

IDENTIFY FUNDING AND INVESTMENT MECHANISM FOR NEW NUCLEAR PROJECT



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Introduction :

❖ Nuclear Power Corporation of India Limited (NPCIL).

- A premier **Central Public Sector Enterprise (CPSE)** under the Administrative Control of the **Department of Atomic Energy, Government of India**
- Comprehensive capability in all **facets of Nuclear Technology**
- Installed capacity: **8.1GWe**
- Operating stations : **24**
- ✓ Site Selection
- ✓ Design
- ✓ Construction
- ✓ Commissioning
- ✓ Operation
- ✓ Maintenance
- ✓ Renovation
- ✓ Modernization & Upgradation
- ✓ Plant Life Extension
- ✓ Waste Management
- ✓ Decommissioning



Introduction :

- In many countries ,there is huge demand for energy in which conventional and other renewable energy having limitation in production/generation ,nuclear power serves as a crucial baseload source of power generation with the lowest greenhouse gas emissions.
- Nuclear power is a key to combating climate change and **reaching net zero.**
- Nuclear power plants play an important role in providing secure ,economic and clean energy electricity .
- To achieve, it becomes important that expansion of nuclear power plants could take place in timely manner.

Special factors in financing NPPs :

While building new NPPs , there are a number of special characteristics and circumstances which make investment in new NPPs different and challenging in several important respects. These features include mainly :-





Components of nuclear power generation costs:

The main components of nuclear power generation costs are

- (a) Basic elements:** Capital investment, nuclear fuel cycle costs ,O&M costs ,Decommissioning costs.
- (b) Additional elements:** Infrastructure development- such R&D and technology transfer and domestic industrial and personnel development associated with a nuclear power programme.
- (c) Plant construction and performance:** Reflected in its construction time, load factor, net power rating and economic life.
- (d) Outside economic influences:** Interest and real escalation associated with plant construction, the fuel cycle and O&M costs during plant life as exogenous parameters.

Components of nuclear power generation costs:

➤ Investment Cost

- Typically 60-80% of the generation cost.
- Can be influenced by various parameters.

➤ Operational & Maintenance Cost

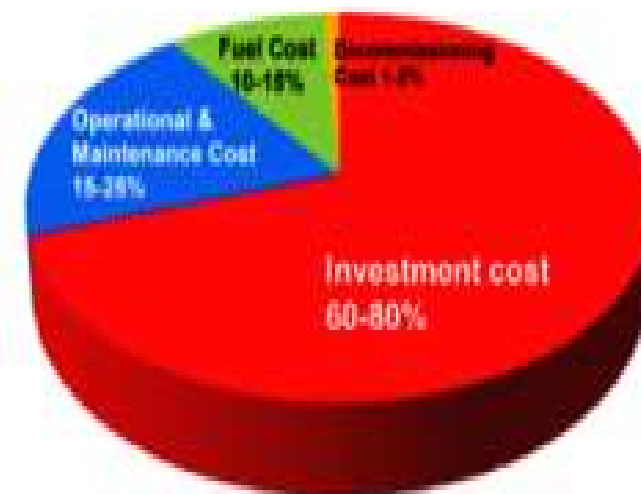
- Typically 15-25% of the generation cost .

➤ Fuel Cost

- Typically 10-15% of the generation cost.

➤ Decommissioning Cost

- Typically 2% of the generation cost.





Investment cost for new NPP :

➤ **Overnight Construction Cost**

- Include all EPC Cost.
- Include Owner's Cost.
- Assume plant to be built on one day, no time dependent cost .

➤ **EPC Cost**

- Directly related to plant engineering construction, procurement, installation, testing and commissioning .70-80% of the Overnight Construction Cost.

➤ **Owner's Cost**

- Licensing project management, supervision and infrastructure cost selection and training of operating personnel, Owner's Engineer Services if applicable
- Typically 20-30% of the Overnight Construction Cost

➤ **Escalation Cost**

- Cost on project delays .Typically 10-20% of Overnight Construction Cost.

➤ **Financing Cost**

- IDC paid during plant construction. Typically 20-30% of the Overnight Construction Cost.



Structuring and Financing New Nuclear Projects:

It is therefore essential in financing new nuclear project:-

- Need for faster project execution
- Creating a favourable public narrative
- Ensuring technology diversification and building robust vendor and manpower ecosystems
- Starting from the earliest planning stages of a project to build a new NPP, project is to be financed in such a way that financial risks are, to the extent possible, kept to a minimum or even eliminated.

Risk allocation will, therefore, be critical to enable new NPPs to be financed.



Structuring and Financing New Nuclear Projects:

- **Business model :** New Nuclear Power Plant can be classified in 4 major categories :-

- **Traditional State Business Model**

- ❖ Government led and funded Investment Project.
- ❖ Less compatible with free market structure.

- **Corporate Business Model**

- ❖ Combination of equity, debt and government support .
- ❖ Companies raise capital by using their own assets (equity) and borrowing money through loans or by issuing bonds.
- ❖ Partnership : Government agencies and private companies.
- ❖ Focus on **Small modular reactors** (SMRs) and exploring instruments like **green bonds** .



Structuring and Financing New Nuclear Projects:

➤ Hybrid Business Model

- ❖ Involves a **public-private partnership** where private companies provide capital for non-reactor components, while the state-owned utility retains control of reactor construction, operation, and fuel management.
- ❖ **Private firms contribute to construction outside the reactor core**, and their revenue comes from selling the electricity generated, with the state utility operating the plant for a fee.
- ❖ This **model aims to attract private investment to accelerate project development**, with companies managing aspects like land acquisition and construction outside the reactor complex
- ❖ **In India**, a plan is in place for private companies like Reliance Industries Limited, Tata Power Company Limited, and Adani Power to invest in new nuclear power generation capacity.



Structuring and Financing New Nuclear Projects:

➤ Pure Economic Business Model

A market-driven model where the project is financed, built, and operated by the private sector with little direct government control or guarantees.

Key characteristics include:-

- **Private Financing:** The primary capital comes from private investors.
- **Market Risk:** Investors bear the majority of the financial and market risks, including construction cost overruns and fluctuating electricity prices.
- **Profit Motive:** The goal is to generate a return on investment based on market demand .
- **Limited Government Support:** it does not rely on direct government financial instruments like loan guarantees, subsidies, or guaranteed revenue streams (e.g., power purchase agreements at a fixed price or Contracts for Difference).
- **Financing Mechanisms:**
 - **Corporate Financing:** Finance the project using their entire asset base as collateral, diversifying risk .
 - **Vendor Financing:** BOT , BOO.

This model is generally considered challenging for new nuclear power projects .



Structuring and Financing New Nuclear Projects:

Two basic types of finance: Debt and Equity.

➤ Equity available sources :

- ❖ Public funds
- ❖ Own funds
- ❖ Potential private investors (private equity funds looking for long term type of returns)

➤ Debts Available sources :

- ❖ Corporate bank market
- ❖ Bond issuance
- ❖ Availability, rates and maturity on the utility rating, appetite and capacity of the financial market
- ❖ Export Credit Agencies loans
- ❖ International Financial Institutions (IFIs) Loans



Summary and Conclusion :

For the development and investment mechanism of New Nuclear Power Project:-

- Strong and consistent government support including clear and sustained policy support.
- Establish an efficient and effective regulatory system to reduce project timelines.
- Broader participation by private /state sectors/PSU's .
- Strengthening public perception and enhancing awareness about nuclear energy's safety and benefits.
- Facilitating faster land acquisition.
- Work with electricity utilities, financial companies and other potential investors, and the nuclear industry, from an early stage to address concerns that may prevent nuclear investment and to avoid mistakes in establishing the parameters for new NPPs.
- Introducing tax concessions, green power classification, and long-term financing to ensure competitive nuclear tariffs.
- Securing diversified uranium fuel sources and expanding the vendor base for specialized nuclear equipment.
- Building skilled manpower capacity by strengthening nuclear education and training infrastructure.



Thank You