

Why A National Strategic Project? Legal and Policy Perspective on Indonesia's National Position for the First Nuclear Power Plant Development

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ARTICLE INFO	ABSTRACT
Received: 28 May 2026	Indonesia's aspiration to develop nuclear power plants dates back to the early decades of the Republic and has been supported by extensive cooperation with the International Atomic Energy Agency (IAEA), including the Integrated Nuclear Infrastructure Review (INIR) mission in 2009. Despite decades of technical preparation and institutional development, the country has yet to commence the construction of its first commercial NPP. However, Indonesia's nuclear programme has entered a new phase following the enactment of Law No. 59 of 2024 on the National Long-Term Development Plan 2025–2045, Government Regulation No. 40 of 2025 on the National Energy Policy, and the Electricity Supply Business Plan 2025–2034, all of which explicitly recognize nuclear power as a strategic component of the national energy transition and establish a target for commissioning the first 500 MW nuclear power plant by 2032. This research approach is a normative juridical using qualitative analysis of laws, regulations, government policy documents, official reports, and relevant literature to examine Indonesia's legal and institutional readiness for the development and operation of its first NPP. The findings indicate that Indonesia has established a substantially stronger regulatory and policy framework than in previous decades, supported by institutional preparations for a Nuclear Energy Program Implementing Organization (NEPIO) and the continued roles of BRIN and BAPETEN. Nevertheless, significant implementation challenges remain, including project delivery mechanisms, financing, technology selection, licensing, and institutional coordination. This study recommends adopting a clear implementation strategy, including designating the first NPP as a National Strategic Project, to strengthen regulatory certainty, accelerate inter-agency coordination, and enhance investor confidence in developing Indonesia's first commercial nuclear power plant and support the long-term objectives of the National Energy Policy through 2060.
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1. Introduction

Indonesia's nuclear power development plan has made significant progress over the past two years, particularly since the enactment of the National Long-Term Development Plan (RPJPN) 2025–2045. In the following year, the government issued several key regulations, including Government Regulation No. 40 of 2025 on the National Energy Policy (Kebijakan Energi Nasional/KEN) and the Electricity Supply Business Plan (RUPTL) 2025–2034, both of which mark a major shift in Indonesia's energy policy. *First*, the National Energy Policy (KEN) no longer treats nuclear energy as the “last option” in the national energy mix. Instead, nuclear power is now recognized as a strategic energy source to support and balance renewable energy development.¹ This policy signifies that nuclear energy will be developed alongside renewable energy rather than being considered only after all other alternatives have been exhausted. *Second*, the government has established a clear deployment target for nuclear power. Indonesia aims to commission its first nuclear power plant with a capacity of 500 MW by 2032, expand installed capacity to 7 GW by 2040, and further increase nuclear capacity to approximately 35–44 GW by 2060. As of mid-June 2026, when this article is being written, the government is also pursuing the establishment of the Nuclear Energy Program Implementing Organization (NEPIO), a crucial institutional framework recommended by the International Atomic Energy Agency (IAEA) to coordinate and oversee the country's nuclear power program.

Nevertheless, it remains unclear how the government intends to implement the country's first nuclear power project. Among the various development and financing models under discussion, designation as a National Strategic Project (*Proyek Strategis Nasional*) remains one of the leading options. Following the failure of the Muria Nuclear Power Plant project in the early 2000s, Indonesia's nuclear power program experienced a prolonged period of stagnation, despite the country being the first in Southeast Asia to actively pursue the peaceful use of nuclear energy. President Soekarno initiated Indonesia's nuclear ambitions in the 1950s, recognizing nuclear technology as an important component of the nation's scientific and industrial development.² Indonesia also became one of the earliest members of the International Atomic Energy Agency (IAEA) in 1957, joining well before several other Asian countries, including China, which became a member in 1984.

On 5 December 1958, the Government of Indonesia established the Atomic Energy Council (Dewan Tenaga Atom) and the Atomic Energy Institute (Lembaga Tenaga Atom). These institutions were later reorganized under Government Regulation No. 33 of 1965 into the National Atomic Energy Agency (BATAN). The establishment of BATAN represented a major milestone in Indonesia's nuclear development, serving as the country's principal institution responsible for nuclear research, development, engineering, and the peaceful utilization of nuclear technology. Over subsequent decades, BATAN developed extensive research infrastructure, human resources, and technical capabilities, laying the foundation for Indonesia's long-term nuclear energy program.³

These included the Bandung Nuclear Area (1965), Pasar Jumat Nuclear Area in Jakarta (1966), Yogyakarta Nuclear Area (1967), and Serpong Nuclear Area (1987), all designed to support the nation's nuclear ambitions.⁴ However, the determination and progress in utilizing

¹ Government Regulation No. 40 of 2026 re the National Energy Policy.

² Sylvia, “Politik Nuklir di Indonesia Masa Sukarno, 1958–1967.”

³ Rahmanta et al., “An Analysis of National Position, Opportunity, and Challenge of Indonesia's Nuclear Program to Support Net-Zero Emissions by 2060.”

⁴ Yanto and Hikmah, “Prospects of Nuclear Power-Based Industry as a Replacement for Depleting Tin Resources

nuclear energy have not gone smoothly, and instead, have continually faced deadlocks up to the present. Among the five most populous countries in the world—India, China, the United States, and Russia—Indonesia remains the only one yet to operate a nuclear power plant.⁵ From a technical perspective, the stagnation Indonesia faces in building and operating nuclear power plants is influenced by several factors, including technology, safety, natural resource management, and human resources.⁶ If development waits for all these factors to be fully prepared and available, Indonesia risks falling significantly behind, potentially rendering the presence of a nuclear power plant less impactful in addressing energy needs. There exists a critical momentum for Indonesia to expedite the construction of a nuclear power plant, capitalizing on current opportunities to ensure its future energy security and environmental sustainability.

To clarify, the ‘momentum’ referred to here is the window of opportunity available. This is akin to the period of Indonesia’s oil boom in the 1970s to early 1980s, a momentum that should have been used to secure the energy sector for the long term but was not fully capitalized upon.⁷ As a result, the benefits of the oil boom era did not significantly impact national energy security. Excluding technical aspects, which can be addressed and improved as with other development projects, this research will focus on one crucial element: decision-making on the national position. The national position is currently the most critical aspect of nuclear power plant development in Indonesia. In recent years, Indonesia has demonstrated a stronger commitment to developing nuclear power through the adoption of several key national policies and regulations. This commitment is no longer reflected merely in policy proposals or legislative drafts, but is now explicitly embedded in binding legal and planning instruments. The RPJPN 2025–2045 recognizes nuclear energy as part of Indonesia’s long-term strategy for achieving energy security and the net-zero emissions target. This policy direction is further reinforced by KEN) which positions nuclear energy as a strategic component of the national energy mix rather than a last-resort option. RUPTL 2025–2034 establishes a clear roadmap for commissioning Indonesia’s first 500 MW nuclear power plant by 2032 and expanding nuclear generating capacity to 7 GW by 2040. Collectively, these regulatory developments provide the clearest legal and policy foundation to date for the deployment of nuclear power in Indonesia.

However, it is important to remember that such regulatory commitments are not new. From 2000 to 2002, the Indonesian Government engaged in an energy planning study known as the Comprehensive Assessment of Different Energy Sources (CADES). This study, involving various related institutions and ministries, was reviewed by the IAEA, and its results were submitted to President Abdurrahman Wahid by IAEA Director General Mohammad ElBaradei in 2003. Based on the results, a nuclear power plant in Indonesia was planned to start operating in 2016.⁸ Given these conditions, a new, more concrete, firm, and definitive legal certainty is required to guarantee the successful development of nuclear power plants in Indonesia.⁹ This study will be developed across three aspects. *First*, it will provide an overview of nuclear energy within the current regulations and planning frameworks.

in Bangka Belitung.”

⁵ Zohuri, “Nuclear Energy Research and Development Roadmap.”

⁶ Putro, *Perkembangan dan Program Energi Nuklir: Alternatif Energi Baru yang Aman dan Bersih?*

⁷ Aspinall and Fealy, eds., *Soeharto’s New Order and Its Legacy: Essays in Honour of Harold Crouch*.

⁸ IAEA, “Country Nuclear Power Profiles 2018 Edition Indonesia” (pub.iaea.org, 2018), <https://www-pub.iaea.org/MTCD/Publications/PDF/cnpp2018/countryprofiles/Indonesia/Indonesia.htm>.

⁹ Gralla et al., “The Role of Sustainability in Nuclear Energy Plans—What Do National Energy Strategies Tell Us?”

Second, it will examine the current organizational and project management structures. *Third*, it will argue for positioning the nuclear power plant (NPP) project as a national strategic project. Recommendations will be included at the end of the article as advice to the government.

2. Method and Legal Material

This study employs a normative juridical research approach to examine the legal and institutional readiness of Indonesia for the development and operation of its first nuclear power plant (NPP). The normative juridical approach is appropriate because the study primarily examines legal norms, statutory provisions, regulatory frameworks, government policies, and institutional arrangements governing nuclear energy development in Indonesia. The study focuses on the extent to which the existing legal and institutional framework provides sufficient certainty, authority, coordination mechanisms, and regulatory support for the implementation of Indonesia's first commercial NPP.¹⁰

The legal materials and documentary sources used in this study consist primarily of primary legal materials, secondary legal materials, and supporting policy documents. Primary legal materials comprise binding laws and regulations directly governing national development planning, energy policy, nuclear energy, nuclear safety, licensing, electricity supply, environmental protection, and strategic infrastructure development. These include Law No. 59 of 2024 on the National Long-Term Development Plan (RPJPN) 2025–2045, Government Regulation No. 40 of 2025 on the National Energy Policy (KEN), Law No. 10 of 1997 on Nuclear Energy, Law No. 30 of 2007 on Energy, and other relevant implementing regulations governing nuclear safety, licensing, and electricity development. Secondary legal materials consist of peer-reviewed journal articles, academic books, research reports, policy studies, and other scholarly publications addressing nuclear energy policy, nuclear governance, regulatory institutions, nuclear technology, energy security, energy transition, public acceptance, project financing, and the development of nuclear power plants in Indonesia and other jurisdictions.

The study also examines supporting policy and planning documents issued by government institutions and other authorized bodies. These include the Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2025–2034 issued by PT PLN (Persero), the Rencana Umum Ketenagalistrikan Nasional (RUKN), the Rencana Umum Energi Nasional (RUEN), the RPJPN 2025–2045, the KEN, and official policy documents concerning Indonesia's nuclear energy programme. These documents are analyzed to determine whether the policy direction established in legislation is translated into concrete electricity planning, nuclear deployment targets, institutional responsibilities, implementation schedules, and project-development mechanisms. The study also examines official reports and publications of the International Atomic Energy Agency (IAEA), particularly documents concerning the IAEA Milestones Approach, nuclear infrastructure development, national nuclear infrastructure assessment, and the establishment and functioning of a Nuclear Energy Programme Implementing Organization (NEPIO).

For the purpose of institutional analysis, the study examines the respective roles and responsibilities of Badan Riset dan Inovasi Nasional (BRIN), Badan Pengawas Tenaga Nuklir (BAPETEN), the Ministry of Energy and Mineral Resources, the Ministry of National

¹⁰ Benuf and Azhar, "Metodologi Penelitian Hukum sebagai Instrumen Mengurai Permasalahan Hukum Kontemporer."

Development Planning (Bappenas), the Ministry of Environment, the Ministry of Finance, PT PLN (Persero), the National Energy Council (DEN), and other relevant government institutions. The analysis focuses on the distribution of authority among these institutions, particularly in relation to national policy formulation, site selection, nuclear safety and security, licensing, environmental protection, financing, electricity planning, human-resource development, stakeholder engagement, industrial participation, and project management.

Data were collected through a comprehensive document and literature review and analyzed qualitatively using descriptive and interpretative methods. The analysis focuses on identifying regulatory gaps, institutional dynamics, and policy strategies relevant to the implementation of Indonesia's first NPP. The findings are subsequently used to formulate policy recommendations that support the effective, legally sound, and sustainable development and operation of Indonesia's first nuclear power plant.

3. Results and Discussion

3.1 Nuclear In Regulation and Planning

In 2009, Indonesia prepared, developed, and conducted a self-evaluation of its national nuclear infrastructure development status. The IAEA's Integrated Nuclear Infrastructure Review (INIR) Mission reviewed this status from November 23-27, 2009.¹¹ The INIR mission concluded that Indonesia had undertaken extensive preparatory work on most infrastructure issues, enabling the country to consider advancing from Phase 1 to Phase 2 in the IAEA's milestone methodology for introducing nuclear power.¹²

A comprehensive feasibility study was carried out over three consecutive years, from 2011 to 2013, on Bangka Island in Bangka Belitung Province.¹³ This study, conducted by the Indonesian Government through BATAN and PLN, with assistance from both domestic and international consultants, identified two potential site candidates: Bangka Barat Regency and Bangka Selatan Regency. Both sites were deemed feasible for nuclear power plant development.¹⁴ Additionally, the Ministry of Energy and Mineral Resources is preparing a white paper on a 5,000 MW(e) nuclear power plant in Indonesia. This white paper aims to serve as an information and reference source for all stakeholders involved in any decisions regarding the construction of nuclear power plants in the country.¹⁵

A study to implement a non-commercial research reactor or experimental power reactor (Indonesian Experiment Power Reactor, I-EPR) was conducted, and the basic design was obtained in 2017. The reactor is based on pebble-bed fueled HTGR technology with 10 MW(th). Based on a technology assessment and funding considerations, HTGR is one viable option, particularly related to the market need in Indonesia as it is an archipelago rich in natural mineral resources (such as are found on Kalimantan, Sulawesi, Maluku and Papua). I-EPR is expected to become a reference in commercial NPP development.¹⁶

¹¹ International Atomic Energy Agency (IAEA), "Country Nuclear Power Profiles 2018 Edition: Indonesia."

¹² Pratama, Priyatna, and Adharani, "Kesiapan Regulasi Indonesia dalam Mengelola Energi Nuklir serta Dampaknya terhadap Lingkungan Hidup."

¹³ Yanto, "Sosialisasi Transisi Energi dan Pemanfaatan Nuklir dalam Bauran Energi Indonesia di Politeknik Manufaktur Bangka Belitung."

¹⁴ Hariyadi, "Agenda-Setting Pembangunan PLTN dan Pencapaian Ketahanan Listrik (Studi di Jepara dan Pangkal Pinang)."

¹⁵ Rahmanta et al., "Nuclear Power Plant to Support Indonesia's Net Zero Emissions: A Case Study of Small Modular Reactor Technology Selection Using Technology Readiness Level and Levelized Cost of Electricity Comparing Method."

¹⁶ International Atomic Energy Agency (IAEA), "Country Nuclear Power Profiles 2018 Edition: Indonesia."

I-EPR development has several objectives, including the safe operation of small NPP demonstrations, implementation of a research and development (R&D) programme in the new and renewable energy field, increasing technology capacity in terms of NPP design, construction, operation and maintenance, as well as the capacity of NPP development project management. It is expected that through the safe operation of I-EPR, public trust in the safety of power reactors and the capacity to operate a nuclear reactor will increase. The public trust is very important to the success of large NPP development to achieve national energy sovereignty. In October 2014, the Government of Indonesia enacted KEN 2014.¹⁷ KEN 2014 is a comprehensive policy which covers both the supply and the demand sides. It serves as the main guideline in national energy management to achieve the security of the domestic energy supply.

In KEN 2014, nuclear is included in the new energy group and is considered an energy that comes from new technology according to Act No. 30 of 2007 on energy, which states that new energy is defined as energy coming from new resources, including nuclear, hydrogen, coal bed methane, liquified coal, and gasified coal. Because management of a nuclear energy programme requires high safety and security standards, especially when considering the impact of nuclear radiation hazards to the environment, nuclear energy utilization is sometimes regarded as a low-priority option.¹⁸ However, in-depth studies have been conducted regarding the technological development of nuclear energy for peaceful purposes, for fulfilling the needs of the growing energy demand by supplying national energy on a large scale and reducing carbon emissions.¹⁹

This policy direction has changed significantly following the enactment of KEN 2025. The regulation marks a fundamental shift in Indonesia's energy policy by explicitly recognizing nuclear energy as a strategic component of the national energy transition rather than merely an alternative of last resort. Nuclear energy is now positioned alongside renewable energy sources as an essential element for achieving long-term energy security, decarbonization, and net-zero emissions.²⁰ The previous policy characterization of nuclear as the "last option" has been removed, providing a stronger legal and policy foundation for the development of nuclear power plants in Indonesia.

The National Energy Policy also establishes clear and measurable targets for nuclear energy deployment. Article 12 paragraph (8) of Government Regulation No. 40 of 2025 provides that nuclear energy is expected to contribute approximately 0.4–0.5% of Indonesia's primary energy mix by 2032, increasing to 2.8–3.4% by 2040, 6.8–7.0% by 2050, and 11.7–12.1% by 2060. To achieve these targets, installed nuclear generating capacity is projected to reach approximately 35–44 GW by 2060, making nuclear power one of the country's major low-carbon electricity sources.

Achieving this level of deployment will require a substantial expansion of Indonesia's nuclear infrastructure. Assuming the use of conventional land-based reactors with capacities ranging from approximately 500 MW to 2 GW, Indonesia may need to construct between 20 and 50 nuclear power units by 2060, depending on reactor size and deployment strategy. If

¹⁷ Putro, *Perkembangan dan Program Energi Nuklir: Alternatif Energi Baru yang Aman dan Bersih?*

¹⁸ Bragg-Sitton et al., "Reimagining Future Energy Systems: Overview of the US Program to Maximize Energy Utilization via Integrated Nuclear-Renewable Energy Systems."

¹⁹ Schuelke-Leech and Leech, "The Viability of Nuclear Power as an Alternative to Renewables for Clean Energy for Climate Change Mitigation."

²⁰ Sadekin et al., "Nuclear Power as Foundation of a Clean Energy Future: A Review"; Santosa, et al., "The Role of Nuclear Power Plants in Indonesia towards Net Zero Emissions (NZE) in 2060 with a Multi Regions Approach."

the government adopts Small Modular Reactor (SMR) technology, which generally offers capacities of up to approximately 300 MW per unit, a larger number of reactors would be required to achieve the same installed capacity. Consequently, technology selection will play a critical role in determining the number, scale, location, and deployment schedule of future nuclear power plants.²¹

The government's commitment is further reinforced through the RPJPN 2025–2045 and the RUPTL 2025–2034, both of which explicitly incorporate nuclear power into Indonesia's long-term electricity development strategy. The RUPTL establishes the target of commissioning Indonesia's first 500 MW nuclear power plant by 2032, representing the first officially adopted implementation schedule for commercial nuclear power generation in the country. To support these objectives, site selection and evaluation must continue to comply with the safety standards established by the IAEA and the licensing requirements of the BAPETEN, encompassing both safety and non-safety considerations throughout the project lifecycle.

In conducting the site survey and evaluation, IAEA guidance and BAPETEN regulations related to the safety and non-safety aspects and other considerations are used as the basis for safety and non-safety analysis.²² The recent regulation in the final draft document of the RPJPN 2024–2045 has included nuclear energy as part of the national energy mix, aiming to contribute 8 GW by 2040. To achieve this target, nuclear power plant infrastructure must be constructed no later than 2030, given that the average construction time spans 10–12 years. There are several locations in Indonesia that have been identified as potential sites for NPPs. Location of each site and its recent status: Muria Peninsula, Banten, East Kalimantan, Bangka Island, West Kalimantan and Batam Island.²³ A site pre-survey for Batam Island was started in 2015. All of the potential sites were located in coastal areas owing to the availability of cooling water.²⁴

3.2 Current Status

The construction, operation, and decommissioning of nuclear reactors in Indonesia are governed by Act No. 10 of 1997 and Government Regulation No. 2 of 2014, which outline that these activities can be carried out by state-owned companies, cooperatives, or private companies. For the operation of a NPP, the operator must obtain a license or permit from BAPETEN covering site selection, construction, commissioning, operation, and decommissioning phases. Indonesia's nuclear power programme has entered a more advanced policy and planning phase following the adoption of the KEN 2025 and the RUPTL 2025–2034. For the first time, nuclear power has been formally incorporated into the national electricity development plan, with the government targeting the commissioning of the country's first commercial NPP, with an installed capacity of approximately 500 MW, by 2032–2033.

To facilitate programme implementation, the Government is in the process of establishing a Nuclear Energy Program Implementing Organization (NEPIO), in accordance with the

²¹ Şahin and Şahin, "Generation-IV Reactors and Nuclear Hydrogen Production."

²² International Atomic Energy Agency (IAEA), "Country Nuclear Power Profiles 2018 Edition: Indonesia."

²³ Wisnubroto et al., "Is West Kalimantan More Suitable for Constructing the First Nuclear Power Plant in Indonesia Compared with Bangka Belitung? Analysis of Public Surveys in Those Two Provinces"; Raditya and Hiendro, "Studi Ekonomis Pembangkit Listrik Tenaga Nuklir ThorCon Molten Salt Reactor (Studi Kasus: Dibangun di Kalimantan Barat)."

²⁴ International Atomic Energy Agency (IAEA), "Country Nuclear Power Profiles 2018 Edition: Indonesia."

milestone approach recommended by the International Atomic Energy Agency (IAEA). The NEPIO is expected to coordinate inter-ministerial policy, institutional preparation, financing, and stakeholder engagement for Indonesia's first nuclear power project. At the same time, BRIN continues to conduct site characterization studies, technology assessments, and public acceptance research, while the BAPETEN remains responsible for developing the regulatory framework and ensuring compliance with nuclear safety, security, safeguards, and licensing requirements.

Despite this significant policy momentum, Indonesia has not yet entered the construction phase of its nuclear programme. Several critical milestones remain outstanding, including the completion of environmental impact assessments, final site licensing, technology selection, investor procurement, financing arrangements, and the appointment of the project developer or owner-operator. Consequently, the programme remains in the preparatory stage of nuclear infrastructure development. Looking ahead, Indonesia's long-term energy strategy envisages a gradual expansion of nuclear power as part of the national energy mix. Government policy projects a steady increase in nuclear generating capacity toward 2060, with particular interest in advanced reactor technologies, including Small Modular Reactors (SMRs) and, potentially, floating nuclear power plants, which may offer greater flexibility for deployment across Indonesia's archipelagic geography.²⁵ Among the projects currently under discussion is a proposal to develop an advanced reactor with a capacity of approximately 500 MW in Bangka Belitung Province. However, this initiative remains at the proposal and planning stage and has not yet progressed to construction.

At present, Indonesia does not operate any commercial nuclear power reactors and therefore generates no electricity from nuclear power. The country's nuclear experience has thus far been limited to research reactors and the peaceful application of nuclear technology in areas such as research, medicine, agriculture, and industry. Nevertheless, Indonesia possesses decades of institutional and technical experience in nuclear science and regulation, providing a strong foundation for future deployment. The principal challenge now lies not in establishing policy commitments, but in translating those commitments into a licensed, financially viable, and technically implementable nuclear power project. Accordingly, Indonesia's nuclear programme can currently be characterized as being in the planning and enabling phase, rather than the construction phase, of nuclear power development.

The construction, operation, and decommissioning of nuclear reactors in Indonesia are governed by Act No. 10 of 1997 and Government Regulation No. 2 of 2014, which outline that these activities can be carried out by state-owned companies, cooperatives, or private companies. For the operation of a NPP, the operator must obtain a license or permit from BAPETEN (Nuclear Energy Regulatory Agency) covering site selection, construction, commissioning, operation, and decommissioning phases.²⁶ Despite the regulatory framework, no organization has yet been established as the owner of Indonesia's first NPP. A study conducted by BATAN (National Nuclear Energy Agency) and Korea Nuclear and Hydro Power (KHNP) recommends a turnkey contract approach for the first NPP project, emphasizing simplicity and efficiency.

Maximizing local participation in NPP construction is crucial, with initial participation targeted at 35% and aimed to increase to 80%. This requires enhancing local capabilities across various fields, including project management, engineering, mechanical and electrical systems,

²⁵ Lumbanraja and Liun, "Reviu Implementasi Thorcon Molten Salt Reactor di Indonesia."

²⁶ Pristianto et al., "The Development of Regulatory Culture and Code of Ethics for BAPETEN."

instrumentation, waste management, and more. Policies and regulations for purchasing nuclear equipment and services are still under development but must align with existing legal frameworks.²⁷ Indonesia has yet to establish a Nuclear Energy Programme Implementing Organization (NEPIO), although proposals for its formation have been submitted by the National Energy Council to the President.

Various institutions, including the BRIN, which assumed BATAN's functions following its integration in 2021, together with relevant ministries, universities, and state-owned enterprises, have played roles comparable to those typically performed by a NEPIO. Responsibilities are currently distributed among several government institutions, including the Ministry of Energy and Mineral Resources, the Ministry of Environment, the Ministry of Finance, the Ministry of National Development Planning (Bappenas), BRIN, and BAPETEN. These institutions collectively contribute to national energy policy, research and technology development, nuclear regulation, environmental oversight, financing, industrial participation, and human resource development. The division of responsibilities among the principal institutions involved in Indonesia's nuclear power programme is summarized in Table 1.

Table 1. Responsible institutions and their scope of work.

Responsible Institution	BRIN	BAPETEN	Executive Government
Scope of Work	- Nuclear safety - Stakeholder involvement - Siting - Fuel cycle and radioactive waste - Environmental protection	- Nuclear safety - Legislative work - Regulation framework - Safeguard - Radiation protection - Emergency planning - Security & physical protection	- National position - Management - Funding & financing - Electrical grid - Human resources development - Stakeholder involvement - Environmental protection - Industrial involvement and procurement

Source: Processed by the author

Although the Government of Indonesia has not made a final decision to pursue nuclear energy, the country is actively preparing for a potential first nuclear NPP development program.²⁸ This preparation includes conducting feasibility studies and addressing various infrastructure challenges. Indonesia is contemplating the NPP project through an open bid mechanism, with the chosen contract type being a turnkey approach. For the nuclear fuel cycle, an open cycle is currently favored. Under BAPETEN Regulation No. 4 of 2009 on Nuclear Reactor Decommissioning, NPP owners are responsible for decommissioning activities, including ensuring financial guarantees for these processes. Despite these

²⁷ Wijayanto and Purwanto, "Kajian Lokasi Potensial Pembangkit Listrik Tenaga Nuklir di Sebagian Pulau Sumbawa menggunakan Weighted Linear Combination."

²⁸ Rahmanta et al., "Nuclear Power Plant to Support Indonesia's Net Zero Emissions: A Case Study of Small Modular Reactor Technology Selection Using Technology Readiness Level and Levelized Cost of Electricity Comparing Method."

preparations, specific plans are still required for the implementation of a national strategy regarding nuclear energy.

3.3 *National Strategic Project*

The funding scheme for Indonesia's first NPP project remains under deliberation, with three potential options identified: conventional schemes, build-operate-transfer (BOT) schemes (including variations like build-own-operate (BOO) or build-lease-transfer (BLT)), and counter trade schemes.²⁹

A study conducted in 2006 by BATAN, PLN, and KHNP proposed a financing scheme and ownership structure for the initial NPP in Indonesia. The funding for constructing the NPP is expected to involve a combination of long-term loans and equity.³⁰ Long-term loans are anticipated to primarily finance the procurement of foreign components, likely secured through agreements with Export Credit Agencies (ECA) and commercial banks. These loans would be structured under agreements with the NPP company, which may be government-owned.

The equity portion would predominantly fund local expenditures such as land acquisition, professional fees, mobilization, and certification. Sources of equity might include funds from public utilities like PLN or other state-owned enterprises collaborating with private investors. The responsibility for funding spent fuel handling, waste management, decommissioning, and final disposal lies with the owner of the NPP. However, funding schemes provided by private investors could also be utilized, indicating potential flexibility in financing arrangements.

In recent years, significant interest from various private investors in developing NPP in Indonesia has been evident. Companies such as Thorcon Power, NuScale, and Rosatom, have actively approached the Indonesian government for investment opportunities. Thorcon, through its Indonesian subsidiary PT Thorcon Power Indonesia, has emerged as one of the leading private developers pursuing Indonesia's first commercial NPP. The company has completed feasibility and pre-engineering studies and submitted a proposal for the deployment of the 500 MW molten salt reactor on Kelasa Island, Bangka Belitung. The proposal has been developed in collaboration with the National Energy Council (DEN), government institutions, and Indonesian universities as part of the country's ongoing nuclear infrastructure preparation. A major regulatory milestone was achieved in July 2025 when BAPETEN approved the company's Site Evaluation Programme (PET) and Site Evaluation Management System (SMET), making it the first nuclear power plant licensing approval ever granted by the Indonesian Government for a commercial NPP project.³¹ However, despite growing policy support for nuclear energy, the designation of Indonesia's first NPP as a has not yet been included in the Government's current regulatory framework or development planning.

Designating the project as a National Strategic Project is deemed the most effective format to support the development and operation of Indonesia's first nuclear power plant, ensuring coordinated efforts and alignment with national goals and international commitments. For both the government and investors committed to building NPP opting for a National Strategic Project (NSP) provides a favorable roadmap through several aspects. Firstly, it offers ease in

²⁹ International Atomic Energy Agency (IAEA), "Country Nuclear Power Profiles 2018 Edition: Indonesia."

³⁰ *Ibid.*

³¹ World Nuclear News, "Regulatory approval for Indonesian site survey".

obtaining permits. According to Government Regulation No. 2 of 2014 on the Licensing of Nuclear Installations and Nuclear Fuel Utilization, which replaced Government Regulation No. 43 of 2006, a nuclear reactor can be constructed and operated after obtaining licenses from BAPETEN. These licenses include stages such as site permit, construction permit, operating license, and decommissioning permit.³²

The licensing procedure involves a five-stage process with defined evaluation periods: Site permit/license (maximum 2 years); Construction permit/license (maximum 2 years); Commissioning permit/license (maximum 1 year); Operating license (maximum 2 years); Decommissioning permit (maximum 1 year). Furthermore, Government Regulation No. 42 of 2021 on the Ease of National Strategic Projects specifies that in projects, every government agency is obliged to identify relevant permits and provide facilitative measures to the business entity. These facilitative measures are provided during planning, preparation, transaction, construction, operation, and maintenance stages.³³

In addition to these facilitative measures, ministries/agencies and local governments involved in the implementation of also benefit from procurement facilitation. This regulation not only addresses the provision of facilitative measures but also outlines the handling of social impacts, legal issues, and reporting requirements related to the progress of National Strategic Projects. Choosing the NSP designation streamlines the regulatory process and enhances coordination between government entities and private sector investors, ensuring smoother project execution and compliance with legal and social responsibilities.

Regarding licensing, the NSP provides an integrated approach with a centralized licensing process through a single window, reducing bureaucracy and expediting approvals. Stakeholders also have the option to obtain dispensations under specific conditions to accelerate project implementation. Additionally, to address potential legal issues, the government has established a Legal Task Force tasked with resolving disputes through fast and fair dispute resolution mechanisms.

Managing social impacts is also a pivotal focus under the NSP, with preparations for Environmental Impact Assessments (EIA) and Environmental Management Efforts (EME) aimed at minimizing the project's adverse environmental effects. Community empowerment programs and assurances of fair compensation and relocation for those affected are integral components of this NSP strategy.

With flexibility in land acquisition, the NSP allows the government to directly appoint parties to assist in land acquisition processes, and mandates objective and transparent land valuation assessments.³⁴ Furthermore, the NSP offers flexibility in project execution by allowing direct contractor appointments under specific conditions, facilitating changes in project design, and granting exemptions from certain taxes to alleviate project costs. The NSP status provides a comprehensive framework that fully supports expediting and streamlining the implementation of Indonesia's first NPP project. This designation is pivotal in achieving national energy goals and upholding commitments to regulatory, environmental, and social standards.

³² Hadiyantina, Cahyandari, and Puspitawati, "BAPETEN Supervisory Authority in the Procedure of Transportation of Radioactive Substance through the Sea."

³³ Sujadi, "Kajian Tentang Pembangunan Proyek Strategis Nasional (PSN) dan Keadilan Sosial (Perspektif Hukum Pancasila)."

³⁴ Aditya, Maryano, and Yani, "Kepastian Hukum dalam Pengadaan Tanah untuk Pembangunan Proyek Strategis Nasional Terkait Ganti Kerugian bagi Masyarakat yang Terdampak."

In addition to the facilitations provided throughout planning, preparation, transactions, construction, operation, and maintenance, Indonesia's NSP status for NPP is directly overseen by the Committee for Acceleration of Priority Infrastructure Provision (KPPIP), as mandated by Presidential Regulation No. 66 of 2020. This regulation tasks KPPIP with coordinating efforts alongside the National Asset Management Agency (LMAN).³⁵

Although nuclear power has been incorporated into RUPTL 2025–2034, the Government has not yet designated Indonesia's first NPP as a . Under the current framework for 2025–2029, the Government has established 77 National Strategic Projects and Programs while introducing a mechanism that allows additional strategic projects to be proposed and evaluated by the Government through Bappenas. Given the strategic role of nuclear energy in achieving national energy security, decarbonization, and long-term electricity supply, the designation of the first NPP as a remains a viable policy option. Such designation would strengthen inter-agency coordination, accelerate permitting and licensing processes, enhance investor confidence, and provide a clearer institutional framework for implementing Indonesia's first commercial nuclear power project.

4. Conclusion

Indonesia's nuclear power programme has entered a new phase of development, marked by a stronger and more explicit policy commitment than in previous decades. The enactment of RPJPN 2025–2045, KEN, and RUPTL 2025–2034 has established, for the first time, a clear legal and policy framework for the deployment of nuclear power. Unlike previous policies that regarded nuclear energy as a last-resort option, the current framework recognizes nuclear power as a strategic component of Indonesia's long-term energy transition and national energy security. The government has also adopted measurable deployment targets, including the commissioning of the first commercial NPP by 2032 and the gradual expansion of nuclear generating capacity through 2060.

Nevertheless, Indonesia remains in the planning and enabling stage of nuclear infrastructure development rather than the implementation stage. While significant institutional progress has been achieved, including preparations for establishing a NEPIO and the continued roles of BRIN and BAPETEN in research and regulation, several critical milestones remain outstanding. These include determining the project implementation model, completing site licensing and environmental assessments, selecting reactor technology, securing investment and financing, and appointing the project developer. Accordingly, the principal challenge has shifted from policy recognition to effective implementation through coordinated institutional arrangements and regulatory certainty.

To accelerate the realization of Indonesia's first NPP, the Government should establish a clear implementation strategy supported by strong institutional coordination and a predictable investment framework. One policy option is to designate the first NPP as a , which would facilitate inter-agency coordination, streamline permitting and licensing procedures, strengthen investor confidence, and improve project governance. Combined with transparent procurement processes, robust regulatory oversight, and continued international cooperation, these measures would provide a stronger foundation for delivering Indonesia's first commercial nuclear power plant and achieving the long-term objectives of the National Energy Policy. Ultimately, the success of Indonesia's nuclear programme will depend not only

³⁵ Sujadi, "Kajian Tentang Pembangunan Proyek Strategis Nasional (PSN) dan Keadilan Sosial (Perspektif Hukum Pancasila)."

on the existence of an adequate legal framework but also on the Government's ability to translate its policy commitments into timely, coordinated, and effective implementation.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Authors' Contribution

The sole author conceived and designed the study, developed the research methodology, conducted the literature review, collected and analyzed the legal materials, interpreted the findings, drafted and revised the manuscript.

Statement of the use of AI

The authors declare that, during the preparation of this manuscript, generative AI and AI-assisted technologies were used solely to refine the grammar, readability, and language expression. However, all intellectual content, data analysis, and research conclusions were independently generated, reviewed, and approved by the authors.

References

- Aditya, Muhammad Irfan, Maryano, and Ahmad Yani. "Kepastian Hukum dalam Pengadaan Tanah untuk Pembangunan Proyek Strategis Nasional Terkait Ganti Kerugian bagi Masyarakat yang Terdampak." *SENTRI: Jurnal Riset Ilmiah* 2, no. 9 (2023): 3710–3721. <https://doi.org/10.55681/sentri.v2i9.1525>.
- Aspinall, Edward, and Greg Fealy, eds. *Soeharto's New Order and Its Legacy: Essays in Honour of Harold Crouch*. 1st ed. Canberra: ANU ePress, 2010. <https://doi.org/10.22459/SNOL.08.2010>.
- Benuf, Kornelius, and Muhamad Azhar. "Metodologi Penelitian Hukum sebagai Instrumen Mengurai Permasalahan Hukum Kontemporer." *Gema Keadilan* 7, no. 1 (2020): 20–33. <https://doi.org/10.14710/gk.2020.7504>.
- Bragg-Sitton, Shannon M., Richard Boardman, Cristian Rabiti, and James O'Brien. "Reimagining Future Energy Systems: Overview of the US Program to Maximize Energy Utilization via Integrated Nuclear-Renewable Energy Systems." *International Journal of Energy Research* 44, no. 10 (2020): 8156–8169. <https://doi.org/10.1002/er.5207>.
- Government Regulation No. 40 of 2025 on the National Energy Policy (Kebijakan Energi Nasional/ KEN
- Gralla, Fabienne, Beatrice John, David J. Abson, Anders Pape Møller, Michael Bickel, Daniel J. Lang, and Henrik von Wehrden. "The Role of Sustainability in Nuclear Energy Plans—What Do National Energy Strategies Tell Us?" *Energy Research & Social Science* 22 (2016): 94–106. <https://doi.org/10.1016/j.erss.2016.09.003>.

- Hadiyantina, Shinta, Dewi Cahyandari, and Dhiana Puspitawati. "BAPETEN Supervisory Authority in the Procedure of Transportation of Radioactive Substance through the Sea." *Yustisia Jurnal Hukum* 8, no. 3 (2019): 447–461. <https://doi.org/10.20961/yustisia.v8i3.34678>.
- Hariyadi. "Agenda-Setting Pembangunan PLTN dan Pencapaian Ketahanan Listrik (Studi di Jepara dan Pangkal Pinang)." *Jurnal Ekonomi & Kebijakan Publik* 7, no. 2 (2016): 127–142. <https://doi.org/10.22212/jekp.v7i2.594>.
- International Atomic Energy Agency (IAEA). "Country Nuclear Power Profiles 2018 Edition: Indonesia." [pub.iaea.org](https://www-pub.iaea.org/pub.iaea.org/MTCDD/Publications/PDF/cnpp2018/countryprofiles/Indonesia/Indonesia.htm), 2018. <https://www-pub.iaea.org/MTCDD/Publications/PDF/cnpp2018/countryprofiles/Indonesia/Indonesia.htm>.
- Law No. 59 of 2024 on the National Long-Term Development Plan for 2025–2045 (RPJPN 2025–2045).
- Law No. 10 of 1997 on Nuclear Energy (Ketenaganukliran)
- Lumbanraja, Sahala Maruli, and Edwaren Liun. "Reviu Implementasi Thorcon Molten Salt Reactor di Indonesia." *Jurnal Pengembangan Energi Nuklir* 20, no. 1 (2018): 53–60. <https://doi.org/10.17146/jpen.2018.20.1.4083>.
- Pratama, Collin Adi, Maret Priyatna, and Yulinda Adharani. "Kesiapan Regulasi Indonesia dalam Mengelola Energi Nuklir serta Dampaknya terhadap Lingkungan Hidup." *LITRA: Jurnal Hukum Lingkungan, Tata Ruang, dan Agraria* 3, no. 1 (2023): 56–70. <https://doi.org/10.23920/litra.v3i1.1496>.
- Pristianto, Agus Yudhi, Pandu Dewanto, Zulfiandri, Dedi Hermawan, and Reno Alamsyah. "The Development of Regulatory Culture and Code of Ethics for BAPETEN." *AIP Conference Proceedings* 2525, no. 1 (2022): 110004-1–110004-8. <https://doi.org/10.1063/5.0127405>.
- Putro, Ledis Heru Saryono. *Perkembangan dan Program Energi Nuklir: Alternatif Energi Baru yang Aman dan Bersih?* Palembang: Rafah Press, 2020. <http://repository.radenfatah.ac.id/id/eprint/8464>.
- Raditya, Zeldi, and Ayong Hiendro. "Studi Ekonomis Pembangkit Listrik Tenaga Nuklir ThorCon Molten Salt Reactor (Studi Kasus: Dibangun di Kalimantan Barat)." *Journal of Electrical Engineering, Energy, and Information Technology* 8, no. 2 (2020). <https://doi.org/10.26418/j3eit.v8i2.42613>.
- Rahmanta, Mujammil Asdhiyoga, Andang Widi Harto, Alexander Agung, and Mohammad Kholid Ridwan. "Nuclear Power Plant to Support Indonesia's Net Zero Emissions: A Case Study of Small Modular Reactor Technology Selection Using Technology Readiness Level and Levelized Cost of Electricity Comparing Method." *Energies* 16, no. 9 (2023): 3752. <https://doi.org/10.3390/en16093752>.
- Rahmanta, Mujammil Asdhiyoga, Andrew Cahyo Adhi, Handrea Bernando Tambunan, Wigas Digwijaya, Natalina Damanik, and Rahmat Adiprasetya Al Hasibi. "An Analysis of National Position, Opportunity, and Challenge of Indonesia's Nuclear Program to Support Net-Zero Emissions by 2060." *Energies* 16, no. 24 (2023): 8089. <https://doi.org/10.3390/en16248089>.
- Sadekin, S. M. Sirazam, Sayma Zaman, Mahjabin Mahfuz, and Rashid Sarkar. "Nuclear Power as Foundation of a Clean Energy Future: A Review." *Energy Procedia* 160 (2019): 513–518. <https://doi.org/10.1016/j.egypro.2019.02.200>.
- Santosa, Joko, Arief Heru Kuncoro, Afri Dwijatmiko, Nurry Widya Hesty, and Arif Darmawan. "The Role of Nuclear Power Plants in Indonesia towards Net Zero Emissions

- (NZE) in 2060 with a Multi Regions Approach." *EVERGREEN: Joint Journal of Novel Carbon Resource Sciences & Green Asia Strategy* 10, no. 3 (2023): 1660–1673. <https://doi.org/10.5109/7151715>.
- Schuelke-Leech, Beth-Anne, and Timothy C. Leech. "The Viability of Nuclear Power as an Alternative to Renewables for Clean Energy for Climate Change Mitigation." In *Renewable Energy for Mitigating Climate Change*, 185–214. CRC Press, 2021. <https://doi.org/10.1201/9781003240129-10>.
- Şahin, Sümer, and Hacı Mehmet Şahin. "Generation-IV Reactors and Nuclear Hydrogen Production." *International Journal of Hydrogen Energy* 46, no. 57 (2021): 28936–28948. <https://doi.org/10.1016/j.ijhydene.2020.12.182>.
- Sujadi, Suparjo. "Kajian Tentang Pembangunan Proyek Strategis Nasional (PSN) dan Keadilan Sosial (Perspektif Hukum Pancasila)." *Jurnal Hukum Lingkungan Indonesia* 4, no. 2 (2018): 1–24. <https://doi.org/10.38011/jhli.v4i2.68>.
- Sylvia, Dara. "Politik Nuklir di Indonesia Masa Sukarno, 1958–1967." *Lembaran Sejarah* 17, no. 1 (2021): 114–122. <https://doi.org/10.22146/lembaran-sejarah.69971>.
- Wijayanto, Giant Nugroho, and Taufik Hery Purwanto. "Kajian Lokasi Potensial Pembangkit Listrik Tenaga Nuklir di Sebagian Pulau Sumbawa menggunakan Weighted Linear Combination." *Jurnal Bumi Indonesia* 9, no. 1 (2020).
- Wisnubroto, Djarot Sulistio, Ruslan Ruslan, Dimas Irawan, and Theresia Erni Wijayanti. "Is West Kalimantan More Suitable for Constructing the First Nuclear Power Plant in Indonesia Compared with Bangka Belitung? Analysis of Public Surveys in Those Two Provinces." *Indian Journal of Science and Technology* 14, no. 40 (2021): 3014–3025. <https://doi.org/10.17485/IJST/v14i40.1111>.
- World Nuclear News. "Regulatory approval for Indonesian site survey", 5 August 2026, <https://www.world-nuclear-news.org/articles/regulatory-approval-for-indonesian-site-survey>
- Yanto, Andri. "Sosialisasi Transisi Energi dan Pemanfaatan Nuklir dalam Bauran Energi Indonesia di Politeknik Manufaktur Bangka Belitung." *Jurnal Pengabdian Hukum "Besaoh"* 2, no. 01 (2022): 20–38. <https://doi.org/10.33019/besaoh.v2i01.3768>.
- Yanto, Andri, and Faidatul Hikmah. "Prospects of Nuclear Power-Based Industry as a Replacement for Depleting Tin Resources in Bangka Belitung." *Jurnal SMART: Sosial Ekonomi Kerakyatan* 1, no. 2 (2023): 1–11.
- Zohuri, Bahman. "Nuclear Energy Research and Development Roadmap." In *Small Modular Reactors as Renewable Energy Sources*, 95–116. Cham: Springer International Publishing, 2019. https://doi.org/10.1007/978-3-319-92594-3_3.