Building Energy Sovereignty in Madura: Legal Analysis, Energy Crisis, and Implementation of President Prabowo's Asta Cita

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Abstract

This study aims to analyze the legal orientation and future potential of the Nipah Reservoir in Sampang, Madura, within the framework of Indonesia's energy transition and commitment to achieve Net Zero Emissions by 2060. The main contribution of this research lies in the proposal to reinterpret reservoirs that have historically been geared toward irrigation, raw water supply, and tourism, transforming them into renewable energy projects that support both national energy sovereignty and environmental sustainability. Using juridical-normative methods through legislative and conceptual approaches, this research was enriched with electrical engineering literature and primary data through interviews with the President Director of Perum Jasa Tirta I. The results of the study show that although the Nipah Reservoir is not listed in the PLN 2024-2033 or 2025-2034 RUPTL, it has significant potential to be developed into a Microhydro Power Plant (PLTMH) and/or a Floating Solar PV (Solar PV) plant. This utilization not only reduces Madura's dependence on fossil-fuel electricity from Java but also helps achieve the target of a new renewable energy mix of 23% by 2025. This study concludes that the reinterpretation of the legal framework is essential to align old irrigation-oriented regulations with modern renewable energy policies. The recommendation of this study is that the government issue more comprehensive regulations and integrate the Nipah Reservoir into national energy planning as a model for locally based renewable energy development.

Keyword: *Energy Sovereignty in Madura, Energy Crisis, Asta Cita, Nipah Reservoir*

Introduction

The Nipah Reservoir in Sampang Regency, Madura, was a project begun during President Soeharto's era in the late 1980s and finally inaugurated in 2016, after being halted following the 1993 Nipah Tragedy.[1] With an inundation area of 81.83 hectares and a capacity of 6.13 million cubic meters, this reservoir has been utilized since its inception for irrigation, raw water supply, water resource conservation, and inland fisheries.[2] This function is legally affirmed through the 1945 Constitution Article 33 paragraph (3), the Basic Agrarian Law (Law No. 5 of 1960), the Irrigation Law (Law No. 11 of 1974), and Presidential Decree No. 55 of 1993, which all affirm the non-energy orientation.

The weakness of the regulations is evident in the outdated rules that limit reservoirs to only agricultural and irrigation functions. Modern legal frameworks, such as Law No. 17 of 2019 concerning Water Resources, Government Regulation No. 37 of 2010 concerning Dams, and Permen PUPR No. 27/2015 jo. 6/2020 & 7/2023, have actually opened up opportunities for multi-functional use, including renewable energy. However, the Nipah Reservoir is still not listed in the 2024-2033 and 2025-2034 PLN RUPTL, indicating a gap between the potential legal-technical requirements and national energy policy.

This study has a novel approach compared to previous studies. First, regarding the object of study, previous research has highlighted the potential of renewable energy beyond Madura, including geothermal in East Java, hybrid power plants at the national level, and local wisdom systems for water resource management in Bali and West Java.[3] No one explicitly discusses the Nipah Reservoir in Sampang from a renewable energy perspective. Some discuss the Nipah Reservoir, but most focus on

[1] Nadia Astriani et al., "Water Resources Management Based on Traditional Wisdom: An Environmental Law Perspective," *Legal Arena* 13, no. 02 (August 2020): 197–217, https://doi.org/10.21776/ub.arenahukum.2020.01302.1.
[2] Alfisah Nurhayati, "Revisiting Pariwisata Madura; Studi Kebijakan Pembangunan Kepariwistaan Kabupaten Sampang," *Karsa: Jurnal Sosial Dan Budaya Keislaman* 18, no. 2 (2012): 182–92, https://doi.org/https://doi.org/10.19105/karsa.v18i2.89.
[3] Astriani et al., "Water Resources Management Based on Traditional Wisdom: An Environmental Law Perspective."

its management institutions, sedimentation,[4] and the empowerment of the surrounding community.[5]

Thus, this article presents the Nipah Reservoir for the first time as a locus for renewable energy analysis and addresses Madura's electricity dependence on Java. Second, this research uses an interdisciplinary approach. If the previous study tended to be technical or socio-legal in focus, this study combines environmental law analysis, energy policy theory, the electrical engineering literature, and primary data in the form of interviews with the President Director of Perum Jasa Tirta I. This approach enhances the scientific and practical value of assessing the energy potential in the Nipah Reservoir.

Third, this study introduces a perspective on energy law that is rarely touched. The old regulations, which focused solely on irrigation, are being replaced by modern regulations that open up opportunities for renewable energy. The analysis is then deepened through the Legal Theory of Development, the Theory of Legal Certainty, and the principle of environmental sustainability. Thus, this article adds a legal dimension that has not been present in previous research, which has focused more on technical or social aspects.

Fourth, this study emphasizes the local context of Madura with national relevance. Madura remains 80% dependent on electricity from Java, making it vulnerable to an energy crisis. The offer to develop floating PLTMH and solar power plants in the Nipah Reservoir is not only a local solution for Madura's energy independence, but also a tangible contribution to the national target of a 23% renewable energy mix by 2025[6] and the Net Zero Emission 2060 commitment.[7]

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[4] Bayu Edhi Catur Sadewo, Muhammad Faiqun Ni'am, and Hermin Poedjiastoeti, "Prediction of Sedimentation Rate in the Rawapening Sub-Watershed, Semarang Regency," *Brilliant: A Journal of Research and Conceptual* 7, no. 1 (February 2022): 220, https://doi.org/10.28926/briliant.v7i1.925.
[5] Andrie Kisroh Sunyigono, Rosyida Ekawati, and Mardiyah Hayati, "Empowerment of Dislocated Communities Due to the Construction of the Nipah-Sampang Madura Dam through the Development of Sharia Tourism Village Areas," *Scientific Journal of Science* 4, no. 2 (October 2018), https://doi.org/10.21107/pangabdhi.v4i2.4940.
[6] Dewi Wuryandari, "Changes in Indonesia's New Renewable Energy Mix Target," Expert Body of the House of Representatives of the Republic of Indonesia, 2025.
[7] "Indonesia Targets Achieving Net-Zero Emissions by 2060," Brin, 2022.

This research looks even more urgent considering that Indonesia has a potential water resource of around 3,900 billion m^3 per year and ranks fifth in the world in water reserves, but only 25% can be utilized, while currently there are 244 dams covering an area of 108,183 hectares that continue to grow through the construction of 61 national strategic dams, hydropower dams, and mining waste dams so that effective management becomes crucial and brings greater benefits to the welfare of the Indonesian people.[8] This study formulates the following questions: 1) What is the legal basis that from the beginning directed the Nipah Reservoir for the functions of irrigation, raw water supply, and tourism, and was not designated as a source of electrical energy?; 2) What is the position of the Nipah Reservoir in national energy policy, especially in the 2024-2033 and 2025-2034 PLN RUPTL documents, when compared to other power plant projects in Madura?; 3) How can the principle of environmental law sustainability be used to assess the potential of the Nipah Reservoir as a renewable energy source (PLTMH and/or floating solar PV), as well as its contribution to the national energy transition and the achievement of Net Zero Emission 2060?

Methods

This research employs a juridical-normative method that combines a legislative and conceptual approach. The legislative approach is used to examine constitutional provisions, laws, and regulations related to the construction, management, and utilization of reservoirs, such as the 1945 Constitution Article 33 paragraph (3), Law No. 17 of 2019 concerning Water Resources, Government Regulation No. 37 of 2010 concerning Dams, and Permen PUPR No. 27/2015 jo. 6/2020 & 7/2023. A conceptual approach is used to interpret these norms within the framework of Development Law Theory, Legal Certainty Theory, and Environmental Sustainability Principles.

[8] Anna Rosytha and Wiel Mushawiry Suryana, "The Role of Dam Management Units in Sustainable Dam Management in the BBWS Brantas OP Task Force (Case Study of UPB Babjulmati Dam and Nipah Dam)," *Civil Engineering Orientation Research Publication (Protection)* 5, no. 1 (June 2023): 44–50, https://doi.org/10.26740/proteksi.v5n1.p44-50.

In addition, this study integrates electrical engineering literature to analyze electricity needs in Madura and the potential for developing PLTMH and floating solar power plants in the Nipah Reservoir. This study uses primary data from an interview with the President Director of Perum Jasa Tirta I, Fahmi Hidayat, as well as additional data to provide a practical perspective on reservoir management and renewable energy opportunities.

For data analysis, this study uses qualitative descriptive analysis, synthesizing legal texts, technical data, and interview results to address the problem formulation. The analysis was carried out in three stages: (1) identification of the legal framework and policy context; (2) comparison between old regulations and modern provisions related to renewable energy; and (3) interpretation of environmental sustainability principles to assess the contribution of the Nipah Reservoir to the national energy transition and the achievement of Net Zero Emission 2060.

Discussion

The Law of the Nipah Reservoir as a Non-Energy Project

Since planning began, the Nipah Reservoir in Sampang Regency was not intended as an electricity project; instead, it focused on meeting the community's basic needs, including agricultural irrigation, raw water supply, water resource conservation, and tourism development. The direction of this policy can be traced back to the underlying legal framework.[9] The Constitution, through the 1945 Constitution Article 33 paragraph (3) states: "The earth, water, and natural resources contained therein are controlled by the state and used for the greatest prosperity of the people." The article was then described in Law No. 5 of 1960 concerning Agrarian Principles (UUPA), especially Article 2 paragraph (2), which emphasizes that "The right of control from the state gives the authority to regulate and organize the designation, use, supply, and maintenance of the earth, water, and space."

[9] Andrie Kisroh Sunyigono, Rosyida Ekawati, and Mardiyah Hayati, "Pemberdayaan Masyarakat Tergusur Akibat Pembangunan Bendungan Nipah-Sampang Madura Melalui Pengembangan Kawasan Desa Wisata Syariah," *Jurnal Ilmiah Pangabdhi* 4, no. 2 (October 26, 2018), https://doi.org/10.21107/pangabdhi.v4i2.4940.

Furthermore, Law No. 20 of 1961 concerning the Revocation of Land Rights Article 1 paragraph (1) gives the President the authority to "revoke the right to land and the objects thereon for the public interest." Then, Law No. 11 of 1974 concerning Irrigation Article 5 paragraph (1) emphasizes: "Water and its sources are in essence controlled by the state and used for the greatest possible prosperity of the people."[10] Finally, Presidential Decree No. 55 of 1993, Article 5, letter b, explicitly includes "construction of reservoirs, dams, and irrigation canals" in the category of public interest projects, without mentioning their use as a source of electrical energy. This series of regulations clearly shows that, from the beginning, the Nipah Reservoir was positioned as an instrument of agrarian development and irrigation, not energy production.

When analyzed through Development Law Theory, law not only maintains order but also serves as a means of development, encouraging social, economic, and political change.[11] Legal development in the authoritarian New Order era in the early 1990s was directed to support the food sovereignty program,[12] especially rice, and has been carried out to this day,[13] remaining the government's top priority for achieving national stability and economic independence.[14] Within that framework, the Nipah Reservoir is designed to address irrigation needs in Madura, an area with limited water resources.[15] The existing regulations reflect an agrarian-centric development policy, with energy not a priority.

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[10] Maisa Maisa et al., "Legal Protection and Certainty of Land Ownership in Post-Disaster Recovery: Evidence from Indonesia, Spain, and Oman," *Journal of Law and Legal Reform* 7, no. 1 (January 26, 2026): 77–112, https://doi.org/10.15294/jllr.v7i1.19431.

[11] Lilik Mulyadi, "Descriptive Study of Analysis of the Essence of Law Studied from the Aspects of Ontology, Epistemology and Axiology of Science," 2008.

[12] Tity Wahju Setiawati, Mardjo Mardjo, and Tutut Ferdiana Mahita Paksi, "The Politics of Indonesian Agricultural Law in Facing Global Challenges," *Ius Quia Iustum Legal Journal* 26, no. 3 (September 2019), https://doi.org/10.20885/iustum.vol26.iss3.art8.

[13] Rahmat Bagja et al., "Towards Electoral Justice: Redesigning an Ideal System for Enforcing Electoral Administrative Law in Indonesia?," *Jambe Law Journal* 8, no. 2 (December 31, 2025): 781–814, https://doi.org/10.22437/9et5k513.

[14] Rachmat Syafa'at, *Political Reconstruction of Food Security Law from Food Sovereignty to Food Sovereignty* ((Universitas Brawijaya Press (UB Press), 2011).

[15] Moh. Ridhwan, "Lack of Clean Water, Minister of Defense Provides 15 Well Drilling Points in Madura," Voice of Indonesia, 2024.

On the other hand, from the perspective of Legal Certainty Theory and its implementation in Indonesia, the law must provide clarity and order, and not give rise to multiple interpretations.[16] Regulations related to the Nipah Reservoir have provided clear legal certainty by affirming its function for irrigation and the supply of raw water. This legal certainty provides stability in the direction of development and avoids differences in interpretation in the field, but it also creates legal rigidity that limits the room for adaptation.[17] As a result, the old regulations did not open up opportunities for the development of reservoir functions beyond the original orientation, including their use as an energy source. In fact, the need for clean, renewable energy is increasingly urgent[18], both for local interests in Madura and for national policies. And, Indonesia has great potential for renewable energy sources.[19]

Comparisons with modern regulations further confirm the shift in the legal paradigm to be more in favor of world climate change.[20] The old regulation emphasized reservoirs as agrarian and irrigation infrastructure for food security, whereas the new regulations actually opened up opportunities for the multi-functional use of reservoirs, including energy production. For example, Article 4, Paragraph (2), of Government Regulation No. 37 of 2010 concerning Dams expressly stipulates that dams may be used not only for raw water and irrigation, but also for power generation, fisheries, and tourism. Furthermore, Law No. 17 of 2019 concerning Water Resources emphasizes that the development and management of natural resources must ensure social, environmental, and economic balance, as well as require government permits in each use. More detailed technical rules are also contained in the Minister of Public Works and Public Works Regulation No. 27/2015

[16] Marthen Benu, "Legal Certainty for Local Investigations of Land Disputes in Civil Cases," *Scientific Journal of Ecotrans & Erudisi* 4, no. 1 (2024).
[17] Zaka Firma Aditya, "Does the Judiciary Support Legal Certainty? An Indonesian Perspective," *Frontiers in Law* 2 (2023): 15–23, https://doi.org/10.6000/2817-2302.2023.02.03.
[18] Hosam M. Saleh and Amal I. Hassan, "The Challenges of Sustainable Energy Transition: A Focus on Renewable Energy," *Applied Chemical Engineering* 7, no. 2 (2024): 1–24, https://doi.org/10.59429/ace.v7i2.2084.
[19] Anisa Ayu Solikah and Bramastia Bramastia, "Systematic Literature Review: A Study of the Potential and Utilization of New and Renewable Energy Resources in Indonesia," *Journal of New and Renewable Energy* 5, no. 1 (March 2024): 27–43, https://doi.org/10.14710/jebt.2024.21742.
[20] Sam Adelman, "A Legal Paradigm Shift towards Climate Justice in the Anthropocene," *Onati Socio-Legal Series* 11, no. 1 (2021): 44–68, https://doi.org/10.35295/osls.iisl/0000-0000-0000-1177.

jo. 6/2020 & 7/2023, which explicitly allow the use of reservoir space for fisheries, tourism, and renewable energy activities, on the condition that dam safety is maintained.[21] This shift shows that normatively, there are no longer legal obstacles to making the Nipah Reservoir a PLTMH and/or Floating Solar Power Plant.

Thus, this analysis reveals a legal dialectic among theories, philosophies, and norms that shape the development of law in Indonesia.[22] Old regulations closed the door to using reservoir energy due to a focus on food security, while modern regulations provide a clear legal framework for renewable energy use. Therefore, the urgency of this research lies in offering a legal reinterpretation of the Nipah Reservoir that is in harmony with the modern legal framework while addressing the actual needs for clean energy in Madura. This reinterpretation is not only relevant to the local context but also supports the national energy transition agenda and the vision of energy sovereignty in President Prabowo's Asta Cita.

The Position of the Nipah Reservoir in the National Energy Policy

Madura's electricity needs are relatively stable, with a peak load of around 290-300 MW and a supply capacity of 450 MW, ensuring sufficient power reserve.[23] Most of the electricity is supplied from the Java system via submarine cables and a 150 kV transmission network via Suramadu, which connects a large plant in Java with the Bangkalan substation, as well as local plants such as PLTD, solar power plants in the islands, and planned solar power plants in Sumenep. In this framework, the Nipah Reservoir primarily serves as a source of raw water, irrigation, and tourism, rather than electricity. In fact, the Nipah Reservoir is not recorded in the PLN RUPTL or in the energy development agenda for Madura.[24]

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[21] Wenyan Wu et al., "Beyond Engineering: A Review of Reservoir Management through the Lens of Wickedness, Competing Objectives and Uncertainty," *Environmental Modelling and Software* 167, no. May (2023): 105777, https://doi.org/10.1016/j.envsoft.2023.105777.

[22] Didik Irawansah et al., "Legal Dialectics: A Study of Legal Philosophy Legal Theory and Legal Dogmatics in Indonesian Legal Thought," *Fundamental: Scientific Journal of Law* 13, no. 2 (December 2024): 150–61, https://doi.org/10.34304/jf.v13i2.314.

[23] Mokhamad Dofir Rahmat Fajar, "PLN East Java Strengthens the Electricity Network in Madura, Encourages the Economy and Industry to Grow," jatimviva, 2025.

[24] Dandy Christian, "Illuminate 8,434 Residents of Remote Islands, PLN Builds Solar Power Plants in 16 Locations in Sumenep Regency," PLN, 2022.

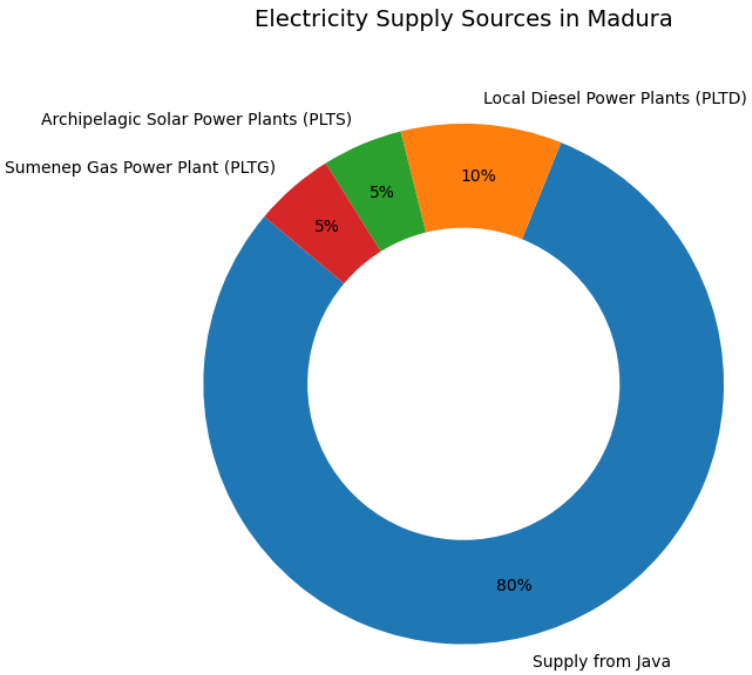


Figure 1: Electricity Supply Sources in Madura
Source: *Rachmawan Budiarto et al., Community-Based Energy Transition in Islands and Remote Areas (Yogyakarta: UGM Energy Study Center, 2019*

The analysis shows that approximately 80% of Madura's electricity still comes from Java, while local plants account for only a small share. Energy growth in Madura was recorded at 9%, despite limited energy sources, as Madura is not yet energy independent and remains vulnerable to transmission[25] disruptions. Furthermore, some existing local plants, such as diesel-fueled PLTDs and gas-based PLTG plants, are not renewable energy sources and therefore are not sustainable in the long term. Therefore, the Nipah Reservoir can serve as an alternative source of renewable energy through PLTMH and/or Floating Solar Power Plants, thereby strengthening Madura's energy independence while supporting the national clean energy transition agenda.[26]

[25] Addin Aditya, Erma Suryani, and Rully Agus Hendrawan, "Analysis of Electricity Demand to Increase the Electrification Ratio (Case Study: Madura Island)," *Science and Technology Journal of Proceedings Series*, no. 2 (May 2017): 143, https://doi.org/10.12962/j23546026.y2017i2.2312.
[26] Indra A. Aditya, Tito Wijayanto, and Dzikri F. Hakam, "Advancing Renewable Energy in Indonesia: A Comprehensive Analysis of Challenges, Opportunities, and Strategic Solutions," *Sustainability (Switzerland)* 17, no. 5 (2025): 2021–30, https://doi.org/10.3390/su17052216.

In the national energy policy, especially through the PLN 2021–2030 Electricity Supply Business Plan (RUPTL) and the 2025–2034 RUPTL,[27] The Nipah Reservoir is not listed as part of the power plant project in Madura. The RUPTL emphasizes Madura's electricity supply from the Java-Madura-Bali (Jamali) system via submarine cables (SKTT) and a 150 kV transmission network via Suramadu, as well as the construction of local power plants, including PLTD, PLTG, and solar power plants, in the Sumenep archipelago. This shows that the state has not designated the Nipah Reservoir as an electricity target, although the reservoir has the potential to be used for PLTMH and Floating Solar Power Plants as part of clean energy, in line with the transition agenda towards Net Zero Emissions 2060.[28] To realize the zero-emission target, the government has set five main principles, namely expanding the use of new and renewable energy (NRE), reducing fossil-based energy consumption, encouraging the use of electric vehicles in the transportation sector, increasing electrification in households and industries, and optimizing Carbon Capture and Storage (CCS) technology.[29]

If analyzed through the Public Policy Theory in Law, which plays an important role in solving social problems (a policy-oriented approach to law) and has a special style in Asia, then energy law is seen as a product of state policy aimed at addressing strategic needs. PLN's policy focuses on the Java-Madura interconnection because it is considered more efficient, safer, and better able to meet Madura's peak load of around 300 MW than developing a small-scale PLTMH. However, this strategy has weaknesses due to its heavy reliance on fossil fuels (PLTD diesel, PLTG gas) and on external supplies from Java. In the context of the global energy crisis, rising oil and gas prices and the volatility of fossil energy supply are driven by an imbalance

[27] Noviana Bayu Alnavis et al., "Sustainable Electrical Energy: Potential and Challenges of Providing Electrical Energy in Indonesia," *Journal of Innovation Materials, Energy, and Sustainable Engineering* 1, no. 2 (January 2024), https://doi.org/10.61511/jimese.v1i2.2024.544.
[28] "Indonesia Targets Achieving Net-Zero Emissions by 2060."
[29] Agung Pribadi, "This Is the Principle and Roadmap of the Government to Achieve Net Zero Emissions," ESDM, 2021.

between demand and production.[30] This dependence has the potential to become a structural vulnerability for Madura.

In addition, within the framework of welfare state theory,[31] in the 21st century, the state is obliged not only to provide electricity but also to ensure that its provision aligns with the principles of environmental sustainability and energy security.[32] At this point, the relevance of President Prabowo's Asta Cita point 4, "building food and energy sovereignty," becomes very real. The Nipah Reservoir was initially projected to support food sovereignty through irrigation, but its potential for renewable energy offers opportunities to advance the energy sovereignty agenda directly. By utilizing the Nipah Reservoir for PLTMH and Floating Solar Power Plants, the country is not only strengthening the clean energy transition but also contributing to achieving the 23% renewable energy target by 2025, while supporting Indonesia's long-term commitment to achieving Net Zero Emissions by 2060.[33]

Thus, even though the Nipah Reservoir is not included in PLN's RUPTL, the energy crisis situation, the national energy transition target, and Asta Cita's agenda show the urgency to review its position. The Nipah Reservoir has the opportunity to become one of the alternative solutions for clean energy, which not only supports the 2025 medium-term energy mix target, but also strengthens the steps towards the vision of food and energy sovereignty, which is a priority of the Prabowo-Gibran administration, as well as a real contribution to Net Zero Emission 2060.

Nipah Reservoir and Renewable Energy Sustainability Principles

In the context of energy development in Madura, various types of power plants exhibit distinct characteristics and implications. PLTD (Diesel Power Plant) has been widely used on small islands such as Raas, Tonduk, Goa-Goa, Masakambing and Pagerungan because it is easy to build, relatively quick to operate, and flexible on a

[30] Turgut Yokuş, "Early Warning Systems for World Energy Crises," *Sustainability (Switzerland)* 16, no. 6 (2024), https://doi.org/10.3390/su16062284.
[31] Nurul Amaliah Afrida and Luqman Hakim Habibulloh, "The Urgency of Fulfilling Citizens' Rights from the Perspective of the Welfare State in Indonesia," *Journal Of Administrative And Social Science* 4, no. 1 (December 2022): 11–22, https://doi.org/10.55606/jass.v4i1.108.
[32] Ahmed Elkhatat and Shaheen Al-Muhtaseb, "Climate Change and Energy Security: A Comparative Analysis of the Role of Energy Policies in Advancing Environmental Sustainability," *Energies* 17, no. 13 (2024), https://doi.org/10.3390/en17133179.
[33] Wuryandari, "Changes in Indonesia's New Renewable Energy Mix Target."

small scale.[34] However, dependence on PLTD raises several fundamental problems: high operational costs due to imported fuel use, supply instability when global oil prices rise, and environmental impacts, including exhaust gas emissions and air pollution that affect public health. On the other hand, the PLTG (Gas Power Plant) planned in Sumenep has a large, more stable capacity to meet peak loads. However, PLTG is still based on fossil energy, so it is not free from risks such as gas supply crises, limited distribution infrastructure, and high investment costs that burden the national energy budget. Thus, although these two types of plants provide short-term electricity supply, they are unsustainable and inconsistent with the clean energy transition agenda. A study in Turkey has proven this.[35]

On the other hand, renewable energy-based plants are beginning to be built in Madura, albeit on a limited scale. Solar Power Plants (Solar Power Plants) have been developed in several Sumenep islands, such as Tonduk and Goa-Goa.[36] This technology is considered environmentally friendly. The cost of panels is decreasing as technology advances, making them suitable for electrifying remote rural areas. However, the limitations of solar power plants include their dependence on sunlight intensity, the need for large land areas, and the requirement for an energy storage system (a battery) that is expensive and may generate hazardous waste in the future. Even in Guluk-Guluk Village, the kiai and the community refused to cut down trees that threatened the spring water source on the PLTS Development project's land.[37] This will certainly not happen if the solar power plant is placed on top of the Nipah Reservoir, because it does not cause environmental damage to the land used. As has been done by the government at the Cirata Solar Power Plant, which is capable of producing 14 Gigawatt (GW).[38]

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[34] Dadang Kurnia, "PLN East Java Inaugurates Power Plants in Nine Islands," Republika, 2019.
[35] Moses Jeremiah Barasa Kabeyi and Oludolapo Akanni Olanrewaju, "Diesel Power Plants: Design and Operation and Performance Enhancement," no. February (2023): 3164–3164, https://doi.org/10.46254/eu05.20220425.
[36] Temmy P, "PLN's New Renewable Energy Program Makes Small Islands No Longer Remote," Beritajatim, 2024.
[37] "It Is Considered That It Will Damage the Environment, Kiai and the Residents of Sumenep Reject the Solar Power Plant Project of Hundreds of Hectares," Mediajatim, 2025.
[38] Genny Jati, "The Big Role of Floating Solar Power Plants to Realize the 2025-2034 RUPTL," IESR, 2025.

In this context, the Nipah Reservoir has the potential to be developed into a PLTMH and/or a Floating Solar Power Plant. This potential is interesting because PLTMH and Floating Solar Power Plants have several advantages over PLTD, PLTG, and land-based solar power plants. First, PLTMH is based on clean, renewable water energy, so it does not cause carbon emissions or air pollution, as reported in the study results in China.[39] Second, the operating costs are relatively low because the energy source is derived from the reservoir's water flow, which is already available. Third, PLTMH can be run in parallel with the main functions of the Nipah Reservoir, namely agricultural irrigation and raw water supply, thereby providing dual benefits (multi-purpose use). Fourth, PLTMH has socio-economic potential, as it empowers local communities,[40] creates new jobs in system management and maintenance, and enhances regional energy independence.[41] Although the scale is relatively small and highly dependent on water discharge, PLTMH remains relevant as a complement to Madura's local energy supply, enabling a significant increase in the share of clean energy. Fifth, there is no need to acquire land to build floating solar PV. Moreover, a comparative study of the Philippines and Indonesia shows that land procurement for the Wind Power Plant (PLTB) has sparked social conflicts and even allegations of budget corruption.[42]

This comparison shows that fossil energy sources, such as PLTD and PLTG, tend to be unsustainable, both in terms of environment, economy, and geopolitics, while renewable energy, such as solar power plants and PLTMH, is more in line with the clean energy transition agenda, environmental sustainability, and national

[39] Caihong Tang et al., "Study on Carbon Emissions of a Small Hydropower Plant in Southwest China," *Frontiers in Environmental Science* 12, no. September 2020 (2024): 1–12, https://doi.org/10.3389/fenvs.2024.1462571.
[40] Ridwan Arifin et al., "Building a Model for Refugee Rights Fulfillment: Community Collaboration at Cisarua Refugee Learning Centre in the Context of International Law," *Indonesian Journal of Legal Community Engagement* 8, no. 2 (2025): 469–92, https://doi.org/https://doi.org/10.15294/jphi.v8i2.33111.
[41] Nurhasan, Bunyamin, and Andian Achya Dzikriyyah Khoirudin, "Peran Kearifan Lokal Dalam Mewujudkan Prinsip Keberlanjutan Lingkungan Hidup Di Indonesia," *LITIGASI* 26, no. 1 (April 2025): 382–408, https://doi.org/10.23969/litigasi.v26i1.19691.
[42] Frankline A. NDI, "Land Acquisition, Renewable Energy Development, and Livelihood Transformation in Rural Kenya: The Case of the Kipeto Wind Energy Project," *Energy Research and Social Science* 112, no. March (2024): 103530, https://doi.org/10.1016/j.erss.2024.103530.

energy independence.[43] Therefore, designating the Nipah Reservoir as a PLTMH not only strengthens the renewable energy mix in Madura but also supports President Prabowo's Asta Cita on energy sovereignty and the national target of a 23% renewable energy mix by 2025. Thus, the reinterpretation of the Nipah Reservoir's function from an agrarian and irrigation instrument to a part of a clean energy strategy is a strategic step with legal, political, social, and ecological relevance.

Conclusion

This study concludes that the legal framework that underlies the construction of the Nipah Reservoir, starting from Article 33 paragraph (3) of the 1945 Constitution, the 1960 Basic Agrarian Law, the 1974 Irrigation Law, and Presidential Decree No. 55 of 1993, affirms the orientation of the reservoir on the function of irrigation, raw water supply, and tourism. This orientation reflects the development priorities during the New Order period, which focused more on food security than on energy security, as well as on creating legal certainty that limits the scope for reinterpretation of reservoir functions. On the contrary, modern regulations such as Law No. 17 of 2019 concerning Water Resources, Government Regulation No. 37 of 2010 concerning Dams, and Permen PUPR No. 27/2015 jo. 6/2020 & 7/2023 actually open up a normative space for the use of reservoirs for renewable energy. However, the Nipah Reservoir is still not listed in the 2024–2033 and 2025–2034 PLN RUPTL, which still depends on interconnection with Java and the dominance of fossil-based plants.

This condition underscores the urgency of reinterpreting the Nipah Reservoir's function within the framework of environmental sustainability and energy transition. The development of the Nipah Reservoir as a floating PLTMH and solar PV is not only a local solution to reduce Madura's energy dependence on Java, but also makes a strategic contribution to the achievement of the target of a new and renewable energy mix of 23% by 2025, as well as Indonesia's long-term

[43] Moh. Muhibbin et al., "Flood Governance and Spatial Planning Failures in Batu City: A Socio-Legal Study on Risk Mitigation," *Administrative and Environmental Law Review* 6, no. 2 (January 2026): 161–76, https://doi.org/10.25041/aelr.v6i2.4462.

commitment towards Net Zero Emission 2060. Therefore, the Nipah Reservoir needs to be repositioned as part of Indonesia's clean energy strategy and integrated into national planning as a model of locally based renewable energy development that aligns with President Prabowo's Asta Cita regarding food and energy sovereignty.

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