



REALIGNING INDONESIAN WASTE-TO-ENERGY POLICIES WITH SDG 11: ANALYSIS OF LEGAL COMPLIANCE AND ITS IMPLICATIONS

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ABSTRACT

To date, Indonesia is still grappling with waste management issues, which is a significant obstacle to realizing Sustainable Development Goals (SDG) 11. One of the ways to deal with this issue is through the development of the waste-to-energy (WtE) system, which can be utilized to transform waste into precious energy resources. However, this system must also be supported with robust legal compliance to ensure that its development is not solely focused on generating profits through energy production but also meets its noble purpose of improving sustainability as conceptualized within SDG 11. This study utilizes the normative legal research method, along with a statutory approach. Analysis of this study finds that the current Indonesian legal framework is insufficient in providing a robust mechanism of compliance to ensure that the waste-to-energy system can contribute to the broader waste-management issues and their ramifications, specifically due to the lack of recognition of the unique intricacies of the development of WtE systems, along with the lack of normative implementation of SDG 11. The paper proposes a model of normative construction to cover these issues as a way of ensuring growth and environmental sustainability in Indonesia, particularly regarding waste management.

A. INTRODUCTION

Environmental damages have contributed massively to the rapid acceleration of climate change, which has threatened the well-being of many communities around the world.¹ The global impact of climate change has made it a global issue, raising the social awareness of many people on the impacts of some human activities and how they might indirectly affect the well-being of many communities by accelerating climate change.² Indonesia, as an archipelagic country, is significantly threatened by climate change impacts and other environmental issues, making the protection of the environment efforts a priority in its development agenda. The rising number of populations,³ the outermost islands' submersion risk due to rising sea levels,⁴ and the environmental neglect associated with economic growth have raised the urgency for adaptive and proactive measures in environmental policies in Indonesia.⁵ This urgency must be met with a framework of actions to tackle climate change and its impacts.

Sustainability came as a concept to fill the gap in understanding how correlations in economic growth, environmental protection, and social equity can be integrated and balanced for the long-term welfare and survival of both humanity and the planet.⁶ In the environmental context, sustainability is particularly important in making sure that every person, including the next generation, can enjoy the right to live in a suitable environment. Sustainability itself is embedded within the broader framework of goals called Sustainable Development Goals (SDGs), which were designed to provide a comprehensive blueprint for achieving a more sustainable future by the year 2030 by addressing many critical global issues, including environmental issues.⁷

¹ Ronald E Anderson. "Well-Being, Future Generations, and Prevention of Suffering from Climate Change." In *Alleviating World Suffering: The Challenge of Negative Quality of Life*, ed. Ronald E Anderson (Cham: Springer International Publishing, 2017), 434.

² Anna Lehtonen et al. "A Pedagogy of Interconnectedness for Encountering Climate Change as a Wicked Sustainability Problem." *Journal of Cleaner Production* 199 (2018): 863.

³ B Widodo et al. "Analysis of Environmental Carrying Capacity for the Development of Sustainable Settlement in Yogyakarta Urban Area." *Procedia Environmental Sciences* 28 (2015): 520.

⁴ Iin Karita Sakharina et al. "Sinking or Not? An Indonesian Approach to Prevent the Rise of Sea Levels Due to Global Warming." In *ASEAN International Law*, ed. Eric Yong Joong Lee (Singapore: Springer Nature Singapore, 2022), 650.

⁵ Bernard Nainggolan. "Strategies for Implementing Progressive Law for Societal Development and Economic Growth." *International Journal of Law Reconstruction* 7, no. 2 (2023): 272.

⁶ Viriya Taecharungroj, Thunwadee Tachapattaworakul Suksaroj, and Cheerawit Rattanapan. "The Place Sustainability Scale: Measuring Residents' Perceptions of the Sustainability of a Town." *Journal of Place Management and Development* 11, no. 4 (January 2018): 371.

⁷ Michael U Ben-Eli. "Sustainability: Definition and Five Core Principles, a Systems Perspective." *Sustainability Science* 13, no. 5 (2018): 1337.

One of the many ways to improve environmental sustainability is waste-to-energy (WtE) systems,⁸ which transform waste materials into various forms of energy, such as electricity or heat, thereby reducing landfill usage and generating renewable energy from otherwise discarded resources. In the context of waste-to-energy policies, there needs to be regulation that ensures the actual utilization of such systems, with real implications for the application of SDG 11, which focuses on sustainable cities and communities. It is also essential to analyze the utilization of these policies to ensure that waste-to-energy systems are not applied merely for compliance, which would defeat their purpose and hinder the realization of the SDGs in general.⁹ Other regulations that can indirectly affect these systems also need to be extensively analyzed to ensure normative harmony within the broader environmental regulatory framework.

A key theoretical consideration is the role of legal capacity in advancing sustainable practices in Indonesia, particularly through the concept embedded within SDG 11. Comprehensive legal analysis is vital within the context of the SDGs to close potential normative gaps where stakeholders might exploit relevant regulations to appear sustainable without making actual positive impacts. This practice creates superficial compliance and essentially erodes the integrity and effectiveness of relevant legal frameworks.¹⁰ Furthermore, it is essential to integrate a system of checks and balances within the legal framework, ensuring that all sustainable development initiatives are evaluated for their environmental impact and adherence to the principles of sustainability, thus preventing the exploitation of legal loopholes through greenwashing practices.¹¹ By strengthening the legal infrastructure, Indonesia can create a robust foundation for sustainable practices that not only meet the standards of international commitments but also resonate with the local needs and realities.

To ensure sustainability compliance among all stakeholders, it is imperative to first analyze whether the legal framework for such compliance is normatively sufficient. In the context of waste-to-energy policies, there needs to be regulation that ensures the actual utilization of such systems, with real

⁸ Budiman and Abdul Kadir Jaelani. "The Policy of Sustainable Waste Management Towards Sustainable Development Goals." *Journal of Human Rights, Culture and Legal System* 3, no. 1 (2023): 70.

⁹ Deepika Saxena, Neelam Dhall, and Rashika Malik. "Sustainable Banking: A Roadmap to Sustainable Development." *Corporate Governance and Sustainability Review* 5, no. 3 (2021): 43.

¹⁰ Radu Mares. "Regulating Transnational Corporations at the United Nations—the Negotiations of a Treaty on Business and Human Rights." *International Journal of Human Rights* 26, no. 9 (2022): 1524.

¹¹ Daniel Cushing Esty. "Red Lights to Green Lights: From 20th Century Environmental Regulation to 21st Century Sustainability." *Environmental Law* 47, no. 1 (2021): 33.

implications for the application of SDG 11, which focuses on sustainable cities and communities. It is also essential to analyze the utilization of these policies to ensure that waste-to-energy systems are not applied merely for compliance, which would defeat their purpose and hinder the realization of the SDGs in general. Other regulations that can indirectly affect these systems also need to be extensively analyzed to ensure normative harmony within the broader environmental regulatory framework.

The literature on waste-to-energy (WtE) systems predominantly focuses on the technological and environmental aspects. A study has emphasized the potential of WtE systems in mitigating landfill use and reducing greenhouse gas emissions.¹² The study highlights the technical efficiencies and environmental benefits of various WtE methods, such as incineration and anaerobic digestion, as one integrated system that could create many benefits. These potentials essentially reflect the benefits of the WtE system as a response to the increase in waste generation and its negative impacts on environmental sustainability. Furthermore, another study also delved into the economic viability of these systems, examining cost-benefit analyses and the long-term financial implications for urban areas.¹³ It underscored the WtE system's potential as a sustainable solution for waste management. However, none of the mentioned literature connects the WtE systems to the broader impacts and application of SDGs, particularly SDG 11. This gap is crucial as the main advantage of WtE systems is their ability to reduce waste while also providing an alternative source of energy, which are both important in improving sustainability.

There is a study focused on the implications of SDGs, highlighting the principles embedded within SDG 11 and the broader implications of other SDGs.¹⁴ The limitation of this study is the lack of legal analysis on the implications of WtE systems. Other researchers have explored the alignment of renewable energy regulations as a broader implication of sustainable practices, critiquing the gaps and challenges in the current legal framework.¹⁵ Studies have pointed out the potential loopholes that allow for superficial compliance. The study was done to highlight the regulatory aspects of energy but ended up only explaining the development of the legal framework in

¹² Ying-Chu Chen and Shang-Lien Lo. "Evaluation of Greenhouse Gas Emissions for Several Municipal Solid Waste Management Strategies." *Journal of Cleaner Production* 113 (2016): 607.

¹³ Masahiko Haraguchi, Afreen Siddiqi, and Venkatesh Narayanamurti. "Stochastic Cost-Benefit Analysis of Urban Waste-to-Energy Systems." *Journal of Cleaner Production* 224 (2019): 751.

¹⁴ Moshood Akanni Alao, Olawale Mohammed Popoola, and Temitope Raphael Ayodele. "Waste-to-energy Nexus: An Overview of Technologies and Implementation for Sustainable Development." *Cleaner Energy Systems* 3 (2022): 7.

¹⁵ Ridoan Karim, Farahdillah Ghazali, and Abdul Haseeb Ansari. "Renewable Energy Regulations in Indonesia and India: A Comparative Study on Legal Framework." *Journal of Indonesian Legal Studies* 5, no. 2 (2020): 362.

Indonesia, along with the comparison to India. There was also no explanation of the prevention of superficial compliance through specific methods of regulatory inspection.

There is a research gap in analyzing the legal capacity in Indonesia, particularly in making sure that WtE systems are utilized in a way that benefits the environment rather than just bringing benefits. The understanding of this issue is particularly important for Indonesia as it edges closer to the SDGs deadline, which is 2030. The key focus of this study is the analysis of legal capacity, including a comprehensive analysis of the existing norms and the prevention of superficial compliance. The analysis consists of the identification of conceptual and legal urgency for the improvement of SDG 11 as the basis of the analytical framework, followed by normative analysis to highlight the relevant legal problems and the development of normative construction for future legal development to fix the identified problems.

B. RESEARCH METHODS

This study utilizes the legal normative research method to provide a comprehensive analysis of the existing norms within the relevant positive laws,¹⁶ and to analyze the legal capacity of Indonesia to ensure sustainable cities and communities as conceptualized in SDG 11 through a waste-to-energy system. Legal normative research is a methodological approach within the field of legal studies that focuses on the analysis and interpretation of existing legal norms, principles, and doctrines.¹⁷ This type of research seeks to understand and evaluate the effectiveness and appropriateness of legal rules and standards by examining the underlying legal sources, such as statutes, regulations, and judicial decisions. Data used in this research are secondary data in the form of primary law sources, namely the 1945 Constitution, Law No. 30 of 2007 on Energy, Law No. 32 of 2009 on Environmental Protection and Management, Presidential Regulation No. 35 of 2018 on the Accelerations of the Development of Waste-to-Energy Processing Plants Based on Environmentally Friendly Technology, Presidential Regulation No. 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply.

¹⁶ Hari Sutra Disemadi. "Lenses of Legal Research: A Descriptive Essay on Legal Research Methodologies." *Journal of Judicial Review* 24, no. 2 (2022): 290.

¹⁷ David Tan. "Metode Penelitian Hukum: Mengupas Dan Mengulas Metodologi Dalam Menyelenggarakan Penelitian Hukum." *NUSANTARA: Jurnal Ilmu Pengetahuan Sosial* 8, no. 8 (2021): 2463.

C. RESULT AND DISCUSSION

1. Conceptual and Legal Urgency for a Comprehensive Legal Framework for Sustainable Practices According to SDG 11

Sustainability in Indonesia remains a pressing issue that needs serious attention from the government.¹⁸ It's particularly important as Indonesia is closing in on the SDGs deadline in 2030, combined with the continued acceleration of climate change and the worsening of its impacts. To tackle these problems, Indonesia needs not only to minimize environmental degradation but also to continue to look for ways to navigate around climate and environmental problems while striving for innovations that can solve many climate and environmental problems. Furthermore, the effort for this must be aligned with unique challenges that exist within different areas in Indonesia, along with the focus on meeting the goal conceptualized within SDG 11, which is sustainable cities and communities. More importantly, this also needs to be supported by an adequate legal framework to ensure that the effort is done without hurting the public interest in general and can maintain balance in the middle of many stakeholder interests.

SDG 11 is conceptualized to dedicate efforts to making cities and human settlements inclusive, safe, resilient, and sustainable, with a strong emphasis on improving urban environments. Within its framework, specific targets and indicators are directly linked to enhancing waste management and promoting sustainable urban living spaces. For example, target 11.6 aims to significantly reduce cities' environmental impacts by 2030, particularly through better waste management, which is even better applied through the development of WtE systems.¹⁹ This principle is crucial because managing urban waste effectively is not only about reducing pollution but also about applying a holistic sustainability approach by utilizing WtE systems while improving environmental awareness.²⁰ Thus, SDG 11's approach to waste management is inherently tied to broader objectives of sustainability, with its relevance underscored in urban settings where the challenge of managing increasing volumes of waste is most acute, making it a pivotal area for interventions aimed at achieving a more sustainable urban future.

Indonesia faces significant waste management challenges, with implications that span environmental, social, and economic dimensions.

¹⁸ Indriati Amirullah et al. "Environmental Sustainability for Urban Areas in Indonesia: Strategies, Challenges, and Future Directions." *Migration Letters* 20, no. S9 (November 2023): 197.

¹⁹ Imran Khan and Zobaidul Kabir. "Waste-to-Energy Generation Technologies and the Developing Economies: A Multi-Criteria Analysis for Sustainability Assessment." *Renewable Energy* 150 (2020): 322.

²⁰ Gabriella Esposito De Vita et al. "A Collaborative Approach for Triggering Environmental Awareness: The 3Rs for Sustainable Use of Natural Resources in Ulaanbaatar (3R4UB)." *Sustainability (Switzerland)* 15, no. 18 (2023): 17.

Annually, the country generates around 68 million tons of waste, a figure on track to continue to rise due to urbanization, population and economic growth, along with technological advancements.²¹ Indonesia has made efforts to improve its waste problem, with 2021 data from the Ministry of Environment and Forestry (*Kementerian Lingkungan Hidup dan Kehutanan/KLHK*) showing 16,23% in waste reduction, showing an increase from 14,58% in 2020, despite waste management remained stagnant in 34,60% from 2020 to 2021.²² Indonesia also aims to get 30% of waste recycled and 70% managed by 2025. However, this can be considered highly ambitious, considering the fact that the increase from 2020 to 2021 doesn't reflect a promising trajectory that can make 2025 a fitting deadline. Therefore, Indonesia needs first to analyze the problems and then find innovative solutions to make the 2025 deadline more realistic.

Furthermore, diseases related to poor sanitation and waste management can also be rampant in many urban areas, highlighting the direct link between inadequate waste handling and urban health crises. Economically, waste management also requires efficiency, which can also be accommodated with WtE systems, to ensure that wastes can be used for energy instead of not being managed improperly to the point that they pollute the environment. A sustainable environment, in turn, can also attract investments into cities as it makes cities more conducive to business through better special interaction.²³ Furthermore, the informal sector plays a crucial role in waste collection and recycling. Yet, it remains undervalued and under-supported, affecting the livelihoods of thousands who rely on waste as a source of income. The cumulative effect of these challenges underscores the urgency of addressing waste management in Indonesia to protect environmental well-being, promote social justice, and harness economic opportunities, all of which are important for Sustainable Development Goals (SDGs).

The conceptual need for a comprehensive legal framework that aligns with SDG 11 is pivotal, as it can significantly enhance the effectiveness of sustainable urban planning and waste management strategies. The relationship between WtE systems and SDG 11 needs to be manifested as a part of the sustainability legal framework to offer an innovative way of dealing

²¹ Aviaska Wienda Saraswati. "The Threat of Indonesian Waste Management Problem." *Greeneration Foundation*, February 3, 2022. <https://greeneration.org/en/publication/green-info/the-threat-of-indonesian-waste-management-problem/>.

²² AHK Indonesia. "Indonesia's Waste Management Sector Still Going Strong." *AHK Indonesia (EKONID)*, May 4, 2021. <https://indonesien.ahk.de/id/infocenter/berita/berita/indonesias-waste-management-sector-still-going-strong>.

²³ Hailing Zhou, Yan Liu, and Miao He. "The Spatial Interaction Effect of Green Spaces on Urban Economic Growth: Empirical Evidence from China." *International Journal of Environmental Research and Public Health* 19, no. 16 (2022): 3.

with waste management issues by turning wastes into precious resources in the form of energy. Such a framework can also mandate the adoption of waste-to-energy technologies, not just as an alternative to landfilling but as a renewable energy source, contributing to urban energy needs while mitigating environmental pollution. Additionally, sufficient legal norms can ensure that these initiatives are implemented in a socially equitable manner, addressing potential disparities in access to the benefits of such technologies. Ultimately, the establishment of a comprehensive legal framework aligned with SDG 11 can drive the systemic changes needed to transition towards more sustainable and resilient urban development pathways.

2. State of The Art of Indonesia's Waste-to-Energy Policies

Energy, in general, is governed by Law No. 30 of 2007 on Energy, which sets the basic legal norms on energy-related issues and developments. This law defines energy through Article 1 No. 1, which states that energy is the ability to do work, which can be in the form of heat, light, mechanics, chemistry, and electromagnetic.²⁴ The most relevant element when it comes to waste-to-energy (WtE) provided by this law is the conceptualization of 'new energy', which is defined in Article 1 No. 5 as energy that comes from new energy sources. Unlike fossil, geothermal, large-scale hydro, and nuclear energy sources, the Indonesian government allows the privatization of new energy. This is reflected by the contrast difference between Article 4 paragraph (1), which governs that the mentioned energies are controlled by the state and utilized for the greatest prosperity of the people, while Article 4 paragraph (2) governs that new energy resources and renewable energy resources are regulated by the state and utilized for the greatest prosperity of the people. Through this, it can be seen that the government acts as a supervisor and regulator.

Furthermore, the central and local governments also have the responsibility to improve new energy resources, as governed by Article 20 paragraph (4), which states that the provision of new energy and renewable energy must be increased by the Government and local governments in accordance with their authority. The utilization of it must also be supported by central and local government, as governed by Article 21 paragraph (2). The more concrete example of the government's role in new energy, including WtE systems, can perhaps be seen in Article 20 paragraph (5) and Article 21 paragraph (3), where companies developing new energy are said to be able to receive incentives and other resources that can increase convenience in the development and the provision of new energy. Research and development

²⁴ Muhamad Azhar and Dendy Adam Satriawan. "Implementasi Kebijakan Energi Baru Dan Energi Terbarukan Dalam Rangka Ketahanan Energi Nasional." *Administrative Law and Governance Journal* 1, no. 4 (2018): 403.

(R&D) regarding new energy is also said to be supported both by the central and local government, by Article 29.

The Indonesian government then takes it one step further through Article 30 paragraph (3) by stipulating that the development and utilization of research results on new energy and renewable energy are financed from state revenues derived from non-renewable energy. Support for R&D is important, as R&D plays a massive role in the development of new energy, including waste-to-energy systems, and holds a particularly high relevance in Indonesia, where R&D isn't often as advanced and as significant as that of other countries, but nevertheless important for future advancements.²⁵ However, this can create ambiguity, particularly in the realm of ownership of private companies that develop new energy, including the ones that do it through a WtE system. Therefore, the stakes that the government has in the development of WtE systems can be significant and need to be further regulated. A clear distinction needs to be made, particularly regarding how the government positions itself regarding this issue, to properly categorize the finance provided by the government as an investment or as an incentive.

Sustainability has to be manifested within relevant regulations, particularly when it's closely related to the environment. This is mandated by Article 28H paragraph (1) of the 1945 Constitution, which guarantees the right to a safe and healthy environment for all Indonesians.²⁶ Unfortunately, the Energy Law doesn't make any provision in the form of sustainability compliance, particularly regarding the development of new energy. This is a crucial problem because the development of new energy itself can also have negative impacts on the environment, especially when it utilizes wastes that can pollute the environment.²⁷ This is also important in realizing SDG 11, as waste management directly contributes to the success of applying sustainability.²⁸ A system of compliance that is often used in many fields in Indonesia is the utilization of environmental impact assessment (EIA), or what is often referred to as *Analisis Mengenai Dampak Lingkungan* (AMDAL). However, this can't be the only system available as new energy itself, let alone waste-to-energy specifically, can have different environmental implications that AMDAL might not sufficiently cover.

²⁵ Maxensius Tri Sambodo et al. "Breaking Barriers to Low-Carbon Development in Indonesia: Deployment of Renewable Energi." *Heliyon* 8, no. 4 (2022): 7.

²⁶ Setia Untung Arimuladi. "The Ecocracy of Water Resource on Water Cultivation Rights in Realizing Soil and Water Conservation." *Jurnal Pembaharuan Hukum* 9, no. 2 (2022): 173.

²⁷ Wajeeha A. Qazi et al. "Waste-to-Energy Technologies: A Literature Review." *Journal of Solid Waste Technology and Management* 44, no. 4 (2018): 390.

²⁸ Aumnad Phdungsilp. "Waste Management and Its Contribution to the Sustainable Development Goals at Dhurakij Pundit University, Thailand." *Journal of Sustainability Perspectives* 2, no. 1 (2022): 65.

EIA is governed introduced by Law No. 32 of 2009 on Environmental Protection and Management (EPM Law). Through Article 1 No. 11, EIA is defined as the assessment of the significant impact of a planned business and/or activity on the environment that is necessary for the decision-making process regarding the implementation of the business and/or activity. A normative restriction comes in Article 28, which governs the requirement of a certificate of competence in preparing an EIA, which is required by someone who compiles an EIA. WtE projects demand an in-depth understanding of diverse waste treatment technologies, the specific environmental impacts associated with these technologies, and the complex dynamics of waste composition and management. Additionally, comprehending the lifecycle and indirect impacts of WtE projects requires expertise in lifecycle analysis and a system thinking approach. Effective stakeholder and community engagement are also critical for addressing public concerns about pollution and health impacts, which further necessitates advanced skills in communication, stakeholder analysis, and conflict resolution. Hence, a more specialized training and certification tailored to the unique challenges of WtE systems is crucial.

This restriction differs from mere compliance with the actual effort to realize SDG 11 by not only better waste management but also the utilization of wastes to turn them into precious resources in the form of energy. Furthermore, another law that covers the utilization of WtE systems is Presidential Regulation No. 35/2018 on the Accelerations of the Development of Waste-to-Energy Processing Plants Based on Environmentally Friendly Technology (Presidential Regulation 35/2018). This is the first and currently remains the only legal framework specifically designed to regulate the utilization of WtE systems. It refers to WtE systems as Waste-based power plants. Article 1 No. 6 stipulates that a Waste-Based Power Plant, hereinafter referred to as PLTSa (*Pembangkit listrik tenaga sampah*), is a Waste processing into electrical energy based on environmentally friendly technology that meets quality standards in accordance with statutory provisions and can significantly reduce the volume of waste and is tested.

Compliance regarding PLTSa is supposedly covered by Article 8 and 9. However, none of these articles provides any solid framework of compliance that specifically governs all the necessities that are unique for WtE systems in general, let alone their SDG 11 implications. Article 8 only covers the pre-feasibility study of PLTSa development, which includes studies of legal, institutional, funding, socio-cultural, and technological aspects in the context of assignment or competition as a form of accelerating PLTSa development. The contents of the study include the amount of waste per day, waste composition, land conditions and availability, special conditions and

requirements needed, water availability and water sources, residue settlement and/or treatment, and project implementation schedule. Despite the mention of funding and socio-cultural factors, the study doesn't include any of these two aspects.

Furthermore, it also lacks recognition in economic studies. Despite its potential, a WtE plant can also have net negative economic impacts when the production is stifled due to different issues, such as variability of the volume of wastes processed.²⁹ Another economic impact that is perhaps often overlooked is property purchases, as evidenced in China, where citizens actively try to stay away from WtE plants when purchasing property due to their perceived risks, which, in the end, can significantly impact the price of those properties.³⁰ This highlights the issue of community engagement, which is also found in the preparation of the AMDAL document, where relevant stakeholder opinions have limited impacts on decision-making processes.³¹

Article 9, on the other hand, doesn't provide any significant provision that can be considered technical-in-nature when it comes to WtE systems in general. Instead, it only refers to other requirements that are already required by another legal framework, with one being AMDAL, as analyzed before, which is far from sufficient to provide enough aspects of legal compliance to protect the environment. The weaknesses in Article 8 and 9 ultimately highlight the problems with the Indonesian legal framework to support the development of WtE systems, with the lack of purposes and standards being the most commonly identified theme. Despite acknowledging the importance of SDGs, SDG 11, as the most relevant framework for WtE systems, never seemed to be used as the guiding principle for the development of policies regarding WtE or what the Indonesian legal framework refers to PLTSa.

There is, however, a missed opportunity from the legislative standpoint, particularly in Presidential Regulation No. 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply (Presidential Regulation 112/2022). This legal framework is supposed to be the main framework for the government's effort to accelerate the development of renewable energy, where it governs aspects of many forms of energy plants. Despite the mention of other renewable energy plants (e.g., solar power plants, photovoltaic power plants, water power plants, etc.), WtE or PLTSa isn't mentioned. It can be

²⁹ Sieting Tan et al. "Economical and Environmental Impact of Waste-to-Energy (WTE) Alternatives for Waste Incineration, Landfill and Anaerobic Digestion." *Energy Procedia* 61 (2014): 704.

³⁰ Chuanwang Sun, Xiaochun Meng, and Shuijun Peng. "Effects of Waste-to-Energy Plants on China's Urbanization: Evidence from a Hedonic Price Analysis in Shenzhen." *Sustainability (Switzerland)* 9, no. 3 (2017): 11.

³¹ Prita Hapsari Kertaningrum and Widayati Widayati. "Community Participation In Development Of Environmental Impact Analysis Documents (AMDAL) Based On Arnstein Concept." *Law Development Journal* 3, no. 2 (2021): 175.

interpreted that the government simply does not acknowledge the potential of WtE systems because the mentioned form of renewable-energy-based power plants is supported by fiscal and non-fiscal incentives, as governed by Article 22 paragraph (1). However, even if the government were to incorporate WtE systems into this regulation, a paradox can be created by the fact that the regulation's incentives are in the form of ease of licensing, as governed by Article 23 paragraph (4), (5), and (6). While in the case of licensing and other forms of permits, these ministries can cover many dimensions of WtE systems as conceptualized by SDG 11, this provision also further necessitates the urgency of the development of robust legal norms for compliance, to ensure that the development of WtE systems can not only increase production of energy overall but also serves its original purpose of sustainability.

3. Proposed Model of Normative Construction for Future Legal Development

To further the SDGs agenda, Indonesia needs to have an adequate legal framework as a foundational support. As Indonesia gets closer to the deadline of SDG 2030, it's imperative to ensure that the existing legal norms, particularly those that are closely related to environmental sustainability, are up-to-date with the current environmental issues. Waste management has often been identified as a serious problem in Indonesia,³² where this problem can exacerbate many socio-economic issues while also increasing the health risks among many Indonesians.³³ Indonesia urgently needs to find a solution to these problems to ensure a sustainable future for its citizens.

WtE systems can come as a fitting solution to this problem, turning waste into precious resources, creating a circular system, and improving sustainability.³⁴ In the context of WtE systems, it has also been identified that many normative issues still shackle Indonesia. These normative issues warrant urgent revision, especially when Indonesia's goal for better waste management is taken into account. Therefore, this paper proposes a model of normative construction for future legal development in Indonesia to support the development of WtE systems while also ensuring that they can actually serve their original purpose of improving sustainability (Table 1).

³² Edi Munawar et al. "The Development of Landfill Operation and Management in Indonesia." *Journal of Material Cycles and Waste Management* 20, no. 2 (2018): 1129.

³³ Putri Winda Lestari and Widanarti Setyaningsih. "Readiness Of Community Participation On Household Waste Management at Cililitan, Kramat Jati, East Jakarta." In *Proceedings of the 5th International Conference on Health Sciences (ICHS 2018)*, 2019, 3.

³⁴ Rocío González-Sánchez, Sara Alonso-Muñoz, and María Sonia Medina-Salgado. "Circularity in Waste Management: A Research Proposal to Achieve the 2030 Agenda." *Operations Management Research* 16, no. 3 (2023): 1523.

Table 1: Proposed Model of Normative Construction for Future Legal Development

Legal Issue Identified	Proposed Solution
Ambiguity in Government's Role and Investment in WtE	Clarify the distinction between government investments and incentives for WtE projects in the Energy Law and Presidential Regulation 35/2018. Specify criteria for government support, whether as financial incentives, R&D funding, or infrastructure development, to facilitate WtE initiatives.
Lack of Comprehensive Compliance Framework for WtE Projects	Amend the Environmental Protection and Management Law to include waste management principles, which can then be used for the development of specialized EIA (AMDAL) guidelines for WtE projects that consider unique environmental impacts, technology requirements, and community engagement strategies to ensure sustainability and public health protection.
Insufficient Consideration of SDG 11 in WtE Development	Incorporate explicit references to SDG 11 objectives in WtE legislation, particularly in Presidential Regulation 35/2018 and the Environmental Protection and Management Law. Establish legal requirements for WtE projects to contribute to sustainable cities and communities through waste reduction and energy production.
Economic Impacts and Stakeholder Engagement Not Adequately Addressed	Expand the scope of feasibility studies required by Presidential Regulation 35/2018 to include economic impact assessments and mandatory stakeholder engagement processes. Ensure that WtE projects consider property value implications, community health concerns, and potential economic benefits or drawbacks.
Missing Inclusion of WtE in Renewable Energy Development Acceleration	Amend Presidential Regulation 112/2022 to explicitly include WtE systems as a recognized form of renewable energy. Establish fiscal and non-fiscal incentives for WtE projects similar to those provided for other renewable energy initiatives, ensuring that WtE benefits from streamlined licensing and support for sustainable development.

As the government plays a key role in facilitating growth in the development of innovative developments for environmental sustainability, it's imperative to properly define the government's position in the provision of incentives. Instead of investing in WtE systems that private companies establish, it might be better for the government to create its own WtE system to streamline the development for faster and more efficient facilitation of waste management solutions. For incentives, be they fiscal or non-fiscal, the government can rely on the existing provisions in Presidential Regulation 112/2022. However, to support this, an urgent revision is needed to acknowledge WtE plants or PLTSa as a renewable energy system, much like the acknowledgment in Presidential Regulation 35/2018.

The main objective of this model is to ultimately create a concrete mechanism of compliance for WtE systems without stifling growth and development and in a manner that promotes growth. Therefore, it's imperative to first provide a baseline of norms in Energy Law as the main legal source of energy-related policies. Due to the limited scope of the Energy Law, the revision can be added in the form of acknowledgment of waste as a possible

source of energy, with SDG 11 elements embedded. Furthermore, the government also needs to provide an extra layer of compliance, specifically addressing WtE plants or PLTSa, with a feasibility study as provided by Government Regulation 35/2018 as the main reference. For this, the feasibility study itself also needs to be updated to include other aspects, such as economic and stakeholder engagements, with spatial interactions being the main benchmark.

Ultimately, it's important to note that waste management itself is a complex issue that requires serious engagement and efforts from various stakeholders, which stems from its web of interdependencies in many factors and social dynamics surrounding it.³⁵ Therefore, the broader impacts of WtE systems must remain an essential aspect of legal development to ensure that WtE systems can serve their purpose without causing any harm to stakeholders and contribute to the broader efforts of realizing sustainability. As Indonesia expects even more economic growth in the coming years,³⁶ this becomes a more pressing issue, as the interplay between economic growth and consumerism can significantly affect waste management issues.³⁷ Consequently, this adds to the already serious urgency for legal development to support WtE systems as the solution for waste management and more robust implementation of SDG 11. With the proposed mode, this study hopes to provide a normative pathway for possible legal development in the future.

D. CONCLUSION

Analysis of this research highlights the pressing need to properly integrate SDG 11 into the development of WtE systems in Indonesia. Normative analysis shows that Indonesia is still restricted by normative issues, namely the lack of adequate forms of legal compliance specifically designed for the development and utilization of WtE systems. The existing legal compliance in Indonesia does not address the dire need for support for the development and utilization of WtE systems, along with the importance of streamlining it with sustainability as conceptualized in SDG 11, subsequently making the legal compliance superficial in nature. The proposed model is designed to address these issues while simultaneously ensuring that the development and utilization of WtE systems do not compromise environmental sustainability. The findings of this research essentially challenge the status quo

³⁵ Giuseppe Salvia et al. "The Wicked Problem of Waste Management: An Attention-Based Analysis of Stakeholder Behaviours." *Journal of Cleaner Production* 326 (2021): 13.

³⁶ Paul J. Burke and Martin D. Siyaranamual. "No One Left behind in Indonesia?." *Bulletin of Indonesian Economic Studies* 55, no. 3 (2019): 269.

³⁷ Nina Panizzut et al. "Exploring Relationship between Environmentalism and Consumerism in a Market Economy Society: A Structured Systematic Literature Review." *Cleaner Engineering and Technology* 2 (2021): 7.

of Indonesia's legal framework for WtE systems and overall commitment to sustainability by providing a more focused pathway for legal development. The limitation of this study comes from its purely normative nature, which warrants further qualitative studies to support the development of WtE systems, particularly to analyze the connection between spatial interactions and legal compliance for WtE systems in Indonesia.

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