# The Role of Partnership in the Development of PLTSa in Surabaya: Environmental Protection and Achievement of SDGs 11

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**ABSTRACT**

This research explores the role of partnerships in the development of Waste-to-Energy Power Plants (WTPs) in Surabaya, with a focus on environmental protection and the achievement of Sustainable Development Goals or SDGs 11. This study focuses on the problem of addressing urban waste management and its impacts on the environment, and how strategic partnerships can improve the effectiveness and sustainability of WTPs projects. The results of the study indicate that collaborative efforts between the government and the private sector significantly improve waste management practices, reduce landfill use, and associated environmental hazards. The authors emphasize that collaboration between these partnerships not only advances technological innovation in waste management but also promotes environmental sustainability in urban areas. The conclusions of this study highlight the importance of strong multi-stakeholder collaboration to achieve SDGs 11, emphasizing the dual benefits of environmental protection and improving urban living conditions. This study underscores the importance of an integrated approach in addressing environmental challenges through sustainable urban development.

***Keywords:*** *Waste-to-Energy Power Plants, Environmental Protection, SDGs 11, Partnerships, Urban Sustainability*

## INTRODUCTION

Surabaya, one of Indonesia's major cities, experiences a significant increase in population annually, which directly impacts the volume of waste produced. This issue presents a major challenge in maintaining environmental sustainability. Poor waste management can lead to various environmental problems, such as soil and water contamination, and increased greenhouse gas emissions, exacerbating climate change. Large cities like Surabaya face serious challenges in managing urban waste. To address this issue, the Surabaya City Government has innovated by utilizing waste as an alternative energy source through the Waste-to-Energy Plant (PLTSa). This project aims to convert waste into energy, reducing the reliance on landfills and their negative environmental impact. The initiative is implemented through a Public-Private Partnership (PPP) scheme to overcome budget constraints and improve the efficiency of waste management.

The success of the Surabaya PLTSa development is closely tied to the importance of the partnership between the Surabaya City Government and the private sector. Waste management issues have become one of the key challenges faced by major cities like Surabaya. The success of the PLTSa project depends on collaboration between the government and the private sector. This partnership is considered crucial in enhancing the project's sustainability and effectiveness. Additionally, this collaboration fosters technological innovation in waste management while striving for environmental sustainability, particularly in urban areas. Such cooperation not only advances waste

management technologies but also promotes environmental protection and improves the quality of urban life. Thus, an integrated approach and collaboration with stakeholders are essential for achieving the Sustainable Development Goals (SDGs), particularly Goal 11.

The rapid development of cities in Indonesia has led to a corresponding increase in waste volume. The PLTSa emerges as an innovative solution to address this challenge. In line with SDG Goal 11, the PLTSa significantly contributes to building inclusive, safe, resilient, and sustainable cities. By converting waste into energy, the PLTSa not only reduces the burden on landfills but also generates clean energy. Additionally, the PLTSa opens up new investment opportunities, creates jobs, and increases local revenue, while contributing to reducing greenhouse gas emissions and improving environmental quality. The partnership between the government, the private sector, and the community is key to the success of PLTSa development, providing dual benefits for the environment and the quality of urban life.

An integrated approach to sustainable urban development highlights the importance of collaboration between the government, the private sector, and the community in tackling complex environmental issues. This includes waste management, emissions reduction, and the efficient use of energy. Cross-sector cooperation allows for more comprehensive and sustainable solutions to improve urban living conditions while achieving globally agreed-upon sustainable development targets (SDGs). A concrete example is the Waste-to-Energy Plant (PLTSa) project in Surabaya, which processes 1,000 tons of waste per day into 12 MW of electricity using gasification technology. This project is the result of a partnership between the Surabaya City Government and the private sector, PT Sumber Organik. In addition to reducing waste, the PLTSa also supports the transition to renewable energy and contributes to urban sustainability in Indonesia.

According to a study titled "The Implementation of Waste-to-Energy (PLTSa) as a Solution to Urban Waste Problems: A Case Study in Surabaya" by Nurdiansah, Priyo, and Kasiwi (2020), this research analyzes the effectiveness of PLTSa in addressing waste problems in large cities such as Surabaya. The method used is descriptive qualitative. The results show that PLTSa can be an effective alternative in reducing waste volume, although standardized operational systems are needed to prevent further environmental damage. Another study titled "The Potential of Waste-to-Energy Plants (PLTSa) as a Solution to Environmental and Social Problems in Indonesia" by Utoyo & Sudarti (2022) evaluates the potential of PLTSa in addressing environmental and social issues in Indonesia. This research uses a qualitative approach, analyzing data from various sources. The findings show that PLTSa not only helps reduce waste but also contributes to reducing greenhouse gas emissions and improving community quality of life.

Based on the background and previous research, this paper will examine the role of partnerships between the government and the private sector in the development of PLTSa in Surabaya and its contribution to environmental protection and the achievement of SDG Goal 11. The study will focus on how collaboration between the government and private sector can enhance the effectiveness and sustainability of PLTSa projects, particularly in addressing urban waste management issues, their impact on the

environment, and the achievement of sustainable goals, especially SDG Goal 11.

## METHODS

The research method employed is qualitative with a descriptive approach. Qualitative research aims to explore and understand the meanings generated by individuals or groups in relation to social issues (Creswell, 2014). Generally, qualitative research can be applied to study life and various social problems. The descriptive approach focuses on investigating the subject in its natural context, where the researcher serves as the key instrument (Creswell & Poth, 2016). In the context of this study, such an approach is highly relevant for understanding the role of partnerships between the government and the private sector in managing the Waste-to-Energy Plant (PLTSa) in Surabaya, with a focus on environmental protection and the achievement of Sustainable Development Goals (SDGs), particularly Goal 11. This study uses primary data collected from interviews with the Surabaya City Environmental Agency, as well as secondary data from academic journals. Data collection techniques include interviews and literature review. The data is then qualitatively analyzed through stages of data reduction, narrative presentation, and drawing conclusions by connecting interview results and literature to the research objectives.

## RESULT AND DISCUSSION

### *The Role of Partnership between Government and Private Sector in the Development of PLTSa in Surabaya*

The Benowo Waste Power Plant (PLTSa) in Surabaya is the result of a partnership between UPTSA, the Surabaya City Environmental Agency (DLH), and PT Sumber Organik in a Build Operate Transfer (BOT) cooperation model. The partnership aims to manage municipal waste into electricity, reduce the impact of waste accumulation, and improve energy security. The evaluation shows several important aspects such as transparency, performance monitoring, negotiation process, role equality, and the need for infrastructure improvement and operational efficiency in the management of PLTSa Benowo. Although the partnership agreement is based on a Memorandum of Understanding (MoU), the evaluation shows that the transparency of the PLTSa Benowo partnership is not optimal, with limited access to information for the public, reducing good governance and creating potential mistrust. The commitment of both parties also needs to be strengthened to ensure the smooth running of the partnership. The partnership is closely monitored by the government through a monitoring team to monitor PT Sumber Organik's performance. However, the evaluation showed the need for stronger supervision, especially regarding machinery and operational performance. Lack of regular maintenance led to machine breakdowns, which hindered maximum electricity production. Negotiations between UPTSA, Surabaya Environmental Agency, and PT Sumber Organik were effective, resulting in a mutually beneficial agreement. However, challenges related to budget and resource allocation need to be addressed together to maintain a balanced role between the government and the private sector.

The division of roles between UPTSA, DLH, and PT Sumber Organik in the management of

PLTSa Benowo has been clearly defined. The government provides the basic infrastructure, while PT Sumber Organik is responsible for the operation and conversion of waste into electricity. Evaluation shows that this role is working well, although there are still challenges related to technology optimization and machine operations that need to be improved. Although PLTSa Benowo is functioning well, there are recommendations to improve operational efficiency. One of the main obstacles is the inadequate road access, given the high volume of garbage trucks. Improved road infrastructure is essential to smoothen the waste delivery process and improve operational efficiency.

**Impact of Partnerships on Waste Management and Environmental Protection**

The partnership between the government and the private sector plays an important role in improving the effectiveness of waste management in Surabaya, especially through the Waste Power Plant (PLTSa) project (BInus University, 2024). This collaboration has a positive impact on various aspects, from reducing the volume of waste entering the Final Disposal Site (TPA), to increasing efficiency in processing waste into renewable energy sources. With this partnership, the government is able to overcome budget and resource limitations through the support of the private sector, which plays a role in providing the latest technology and innovation in waste management.

The PLTSa in Surabaya is a real example of how partnerships between the government and the private sector can produce more effective solutions to urban environmental problems. By converting waste into energy, this project not only reduces dependence on landfills, but also reduces greenhouse gas emissions produced by piles of waste. In addition, the technology used in PLTSa allows for cleaner and more efficient waste processing, so that the risk of soil and water pollution can be minimized. To date, PLTSa has contributed 122.04 GWh of clean energy in East Java (Hasan, 2023).

This partnership also has an impact on overall environmental protection. Innovation resulting from collaboration between the government and the private sector encourages the application of environmentally friendly technologies that can support urban sustainability. In addition, this collaboration encourages the adoption of a more systematic and integrated waste management approach, which focuses not only on waste reduction but also on long-term environmental protection.

In the context of achieving the Sustainable Development Goals (SDGs), especially SDG 11 which focuses on sustainable urban and community development, this partnership is very important. By creating a cleaner and more sustainable urban environment through efficient waste management, the PLTSa project not only protects the environment but also contributes to improving the quality of life of urban communities. This reflects the dual impact of collaborative efforts, where environmental protection and effective urban management go hand in hand in achieving global development goals.

Therefore, multi-stakeholder partnerships involving the government, private sector, and local communities are important factors in the success of waste management in Surabaya. This shows that good collaboration can address a variety of environmental challenges while strengthening efforts towards greater sustainability in urban areas.

**Technological Innovation in Waste Management**

The partnership between the government and the private sector in the development of the Benowo Waste-to-Energy Plant (PLTSa) in Surabaya serves as a concrete example of successful collaboration in addressing waste management challenges and providing renewable energy. This project is designed to tackle the growing waste volume in major cities like Surabaya, while simultaneously meeting the increasing demand for electricity in a more sustainable manner. The Benowo PLTSa demonstrates how a Public-Private Partnership (PPP) model can offer an effective solution to complex urban issues by involving the private sector in the provision of public services.

The Benowo PLTSa in Surabaya represents a technological innovation in waste management by integrating waste-to-energy systems with waste treatment processes. Key technological innovations implemented at the Benowo PLTSa include gasification technology, which is used to convert waste into electricity (Panjalu et al., 2024). The Benowo PLTSa is one of the examples of waste-to-energy (WTE) technology implemented in Indonesia, where waste produced by the community is converted into electricity through incineration. This technology offers a dual solution: reducing the amount of waste that needs to be disposed of in landfills while simultaneously generating renewable energy that can be distributed to the national grid.

The plant can generate up to 500 kWh of electricity from the waste processed. This system not only reduces the volume of waste but also creates additional economic value from waste. The Benowo PLTSa applies a sanitary landfill system in accordance with Indonesian Law No. 18 of 2008 on Waste Management (Dwicahyono, 2018). This system is more environmentally friendly compared to the open dumping system commonly used in Indonesia. However, several challenges exist in the implementation of this technology. Studies indicate negative environmental and socio-economic impacts on the surrounding community, such as increased air pollution (Panjalu et al., 2024). Additionally, the reduction in methane gas production has resulted in suboptimal power generation capacity. Overall, the Benowo PLTSa represents a promising technological innovation in waste management and renewable energy production. However, further optimization is required to address existing challenges and enhance the system's effectiveness.

**Contribution of Surabaya PLTSa to Achieving SDGs 11**

The Waste-to-Energy Plant (PLTSa) in Surabaya plays a crucial role in achieving the Sustainable Development Goals (SDGs), particularly Goal 11. This goal focuses on making cities and human settlements inclusive, safe, resilient, and sustainable. PLTSa Surabaya is touted as the largest waste-to-energy plant in Indonesia, occupying an area of 37.4 hectares. It is capable of processing up to 1,000 tons of waste per day, generating 12 megawatts of electricity (Hasanah, 2020). This technology will certainly

help reduce the amount of waste sent to landfills and mitigate the environmental pollution caused by waste accumulation. Moreover, PLTSa aims to reduce CO2 emissions by 300,000 tons per year (Nurdiansah, Priyo, & Kasiwi, 2020).

In line with SDG Goal 11, PLTSa Surabaya has contributed to the implementation of Indicator 6, which aims to reduce the per capita adverse environmental impact of cities, with special attention to air quality and municipal waste management. The waste treatment process at PLTSa produces energy that can reduce the reliance on fossil fuels, and in the long term, is seen as contributing to the reduction of greenhouse gas emissions (Sipiloka, 2020). Greenhouse gasses are one of the primary causes of climate change. This aligns with SDG Goal 11, Indicator B, which encourages cities to adopt and implement policies and plans aimed at climate change mitigation and adaptation. Furthermore, by reducing the amount of waste that is openly burned or improperly disposed of, PLTSa helps improve air quality in Surabaya. Uncontrolled waste burning can produce harmful pollutants that damage both human health and the environment. PLTSa, with its cleaner processing technology, helps reduce air pollution and improve public health.

Overall, the PLTSa in Surabaya not only helps address urban waste issues but also makes a significant contribution to achieving SDG Goal 11 by creating cleaner, healthier, and more sustainable cities. Through effective waste management, the reduction of greenhouse gas emissions, improvement of air quality, provision of renewable energy, and the enhancement of public awareness and participation, PLTSa Benowo serves as a concrete example of how technology and strategic partnerships can support sustainable urban development.

## CONCLUSION

The Surabaya Waste Power Plant (PLTSa) is a real example of how the partnership between the government and the private sector through the Build Operate Transfer (BOT) scheme provides a comprehensive solution to the waste problem in the city. In addition to having the aim of reducing the amount of waste entering the Final Disposal Site (TPA), this PLTSa project can create electricity from renewable energy which can help reduce the use of conventional energy. This partnership has a positive impact on the environment by reducing greenhouse gas emissions and pollution caused by piles of waste. This also supports the achievement of the Sustainable Development Goals (SDGs), especially in point 11, creating inclusive, safe, resilient, and sustainable cities and settlements. Because this technology contributes to long-term efforts to create a sustainable urban environment.

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