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Conference Paper

JAKARTA ADAPTIVE STRATEGY FOR ENHANCING ENERGY AND ECONOMIC RESILIENCE

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Abstract.

Jakarta, the capital of Indonesia, has contributed 16.71% to the gross domestic product of Indonesia in 2024 while hosting to millions of residents and daily commuters. With the impressive urban economy and human capital resource, the city is confronted with looming problems of flooding, the effects of climate change, poverty and restricted energy usage. This study use qualitative content analysis to examine the sustainability strategy, energy policy and spatial plan of Jakarta, this article. The result reveals that Jakarta has placed the development agenda to a align with the international climate commitment through the RUED 2023-2050 by focusing on promotion of renewable energy, conservation and low carbon development. Programs such as Transit-Oriented Development (TOD), electro mobility for public transport, mangrove conservation and restoration, and increased green space reflect examples of good efforts towards sustainability practices in the urban context. But the adoption of renewable energy is remain low, at only 0.66% of the energy mix, and has been stymied by technical, behavioural and infrastructural obstacles. The study concluded that achieving Jakarta's vision to be within the top 20 global cities in 2045 requires scaling renewable energy, increasing institutional capacity, and enhance public participation, while also maintain the balance between economic growth and the sustainability of the environment.

Keywords: low-carbon development; renewable energy; urban sustainability; energy transition

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Introduction

Jakarta holds a unique position as Indonesia's capital and primary economic hub (1,2). The city covers a land area of 664.78 km² and an aquatic area of 5,853.2 km². Despite a small amount of landmass, Jakarta supports a population of 10.6 million residents, with an additional 4 million commuters daily for work. This density reflects Jakarta's position as a mecca of opportunity and growth. Jakarta contributed 16.71% of the national gross domestic product as of 2024, the Gross Regional Product was Rp 2.7 quadrillion (roughly equivalent to US$285 billion dollars) in 2013, making the city the 26th largest economy in the world. This position places Jakarta as a driver of national and global economic visions. The city also shows good Human Development Index (HDI) and demographic bonus (3,4).

Nevertheless, Jakarta still confronts major problems like floods, impacts of climate change (5,6), poverty rate of 4.14% and low electricity coverage in some regions like Kepulauan Seribu. In addition to capital relocation and dependence on energy, these problems require integrated urban development and energy policies. To address these challenges, the city government has put forth progressive programs within the governance arrangement of the city, aspiring to put Jakarta in the ranks of the world's top 50 cities by 2030 and the top 20 cities by 2045 (3,4).

Literature Review

Theoretical Studies

Theories of urban sustainability highlight the integration of low-carbon city, the adaptation to climate change and the equity in terms of access to resources (7). Green urbanism theories suggest that sustainable water management, use of renewable energy, and ecological balance may be achieved through urban planning (8). The spatial planning frameworks recommended the role of Transit-Oriented Development (TOD), green buildings, or waste management in carbon emission reduction (9).

The theories of the energy transition also provide a framework for Jakarta's strategies (5). These theories claim that to make cities sustainable they have to diversify energy supplies, exploit more renewable energies and be more efficient. International governmental agreements such as the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC) guide the local governments in the effort to integrate city development into global climate commitments (3,4).

Empirical Studies

Jakarta has demonstrated a commitment to engage in international climate and environmental agreements (5,10). This commitment was reinforced by city-level climate initiatives to adopt low-carbon aspirations in 2007, and commitments made in 2009 at COP Denmark to reduce emissions by 30%. These promises are codified in Jakarta 2045, a city development plan that emphasizes green buildings, renewable energy, and sustainable mobility (3,4).

The Regional General Energy Plan (*Rencana Umum Energi Daerah* or RUED) 2023-2050 outlines Jakarta's vision for fulfilling energy needs sustainably, encourage community participation, and applications of the energy technology (11). This vision is directed by six policy objectives, that are ensuring a secure energy supply, promoting renewable energy, conserving energy, mitigating environmental impacts, enhancing energy access in Kepulauan Seribu, and improving energy management capabilities (3,4).

One of the Implementation measures is the installation of 34.38 MW solar panel capacity, representing 0.66% of Jakarta's energy mix. Senayan, Dukuh Atas, Blok M, Fatmawati and Lebak Bulus are guided by urban design guidelines to achieve sustainable development. The implementation also made way for low-carbon projects, such as solar charging stations and the deployment of electric public transit. Other initiatives include mangrove reforestation, electrification of public buses and the incorporation of green spaces into communities (3,4).

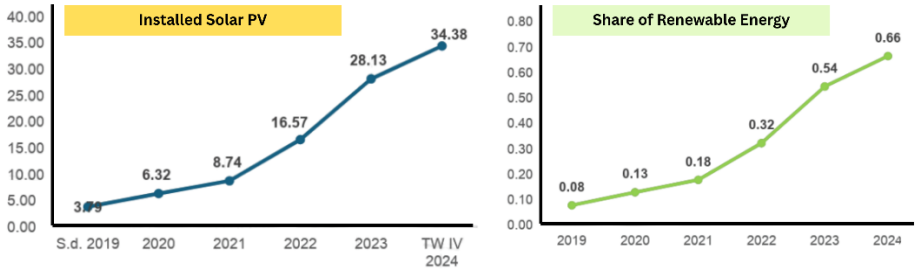

Figure 1. Installed Solar PV and Share of Renewable Energi in Jakarta
Source: Rahmania (2025)

Methods

The method is qualitative content analysis to provide replicable, valid inferences from texts or policy data (12,13). The study focuses on the sustainability options, especially those dealing with energy and urban development, of Jakarta. Primary sources are governmental (regional and national level) reports, (international) climate treaties, institutional publications (including NGO's), and peer-reviewed articles (published in the last 20 years). Selection criteria emphasize relevance to low carbon

development, deployment of renewable energies, urban resilience and sustainable city planning more broadly, and specifically Jakarta's commitments to global climate frameworks and The Regional General Energy Plan (RUED) 2023-2050. The unit of analysis are the city or city-led initiatives, the regulatory instruments, and the institutional response to flooding, energy reliance, and emission reduction. Data validity is guaranteed with triangulation of official policy papers, expert evaluations, and the published peer-reviewed literature.

Results and Discussion

Jakarta's plans represents a methodical approach to addressing urban sustainability concerns (5,6). Economic strength and human capital represent substantial prospects for advancing low-carbon development. Policies aimed at enhancing mobility via expanded public transportation and Transit-Oriented Development (TOD) design mitigate congestion and pollution while augmenting accessibility. Effective water management and ground subsidence reduction significantly bolster urban resilience to flooding and climate-related consequences (3,4).

The city's energy strategies show incremental progress yet lack of depth. The use of inefficient non-renewable sources of energy persists, of which green energy is only 0.66% of the total energy mix. Challenges like low technical competence, narrow public participation on energy-efficient behaviour and lack of energy access in island communities inhibit progress. The adoption of RUED policies, joining C40 Cities and commitment to the Paris Agreement demonstrate a strong institutional commitment (3,4).

Urban greening projects, for example mangrove reforestation, electrified public transport, enhanced public spaces, serve to mitigate carbon emissions and improve the lives of citizens. These are steps that ensure Jakarta development is align with the United Nations' Sustainable Development Goals' (SDGs). Yet, whether due to capital relocation, or to economic imperatives, pressures have compelled ongoing policy adaptation to sustain Jakarta's aspirations as a global city (3,4).

Conclusion

Jakarta's drive for sustainable and low-carbon development combines the imperatives of economic development, environment protection and social equity. A solid economy and great human capital offer leverage, while obstacles such as flooding, energy reliance, and dirty air are significant limitations. TOD, the deployment of renewable energy, green infrastructure and global commitments to the climate reflect these proactive strategies in

Jakarta. The long-term vision for Jakarta to be among the top 20 global cities by 2045 needs robust strategies of continuous renewable energy, stronger public participation, and improved technological adoption. The Jakarta case points out the need for integrating spatial planning, policy and participatory processes into an urban sustainability approach, as reflected by the implemented best practice on other megacities around the world.

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