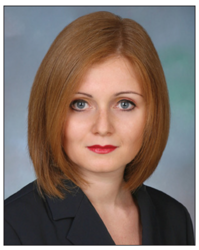
# Securing Finance for Nuclear Projects

This article was originally published in *Project Finance International* on May 20, 2015.

*by Elina Teplinsky and Vincent Zabielski*



**Elina Teplinsky**
Energy
+1.202.663.9009
elina.teplinsky@pillsburylaw.com

Elina Teplinsky is a partner in Pillsbury's Energy practice and is located in the Washington, DC office.

**Vincent C. Zabielski**
Energy
+44.20.7847.9537
vincent.zabielski@pillsburylaw.com

Vincent C. Zabielski is a senior lawyer in Pillsbury's Energy practice in the London office.

*The resurgence of new nuclear power plant construction in the past decade, dubbed the nuclear renaissance, has faced several challenges, including political hesitancy in some markets to move forward with new projects after the Fukushima Daiichi accident of 2011, protracted licensing and construction schedules, and the difficulty in emerging markets of arranging for proper infrastructure to support nuclear power programmes. One of the principal challenges, however, to truly reviving the growth of nuclear power, has been obtaining adequate financing of the substantial capital cost of nuclear construction.*

Historically, nuclear projects have been financed on the balance sheets of large utility companies or funded by government budgets. However, customers and host governments are increasingly less willing to solely undertake the risk of the immense costs associated with new nuclear build, which may negatively impact balance sheets and credit ratings.

Export credit agency (ECA) financing is therefore playing a growing role in supporting nuclear construction and, increasingly, vendor equity and industrial customer investment are viewed as other potential sources of funding. However, to-date, no nuclear project has been financed under a project finance model.

The barrier to project finance for nuclear new build has certainly not been the pure size of these projects. The largest energy project to be project-financed, the Australian Ichthys LNG gas project, is more capital-intensive than most nuclear projects: that project closed on a US$20bn debt package in 2012, which covered about 60% of the US$34bn total project cost.

Therefore, lenders' reluctance to invest in nuclear projects has more to do with the unique risks posed by nuclear power. This article explores factors that distinguish nuclear projects from conventional power projects from a lenders' perspective and suggests some solutions that could improve the bankability of nuclear projects.

## Assessing and mitigating nuclear project risks

The differences between conventional fossil-fuelled power plants and nuclear power plants can be grouped into four general risk categories: (1) construction risks; (2) risks of radiation and nuclear damage; (3) nuclear regulation, political and licensing risks; and (4) risks associated with decommissioning and disposal of irradiated materials, spent fuel, and nuclear waste.

Other risks, such as the energy market

risk, also affect the bankability of nuclear power projects; however, for the purposes of this article, we will only focus on the incremental risks of a nuclear power project vis-à-vis a conventional power project.

### Construction risk

Compared with similarly-sized conventional power plants, nuclear plants have higher initial capital costs due in part to the cost of nuclear-grade materials, the need for extensive safety systems, and the requirement for back-up power systems.

The significantly longer construction period of a nuclear plant also increases the overall investment cost and is a major impediment to project finance – commercial banks usually seek five to seven-year payback periods, while just the planned construction periods for nuclear power plants are five to seven years. Another key issue for potential financiers is construction risk: Will the project be completed on time, on budget, and most importantly, will the revenue stream under the power purchase agreement (PPA) commence when it is expected to do so?

Sadly, history has shown that nuclear power projects are particularly susceptible to construction risks that delay the delivery of the project, especially in projects involving first-of-a-kind designs.

Take, for example, the case of the Olkiluoto 3 project in Finland, originally a €3.2bn turnkey contract with Areva and Siemens. Construction of the first-of-a-kind 1,600MW EPR pressurised water reactor began in 2005, with commercial operation originally planned for 2010. However, by 2009 the cost over-runs for the project had become so massive that Stephen Thomas, a professor at the University of Greenwich Business School, wrote in his paper The Myth of the European Nuclear Renaissance, that “Olkiluoto has become an example of all that can go wrong in economic terms with new reactors”.

After a series of delays and spectacular cost increases, commercial operation of Olkiluoto 3 is now expected to achieve commercial operation late in 2018 at an expected cost of potentially over €8.5bn.

Similarly, another EPR, the Flammanville Unit 3 in France, is more than three years behind schedule and significantly over budget. Likewise, Korea Hydro & Nuclear Power’s first-of-a-kind APR-1400, Shin Kori 3, was scheduled to be operational by the end of 2013, but has been delayed for two years due to key plant cabling not meeting the requisite safety standards.

Construction risks in nuclear power projects can be mitigated, in part, by choosing licensed and proven technologies, properly allocating construction risks to the party that is in the best position to bear those risks, selecting an EPC contractor and subcontractors that have recent and proven experience in nuclear construction, putting in place a gold standard Quality Assurance/Quality Control programme and ensuring an excellent line of communication between the regulator and the project participants.

There are many examples of nuclear power plants that were previously constructed without delays, including reactors in Japan, China and South Korea. The construction of the Barakah NPP units in Abu Dhabi is currently reported to be in accordance with schedule. Moving forward, demonstrating an excellent construction risk mitigation strategy in any single project, and the collective experience of improved construction timelines in nuclear projects world-wide, should be a major factor in increasing the availability of commercial financing for nuclear power.

### Risk of radiation and nuclear damage

The unique hazards inherent to nuclear power arise from the radioactive nature of the materials involved. The normal operation of any nuclear power plant in accordance with standards set by national regulatory authorities, the International Atomic Energy Agency (IAEA) and self- regulating organisations such as the World Association of Nuclear Operators (WANO) will not result in radiation exposure that will adversely affect public health and the environment.

Any modern nuclear power plant seeking financing would necessarily need to meet accepted standards protection against the hazards associated with exposure to radiation under normal operating conditions. It is therefore unlikely that normal operating exposure to radiation would be an issue that would affect financing of a nuclear project.

However, given the potentially enormous liability associated with a major nuclear incident that causes nuclear damage, any potential lender to or investor in a nuclear project will pay careful attention to the nuclear civil liability regime and implementing legislation of the host country and its surrounding neighbours.

Although the chances of a major nuclear incident resulting in nuclear damage occurring remains very low, events such as the Chernobyl accident in 1986 and the Fukushima Daiichi accident in 2011 demonstrate that the financial impacts can be astronomical. Therefore, as a threshold question, any investor or lender willing to fund a nuclear project will first look to the civil nuclear liability regime to ensure that the risk of the lender being held liable for resulting damage in the event of a nuclear incident is acceptably low.

The financiers will look to see if the host country is party to the major nuclear civil liability conventions, such as the Vienna Convention on Civil Liability for Nuclear Damage, the Paris Convention on Third Party Liability in the Field of Nuclear Energy, and the Convention on Supplementary Compensation for Nuclear Damage (CSC).

These nuclear liability regimes limit the lender's exposure to suit for nuclear damage by: (1) channelling all liability for nuclear damage to the operator of the nuclear plant; (2) capping the total liability at a fixed limit; (3) requiring mandatory insurance or other security up to the liability limit; and (4) establishing reciprocity with other states' nuclear liability regimes.

The lenders will also take a close look at the host countries' domestic nuclear civil liability legislation to ensure that they properly implement or parallel the requirements of the civil liability conventions.

The financiers' risk exposure to third-party nuclear liability can further be reduced by structuring the project in a way that allocates the nuclear liability risk to a different corporate entity than the borrower.

Another potential solution is for the project sponsor or the host country to provide to the financiers indemnification against liability for nuclear damage. Make no mistake, the issue of financier liability for nuclear damage is a major concern, but, given the right set of circumstances, the risk is manageable and should not be an absolute impediment to commercial financing of a nuclear project.

**Nuclear regulatory and political risks**

For any nuclear project to be viable, the host country will need to have developed a comprehensive regulatory regime for licensing the construction, operation, and eventual decommissioning of the project. Nuclear power is a highly regulated industry and regulatory regimes differ markedly even among countries that have mature nuclear power programmes.

In the United States, for example, the licensing process allows interested parties that can meet minimal standing requirements and that wish to intervene in a licensing proceeding to join the licensing proceeding as a party to the proceeding. The intervener's concern is then litigated in a formal licensing proceeding, and the outcome of that proceeding is binding on the licensee.

In the UK, interested parties are invited to provide input but are not actually admitted as parties to the proceeding. In other countries, such as the UAE, the public may provide input to the licensing process, but has no right to take part in the process.

Similarly, licensing structures vary across regulatory regimes, from regimes that provide for multi-step licensing in countries such as Canada, Germany, Japan and South Korea, to regimes that allow for one-step licensing such as in the US and the UK. In any event, lenders will insist that the host country of the proposed project has a strong and credible nuclear regulatory authority and a predictable licensing regime.

The licensing process can also be affected by politics. The potential effects of an inhospitable political climate can be catastrophic for a nuclear project. One of the more extreme examples of the potential effects of political/licensing risk is that of the Shoreham Nuclear Power Plant in East Shoreham in the state of New York in the US.

Construction of the power plant was 100% complete when the local county legislature determined that the county could not safely be evacuated in the event of an accident. In the face of considerable opposition to the plant, a settlement was reached between the State of New York and the project sponsor that resulted in the plant being scrapped without ever running.

In the Shoreham scenario, the ratepayers shouldered the costs for the failed project, a scenario that would not be possible in a merchant market. Political risks can be difficult to mitigate in purely commercial projects. However, in projects that include some level of government sponsorship, political risks can be addressed in intergovernmental agreements and host government agreements by including measures that compensate project sponsors in the event of government action or inaction that adversely affects the progress of these projects.

**Risks related to decommissioning and disposal of irradiated materials, spent fuel, and nuclear waste**

The fuel used for modern nuclear plants is typically low-enriched uranium in the form of ceramic-like uranium dioxide pellets housed inside metal tubes. Before it is loaded into the reactor, the uranium fuel is mildly radioactive and if properly handled does not present any significant health or safety issues.

Once the fuel has been "burned" in the core, the fuel assemblies are very radioactive and, unless properly stored and handled, can pose an immediate threat to life and the environment. The levels of radiation emitted by used nuclear fuel decreases over time, but the time frames are very long indeed. From the perspective of one or even tens of human lives, as a practical matter the hazard posed by ionising radiation from used fuel assemblies is a permanent hazard. There are on-going debates about the best way to presently dispose of or recycle the used fuel and associated waste, but little practical progress has been made.

Despite the particular hazards associated with used nuclear fuel, the nuclear waste issue is not a major impediment to financing. While the problem of permanent disposal of the used fuel has not been solved in most countries, reliable and safe technologies have been developed that allow the spent fuel to be safety stored for 100 years or more, which is certainly past the tenor of any project financing loan. Moreover, disposal of waste is largely regarded as a government problem. So while disposing of used nuclear fuel and nuclear waste is a big problem, it is not the banker's problem.

## Conclusion

In conclusion, most of the issues that negatively impact the bankability of new nuclear construction are manageable. A key issue for host country governments and project sponsors is to recognise the unique risks posed by nuclear power projects and seek to mitigate these risks at the outset of the development of these projects.

Pillsbury Winthrop Shaw Pittman LLP | 1540 Broadway | New York, NY 10036 | +1.877.323.4171