

The US Nuclear Renaissance: Before & After Fukushima Dai-ichi

By Jac H. GOODMAN & Eric LUNDELL



Author Jac H. Goodman



Author Eric Lundell

Following the events at the Fukushima Dai-ichi nuclear plant, the US nuclear renaissance has indeed entered a new phase. However, the outlook for the US nuclear power sector and, in particular, the prospect for new reactor construction, has been in a period of transition for several years prior to the tragic March 11 earthquake and tsunami. As such, the question is not simply how Fukushima Dai-ichi will impact the US nuclear renaissance, but rather how Fukushima Dai-ichi will affect pre-existing trends.

The US Nuclear Renaissance

In 2002, Spencer Abraham, President George W. Bush's (R) first Secretary of Energy, announced Nuclear Power 2010 (NP 2010), an industry-government program to support the licensing of new reactor projects. Three years later, the Republican-controlled 109th US Congress enacted the Energy Policy Act of 2005 (EPACT), extending financial incentives to support new reactor construction. Along with a production tax credit for the first 8,000 megawatts of new capacity, EPACT created a Stand-by Support Program to compensate the first six new reactor projects for certain regulatory delays. The Act also made reactor projects eligible for a new clean energy loan guarantee program.

NP 2010 and EPACT 2005 marked an important shift in US policy towards nuclear energy. Although the Tennessee Valley Authority had completed construction of its Watts Bar Unit 1 reactor in 1996, no new reactor orders had been placed after 1978 (preceding the 1979 Three Mile Island Accident). During the early 1990s, the US Department of Energy (DOE) supported the industry's certification of two advanced light water reactor designs. However, the Clinton Administration down-scaled the department's nuclear energy R&D programs and did not promote new reactor deployment.

Market, Operational and Regulatory Foundation of the US Nuclear Renaissance

Political support during the Bush Administration had actually been preceded, and in some ways generated, by positive trends in nuclear power's market, regulatory and operational environments.

- Electricity market restructuring in the 1990s prompted concerns that reactors would not be capable of operating economically in a new deregulated environment. Responding to these new regulatory and financial environments, utilities implemented operational and managerial improvements to boost plant performance and reduce operating costs.
- Industry also worked with the US Nuclear Regulatory Commission (NRC) on a new risk-informed, performance-based reactor oversight process (ROP) that went into effect in 2000. The ROP followed previous reforms of NRC licensing processes in 1989 including the creation of the combined construction-operating license (COL) process for new reactors.
- By the beginning of the last decade, existing US nuclear plants had proven themselves valuable assets. Meanwhile, volatile natural gas prices and environmental concerns for coal-fired plants prompted

utilities to reexamine nuclear energy options for baseload planning.

These favorable policy developments, regulatory reforms, and market/operational trends collectively enhanced the outlook for US nuclear power. Furthermore, political support for nuclear power has not been exclusive to the Republican Party. Indeed, President Barack Obama (D) has expanded upon President Bush's promotion of nuclear power, characterizing it as a clean energy capable of moving the US away from fossil fuels. Most recently, the Obama Administration requested \$36 billion in additional loan guarantee authority for new reactors, building upon the \$18.5 billion originally authorized by the Democratic-controlled 110th Congress.

Status of the US Nuclear Renaissance Prior to Fukushima Dai-ichi

In terms of new reactor licensing activity, industry has submitted applications for eighteen licenses, envisioning over thirty new reactors. However, even before Fukushima Dai-ichi, the list of new reactor applications alone was never an accurate measure of the scope of the US nuclear renaissance. It was never reasonable to assume that all of these proposed projects would move beyond the development and licensing stage.

Well before the events of March 11, several utilities had asked the NRC to suspend review of their applications, while others had delayed their construction timetables into the next decade. The Nuclear Energy Institute, the US nuclear power industry association, now envisions that four to eight new reactors could be constructed by 2020. Currently, the two-reactor Vogtle project in Georgia and the two-reactor Summer project in South Carolina are leading contenders.

Challenges for the US Nuclear Renaissance Prior to Fukushima Dai-ichi

Even prior to Fukushima Dai-ichi, various financial and market conditions challenged the new reactor build-out despite a generally favorable political and public opinion environment.

- In the wake of the 2008 financial crisis, utilities delayed their timetables for new baseload construction projects in response to a changing long-term outlook for electricity demand.
- The expanded outlook for natural gas supply also transformed the economic environment for nuclear power. Shale gas promises to provide a domestic source of affordable, reliable energy supply, further undercutting the financial position of new reactor projects.



The five-member US Nuclear Regulatory Commission (NRC) receives a briefing on the agency's response to the events at the Fukushima Dai-ichi plant from Executive Director of Operations R. William Borchardt.

Within this challenging environment, reactor projects require even greater government support to overcome market conditions. To date, the DOE has awarded an \$8.33 billion conditional loan guarantee to the Vogtle project in Georgia, a traditionally regulated state. The department's \$10.2 billion of remaining new reactor loan guarantee authority is only enough to cover only one more project, and White House budget authorities remain wary about project risk posed by merchant nuclear power plant projects in deregulated states. Meanwhile, Congress has yet to act on President Obama's request for additional loan guarantee authorities, and the current focus within Congress on fiscal reform has complicated the outlook for future loan guarantees authority even among pro-nuclear legislators.

The prospect for a near-term national market price for carbon, which would improve the competitiveness of new reactors vis-à-vis other baseload generating options, has also decreased. Political movement on a national cap-and-trade regime for greenhouse gases (GHGs) halted following the Republican takeover of the US House of Representatives in the November 2010 election. The US Environmental Protection Agency (EPA) is pressing forward with regulatory measures that will impact GHG emissions from the electric power sector. However, House Republicans (as well as some Democrats) are working to delay these efforts.

The Impact of Fukushima Dai-ichi on the US Nuclear Renaissance

As indicated above, the scope of the US nuclear renaissance was consistently overstated by the number of project applications at the NRC. The financial crisis and recession, shifts in the outlook for carbon pricing, limitations with the loan guarantee program, and changes in the natural gas outlook also moved the US nuclear renaissance into a "new phase" in which the industry already envisioned a relatively small number of new reactors by 2020, regardless of the events of Fukushima Dai-ichi.

Given this condition, the greatest concerns for new reactor projects and the broader US nuclear power industry regarding the situation at Fukushima Dai-ichi are in three areas: 1) the impact on US public opinion toward nuclear power, 2) the effects on the political environment for nuclear power, and, 3) most importantly, the domestic regulatory response to safety issues raised by the events at Fukushima Dai-ichi. All three areas pose different types of risk for the future of US nuclear reactor build-out and the US nuclear power sector in general. All three are now being carefully monitored by both the US nuclear industry and the financial community.

US Public Opinion

US media coverage of events in Japan was intense in the immediate aftermath of the March 11 earthquake and tsunami. The evolving situation at Fukushima Dai-ichi quickly became the dominant focus of coverage of the broader disaster by most of the major US news media outlets. The scope and frequency of US media coverage of Fukushima Dai-ichi have subsided in recent weeks. However, US opinion polls sponsored by media outlets and various stakeholder groups over the last two months indicate that developments in Japan have indeed had an impact on US public opinion towards nuclear energy, raising concerns about existing reactor safety and eroding support for new reactor deployment.

This immediate drop in public opinion was to be expected. However, the key issue will be the long-term trend in public opinion. In this regard, both pro-nuclear stakeholder groups and anti-nuclear stakeholder groups are now working aggressively to advance their own messages to the US public.

In terms of shaping public opinion, the situation at Fukushima Dai-ichi has given US anti-nuclear and watchdog groups the opportunity to reinvigorate their message among the general US public. Over the last decade, their influence on US policy debate has waned as a generally pro-nuclear consensus emerged in both the US public and Washington, based on the nuclear power industry's strong safety record following the Three Mile Island accident and the positive role nuclear power can have in moving to a less carbon-intensive economy. US anti-nuclear groups are now hoping that the events in Japan and associated public concerns about reactor safety will help them reinvigorate their eroded political base in the US.

Whether the currently-heightened US public sensitivity to issues concerning nuclear power plant safety will persist over the coming months or develop into a broader public backlash against nuclear power remains highly uncertain. Much will depend on the still-evolving events at Fukushima Dai-ichi, the general public's confidence in the NRC's ongoing regulatory response, and the comparative success of the competing US anti-nuclear and pro-nuclear groups in their public and government relations campaigns over the coming months. The decline in US media coverage of the events at Fukushima Dai-ichi and on nuclear power generally—in conjunction with the industry's public outreach efforts—is a positive development for the industry.

Political Reaction

At the national level, the White House, working with the US Department of Energy and other elements of the Executive Branch, has been focused on three core objectives in its immediate response to Fukushima Dai-ichi: 1) ensuring the immediate safety of US citizens in

Photo: NRC file



US Secretary of Energy Steven Chu and Japan's Ambassador to the United States Ichiro Fujisaki during a meeting at the Japanese Embassy in Washington, DC on March 25, 2011.

Photo: NRC file



Assistant Secretary for Nuclear Energy Peter Lyons, head of the US Department of Energy's Office of Nuclear Energy, and R. William Borchardt, the NRC's Executive Director of Operations, testify before Senate Energy and Natural Resource Committee on US government's response to Fukushima Dai-ichi.

Japan, 2) assuring the US public that there is no public health threat from radiological releases coming from Japan, and 3) conveying their confidence in the safety of the US operational reactor fleet. Importantly, President Obama, Energy Secretary Steven Chu, and other Obama Administration officials have been consistent in expressing their support of nuclear energy's role in the US energy mix, even as they have supported a comprehensive safety review of US nuclear power plants.

In the US Congress, the events at Fukushima Dai-ichi have largely served to harden the existing policy positions of pro-nuclear and anti-nuclear legislators. Over the past two months, congressional Republicans have been warning against any quick response or regulatory overreaction to events in Japan, while long-standing anti-nuclear Democrats have been calling for a tightening of safety oversight for existing reactors and the suspension of new reactor licensing. Individual legislators from states and districts hosting some of the more controversial nuclear power plants in California (e.g., Diablo Canyon and San Onofre), New York (e.g., Indian Point), and Vermont (e.g., Vermont Yankee) have also used events in Japan as an opportunity to raise long-standing site-specific concerns.

More broadly, however, key leaders of both political parties in Congress have been generally supportive – at least for now – of the NRC and industry's actions in response to Fukushima Dai-ichi. While the events at Fukushima Dai-ichi could potentially complicate debate on new reactor loan guarantee authorizations, there has been no legislative momentum behind proposals to block new reactor projects or eliminate existing federal incentives. Indeed, DOE's nuclear energy-related research and development budget fared well in recent congressional appropriations negotiations, despite cuts in the department's overall funding for the 2011 fiscal year finalized on April 15, 2011. As such, there have yet to be significant signs of an impending political shift against new reactor construction, much less the nuclear power industry generally, due to the events at Fukushima Dai-ichi at the national level in the US. In this regard, long-term trends in US public opinion toward nuclear power – and the resulting impact on the political environment – will be a key issue for attention by pro-nuclear power stakeholders.

Regulatory Impact

The area of greatest specific concern for the US nuclear power industry and its political supporters in Congress is arguably the outcome of the NRC's unfolding regulatory response to the events at the Fukushima Dai-ichi nuclear plant. Currently, the NRC is in the midst of a 90-day senior-staff task force review of the safety of the existing nuclear power reactor fleet, focusing on key safety issues raised by the events in

Japan, including reactor core and spent fuel pool cooling capabilities in severe accidents and station blackout preparedness. This near-term review will be followed by a more intensive six-month assessment based on further information and lessons learned from Fukushima Dai-ichi.

So far, US nuclear power utilities and the top managers of the NRC's technical staff have expressed confidence in the adequacy of existing regulatory requirements:

- In the wake of the 9.11 terrorist attacks, the agency imposed new requirements to ensure that US reactor operators have the capability to respond to severe accident events, like large-scale fires and explosions. The industry argues that implementation of these enhanced emergency plans, procedures and equipment requirements means that US reactors are better prepared to manage conditions like those experienced at Fukushima Dai-ichi.
- In public comments to date, NRC Chairman Gregory Jaczko has asserted that the agency should be capable of implementing any regulatory enhancements identified by the task force's review independent of the new reactor licensing processes. NRC officials have also emphasized the incorporation of passive cooling systems and other safety enhancements in the new reactor designs now being considered for deployment.

Photo: DOE file



NRC Chairman Gregory Jaczko testifies on the nuclear emergency in Japan before a subcommittee of the US House of Representatives.

However, given public, media, and congressional scrutiny, as well as any issues identified in its review of events in Japan, the NRC may be unable to avoid adopting new safety requirements in response to the events at Fukushima Dai-ichi. As such, the US nuclear power industry is closely watching any momentum toward new regulatory requirements imposed on new reactor projects and the existing reactor fleet. For new reactor projects, new regulatory requirements have the potential of increasing costs and lengthening project timetables, while for existing reactors, regulatory changes threaten to complicate ongoing and future license renewals and increase the costs of implementing power uprates and reactor upgrades.

As such, the NRC's regulatory response to Fukushima Dai-ichi has the potential to exacerbate the economic and financial obstacles to new reactor deployment that were already in place prior to the March 11 earthquake in Japan. Furthermore, while public and political opinion may shift over time based on events, NRC regulatory change moves at a much slower pace but is also considerably more difficult to shift once it begins. However, at the same time, both the US nuclear energy industry and US policymakers continue to maintain that energy and environmental requirements, to include the ongoing and future shutdown of coal plants and limitations on the expansion of renewables, necessitate a continued commitment to the role of nuclear power in the US energy mix. **JS**

Eric Lundell is President of International Technology and Trade Associates, Inc. (ITTA), a consulting company in Washington DC. He has an MA in International Economics and has advised on US energy policy and business issues for over 17 years.

Jac Goodman, who has an MA in International Affairs, is a Program Director in ITTA's Energy Practice, where he advises clients on US policy, regulatory and business issues in the power production sector.