government must give nonproliferation assurances that the transferred technology will not be used for non-peaceful purposes nor retransferred without U.S. consent. On average, 6 to 14 months is needed for a specific authorization.
* The NRC is responsible for approval of Part 110 licenses (10 CFR Part 110), which control the import and export of nuclear reactors, equipment, components, and materials – a process which takes approximately one year. The granting of a Part 110 license for a significant nuclear export to a specific country also requires the successful negotiation of a bilateral nuclear cooperation agreement (NCA or 123 Agreement) with that foreign government before it is sanctioned.
* The Department of Commerce clears the export of dual-use technology subject to Export Administration Regulations. Typically, the Department’s review requires 45 to 90 days.

The U.S. Government should work to align its export control regime as much as possible with those of its competitors. While no one would advocate a softening of controls to the detriment of the nonproliferation regime, it is important that U.S. vendors have as much access as possible to the growing market for nuclear technology and services. Because U.S. exports are accompanied with conditions on use and transfer, an increase in U.S. market share would correspond with an enhanced U.S. ability to help shape global nonproliferation and safety issues.

Washington should therefore seek to increase the trade controls of our competitors when pursuing that path makes sense and is plausible, but on the other hand, the federal government should reduce unnecessary and redundant bureaucratic red tape that unfairly penalizes the U.S. nuclear industry without any real benefits.[[33]](#footnote-33) Because nuclear trade is viewed broadly as a strategic asset, we should expect our competitors to pursue aggressive export strategies, which left unchecked, would result in a further erosion of U.S. market share.

1. ***The federal government should pursue a pragmatic approach to negotiating and approving nuclear cooperation or 123 Agreements***

U.S. nuclear trade is governed by Section 123 of the Atomic Energy Act, which generally requires the successful negotiation of a nuclear cooperation agreement before U.S. nuclear equipment or materials can be exported. 123 Agreements are the principal U.S. foreign policy means for gaining assurances that U.S. nuclear technology and materials will be used for peaceful purposes. Our main foreign competitors – France, Japan, Russia, and South Korea – typically negotiate bilateral agreements as well, but this practice is a matter of policy; they are not required to do so for the export of controlled items.[[34]](#footnote-34)

Currently, the United States has nuclear cooperation agreements with 21 countries,[[35]](#footnote-35) Euratom (the 27 Member States of the European Union), the International Atomic Agency, and Taiwan. Seven of these agreements expire between now and 2015, including the NCA with a key U.S. military ally, South Korea. At the same time, the United States is negotiating or in the process of finalizing 123 Agreements with countries that do not have existing NCAs – most notably Vietnam, which already has bilateral nuclear trade agreements with France, Japan, and Russia.

Negotiating 123 Agreements can be challenging for the United States, given the level of U.S. engagement and political capital invested in regional security matters, including defense and military agreements, and civil society and human rights around the world. Further, the role of Congress in reviewing nuclear cooperation agreements introduces into the equation the dynamic of special interest considerations, which can complicate the executive branch’s negotiating process. Consequently, negotiations can take years to wrap up.

Specifically, some Members of Congress desire the inclusion of a legally binding commitment by the partner country not to develop uranium enrichment and reprocessing – commonly referred to as the “gold standard” for such agreements. While this request may seem reasonable to some U.S. nonproliferation advocates, most countries view such a request as infringing upon rights recognized by the Nonproliferation Treaty (NPT), which the United States has ratified.[[36]](#footnote-36)

The Administration’s current position of using a case-by-case approach to negotiating NCAs is practical, given the fact that each potential foreign partner has different national circumstances, levels of development, political and security concerns, and economic arguments for pursuing commercial nuclear power. Further, some countries belong to multiple export control and nonproliferation regimes and others are already nuclear weapons states – factors that should be considered.

Certainly, the United States should consider current nuclear cooperation agreements between the potential U.S. partner and foreign competitors – particularly if Washington is pursuing higher standards than those that already exist in non-U.S. arrangements. While obtaining the blessing of the United States for a nuclear program remains politically important, it is not indispensable to a country’s plan to develop a commercial program – a fact that we have seen play out between Vietnam and Russia. Accordingly, a pragmatic approach to negotiating and approving nuclear cooperation agreements is needed, including potential NCAs with Saudi Arabia and Jordan. Shutting out U.S. vendors from any particular export market would not only harm domestic manufacturing capacity but would also do little to ensure continued U.S. ability to shape a country’s nonproliferation policy.

**Call to Action**

In 2010, the Department of Commerce’s International Trade Administration warned that the U.S. nuclear sector had “atrophied.” This sharp decline in our nuclear program should disturb any policymaker who understands the national security dimensions of commercial nuclear power, including the dependence of our military on the civil sector. It should also trouble environmental activists, given the importance of an expansion of nuclear power in climate mitigation strategies.

Subsidies and mandates for the nuclear industry, however, are not the answer to getting nuclear back on track. Market distortions in energy markets, caused by these types of policy measures, are increasingly problematic, threatening the future of grid reliability. Now that the climate agenda is progressing, state and federal policymakers need to reexamine measures adopted to further clean energy goals that are no longer practical or required.

Ending or reforming policies and regulations that disadvantage nuclear power would increase the odds of survival for existing reactors that must also overcome genuine market-driven forces, such as competition from shale gas. Further, pursuing nuclear trade policy in the context of current market realities – the United States no longer has a monopoly over nuclear technology and services – is more likely to produce better results for U.S. nonproliferation and trade policy.

Taking a more rational approach to electricity market and nuclear trade policymaking would go a long way toward bolstering the outlook for both operators and vendors, including the nuclear fuel industry. However, the time to act is now – before we lose leadership in an indispensable technology that is vital to preserving and promoting U.S. national security interests.

1. See Senator Alexander’s recent remarks at the National Association of Regulatory Utility Commissioners at <http://www.alexander.senate.gov/public/index.cfm?p=PressReleases&ContentRecord_id=ee010fa6-d7da-4e75-b561-7d98b33c8986&ContentType_id=778be7e0-0d5a-42b2-9352-09ed63cc4d66&Group_id=80d87631-7c25-4340-a97a-72cccdd8a658>. [↑](#footnote-ref-1)
2. Specifically, nonproliferation policymaking on Capitol Hill – in contrast to the more rational approach taken by executive branch agencies. [↑](#footnote-ref-2)
3. Southern Company and SCANA are each building two new reactors, respectively in Georgia and South Carolina, which are regulated markets. Tennessee Valley Authority (TVA), which is owned by the federal government, is completing work on a reactor at Watts Bar, which was 80 percent completed when construction stopped in 1988. [↑](#footnote-ref-3)
4. See Wernau, Julie. “Exelon May Shut Down Nuclear Plants in Profit Struggle,” Chicago Tribune, February 6, 2014 at <http://articles.chicagotribune.com/2014-02-06/business/chi-exelon-earnings-20140206_1_nuclear-plants-coal-fired-power-plants-power-prices>. [↑](#footnote-ref-4)
5. Operating and Maintenance (O&M) costs for nuclear power were 69 percent of electric power production costs in 2011, compared to 12 percent for natural gas and 22 percent for coal. [↑](#footnote-ref-5)
6. Some states in PJM – a regional transmission organization stretching from Illinois to Delaware – also subsidize over 4,500 MWs of new combine cycle gas plants with guaranteed revenue streams. This also has the impact of depressing capacity clearing and energy prices. [↑](#footnote-ref-6)
7. Larger dual-unit nuclear sites have much lower cost per MWh – by as much as 50 percent. [↑](#footnote-ref-7)
8. MISO or Mid-Continent Independent System Operator is an independent system operator (ISO) and regional transmission organization (RTO) located across the Midwest and Manitoba, Canada. [↑](#footnote-ref-8)
9. See “Nuclear Energy & Renewables: Systems Effects in Low-Carbon Electricity Systems,” Nuclear Energy Agency, OECD, December 2012 at <http://www.oecd-nea.org/ndd/reports/2012/system-effects-exec-sum.pdf>. With a 10 percent penetration of wind power, nuclear operators suffer a 4 percent loss in load and a 24 percent loss in profitability; those numbers worsen considerably when 30 percent of electricity is generated by wind—a 20 percent loss in load and 55 percent loss in profitability. [↑](#footnote-ref-9)
10. Wallace, Michael and George David Banks, “Restoring U.S. Leadership in Nuclear Energy: A National Security Imperative,” Center for Strategic & International Studies, June 2013, pg. xvi at <http://csis.org/files/publication/130614_RestoringUSLeadershipNuclearEnergy_WEB.pdf>. This is in stark contrast to the much more optimistic forecast by the Energy Information Administration (EIA), which does not include an analysis of the impact of market externalities, distortions, or structure on the nuclear reactor fleet. [↑](#footnote-ref-10)
11. See <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/China--Nuclear-Power/>. [↑](#footnote-ref-11)
12. “Nuclear Commerce: Government Wide Strategy Could Help Increase Commercial Benefits from U.S. Nuclear Cooperation Agreements with Other Countries,” United States Government Accountability, Report to the Committee on Foreign Affairs, House of Representatives, November 2010 at <http://www.gao.gov/assets/320/311924.pdf>. Interestingly, GAO found that no “single federal agency systematically tracks and reports the data necessary to determine the amount and value of U.S. nuclear exports facilitated by U.S. nuclear cooperation agreements.” [↑](#footnote-ref-12)
13. Over the past several years, this number has certainly fallen further, given U.S. dependence on Japan as an export market for sensitive nuclear material. Before the Fukushima disaster, Japan bought roughly 63 percent of those exports. [↑](#footnote-ref-13)
14. Banks, George David and Michael Wallace, “Recapturing U.S. Leadership in Uranium Enrichment,” Center for Strategic & International Studies, December 2013, pg. 4 at <http://csis.org/files/publication/131125_Banks_RecapturingUSLeadership_Web.pdf>. [↑](#footnote-ref-14)
15. See Office of the U.S. Trade Representative (USTR), “2012 National Trade Estimate Report on Foreign Trade Barriers Regarding the European Union.” at http://www.ustr.gov/sites/default/files/European% 20Union\_0.pdf. [↑](#footnote-ref-15)
16. Thirty states and the District of Columbia have a renewable portfolio standard or mandated renewable capacity policies. See <http://www.eia.gov/todayinenergy/detail.cfm?id=4850>. [↑](#footnote-ref-16)
17. Smith, Anne and others, “An Economic Analysis of EPA’s Mercury and Air Toxics Standards Rule,” NERA Economic Consulting, March 2012 at <http://www.nera.com/nera-files/PUB_MATS_Rule_0312.pdf>. [↑](#footnote-ref-17)
18. Broder, John, “Obama to Go to Copenhagen with Emissions Target,” New York Times, November 25, 2009 at <http://www.nytimes.com/2009/11/26/us/politics/26climate.html?pagewanted=all&_r=0>. [↑](#footnote-ref-18)
19. Friedman, Lisa, “Obama Administration Quietly Preparing Pledge of Deeper GHG Emissions Targets for U.N. Talks, ClimateWire, February 11, 2014 at <http://www.eenews.net/stories/1059994373>. [↑](#footnote-ref-19)
20. Carbon Dioxide Equivalent (CO2e) [↑](#footnote-ref-20)
21. As part of these efforts, the Obama Administration should adopt a technology-neutral approach in its procurement of electricity. Last December, President Obama issued an executive order to nearly triple the federal government’s procurement of electricity from renewable sources by 2020. The previous renewable target, set in 2009, was 7.5 percent. See <http://www.whitehouse.gov/the-press-office/2013/12/05/presidential-memorandum-federal-leadership-energy-management>. [↑](#footnote-ref-21)
22. See <http://energy.gov/articles/energy-dept-reports-us-wind-energy-production-and-manufacturing-reaches-record-highs>. [↑](#footnote-ref-22)
23. For a discussion on the impact of the wind production tax credit on the operation of the nuclear fleet, see Huntowski, Frank, Aaron Patterson, and Michael Schnitzer, “Negative Electricity Prices and the Production Tax Credit,” The NorthBridge Group, September 10, 2012 at <http://graphics8.nytimes.com/news/business/exelon.pdf>. [↑](#footnote-ref-23)
24. Wernau, Jule. “Exelon May Be Feeling A Bit Winded,” Chicago Tribune, September 16, 2012 at <http://articles.chicagotribune.com/2012-09-16/business/ct-biz-0916-new-exelon-20120916_1_exelon-ceo-christopher-crane-wind-power>. [↑](#footnote-ref-24)
25. See <http://www.entergy.com/news_room/newsrelease.aspx?NR_ID=2769> [↑](#footnote-ref-25)
26. Brandt, Evan. “Exelon, Owner of Limerick Nuke Plant May Shut Down Unprofitable Plants,” February 13, 2014 at <http://mainlinemedianews.com/articles/2014/02/13/region/doc52fa7cdb07e8a215407175.txt?viewmode=default> [↑](#footnote-ref-26)
27. Prabhu, Aneesh. “How Changes in U.S. Power Capacity Markets Might Affect Merchant Generators’ Credit Quality,” Standard & Poor’s Rating Services, January 3, 2014 at <http://twitdoc.com/upload/standardpoors/ratingsdirect-commentary-1236127-01-06-2014-11-18-03.pdf>. [↑](#footnote-ref-27)
28. Volt-Amp-Reactive. VAR is needed to deliver power effectively across transmission lines, which baseload generation provides. [↑](#footnote-ref-28)
29. See <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/v25/sr1350v25-sec-1.pdf>. [↑](#footnote-ref-29)
30. It is interesting to note that during the recent government shutdown, the NRC furloughed 92 percent of its staff while the private sector continued to pay its obligated fees, though not directly to the Commission. On average, other federal agencies – excluding the Defense Department – furloughed only 36 percent of their workforce. [↑](#footnote-ref-30)
31. Glasgow, James, Elina Teplinsky, and Stephen Markus. “Nuclear Export Controls: A Comparative Analysis of National Regimes for the Control of Nuclear Materials, Components and Technology,” Pillsbury Winthrop Shaw Pittman, LLP, October 2012 at <http://www.pillsburylaw.com/siteFiles/Publications/NuclearExportControls.pdf>. [↑](#footnote-ref-31)
32. For a flow chart on the export approval process see <http://ita.doc.gov/td/energy/Civil%20Nuclear%20Exporters%20Guide%20(FINAL).pdf>. [↑](#footnote-ref-32)
33. In an effort to streamline the parts of the U.S. export control regime under the jurisdiction of the Departments of State and Commerce, the Obama Administration launched an initiative in 2010 to create a single control list, single licensing agency, unified information technology system, and enforcement coordination center. While this is an important step forward, nuclear exports that fall under the control of DOE and NRC – the federal entities that review the applications of most U.S. nuclear trade – are not included in the initiative. See <http://export.gov/ecr/index.asp> for further details. [↑](#footnote-ref-33)
34. See Pillsbury report referenced above. [↑](#footnote-ref-34)
35. Argentina, Australia, Bangladesh, Brazil, Canada, China, Columbia, Egypt, India, Indonesia, Japan, Kazakhstan, Morocco, Norway, Peru, Russia, South Africa, South Korea, Switzerland, Thailand, Turkey, Ukraine, and UAE. See <http://nnsa.energy.gov/aboutus/ourprograms/nonproliferation/treatiesagreements/123agreementsforpeacefulcooperation> for further information. [↑](#footnote-ref-35)
36. While the NPT does not explicitly grant countries the right to enrichment and reprocessing, Article IV says, “Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production, and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.” See <http://www.state.gov/t/isn/trty/16281.htm>. Thus, as long as countries remain non-weapons states and comply with International Atomic Energy Agency safeguards, the plain reading of the NPT implies that countries have some right to enrich and reprocess. See Chairman Bob Menendez’s remarks at the Senate Committee Hearing on 123 Agreements on January 30, 2014, pushing back on the assertion of a witness that the NPT does not give countries the right to enrich, at minute 44:35, located at <http://www.foreign.senate.gov/hearings/section-123-civilian-nuclear-cooperation-agreements>. [↑](#footnote-ref-36)