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FINANCING ASPECTS OF NUCLEAR POWER PROGRAMS

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Abstract

This paper considers the standards applied to investment appraisal by financiers. It looks at the spectrum of costs, benefits and risks, which the project sponsors must meet to satisfy prospective financiers. Most considerations are standard to most types of investment project, particularly in a country where the technology is new. These standards apply where external financing is sought. Clearly, governments investing in nuclear power with public funds may choose to do so for other than competitive economic reasons, although ultimately efficient investment requires that they apply similar criteria in allocating available resources among the many demands on the public fisc.

1. INTRODUCTION

Nuclear fuels have the potential to help meet the needs for electricity of many of the more advanced developing nations. These fuels are abundant and commercially available from a number of suppliers in a relatively open global market. There is a choice of nuclear power plant designs that are operating successfully. A number of large national and multinational companies have the capability, experience and ambition to supply components, manage construction and commissioning, support licensing, and train operators in plant operations and maintenance over the life of the plant. Investments in nuclear power provide a way to introduce large increments of electrical capacity, diversify fuel sources to reduce dependence on coal, oil and gas, and cut the impact of generating power from hydro potential and fossil fuels on the local or global environment. These are many reasons why a prospective host nation and other nations around the world may be attracted by nuclear power generation. In advancing this viewpoint, the specific problems for nuclear power of long-term waste disposal and high construction costs should not be overlooked.

2. FINANCIER’S PERSPECTIVE

From a financier’s viewpoint, and by financiers it is generally meant providers of long-term debt financing, a nuclear investment project should not demand special treatment relative to other types of investments. Investments are subject to a common risk/reward standard since finance is globally fungible. Attractive investments are those in which all risks are secured, shared, assigned, compensated or allocated efficiently and where the returns over time appear commensurate with risk and at least comparable with returns from alternative investment opportunities that carry similar financial risk.
Ideally, financiers would neither favour nor penalise a nuclear project because it is nuclear, but examine the economic strength of the project and base a decision about their involvement on the expected returns in relation to the perceived risk. They would support only projects that conform to the relevant national and international regulations and conventions. In today’s economic and political climate it is usually difficult for nuclear power investments to satisfy lenders on this score, but this is not a problem unique to nuclear power investments. However, financiers are in fact not always unbiased about nuclear power. Some lending institutions, particularly multi-laterals, have particular policy requirements about lending for nuclear power that reflect pressure from their shareholders, who in turn may react to popular attitudes towards nuclear power. Meanwhile some governments and government institutions may offer preferential terms, often for reasons other than strict financial ones. Again, nuclear power is not unique in these respects.

3. THE CHALLENGE FOR FINANCING NUCLEAR POWER PROJECTS

The challenge for financing nuclear power projects should not be regarded as one of finding “innovative financial arrangements” that somehow soften market-driven requirements. Instead, the challenge is to ensure that all risks are carried in the appropriate places and all sources of earnings and support for operations are secured over the life of the project. For this reason we have concentrated on underlying principles and have not attempted to look in any detail at particular examples; these can be found in the excellent IAEA Technical Report 353, “Financing Arrangements for Nuclear Power Projects in Developing Countries”.

No financier readily invests in open-ended liabilities. Defining and securing risk is always a key factor in attracting investment, on a par with securing the project’s revenue stream. Risks to be secured include completion, currency, market and financing risks, to name a crucial few. From a financial viewpoint, even an individual nuclear power project represents a much larger capital investment than alternative power projects - with the possible exception of the very largest hydroelectric schemes. Nuclear power and hydroelectric projects concentrate the financial risk in the projects themselves, whilst power plants fuelled by oil, gas or coal divide this risk by requiring substantial capital investment in upstream fuel supply facilities. The risk involved in such large investments, compared to the demand on an investor’s resources, can be daunting. For this reason, to spread the risks and financial obligations, such projects are often financed by consortia of investors and banks.

A nuclear project also imposes special requirements on the physical, industrial and regulatory infrastructure of the host country. It has a planning, construction and licensing lead time and operating lifetime much longer than normal for industrial and power plant investments. Single plant programs face the additional challenges of carrying all the overhead costs and diseconomies of “prototype” investment even where a “standard” design is adopted. No wonder financing is seen as a major barrier for nuclear projects, and the challenge is to turn these projects into competitively attractive investments.

The paper approaches this task constructively by asking:

– What, from a financier’s viewpoint, is “ideal”? 
– How can such an ideal be approached in the real world?

The short answer is simple. The ideal is that the financier is confident that it has a complete picture of the project, it has accounted for every source of cost, risk and future earnings potential, and it is confident that the investment is competitive in the market into
which the product will be traded, at least up to the time when the financier's interest in the project ceases. Frankly, this applies to every provider of funds, be it lenders, shareholders in companies involved in the project, governments, insurers and the customers for the product who do not wish to pay premium prices.

To apply these investment principles to nuclear power, investors must be reasonably secure that power generated will be priced to cover the costs of plant investment and operations. At the same time, they must be secure that power can be sold competitively in quantities sufficient to guarantee a financially viable revenue stream, even in more liberalised electricity markets. While the failure to price power adequately is not unique to nuclear power, the capital intensive nature of the nuclear plant tends to exacerbate this problem for investors.

The working assumption for this paper is that in today's energy market, nuclear power projects fall short of this ideal when examined in open competition with power projects fuelled by oil, gas or coal. Even small scale renewable systems, while arguably even more capital intensive than nuclear on a $/lifetime megawatt hour (MW(h)) basis, are easier to finance because of the dispersion of risk obtained from small cost increments and minimal infrastructure requirements. Moreover, especially in smaller economies and developing countries, there may be problems matching plant capacity with grid capacity and demand. Large single increments of power, such as those associated with nuclear power plants, can be disproportionate to transmission and load following capabilities in these countries.

There is the further assumption that financing of nuclear power by the host nation is generally not practical. Governments are increasingly incapable of simply underwriting investments without considering the quality and risk/return potential of such investments. Under these circumstances, host governments must ensure that they and sponsors of nuclear power projects meet a number of requirements – political, financial, market, regulatory, and commercial – to create the conditions for financing.

4. OPTIONS FOR THE REAL WORLD

The way ahead lies in three inter-related areas:

First, many requirements must be met for a nuclear project even to be considered for financing. These include steps to meet national political and regulatory requirements and to gain international approvals to minimise safety, regulatory and political risks to the project and long term operation of the plant. This includes assurance that future operators are capable of maintaining the plant in a fully licensable and operable state.

Second, doing everything to ensure that project costs are minimised and that risks to the costs and programme to complete the project are fully discharged by the constructors.

Third, doing everything to secure the income for the project's output. It is legitimate to provide the necessary guarantees so long as the measures taken have political and public support and will endure, are completely transparent, and do not remove the scope for competition in the power market. In general, the result must be the removal of both non-commercial volume and price risks in the supply market that arise from interference in the power market or from future changes in government or political priorities. The complexity of the management and financing arrangements for most large projects reflects the fact that those
involved depend on each part of the arrangement functioning effectively. One failure, one uncovered risk that becomes material, and everyone can lose.

5. WHO LEADS?

The next key question is how are the responsibilities for securing the environment within which a nuclear project can be financed divided? We propose that any specific issue can be addressed from within a simple rule base.

**Rule 1** - Financiers are not responsible for the success of the project! The financier’s responsibilities are to uphold banking principles, notably that the expected returns are commensurate with the objectives of the bank and its attitude to risk.

**Rule 2** - Project risks should always be carried by those who should be managing them at least cost, even if they must be paid to do so. For example, the completion risk to within cost and schedule of construction should be the sole responsibility of a general contractor under a competitively awarded turnkey contract.

**Rule 3** - Project sponsors should engage those parties who consider themselves to be affected by a nuclear power project, whether inside or outside the country of the project, in a dialogue concerning the rationale (economic, safety) behind the proposed investment and the impact of the project on local communities.

**Rule 4** - Every aspect of the project should be transparent – especially to the financiers.

6. REGULATORY REQUIREMENTS

While financing nuclear projects may exceed the capability of most governments, they bear responsibility for the context in which viable investments can be made with reasonable assurance of success. This includes providing a sound regulatory structure, and assurances against arbitrary changes in the regulations in a number of pertinent areas. Governments’ vital regulatory responsibilities for financing nuclear power projects would thus include the following:

**6.1. Market**

Government is responsible for establishing an impartial regulatory framework for power purchases and pricing in the national power market, and applying consistent taxation and other policies. Government must make the rules clear, transparent and enduring and must keep the regulator of the power market as free as possible from political interference.

**6.2. Safety and environment**

Government is responsible for negotiating appropriate environmental compliance arrangements with project sponsors. They are also responsible for obtaining approvals and co-operation from the national community and international community and agencies. The safety regime should closely match that which is established in nations likely to provide designs, equipment, project and operational support. Government should require comprehensive safety-related infrastructure for its plants, access to relevant technology and research, training for regulatory staff and links to the international regulatory community to share experience and secure assistance. The safety regime should be clearly mandated, very
powerful and independent of political influence, but accountable for the way in which it discharges its responsibilities.

6.3 Safeguards

If international finance and technology transfer is required, safeguards for non-proliferation are essential. This is non-negotiable. Government must fully accept commitments under international treaties and observe these requirements, and must impose the consequent duties on all involved under its jurisdiction.

6.4. Externalities impacting in the market

All externalities associated with the construction and operation of a nuclear power plant, deemed of sufficient national significance to affect power prices and market arrangements, are the responsibility of the host government. This includes environmental taxes or levies, tax incentives, and support for long term issues such as waste management. Other responsibilities of the government are features or concerns that are not externalities but are considered of national interest, such as linked deals for inward investment or technology transfer where the value extends beyond the particular project but represents an assured material benefit to the project and the country. In all cases the actions and the costs should be transparent, and be administered by regulators independent of short term changes in political or public mood. Contractors and financiers will seek guarantees that the regime negotiated and established for the project will have a known minimum lifetime.

6.5. Payment

In general, financiers wish to avoid reliance on payments from government budgets except where such payments are covered by a suitable bond or insurance.

7. CONCLUSION

Nuclear power can be and has been financed by world capital markets, so this is not the issue. The crucial question is whether host governments and interested utilities are willing to take the steps required to attract investment, and whether the nuclear industry is willing and able to become competitive in increasingly deregulated financial and energy markets.