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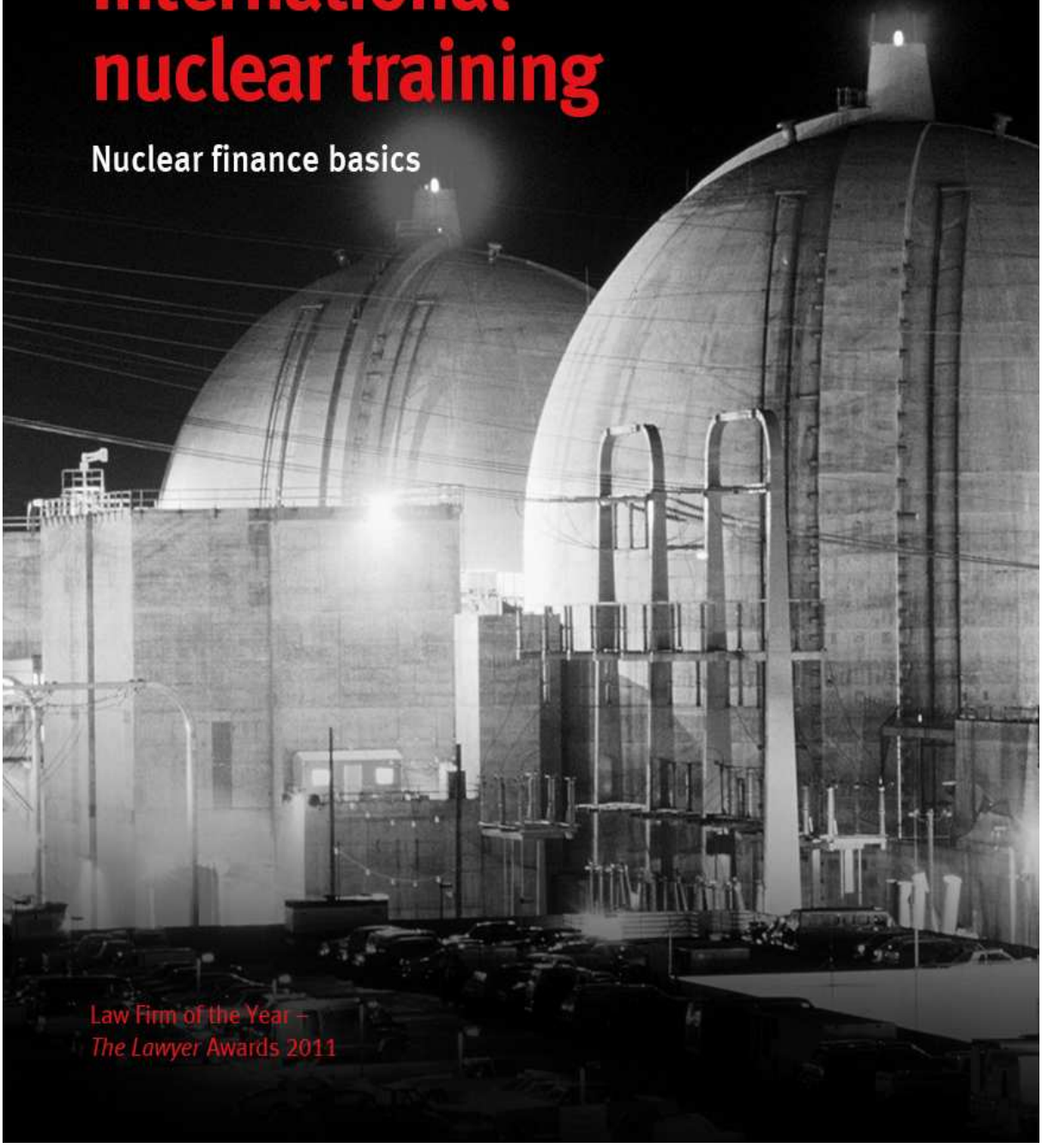
International nuclear training

Nuclear finance basics



Law Firm of the Year –
The Lawyer Awards 2011

1 Introduction

1.1 We have been asked to set the scene for a general discussion of nuclear financing and to ensure that you all share a basic understanding of the topic in order to facilitate collaborative participation in the workshop.

1.2 We will lead you through some of these issues in more detail during the workshop. However, here is a preliminary and very basic view of the main factors affecting nuclear financing. Words and phrases which appear in the main text of this document in **red and bold** are defined in, or are derived from words and phrases defined in, the Norton Rose Glossary of Nuclear Financing, which accompanies this paper.

2 The 12 Basics of Nuclear Financing

2.1 International

- **3 Ss including non proliferation**

Safety, security and safeguarding (3Ss) are the cornerstones of international nuclear law. Compliance with the 3Ss is paramount. The obligations are established and expanded upon in international treaties (to which many countries are party), domestic law, bi-lateral or multi-lateral agreements between countries (including **safeguarding** agreements) and through the IAEA (and other agency's) principles.

Sitting with the 3Ss is the Treaty on the Non-proliferation of nuclear weapons. This treaty seeks to restrict the possession of nuclear weapons and to maintain **safeguards** to prevent new nations gaining access to nuclear weapons and to ensure that those who already had nuclear weapons at the time of the treaty manage those weapons responsibly, including not transferring the knowledge to non nuclear weapons states. Nuclear **safeguards** are measures to verify that States comply with their treaty obligations not to use nuclear materials for nuclear weapons.

- **Political acceptance**

The acceptance of the international community is key to developing a nuclear programme particularly where the project is seeking to secure third party financing. Developing a project to the highest international standards and meeting the requirements of the 3Ss is vital but having in place a number of bilateral and international agreements is also a major concern. One bilateral agreement which is often referred to is a Section 123 Agreement which countries enter into with the United States. The terms of Section 123 Agreements vary slightly but they are an agreement for cooperation between nations in accordance with section 123 of the US Atomic Act.

- **CNE and Liability regime**

One of the major concerns for a nuclear project is avoiding any nuclear incident and particularly a **CNE**. However the **liability conventions** establish regimes for compensating third parties in the event of such an incident. The **liability conventions** channel liability for such an incident to the **operator** of a nuclear installation. Without channelling provisions (either through the conventions or through domestic legislation) a country (and therefore a project) cannot get

access to the nuclear insurance pools and the insurance available to cover damage to third parties.

A new entrant to the nuclear market should consider whether to sign one of the **liability conventions** and/or whether to implement domestic law channelling liability. This issue will need particular consideration if a project is seeking third party financing as generally financiers will expect the **liability conventions** to be entered into so that not only third parties in the country where the project is situated are protected but also that surrounding countries are protected.

2.2 Government

- **NEPIO**

The government or a quasi-government organisation will generally take the Nuclear Energy Programme Implementation Organisation (NEPIO) role in any nuclear development. The NEPIO is an IAEA concept and is the entity responsible for bringing all the stakeholders in a project together to prepare policy and strategy recommendations to the decision makers in government with respect to each of the 19 infrastructure issues identified in the IAEA Milestones approach. Once the strategies have been approved the NEPIO should direct how they are turned into firm action plans to develop a nuclear programme which incorporates the 3Ss and meets the risk profile of key investors.

- **Policy Support e.g. Electricity market and regulation**

Strong domestic government support is vital to any nuclear project. Without this support investors will not have confidence in the project. Furthermore, as was recently seen in Germany a change in policy can have a huge impact on the shareholders in nuclear power projects which impacts on their ability to invest elsewhere.

Government support can be more than just policy support. The government may introduce subsidies or other mechanisms to support the industry. Nuclear is seen by many as a clean technology as it helps countries to meet their climate change commitments. As such some governments are offering the same incentives offered to renewable projects, to nuclear projects.

- **Direct or indirect public sector financial support**

Traditionally the nuclear industry was financed by governments and the public sector. In recent years there has been a move away from state financing of nuclear plant, however some states are still willing to directly finance projects not only in their own country but also in other countries, although this is usually done to support the export of **nuclear reactor** technology.

In addition, a government might be willing to offer other support such as a **sovereign guarantee**. **Sovereign guarantees** are most often given by host governments to assure project **funders** that the government will take certain actions or refrain from taking certain actions affecting the project.

2.3 Regulators

- **Independent**

The domestic regulator needs to be independent of all the stakeholders including the host government. It needs to be unsusceptible to external influence while taking appropriate measures to understand the stakeholders' concerns. It also needs to take decisions that promote the 3Ss and are taken on the basis of the best available techniques.

The regulator will have to approve any project structure to ensure that the regulatory requirements are complied with. This will include ensuring the entity which holds the nuclear licences (construction and operation) is a party to any contract which effect on any aspect of the 3Ss.

- **Efficient and effective regulatory system**

The regulator can have a huge impact on any project, particularly during the **construction period**. The way that the regulator issues approvals and audits a project will depend on the regime established in a particular country but that process can have a significant impact on the attractiveness of a project to third party investors, in particular whether the regulatory process could result in significant delays and additional cost. A regulator whose approach would result in such delays and costs is likely to affect the ability to finance a project. However regulatory control and compliance must remain paramount in any nuclear project.

- **Transparency and predictability**

Decisions of the regulator need to be transparent and predictable, particular in relation to any decision that would have an impact on the public. The regulator will need to show that all decisions are taken on the basis of science and proven technology and relevant experience, and be accompanied by clear explanations of the reasoning underpinning the decisions. It will need to show that international and domestic regulatory requirements have been complied with and that any project meets the high regulatory requirements expected in the nuclear industry.

2.4 Developers

- **Equity investment**

A number of companies are looking to invest in nuclear projects around the globe. Companies look to buy shares in companies which own and/or operate nuclear facilities. In doing so the investing company may not only be responsible for any initial investment but also may be responsible for providing future funds should the company require it. For example, in the event of a **CNE** the shareholders (equity investors) may be required to contribute to the costs, in proportion to its shareholding, of any rectification work and **decommissioning** work required to make the nuclear plant safe.

Whether such foreign investment is allowed will depend on the laws of the host country for the project. Some countries provide that the major shareholding in any company needs to be domestically held, thereby allowing only up to 49% foreign investment. Other countries, such as the U.S., have prohibitions on foreign investment in the ownership of U.S. nuclear plant and will only allow foreign investment if certain conditions are met.

Also see technology provider as investor below.

- **Balance sheet financing**

  Balance sheet financing is where an investor uses the strength of its balance sheet to raise funds to finance a future project.

  A number of investors in the nuclear industry have indicated an interest in financing the **construction period** of nuclear projects through balance sheet financing with the intention of moving to a **project financed** model for the operations phase.

2.5 Financiers

- **Debt v capital markets**

  The **capital markets** include both the stock and **bonds** markets, including treasury **bonds**. Individuals and institutions trade these financial securities on the **capital markets** in order to raise funds.

  The debt market is the market by which an amount of money is borrowed by one party from another under the condition that it is to be paid back at a later date, usually with interest.

- **Project finance market**

  The financing of projects based upon a non-recourse or limited recourse financial structure where project debt and equity used to finance the project are paid back from the cashflow generated by the project. To date there has been no nuclear project which has been truly **project financed**.

- **ECAs/ technology providers**

  Technology providers can "bring with them" an **export financing** in the form of direct loans or guaranteed loans from an **ECA**. The scope of the arrangement available from the **ECA** depends on the exporting country and the conditions under which the particular **ECA** works e.g. **EXIM** can offer direct and guaranteed loans whereas **ECGD** can only offer guaranteed loans.

  ECA financing is available in nuclear projects "for

  - the export of complete nuclear power stations or parts thereof, comprising all components, equipment, materials and services, including the training of personnel directly required for the construction and commissioning of such nuclear power stations;

  - the modernisation of existing nuclear power plants in cases where both the overall value of the modernisation is at or above SDR 80 million and the economic life of the plant is likely to be extended by at least the repayment period to be awarded. If either of these criteria is not met, the terms of the Arrangement apply;

  - the supply of nuclear fuel and **enrichment**; or

  - the provision of **spent fuel** management."

  (OECD Arrangement - Sector Understanding).

- **Structuring/ Enforcement**

  See **Owner/ Operator** briefing attached.

2.6 Operators

- **Controlling Mind**

  The **operator** needs to be the "controlling mind" of all **safety, security** and **safeguarding** issues on a nuclear site. In relation to those areas it cannot be constrained by the **owner** of the nuclear power plant or even the **operator's** parent company, shareholders or investors. This can adversely effect the ability of **funders** to enforce their rights in a traditional **project finance** way. This in turn can affect the structure of the project.

- **Intelligent Customer**

  A nuclear **licensee** is expected to have the capability, within its own organisation, in terms of staffing and expertise, to understand the **safety** case for all the nuclear facilities on the site and the limits under which it must be operated. A nuclear **licensee** needs to understand the **safety** significance of any work undertaken by contractors and to oversee and take responsibility for contractor's activities, including ensuring that the contractor's staff are suitably qualified and experienced to carry out their nuclear **safety** duties. This means that major contracts which affect the **safety, security** or **safeguarding** of the plant, including the **EPC Contract** and the Fuel Supply Agreement (FSA), must sit with the licensed entity i.e. the licensed entity needs to have control of those contracts to be able to fulfil its Intelligent Customer capability.

- **Nuclear Liability - 3rd Party**

  The **liability conventions** establish regimes for compensating third parties in the event of a nuclear incident. The **liability conventions** channel liability for such an incident to the **operator** of a nuclear installation. Without channelling provisions (either through the conventions or through domestic legislation) a country (and therefore a project) cannot get access to the nuclear insurance pools and the insurance available to cover damage to third parties.

  A new entrant to the nuclear market should consider whether to sign one of the **liability conventions** and/or whether to implement domestic law channelling liability. This issue will need particular consideration if a project is seeking third party financing as generally financiers will expect the **liability conventions** to be entered into so that not only third parties in the country where the station is situated are protected but also that surrounding countries are protected.

  The **liability conventions** only cover liability to third parties following a nuclear incident. They do not cover the liability for damage to the station itself. This issue needs to be dealt with separately to satisfy investors in a project that the risk is adequately managed.

- **Owner/ Operator Distinction**

  See **Owner/ Operator** briefing attached.

2.7 Suppliers

- **Technology provider as investor**

  A number of projects are looking to the technology provider to bring equity or some other financing to the project.

  Technology providers are generally reluctant to do this as it is not their core business. While some technology providers may be willing to offer some long term **operator** services to the project, others are not.

  Much will depend on the project and the commercial deal between the parties, however technology providers may be willing to invest in projects through a mix of debt and equity (particularly where there is **export financing** available).

- **ECA financing direct and/or guaranteed for the plant and/or fuel**

  Technology providers can "bring with them" an **export financing** in the form of direct loans or guaranteed loans from an **ECA**. The scope of the arrangement available from the **ECA** depends on the exporting country and the conditions under which the particular **ECA** works e.g. **EXIM** can offer direct and guaranteed loans whereas **ECGD** can only offer guaranteed loans.

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  - the supply of nuclear fuel and **enrichment**; or
  - the provision of **spent fuel** management."

  (OECD Arrangement - Sector Understanding).

- **Fuel market**

  The nuclear fuel market has been developing rapidly in recent years, moving from a market where companies largely relied on their technology provider to supply the nuclear fuel to a more open and competitive market where **operators** are looking to purchase fuel from a number of different sources during the life of the plant or even developing their own **fuel fabrication** capability.

  A liberalised nuclear fuel market has many advantages for **operators** and allows **operators** to take advantage of different approaches; some options even provide **waste** solutions for **operators** in relation to **spent fuel**. However those lending to a project have different concerns and one of the key concerns is whether the **operator** has a confirmed source of fuel

for the period of any debt. **Funders** will want to know that the supply is confirmed, the costs of that supply are confirmed and how that fits into any pricing model for the project.

- **Risk allocation**

Risks arise on every project. Parties negotiate to determine who should take each risk or how risks are to be split amongst those involved in the project. This is largely a matter of commercial negotiation. However, those lending into a project will also want to see that risks are being managed properly and that risks are flowed down to the most appropriate entity able to deal with a particular risk.

2.8 Insurers

- **Nuclear pools - 3rd party liability**

As mentioned above one of the key provisions of the **liability conventions** is the channelling of nuclear liability to the **operator** of a nuclear station for third party damage arising from a nuclear incident. Once a country has adopted the **liability conventions** and/or enacted domestic law which channels liability for third party damage to the **operator** of the nuclear installation the country has access to the nuclear pools that provide insurance to cover such circumstances.

Insurance pools are where insurers agree to appoint a common agent to **underwrite** jointly a particular risk or class of business. There are over 23 nuclear pools, each one linked to an individual country. However, if a country does not already have its own nuclear pool it can either establish one or elect to join one of the other pools already linked to another country.

- **Plant damage - scope and limit**

Damage to the nuclear plant itself, either by way of a nuclear incident or otherwise, is not covered by the third party liability insurance. There are, however, insurance policies available which cover damage to a nuclear plant itself. **Coverage** will depend on the market.

Those investing in a project will want certainty as to what insurance is available and the cover that the insurance provides. This will allow them to ascertain the risk of having to finance rectification and/or **decommissioning** activities which arise out of damage to the plant.

2.9 People

- **SQEP**

As with any highly technical industry the nuclear industry requires a significant number of Suitably Qualified and Experienced Personnel (SQEP). The SQEP requirement is twofold: (i) the individual has received the appropriate training to undertake the work; and (ii) the individual has the relevant level of experience to undertake the work.

Nuclear licenses often contain requirements that:

- all people who carry out activities during design, construction, manufacture, commissioning, operation or **decommissioning** of a nuclear installation which may affect **safety** are adequately trained for that purpose and that those who are trained can prove that they have been trained; and

- only SQEP perform duties which may affect **safety**.

With the growth in the nuclear market, SQEP are becoming a rare resource. However **funders** will want to be sure that the **operators** have the necessary SQEP available to operate the nuclear station properly and in accordance with regulatory requirements including meeting the requirement as the intelligent customer.

- **Cross border accreditation**

The Nuclear Skills Passport has been developed in the UK with industry consultation to provide the nuclear sector in the UK with a standardised approach to skills development and recognition.

The Skills Passport is an effective, nationally recognised system, which can be used to demonstrate the suitably qualified aspects of SQEP to regulators and others.

The industry should consider whether a cross border passport is appropriate as this would help meet the requirements for trained personnel around the world and give **funders** comfort with the level of training being offered and received.

- **Localisation**

A number of countries, who are new to the nuclear market, are considering not only taking the benefits of nuclear power but building their own nuclear industry. This can range from establishing companies or other organisations to own and operate stations through to, in time, developing their own technology and establishing fabrication plant for both the technology and the fuel. One of the key elements to establishing a nuclear industry is people.

In addition, many countries set high standards for localisation of their industries. Depending on the host country's requirements there may be a need to meet a quota of locals working on a particular project. This can prove a challenge when you are considering a country that has no previous experience of the nuclear industry with the requirements for SQEP for all persons carrying out **safety** related activities on a nuclear site.

With access to relevant courses and training programmes it is relatively easy to meet the suitably qualified criteria but where is the experience to be gained? The best approach is to engage with the chosen technology provider to consider how locals can gain experience on a mix of simulators and existing plant or the transfer of operation of the station from staff provided by the technology provider or others to locals over an extended period of time.

Funders to the project will be unwilling to lend to a project where the regulatory requirements are not met and where the appropriate numbers of SQEP are not in place.

2.10 Offtakers

- **Regulated v liberalised markets**

Electricity markets around the world take various shapes and forms but whatever the structure of the market it has a significant influence on the structuring of a nuclear project and its attractiveness to external investors.

In some countries it is the norm for a state owned entity to purchase power from generators under long term power purchase agreements at tariffs that have been bid as part of a wider

competition. Fuel may be provided to generators at or below market price or on a pass through basis under a so-called tolling arrangement. Successful gas and oil fired independent power programmes have been built around this model in the Cooperation Council for the Arab States of the Gulf (GCC) region and some are now looking at how that model can be adapted for the nuclear sector.

In other countries sales are made into a so-called electricity pool where offers to sell and bids to purchase power are made and the price is set by the market on a periodic basis (half hourly is not unusual) with some form of secondary mechanism in place to ensure the grid is balanced. There is considerably more price uncertainty in a pool mechanism than under a long term power purchase agreement and there is also a risk that the plant would not be despatched at all or at a level below that predicted in the financing model (although nuclear generally gets despatched as **base-load**).

- **Credit risk**

Whatever the nature of the market, the generator will be keen to ensure that it is paid for its power output and is thus able to service debt and support an equity return. It follows that credit worthiness of the power purchaser(s) will be a key consideration in attracting investment into a nuclear project.

In the event that the power purchaser(s) are not sufficiently credit-worthy, some form of credit support, whether by way of a suitable financial instrument such as a **letter of credit** or, at the opposite end of the spectrum, a **sovereign guarantee** may be required.

- **Project Risk**

Offtakers may also play a significant role in risk mitigation either contractually through the power purchase agreement or directly as debt or, more frequently, equity providers to nuclear generating companies.

Such support may be present from the outset e.g. an initial equity investment in a nuclear project or may arise at a later date following the occurrence of a particular risk that it has been not been possible for the project to bear if it is to attract external investment.

Examples include either liquidity support for a nuclear project in the event of a prolonged outage or indeed the payment of compensation on termination of a project depending on the circumstances giving rise to the issue.

2.11 Public

- **Consultations and Public Acceptance**

Stakeholder acceptance of a nuclear programme is vital to the success of the programme and particularly **funders'** willingness to invest in a programme. One key stakeholder is the general public in the country where the plant is to be built. To achieve public acceptance governments need to communicate with the general public and consult with them on key issues such as the siting of the proposed power plant.

Without public acceptance the construction and operation of the plant could be adversely affected by objections and demonstrations which could affect the ability to construct the plant to time and budget and to operate the plant without interference. These are not acceptable risks for **funders**.

As can been seen in recent years, political acceptance, including public acceptance, of a plant is a huge consideration for investors in nuclear projects. Investors will not invest in a project where a change of government may result in a change in policy which could result in the closure of nuclear plant before its time.

- **Taxpayers**

Nuclear is crucial to many countries meeting their ambitious targets for reducing carbon emissions. As such, some host countries suggest that nuclear should receive the same financial support as other low carbon technologies.

Support, in this sense, is often provided by taxpayers in that the support takes the form of tax breaks, subsidies, pricing controls (through mechanisms such as a power purchase agreements or a contract for differences) or other financial support to assist the way power from the stations is sold into the grid.

Any such financial support makes the building of nuclear stations more financial viable; it should be remembered that the build costs of nuclear are high whereas the operational costs are low compared to other technologies.

2.12 Legacy Managers

- **Spent fuel disposal/ reprocessing**

One of the continuing debates around nuclear power is that of whether **reprocessing** of **spent fuel** should be encouraged/ allowed.

The benefits of **reprocessing** are that:

- it reduces the amount of **high-level waste** from nuclear fuel which needs to be managed (without **reprocessing** the **spent fuel** is **high-level waste**); and

- it produces assets in the form of **uranium** and plutonium which can then be used to produce more nuclear fuel (either **uranium** only or **MOX** fuel) which can be used in power plant to produce energy.

While there are benefits to the environment in reducing the amount of nuclear **waste** produced the concern about **reprocessing** is that, although **reprocessing** only produces 1% of plutonium, plutonium could be misused. Plutonium is a man-made product and a by-product of nuclear power which can be used to create nuclear weapons. If **reprocessing** is allowed measures have to be put in place to protect and manage the plutonium properly. Some countries have agreed not to reprocess domestically thereby agreeing not to have access to the plutonium.

Funders will need to be assured that all fissile material including plutonium will be used solely in the civil nuclear industry and that the products of **reprocessing** will not create a risk to people or the environment. However, if the **funders** can be satisfied of this then the costs of **reprocessing** are significantly smaller than having to manage **spent fuel** as **waste** thereby reducing the amount of money needing to be set aside for **waste** management.

- **Repositories**

  How to manage in the long term, high level and **intermediate level waste** arising from nuclear power plant has long been an issue which the nuclear community has wrestled with, particularly while each country is required to manage its own nuclear **waste**.

  However, for some time the consensus has been that the best option for the long term management of nuclear **waste** is deep geological burial in a **repository**. There has been discussion since the 1970s of international geological repositories to take the **waste** from multiple countries. However while some communities may be willing to accept a **repository** to manage their own country's **waste**, most remain unwilling to have a **repository** managing other countries' **waste**.

  At present a number of countries are considering building a deep geological **repository** to deal with their nuclear **waste**. The repositories will be funded from fees paid by **operators** of nuclear power plant for the provision of the **waste** management services; which sits well with the idea of the repositories being **project financed**.

- **Decommissioning and waste funds**

  There has generally been a move away from governments paying for **decommissioning** and long term **waste** management costs towards the **owner** and/or **operator** providing for the costs of **decommissioning** the nuclear plant and paying for the long term disposal of nuclear **waste**.

  A number of countries now require that the **operator** of a nuclear station establishes and/or pays into a fund or funds to provide for the costs of **decommissioning** and long term **waste** management. These funds are either managed by a government entity or are established by the **operator**. If established by the **operator**, the funds have to be ring-fenced so that they can only be used for **decommissioning** and **waste** management (in accordance with a **decommissioning** and **waste** management plan prepared during the development of the plant) and are protected should the **operator** become insolvent. Payment into the funds is required to be made in accordance with a payment cascade such that periodic payment to the funds must

  be made before any debt is serviced, returns to investors can made or any dividends or profit distributions made.

  Not only will **funders** want to take into consideration the payments to the funds in establishing a financial model for a project, they will also want ensure that their environmental standards have been met and part of this will relate to the **decommissioning** and **waste** management of any project.

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