

## PROJECT FINANCE STRUCTURES FOR NUCLEAR

NUCLEAR POWER PLANTS ARE AMONG THE MOST COMPLEX INFRASTRUCTURE PROJECTS TO DEVELOP. SPONSORS OF NEW NUCLEAR POWER PLANTS MUST MANAGE COMPLICATED STAKEHOLDER RELATIONSHIPS, INCLUDING HOST AND EXPORTING COUNTRY GOVERNMENTS AND GOVERNMENTAL AUTHORITIES, SHAREHOLDERS AND PROSPECTIVE EQUITY INVESTORS, TECHNOLOGY EXPORTERS AND OTHER PROJECT PARTICIPANTS, AND LOCAL AND GLOBAL COMMUNITIES AND CITIZENS THAT INVARIABLY HOLD SPLIT OPINIONS ON THE TOPIC OF NUCLEAR POWER. BY **JASON J CROWELL**, MANAGING PARTNER, AND **VIET H NGUYEN**, AN ASSOCIATE, AT **PEACE CROWELL LLP**.

Financing new nuclear projects presents unique and complicated issues for project sponsors and financiers alike. In fact, there are relatively few contemporary precedents worldwide for successful financings of new-build nuclear power generating projects, and although there have been unsuccessful attempts to apply project finance paradigms to nuclear power projects proposed in the United States, the Middle East and Europe, there has never been a true project financing of a nuclear power plant.

A fundamental truth emerges in all viable financing structures for new nuclear power projects: nuclear power is a uniquely governmental undertaking, even when pursued by private developers, and without appropriate governmental involvement nuclear power plants simply cannot be built.

This is true from a financing perspective, in part, because few project sponsors have the balance sheet capacity to raise the tens of billions of dollars of financing required for a new nuclear power project absent governmental credit backstops or government-prescribed cost recovery mechanisms, or both. As a result, governments desiring to promote nuclear power must be prepared to provide appropriately tailored financial support for new projects.

The manner in which governmental financial support is secured for new nuclear power plants is a vital consideration for any new project. Governments are often opposed to providing direct credit support that can be viewed as an unfair subsidy, which creates negative implications for the applicable government's balance sheet, or which can be perceived as an upfront commitment to bail-out a failed project.

Outright government financial guarantees frequently meet significant challenges in government approval processes and may require substantial concessions and contingent liabilities to be absorbed by project sponsors in order to secure governmental approvals.

While the magnitude and complexity of such challenges are far greater for nuclear power

projects than virtually any other asset category, these types of challenges are not entirely new concepts to the world of finance. In fact, project finance was originally developed and is frequently used to overcome financing obstacles that arise when a project sponsor does not have sufficient balance sheet capacity to raise financing on its own, and when a form of debt repayment assurance must come from a more creditworthy party such as a governmental instrumentality and must be structured other than as an outright financial guarantee.

In the case of a power plant, the credit of the power plant is based on the creditworthiness of the electricity purchaser and the legal and commercial integrity and soundness of the contracts that facilitate the development, construction, and operation and maintenance of, and sale of power from, the power plant.

In the case of nuclear power, a question arises as to whether project finance concepts can be effectively adapted and tailored to create a new model for financing nuclear power projects that enables governments to provide the kind of financial support necessary for the viability of nuclear power plants in a paradigm that is politically acceptable.

This question is and has in recent years been particularly relevant in the United Kingdom, where the Electricity Market Reform under the Energy Act 2013 introduced the prospect of contracts for difference to support the development of new nuclear plants under a construct akin to some single-asset independent power producer (IPP) structures frequently seen in global project finance transactions for other power generating technologies.

This article explores the question of adapting project finance concepts to nuclear power plants, focusing on certain key considerations and areas where traditional project finance approaches require re-examination in the context of nuclear power projects. We also discuss, briefly, the prospects for limited recourse financing of new nuclear power projects.

## Challenges

A proper understanding of the challenges of applying a project finance model to nuclear power plants begins with understanding why nuclear power plants are fundamentally different from virtually any other type of revenue-generating asset that utilises project finance. Aside from the obvious differences such as technology, nuclear safety and security, cost and scale, nuclear power plants stand unique among power plants insofar as they are intrinsically full-scale, highly regulated businesses vitally dependent upon corporate management to deliver financial results.

For this reason, project finance professionals must approach nuclear power with a mindset that is more familiar to corporate finance – namely, financing a nuclear power station is essentially an exercise in extending credit to a corporate enterprise. Lenders must have confidence in the management team and must afford corporate management the flexibility to run its business in a dynamic environment where safety, efficiency and regulatory compliance parameters are both stringent and continually evolving.

Often, discussions about financing nuclear power facilities under a project finance model quickly turn to discrete project risk identification, with a focus on issues such as nuclear third-party liability, tariff constructs, completion risk, budget and schedule management, and credit questions. Traditionally, project finance has sought to control such project risks by introducing constraints that tie down discretionary changes at a project.

However, the certainty of contractual inputs and constrained borrower flexibility that are hallmarks of many traditional project financings are diametrically opposed to the needs of nuclear plant developers and their management teams. This tension sometimes leads to misunderstandings between those with deep nuclear industry expertise on the one hand, and project finance experts on the other. To alleviate that underlying tension, there are several key areas where traditional project finance approaches require re-examination in the context of nuclear power projects.

- *The role of skilled staff and executive managers who have the experience, knowledge and discretion to safely and efficiently manage the nuclear business is paramount* – Building and operating nuclear power plants are often more complex than conventional and renewable power generating assets due, in part, to the highly regulated nature of the sector and overriding safety considerations.

A two-unit to four-unit nuclear power station will employ thousands of highly skilled employees, many of whom are operators that are individually licensed to perform safety-related functions. Those employees are, in turn, managed by a team of executives dedicated specifically to safe and efficient operation of the nuclear plant, and who are approved to do so by the applicable nuclear regulator.

For these reasons, lenders must not think of nuclear project finance as merely asset-based financing where service providers and human resources are fungible inputs; instead, they must consider extending credit to the people who comprise the business enterprise that will develop and operate the plant. If a lender is not sufficiently comfortable with a management team and the nuclear regulator that oversees it to confidently extend credit on terms that leave considerable discretion to those managers, then the lender should simply not lend.

- *Construction period risks demand additional credit enhancements* – A two-unit to four-unit nuclear power plant will cost tens of billions of dollars and may take more than a decade to build. Moreover, in particular jurisdictions that are doing it for the first time, the complexity and cost of establishing the necessary framework to build and operate a nuclear power plant are daunting.

For example, a lender considering a project finance loan for a nuclear power plant in a country with a new nuclear power programme will undertake a sources and uses analysis to ensure that there are sufficient funds to build the plant. Frequently, however, lenders fail to consider the complexity of establishing a new nuclear regulator, training host country residents, and developing other support infrastructure. Thus, a lender looking at a sources and uses table may see the specific cost and budget for a nuclear plant itself, but that budget will substantially understate the total programme cost.

Moreover, nuclear power plants are notoriously late and over-budget. Contractors, as a general rule, cannot provide sufficient financial assurance of timely completion to make a project independently bankable on the back of an engineering, procurement and construction contract alone. Even if they could, the timeline, regulatory oversight and complexity of nuclear power plants makes them prone to claims for force majeure, changes-in-law and owner-caused delay, which are generally outside the scope of contractor culpability.

In addition, nuclear power plants may involve some elements of first-of-a-kind technology risk. This occurs where a new plant design or enhancement is being built for the first time, or where an established plant design is being adapted for a new environment.

For all of these reasons, lenders will require some level of financial guarantees, contingent equity commitments or similar credit support from creditworthy parties for the period while a plant is under construction, and likely until the plant has achieved stable operations and met specified financial metrics.

- *Project finance transactions require revenue assurance. In the case of nuclear power projects, it can be both difficult and costly to commit to a fixed electricity cost before a plant has been completed* – A core requirement of project finance is revenue certainty, which can be achieved through

contractual offtake agreements, revenue assurance backed by market studies, or contracts-for-difference or “keep-well” arrangements. In an IPP-styled nuclear power development project, that usually means the power purchase agreement.

Buyers under power purchase agreements generally prefer fixed prices for electricity. However, because of the potential variability in cost and schedule described above, taken together with the potential for changes in operation and fuel costs, and potentially costly changes in regulatory requirements, any attempt to fix a specific numeric tariff will necessarily involve a substantially higher price than is otherwise projected from base-case cost data because project sponsors, and their lenders, will require the various budgets to account for unanticipated costs and delays.

Many jurisdictions around the world, including many parts of the US, take a different approach in paying for the capital cost of nuclear power plants. Under merchant or utility-owned plant models, the risk of delay and cost is spread across numerous end-users and regulated by a public utilities commission or other governmental agency. Under this model, a developer is permitted to seek tariff adjustments periodically by presenting new cost data associated with its plant.

This rate-recovery model can also be successfully adopted in IPP-styled nuclear power transactions, with the benefit to the host country that it does not pay for conservative contingencies based on up-front projections. Moreover, this contractual rate-recovery model provides assurances to lenders that actual prudently incurred costs will ultimately be passed through to the tariff and therefore allows them to take a more relaxed view of construction period risk, easing the ability of project sponsors to secure financing.

Adapting the traditional power purchase agreement to meet the demands of a nuclear power project and its financing terms is a complex exercise, but can be an effective approach in nuclear IPP transactions.

● *Nuclear third-party liability is an area of significant concern for many lenders* – Virtually all countries with a civil nuclear power programme have attempted to address concerns over nuclear liability in some form or another. The potential exposure to commercial parties, such as contractors and lenders, and even to governments resulting from catastrophic nuclear occurrences is enormous. For example, as of the date of writing this article, the estimated clean-up and compensation costs associated with the 2011 Fukushima catastrophe is reported to be US\$118bn while independent estimates put the total economic cost at US\$250bn–\$500bn.

Many of the vendors and service providers needed to implement a nuclear power programme would simply not participate if the host country government failed to provide some

level of protection from nuclear third-party liability. Often that protection comes by way of international conventions on nuclear damage; otherwise domestic legislation alone will attempt to provide the necessary protection.

The problem with nuclear liability protection laws and treaties is that they only apply within the host country and, in the case of treaties, potentially within the territories of the applicable treaties or member states. Thus, if a host country borders on a non-convention country – ie, a country that is not party to the applicable treaty or convention – then radioactive releases from a host country that cause harm in the neighbouring country or to citizens of a non-convention country could give rise to nuclear liability tort claims.

This exposure to potential extra-territorial tort liability is especially sensitive for lenders that play in an international marketplace, because very often they hold assets in territories all around the world. Therefore, while a lender may be protected from suit for damages in a host country where a project is situated, the lender may fear that it will be sued and its assets subject to seizure to satisfy judgments for nuclear damage in a neighbouring non-convention country if there is a widespread radioactive release from a nuclear plant for which it has provided financing.

All that said, there is no known precedent anywhere in the world for lenders to be held liable for nuclear damage. Since lending does not, in and of itself, entail any element of operational control over a nuclear power plant, lender liability for nuclear damage is an extremely remote risk, but one that lenders will nonetheless expect the host country to address.

● *Project finance remedies for nuclear power plants during the operating period are difficult to structure* – Traditional project finance step-in remedies under which lenders (through their security agent) can step into the shoes of the project owner for purposes of taking operational control of a project to remedy project-level failures and apply resulting project revenues to discharge monies owed to them are generally considered controversial in the context of nuclear power plants for two key reasons.

First, many lenders hold a general view that there may not be any or a sufficient number of available plant operators that can be called upon to operate, repair and/or maintain the plant in case of a loan default by the project owner and subsequent exercise by lenders of their rights to “step into” the project owner’s operational, contractual and project management rights in respect of the project.

Second, even assuming that step-in remedies are viable, there are nonetheless two fundamental concerns with step-in rights that are unique to nuclear power plants: (1) implementing any change in operational management or control would be time-consuming and costly due to required nuclear regulatory approvals, and

(2) lenders potentially assume an inappropriate level of nuclear liability risk the moment they exercise project-level remedies by stepping in and affecting operational control and management of the plant.

Hundreds if not thousands of highly trained staff, including senior reactor operators that are individually approved by the nuclear regulator, all working together under a management team and management model approved by the nuclear regulator are generally required to operate and maintain a nuclear power plant.

Moreover, from a nuclear safety perspective, it is paramount to maintain continuity in plant operations and personnel at all times to ensure proper management of the nuclear reactor, nuclear fuel and waste, and continuous plant safety, maintenance and operation. As a result, it is simply not feasible for a group of lenders stepping into a nuclear power plant to dismiss the existing operating organisation and hire a replacement contractor to take over full nuclear plant operations.

One way to ensure, then, that lender step-in remedies are real and effective would be to pre-arrange those remedies under contractual option agreements with one or more nuclear operating organisation that would be willing, on sufficient advance notice, to deploy a team of suitably qualified and experienced senior managers and executives and a tested nuclear plant operations management model into a nuclear power plant experiencing operational challenges at the option of project finance lenders.

Implementing such an option agreement is significantly limited by the availability of substitute operators and the fees they would charge to enter into such an option agreement and/or sell their management model as a precondition to such an option agreement.

Moreover, the timeframes required to effectively trigger a change in operational control of a nuclear plant are significant given the requirements for regulatory review and approvals. As a result of this, debt service reserves of sufficiently significant magnitude would be required to ensure that debt service would be paid during any likely period of regulatory approval required as a condition to exercising “step-in” remedies.

● *Negotiating financing terms that respect the unique attributes of the nuclear power business and afford developers and operators required discretion to effectively run that business, while at the same time protecting lenders’ interests in a project, touches upon a delicate nexus of lender concerns over nuclear liability and reputational considerations – One of the most challenging aspects of negotiating the project finance terms for a nuclear power plant is the tension that lenders face between concerns over “extra-territorial” nuclear third-party liability and reputational considerations. This conflict shapes the contours of a “nuclearised” project finance loan agreement distinctly from any other type of project financing.*

As discussed above, lenders to a nuclear power plant will be concerned about avoiding liability in the event of a radiological release giving rise to nuclear damage claims from third parties. If lenders are seen to exercise too much control over plant development or operation through the provisions of the loan agreement, they may risk being held liable for certain “extra-territorial” third-party claims for nuclear damage. This concern will inherently drive lenders to prefer more passive terms for their debt investment.

In addition, executive managers will demand flexible loan terms to retain discretion and control of their business, in order to respond to evolving regulatory requirements, to change management systems and other operational parameters, and even to modify plant design. To avoid potential lender liability implications, lenders will generally prefer to take a passive approach to the implementation of such changes.

On the other hand, a nuclear project that encounters a major disaster, or which suffers from poor operation and maintenance, will likely be the subject of media reports and public scrutiny, which creates heightened reputational concern among lenders. Those reputational concerns will drive lenders to seek greater visibility regarding construction and operational matters so that they may influence change if necessary before problems escalate.

The resolution of this tension is often found in disclosure requirements ensuring high transparency on the part of developers and operators, and great deference to the competence and oversight of the nuclear regulator on the part of lenders.

#### **A possible project finance solution**

Legal and financial advisers specialising in project finance transactions typically hold one of two views in relation to project financing new-build nuclear projects: project finance transactions for new nuclear plants are either (1) very difficult, or (2) impossible.

Those who believe project finance is very difficult to apply to nuclear power plants do so for all the reasons described in Part II above; those who say it is impossible do so principally because they believe there are insufficient remedies for lenders to manage the risks they are asked to take under a project finance model, and because any attempt to exercise project-level remedies would expose a lender to inappropriate risk of “extra-territorial” non-convention nuclear liability.

We believe that project finance for nuclear power plants is a very difficult, but not impossible, endeavour. We further believe that a group of enterprising project sponsors will eventually successfully secure project finance loan commitments to fund the construction, development, operation and maintenance of a new nuclear power plant for which the inaccessibility of other financing sources would otherwise make pursuit of the project itself futile. ■