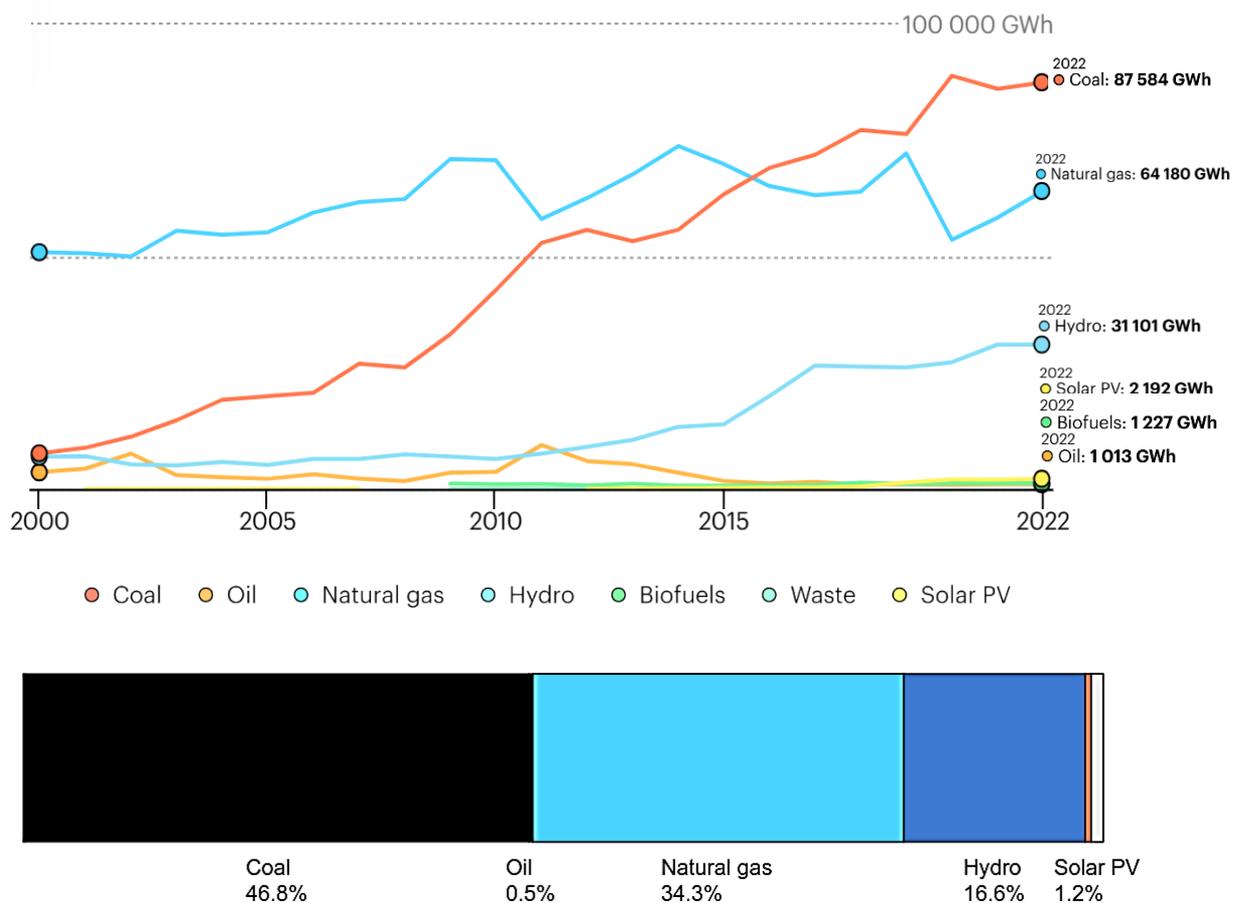


Is Malaysia Ready for the Nuclear Leap?

By Mohd Khairul Ramli

As Malaysia progresses towards its ambitious goal of achieving Net Zero emissions by 2050, the consideration of nuclear energy as part of its energy mix has gained traction. With fossil fuels continuing to dominate Malaysia’s energy supply, the shift to cleaner, more sustainable energy sources is critical. Nuclear power as an energy generation offers a compelling case as a low-carbon energy source that can significantly contribute to reducing greenhouse gas emissions. Historically, the implementation of nuclear power is a multifaceted endeavour that demands careful consideration of capital, infrastructure, maintenance, contingency planning, and public perception.

Figure 1: Electricity Generation Sources, Malaysia



Source: International Energy Agency (IEA)

Constructing a nuclear power plant (NPP) is undeniably capital-intensive. Estimates suggest costs can range from RM 8,900/kW to RM 20,000/kW for a single 1,000 MW unit,¹ significantly higher than fossil fuel-based power plants. The high initial cost of construction arises from the advanced technology, safety mechanisms, and rigorous standards required for nuclear facilities. However, operating costs for nuclear energy are comparatively lower over time. This cost disparity raises the critical question: Is Malaysia prepared to undertake such a monumental commitment?

To finance a nuclear energy program, Malaysia must explore innovative funding mechanisms, including international green financing, public-private partnerships, and collaborations with countries experienced in nuclear technology. For instance, nations like China and South Korea have successfully exported their expertise to developing countries, reducing technological barriers. Yet, Malaysia must balance this approach with ensuring that local expertise is developed simultaneously, avoiding over-reliance on foreign stakeholders.

Nation Readiness

The development of nuclear energy requires robust infrastructure and a highly skilled workforce. Currently, Malaysia lacks significant expertise in nuclear technology, a gap that must be bridged before embarking on such a project. Sending engineers and technical experts abroad for training in NPP management, safety protocols, and maintenance is an essential first step. This should be supplemented with the establishment of local institutions specializing in nuclear sciences and engineering.

Malaysia must also strengthen its regulatory framework to align with international standards such as those set by the International Atomic Energy Agency (IAEA). This involves addressing gaps in legislation and ensuring the independence and competency of regulatory bodies like the Atomic Energy Licensing Board (AELB).² In addition, integrating a centralized energy policy under a unified authority could prevent the fragmentation currently observed among various agencies.

Contingency Planning and Waste Management

Operating an NPP involves sophisticated technology and a high degree of technical competency. Malaysia's limited experience in this domain necessitates a long-term

¹ https://www.eia.gov/analysis/studies/powerplants/capitalcost/pdf/Capital_Cost_Study_Discussion_Slides.pdf

² [https://gnsn.iaea.org/main/Knowledge%20Base%20Articles/AELB%20\(Malaysia\)%20-%20Regulatory%20Infrastructure.pdf](https://gnsn.iaea.org/main/Knowledge%20Base%20Articles/AELB%20(Malaysia)%20-%20Regulatory%20Infrastructure.pdf)

commitment to developing expertise. Sending engineering graduates abroad for specialized training and fostering partnerships with global institutions, as suggested in the National Energy Transition Roadmap (NETR),³ could build a foundation of competence. However, maintenance costs for nuclear facilities remain significantly high, requiring consistent budgetary allocation.

A comprehensive contingency plan is crucial to address potential emergencies. Malaysia's geographical location, characterized by low seismic activity, mitigates some risks associated with natural disasters. However, lessons from the Fukushima disaster highlight the need for preparedness against unforeseeable events. An effective plan must encompass not only operational safety but also the secure transportation, storage, and eventual disposal of radioactive waste is a perennial concern for nuclear projects worldwide.

Public Perception and Stigma

Public perception remains one of the most significant barriers to the adoption of nuclear energy in Malaysia. The Fukushima incident and the radioactive waste crisis at Bukit Merah have left a lasting imprint on the Malaysian psyche, fuelling scepticism and opposition. Surveys reveal that while some Malaysians are cautiously optimistic about nuclear energy's potential, a significant portion harbours concerns over health risks, environmental impact, and the management of nuclear waste.

To address this stigma, the government must embark on a comprehensive public engagement campaign. This includes educating citizens about the safety advancements in modern NPPs, such as 5th-generation reactor designs that minimize risks. Additionally, highlighting the potential of thorium-based reactors, which produce less radioactive waste, could alleviate concerns. Public consultations, involving key stakeholders from environmental groups to community leaders, should be prioritized to ensure inclusivity and transparency in decision-making.

The establishment of a centralized information portal, providing real-time updates on nuclear energy developments, can further demystify the technology. Malaysia's success in gaining public trust will ultimately hinge on its ability to demonstrate a strong commitment to safety, environmental sustainability, and economic viability.

³ <https://www.mida.gov.my/national-energy-transition-roadmap-netr-charting-a-path-to-a-sustainable-energy-landscape/>

Moving Forward

As Malaysia moves towards net-zero emissions, renewable energy sources like solar and hydroelectric power are crucial. However, these sources alone may not suffice to meet the country's growing energy demands. Incorporating nuclear energy into Malaysia's energy mix could provide a stable, low-carbon alternative that complements renewables.

Nonetheless, the transition to nuclear energy must be methodical. Malaysia should consider initiating pilot projects, such as small modular reactors (SMRs),⁴ to gauge the feasibility and public receptivity of nuclear energy. Concurrently, the government should foster regional and international partnerships to share knowledge and resources, ensuring that Malaysia's nuclear ambitions are both sustainable and secure.

The readiness of Malaysia for nuclear energy hinges on a confluence of factors such as capital investment, infrastructure development, operational planning, and public perception. While challenges abound, they are not insurmountable. With strategic planning, transparent governance, and a commitment to public engagement, Malaysia can lay the groundwork for a nuclear energy future that aligns with its sustainability goals. However, as the country embarks on this path, it must tread carefully, learning from global experiences and ensuring that the benefits of nuclear energy are not overshadowed by its risks. The journey to net-zero emissions by 2050 will require a balanced energy portfolio, and nuclear energy, if implemented responsibly, could play a transformative role in shaping Malaysia's energy landscape.

⁴ <https://www.energy.gov/ne/advanced-small-modular-reactors-smrs>