

Assessing Risks and Rewards of Rooppur Nuclear Power Plant: A Crossroads for Bangladesh's Energy Future

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Source: Dhaka Tribune

Introduction

Bangladesh stands at a pivotal juncture in its energy trajectory. With a huge population and an annual GDP growth rate averaging 6-7% over the last decade, the nation encounters escalating energy demands. Fossil fuels, primary natural gas, currently dominate its energy mix, but depleting reserves and environmental concerns have necessitated diversification. The Rooppur Nuclear Power Plant (RNPP), located in the Pabna district of Bangladesh, represents the significant leap in the country's energy infrastructure. As Bangladesh grapples with increasing energy demands and environmental challenges, the RNPP emerges as a critical component of its strategy to achieve energy security and sustainability.

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This commentary dives into the evaluation of risks and rewards of RNPP, situating it within Bangladesh's socio-economic, environmental, and geopolitical landscape.

Historical Context

The journey toward establishing a nuclear power plant in Bangladesh began as early as 1961, but it was not until 2011 that substantive agreements were made with Russia for the construction of Rooppur facility. The plant is designed to house VVER-1200 reactors, which will collectively generate 2400 MW of electricity, significantly contributing to the national grid.²³ The project is not only the first of its kind in Bangladesh but also the most expensive development initiative in the country's history, with an estimated cost of \$12.65 billion, primarily funded through Russian loans.⁴

Rewards of RNPP project

Energy Security and Economic Growth

RNPP's 2,400 MW output could meet 10% of national demand, alleviating load-shedding those costs 1% of GDP annually. As a baseload source, nuclear power provides uninterrupted electricity, critical for industrial growth. The Asian Development Bank estimates that reliable energy could boost manufacturing output by 15%, vital for Bangladesh's export-driven economy. Moreover, RNPP's 60-year lifespan offers long-term stability compared to fossil fuel plants.

Environmental Benefits

One of the most compelling arguments in favor of nuclear energy is its potential to reduce greenhouse gas emissions. Unlike coal or natural gas, nuclear power plants do not emit carbon dioxide during operation, making them a cornerstone for countries committed to meeting international climate agreements. For Bangladesh – a country highly vulnerable to the adverse effect of climate change, including rising sea levels and extreme weather events – the environmental benefits of a low-carbon energy source are particularly significant.⁵

² Rooppur Nuclear power plant capacity. (n.d.). সর্বসাধারণ পারমাণবিক তথ্য কেন্দ্র. <https://bdnuclear.energy/rooppurnpp/rooppur-nuclear-power-plant-capacity/>

³ Rooppur Nuclear Power Plant, Ishwardi, Bangladesh. (2023, August 29). Power Technology. <https://www.power-technology.com/projects/rooppur-nuclear-power-plant-ishwardi/?cf-view>

⁴ Topu, A. H. K. (2024, April 27). Rooppur Nuclear Power Plant: First unit to start production in December. The Daily Star. <https://www.thedailystar.net/news/bangladesh/news/rooppur-nuclear-power-plant-first-unit-start-production-december-3596116>

⁵ Climate Change 2022: Mitigation of climate change. (n.d.). IPCC. <https://www.ipcc.ch/report/ar6/wg3/>

Moreover, nuclear energy can play a crucial role in reducing air pollution. Major cities in Bangladesh, for example, Dhaka suffers from poor air quality, a factor that directly impacts public health. Transitioning to nuclear power could alleviate some of these concerns by decreasing the emissions associated with conventional power generation.

Economic Stimulus and Technological Advancement

The development of the RNPP has the potential to stimulate coal economics. The construction phase has already generated employment opportunities and is likely to create ancillary industries, ranging from engineering services to infrastructure development. Additionally, the project is expected to foster technological transfer and capacity-building enabling Bangladesh to develop a skilled workforce in advanced technological field.

Investments in nuclear energy often come with long-term economic benefits. While the initial capital expenditure is high, the operational costs are relatively low compared to fossil fuel plants, and nuclear reactors offer a longer operational lifespan. In the long run, the RNPP could provide a cost-effective solution for Bangladesh's growing electricity needs, reducing energy bills for industries and consumers alike.

The Risks: Safety concerns, Waste Management, and Socio-Political Challenges



Source: Sarbojonkotha

Nuclear Safety and Accident Risks

Perhaps the most significant risk associated with the RNPP is the potential for nuclear accidents. Historical incidents such as the Chernobyl disaster in 1986 and the Fukushima Daiichi accident in 2011 have underscored the devastating consequences that can arise from inadequate safety protocols and

natural disasters. Although modern reactor designs incorporate advanced safety features, the inherent risks associated with nuclear energy cannot be entirely eliminated.⁶

The RNPP's location in Rooppur, near the Padma River, also raises questions about natural disaster preparedness. Bangladesh is prone to cyclones, flooding, and seismic activity. Ensuring that the plant's design and operational protocols can withstand such events is critical. International regulatory frameworks, including those set by the International Atomic Energy Agency (IAEA), provide guidelines, but their successful implementation depends on rigorous oversight and continuous improvement in safety culture.⁷

Radioactive Waste Management

Another major concern is the long-term management of radioactive waste. Unlike fossil fuels, nuclear power generates waste that remains hazardous for thousands of years. The challenge for Bangladesh will be establishing secure and sustainable waste disposal methods. Current technologies, such as deep geological repositories, have been implemented in other countries, but adapting these to the local context in Bangladesh presents both technical and political hurdles. Public perception of nuclear waste is also a significant barrier. The long-term storage of radioactive materials has historically been a source of public anxiety, and without transparent, effective communication strategies, the RNPP project could face considerable opposition from local communities and environmental groups.⁸

Economic and Financial Risks

The economic viability of nuclear projects is another critical area of concern. Nuclear power plants require massive upfront investments, and the financial models often depend on long-term government commitments and international financing. Cost overruns and delays are common in nuclear construction projects worldwide, and these risks are compounded in emerging economies with less experience in managing such large-scale projects. Bangladesh's economy, while growing, faces challenges related to fiscal stability and infrastructure financing. Ensuring that the RNPP remains on schedule and within budget will require robust project management and transparent financial oversight. Moreover, the long-

⁶ Safety of nuclear power reactors - World Nuclear Association. (n.d.). <https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/safety-of-nuclear-power-reactors>

⁷ Safety standards. (n.d.). IAEA. <https://www.iaea.org/resources/safety-standards>

⁸ Alfee, Sadia Lena, and Md. Shafiqul Islam. "Assessment of public perception towards the radioactive waste management of Bangladesh." *Progress in Nuclear Energy* 140 (August 12, 2021): 103916. <https://doi.org/10.1016/j.pnucene.2021.103916>.

term operational costs and decommissioning expenses must be carefully planned to avoid imposing future financial burdens on the country.⁹

Geopolitical and Strategic Implications

The RNPP is not merely an energy project—it is also a strategic instrument in Bangladesh’s geopolitical landscape. The involvement of foreign partners, particularly Russia’s Rosatom, has raised questions about geopolitical dependencies and influence. While international cooperation can bring in expertise and capital, it may also lead to a reliance on foreign technology and political alignments that could complicate Bangladesh’s autonomous decision-making in the future.

Moreover, regional dynamics in South Asia are complex. Nuclear technology often carries with it a dual-use potential, where civilian nuclear capabilities can be perceived as a stepping stone toward military applications. This aspect, albeit speculative, could stir concerns among neighboring countries and international watchdogs, potentially affecting regional security and diplomatic relations.

Balancing Act: Policy Recommendations and Path Forward

Given the multifaceted rewards and risks, it is imperative that Bangladesh adopts a balanced and transparent approach to the RNPP project. The following policy recommendations are proposed to ensure that the project contributes positively to the nation’s energy future while mitigating its potential downsides.

Strengthening Regulatory Oversight and Safety Protocols

Bangladesh should prioritize the establishment of a robust, independent regulatory body dedicated to nuclear safety. This agency must have the authority to enforce international standards and conduct regular audits of the RNPP. Collaboration with international bodies such as the IAEA can help ensure that the latest safety protocols are adopted and that there is accountability at every stage of the project’s lifecycle.

Investing in comprehensive emergency preparedness programs is equally important. This includes the development of evacuation plans, continuous training for emergency responders, and the establishment of real-time monitoring systems. Given the country’s vulnerability to natural disasters, integrating nuclear safety with broader disaster management frameworks is essential.

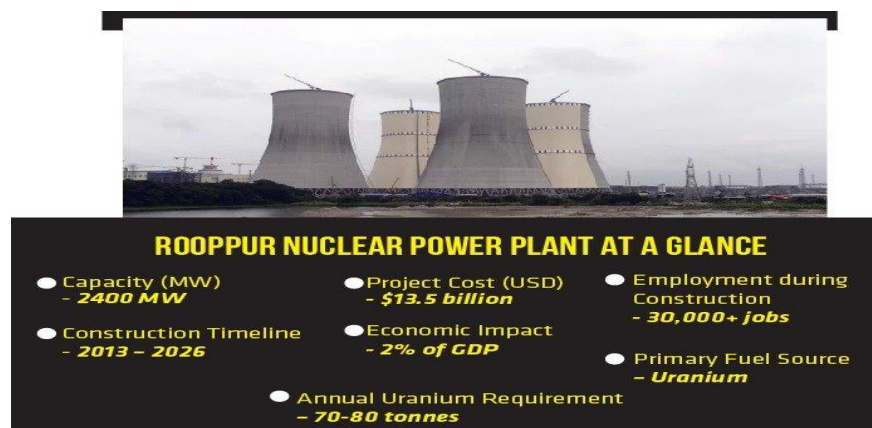
⁹ Bangladesh Power Development Board. 2023. Annual Report 2022–23. Dhaka: BPDB

Developing a Sustainable Radioactive Waste Management Strategy

Addressing the challenge of radioactive waste requires both technological and policy innovations. Bangladesh should invest in research to explore the feasibility of various waste management solutions, including deep geological repositories and reprocessing technologies. Public engagement and transparent communication about waste management plans can help build trust and reduce opposition from local communities. Long-term financial planning for waste disposal and decommissioning costs should be integrated into the overall budget of the RNPP. Creating a dedicated nuclear waste management fund, supported by contributions from operational revenues, could provide a sustainable financial mechanism for future liabilities.

Enhancing Economic and Financial Governance

To mitigate the economic risks associated with the RNPP, Bangladesh should adopt a rigorous project management framework that emphasizes transparency and accountability. Regular audits, public disclosure of financial reports, and the involvement of international financial institutions can help ensure that the project remains on track and within budget. Economic contingency plans should also be developed to address potential cost overruns or delays. The government must also consider diversifying its financing sources to reduce dependency on any single foreign partner. Establishing partnerships with a mix of international investors and leveraging multilateral funding sources can provide a more stable financial foundation for the project.¹⁰



Source: PressXpress

¹⁰ Bangladesh Bureau of Statistics, Bangladesh Energy and Electricity Report 2023 (Dhaka: BBS, 2023)

Addressing Geopolitical Concerns Through Diplomatic Engagement

Given the strategic implications of the RNPP, Bangladesh should engage in proactive diplomatic efforts to clarify the civilian nature of its nuclear program. Transparent communication about the project's safety measures, regulatory frameworks, and long-term plans for nuclear technology can help allay fears both domestically and internationally. Building confidence through multilateral forums and regional dialogues will be critical in mitigating geopolitical tensions.¹¹

Conclusion

The Rooppur Nuclear Power Plant stands at the intersection of promise and peril for Bangladesh. On one hand, it offers a path toward greater energy security, environmental sustainability, and economic development—a crucial trifecta for a country striving to meet its burgeoning energy needs while addressing the challenges of climate change. On the other hand, the inherent risks of nuclear power—from potential accidents and radioactive waste management challenges to significant financial and geopolitical concerns—cannot be overlooked. To realize the rewards while mitigating the risks, Bangladesh must adopt a holistic and transparent approach. Strengthening regulatory oversight, investing in robust safety and waste management systems, ensuring economic accountability, and engaging in proactive diplomacy are essential steps toward harnessing the potential of nuclear energy. As Bangladesh navigates this complex landscape, the RNPP could indeed become a cornerstone of the nation's energy future, provided that the lessons from global nuclear experiences are carefully integrated into local policies.

¹¹ Asian Development Bank. *Bangladesh Energy Transition Roadmap 2023*. Manila: ADB, 2023.