



**IFNEC Finance, Regulatory, Energy Planning Authority
Workshop
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WORKSHOP SCENARIO

SCENARIO SUMMARY

The hypothetical scenario to be discussed in the Workshop involves a country embarking on the development of its first nuclear power project. The country has completed the actions required for IAEA Milestone 1, which include the establishment of a NEPIO, the government's firm commitment to nuclear power, and evidence of efforts underway to achieve the necessary levels of technical and institutional competence for the completion of Milestone 2.

The country is considered politically and economically stable with a government committed to open public discourse. There is general consensus among international analysts that its prospects for continued economic development and GDP growth are good, which is supported by a history of consistent foreign investment. The country has a record of successfully developed large capital construction projects. A legislative framework, supportive of the peaceful use of nuclear power, has been completed, along with comprehensive regulations that include standards based on the IAEA Safety Standards.

Significant progress has been made in the development of an independent nuclear energy regulatory body with the capability to oversee the safety and security of the project. The organization and experience of the regulatory body that oversaw the country's research reactor has contributed to these efforts. Since this regulatory body is a small organization, major additions have been made to its organizational and technical competencies with the help of international peer groups. However, uncertainties remain regarding the extent to which the regulatory body will be prepared to function effectively.

As part of the completion of Milestone 1, one of the actions required was to evaluate different options for financing the nuclear power project in the country's liberalized electricity market. The increase in the foreseeable electricity demand has shown that there will be a need in the country for the base load electricity that a nuclear power plant would produce. However, in this country's liberalized electricity market with potential price volatility resulting from competition with other energy sources, electricity generated from nuclear power could be exposed to low electricity prices over long periods. As a result, there is risk associated with being able to recover the high capital cost of the nuclear project from revenue generated during the plant's lifetime.



The strategy determined to be the most promising in seeking to finance the nuclear power project requires a long-term commitment to a source of revenue from a credit worthy entity (most likely the host government). This source of revenue would be linked to the nuclear power plant and be sufficient to raise the capital needed for the project.¹ The private utility, working with the government, has concluded that if the proper long-term commitments can be established, the viability of the nuclear power project will increase. Such long-term commitments will require electricity market regulator support and possibly some changes to the current electricity market regulation rules. Questions have been raised regarding the soundness of this conclusion, and the government realizes that more information is needed to confidently make this assessment.

It is not clear what the role of the government should be under this strategy. The risks associated with this strategy need to be better understood, along with the approaches available to manage these risks.

¹ The hypothetical country would have considered, and at this point in the process could still consider, alternatives to the EPC contracting approach that is assumed here. Other contractual arrangements that might be available include more direct involvement by the technology supplier such as build, own, operate (BOO); build, own, operate, transfer (BOOT); and intergovernmental agreements. Regardless of the contracting approach, confidence in the ability to recover costs through the sale of electricity generated will be an essential component of any financing arrangement.



OBJECTIVES OF THE SCENARIO DISCUSSION

1. The nuclear safety regulator must ensure that the country's first nuclear power project is designed, constructed, and operated safely and securely. The scenario discussion will:
 - a. Develop an understanding of the importance that competence, effectiveness, transparency, and independence of the safety and security regulator plays in the financing of a nuclear power project, and
 - b. Identify how the financial community determines whether the regulatory function is sufficiently developed to secure the confidence needed to underpin financing.

2. Long-term commitments related to the sale or purchase of electricity are being used today in other countries to support the financing of nuclear power projects. In developing its financing plan, the private utility working with the government will consider alternative financing approaches, which may include long-term commitments such as power purchase agreements and contracts for difference. The scenario discussion will:
 - a. Identify the potential contributions that long-term commitments can make to the private utility's overall financing plan,
 - b. Clarify the role of the government in such long-term commitments, and
 - c. Identify the important considerations that need to be part of any decision to pursue such long-term commitments.



SCENARIO DETAILS

Project Data

- The proposed project would be the first nuclear power project in the country and have a capacity of up to *3,500 MW*.
- The increase in electricity production resulting from the nuclear power plant will require improvements to the distribution infrastructure.
- The plant location is proposed on a suitable coastal site that is 30 miles from the nearest population center and has gone through full characterization.

Country Data

- Population of 30 million, growing steadily (+2 % annual).
- GDP of USD 200 billion, growing by +3-5% a year.
- Good political stability over past 20 years, with no foreseeable changes in the future.
- Country credit rating is above investment grade (BBB+), with positive outlook.
- Electricity generation relies heavily (90%) on gas and coal. Current studies indicate abundant reserves of both.
- Need for significant additional electricity generating capacity in the future based on projected growth.
- Electricity market reforms were initiated in the 1990's, and the country continues its efforts to develop effective competitive wholesale and retail markets. The electricity market regulatory body leads efforts related to electricity market reforms. The country is struggling with the reforms, but the overall reform effort continues to have strong pro-competition political support.
- The electricity regulatory authority is responsible for ensuring a stable and secure supply of electricity and is supportive of the nuclear power project as it would help provide the base load demand needs of the country.
- The investors and lenders of the new nuclear power plant need assurance of revenue and return on investments and seek long-term contractual arrangement on electricity price.
- The country is working to address carbon emissions control and moving toward instituting legally binding commitments. Pricing of CO₂ emissions will impact the competitiveness of nuclear energy, and it is recognized that the government's long-term commitment to carbon policies and carbon pricing is essential for the nuclear project.
- The government is committed to attracting foreign investment and financing since (i) the utility developing the nuclear project is unable to finance the project on its balance sheet, and (ii) the size of the local banking industry is not sufficient to assume the magnitude of the risk involved.



- The national research reactor has been operating for over 10 years, and the nuclear regulatory body is working to build on the base of experience obtained from regulating the research reactor.
- The country has put in place most of the necessary regulation regarding nuclear energy. It has communicated its plans for the development of nuclear power with safety as the foremost criteria and has gathered reasonably good public support.
- The nuclear waste management policy is still under discussion, but the operative assumption is that nuclear waste generated in the country will be disposed of within the country. The costs for decommissioning and waste management will be a factor in the development of the financing model.
- The country has a national law that channels all of the liability for operation of the nuclear plant to the licensed operator. The country has signed the 1963 Vienna Convention on Civil Liability for Nuclear Damage, but not the 1997 amendments. None of the surrounding countries have signed the Vienna Convention.
- The country has signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), has a Comprehensive Safeguards Agreement and Additional Protocol in force, and is a party to the Convention on Nuclear Safety and the Notification and Assistance Conventions.
- The country is not a party to the Convention on the Physical Protection of Nuclear Material (CPPNM), the 2005 Amendment to the CPPNM, or the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Utility Data

- The utility is the proponent or the nuclear power project.
- The utility is privately owned and operates in a liberalized electricity market structure with the competitive wholesale and retail markets continuing to evolve.
- The utility has successfully developed large capital projects, although not as large as a nuclear power plant.
- There are currently no cross-border interconnections or purchase agreements, and none are planned at this time.
- It is not possible for the utility to finance the nuclear power project based on its balance sheet.
- The lack of a regulatory approach to ensure investors that the capital cost of the nuclear power plant will be recovered in electricity rates means that the required revenue certainty must come from some other source.
- The utility is exploring options for financing the proposed nuclear power project. Although the utility has full support from the government to develop nuclear power, external financing will be required, and the path to financing remains unclear.