FINANCING THE NUCLEAR RENAISSANCE: THE BENEFITS AND POTENTIAL PITFALLS OF FEDERAL & STATE GOVERNMENT SUBSIDIES AND THE FUTURE OF NUCLEAR POWER IN CALIFORNIA

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Synopsis: Amidst increasing concerns of global warming and greenhouse gas emissions and predicted growth in energy demand over the long term, legislative, and public support for clean alternative energy is rapidly increasing. Nuclear power is garnering attention in political and scientific circles as a potential critical part of a green energy policy that will keep up with future growth in energy consumption. Although nuclear power is now included within the legislative and financial incentive frameworks established by the federal government and certain state governments for the development of other alternative energy projects, several distinct aspects of financing nuclear power projects should be more carefully considered in connection with those policy efforts. The financing of nuclear power projects is unique relative to financing traditional renewable energy projects on account of the vast size and capital costs of nuclear power projects and the accompanying construction budget and schedule risks, and political and regulatory risks. Existing federal incentive programs aimed at promoting nuclear power plant development do not account for these differences. As a result, unless changed, the existing federal subsidies are likely to disproportionately benefit development of new nuclear power plants by public utilities in rate-regulated states that have other avenues available to them to mitigate the unique construction, political and regulatory risks that face new nuclear projects—i.e., by shifting those risks onto public ratepayers in the form of increases in the utilities' rate bases. To effectively promote private financing of what some have termed the "nuclear renaissance" under a financing model that internalizes these unique risks rather than relying on ratemaking for risk mitigation, federal incentive programs should be re-evaluated in accordance with these structuring considerations and state level programs should be implemented to fill in the gaps in federal incentive programs, particularly in restructured energy markets. States such as California, with moratoria on nuclear energy development, should reconsider the issue of nuclear power or else risk being left behind without a say in the development of federal programs designed to promote the construction of nuclear power projects or a share of the financial incentives for such development that are paid for by all United States taxpayers.

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Engaging California in the policy debate over new nuclear power could have significant implications for the focus of federal programs. Because of the structure of California's energy market, under which power generation and transmission have been largely separated, California's involvement in the nuclear dialogue could focus part of that conversation on a principal topic addressed in this article: how to best structure federal and state programs to promote the development of new nuclear power facilities by both utilities *and* independent power producers under a project finance model that does not necessitate the ability to pass developing costs on to ratepayers irrespective of cost overruns or failures to successfully commission a new project.

I. INTRODUCTION

Federal and state policymakers in the United States are promoting "clean energy" as a principal solution to the problem of increasing greenhouse gas emissions that contribute to global warming in the face of predicted long term increases in the demand for energy.[1] While these policymakers almost

1. Presidential candidates from both parties focused on clean energy and climate change in the 2008 campaign. For one of many examples of policymakers touting the expansion of renewable energy, s*ee, e.g.*, Ben Geman, *Obama Stresses Energy Investment but Policy Battles Loom*, NY TIMES, February 25, 2009 *available at* http://www.nytimes.com/gwire/2009/02/25/25greenwire-obama-stresses-investment-but-policy-battles-lo-9850.html (discussing Obama's focus on renewable energy in his primetime speech on February 24, 2009 and his repeated pledge to invest $15 billion annually to develop technologies such as "wind and solar, next-wave biofuels, 'clean coal' and efficient cars"). Some energy specialists even urged students to consider the clean-energy industry for career opportunities, as it is one of the rapidly expanding fields. *See* Lea Terhune, *Solar and Wind Resources Can Fuel the Future*, AMERICA.GOV (Apr. 10, 2008),

universally promote renewable energy generation, such as wind farms and solar projects, as a key part of that solution, many express reservations about the viability of new nuclear power as another important part of a green energy policy.[2] Part of the reluctance to embrace nuclear power stems from doubts among policymakers about the appetite of banks and other private financiers to fund the enormous development and construction costs required to build new nuclear reactors in the face of political and other risks unique to nuclear projects.[3] These doubts have been reinforced by recent instability in global credit and capital markets. Notwithstanding the reservations of some policymakers, the federal government has implemented a number of incentive programs to spur development, which will be discussed in depth in this article.

On the other side of the basic development equation, banks and other potential private financiers and investors are uncertain about the political feasibility of pursuing new nuclear reactors and about the financing risks and complications associated with government licensing regimes and federal subsidies intended to facilitate the development of nuclear power projects.[4] The

http://www.america.gov/st/env-english/2008/April/20080410164015lenuhret0.1753504.html (printing the advice and predictions of energy specialist David Sandalow quoting him so stating "[r]enewable energy sources . . . [are] an essential part of the solution to the global warming problem").

2. President Barack Obama has stated "[n]uclear power represents more than 70 percent of our non-carbon generated electricity . . . It is unlikely that we can meet our aggressive climate goals if we eliminate nuclear power as an option. However, before an expansion of nuclear power can be considered, key issues must be addressed including: security of nuclear fuel and waste, waste storage, and proliferation." Larry West, *Election 2008: Barack Obama on Nuclear Energy*, ABOUT.COM, http://environment.about.com/od/environmentallawpolicy/a/obama_nuclear.htm (last visited Sept. 1, 2009). Secretary of Energy Steven Chu stated in a speech to the Western Governors' Association that "[n]uclear has to be part of the mix. . . . It's clean, base-load power." He also noted the problems of waste and safety, but stated that such problems can be solved. Patty Henetz, *Energy Secretary Sees Nuclear Power In America's Future*, SALT LAKE TRIBUNE, June 16, 2009, *available at* http://www.sltrib.com/news/ci_12595919. Exemplifying policymakers' hesitance to support nuclear energy as part of a green energy policy, proposed amendments to increase incentives for nuclear power were voted down by the Senate Energy committee, including an amendment proposing to include nuclear power as renewable energy for purposes of renewable portfolio standards. Ayesha Rascoe, *U.S. Lawmakers Seek More Nuclear Power in Bill*, REUTERS, June 5, 2009, *available at* http://www.energy-business-review.com/news/us_lawmakers_seek_more_nuclear_power_in_bill_090605. Also, despite significant funding for and emphasis placed on renewable energy in the 2009 American Recovery and Reinvestment Act, funding for nuclear power was entirely eliminated. *See "Nuclear Pork" Cut Out of Final Recovery and Reinvestment Package*, ENVTL. NEWS SERV., Feb. 12, 2009, *available at* http://www.ens-newswire.com/ens/feb2009/2009-02-12-094.asp (quoting Kevin Kamps of Beyond Nuclear who helped lead the campaign on Capitol Hill to cut nuclear money from the stimulus as saying "nuclear energy cannot solve the climate crisis and fattening the nuclear calf has deprived real energy solutions like renewable energy and energy efficiency programs from essential support for decades"). Even many policymakers who express support for nuclear energy also express reservations about its use. *See, e.g.*, Kent Garber, *Gauging the Prospects for Nuclear Power in the Obama Era*, US NEWS AND WORLD REPORT, Mar. 27, 2009, *available at* http://www.usnews.com/articles/news/energy/2009/03/27/gauging-the-prospects-for-nuclear-power-in-the-obama-era.html (suggesting that even within the Obama administration which states it supports nuclear energy, there are doubts about whether these statements are actually meant and "[e]ven Democrats are arguing among themselves over how much to support nuclear energy").

3. Michael Grunwald, *Nuclear's Comeback: Still No Energy Panacea*, TIME, Dec. 31, 2009, *available at* http://www.time.com/time/magazine/article/0,9171,1869203,00.html ("[N]ew plants would be not just extremely expensive but spectacularly expensive. . . . This sticker shock has unnerved Wall Street.").

4. *See* SCULLY CAPITAL, BUSINESS CASE FOR EARLY ORDERS OF NEW NUCLEAR REACTORS 29 (2002), *available at* http://www.nuclear.gov/home/bc/section%203%20final.pdf ("[L]enders are not yet ready to accept

core disjoint between the public regulatory and incentive frameworks intended to spur development and the "less-than-exuberant" responses from the private sector should elicit at least one bit of positive response from the nuclear industry: the fact that such a disjoint exists is evidence that nuclear power is back on the table in the United States after a prolonged absence from the public dialogue on smart energy policies. In fact, substantial efforts are now focused on the second order question of how to develop new nuclear power projects.

We have divided this article into two key sections. In the first section, we will outline existing federal and state programs designed to promote nuclear development and attract the private capital needed to fund that development. In the first section, we also provide a critique of those programs and a discussion of ways in which existing programs can be improved and future programs implemented to more effectively advance private development of new nuclear power projects. Since the time we began writing this article, initiative has been taken by federal regulators and policy makers to address some of the concerns we raise in this article.[5] However, these initiatives still leave room for improvements to more effectively promote private investment in new nuclear power.

In the second section, we will discuss issues pertaining to the financeability of new nuclear power plants that California must address if it chooses to engage in a meaningful discussion about the future of nuclear power in California, and the possible fiscal and energy policy consequences to California of choosing not to consider lifting its moratorium on the development of new nuclear power.

This article discusses certain issues pertaining to development of new nuclear power from California's perspective for the following reasons: (1) the authors are Californians and believe that California should address the nuclear power issue while federal money may still be on the table,[6] (2) issues that pertain to California apply to other states with restructured energy markets, (3) California holds itself out as a cutting edge leader in clean energy policy and yet has failed to engage in the dialogue on nuclear power due to a moratorium that is over three decades old, and (4) if California would engage in the nuclear debate, it could help focus the national policy dialogue on the core issue of what it

exposure to risks that have a nuclear element as their central focus. . . . [T]he financial markets view commissioning and other regulatory risks as the most grave concern and the risks most difficult to mitigate using traditional risk management techniques. . . . Event risks for a nuclear plant are much larger than they are for a fossil fuel plant (e.g., shutdowns for political reasons . . .)."); *see also* Lester R. Brown, *The Flawed Economics of Nuclear Power*, EARTH POLICY INST., Oct. 28, 2008, http://www.earth-policy.org/Updates/2008/Update78.htm ("Despite all the industry hype about a nuclear future, private investors are openly skeptical.").

5 . For example, climate change bills introduced in 2009 and pending before Congress include public investment in nuclear power as a part of the approach to a clean energy future as well as revisions to existing subsidy programs. *See, e.g.*, Clean Energy Jobs and American Power Act, S. 1733 § 131; *See*, American Clean Energy Leadership Act of 2009, S. 1462, § 103(b).

6 . Ten states other than California have legislation that bans the construction of new nuclear plants in the state absent various forms of state legislative approval. *See* THE KEYSTONE CENTER, NUCLEAR POWER JOINT FACT-FINDING 74 (2007), *available at* http://www.keystone.org/spp/documents/FinalReport_NJFF6_12_2007(1).pdf (discussing state moratoria on nuclear power in California, Connecticut, Hawaii, Illinois, Kentucky, Maine, Minnesota, Oregon, Vermont, West Virginia, and Wisconsin). Note, however, that several of these states are considering overturning the state moratoria on nuclear construction.

means to privately develop and finance nuclear power under a project finance model.

Under a project finance model, financing is non-recourse to the developer, except for limited equity support or sponsor guarantees that may be required on a case-by-case basis to secure financing, and construction, political and regulatory risks are not mitigated principally by passing costs directly to ratepayers through ratemaking proceedings (such model is referred to herein as the Independent Development Model). Instead, such risks could be mitigated under the Independent Development Model by cash payments, refundable tax credits, or other incentives which can be monetized in an interim financing. To date, the policy debate has been imprecise in speaking about privately financing nuclear power because this debate has not clearly distinguished the differences between developing new nuclear power plants under a public utility model where the developer can pass costs (and thereby risks) onto ratepayers through cost recovery legislation (similar to the model used to build the prior generation of nuclear power plants in the United States) and the Independent Development Model.[7] This imprecision has resulted in a federal policy framework that may not best achieve the stated goal of harnessing the private sector to build and finance a new generation of nuclear power plants that may be developed during the nuclear renaissance in order to gain efficiencies and avoid cost overruns. Perhaps a principal reason for this lack of precision is that the state congressional delegation that would be most vocal about concentrating on issues specific to supporting an Independent Development Model has yet to engage the topic.

As part of our discussion, the following pages also address the practical realities that some communities are further advanced in the nuclear power dialogue than others, and views on new nuclear power in the United States are as varied as the local constituencies of the states in which new nuclear reactors either will, or will not, ultimately be sited. Many states are actively promoting new nuclear power development through state-level legislation providing incentives or streamlined regulatory processes for nuclear development to supplement federal incentives. Although the most proactive steps have to date been taken predominately in southern states, and applications from developers for federal loan guaranties and other federal programs have largely concentrated on proposed projects in those southern states, developers have expressed interest in developing nuclear reactors elsewhere in the United States as well.[8] Meanwhile, California, like a handful of other states, still has a statewide moratorium in place on nuclear power development. As a result, there are no California sited projects under consideration for current federal subsidy

7. We note that much attention and investment is occurring in the area of developing smaller modular nuclear reactors (e.g., 45 mw to 300 mw). If nuclear power projects could be scaled down to these sizes, such projects may be financeable under a project finance model. We further note that a significant amount of government research and development is occurring in the area of fully integrated power parks that combine nuclear power plants with manufacturing, water desalination and/or other industrial or public uses to maximize resources by using heat generated by nuclear power plans for production in other areas. *See* Tim Leahy, *State of Nuclear Power in the United States* (Oct. 8, 2009) (on file with author). These types of large power parks present an interesting set of new financing challenges and opportunities. This article addresses the current paradigm of a large stand-alone nuclear power plant.

8. Roland M. Frye, Jr., *The Current "Nuclear Renaissance" in the United States, Its Underlying Reasons, and Its Potential Pitfalls*, 29 ENERGY L.J. 279, 283 (2008).

programs, and in some cases the window of opportunity for California to benefit from those subsidies has closed. Since existing federal programs are set up to support only the first-in-kind deployment of new reactors designs, "[i]t's not like a bottomless cup of coffee."[9] As discussed in more detail in this article, the result is a potentially costly tension between California's current policy on nuclear power and the federal policy of frontloading federal financial assistance to early nuclear power projects.

II. FEDERAL INITIATIVES TO PROMOTE PRIVATE DEVELOPMENT OF NUCLEAR ENERGY

A. The Structural Challenges of Private Financing

The nuclear power projects developed in the United States throughout the 1960s, 1970s, and early 1980s were developed largely by utilities in regulatory environments that permitted the construction cost overruns that plagued the nuclear industry from its inception[10] to be added to the utility's rate-base in ratemaking proceedings and passed through to ratepayers.[11] Today, particularly in states like California that have restructured energy regulatory regimes, when we talk about privately financing nuclear power plants, we are doing so in the context of a very different development and financing framework.

The simplest answer to financing new nuclear power may be best reflected in the cost recovery legislation enacted by states such as Kansas and Virginia. Under these models, a utility can pass the construction costs for a new nuclear reactor along to ratepayers before the plant is completed by obtaining rate increases periodically during the construction process without regard to whether development stays on-budget or on-schedule, and even without regard to whether the facility ultimately achieves commercial operation.[12] So long as costs are deemed prudent and a rate increase is approved by the state, those additional increments to the rate-base represent guaranteed income streams that can theoretically be monetized through any number of different financing vehicles. Consequently the Kansas/Virginia model could work quite well to spur development by effectively shifting traditional construction loan risks—i.e., cost overruns, schedule delays, and completion risk—on to the ratepayers.

9. Bill Wicker, spokesman for the Senate Energy committee, described the emphasis on frontloading financial assistance to maiden versions of new reactor models. Paul Davidson, *Nuclear Power Inches Back into Energy Spotlight*, USA TODAY, March 30, 2009, *available at* www.usatoday.com/money/industries/energy/environment/2009-03-29-nuclear-power-energy-return_N.htm.

10. *See* Michael Grunwald, *Three Mile Island at 30: Nuclear Power's Pitfalls*, TIME, Mar. 27, 2009, *available at* http://www.time.com/time/nation/article/0,8599,1888119,00.html ("The entire U.S. nuclear industry was melting down in the 1970's, irradiated by spectacular cost overruns, interminable delays and public outrage. . . . The average cost overrun for a reactor approached 300%; the Washington Public Power Supply System . . . walked away from three plants mid-construction, triggering the largest municipal bond default in U.S. history."). *See also* Frye, *supra* note 6, at 350 ("[A]s of 2007, American utilities were still carrying $80 billion in debt as the result of bad bets on nuclear energy in the 1970s and 1980s.").

11. *See* INTERNATIONAL ATOMIC ENERGY AGENCY, FINANCING OF NEW NUCLEAR POWER PLANTS, IAEA NUCLEAR ENERGY SERIES, NO. NG-T-4.2 (2008) [hereinafter, *IAEA Report*] ("Nearly all nuclear power plants operating today were financed and built in regulated utility markets.").

Some states, such as South Carolina, do not go as far as Kansas and Virginia in allowing cost recovery periodically during construction, but do guarantee that upon commercial operation or abandonment of construction of a new nuclear reactor, the rate-base will be adjusted to ensure that the utility developer gets sufficient revenue through rate increases to achieve a reasonable rate of return and have cash available to service debt on the project.[13] Prudent costs are approved annually in most states following this model, and once approved, these costs cannot be later disallowed or subjected to further review.

Some commentators on the federal credit support programs have argued that plants in rate-regulated states such as Kansas, Virginia and South Carolina may be built without the promise of federal financial incentives, as developers are guaranteed "full or partial recovery of their nuclear development costs through rate increases."[14] But even with the revenue assurances of a rate-regulated market, the industry may still need to look to various finance structures that mitigate and control risks inherent in complex financings of highly capital intensive projects, such as project finance models, to raise sufficient up-front capital required to construct a new nuclear power plant. The need to carefully think through financing structures is all the more true in markets where developers lack the ability to obtain assurances of cost recovery from ratepayers.

Moreover, the above-described guaranteed cost-recovery models are politically charged, and as evidenced by challenges to both South Carolina and Florida legislation permitting cost recovery through ratemaking proceedings for nuclear plant development costs,[15] citizens may object to paying higher electricity rates to fund construction of new nuclear projects in the face of significant construction and completion risks. These cost recovery models are likely not going to work in every state, for a variety of reasons. In fact, from an interstate policy perspective, lenient cost recovery mechanisms represent a shift back, in places like California, to a regulatory model that was abandoned in part due to concerns that such a model encouraged market inefficiencies.[16] And since cost recovery mechanisms will not always work to solve the challenges discussed in this article and because certain regulatory regimes like that of California that do not entail the same rate-making procedures as regulated

14. Frye, *supra* note 8, at 352.

15. For a brief discussion of the South Carolina lawsuit filed by the environmental group Friends of the Earth, *see* Wayne Barber, *South Carolina Law Suit Targets Recovery of Nuke Plant Development Costs*, SNL*I* (June 5, 2009). The Florida Green Party filed a petition to intervene in the NRC licensing process for a Florida nuclear reactor. The Greens object to the construction of new nuclear reactors in general, and also object to cost recovery. The co-chair of the Alachua County Green Party in Florida stated "[t]he 'Early Cost Recovery' scam is little more than legalized theft from utility customers, and it should be immediately repealed by the Florida legislature. . . . Progress Energy can't get private investors to finance this $20 billion boondoggle, so they are forcing their customers to become investors." Press Release, Green Party of Florida, Florida Greens File Petition against NRC Licensing of Levy City Nuclear Plant, (Feb. 14, 2009), *available at* http://www.gp.org/press/pr-national.php?ID=181.

16. California restructured its energy market in 1998 in an effort to increase competition and lower costs of electricity for consumers. *See* Alexander Ritschel & Greg P. Smestad, *Energy Subsidiaries in California's Electricity Market Regulation,* 31 ENERGY POLICY 1379 (2003) ("Besides cost reductions, other benefits were also expected, including improved customer services . . . improved levels of reliability, and added environmental benefits.").

jurisdictions are less conducive to liberal cost recovery mechanisms, and therefore may require thinking about new nuclear power through the lens of an Independent Development Model, we look to a project finance model as a starting point for our analysis.

Project finance is non-recourse finance. When we talk about non-recourse finance in this article we are speaking about an Independent Development Model that is non-recourse to both the developer, aside from any limited equity commitments or sponsor guarantees that may be required on a case-by-case basis to secure financing, and also the ratepayers, in the sense that we do not speak of a model that must rely on liberal cost recovery mechanisms to be viable. Putting aside the ethical, environmental, and other issues that form the debates within the ongoing policy dialogue on nuclear power, many opponents to the development of nuclear power projects have framed their opposition around the assumption that financing new nuclear power projects on a basis similar to the Independent Development Model is not viable because the private sector cannot absorb the risks that are spread to the public ratepayers under the traditional utility model that allows assurances of cost recovery through ratemaking. For instance, Ameren says it will not build a new nuclear reactor without rate base cost recovery legislation. As described by one Senior Vice President at Ameren, "You'd get laughed off Wall Street [without it]."[17] Maybe so, but it may be appropriate to think about developing nuclear power in a project finance structure that is tailored to nuclear power and to think about our federal and state incentive and regulatory frameworks through the lens of supporting an Independent Development Model.

Project finance, at its core, is about creating credit to support a financing through contractual arrangements with creditworthy counterparties (or through market assurances in the case of merchant deals). Financing of a new development is always broken into two components (although they may be provided under a single facility): construction period financing and term period financing.

Construction loan risks (and the dozens of pages of loan covenants that are intended to control those risks) boil down to schedule and budget. Under a traditional project financing for a project other than a nuclear power plant, it is imperative for a developer to come to the financing table with an engineering, procurement, and construction contract, or some other set of construction contracts,[18] that ensures that a creditworthy contractor (or group of contractors) with appropriate expertise has sufficiently guaranteed cost and schedule.

Similarly, managing term loan risk is about ensuring that the project, once built, will have sufficient revenue to service the debt encumbering the project.[19]

17. Davidson, *supra* note 9.

18. Industry practice for financings for wind farms, for example, often involves a split or splintered construction contract approach where wind turbines are provided directly to the project owner by a manufacturer under a turbine supply agreement and the balance of plant work, i.e., civil and electrical works, are provided under one or more additional construction contracts entered into directly with the project owner.

19. "Because of the large capital costs for nuclear power, and the relatively long construction period before revenue is returned, servicing the capital costs of a nuclear power plant is the most important factor determining the economic competitiveness of nuclear energy." *What Would It Take? New Nuclear Electricity*

In a rate regulated market, a utility may have adequate assurance of revenue through guaranteed increases in the rate base. In rate-restructured markets (and especially in California where generation and transmission of power are separated), there may be no assurance of cost recovery or of profit to the developer. In these markets, revenue often comes contractually through an independent power producer entering into one or more long term power purchase agreements (PPAs) with utilities or other load serving entities.

Under a project finance model, while term period risk should be no different in kind for a 2,000 megawatt nuclear project than it is for a 100 megawatt wind farm,[20] it is less likely that a private contractor or series of private contractors will fully wrap and guarantee the budget and schedule risks construction lenders will face when financing a new nuclear project or, if a private contractor or series of private contractors does fully wrap and guarantee budget and schedule risks, the underlying contracts may be crafted to shift any overruns or delays resulting from the political and regulatory risks of developing a new nuclear plant wholly onto the developer.[21] Recent announcements suggest that certain suppliers of nuclear reactors have agreed to "fully wrap" the design and performance of their reactors, and that certain large integration contractors have agreed to "fully wrap" their construction budget and schedule for the construction of an overall facility.[22] But there is little information regarding the terms of these "full wraps," in particular the premium that is paid for certainty and what level of "finger-pointing risk" may exit in the consortium between equipment manufacturers and integrators.[23] However, in our view, this development is a further sign that the industry is moving in a direction that would enable private development of new nuclear power plants by large

at Less Than Two Cents per KWh, NEXT BIG FUTURE, Aug. 5, 2008, http://nextbigfuture.com/2008/08/what-would-it-take-new-nuclear.html.

20. Although the risk should not differ, of course the payments under a power purchase agreement for a nuclear project will be much larger than the payments under a power purchase agreement for a wind farm given the vastly greater capacity of a nuclear project.

21. Although we do not believe a private contractor would fully wrap the construction risks associated with a new nuclear project, we note that it is possible that a government-owned integrator, such as the French-owned company Areva, could provide full wraps backed by the full faith and credit of the sponsoring government. *See also IAEA Report*, *supra* note 11, for a related discussion of the increased risks presented by nuclear project financing. "Nuclear power plants are acknowledged to be capital intensive, which by itself is not a problem for financing. But high capital intensity carries with it consequent high capital costs, and especially a high level of sensitivity to interest rates, to construction delays, cost overruns or to inflation, all of which can quickly multiply financing costs." *Id*. at 6.

22. *See* Davidson, *supra* note 9. Four Engineering, Procurement and Construction Contracts have been signed for new nuclear plants: (1) Progress Energy with Westinghouse and Shaw Group for two reactors at a site in Levy County, Florida, (2) Southern Nuclear with Westinghouse and Shaw Group for two reactors at the site of the Vogtle Electric Generating Plant in Burke County, Georgia, (3) South Carolina Energy & Gas and Santee Cooper with Westinghouse for two reactors in Fairfield County, South Carolina, and (4) STP Nuclear Operating Company with Toshiba for two reactors in Matagorda County, Texas.

23. For instance, mechanical and integration contractors within any such consortium may exclude from their guarantees any delays of performance deficiencies caused by other members of the consortium supplying equipment and vice versa. Unless the scope of responsibilities among members is very clear, this creates risks that members of the construction consortium will blame each other in the case of a deficiency leaving it hard for the project sponsor to make an effective claim.

independent developers as a viable alternative to the traditional utility model that shifts many of the risks that are apparently now guaranteed by contractors onto ratepayers. By absorbing these risks under contractual schedule and performance guarantees, financiers may be able to look to creditworthy contractors and suppliers to mitigate otherwise unfinanceable construction risks.

Moreover, the sheer magnitude of debt needed to finance a multi-billion dollar reactor will likely require multiple tranches of debt designed to tap different markets in order to raise sufficient capital.[24] Each tranche of debt will price construction and other risks relative to its return and expect sponsor or government support to mitigate any risk in excess of its risk profile. Some studies analyzing projected costs of construction of new nuclear power facilities indicate that due to high capital costs and cost recovery, without federal incentives and with all else remaining equal, nuclear power cannot be economically competitive with other forms of energy such as coal or natural gas.[25] These simple facts alone drive an obvious conclusion: the historic single-tranche, simple lockbox project finance model, which has served renewable energy projects in the wind, solar, geothermal, ethanol, biofuel, and related spaces so well, simply will not work for new nuclear power projects without substantial customizing. The incentive structures designed to promote renewables, which are predicated on this simple project finance model and serve

24. *See IAEA Report*, *supra* note 11, at 8 ("One suggested hedge for containing cost overruns is phased financing. This approach . . . involves financing a project in tranches, starting with construction. . . . Different financing phases may also have different capital structures: for example shareholders would generally be at risk for the construction phase, but non-recourse financing might be introduced with the onset of commercial operations.").

25. *See* LARRY PARKER & MARK HOLT, NUCLEAR POWER: OUTLOOK FOR NEW U.S. REACTORS 14 Cong. Research Serv. (2007); *see generally* UNIV. OF CHICAGO, THE ECONOMIC FUTURE OF NUCLEAR POWER (2004), *available at* http://nuclear.energy.gov/np2010/reports/NuclIndustryStudy-Summary.pdf (discussing the future costs of nuclear power under various assumptions); *see also* Glenn R. George, *Financing New Nuclear Capacity: Will the "Nuclear Renaissance" be a Self-Sustaining Reaction*, 20 ELEC. J. 12, 18 (2007) (suggesting this argument). A University of Chicago study predicted that without federal assistance, the levelized cost of electricity produced by nuclear plants would be between $47 and $71 per megawatt-hour compared to only $33 to $41 for electricity produced by coal plants and only $35 to $45 for electricity produced from natural gas. Univ. of Chicago, *supra* at S-8–S-9. The CRS Report to Congress similarly predicts the capital costs of nuclear energy in 2015 to be $1,913 per kilowatt compared to $1,217 per kilowatt for coal and $555 per kilowatt for advanced natural gas facilities. It predicts that the annual costs for a kilowatt-hour of electricity would be 4.5 cents for coal-fueled energy, 4.6 cents for electricity produced with advanced natural gas, and 5.6 cents for nuclear-produced energy. *See* Parker & Holt, *supra*. However, the implementation of the nuclear production tax credits (PTCs) makes nuclear power competitive with other types of energy facilities. The University of Chicago study projected that levelized costs would drop to approximately $38 per megawatt-hour for the lowest cost nuclear reactor if the government implemented a PTC of $18 per megawatt-hour, as in the Energy Policy Act of 2005, discussed *infra*. This reduces the cost of nuclear energy to an amount highly competitive with electricity produced by coal or natural gas. The study also projected costs for other government financial incentives and concluded that a loan guarantee for 50% of construction costs would reduce costs to $49-$53 per MWh, the use of accelerated depreciation would drop costs to $47 per MWh, and an investment tax credit (ITC) of 20% would drop electricity costs to $44 per MWh. *See* Univ. of Chicago, *supra* at S-14–S-16. A combination of the PTC and a 20% investment tax credit was projected to bring costs to $26 per MWh for a lowest cost reactor, below the range of costs for coal or natural gas. With these incentives, even plants using more costly designs or longer construction periods would still be competitive. *Id*. at S-14. The CRS Report to Congress similarly predicted that costs of nuclear energy would drop to 4.2–4.7 cents per kilowatt-hour of electricity with the use of a PTC. This is a level competitive with the cost of electricity produced by coal or natural gas discussed above. Parker & Holt, *supra*.

as the basis for many of the government subsidies that have been proposed for nuclear power, should also be substantially rethought or customized for nuclear power in order to achieve the greatest efficiency possible.

This article is written from the perspective of discussing financing structures under which nuclear power can be privately financed applying the Independent Development Model, and what this means for our traditional ways of approaching project finance. Notwithstanding skepticism around the idea that the private sector can eventually build new nuclear power plants under a model like the Independent Development Model, there are signs in the industry suggesting that developers other than just public utilities in rate-regulated markets are serious about pursuing new nuclear power and are thinking about pursuing these projects under a project financing framework tailored to the unique aspects associated with nuclear power development that are not present in the development of other renewable energy sources.[26] In addition, even utilities in rate-regulated markets with the ability to rely on generous cost recovery legislation can benefit from the financing models described in this article, which are designed to raise large amounts of capital on a largely non-recourse basis. If our policy goal is to harness the private sector to build new nuclear power projects, then our legislative and regulatory frameworks should be crafted to best support an Independent Development Model.

In other words, there is a newness to privately financing nuclear power that heretofore has gone underappreciated in the public dialogue.[27] A great deal of warranted attention has been placed by the government on developing a framework that gets over first-in-kind technology hurdles associated with nuclear reactor designs that have advanced substantially in recent decades. But these modern nuclear technologies are being deployed all over the globe. The United States is behind countries like France and China in the deployment of new nuclear technologies. A strong argument can be made that first-in-kind technology hurdles (at least to the extent those hurdles contribute to construction risk) will be overcome through deployment currently underway in these other countries before new plants are built on a large-scale basis in the United States. Moreover, on the operational side, first-in-kind issues will simply not be mitigated by any governmental support that applies only to a few of the first new reactors. Nuclear reactors can take up to a decade to construct.[28] While credit support may help get the shovel in the ground on a new development project, the operational first-in-kind hurdles may not even be fully known until a number of new plants go operational to prove up the technology.

However, financing nuclear reactors under an Independent Development Model where owners, contractors and lenders take cost overrun, schedule, completion and other construction risks is also a first-in-kind venture deserving

26. For example, applications for new nuclear licensing applications have been filed for plants to be constructed in New York or Maryland, states which have restructured energy markets without cost recovery legislation. *See infra* Appendix I for a chart of new nuclear licensing applications.

27. *See IAEA Report, supra* note 11, at 8 ("In the past, project sponsors could ensure the return of and on equity by virtue of government guarantees, guaranteed rates and captive electricity markets.").

28. Nuclear Rural Elec. Coop. Ass'n, *Bold Ideas for the Next Decade's Challenges*, http://www.nreca.org/Documents/PublicPolicy/BoldIdeas.pdf (last visited Sept. 1 2009) ("Today it can take 10 years to work through the process of building a nuclear power plant.").

of thoughtful analysis before locking ourselves into a policy framework that might not work as well as intended. The United States may be behind Europe and Asia in the development and deployment of new nuclear technologies for energy production, but it could be at the forefront of harnessing the private sector to build and finance this development. If it can do so, the United States can catch up to other nations pushing toward energy independence and dramatic reductions in greenhouse gas emissions by pursuing new nuclear power projects with the help of the world's financial markets.[29][30]

The discussion on the financeability of new nuclear power projects in this article is based on certain fundamental structuring assumptions that go into financing a multi-billion dollar project that may not exist for smaller renewable energy projects. For example, in multi-billion dollar structured financings, there will likely be multiple financiers slotted in different tranches of debt, representing different types of debt instruments. There may also be multiple owners of the project under a tenancy in common or similar structure, each of whom may need to secure separate financing.[31] Moreover, the credit that backstops construction risks may not be adequately mitigated by an engineering, procurement, and construction contractor's schedule and performance guarantees as is the case in traditional project finance. Schedule and budget risk inherent in projects of this scope and complexity will necessitate external support, either from government, a creditworthy sponsor, a consortium of equipment manufacturers and integrators, or some combination of these. These multiple sources of debt and equity funding and contingent support will give rise to complicated intercreditor issues, ranging from fundamental lien priority issues (e.g., whether a government guarantor can prime the lien of a secured lender), to mechanical issues such as which tranche funds first (and what happens if later tranches find reasons not to fund due to, for instance, technical defaults or failures of conditions to funding). These complex issues will work their way

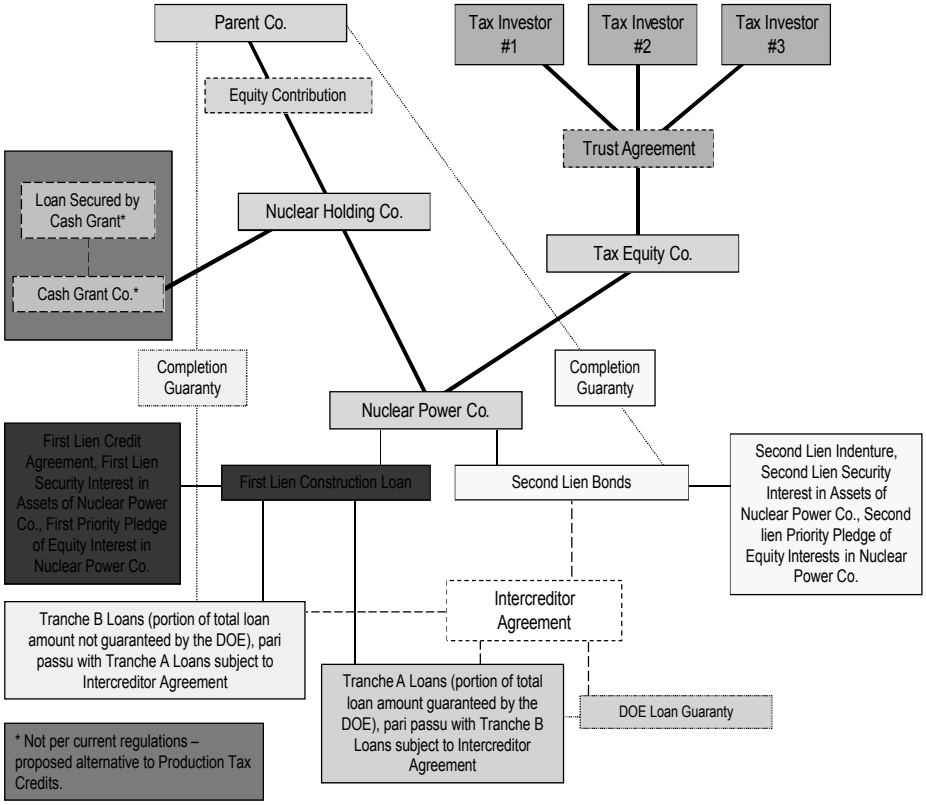
29. *See* Nuclear Energy Inst., *Nuclear Units Under Construction Worldwide* (May 2009), http://www.nei.org/resourcesandstats/documentlibrary/newplants/graphicsandcharts/nuclearunitsunderconstructionworldwide. Of the 45 nuclear units under construction worldwide, only one is located in the United States—the Watts Bar 2 unit licensed in 1973, the last nuclear unit to be licensed in the United States. Construction was suspended on Watts Bar 2 in 1985 and resumed in 2007.

30. U.S. Nuclear Regulatory Comm'n, *Watts Bar 2 Reactivation*, http://www.nrc.gov/reactors/plant-specific-items/watts-bar.html (last visited June 7, 2009). The majority of the nuclear units under construction are located in Europe and Southeast Asia. Nuclear Energy Inst., *supra* note 29.

31. *See, e.g.,* Department of Energy, Loan Guarantees for Projects that Employ Innovative Technologies, Proposed Rule, 10 CFR 609 ("In particular, the tenancy in common ownership structure proposed for the next generation of nuclear generating facilities, under which multiple entities own undivided interests in a single facility, does not lend itself to the unitary project ownership anticipated by the regulations. . . . Approximately one third of all currently operating nuclear power reactors, and approximately one-third of all planned nuclear power reactors for which applications are pending at the Nuclear Regulatory Commission are jointly owned through tenancies in common."); John Gilbertson, *et al.*, Goldman Sachs, Comments in Response to Notice of Proposed Rulemaking for Projects that Employ Innovative Technologies (Sept. 22, 2009) (on file with author) ("[A] joint venture where one, but not all, of the sponsors are seeking financing for their share of project costs . . . is [a] common [structure] in the case of nuclear projects, where the co-venturers are often tenants-in-common in an unincorporated joint venture, co-venturers (and not a project entity) are the borrowers . . . .").

into the hundreds of pages of loan documentation that will underlie the financing. In our view, that financing structure is certain to look more like the financing of a multi-billion dollar natural gas liquefaction facility than a few hundred million dollar wind farm or geothermal plant. The complexity of such financing arrangement is depicted in Figure 1 below, which illustrates what a potential financing structure for a new nuclear facility might look like given the federal subsidy programs currently in place. We refer to such complicated, multi-billion dollar, multi-tranche financings as "Mega-Financings."

Figure 1. Potential Financing Structure for a Nuclear Power Project



A primary reason why the financing of a nuclear power project may resemble a Mega-Financing is the sheer magnitude of capital required to finance project construction.[32] Absent proper government incentives, the required capital may not be obtainable at optimal pricing for reasons aside from the intercreditor issues noted above. Lending institutions often have caps on the

32. James L. Cuclis, Presentation to the Africa Oil & Gas Forum: Financing LNG Projects and Refineries, Vinson & Elkins (Dec. 1, 2004), http://www.africacncl.org/downloads/Presentations/Financing_Cuclis.ppt#257 ("Capital costs for LNG projects are enormous as each project often requires development of entire LNG supply chain.") A liquefied natural gas facility is a good example of a Mega-Facility.

amount of capital that can be exposed to both a particular project and a specific industry sector. In addition, regulatory and construction risks at any given project will limit any particular investor's desire to put too much money into any one project. As a practical reality, this desire to diversify against risk and the sheer magnitude of debt capital needed for any project may limit the amount of debt a project sponsor can raise in the commercial bank and capital markets. Government issued loan guarantees present one way to potentially decrease perceived risk and thereby increase the amount of money an investor is willing to put into a project and bring to the table investors who might otherwise not be interested (for example, certain institutional investors may only invest in instruments backed by the full faith and credit of the United States Government). To optimize nuclear development in the United States, the specifics of the government support programs should be adjusted in ways necessary to reach the point whereupon lending institutions can invest sufficient capital for nuclear construction as part of a well-balanced portfolio of assets. Specific adjustments that may help reach this point are discussed in Section II.D.2 below.

Nuclear power project financing also may more closely resemble a Mega-Financing than a traditional project financing of a renewable power project due to the unusual risks presented by construction of a nuclear reactor. One of the key issues involved in many Mega-Financings (particularly cross-border financings) is political risk and uncertainty. Natural gas liquefaction projects, for example, often take place in less developed countries in South America and West Africa, where political risk factors abound, including currency conversion risk, sovereign risk and environmental issues presented by investing in the global market. "No matter how detailed a contract, a new political regime could change the rules and the conditions under which you made your investment virtually overnight."[33]

Similar to this political risk, investors in new domestic nuclear reactors will likely face substantial regulatory and permitting risks, such as the risk of litigation by residents or environmentalists desiring to thwart any large scale development of new reactors in the United States and the risk that a largely untested regulatory approval process may not operate as anticipated, and those challenges can result in significant delays in construction of a nuclear power project. Although they are different in kind, the substance of sovereign and other risks facing large overseas infrastructure projects is similar in the sense that worst case scenarios of delay or inability to make commercial use of the projects and the magnitude of the potential losses are roughly equivalent. As a risk mitigation measure in the case of financings for natural gas liquefaction facilities and other large overseas infrastructure projects, the Export-Import Bank of the United States may approve loan guarantees and offer credit enhancements and/or direct loans to support the sale of United States exports to emerging markets throughout the world. Its loan guarantees to support the construction of large overseas infrastructure projects increase the comfort of private institutional investors because these investors believe there is a substantially lower risk that

33. Jose Luis Vittor, *LNG Deals in South America Offer Big Risks and Rewards,* PIPELINE & GAS JOURNAL (Jan. 1, 2007), *available at* http://www.allbusiness.com/agriculture-forestry-fishing-hunting/support-activities/3986203-1.html.

an overseas political regime will change the rules in a manner adverse to creditors if the United States government is one of those creditors.[34] In a similar fashion, regulatory risk insurance and loan guarantees provided by the federal government should encourage private financing of domestic nuclear power projects because the government providing the guarantees also controls many of the risk factors which could give rise to regulatory delays in commencing commercial operation of a new nuclear project.

Further, in the nuclear power industry, the federal government is reviewing development applications and reactor designs, and is equipped with a team of experts in nuclear technologies, so that if the federal government has skin in the game, so to speak, private lenders may take additional comfort that the government has performed a certain level of due diligence on a particular project and determined that there are no major flaws from its vantage point. Section II.D.3 below discusses the risks covered by federally provided regulatory risk insurance and the ways in which it can be adapted to best encourage private sector financing for nuclear energy.

Against the backdrop of this larger structuring discussion, as we look at different public support and incentive programs designed to spur development, we must bear in mind that the efficacy of these programs will depend on whether and how well they work in the context of larger, more complicated financing structures.[35] In fact, the very complexity of intercreditor relationships in different deal structures may run counter to the government's adopted goal of standardizing and streamlining the development and financing of new nuclear projects.[36] As a practical matter, not only must the credit support programs work in the context of these complex financings, but the government may also have to be involved in the structuring of these financings, taking a seat at the table to customize each transaction.

B. Existing Federal Programs

As suggested above, nuclear power projects are decisively dissimilar to other energy projects due to the unique national security, insurance, and construction risks, and size and capital cost considerations raised by nuclear power.[37] Financial institutions are reluctant to invest in or lend money to finance

34. *See, e.g.*, News Release, Ex-Im Bank $930 Million Guarantee Supports U.S. Exports to Build LNG Plant in Qatar, Export-Import Bank of the United States (Nov. 18, 2004), *available at* http://www.exim.gov/pressrelease.cfm/4D3D38DE-B5FA-32D1-EE651FF693391BBA/.

35. "[T]he challenge for new nuclear plant financing is one of scale: these are large capital investments – likely $6-8 billion for a new reactor – being built by relatively small companies. . . . New nuclear projects will likely require financing support to offset the disparity in scale between project size and company size, and this is especially true for the plants that would be built by unregulated generation companies. . . . It seems clear, therefore, that there is a critical need for an effective, long-term financing platform to ensure deployment of clean energy technologies in the numbers required and to accelerate the flow of private capital to achieve a sound energy and environmental policy." *Department of Energy Loan Guarantee Program; Hearing on the Current State*, 111th Cong. 6 (2009) (statement of James K. Asseltine, Managing Director, Barclays Capital) [hereinafter, *Statement of James Asseltine*].

36. *See infra* (for a discussion of the NRC's regulations to streamline the licensing and approval processes for nuclear plants as well as to promote standardized designs for nuclear reactors.)

37. *See* Mathew L. Wald, *Can Nuclear Power Compete?* 18 SCIENTIFIC AMERICAN EARTH 26, 30 (2008) (Nuclear power plants are expensive to construct, costing approximately $4,000-6,000 per kilowatt of capacity,

projects that pose unreasonable or unquantifiable regulatory, construction, technological, or political risks. While often a smaller scale renewable power project can be financeable with the benefit of only certain of the potential government support programs (for instance, a wind farm may be financed in part based upon tax credits or cash grants in lieu thereof even if it does not also benefit from a loan guarantee that may be available under the American Recovery and Reinvestment Act of 2009), nuclear projects are sufficiently unique from cost and risk perspectives that policymakers will need to orchestrate an interconnected web of incentives that are well coordinated. In the case of smaller scale renewable projects, an approach whereby politicians deploy disparate policy initiatives in the hopes that some of those initiatives may help spur development may prove to be a perfectly workable approach, but we think nuclear power will need a different approach. The viability of nuclear power projects today requires policymakers and regulators to devise complimentary regulatory and financing structures uniquely tailored to nuclear power.[38]

To mitigate the risks inherent in pursuing nuclear power development, the federal government and many state governments have streamlined regulatory processes and instituted financial incentives to promote the construction of nuclear power reactors and to overcome first-of-a-kind risks until efficiencies of standardization are achieved. While federal policymakers and regulators have made some progress to address these considerations through implementation of the programs described below in this section, we will also discuss the reasons why their approach so far may not give sufficient regard to the concerns of private investors that will need to be addressed in order to attract the massive levels of capital from debt and capital markets needed to make large-scale development of new nuclear power projects viable.[39] Although the DOE has allegedly already selected recipients for loan guarantees to the extent of its current authority, and the window of opportunity for projects to receive production tax credits (PTCs) has closed for all except those developers who submitted license applications to the Nuclear Regulatory Commission (NRC) before December 31, 2007, we write about the current programs to identify the issues that should be considered in any renewal of these programs or in the implementation of any potential future nuclear incentives to ensure that they avoid potential financing pitfalls and achieve their intended effect of spurring new development of nuclear power generating facilities.

C. Streamlining the NRC Regulatory Process

In 1992, the NRC instituted several programs to streamline the regulatory processes required to obtain approvals to develop nuclear power projects. First, the "Standard Design Certification" process is an optional first step in the licensing process which permits manufacturers to submit nuclear reactor designs for NRC pre-approval. Developers can then choose a pre-approved design to

for a total per plant of approximately $5-6 billion each.) *See also,* Nuclear Energy Inst., *Policies that Support New Nuclear Power Plant Constr.,* (2009), *available at* http://www.nei.org/resourcesandstats/documentlibrary/newplants/brochures/policies_that_support_new_nuclear_power_plant_construction.

38. *See* Nuclear Energy Inst., *Policies that Support New Nuclear Power Plant Constr., supra* note 33.

39. *Id.*

accelerate the licensing process for new reactors, thereby significantly decreasing the technology-related permitting challenges associated with licensing a new project.[40] Second, the NRC promulgated regulations permitting a developer to seek an Early Site Permit (ESP) through which the NRC will approve of a specific site for a nuclear plant. This helps developers avoid expending substantial resources in development activities that may ultimately prove to be unviable.[41] Finally, the NRC created the Combined Operating License (COL), under which a developer may obtain construction and operating approvals in a single advance process before financial closing of its construction financing. The COL process streamlines the required construction and operations approvals required for the development and operation of a nuclear plant. The COL was intended to relieve "plant-owners' fear[s] 'that a plant could be built, but then be found unacceptable for operation – a worst-case financial scenario.'"[42]

However, the NRC still retains discretion to confirm that, once built, a nuclear power plant conforms to certain criteria set forth in the COL. Such confirmation is required before a developer can load fuel into the reactor for operation.[43] After a COL is issued and during plant construction, the NRC, using the NRC's "Inspections, Tests, Analyses and Acceptance Criteria" (ITAAC) as a guideline, determines whether the constructed plant conforms to its licensing requirements and is safe for operation.[44] The regulations require that the licensee not operate the nuclear facility until the NRC finds that the acceptance criteria in the COL are met. "Utility executives were emphatic that certain and finite ITAAC approval procedures for commissioning new reactors must be completed before nuclear plant orders can be made. Even after such procedures are completed, they will have to be successfully tested."[45]

The ITAAC procedures are a concern for potential equity and debt investors, as indicated by the comments of various utility executives. One declared, "nobody wants to bear the risk of not being able to turn on the unit after you build it . . . for whatever reason[,]" while another proclaimed the ITAAC procedures "a big issue, a potential show stopper."[46] Thus, despite the significant efforts and progress made by the NRC to reduce many regulatory and permitting risks by streamlining the licensing and approval processes, financiers and developers must realize that there remain certain discretionary regulatory approvals as a significant hurdle to operation of nuclear plants in the ITAAC review process.[47] The NRC could help cabin the level of this risk by working to

40. Nuclear Regulatory Comm'n, Office of Pub. Affairs, *Nuclear Power Plant Licensing Process* (2005), *available at* http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/licensing-process-bg.html.

41. Nuclear Energy Inst., *Licensing New Nuclear Power Plants* (2009), *available at* http://www.nei.org/resourcesandstats/documentlibrary/newplants/factsheet/licensingnewnuclearpowerplants.

42. Frye, *supra* note 8, at 338.

43. 10 C.F.R. § 52.103 (2008).

44. *Id. at* § 52.99; *See also* Licensing New Nuclear Power Plants, *supra* note 41, at 1.

45. Scully Capital, *supra* note 4, at 3-16.

46. *Id*.

47. *Id*. at 3-32 ("While the NRC has made great strides in developing a more streamlined approach, the regulatory regime is ultimately untested, driving many financial players to the sidelines in search of mitigating cover against this risk.").

implement more objective standards for ITAAC review in the COL. However, based upon our conversations with potential financiers of new nuclear projects, we believe this issue has drawn far less attention from the lending community than the federal subsidy programs discussed in the next session. Whether the ITAAC discrepancy review process at commissioning is truly a potential "show stopper" remains to be seen. Invariably, however, it presents the kinds of regulatory risk that create anxiety for potential investors. Having said that, properly structured federal subsidy programs of the type discussed in the following section can, if properly tailored to assure private lenders that the federal government is taking risks of the same nature and scope as those private investors must assume (at least until the ITAAC commissioning review under the COL is better understood following implementation), largely reduce that anxiety.

D. Financial Incentives in the Energy Policy Act of 2005

Along with the NRC's efforts to streamline regulatory processes, the federal government has instituted various financial incentives to promote the construction of new nuclear projects. The Energy Policy Act of 2005 (EPAct 2005) creates three main types of financial incentives that may be available alone or in combination[48] for the construction of nuclear facilities: (1) PTCs, (2) a loan guarantee program and (3) regulatory risk insurance.

1. Production Tax Credits

The EPAct 2005 provides PTCs of 1.8 cents per kilowatt-hour for up to 6,000 megawatts of newly constructed nuclear power reactors.[49] The PTCs apply during the first eight years of operation of qualifying reactors, and are capped at $125 million per 1,000 megawatts of qualifying capacity allocated to any particular project.[50] To qualify for the credit, a new nuclear project must, among other things, (1) employ new technology, including a design approved by NRC after December 31, 1993, (2) be placed in service before January 1, 2021, the feasibility of which must be certified by DOE,[51] (3) have submitted an application for a license with the NRC on or before December 31, 2007, and (4) commence construction by January 14, 2014.

48. Standby Support for Certain Nuclear Plant Delays, 10 C.F.R. 950, 71 Fed. Reg. 46,306, 46,308 (August 11, 2006) (hereinafter, *Standby Support Final Rule*).

49. Energy Tax Incentives Act of 2005, 26 U.S.C. § 45J(a) (2000).

50. *Id.* at § 45J(c)(1). Note that the total megawatts available to be allocated among qualifying projects is 6,000; thus, the amount of PTCs available to each nuclear project will depend upon the number of eligible applicants.

51. *Id.* at § 45J(d); *See also* Credit for Production from Advanced Nuclear Facilities, I.R.S. Notice 2006-40 (May 1, 2006).

PRODUCTION TAX CREDIT BASICS

- 1.8¢/KWh of electricity generated in the first eight years of production
- Capped at $125 million in tax credits per 1,000 MW of allocated capacity per year
- 6,000 MW of national nameplate capacity to allocate among all new nuclear facilities

Tax credits have been used in combination with accelerated depreciation under the Modified Accelerated Cost Recovery System for quite some time to spur the development of renewable energy projects. It appears as though Congress intended to draw on the positive experience it has had with subsidizing renewable energy projects through tax credits in order to promote new nuclear development under the EPAct 2005. But the nuclear PTCs do not reflect certain fundamental distinctions that make the comparisons of nuclear power and renewable energy not analogous in respect of effective tax subsidization; this has led to a number of issues that impair the value of the PTCs for use as part of an overall financial structure for nuclear projects.

As a basic premise, tax credits operate to "level the playing field," so to speak, for alternative forms of energy generation that may carry with them larger production costs than traditional forms of energy. In other words, taking PTCs as an example, by providing tax credits for units of energy generated from alternative sources of energy, the federal government can subsidize the value of any such unit of energy by reducing the tax liability associated with the revenue derived from that unit of output. However, when it comes to structuring a financing for an alternative energy project, the tax credit itself is just the starting point. Tax credits have historically worked to spur development of renewable energy because there have been eighteen or so large financial institutions that, in the mid-2000's, monetized those tax credits to help indirectly offset the upfront capital requirements for renewable projects.[52] This historically worked because the tax investors had substantial annual tax liabilities and could barter cash in exchange for tax credits to achieve favorable tax offsets at a good price. Those same tax investors have historically provided commitments to fund cash in exchange for tax credits. Those commitments are generally made prior to the closing of a construction financing for a new power project. Consequently, although the cash provided in exchange for tax credits is typically funded only after a new project is complete, the commitment of a credit-worthy tax investor provides a separate source of anticipated cash that can be leveraged in an interim debt transaction in order provide an additional source of funds to pay for development and construction costs.

Similarly, although PTCs have value for nuclear power plants from the simple standpoint of lowering the costs of producing a unit of output and thereby creating a competitive advantage, the value of PTCs should also be evaluated

52. Lenders have often provided bridge loans to finance tax equity commitments.

from the perspective of whether or not they can be monetized prior to commencement of construction in order to provide an additional source of financing that creates flexibility for financial institutions in structuring the various financing tranches necessary to raise the substantial volumes of capital needed to build a new nuclear power plant. From this perspective, setting aside the fact that the tax equity market has all but completely dried up in 2008 and early 2009, it is unlikely that any single tax investor would ever have a desire to purchase the quantity of tax offsets that would be produced by a nuclear power plant from a single source. The reason is simple portfolio risk theory: it is better to be diversified across many investments in case one or a small number of them fail to meet performance expectations. If for some reason a nuclear power plant ceases to produce electricity in optimal quantities, then a portion of the PTCs associated with that output are also eliminated. This problem is exacerbated in the context of nuclear power because, unlike any other source of clean energy, nuclear power plants produce baseload output measured in gigawatts. Assuming the PTCs work properly to subsidize the intended levels of output at each individual facility, and setting aside caps or issues associated with PTCs being spread too thin among too many projects (as we discuss below), the result would be, by definition, huge pools of tax offsets aggregated at individual nuclear projects, which carries with it risk of large PTC losses if a single project encounters problems. Additionally, to effectively monetize such a large pool of credits may require multiple tax investors in any single financing transaction. That may sound fine in theory, but combining debt and tax equity investment from a single tax investor is hard enough to structure. Creating a structure that would likely require multiple self-interested tax investors introduces substantial complexity into transaction structures, making the financing of nuclear power more expensive and difficult by layering in additional forbearance and inter-investor issues at the tax equity level. Figure 1, above, illustrates the complexity generated by the addition of multiple tax equity investors.

In reality, a dollar of foregone tax revenue is no different from a dollar of expenditure. In the case of nuclear projects, it may make sense to consider implementing cash grants in lieu of at least a portion of the PTCs, as was done in the American Recovery and Reinvestment Act of 2009 to stimulate investment in other renewable resources.[53] Cash grants would theoretically allow for interim debt financing secured by revenues under the grant program, which could be financed separately from the project as depicted in Figure 1. As it currently stands, unless the tax credits can be monetized, the PTCs cannot be used to indirectly offset upfront capital requirements and can only be used to offset taxable income of the project's sponsor. While these tax benefits are useful to a project sponsor, unless properly monetized they do not directly aid in achieving a workable financing structure.[54] In our view, the PTC program can

53. Note that attempts were made to include incentives for nuclear power in the American Recovery and Reinvestment Act of 2009 but these provisions were removed from the Act before the legislation was passed. *See generally, supra* note 2.

54. "[F]inancial returns are heavily influenced by the availability of tax credits in the form of Production Tax Credits . . . Because many of the renewable project developers are smaller companies or European utilities, the ability of these companies to use the tax credits being generated by the projects is constrained. In addition, the availability of Production Tax Credits is limited to entities who are owners and producers of the project and

be structured more efficiently by introducing well-thought-out direct-pay subsidies to avoid certain issues associated with monetization of tax credits on nuclear power generating assets.

Presenting problems on the opposite side of the spectrum, the 6,000 megawatts worth of new nuclear PTCs will be allocated proportionally among qualifying reactors and if too many developers apply, the PTCs will be spread too thin to be effective because the value allocated to any single project will pale in comparison to the project's capital requirements. [55] This erosion in efficacy will likely result if a simple majority of the current NRC license applicants for new nuclear reactors become eligible for the PTCs.[56] Additionally, the nuclear PTCs, unlike the renewable PTCs,[57] are not adjusted for inflation and thus do not retain their original value.

As a focal point, because applications for an NRC license must have been submitted by December 31, 2007 in order to be eligible to apply for the PTCs, future applicants cannot participate in this subsidy unless the program is expanded and extended.[58] Information on the companies that have submitted or announced the intent to submit applications to the NRC for new nuclear plant licenses is included in Appendix I. As shown in Appendix I, NRC applications submitted before the December 31, 2007 cut-off date referenced at least three different reactor designs.[59] As a result, it is likely that only one or two reactors of each design can be built with the benefits of the PTCs. Some experts do not believe that one or two repetitions of a design will be enough to reduce the first in-kind costs associated with new technology and construction cost overruns to a point at which future nuclear construction can be economically viable without the PTCs.[60] Consequently, although well-intentioned, the PTC program for nuclear reactors may not be sized appropriately to achieve its stated goals. Guidelines have been issued for the PTCs, but as of yet, there have been no

its power output. As a consequence of these limitations, renewable project developers have increasingly utilized structured tax partnerships or lease structures, which allow developers to raise capital from one or more financial partners who have the capacity to use the tax benefits. . . . [A] core group of about 10-20 large financial investors, which include large banks, insurance companies, and structured finance investors, has developed a detailed understanding of the technology, structure, and analysis of these transactions. Unfortunately, as a result of the credit crisis, most of these financial investors no longer have the capacity to use the tax benefits from these projects at present. This lack of 'tax equity' in the current environment provides a significant constraint on the ability to finance new renewable energy projects or to refinance existing projects where construction is nearing completion." *Statement of James Asseltine*, *supra* note 35. If financial investors do not have the capacity to use tax credits generated by smaller renewable projects, it stands to reason that they will not have the capacity to make use of the significantly greater quantity of PTCs generated by nuclear projects.

55. Parker & Holt, *supra* note 25, at 10.

56. *Id*. at 3.

57. 26 U.S.C. § 45(b)(2) (requiring the value of renewable PTCs to be adjusted annually for inflation).

58. Credit for Production from Advanced Nuclear Facilities, *supra* note 51, at § 3.01(1). Note that because the California moratorium on construction of nuclear facilities prevented any NRC applications for California sited projects within the window required to qualify for the PTCs, no California nuclear power facilities can benefit from the PTCs as they are presently implemented.

59. *See* Consolidated Schedule for Docketed Combined License and Design Certification Applications, http://www.nrc.gov/reactors/new-reactors/new-licensing-files/consolidated-col-schedule.pdf (last visited Sept. 1, 2009).

60. Parker & Holt, *supra* note 25, at 10.

applications for allocation of the 6,000 national megawatt capacity. The Internal Revenue Service is considering issuing revised guidance for the PTC program, which was expected as early as the early part of 2009, but, as of the date of this article, there are no indications of when such guidance might be available.[61]

However, irrespective of what it contains, that guidance cannot solve the issues associated with the potentially inadequate sizing of the PTCs (i.e., PTCs being spread too thin among too many projects) discussed above, and, even if the sizing issue were addressed by Congressional action, clear guidance alone is similarly unable to effectively mitigate the complexities of monetizing large pools of PTCs associated with a single project (and the associated inter-investor complexities described above). The simplest solution to these issues is to recast the program through new legislation that would provide either upfront cash payments or even refundable tax credits or other payments that can be made over time but which are, from the project sponsor's perspective, direct revenues that can be monetized through an interim financing that would be secured separately from the project assets.[62]

More fundamentally, PTCs are paid based upon output, which of course requires that the project receiving PTCs must have been successfully commissioned. Consequently, PTCs by their very nature are not designed or equipped to address the construction and regulatory risks facing new nuclear development. As a result, PTCs can best be viewed as a pure subsidy intended to enhance the value of power generated by a nuclear reactor so as to "level the playing field" with other conventional forms of electricity generation, as has been done with PTCs for renewable power projects. However, given the limitations described above on the efficiency of the program, it remains to be seen whether PTCs for nuclear power will prove a necessary or effective subsidy to spur new development. From our perspective, the guarantee and other programs described below that address the construction and regulatory risks facing new development will likely prove far more instrumental in financing the "nuclear renaissance."

61. *See* U.S. Dep't of Energy, *Nuclear Power 2010, Nuclear Power Deployment Scorecard, Federal Financial Incentives*, OFFICE OF NUCLEAR ENERGY, May 11, 2009, http://www.ne.doe.gov/np2010/neScorecard/neScorecard_financial.html (hereinafter, *Federal Financial Incentives*) ("Internal Revenue Bulletin 2006-18 published May 2006. Modified Guidance on Tax Credit may be issued by early 2009.").

62. Note, however, that if the payments are based upon performance rather than capital investment and are made over a long period of time rather than upfront at commercial operation of the project, this monetization exercise becomes complicated by the fact that lenders under the interim financing secured by those payments need to be concerned about the project's performance and output, and thereby many of the same inter-investor and intercreditor issues arise with respect to control of the project in the event of a performance issue or default under any of the loan facilities.

LOAN GUARANTEE BASICS

- Covers debt up to 80% of total project costs
- Lenders can demand payment from DOE upon borrower's default
- Funded by appropriations or fees paid by project developers

2. Loan Guarantees

Much has been written on the DOE's loan guarantee program under the EPAct 2005, particularly in light of the changes to that program for renewable projects under the American Recovery and Reinvestment Act of 2009, and as such we will not cover its "nuts and bolts" in great detail. But generally speaking, the federal loan guarantee program applicable to nuclear projects authorizes the DOE to make guarantees of debt service under construction loans for up to eighty percent of the construction costs of new nuclear projects that will (1) avoid or reduce air pollutants and emissions of greenhouse gases, and (2) employ new or significantly improved technology to do so.[63]

Several requirements must be met before the DOE can enter into a loan guarantee agreement. First, either an appropriation for the cost of the guarantee must have been made or the DOE must receive full payment for the cost of the guarantee from the developer.[64] Because no money has been appropriated to cover these costs and the DOE has stated it does not intend to seek appropriations to pay these costs for any nuclear projects,[65] it appears that project developers may be responsible for pre-paying the full costs of the loan guarantees,[66] unless the Bingaman legislation discussed below is passed as proposed or similar legislation is enacted.

Two components currently make up the cost of the guarantee. The first part is an "Administrative Cost": the DOE must receive fees sufficient to cover applicable administrative expenses for the loan guarantee including the costs of evaluating applications, negotiating and closing loan guarantees, and monitoring

63. Energy Policy Act of 2005, 42 U.S.C. §§ 16512–13 (2000). Although we note potential changes to the loan guarantee program that may result from proposed amendments to the implementing regulations, this article discusses the loan guarantee program as it exists as of early October 2009.

64. *Id*. at § 16512(b). Note that costs cannot be funded by a combination of an appropriation and payment by the project developer. The DOE has determined that appropriations must be all or nothing. Loan Guarantees for Projects That Employ Innovative Technologies, 10 C.F.R. § 609 (2007), 72 Fed. Reg. 60,116, 60,129 (hereinafter, *Loan Guarantees Final Rule*). However, the American Clean Energy Leadership Act of 2009, more commonly known as the Bingaman legislation, would alter this appropriation method if passed as proposed, as discussed below.

65. Given the disparate interests of states, for example California in relation to Florida, there are appropriation risks that may underlie DOE's reluctance to seek appropriations.

66. *Loan Guarantees Final Rule*, 72 Fed. Reg. at 60,129.

the progress of projects.[67] These administrative expenses passed on to the developer include an application fee of $800,000, a facility fee of one half of one percent of the amount guaranteed by the loan guarantee, and a maintenance fee of $200,000–$400,000 per year.[68]

Second, the DOE must receive a "Subsidy Cost" for the loan guarantee, which is defined as the net present value of the government's expected liability from issuing the guarantee.[69] The Subsidy Cost must be estimated by a developer in an application, but cannot be officially determined until the time the loan guarantee agreement is signed.[70] The administrative costs associated with the program have been criticized as overly burdensome,[71] and the Subsidy Cost remains unquantifiable but decisively enormous. In fact, Standard & Poor's recently estimated that the Subsidy Cost for a typical nuclear reactor could be as high as several hundred million dollars.[72] The lack of clarity around how to quantify these costs up front and, as discussed below, the position of the DOE that the Subsidy Cost is not an eligible project cost under the loan guarantee program, make it difficult for developers to arrange investment or interim financing to get them through the development process.[73]

Additionally, before entering a loan guarantee, the DOE must determine that (1) "there is reasonable prospect of repayment of the principal and interest on [the guaranteed debt] by the borrower," (2) the amount guaranteed by the government under the loan guarantee, when combined with other available

67. Loan Guarantees for Projects that Employ Innovative Technologies; Guidelines for Proposals Submitted in Response to the First Solicitation, 71 Fed. Reg. 46,451, 46,454 (August 14, 2006) (hereinafter, *Loan Guarantees Guidelines*).

68. DOE Loan Guarantee Solicitation Announcement, U.S. Department of Energy Loan Guarantee Program Office (July 11, 2008), *available at* http://www.lgprogram.energy.gov/NuclPowerSol7-11-08Amend1.pdf (hereinafter, *DOE Solicitation*).

69. *Loan Guarantees Guidelines*, *supra* note 67, 72 Fed. Reg. at 46,455. This Subsidy Cost is determined in accordance with principles set forth in the Federal Credit Reform Act of 1990, 2 U.S.C. § 661(a)(5)(C).

70. *Id.* at 46,455 (The DOE responded negatively to commenting parties who requested that a transparent formula be used to permit project developers to calculate their Subsidy Costs ahead of time.)

71. *See, e.g.*, *Full Committee Hearing: To Receive Testimony on the Current State of the Department of Energy Loan Guarantee Program*, 111th Cong. 1 (Feb. 12, 2009) (statement of The Honorable Alexander "Andy" Karsner, Distinguished Fellow, Council on Competitiveness) (hereinafter, *Statement of Andy Karsner*) ("The fees placed upon renewable energy projects [under the loan guarantee program] are artificially high and unreasonable, and are unduly high hurdles that prevent the good projects from coming forward.")

72. *S&P on Nuclear Power Subsidy Estimates*, REUTERS UK.COM, Oct. 7, 2008, http://uk.reuters.com/article/oilRpt/idUKWNA597920081007.

73. The need for clarity around the terms of government support programs is perhaps best evidenced by the recent cash grant in lieu of investment tax credit legislation for renewable projects under the American Recovery and Reinvestment Act of 2009. Following the February 2009 enactment of the legislation, we and many other finance and tax attorneys were bombarded with calls from renewable energy developers and lenders to better understand some of the ambiguities and parameters around the program. Without implementing regulations, we and those other attorneys were left with incomplete answers to the industry's questions. Ironically, the availability of the cash grant program, which was intended to spur development in the wake of a very difficult tax equity market, effectively imposed a temporary "moratorium" on new development as developers and lenders waited for clarity on how the cash grants would work. The point we are illustrating may be obvious, but it seems to be often overlooked: just throwing public money at a project will not make it privately financeable. The more profound point buried in this counter-intuitive statement is most definitely undervalued: by throwing cash at projects without clear rules for how that cash can be spent, the government can actually delay the development of new projects.

financing sources, is sufficient to carry out the nuclear construction project, and (3) the DOE possesses a first lien on the assets of the project and other assets pledged as security and its security interest in the project is not subordinate to any other financing for the project.[74] Finally, the loan guarantee obligation must bear interest at a rate determined by the Secretary to be reasonable, taking into account the range of interest rates prevailing in the private sector for similar Federal government guaranteed obligations of comparable risk and the term of the guarantee cannot exceed the lesser of thirty years or ninety percent of the useful life of the nuclear reactor.[75]

These requirements create uncertainties for developers and financiers seeking to understand how the program will work to support the financing of a new nuclear power plant. For instance, it is unclear how government approval of interest rates will work in the context of a deal with multiple debt instruments that each may have different pricing. Setting interest rates in these types of deals is an iterative process of modeling interest rates and testing markets. Further, it is unclear how interest rates will be compared. To our knowledge, there are no "similar Federal government guaranteed obligations of comparable risk" to debt issued for the construction of a nuclear power project.[76]

The limited size of the DOE's loan guarantee authority poses another uncertainty for the efficacy of the program. The DOE's website states that "[a]s construction cost estimates rise, the authorized amount for loan guarantees may be insufficient to catalyze follow-on nuclear construction fully financed by the private sector."[77] The site further proposes that

> [i]t will be necessary to: Increase the loan guarantee authority, [r]evise the Final Rule to allow inter-creditor agreements across multiple loans on one project, or [a]gree that only the actual [government] exposure on partially-guaranteed loans be scored against the loan guarantee authority rather than the entire loan principal.[78]

The proposed American Clean Energy Leadership Act of 2009, more commonly known as the Bingaman legislation, which is pending before the Senate, could address this concern, as loan guarantees would be administered by the proposed Clean Energy Deployment Administration which would receive an initial ten billion dollars in direct appropriations and have the ability to retain

74. Energy Policy Act of 2005, 42 U.S.C. § 16512(d) (2000). Note that proposed amendments to the implementing regulations would not require a first lien on all project assets as a requirement to receive a loan guarantee, but would be considered only as an element the Secretary of Energy may require for any particular project. *See* Loan Guarantees for Projects that Employ Innovative Technologies, Department of Energy, 10 C.F.R. § 609 at 5 (2008).

75. 42 U.S.C § 16512(e)–(f) (2000).

76. U.S. Dep't of Energy, Loan Guarantee Program; Frequently Asked Questions, http://www.lgprogram.energy.gov/FAQs.html (last visited Sept. 25, 2009).

77. U.S. Dep't of Energy, *Nuclear Power 2010: Nuclear Power Deployment Scorecard: Powering Future Decades*, Office of Nuclear Energy, August 5, 2008, http://www.nuclear.gov/np2010/nescorecard/pdfFiles/scorecard_suppl_2008_07_02.pdf.

78. *Id*. Currently, regulations appear to require that a "loan guarantee" only cover a borrower's loan from one particular lender. Although a project developer can seek multiple loan guarantees for different loans, there does not appear to be a way to currently allow inter-creditor agreements. Additionally, the DOE defines a "guaranteed obligation" as any loan or debt obligation under which the DOE "guarantees all or any part of the payment of principal and interest." Thus, the entire amount of a loan of which only a percentage is guaranteed by the DOE would be counted toward the amount of the "guaranteed obligation" which is capped at 80% of a project's costs.

and use the credit subsidy fees it collects to provide further subsidies without future specific appropriations.[79] These changes could increase the amount of federal loan guarantees available to new nuclear power plants and help reduce uncertainty and catalyze follow-on construction if implemented with sufficient clarity of detail. Legislators should also ensure the funds available through this Clean Energy Deployment Administration will be of a sufficient amount to permit construction on a scale sufficient to overcome first-of-a-kind construction costs.

The several energy and climate change bills pending before Congress provide the perfect opportunity to re-examine the loan guarantee program. If properly implemented, the loan guarantee program can be used to incentivize project level non-recourse financing for nuclear plant construction and can create lower average costs of construction.[80] However, the loan guarantee program must be structured properly to meet these goals. In particular, as specified above and as recognized by the DOE and the Senate in the proposed amendments to the loan guarantee regulations, we believe it is vital to the loan guarantee program's efficiency that the federal government be viewed as sharing in the same risks as private lenders in order to maximize the program's ability to motivate private lenders to invest in projects that present those very risks. If the DOE assumes a superpriority position relative to other lenders, private investors may feel that the government does not have sufficient "skin in the game" to give them comfort that the unique risks associated with investing in a new nuclear power project are perceived by the federal government to be manageable. These issues are discussed in more detail in Section II.D.2.c below.

Moreover, the mechanics of the loan guarantee program raise a number of structural issues for financing nuclear projects, including, without limitation, structuring default and cure mechanics to allow for a government sponsored "equity" cure, accounting for the potential transfer of a project from the developer to the government, effectively securitizing a project in this public/private environment, and sheer cost considerations in light of the unquantifiable but undoubtedly massive costs associated with obtaining a guarantee absent an effort by Congress to appropriate funds.[81]

a. Narrow Scope of Eligible Project Costs

The loan guarantee covers up to eighty percent of the *eligible* "project costs." The DOE has determined under its Final Rule regarding "Loan Guarantees for Projects that Employ Innovative Technologies" (Final Rule) that "eligible project costs" do not include "Administrative Costs" and the "Subsidy

79. *See*, American Clean Energy Leadership Act of 2009, S. 1462, §§ 105–07.

80. *See* Nuclear Energy Inst., *supra*, note 33, at 5.

81. *See Statement of Andy Karsner*, *supra* note 67, at 2 ("It is my view, having worked meticulously in support of every effort to successfully stand up and make effective the DOE Loan Guarantee Program, that this mission can only be solved by modernizing and reorienting the government's energy financing efforts to interact with private markets using successful quasi-governmental models already deployed by the federal government with great impact and positive effect. [T]he way we solve our energy and environmental dilemmas will require the involvement of both the public and private sector, if we are going to attain our goals in the near term.").

Cost."[82] By excluding the costs of the guarantee, the federal government has limited the portion of the capital budget for a new nuclear project that can be financed through federally guaranteed debt. The potential substantial nature of the Subsidy Cost and the recognition by DOE in the Final Rule that "[i]t is impossible to tell at this point what the Credit Subsidy Cost will be for any particular project" make it difficult for developers and financial advisors to model a plan for pursuing development of a new nuclear project.[83] Although the proposed Bingaman legislation attempts to address concerns regarding the costs of the loan guarantees by providing the DOE Secretary the authority to adjust the amount of the fees as "necessary to promote…eligible projects" and provides for a refund of seventy-five percent of the amount of fees collected if there is no financial close on an application,[84] there could be an undefined but potentially massive financial obligation that may require up-front payment for the project to move forward from development to construction, twenty-five percent of which would be lost even if an applicant never reached a close on its application.

In addition, because the DOE has not set an equity threshold requirement for these projects, but has stated that the debt to equity ratio will be considered in determining whether to provide a loan guarantee, it is not clear whether the amount of Administrative Costs and Subsidy Costs will be counted against the amount of equity determined to have been funded into a project.[85] This ambiguity makes it impossible for a developer to know with certainty in advance what its equity commitment will be, because any costs excluded from eligible project costs under the loan guarantees will need to be equity financed. Figure 1, above, depicts the equity contribution of a parent company in light of the overall financing structure of a nuclear power project.

Further, DOE rules are unclear as to how administrative costs and other pre-development expenses in respect of entitlement processes and other approvals at state and local levels will be treated under the loan guarantee program. These costs will vary substantially depending on the location of a project. In states with complex regulatory regimes, these costs can be massive and extend over many years. If these costs are excluded from eligible project costs under the loan guarantee program, nuclear power development in states with more complicated regulatory frameworks and litigation tools for project opponents will be at a decided disadvantage.

The DOE has suggested, against concerns raised by certain financial institutions, that default and post petition interest, reimbursement of letter of credit drawings, prepayment premiums, payments under hedge agreements, and indemnification payments are not eligible for the loan guarantee program.[86] Gaps in guaranteed coverage leave lenders without recourse to the United States government to recover all "obligations" under the loan facility. For example,

82. *Loan Guarantees Final Rule*, *supra* note 60, at 61,026–27. Note that proposed amendments to the loan guarantee program discussed herein could alter some of the guidelines set forth in the Final Rule.

83. *Id.*

84. American Clean Energy Leadership Act, *supra* note 79, § 103(b)(4).

85. *Id*. at 60,125 (discussing the DOE's position on equity requirements for project sponsors without mentioning whether Administrative Costs or Subsidy Costs are to be considered in equity contributions, despite public comments).

86. *Id*. at 60,127.

typically in large loans, the cost of certain qualified interest rate hedges are included with the "obligations" under the loan facility, and are secured *pari passu* with those obligations.[87] If payments in respect of an interest rate cap on a DOE guaranteed loan cannot be included with the guaranteed obligations, the cost of the hedge, if at all obtainable, will dramatically increase for the sponsor. The DOE should reconsider the ways in which obligations are lumped together for securitization and priority of payment purposes and model the trade offs between the presumed exposure to the DOE of adding the above mentioned costs to the guaranteed obligations versus the added costs and complexity that excluding such costs will add to the financing matrix. Otherwise, the DOE loan guarantee must be viewed as covering less than eighty percent of the costs of new nuclear construction projects nominally purported to be covered.

b. Anti-Stripping Provisions

While DOE has not implemented an equity investment threshold, implementing regulations provide that the DOE may issue loan guarantees to private lenders only where the guarantee sought is for less than 100% of the amount of the debt obligation.[88]

However, if the DOE guarantees more than ninety percent of the guaranteed obligation, and the underlying loan is participated, syndicated, traded, or otherwise sold on a secondary market, the DOE requires that the non-guaranteed portion and the guaranteed portion of the debt be sold on a pro-rata basis. This provision has been described as an "anti-stripping" measure because it effectively prevents stripping the guaranteed portion of the debt from the non-guaranteed portion in order to sell fully guaranteed investments in the capital or credit markets as a separate tranche of debt. The DOE comments in the Final Rule suggest that in situations where the guaranteed amount is greater than ninety percent of the loan amount there are insufficient incentives for the private lenders to perform adequate due diligence at the project level because such a large percentage of the debt is guaranteed by the United States government, which is the rationale for the DOE's anti-stripping provisions for loans with guarantees above ninety percent.[89]

In comments to the proposed Final Rule, certain financial institutions noted that this anti-stripping provision "is the provision that has the greatest credit consequence. The rating associated with a partially guaranteed obligation will be substantially lower than the 'AAA' rating of a fully guaranteed instrument."[90] Some critics of this feature of the loan guarantee program have argued that the anti-stripping requirement will result in a hybrid financial instrument for which there is no market. Others have argued that the financial institutions would find

87. *Id*. at 60,124 ("It is customary and common practice in project financing for multiple lenders to enter into a *pari passu* structure with respect to assets pledged as collateral to secure debt.").

88. *Id.* at 60,123. Note, however, that the DOE may issue a loan guarantee for up to 100% of a loan so long as (a) the loan does not represent more than 80% of the eligible project costs and (b) the loan is issued and funded by the Treasury Department's Federal Financing Bank.

89. *Id*. at 60,121-25.

90. *Id*. at 60,121.

a way to synthetically strip the non-guaranteed portion from the guaranteed portion of the debt.[91]

The consequence of this anti-stripping provision to a project is that the cost of capital will significantly increase. Structurally, this will create underwriting and other issues. Many of the financial institutions that are authorized to purchase and trade in AAA rated debt backed by the federal government cannot participate in lower level debt. As a result, the size of the markets shrinks under this scenario. The inability to parse credit risks into instruments that can be most efficiently allocated to different players in the credit and capital markets with varying credit requirements significantly handcuffs the ability to raise substantial amounts of capital.

States that wish to promote nuclear development should take a hard look at these gaps in the DOE program. If lenders express concern that a loan receives only a ninety percent guarantee from the federal government, states may be able to craft their own credit support to pick up the ten percent gap. If DOE will not pick up certain significant pre-development costs, state programs can be crafted to do so. The question is always one of amount, scope, and value attributed to such a guarantee by lenders, but understanding the financing gaps in the DOE framework will allow enterprising states to get a jump on nuclear power development.[92]

c. Priority

Of paramount concern to financiers in large financings is clarity as to how collateral can be securitized in varied bundles across multiple tranches of debt, often times with competing liens. As originally drafted and interpreted, the loan guarantee program required that the government take a first priority interest in the project collateral. Under this original structure, the DOE took a position that the loan guarantee program restricted other debt on a *pari passu* basis with the government. Numerous lending institutions provided comments to the proposed Final Rule arguing that the restriction on *pari passu* debt would make the loan guarantee program not viable for most projects.[93] A proposed amendment to the loan guarantee implementing regulations would make this first priority position only one element the DOE can require to issue a loan guarantee, rather than an

91. Public comments to the Loan Guarantee Final Rules made jointly by a group of investment bankers including Citigroup, Credit Suisse, Goldman Sachs, Lehman Brothers, Morgan Stanley and Merrill Lynch voiced these concerns. *Id*. at 60,121–22. The group of investment bankers and Credit Suisse, in particular, has been actively vocalizing the need to clarify the Subsidy Cost and to provide that it may be included in determinations of a Sponsor's equity contributions. *Id*.

92. For a similar argument made by a private financier, *see Statement of James Asseltine*, *supra* note 35, at 7 ("Loan guarantees are a powerful tool and a highly efficient way to expand the availability of private capital, but an effective financing platform may also need the authority to make direct loans, to take an equity position, to provide insurance against certain project or technology risks, and to provide financing to bridge the gap between small-scale technology demonstration and large-scale technology deployment").

93. *See Loan Guarantee Final Rule*, *supra* note 65, at 60,122 (stating that the group of Investment Bankers including Citigroup, Credit Suisse, Goldman Sachs, Lehman Brothers, Morgan Stanley and Merrill Lynch, commented that prohibiting *pari passu* debt would make the project's debt unable to be placed in the existing marketplace). JP Morgan, commenting separately, supported this view and stated "it is unclear how lenders would fund the non-guaranteed portions of a partially guaranteed loan on which stripping was prohibited." *See id*.

absolute requirement. This proposed amendment would also permit other sources of financing to share, on a *pari passu* basis, in collateral pledged to secure a borrower's obligations.[94] Proposed amendments to the loan guarantee program included in the Bingaman legislation would provide an exception to superiority requirements as appropriate to provide for sharing of proceeds received for a sale of assets with other creditors or control of disposition of assets to protect the interests of the United States.[95]

If the government is going to take a priority position in a nuclear project with multiple tranches of financing, the government will have to be party to a larger intercreditor agreement that will govern the rights and obligations of each of the parties providing financing to the project. DOE comments in the Final Rule, and the proposed amendment to the Final Rule, show a recognition that the government will have to relax its stance on priority and even enter into intercreditor arrangements with private financiers in order to structure competing interests at the front end of a new nuclear project. The DOE should keep these considerations in mind when determining whether to require that the DOE hold a first priority position with respect to any particular project.

The Final Rule clarifies that non-guaranteed debt may share the proceeds received from the sale of project assets with the DOE, effectively permitting a *pari passu* structure with respect to sale events. However, the Final Rule still requires that any intercreditor arrangement maintain that the DOE controls the disposition of assets. As proposed, the amendments to the Final Rule do not appear to change this requirement. As a practical matter, this means that other financiers may contract to receive a share of the proceeds of a sale, but that ultimately DOE has full discretion in how it disposes of the assets in order to protect the interests of the United States. Specifically, the implementing regulations state:

> DOE retains – as a superior right – the ability, even over the objection of other parties, to decide against the liquidation of project assets and instead to complete construction of the project, subject to appropriations, or to sell an incomplete project to an entity that will complete the project . . . [w]hile DOE is required . . . to have a first lien on all project assets, the [DOE] is not prohibited from negotiating and agreeing with parties about how the proceeds from the sale of collateral will be shared.[96]

This approach may make sense if the DOE were to pay out the entire amount of accelerated loan obligations upon an event of default – i.e., if the United States government makes the lenders whole, then from the lenders' perspective the United States government should be able to do what it wants with the collateral that secured the debt. However, the rules and regulations under the DOE loan guarantee program provide little guidance as to whether the DOE will actually pay out the entire guaranteed debt amount in the case of an acceleration of the loan, or whether the guarantee is limited to installments of scheduled debt service. Further, typically in a Mega-Financing with multiple layers of debt, although the majority holder of the project debt retains discretion on the disposition of collateral, there are limitations placed on this discretion.

94. *See* Loan Guarantees for Projects that Employ Innovative Technologies, *supra* note 69, at 8.

95. *See* American Clean Energy Leadership Act, *supra* note 81, § 103(b)(3)(c)(iii).

96. *Id*. at 60,124.

For example, in order to protect the interests of all debt holders, an intercreditor agreement will provide that the percentage of debt holders required to authorize remedies reduces over time. This prevents a situation wherein a single debt holder (for example, the government) can significantly impair the value of the collateral by failing to realize that value in a timely manner, or exercising other remedies in order to most effectively get the project back on course.

Additionally, the Final Rule lacks mechanics for the transfer of collateral controlled by the DOE or, alternatively, if and how the DOE can "cure" a default by the borrower to avoid foreclosure. Some have argued that holding debt that is *pari passu* with the interest of the government on the collateral but can be out-voted by the government on intercreditor issues is tantamount to purchasing second lien debt.[97] Goldman Sachs, in its comments to the DOE's proposed amendments to the loan guarantee program, states that "other lenders or guarantors…cannot tolerate the risk that DOE (having energy policy objectives as well as a mandate to protect the interests of the U.S. as a creditor) would prevent other creditors from enforcing the security following a default, and thus obtaining the benefit of their liens."[98] The issue for developers is that the markets may price this debt higher (with a premium akin to the risk premium on second lien debt) unless the DOE provides clearer guidance on intercreditor and realization on collateral matters. For example, Goldman Sachs also suggests that the DOE expressly permit loans that may be repaid on shorter amortization schedules in order to enable applicants to mobilize other sources of financing.[99] The DOE and developers would be well served by a set of implementing regulations that clarify the foreclosure process and acceptable intercreditor issues that would/may apply in accordance with the loan guarantee program.

d. The Original Program is Too Small

The size of the loan guarantee program appears to be insufficient to spark the kind of large-scale development needed to truly overcome initial first-of-a-kind risks that the program is intended to mitigate. In fact, on June 30, 2008, the DOE announced a solicitation for up to $18.5 billion in loan guarantees for nuclear power facilities and up to $2 billion for "front-end" advanced nuclear facilities.[100] The Acting Deputy Secretary of Energy stated that "[l]oan guarantees from the Department will enable project developers to bridge the financing gap between pilot and demonstration projects to full commercially viable projects that employ new or significantly improved energy technologies."[101] On October 2, 2008, the DOE announced that it had received nineteen Part I applications for loan guarantees from seventeen electric power companies to build fourteen new nuclear plants consisting of twenty-one new

97. *Id*. at 60,122 (discussing comments of JP Morgan Securities referring to a lender's participation in the loan guarantee program as essentially participation through a second lien interest).

98. John Gilbertson, et al., Goldman Sachs, Comments in Response to Notice of Proposed Rulemaking for Projects that Employ Innovative Technologies (Sept. 22, 2009), (on file with author).

99. *Id*.

100. *DOE Solicitation*, *supra* note 70, at I(A).

101. Press Release, U.S. Dep't of Energy, DOE Announces Solicitations for $30.5 Billion in Loan Guarantees (June 20, 2009), *available at* www.energy.gov/print/6377.htm.

reactors.[102] These applications requested $122 billion in loan guarantees, significantly exceeding the $18.5 billion solicited.[103] The estimated cost to construct the facilities for which applications were submitted was $188 billion, greatly in excess of the solicited amount.[104] In fact, Exelon Corporation is reported to have "called off plans to build two nuclear reactors in Victoria, Texas . . . [citing] 'worries over the economy and the limited availability of federal loan guarantees.' . . . The death knell is that Exelon wasn't on the short list of energy companies to receive $18.5 billion in federal loan guarantees."[105] Legislation increasing the loan guarantee authority, such as the proposed Bingaman legislation discussed above, must ensure authorized funds are sufficient to overcome first-of-a-kind construction and licensing costs and incentivize future construction so that the "death knell" is not sounded for developers who do not receive loan guarantees.[106]

In addition, since becoming authorized to issue loan guarantees in 2005, the DOE entered into the first (and only) final loan guarantee on September 4, 2009 (for a solar manufacturing facility), and as of the writing of this article, has entered into only two conditional commitments to enter into loan guarantees (for (1) the expansion of a wind turbine assembly plant, and (2) the construction of an energy storage plant), for the many clean energy projects within the scope of eligible projects, despite the fact that the DOE has received in excess of 150 applications for the various solicitations.[107] This fact has led some to question whether the DOE may have been simply plagued by too much bureaucratic inertia to effectively administer the loan guarantee program.[108]

102. Press Release, U.S. Dep't of Energy, Office of Public Affairs, DOE Announces Loan Guarantee Applications for Nuclear Power Plant Construction (October 2, 2008), *available at* http://www.energy.gov/news/6620.htm.

103. *Id*.

104. *Id*.

105. Russell Gold, *No Nukes: Of Exelon and Rising Government Influence*, WALL ST. J., June 30, 2009, *available at* http://blogs.wsj.com/environmentalcapital/2009/06/30/no-nukes-of-exelon-and-rising-government-influence/.

106. *See* Press Release, U.S. Department of Energy, Vice President Biden Announces Finalized $535 Million Loan Guarantee for Solyndra (Sept. 4, 2009), *available at* www.lgprogram.energy.gov/press/090409.pdf.

107. *See Full Committee Hearing: To Receive Testimony on the Current State of the Department of Energy Loan Guarantee Program*, 111th Cong. (2009) (Statement of David G. Frantz, Director of Loan Guarantee Program, Department of Energy). Note that this number includes the pre-applications submitted for projects under the pre-application solicitation for renewable projects.

108. *See Statement of Andy Karsner*, *supra* note 73, at 1 ("I believe that the painfully slow and unacceptable rate of progress on loan guarantees substantially reflects institutional barriers, organizational intransigence, and bureaucratic dysfunction.").

3. DOE Standby Support (Regulatory Risk Insurance)

STANDBY SUPPORT BASICS

- Risk insurance for delays caused by federal licensing or litigation
- Covers costs of debt service and incremental costs of replacement power during the delay
- Up to $500 million of coverage for each of the first 2 reactors, and $250 million for each of the next 4 reactors
- Developers directly pay portions of the costs of the program

Section 638 of the EPAct 2005 implemented a federal risk insurance program known as DOE standby support. The program is designed to mitigate the concerns of debt investors and developers associated with delays in achieving commercial operation of a new nuclear reactor as a result of the regulatory licensing process or litigation.[109] The DOE stated that

> [s]uch insurance is intended to reduce financial disincentives and uncertainties for [developers] that are beyond their control so that they will invest in the construction of new nuclear facilities. By providing insurance to cover certain of these risks, the Federal Government can reduce the financial risk to project sponsors that invest in electric generation facilities that the Administration and Congress believe are necessary to promote a more diverse and secure supply of energy for the Nation.[110]

Through the standby support program, the DOE is authorized to enter into standby support contracts for up to six new reactors consisting of not more than three different reactor designs.[111]

Not only is standby support available for no more than six reactors, but the program phases down quite rapidly as new reactors are built. The first two eligible reactors to become NRC licensed and commence construction will receive standby support contracts covering 100% of qualifying delay-related costs, up to $500 million per standby support contract. The next four reactors will be covered only up to fifty percent of qualifying costs, up to $250 million per contract, and a six month deductible period will apply for these last four covered reactors (i.e., coverage will only apply for costs incurred during periods of delay that are more than six months after the scheduled commercial operation date).[112]

Processing claims with the DOE works much the same way as a private insurance contract. A claims administrator at the DOE will review claims notices and supporting information to determine whether delays resulted from "covered events," whether any non-covered events are found to have been a

109. *See Standby Support Final Rule*, *supra*, note 48, at 46,308; Recitals to Conditional Agreement between United States Department of Energy and [Sponsor] to enter into a Standby Support Contract, *available at* http://www.ne.doe.gov/pdfFiles/conditional_agreement_sept102007.pdf (hereinafter, *Conditional Agreement*).

110. *Id*.

111. Energy Policy Act of 2005, 42 U.S.C. § 16014(b)(1) (2000). Although the EP Act of 2005 states that only three different designs can be covered in the standby support contracts, it does not indicate which three designs will be used.

112. *Id*. at § 16,104(d)(2)–(3).

concurrent cause, in which case no claims will be paid,[113] and the amount of the covered loss.[114] Covered events include the NRC's failure to adhere to licensing review and approval schedules, pre-operation hearings initiated by the NRC, or in-court "litigation," defined as adjudication in the Federal, State or local or tribal courts, including appeals of licensing proceedings which occur in these courts, but specifically excluding administrative litigation.[115] Costs covered by the standby support are "those costs that result from a delay during construction and in gaining approval for fuel loading and full-power operation," including scheduled debt service and the incremental replacement cost of power purchased to meet contractual obligations under a power purchase agreement.[116]

The DOE is also explicitly precluded from paying costs associated with delays which occur due to (1) the developer's failure to take action required by law or regulation, (2) events within the control of the developer, or (3) normal business risks, which includes risks associated with obtaining state licenses or permits.[117] The program also purports to permit the DOE claims adjustor to deny claims if it determines that a delay in achieving commercial operation is a construction delay or results from inadequate construction financing, or because of unrealistic or overly ambitious schedules set by the developer.[118]

In this regard, the limitations of the program are readily apparent. For one, the federal program necessarily excludes state licensing, which means that the states should be proactive about streamlining their regulatory processes if they wish to most effectively attract capital to develop nuclear power facilities within their jurisdictions. A few states have made initial efforts to implement programs that may reduce risks of delays or permits for nuclear plants at a local level. For example, Kansas legislation enacted in 2007 provides that once the Kansas Corporation Commission issues a permit to build a nuclear plant, no local ordinance, resolution or regulation can prohibit its construction. Because project finance lenders do not take unreasonable or unquantifiable permitting risks, states would be well served to implement their own streamlined regulatory programs given that many of the entitlement risks and delays occur at a local level.

As those in the industry know, construction schedules are highly interdependent on permitting schedules. There is no precedent for determining if a certain construction delay is a simultaneous cause of a delay in commercial operation, which permits the DOE to refuse claims payment. In addition, it is unclear how a construction schedule may be scrutinized by adjusters to determine whether the project sponsors included sufficient float in the schedule to allow for foreseeable permitting delays. Presumably, if the government is a guarantor of the debt, it has reviewed and approved these schedules in advance of construction. As far as we know, there is no guidance published on these issues, and they create meaningful concerns for a lender that is banking on the

113. *Standby Support Final Rule*, *supra* note 48, at 46,315.

114. *Id*. at 46,330–32.

115. 42 U.S.C. § 16014(c) (2000); *Standby Support Final Rule*, *supra* note 48, at 46,309, 46,326.

116. *Id.* at § 16,014(d)(5).

117. *Id*. at § 16,014(c)(1)(B).

118. Standby Support for Certain Nuclear Plant Delays, Interim Final Rule, Department of Energy, 10 C.F.R. § 950 (2006), 71 Fed. Reg. 28,200, 28,211 (May 15, 2006) (hereinafter, *Standby Support Interim Rule*).

availability of the standby support program when it makes an investment in a new nuclear project. At best, without more guidance on some of these questions and with the discretionary aspects of claims review, financiers may require developers to include potentially overly-conservative assumptions in their construction schedules and models, thereby unnecessarily increasing cost and complexity in financing transactions. These concerns are exacerbated by the bureaucratic inertia that is perceived, rightly or wrongly, to have plagued the DOE in its efforts to issue loan guaranties.[119]

In addition to these claims-related concerns, costs associated with the program remain unclear. To participate, developers must determine how much coverage they wish to obtain based on their estimated covered costs, at which point appropriated funds, loan guarantee fees paid by the project developers and other funds or fees paid by the developer are deposited into government-owned accounts established for that purpose. Any money deposited into the accounts in excess of the amount appropriated by Congress must come from the developers' payments.[120] Thus, the amount of coverage provided by each particular standby support contract will depend on both the amount appropriated for the specific contract and the amount contributed by the developer. In this way, the standby support program will function as a typical insurance contract, whereby the developers pay premiums for their coverage. However, the DOE has stated it is unable to estimate the amount of these fees until developers submit applications for the program. [121]

Notwithstanding this uncertainty, which inevitably impacts financial models required to structure financing arrangements for new nuclear projects, the DOE requires applicants to enter into a "conditional agreement" with the DOE before an NRC license needed to commence construction has been issued, and before a standby support contract is entered into. Along with that agreement, the developer must submit to the DOE a detailed business plan including a financing and credit structure for the project.[122] Developers and financiers are provided little guidance as to how they should model the cost of this program, yet they must provide detailed financing and credit structures early in the standby support application process.

In addition, although the standby support program mitigates potential federal licensing and permitting risks, it does not address delays that could arise from state or local licensing processes or from hold-ups due to public protest. Moreover, the standby support covers only the costs of debt service and contracting for replacement power to satisfy obligations to an off-taker under a power purchase agreement. It does not cover any other costs that would arise from licensing or litigation delays, such as litigation costs or construction

119. *See* Office of Public Affairs, *DOE Announces Loan Guarantee Applications for Nuclear Power Plant Construction*, *supra* note 102.

120. *Standby Support Final Rule*, *supra* note 48.

121. See *Standby Support Interim Rule*, *supra* note 118, at 28,205–06, for a more thorough discussion of these costs and the inability to estimate the amounts developers will have to pay in advance of Congressional appropriations and the allocation of the appropriated amount to each contract.

122. Conditional Agreement, *supra* note 109, at 2.

contract change orders and suspension costs.[123] Also, because the exact costs of the standby support program to specific developers cannot be determined until closing a standby support contract, the value of this program is still unclear.[124] By carving out state regulatory risks and certain costs from coverage, the standby support program is insurance provided by the federal government that effectively covers only those risks that the federal government is in the best position to control.

Ironically, the risk mitigated by the standby support program is theoretically the one risk that an optimally structured loan guarantee program may be able to mitigate without having to implement a special regulatory risk insurance program. To illustrate this point we refer to the comparison offered earlier in this article to the case of a cross-border Mega-Financing where the United States Export-Import Bank provides loans or loan guaranties in order to provide comfort to private lenders and thereby enable a financing to proceed for a project with respect to which United States contractors or suppliers will derive substantial revenue from exporting their goods and services to support the project. The political and nationalization risks in those deals, although different in kind and magnitude, are not dissimilar in substance from the regulatory and litigation risks posed by new nuclear power plants in the United States. In all cases, the ultimate downside risk is that, due to legal requirements (either as a result of regime change or of regulatory requirements) the project cannot be completed or operated – i.e., the risk is simply a risk of loss of the value of the collateral supporting the loan. In the cross-border deal, if the Export-Import Bank is willing to invest *pari passu* with the private investors, then the private lenders know that if they lose, so will the United Sates government. Most investors view this as a manageable risk since, although a foreign government might be comfortable nationalizing a project or otherwise changing the rules in a way that harms "Private Bank X," it probably will not take such an action if the result would be to also directly harm the United States government.

Similarly, if the DOE loan guarantee program was structured along the lines of our suggestions above to ensure that the DOE at all times has "skin in the game" on a basis not more advantageous than any other private investor, theoretically private lending institutions could get comfortable coming into a deal despite regulatory risks because, even more so than in the cross-border context, it can be argued that the federal government is in the best position to control those exposures. Of course, that is not to say that regulatory risk insurance is a bad idea (in fact it is a quite good idea) but the efficacy of the program might be enhanced by tailoring it to cover risks beyond those most closely within the federal government's control, and at a minimum, by more clearly articulating the risks covered by the insurance and the costs associated with the program. Politically, expanding the program to cover state-level risks, for instance, may prove untenable, but from the standpoint of enhancing efficacy of the program, thinking along those lines in a manner that would force states

123. Nuclear Energy Inst., *Policies that Support New Nuclear Power Plant Construction, supra*, note 38, at 5.

124. Glenn R. George, *Financing New Nuclear Capacity: Will the "Nuclear Renaissance" be a Self-Sustaining Reaction*, 20 ELEC. J. 12, 15 (2007) (discussing the potential benefits of standby support and its inability to be directly monetized).

and federal regulatory bodies to work cooperatively to streamline regulatory risks so that they are quantifiable in the way that would be required to price, for instance, an insurance product covering these risks, may prove to be a fruitful discussion.

4. Other DOE Support for Nuclear Energy

In addition to financial incentives, various other policies in the EPAct 2005 indicate extensive DOE support for the development of new nuclear capacity in the United States. The EPAct 2005 extended the Price Anderson Act, which provides no-fault insurance coverage for the public in the event of a nuclear reactor accident and indemnifies nuclear facilities licensed by the NRC.[125] The EPAct 2005 also funded various nuclear energy research and development programs designed to promote the development of improved nuclear technologies, educate future nuclear specialists, and develop an infrastructure sufficient to maintain nuclear development, including $1.25 billion to fund the "Next Generation Nuclear Plant Project," a prototype nuclear reactor and hydrogen plant to be designed in Idaho.[126] On May 6, 2009, Secretary Chu announced funding of approximately $44 million for over seventy-one university projects to advance nuclear technology.[127]

5. Existing Applications for Federal Subsidy Programs

Although no companies have yet been able to take advantage of the financial incentives for nuclear power projects provided by the EPAct 2005, several applications and notices of intent to apply have been filed with the DOE.

To date, one formal request for standby support from a private developer was submitted to the DOE in September 2008.[128] Two additional developers submitted notices of intent to request a conditional agreement for standby support were also submitted, one in 2008 and another in February 2009, and a third notice of intent was submitted then subsequently withdrawn.[129] The DOE has stated that the first approval for a standby support contract will likely be granted in 2011.[130]

On October 2, 2008, the DOE announced that it had received 19 Part I applications for loan guarantees from seventeen electric power companies to build fourteen new nuclear plants consisting of twenty-one new reactors.[131] The DOE released an initial ranking of applications to project developers on October

125. *See* Energy Policy Act of 2005, 42 U.S.C. § 2011 (2000) (amending 42 U.S.C. § 2210).

126. *See* Title IX of the Energy Policy Act of 2005 (codified in scattered sections of 42 U.S.C. at §§ 16,021–25.)

127. *See* Press Release, U.S. Dep't of Energy, *Secretary Chu Announces Funding for 71 University-Led Nuclear Research and Development Projects* (May 6, 2009) http://www.energy.gov/news2009/7383.htm.

128. *Federal Financial Incentives*, *supra* note 61.

129. U.S. Dep't of Energy, *Nuclear Power 2010: Nuclear Power Deployment Scorecard: Powering Future Decades*, OFFICE OF NUCLEAR ENERGY, May 11, 2009, http://www.ne.doe.gov/np2010/neScorecard/neScorecard_financial.html.

130. *Federal Financial Incentives*, *supra* note 1.

131. Press Release, U.S. Dep't of Energy, Office of Public Affairs, DOE Announces Loan Guarantee Applications for Nuclear Power Plant Construction (Oct. 2, 2008), *available at* http://www.energy.gov/news/6620.htm.

29, 2008, but this ranking has not been publicly released. Fifteen of the initial applicants submitted Part II applications by the December 19, 2008 deadline. These Part II applications requested $93 billion in loan guarantees to cover ten new nuclear plants with 16 reactors which will be capable of providing twenty-two gigawatts of energy. Although the DOE has not yet formally announced the selected applicants, after interviews with DOE and NRC staff, the Wall Street Journal announced that four power companies, UniStar Nuclear Energy, NRG Energy Inc., SCANA Corporation and Southern Company are expected to split $18.5 billion in DOE loan guarantees to construct new nuclear facilities. The four companies have purportedly selected sites for the construction of their new reactors and "are at the front of the pack to receive licenses to build and operate them." Construction could begin as early as 2011, with plants reaching commercial operation by 2015 or 2016.[132] UniStar will be using a design by Areva and the other three companies selected will use designs by Toshiba.[133]

The current status of the federal nuclear incentive programs is summarized in Table 1 below.

Table 1: Current Status of DOE Financial Incentives Applications[134]

Matter	PTC	Loan Guarantee	Standby Support
Notice/Guidelines Issued	☑	☑	☑
Final Rules Issued		☑	☑
Current Applicants	None	19 Part I Applications 15 Part II Applications Media announced 4 selected Applicants	1 Formal Request for Standby Support under review by DOE 2 Notices of Intent to Request Standby Support
Next Step	IRS considering revised guidance	DOE to select applications and issue conditional commitments	Expected approval of first contract in 2011

"According to Standard & Poor's utility industry analyst Dimitri Nikas, '[d]espite billions of dollars in federal incentives to jump-start construction of a

132. Rebecca Smith, *U.S. Chooses Four Utilities to Revise Nuclear Industry*, WALL ST. J., at A1 (June 17, 2009), http://online.wsj.com/article/SB124519618224221033.html#mod=testMod.

133. Keith Johnson, *Nuclear Revival: DOE Picks Recipients of Nuclear Loan Guarantees*, WSJ BLOGS (June 17, 2009), http://blogs.wsj.com/environmentalcapital/2009/06/17/nuclear-revival-doe-picks-recipients-of-nuclear-loan-guarantees/.

134. *See Federal Financial Incentives*, *supra* note 61.

half dozen new nuclear plants, any new wave of nuclear construction will have to satisfy Wall Street if its ever going to get off the ground.'"[135] The limitations of the federal financial incentives discussed above must be addressed in order to stimulate investment in new nuclear projects.

6. Suggested Improvements to Federal Financial Incentives

Table 2, below, summarizes the limitations inherent in the current federal financial incentive programs for nuclear energy as well as suggestions for how these incentive programs could be revised to most effectively stimulate the development of new nuclear power projects.

Table 2: Limitations and Suggested Improvements to Federal Incentives

Federal Incentive Program	PTCs	Loan Guarantees	Standby Support
Limitations of Program	• PTCs are spread too thin among too many projects • Multiple tax investors in any project can complicate structure	• Narrow and unclear definition of eligible "project costs" leaves lenders with gaps in coverage and without recourse • Anti-stripping provision increases cost of capital • DOE has first priority to all assets, superior rights to project assets, but regulations provide no guidance on ability to negotiate intercreditor issues • Size of program too small to truly overcome first-of-a-kind risks	• Risks mitigated are those which the federal government may already be in the best position to control • No mitigation of state regulatory or other risks
Suggested Improvements	• Provide direct revenues that can be separately monetized through interim debt • Increase/extend program	• Consider expanding definition of project costs • Permit parsing of credit risks • Provide clear guidance on intercreditor issues • Increase/extend loan guarantee authority	• Structuring of a truly pari passu DOE loan guarantee program without exclusions for regulatory risk could accomplish the same result • Consider expanding covered risks

135. Frye, *supra* note 8, at 349 (quoting John W. Schoen, *Does Nuclear Power Make Financial Sense? Industry Must Persuade Wall St. That New Advantages Translate to Profits*, MSNBC, Jan. 26, 2007, http://www.msnbc.msn.com/id/16286304/from/ET/).

7. State Financing of Nuclear Energy

In addition to federal subsidies, various states have passed legislation to promote the development of new nuclear power plants that supplement the financial incentives provided by the DOE. The most commonly used incentive for nuclear construction in states with rate-regulated utilities are regulations which allow utilities to recover their capital costs and construction work in progress (CWIP) in rate-bases utilized to determine the regulated rates utilities charge to consumers either during construction or once the plant is either put in service or abandoned. The states that do not permit costs to be recovered during construction have a process by which a state commission can annually approve costs on a non-appealable basis for inclusion in the rate-base at commercial operation or abandonment.

Both rate-regulated and restructured states also provide tax credits or exemptions for new nuclear construction. Kansas exempts new nuclear facilities from state property taxes while Texas permits school districts to enter into agreements with developers of new nuclear plants to limit the appraised value of the plants for purposes of assessing school district maintenance and operations property taxes.

The following Table provides a summary of the key features of the various state programs providing financial incentives for new nuclear power development.

Table 2: Summary of State Financial Incentives for Nuclear Construction[136]

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
Florida	Regulated	Cost Recovery During Construction	• Costs incurred in site selection and pre-construction accrue a carrying charge until recovered in rates. • A utility may file petitions for recovery of site selection costs, pre-construction costs, and carrying costs on construction balance. Costs must be reasonable and prudent to be recoverable in rates. • Each year the utility submits its pre-construction and construction costs for approval and reasonable costs are included in the following year's capacity cost recovery factor. • Once the plant is placed in service, the utility must file a petition for a base rate increase separate from previous cost-recovery petitions. The base rate may be increased for the first twelve months of service according to projected costs. Once the base rate is increased, recovery through the capacity cost recovery clause will cease. • If the plant never enters service, costs can still be recovered through the capacity cost recovery clause.[137]

136 *See* Nuclear Energy Institute, *Status Report: State Legislation and Regulations Supporting Nuclear Plant Construction* (July 2009), http://www.nei.org/filefolder/State_Legislation_Regulations_July_2009.pdf (providing a more extensive summary of state legislation and regulations pertaining to nuclear plant construction).

137 FLA. STAT. § 366.93 (2009).

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
Georgia	Regulated	Cost Recovery Upon Completion or Abandonment[a]	• Costs of financing associated with the construction of a nuclear plant that has been certified by the Georgia Public Service Commission may be recovered by a utility. Financing costs are based on the utility's actual cost of debt and authorized cost of equity.[138] • Costs approved by the Georgia Public Service Commission cannot be excluded from the rate base unless there has been fraud or misconduct. If costs exceed those approved by the commission, the utility must prove they are "reasonable and prudent." • Every one to three years applicants file progress reports and proposed revisions in cost estimates and the commission verifies and approves the expenditures. Once approved, the costs cannot subsequently be excluded from the utility's rate base.[139]
Idaho	Regulated	Cost Recovery[b]	• Utilities may choose to file an application with the Public Utilities Commission for a binding order that includes the utility's proposal for cost recovery and any proposed ratemaking treatment to be applied to the proposed facility.[140]

138. Georgia Nuclear Energy Financing Act, S.B. 31 (2009).
139. GA. CODE ANN. § 46-3A-7 (2009).
140. Idaho S.B. 1123 (2009).

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
Iowa	Regulated	Cost Recovery Upon Completion or Abandonment[b]	• Legislation allows Iowa Utilities Board to specify return-on-equity and other rate-making principles that will apply to a new electrical generating project before construction begins or a lease is signed. • Once established, rate-making principles are binding and can't be changed at a later proceeding.[141]
Kansas	Regulated	Cost Recovery During Construction[a]	• A utility may recover CWIP and prudent expenditures for development costs of a new nuclear facility including preliminary engineering, feasibility studies, and prepayments for equipment. • The Kansas Corporation Commission allows a utility to apply for a predetermination of rate-making and include development costs in customer rates before the plant is operational.[142]
		Depreciation[a]	• New nuclear facilities that receive licenses on or after July 1, 2008 can use a book depreciable remaining life of no more than the amount of time remaining on its license.[143]

141. Iowa H. File 577 (2001).
142. Kan. S.B. No. 586 (2007).
143. *Id*.

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
		Tax Credit[a]	• A new nuclear generation facility within three miles of an existing reactor is exempt from all property taxes levied by the state of Kansas. • Exemption begins at the start of construction and continues for ten years after completion. • Instead of property taxes, developers pay a fee in an amount that would have been levied on the real property portion of the property if subject to ad valorem taxes.[144]
		Local Prohibition[a]	• Once the Kansas Corporation Commission issues a permit to build a nuclear plant, no local ordinance, resolution or regulation can prohibit its construction.[145]
Louisiana	Regulated	Cost Recovery Upon Completion or Abandonment [a]	• There is a three part process for certification of a nuclear plant: 1) siting and licensing, 2) plant design and development, and 3) construction. • "Transition costs" prudently incurred before and during review of applications can be recovered regardless of outcome of the certification proceedings. • Once certification is granted for a phase, an annual "prudence review hearing" is held to review and approve costs for inclusion in the rate-base once the plant begins operation or is canceled.[146]

144. Kan. H.B. No. 2038 (2007).

145. *Id*.

146. Incentive Cost Recovery Rule for Nuclear Power Generation, La. Pub. Serv. Comm'n, Gen. Order, Docket No. R-29712 (May 1, 2007).

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
Michigan	Restructured	Cost Recovery During Construction[b]	• Utilities can apply for and receive a certificate of necessity for assets costing $5 million or more to construct or purchase that allows the Michigan Public Service Commission to determine in advance the prudence of the investment. • The certificate of necessity will specify approved project costs that can be added to rates when the asset becomes operational. • The MPSC may allow interest during construction to be passed through in rates for projects granted certificates of necessity.[147]
Mississippi	Regulated	Cost Recovery[a]	• The Public Service Commission is authorized to include in rates all prudent pre-construction and construction expenditures, including CWIP, whether or not the facility is ever commenced, completed, or put into commercial operation.[148]
North Carolina	Regulated	Cost Recovery During Construction[b]	• Utilities must submit annual reports during construction. • Reasonable and prudent costs incurred in construction of a new facility can be reviewed periodically. Once approved, they are added to the rate base. • Construction does not have to be complete for incurred costs to be added to the rate base.[149]

147. Mich. H.B. 5524 (2008).
148. Miss. S.B. No. 2793 (2008).
149. 2007 N.C. Sess. Laws 397.

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
South Carolina	Regulated	Cost Recovery Upon Completion or Abandonment[a]	• The Public Service Commission can grant a project development order allowing pre-construction and development costs and an allowance for funds used during construction associated with those costs to be included in a rate increase when the plant goes into service or is abandoned. • The developer can submit a revised rate request every year to allow CWIP recovery.[150]
Texas	Restructured	Tax Credit[a]	• Law permits school districts to enter into agreements with nuclear power developers to designate the plant a "reinvestment area" and limit the appraised value of the plant's real and personal property for the first eight years after the "qualified period" which is the first seven tax years after the third anniversary of the school board's approval of the application – essentially, the first eight years of operation. • New facilities must be within three miles of existing nuclear generators. • The developer must provide reports to the district regarding the creation of new jobs, average wages, qualified investments made in the district, and market value of the plant.[151]

150. S.C. H.B. 3499; S.B. 431.

151. H.B. 2994, 80th Gen Assem., Reg. Sess. (Tex. 2007).

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features
Utah	Regulated	Tax Credits[b]	• "Renewable energy development zones" can be created if a local government entity commits to provide incentives that may include an abatement of some or all of a qualified renewable energy project's property taxes for up to thirty years. • Nuclear projects may qualify as qualified renewable energy projects and must bring incremental jobs to Utah, involve significant capital investment within the zone, create high-paying jobs, or generate significant purchases from Utah vendors and providers.[152]
Virginia	Restructured[153]	Cost Recovery During Construction (Additional Costs Upon Completion) [b]	• Before beginning construction, utilities may apply for the recovery of the cost of building a new facility. Once construction begins, planning, development, and life cycle costs can be recovered. • During construction a utility can collect an allowance for funds used during construction and rate of return, including the enhanced rate of return discussed below, on CWIP.[154]
		Increased Return on Equity [a]	• As an incentive to undertake projects, a utility can collect an enhanced rate of return to supplement the determined incremental rate of return. Nuclear power developers can receive an incremental two percent rate of return above the standard return on equity for twelve to twenty-five years.[155]

152. H.B. 430, Gen Sess. (Utah 2009).

153. Note that although most sources cite Virginia as a restructured state, it still retains rate caps and other features of regulated markets.

154. H.B. 3068 (Va. 2007); S.B. 1416 (Va. 2007).

155. *Id*.

State	Regulated vs. Restructured	Financial Incentive	Description/ Key Features

a = provision specifically applies to nuclear energy facilities
b = provision applicable to all energy facilities

Legislation is also currently pending in Indiana and Oklahoma that would provide cost recovery mechanisms for new nuclear construction.[156] Other states have recently implemented legislation or regulations indicating their support for construction of nuclear power plants through programs aside from direct financial incentives. Utah passed a bill establishing a state position of "energy officer" and a policy to promote "the study of nuclear power generation."[157] Illinois, Kentucky, Minnesota and Wisconsin all currently have legislation pending to overturn state moratoria on the construction of new nuclear plants.[158]

Finally, Georgia and Kentucky have issued general resolutions to support development of new nuclear power plants, while many other state or local governments have issued resolutions to support the construction of particular nuclear plants.[159] The many states that have recently implemented financial incentives for construction of new nuclear power plants to supplement federal programs, and the states that have released policies in support of nuclear development signify the increasing and widespread support for new nuclear power.

Additionally, certain local municipalities and counties have discussed adding nuclear power to their local clean/sustainable energy initiatives. For example, Calvert County in Maryland entered into an agreement with a nuclear power developer providing for a fifty percent tax credit against property taxes for fifteen years so long as the developer invests at least $2.5 million in improvements or equipment in the county and creates at least twenty-five new jobs with salaries above the county median salary.[160] It is interesting to note that the Calvert County action reflects a growing recognition that nuclear energy will boost the number of high paying professional jobs in the markets where new nuclear power plants are located.[161]

156. Nuclear Energy Inst., *Status Report: State Legislation and Regulations Supporting Nuclear Plant Construction* (July 2009), *available at* http://www.nei.org/filefolder/State_Legislation_Regulations_July_2009.pdf.

157. H.B. 46, Gen. Sess., at § 63-553b-201(2)(c)(iii) (Utah 2006).

158. S.J. Res. 101, Gen Assem. (Ill. 2008); S.B. 156 (Ky. 2008); H.B. 346 (Wis. 2007).

159. S. Res. (Ga. 2006); H.R. Con. Res. 1010 (S.D. 2006).

160. *See* MD. CODE ANN. § 9-306(g) (2006) (granting Calvert County the authority to enter into a property tax credit agreement); Nuclear Energy Inst., *Tax Credit Agreement for the New Nuclear Power Plant at Calvert Cliffs Nuclear Power Plant* (Aug. 8, 2006), *available at* http://www.nei.org/resourcesandstats/documentlibrary/resolutions/resolutions/agreement_calvert_constellation_0806/.

161. *See generally,* Nuclear Energy Inst., *Nuclear Power Plants Contribute Significantly to State and Local Economies* (Jan. 2009), *available at* http://www.nei.org/keyissues/reliableandaffordableenergy/factsheets/nuclearpowerplantcontributions ("Each year, the average nuclear plant generates approximately $430 million in sales of goods and services [economic outcome] in the local community and nearly $40 million in total labor income. Operation of a nuclear plant generates 400 to 700 permanent jobs. These jobs pay 36 percent more than average salaries in the local area").

Having described a number of state-level policies aimed at spurring new development, arguably the most important of all state-level policy initiatives aimed at promoting development of new nuclear power plants is the same policy initiative that drives renewable projects, the renewable portfolio standard, which we describe in detail in the next section.

III. CALIFORNIA AND NUCLEAR POWER

Twenty-four states and the District of Columbia have legislatively mandated renewable portfolio standards (RPS) aimed at reducing greenhouse gas emissions by mandating the increase of renewable sources of energy, and of course the federal government under the Obama administration has been talking very seriously for some months about a federal RPS.[162] Although many of the state RPS programs do not include nuclear energy in their definitions of renewable energy sources, some states are encouraging nuclear energy as part of their RPS to reduce greenhouse gas emissions. Both Florida and Ohio include nuclear energy among the alternative energy sources that qualify for meeting state-mandated RPS.[163] South Carolina also is considering legislation which would include nuclear energy among the state's official definition of renewable power sources.[164]

Using California as an example, this section illustrates the importance of considering and encouraging nuclear energy through state level programs that encourage construction of nuclear projects in an effort to reach RPS standards, and the reasons why including nuclear power in any national RPS, particularly in the event that such a national RPS preempts state initiatives, may prove vital to the longevity of what many have termed the "nuclear renaissance."[165]

Established in 2002 and accelerated in 2008, the California RPS obligates California utilities to procure twenty percent of California's electricity from eligible renewable sources by 2010.[166] In November 2008, Governor

162. Energy Information Administration, *Annual Energy Outlook 2009 with Projections to 2030,* (Mar. 2009). The Waxman-Markey climate change bill, which passed in the House of Representatives by a narrow margin on June 26, 2009, includes provisions requiring new national RPS, which would begin at 6% in 2012 and gradually increase to a 20% RPS by 2020. Nuclear power is not included within the definition of renewable energy resources for purposes of the RPS in the Waxman-Markey bill. The full text of the bill as well as a brief summary is *available at* H.R. 2454: American Clean Energy and Security Act of 2009, http://www.govtrack.us/congress/bill.xpd?bill=h111-2454 (last visited Sept. 25 2009). The bill would not preempt more stringent state standards. Frederick R. Anderson, *House of Representatives Passes Groundbreaking Climate and Energy Bill – The American Clean Energy and Security Act (ACESA) Now Heads to the Senate for Debate,* CLIMATE CHANGE INSIGHTS (June 30, 2009), *available at* http://www.climatechangeinsights.com/2009/06/articles/us-policy/house-of-representatives-passes-groundbreaking-climate-and-energy-bill-the-american-clean-energy-and-security-act-acesa-now-heads-to-the-senate-for-debate/. Five additional states have non-binding goals for the adoption of renewable energy instead of an RPS. U.S. Dep't of Energy, States with Renewable Portfolio Standards, http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm (last visited Sept. 1, 2009).

163. S.B. 1544 (Fla. 2008); S.B. 221, 127th Gen. Assem. (Ohio 2007).

164. S.B. 260 (S.C. 2008).

165. Because so much has already been written on the federal RPS proposals and because as of publication of this article nothing definitive has been enacted, we focus our discussion on existing state RPS programs. Similar analysis would apply to any federal program. For a thorough discussion of the "nuclear renaissance" in the United States, *see generally* Frye, *supra* note 8.

166. S.B. 1078 (Ca. 2002); S.B. 107 (Ca. 2006).

Schwarzenegger issued an executive order establishing a further goal of thrity-three percent renewable energy by 2020.[167] To put the "numbers" in perspective, more than one researcher suggests that to stabilize or reduce global greenhouse emissions, communities like California will need to completely eliminate carbon emitting energy production from their overall energy portfolio by 2020.[168] Nathan Lewis, a chemistry professor at California Institute of Technology, predicted that

> [i]f we want to hold CO_2 even . . . even with aggressive energy efficiency we will need as much clean, carbon-free energy… as the entire oil, natural gas, coal and nuclear industries today combined—10 to 15 terawatts. . . . So let's look at carbon-neutral energy sources. We could go nuclear, which is the only proven technology that we have that could scale to these numbers. We have about 400 nuclear power plants in the world today. To get the 10 terawatts we need to stay on the 'business-as-usual' curve, we'd need 10,000 of our current one-gigawatt reactors, and that means we'd have to build one every other day somewhere in the world for the next 50 straight years.[169]

In this context, and without downplaying the significance from a policy perspective of the gains made in renewable energy production in California from traditional renewable sources, a thirty-three percent RPS target by 2020 is likely impossible to achieve unless nuclear power is counted in RPS standards and widely deployed. California Assemblyman Chuck Devore stated "California's landmark 2006 global warming law, AB 32, requires massive reductions in emissions over the next decade, but the laws of physics and economics dictate that this effort is doomed to failure without modern nuclear power."[170] Maureen Koetz, Director of Environmental Policy for the Nuclear Energy Institute, has long since shared Devore's views about the necessity of nuclear energy at the national level, stating that "[p]ut simply, the United States cannot meet its greenhouse-gas-reduction goal without increased use of nuclear energy."[171] Even a few environmentalists have begun considering the necessity of nuclear energy to reduce greenhouse gas emissions. "The risks posed by climate change may turn out to be so grave that the United States and the world cannot afford to rule out nuclear power as a major contributor to addressing global warming," stated a recent report by the Union of Concerned Scientists, a non-profit group for the environment.[172]

167. Exec. Order No. S-14-08 (2008).

168. Indeed, even the United Nation's first draft of a treaty to stem global warning suggests goals such as the near elimination of greenhouse gas emissions. Greenpeace's climate campaigner stated that global "[e]missions need to come as close to zero as possible by 2050, that's the scientific reality." Alex Morales and Jeremy Van Loon, *Climate-Treaty Draft Proposes Rich Countries Eliminate Most CO2*, BLOOMBERG (May 20, 2009) http://www.bloomberg.com/apps/news?sid=ahgr9QpMwx6o&pid=20601124.

169. Nathan S. Lewis, *Powering the Planet*, 2 ENGINEERING & SCIENCE 12, 18-19 (2007).

170. California Political Desk, *Assembly Panel Blocks Measure Allowing Modern Nuclear Power*, CALIFORNIA CHRONICLE (Apr. 22, 2009), *available at* http://www.californiachronicle.com/articles/view/99583.

171. Nuclear Energy and Climate Change: A Debate, Living on Earth (April 2, 1999), *available at* http://www.loe.org/series/three/nuclear.htm.

172. Frank Nelson, *Nuclear's on the Road Again, But It's Uphill*, MILLER-MCCUNE, Mar. 6, 2008, *available at* http://www.miller-mccune.com/science_environment/nuclear-on-the-road-again-191.print. Note that the Union of Concerned Scientists also stated that if safety concerns are presented, nuclear power may not be able to be deployed on the scale needed to combat global warming. *Id*. Environmentalists feel "the position

Given that (a) nuclear power already makes up about 15% of California's overall energy portfolio,[173] (b) California's energy consumption is projected to significantly increase over the next decade, and (c) the remaining operating nuclear power plants in California are scheduled to be decommissioned over the next decade, California must at some point address the question of whether clean, base-load alternatives to nuclear power can be deployed on a timely and sizeable basis to achieve California's stated RPS goals. As noted above, the evidence in the scientific community seems to suggest that the answer to that question is decidedly "no."

In addition, with much talk afoot in Washington about federal climate change and cap and trade legislation, the stakes are even higher.[174] Those states that permit and facilitate clean nuclear reactors will reap potentially tremendous competitive advantages in all sectors of the state's economy.[175] Yet California is one of a handful of states with a moratorium on the development of nuclear power. Under California law, the California Energy Commission (CEC) cannot certify a nuclear power plant for operation within California until the federal government has demonstrated and approved (1) a means for permanent disposal of spent nuclear fuel[176] and (2) a means for the disposal of high-level nuclear waste.[177] The federal government has neither approved nor demonstrated reprocessing or disposal technology.

Today, developers in California are building a matrix of disparate renewable power projects and transmission systems that span deserts and cross mountains while in Europe and Asia, communities are quickly churning towards energy independence through the systematic construction of new nuclear reactors. But, in the face of countries like France that achieve true clean energy independence through wide scale deployment of nuclear reactors, California's greenhouse gas numbers and projections simply do not compare with the global leaders in combating global greenhouse gas emissions.[178] While a number of

that nuclear energy is both safe and reliable and that it cannot realistically be phased out and replaced with renewable energy sources." Frye, *supra* note 8, at 290.

173. *See* Cal. Energy Comm'n, Nuclear Energy & Nuclear Issues, Nuclear Energy in Cal., http://www.energy.ca.gov/nuclear/index.html (last visited Sept. 25, 2009) ("Nuclear power plants in California produced 35,692 gigawatt hours of electricity in 2007 . . . [which] represents 14.8% of electricity from all sources in 2007").

174. Proposed climate change and/or cap and trade legislation is included within the American Clean Energy and Security Act of 2009, which passed the House of Representatives on June 26, 2009, as well as in the American Clean Energy Leadership Act of 2009 and the American Clean Energy Jobs and American Power Act, which are pending before the Senate.

175. *See* Nick Hodge, *Cap and Trade Legislation: What Carbon Regulation Means for Energy Investors*, WEALTH DAILY.COM, Feb. 25, 2009, *available at* http://www.wealthdaily.com/articles/cap-trade-legislation/1716 ("Other than mandating its use, capping carbon emissions is the next best thing to spur wide scale adoption of renewable energy. A cap-and-trade program instantly makes carbon a liability, thereby driving up the cost of burning fossil fuels to generate electricity . . . What that means is [that] renewable energy instantly become[s] more competitive, if not advantageous").

176. CAL. PUB. RES. CODE § 25524.1(a)(1) (2008).

177. *Id.* at § 25524.2.

178. For example, despite ranking fairly high as a leader in the reduction of greenhouse gas emissions, California's targeted per capita emissions target in 2020 is 13.68 metric tons, *see* American Council for Capital Formation, *A Reality Check on Initiatives to Reduce Greenhouse Gas Emissions in California, Oregon, the Northeast and in Europe* (Aug. 2007), *available at* http://www.accf.org/media/dynamic/1/media_19.pdf, while

California political leaders from both parties have privately acknowledged that traditional renewables alone are not enough, few have been willing to make a public statement like that of Governor Schwarzenegger, who, in March of 2008, told an audience at a Wall Street Journal Economic forum that it is time for California to "relook at the [nuclear] issue again rather than just looking the other way and living in denial."[179]

We write this article with a full awareness of the sensitivity that surrounds the nuclear power question. However, we write with an assumption that California's policy makers will ultimately conclude, in the face of the scientific evidence and policy discussions cited above, that California must inevitably pursue new nuclear energy projects or else fail to meet its goals. Rather than debate the merits of that conclusion, the question this article addresses is "how" to foster an environment conducive to development and financing of new reactors.

Consider that in the 1970's California faced an energy shortage. The state hired Rand Corporation to study possible solutions to the shortfall.[180] The Rand study suggested that the state should build 90,000 additional megawatts (MW) of nuclear energy by 2000, or about ninety plants. The CEC was founded primarily to implement this strategy to mitigate concerns that local governments would hold up issuing local permits needed for those nuclear projects. Fast-forward more than thirty years and we find ourselves in a more precarious situation: California has two operational nuclear power plants grandfathered into the moratorium,[181] and an energy shortfall and a global warming crisis that demands that we fill this shortfall with clean energy. While the energy industry is touting a "nuclear renaissance" in the United States, there is little evidence of it in California. If California does choose to pursue new nuclear power as part of the answer to clean base load power, then unless California acts quickly, the emergence of the nuclear renaissance may be no more to California than a sign post to read California's existing moratorium as a lost opportunity to achieve California's energy goals.

Today, California's two operating nuclear power plants were constructed before the moratorium was put in place in 1976. There are three decades of advancements in nuclear technologies to consider. To say "no" to nuclear power on the basis of a thirty year old policy is saying "no" to something Californians do not fully understand. And, the options for deploying nuclear technology are not limited to constructing new plants on new sites. California has an opportunity to be creative with how it harnesses advancements in nuclear

France's per capita emissions are significantly lower and typically reported at around 7-9 metric tons per capita. *See, e.g.* Greenpeace, *France: Climate Killer No. 8* (Mar. 2007), *available at* http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/klima/Climate_profile_France.pdf.

179. Shane Goldmacher, *Schwarzenegger Goes Nuclear?*, THE SACRAMENTO BEE, Mar. 17, 2008, *available at* http://www.sacbee.com/static/weblogs/capitolalertlatest/011157.html.

180. William Ahern, *Energy Alternatives for California: Paths to the Future*, RAND, Dec. 1975, *available at* http://www.rand.org/pubs/reports/R1793/.

181. California currently has two active nuclear power plants, PG&E's Diablo Canyon Nuclear Power Plant and the San Onofre Nuclear Generating Station jointly owned by Southern California Edison and San Diego Gas & Electric. Both plants were constructed prior to the enactment in 1976 of the moratorium on nuclear power. *See, e.g.,* Cal. Energy Comm'n, Nuclear Energy in Cal., http://www.energy.ca.gov/nuclear/california.html (last visited Sept. 2, 2009).

technology, federal credit support programs and private financing. Polls suggest that the public now supports the development of nuclear power.[182] If you consider that fifteen percent of California's energy comes from nuclear power produced by its two operating nuclear power plants, adding a single new reactor would be a significant boost to California's clean energy grid.

Very little discussion or pre-development activity for nuclear power development has occurred in the Western United States. There are no California sited projects under consideration for current federal subsidy programs, and in some cases the window of opportunity for California to benefit from those subsidies has closed. There is a potentially costly tension between California's current policy on nuclear power and the federal policy of frontloading federal financial assistance to early nuclear power projects.

As a matter of federal energy policy, California, one of the largest energy consuming states in the nation,[183] is inadvertently on a path that may foreclose its ability to take advantage of billions of dollars in federal financial support for nuclear development. Californians pay approximately twelve percent of the nation's tax revenue that ultimately funds these same financial support programs – whether or not any nuclear reactor gets built in the Golden State.[184] California may well decide that the moratorium on nuclear power development should stay in place because nuclear power as a concept is not an acceptable solution to the state's power needs. But with high fiscal and energy policy stakes, this decision should not be made inadvertently because of a 1976 legislative moratorium that has effectively forestalled thoughtful discussion in California while the rest of the nation embarks on a "nuclear renaissance."

There are signs that California is entering the nuclear power dialogue. On the private developer front, a group of business persons in Fresno formed the Fresno Nuclear Energy Group, LLC and signed a letter of intent with Unistar Nuclear Development, LLC to design, build, and operate a 1,600 MW reactor in the Central Valley by 2017. The partnership with Unistar, which is a jointly owned subsidiary of Constellation Energy and the EDF Group, was set up in

182. The 2009 annual Gallup Environmental Poll found a new level of support for nuclear energy in the United States, with 59% favoring its use. Jeffrey Jones, *Support for Nuclear Inches up to New High*, GALLUP (Mar. 20, 2009), *available at* http://www.gallup.com/poll/117025/support-nuclear-energy-inches-new-high.aspx. Other polls indicate even higher levels of support. A 2008 Zogby poll indicated that 67% of Americans would support the construction of a nuclear power plant and are much more likely to support the construction of a nuclear-powered plant in their community as opposed to a natural gas, coal, or oil plant. Press Release, Zogby International, Zogby Poll: 67% Favor Building New Nuclear Power Plants in U.S. (June 2008). Particularly interesting is a poll of American adults living within 20 miles of a current nuclear power plant. Of those people, 82% favor nuclear energy and 71% would support building a new reactor at the current site. Press Release, Nuclear Energy Inst., Nuclear Power Plant Neighbors Accept Potential for New Reactor by Margin of Nearly 3 to 1, (Aug. 20, 2007), *available at* http://www.nei.org/newsandevents/newsreleases/nuclearpowerplantneighborsacceptpotentialfornewreactornearby. These statistics seem to discount many "not-in-my-backyard" concerns.

183. *See* The Encyclopedia of Earth, Energy Profile of California, http://www.eoearth.org/article/Energy_profile_of_California,_United_States (last visited Sept. 29, 2009) ("California is the most populous State in the Nation and its total energy demand is second only to Texas").

184. *See* Internal Revenue Service, 2008 IRS Data Book (Publication 55B), Table 5: Internal Revenue Gross Collections, by Type of Tax and State, Fiscal Year 2008, http://www.irs.gov/taxstats/article/0,,id=205182,00.html (last visited Sept. 25, 2009).

December 2006.[185] The Fresno Nuclear Energy Group has also entered into an agreement to purchase 500 acres in the Westlands Water District and is studying the feasibility of building a dual unit nuclear plant and desalinization plant on the land.[186]

On the policy side, in September 2008, Governor Schwarzenegger spoke at an anniversary celebration of Assembly Bill 32, which committed the state to lowering greenhouse gas emissions to 1990 levels by 2020.[187] When asked about nuclear power, Schwarzenegger said: "It drives me nuts when I go over to France and they get 80 percent of their power with no greenhouse gas emissions whatsoever from nuclear power. And they have been safe, they have been handling it the right way and they are building some more. So I think we should look at that again and revisit it."[188] Now that there are proposals to lower greenhouse gas emissions by an even greater percentage, this revisiting is even more necessary. On the necessity of nuclear power and political feasibility, Dennis Gartman commented on nuclear power in the Obama administration, stating:

> I think it's [*sic*] wonderful job-creation programs, none of which will prove to be of much merit at all. All of the Birkenstock-wearing greens will feel very good about having their rooftops covered by solar panels, but is that going to resolve any energy problems we have? No. No. Nuclear power will do that. Maybe using the oceans will do that, but wind power, probably not. Solar power, probably not. It makes everybody feel good, but are we going to power our cars in the next 40 years with solar power? I doubt it. Do I expect some sort of material technological breakthrough in the next 100 years that will change what we use as energy? Oh, absolutely. Do I have any idea what it will be? Of course not . . .there are a lot of new nuclear facilities on the drawing boards, and they're probably going to be approved. If there's going to be one surprise by the Obama Administration, it will be that you don't get nuclear energy advances under a right-wing government; you always get them under a left-wing government.[189]

In our view, there are five core questions about nuclear power that need to be confronted by Californians to further this incipient discussion:

185. Public Citizen, Fresno California, *available at* http://www.citizen.org/cmep/energy_enviro_nuclear.

186. Dale Young, *Fresno Nuclear Power Plant*, ABC 30, Aug. 19, 2008, *available at* http://abclocal.go.com/kfsn/story?section=news/local&id=6338194.

187. *See* Arnold Schwarzenegger, *Gov. Schwarzenegger Highlights CA's Global Warming Accomplishments on Eve of AB 32 Anniversary*, Office of the Governor of the State of California (Sept. 26, 2008), *available at* http://gov.ca.gov/speech/10641. Also, in March of 2008 California Governor Arnold Schwarzenegger publicly stated that "nuclear power has a great future, and I think that we should look at it seriously again. I know there are people who are scared about it, and I know there are certain environmentalists that put the scare tactics out there, and they frighten everyone that we're going to have another blowup and all of those things. But I think technology has advanced so much." Previously, Schwarzenegger stated, "I want people to look at nuclear power. There is [sic] ways of going where we can revisit it. I'm not saying build it, because I'm not running the state by myself. What I'm saying is, 'let us all discuss it.'" NOVA, *The Big Energy Gamble* (Apr. 23, 2008), *available at* http://www.pbs.org/wgbh/nova/energy/governator.html.

188. Kevin Yamamura, *Is More Nuclear Energy in California's Energy Future?,* THE SACRAMENTO BEE, Nov. 3, 2008, *available at* http://www.sacbee.com/capitalandcalifornia/v-print/story/1365206.html.

189. The Gold Report, *Dennis Gartman: Things are Always Their Worst at the Bottom* (Jan. 23, 2009), *available at* http://jutiagroup.com/2009/01/23/dennis-gartman-things-are-always-their-worst-at-the-bottom/. "Obama will be smart enough to understand that [nuclear]'s the only way—that's the best and cleanest methodology to use." *Id*.

1. Is California comfortable missing the opportunity to take advantage of federal subsidies and regulatory policies designed to advance nuclear development in the United States even though Californians will, through their tax dollars that fund those federal subsidies, play some role in financing new nuclear reactors?
2. Do the technological and safety advances that have been achieved in the thirty-three years since California enacted the moratorium on nuclear power mitigate against the public policy concerns that underlie the existing moratorium?
3. Does California believe that the nation-wide nuclear renaissance will bring with it acceptable solutions to waste and reprocessing issues that have fueled so much public concern?
4. How can nuclear power be financed by independent developers in a "restructured" energy market?
5. Is there a state framework for promoting nuclear power that cabins the not-in-my-backyard fears and environmental concerns?

All this can be summed up in one big question: Which is more urgent, dealing with the immediate problem of global warming and the need to reduce greenhouse gas emissions or solving the nuclear waste issues that scientists suggest can wait decades?[190]

While a detailed discussion of these questions is beyond the scope of this article, the ultimate answers to these questions must involve policymakers, leaders in science and technology, regulators, developers and financiers. There are unique questions raised by nuclear power that go beyond crafting a clean energy policy that promotes the financeability of nuclear power – questions of security, sustainability and economy that go beyond differences between and among states to relations between and among countries and national economies. But if the answers to these questions prompt an initiative to promote new nuclear power development in California, the questions we have discussed in this article regarding the financeability of those new projects will take a position of prominence in those policy debates.

IV. CONCLUSION

Unless we are prepared to publicly finance nuclear power, the financial models for developing nuclear power will vary depending on, among other things, project specific risks and the condition of the credit markets at the time

190. A panel of experts from MIT and Harvard stated that "the current approach used to store nuclear waste at nuclear-power plants is safe and will be for decades, giving researchers and policy makers plenty of time to conduct research into new nuclear-reactor designs and new sites and methods for storing nuclear waste." Kevin Bullis, *Plenty of Time to Deal with Nuclear Waste*, TECH. REVIEW, May 18, 2009, *available at* http://www.technologyreview.com/blog/energy/23547/. According to Ernest Moniz, a physics professor at MIT, "requiring reprocessing [now] could be a major setback to the nuclear industry, which is starting to move toward building more plants after a decades-long hiatus. What's most important now is to get these first new plants built, mostly because of their potential to supply power without carbon dioxide emissions . . . . A move to reprocessing now is both unnecessary and in fact likely to be a major impediment towards that goal." *Id*.

the project obtains financing. Because nuclear power projects are markedly dissimilar to other renewable energy projects on account of the vastly increased scale of the projects as well as the associated political and regulatory risks, financing nuclear power projects is more similar to multi-billion dollar, multi-tranche financings of large infrastructure projects than to financing of renewable energy projects. The complexity of the financing structures mandated by private financing of a nuclear power project should be considered when evaluating federal financial incentives for new nuclear power development. Frameworks which work well in other areas of renewable energy development, such as PTCs or loan guarantees, may need to be adjusted in order to optimally incentivize nuclear power project development. State incentive programs might also be considered to support these federal programs and further encourage the development of nuclear power projects.

The United States is marked by a mesh of rate-regulated and restructured energy markets and varied land use and permitting regulations. As a result, a workable framework for promoting nuclear power generally in the United States will require flexibility in the financing and licensing mechanisms available to developers. Nowhere will this be more true than in California, where under its current energy framework (assuming the moratorium on nuclear power is lifted without other substantial changes to the regulatory structure), new nuclear power plants will have to be privately financed in the purest sense.[191] If California would engage in the nuclear discussion it could move the national dialogue forward in ways that will force the dialogue towards a focused conversation on these differences.

California went through an energy crisis because of an alleged shortage of energy that legislators determined was the result of a failure by the federal government to discipline markets. This failure cost California billions of dollars.[192] The failure of California to engage in the dialogue on new nuclear power to ensure that federal programs fit the State's energy market paradigm has the danger of creating a real and enduring shortage of power and a lost opportunity to capture billions of dollars in federal programs at a time when the state is working to develop green industries to meet its economic needs and energy policy goals for reducing carbon emissions.

191. We note that California still has a number of partially regulated public utilities which conceivably, with CPUC approval and legislative changes, could build a nuclear plant and pass costs through to rate payers; however, given their small size, this is highly unlikely.

192. *See, e.g.*, Rep. Henry A. Waxman, Ranking Minority Member, Comm. on Gov't Reform, U.S. House of Representatives, *Fact Sheet: California and the Energy Bill, The California Energy Crisis* (Apr. 2005), *available at* http://oversight.house.gov/documents/20050408123544-16103.pdf ("In 2000 and 2001, California experienced a severe energy crisis. Blackouts caused economic chaos, and energy prices in the state skyrocketed. In 1999, Californians paid $7.4 billion for wholesale electricity. A year later, these costs rose 277% to $27.1 billion. . . . Early evidence showed — and later evidence has proven — that these prices were the result of deliberate actions under lax regulation. Energy companies took advantage of market design flaws and negligent federal enforcement to increase profits through substantial market abuse and market manipulation."); Senator Joe Lieberman, *Asleep at the Switch: FERC's Oversight of Enron Corporation* (Nov. 12, 2002), *available at* http://hsgac.senate.gov/hearings02.htm ("The majority staff of this Committee has completed an exhaustive investigation into FERC's role, and in my judgment what they have found is an embarrassing and unacceptable story of governmental failure. . . . The Committee's investigation has found the most egregious examples of lax FERC oversight in four areas: . . . four, Enron's actions during the West Coast energy crisis last year, which raised electricity prices in California . . . .").

APPENDIX I
CURRENT STATUS OF NEW NUCLEAR LICENSING APPLICATIONS[193]

Company	Site	Design	# of Units	Early Site Permit (ESP)	Construction / Operating License Submittal
Alternate Energy Holdings / UniStar	Elmore County, ID	EPR	1		FY 2009
Amarillo Power / UniStar	Vicinity of Amarillo, TX	EPR	1		FY 2009
Constellation / UniStar	Calvert County, MD (Calvert Cliffs)	EPR	1		July 2007 & March 2008
Constellation / UniStar	Oswego County, NY (Nine Mile Point)	EPR	1		September 2008
Detroit Edison	Fermi, MI (Fermi)	ESBWR	1	NYD	September 2008
Dominion	Louisa County, VA (North Anna)	ESBWR	1	Approved November 2007	November 2007
Duke	Cherokee County, SC (William States Lee)	AP1000	2		December 2007
Duke	Davie County, NC	NYD	-	Under consideration	NYD
Duke	Oconee County, SC (Oconee)	NYD	-	Under consideration	NYD
Entergy	West Felciana Parish, LA (River Bend)	NYD	-		September 2008
Entergy (NuStart)	Claiborne County, MS (Grand Gulf)	NYD	-	Approved April 2007	February 2008

193. Table taken from the Nuclear Energy Institute website, http://nei.org/filefolder/New_Nuclear_Plant_Status_23.xls (last updated Sept. 2009).

Company	Site	Design	# of Units	Early Site Permit (ESP)	Construction / Operating License Submittal
Exelon	Clinton, IL (Clinton)	NYD	-	Approved March 2007	NYD
Exelon	Victoria County, TX	ABWR	-	To submit Spring 2010	NYD
Florida Power & Light	Miami-Dade County, FL (Turkey Point)	AP1000	2	NYD	June 2009
Luminant	Glen Rose, TX (Comanche Peak)	APWR	2		September 2008
NRG Energy / STPNOC	Matagorda County, TX (South Texas Project)	ABWR	2		September 2007
PPL Corp. / UniStar	Luzerne County, PA (Bell Bend)	EPR	1		October 2008
Progress Energy	Wake County, NC (Harris)	AP1000	2		February 2008
Progress Energy	Levy County, FL	AP1000	2		July 2008
PSEG	Lower Alloways Creek, NJ (Salem / Hope Creek)		-	To submit in Spring 2010	NYD
South Carolina Electric & Gas	Fairfield County, SC (V.C. Summer)	AP1000	2		March 2008
Southern Company	Burke County, GA (Vogtle)	AP1000	2	Approved August 2009	March 2008
Southern Company	TBD	NYD	NYD	NYD	NYD
TVA (NuStart)	Jackson County, AL (Bellefonte)	AP1000	2		October 2007

NYD – Not Yet Determined
FY - Federal Fiscal Year