Green buildings as a concept for government buildings Case study: The Office of Public Housing, Settlement Areas, and Spatial Planning of East Java Province.

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Abstract

This paper discusses the application of green building concepts in government buildings, focusing on the Office of Public Housing, Settlement Areas, and Spatial Planning of East Java Province. Green buildings have become important in the context of sustainability, energy efficiency, and reducing environmental impact. According to data from the Intergovernmental Panel on Climate Change (IPCC), the rapid warming of the Earth over the past century is not due to natural causes. It is the commitment of the East Java Provincial Office of Public Housing, Settlement Areas, and Public Works to participate in reducing greenhouse gas emissions, which is one of the causes of global warming. This office is also tasked with implementing the mandate of Government Regulation No. 16/2021, which expects government office buildings to serve as pilot projects for Green Buildings (GB), and to carry out the mandate of Government Regulation No. 33/2023, which requires government buildings to implement energy management as a parameter for assessment in GB.

Through a comparative analysis of design in the use of environmentally friendly materials and energy management systems, this study evaluates the effectiveness of implementing the principles of green buildings. The research results indicate that the implementation of the green building concept in the PRKPCK building not only meets sustainability standards but also enhances user comfort and the image of a government that is responsive to environmental issues. This research is used as a recommendation for further development, including the enhancement of green technology usage and the integration of green open spaces to support the quality of the surrounding environment.

Keywords: Resilience, Architecture, State building, Green Building, IPCC

Introduction

Climate Change and Global Warming have become major issues in the world. The process of climate change is naturally long-term, referring to long-term changes in temperature and weather patterns, such as through variations in the solar cycle. But since the 1800s, human activity has been a major cause of climate change. The United Nations (UN) climate body, the Intergovernmental Panel on Climate Change (IPCC)[15] says that the rapid warming of the earth over the past century is not natural. According to the IPCC, this long-term climate change is caused by human activity, particularly widespread use of fossil fuels such as coal, oil and gas in homes, factories and transportation. The burning of these fossil fuels produces greenhouse gas emissions that act like a blanket wrapped around the Earth, generating solar heat and raising temperatures.

Considering the issue of climate change and the mandate in the regulations governing Green Building, the Office of Public Housing, Settlement Areas and Human Settlements (PRKPCK) of East Java Province in order to support the target of reducing greenhouse gas emissions and carbon emissions by 2050, as well as becoming a pilot project or pilot government building that applies Green Building principles, the Office of Public Housing, Settlement Areas and Human Settlements of East Java Province intends to retrofit the existing office building into Green Building.

Figure 1. Office Building, the Office of Public Housing, Settlement Areas and Human Settlements of East Java Province

This research aims to evaluate the implementation of Green Building adaptation in the East Java Province Public Housing, Settlement and Human Settlement Agency Building in accordance with green building requirements through retrofitting based on the technical standards stipulated in the PUPR Ministerial Regulation Number 21 of 2021 and SE Minister of PUPR Number 1 of 2022. And to be able to plan retrofitting into Green Buildings and identify challenges and advantages in its application. This research is expected to provide recommendations in the implementation of green building in future government buildings and ultimately support the achievement of sustainable development goals in Indonesia.

Methodology

In this research method consists of data collection, analysis, and presentation of results. In this research is a comparative research method because in this study it compares existing buildings and variable data on the fulfillment of green buildings. As a guide in this research based on literature studies from several studies supported by data from the Ministry of Energy and Mineral Resources (ESDM) related to green buildings to be implemented in the application of green buildings in Indonesia.

In the application of green building in line with the target of sustainable development goals (SDG), the research obtained data on energy consumption in different building sectors. This can be seen in the data on electrical energy consumption in commercial buildings above 60% for air conditioning consumption, the remaining range of 5% - 8% for lights, sockets, elevators and others.

Figure 2. Source ; Sustainable Develompent Goals Document Ministry of energy and mineral resources .

Target to 7 : Affordable and Clean Energy considering that energy efficiency efforts can reduce energy costs while reducing carbon emissions.

Target to 8 : Decent Work and Economic Growth, where energy efficiency creates opportunities business opportunities and green job

Target to 11 : Sustainable Cities and Communities, decarbonization of buildings supports development of the concept of sustainable cities

Target to 12 : Responsible Consumption and Production, energy efficiency supports efforts to use resources energy resources in a sustainable manner.

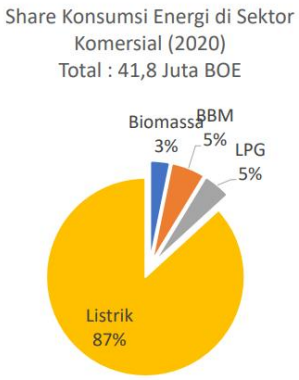

Figure 3. Sources : Handbook of Energy and Economics Statistics of Indonesia, Pusdatin KESDM 2020

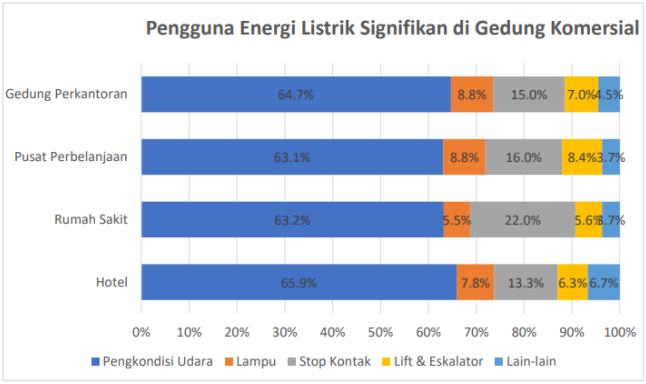

Figure 4. Source: Specific Energy Consumption Benchmarking Final Report at Commercial Buildings, EBTKE, MEMR 2020

In applying the implementation to the achievement of green building both modern and existing buildings can also utilize various Subject Matter Expert (SME) methodologies. These methodologies involve knowledge and expertise to evaluate buildings based on certain criteria in the green building concept. In the application of SME in different countries, this is also related to the influence of the geography and climate of the country.

Categories	Elements	Level of agreement
Scope and Definitions	Scope	Medium
	Definitions	Medium
General Requirements	General Requirements	High
	Documentation	High
	Records	High
"Planning" elements	Management commitment	Low
	Energy Policy	High
	Responsibility and authority	Medium
	Strategic planning	Low
	Energy data management	Low
	Energy Profile (aspects)	Medium
	Legal and other	High
	Goals, targets and projects	High
"Doing" elements	Purchasing	Low
	Design	Low
	Communication	High
	Competency, training and awareness	High
	Equipment, systems, and process control	Medium
	Energy project implementation	Low
	Calibration	Medium
	Contingency planning	Low
"Checking" elements	Monitoring and measurement	Medium
	Evaluation of legal and other requirements	High
	Internal audits	Medium
	Nonconforming, corrective action, preventive action	High
"Acting" elements	Management review	High

1. U.S. Standard ANSI/MSE2000:2005
2. U.S. Standard MSE 2000:2008
3. Chinese Standard GB/T xxx-2000x ICS 03.120.10
4. European Union Standard CEN/CLC/TF 189 N. 030 2007-05-016, EN 16001 on Energy Management Systems 2009
5. Swedish Standard SS 62 77 50: 2003
6. Irish Standard IS 393:2005
7. Danish Standard DS 2403 E:2001
8. Netherlands Standard SenterNovem 2004
9. Korean Standard KSA 400:2007
10. United Kingdom Standard PAS 99:2006
11. Proyek komite, ISO / PC 242, Energi manajemen, mengharmonisasikan menjadi ISO 50001 dipimpin oleh American National Standards Institute (ANSI), 2008

Figure 5. Source ;UNIDO,2009 Categories and Priorities for implementing SME

From the existing data, the retroffiting method on existing buildings also becomes more suitable to be applied to existing buildings,[4],[7],[10],[13]. This is based on literature studies from several research journals that have been published with the same case study even though in its application there are several obstacles and also a large cost but in the running period of energy consumption data obtained a significant decrease in energy efficiency.

According to the literature study "Joohyun Lee a, Mardelle McCuskey Shepley b, Jungmann Choi; Volume 25, September 2019, 100822 " to increase the participation rate in green renovation, efforts need to be made to reduce barriers to energy efficiency in existing buildings [10]. They found that upfront cost burden, lack of information and resources, limited incentives for implementation, building complexity.

It was also added from the study literature “Ingy El-Darwish, Mohamed Gomaa; 2017”[4],[7],[10]. The research focuses on improving energy efficiency through retrofitting strategies on building envelopes to reduce energy consumption related to the use of renewable materials, replacement of window materials (glass), maximizing openings or ventilation systems that are maximized to be sustainable and efficient.

Building envelopes and the size of window openings greatly affect the achievement of natural light and indoor air conditioning[7]. If the building that is exposed to direct sunlight is not designed with the addition of shading or sunscreen, the temperature in the room will feel hot so that it must use air conditioning (AC). Likewise, if the window opening is less than 40% of the wall area, the incoming light will depend on electrical energy so that of course it will cause higher costs compared to maximizing natural light or sunlight

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Result and Discussion

Existing variable data for green building assessment.

Tabel. 1 Source Analysis of personal data

Assessment Criteria	Description	Suitable	Not suitable
Land Use	Land use and allotment	√	
Energy Efficiency and Conservation	Efficient use of energy and application of renewable sources		√
Water Conservation	Water treatment and use		√
Material Sourcing and Recycling	Use of environmentally friendly and recycled materials		
Air Quality and Indoor Comfort	Ensure good and comfortable air quality		√
Good management of the surrounding environment	Good management of the surrounding environment		√

From the existing data, The Office of Public Housing, Settlement Areas and Human Settlements of East Java Province (PRKPCK) cannot be submitted as a green building. In fulfilling the provisions of the assessment variables, of course, it is not only fulfilling but needs to be responded to the effects of fulfillment and must be resilient to its sustainability needs to be responded to properly and comprehensively.

Conclusion

By comparing existing data variables and green building assessment variable data, it is found that in the case study building there are many variables that do not meet the requirements if submitted as a green building concept. So that adjustments need to be made to meet the required variables. And with the change / match method or retrofitting being a suitable alternative without having to dismantle the entire building.

From several journals shown in the study, the application of RETROFITTING to the existing building concept for green building, especially in Indonesia, must continue to be improved in government buildings and of course with government regulations that follow the development of the application in existing buildings there are obstacles and obstacles so that solutions can be found without stopping the green building program in government office buildings.

Recommendations for methods of retrofitting existing buildings for the concept of Green Building (GBH) from several journals and research in the world found retrofitting to be a method that many data have been successfully carried out. But still in its implementation it needs cooperation between the government and service actors both architects and contractors.

Acknowledgements

The author would like to thank the supervisor for the completion of this journal, friends in arms who are not tired of always encouraging, the entire academic community of the University campus 17 August 1945 Surabaya who always support until the completion of the master of architecture program, hopefully this journal can be useful for the sustainability of sustainable development that is comfortable, safe, and environmentally friendly.

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