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Water Tower Conservation and Sriwijaya University Law Efficiency Based on Indonesian Green Building Certification

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Abstract

The problem of global warming is increasing due to an increase in CO2 emissionsby 33%, an increase in water consumption by 17%, energy consumption by 30% - 40% and raw materials by 40% - 50% in building operations. One of the efforts to reduce the occurrence of these problems can be done through one of the green building , namely water conservation and efficiency. According to Yudo, saving water is a very important effort to avoid water scarcity. In addition, saving water is an effort to use water efficiently. Therefore, this study was conducted to analyze the application of water conservation and efficiency in the Tower LawThe data collection method used in this study was based on interviews, observations and measurements. The data obtained will be analyzed for water conservation which is applied to towers legal existing Greenship building and water efficiency levels using the Excellence in Design for Greater (EDGE) system. Based on the results of the analysis carried out on tower , the results of the application of water conservation with the Greenship existing building standard only got 11 points out of a maximum total of 20 points. In addition, the application of water efficiency that has been carried out tower based on the EDGE system obtained 24.28% water efficiency measures. From the results of the analysis, it was found that tower has not met the criteria for water conservation well but has met the level of water use efficiency based on the green building.

Keywords: green building; water conservation; water efficiency.

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1. Introduction

Currently, the issue of global warming has become a hot topic of discussion. According to the World Green Building Council, one of the causes is that buildings contribute 33% of CO2 emissions, 17% of clean water and energy, up to 17% to 40%, and raw materials, as much as 40% to 60% in building operations (S. N. Indonesia, 2005; Sobirin, 2014). Efforts that can be made to reduce the occurrence of global warming include applying the concept of green building.

Green building is currently the best solution and policy today. According to data from the Green Building Council Indonesia, on the island of Java, there are many buildings that have green building certification, but in the city of Palembang there is not a single building that has green building certification. As a city that is dense with buildings, the city of Palembang can apply the concept of green building to existing buildings, especially in educational facilities (Idhar & Yuwono, 2019; Massie et al., 2018; Setyowati et al., 2020; Widiati, 2019).

Educational facilities have a green campus rating, which is part of the green building concept. Based on the rankings set by the UI Green Metrick World University, Sriwijaya University is not included in the ranking of 72 universities in Indonesia. To create a green campus, it is necessary to apply the green building concept at Sriwijaya University. This application can be done by starting in one of the existing faculty buildings (Green Building Council Indonesia, 2019).

The faculty that will apply the green building concept in this study is the Faculty of Law, because this faculty is one of the few that has a building with eight floors. The application of the green building concept is very important for towers to reduce environmental degradation without paying attention to environmental sustainability (Widyawati,

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2018). By not preserving the environment, this creates a quality and quantity crisis in the consumption of clean water (G. B. C. Indonesia, 2019a; Ukata et al., 2011).

To maintain a decrease in the quality and quantity of clean water, it is necessary to increase water conservation efforts so that there is no water scarcity (Widodo & Yuwono, 2019; Yudo, 2018). Enforcement of water conservation in the law tower can be done by using water efficiently. Water efficiency is an effort to use water well and reduce water wastage. The link between building conservation and water efficiency is very important (Prasetyo & Kusumarini, 2016).

The implementation of water conservation and efficiency in legal towers can be carried out based on Indonesian green building certification. So, in this research, the implementation of water conservation and efficiency has been carried out by the legal tower in maintaining environmental balance based on Indonesian green building certification.

This study aims to analyze the results of the application of water conservation in legal towers based on Indonesian green building certification and the results of water efficiency that have been applied to legal towers based on Indonesian green building certification.

2. Research Methodology

The method used in this research data collection is as follows:

1) Interview

   The interview was conducted with the legal tower technician, Mr. Prabowo. The interviews were conducted in the form of water-saving SOPs, standards in plumbing system maintenance, air conditioning systems used, and wastewater and condensate water treatment. Data from interviews is used for analysis of water conservation and efficiency.

2) Observation

   Observation activities at the law tower were carried out together with the management, namely Azhar. Observations were made in the form of knowing the source of clean water flow in the legal tower; tools for measuring the amount of water flow in pipes or meters; faucet features and specifications of toilets and urinals. The results of these observations are used to figure out how to save water and use it more efficiently.

3) Measurement

   Measurements were made in obtaining data for water efficiency analysis. Measurements taken are to determine the flow rate of water on the toilet faucet, toilet shower, and sink faucet. This measurement is carried out in every women's bathroom, men's bathroom, ablution place, and pantry.

4) Secondary Information

   The secondary data used for water conservation analysis while the secondary data obtained are the number of active students of the Faculty of Law, Sriwijaya University, Palembang Campus, obtained from the Academic Field of the Faculty of Law; the number of staff and lecturers at the Faculty of Law, obtained from the Staffing Division of the Faculty of Law; and water consumption data for the last six months, obtained from the Faculty of Law Finance.

Greenship Existing Building Water Conservation Analysis

Water conservation analysis is carried out based on Indonesian green building standards specifically for existing buildings, namely the existing Greenship building. The analysis is carried out as follows:

1) WAC P (Required)

   A checklist was carried out. If the legal tower meets the criteria for the WAC P requirement, a green building certification can be carried out. However, for this study, it does not have to be fulfilled.

2) WAC 1

   The WAC criteria 1 carried out an analysis of the completeness of the measuring device for the volume of water flowing in the pipe, namely the sub meter.

3) WAC 2

In the WAC 2 criteria, an analysis of the standards in the maintenance of the plumbing system on the legal tower is carried out.

4) WAC 3

It carried out an analysis of calculations regarding the consumption of clean water in the tower based on SNI standards.

5) WAC 4

In the WAC 4 criteria, an analysis of the examination of clean water in the laboratory was carried out.

6) WAC 5.

WAC Criterion 5 looks at how recycled water is used to water plants on the building and how the legal tower gets clean water.

7) WAC 6.

WAC Criterion 6 talks about the system used to filter drinking water in the legal pantry tower.

8) WAC 7

The WAC 7 criteria discuss the use of drilled wells as a source of clean water.

9) WAC 8.

In WAC 8, the features of the faucet in the legal tower are talked about.

EDGE System Water Efficiency Analysis

Water efficiency analysis is carried out based on Indonesian green building standards with the Excellence in Design for Greater Efficiencies (EDGE) system. The analysis is carried out as follows:

1) EDW01

In this study, after measuring the flow of water in the shower toilet, the measurement data has been processed first. Also, the results of processing the data will be put into the system so that water savings can be analyzed.

2) EDW02

The research on this code was carried out by measuring the flow of bathroom tap water and sink faucets. The measurement data obtained is processed for analysis of water efficiency with the system.

3) EDW03

In this study, the information about the toilets will be put into a system that will look at how well they use water in the legal tower.

4) EDW04

Then, after observing the specifications of the urinal in the men's toilet, the results of the specifications obtained will be analyzed by the system by inputting the data obtained.

5) EDW05

In this study, the flow of water from the kitchen tap was measured, processed, and put into the system to figure out how well the legal tower uses water.

6) EDW06

Researchers looking into this code talked to people about how condensate water is treated, and the results of those conversations were put into the system to see if they met the water efficiency analysis for the legal tower.

7) EDW07

Research was conducted on this code by providing a checklist on the system if the results of interviews regarding the roof area for rainwater catchment carried out meet this code.

8) EDW08

aIn this code, interviews are conducted regarding the amount of recycled water used, and the results obtained from the interviews will be inputted for analysis of water efficiency in the legal tower based on the system.

9) EDW09

In this code, interviews are done about the swimming pool cover to figure out the list of things to look at when analyzing the system's water efficiency.

10) EDW 10 and EDW 11

Research on codes EDW10 and EDW11 conducted interviews regarding the bathroom and kitchen waste water recycling systems. The results obtained from the interview are checked on the system if they meet the requirements to be analyzed using the system.

3. Results And Discussion

Based on Indonesian green building certification, the results of this study talk about how legal towers save water and use it as efficiently as possible.

3.1. Results of Water Conservation

A discussion will be carried out on the percentage of water conservation applications in the legal tower based on all the data that has been obtained and analyzed based on each of the criteria contained in the Greenship Existing building standard. The results of the analysis of the water conservation assessment can be seen in the Table 1.

Based on the results of the table 1, it was found that the legal tower only got 11 points out of the 20 total points owned by water conservation, with 55% of the implementation carried out. The points generated on the legal tower only come from the three criteria contained in the existing Greenhip building standards, specifically for water conservation, namely water sub-metering, water fresh efficiency, and deep well reduction. So it can be said that the legal tower has not implemented water conservation properly because it only meets three of the eight criteria, even though the points obtained have reached half of the total points.

3.2. Water Efficiency Findings

After the data is obtained and analyzed based on each criterion contained in the EDGE system specifically for education, the data will be inputted into the EDGE system. The results obtained from the EDGE system are as show on figure 1.

Table 1. Recapitulation of water conservation results based on existing green building standards

	Water Conservation	Max Poin	Poin
WAC P	Water management policy		
WAC 1	Water sub-metering	1	1
WAC 2	Water monitoring	2	0
WAC 3	Fresh water efficiency	8	8
WAC 4	Water quality	1	0
WAC 5	Recycled water	5	0
WAC 6	Potable water	1	0
WAC 7	Deep well reduction	2	0
WAC 8	Water tap efficiency	2 (bonus)	0
	Total	20	9
	Percentage (%)	45%	

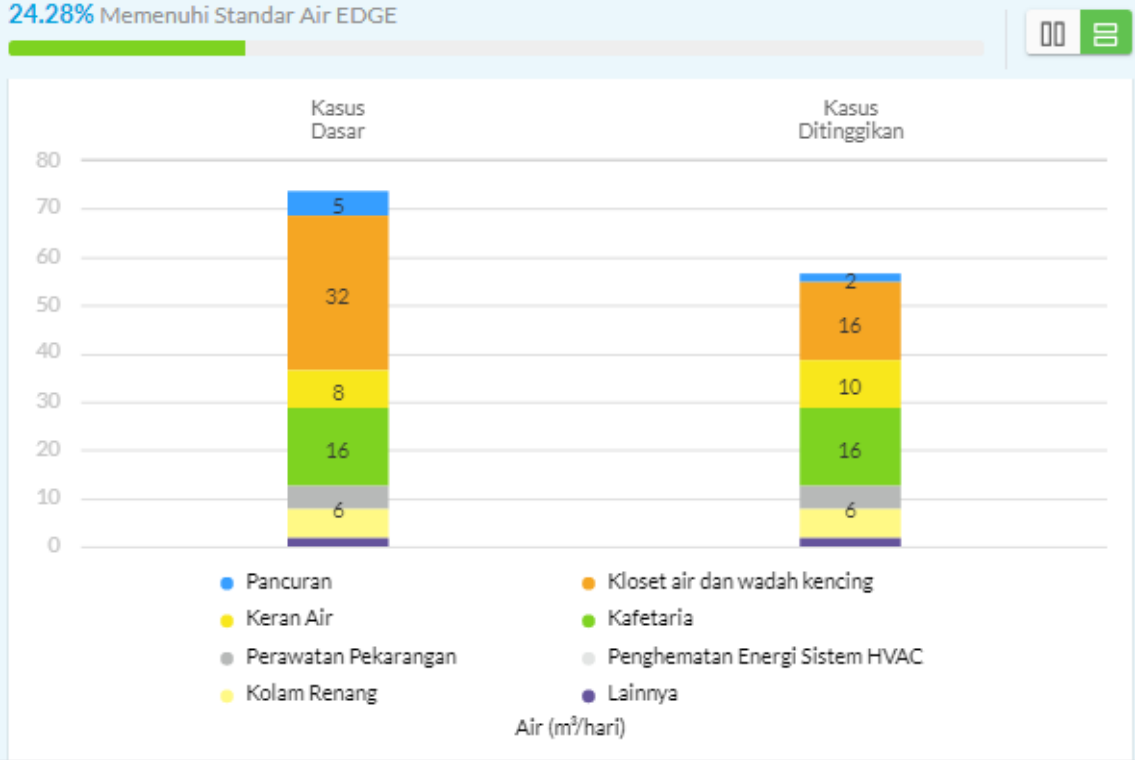

Figure 1. EDGE analisis analysis results.

Based on the results of the EDGE analysis, it was found that the water savings carried out by the legal tower were 24.28% water efficiency. Measured with details from the graph for water use, it was obtained that 57 m3/day. The percentage results obtained show that the legal tower has met the standards determined by the EDGE system, which is more than 20% of the water saving steps.

3.3. Recommendations for Repairs to the Law Tower

The existing Greenship building standard is issued by the Green Building Council Indonesia and is related to the EDGE system. The criteria for water conservation, which include efforts to save water by applying water-saving features, can affect the efficiency of water use in the legal tower. Based on the results of the water conservation analysis, there are criteria that have not been met to improve the efficiency of water use, as well as recommendations for legal towers in improving the application of water conservation as follows:

1) Make standard operating procedures and implementation of plumbing system maintenance which is carried out periodically based on the Decree of the Minister of Manpower of the Republic of Indonesia Number 304 of 2016 concerning the Stipulation of Indonesian National Work Competency Standards for Construction Categories of Special Construction Principal Groups for Plumbing Work Positions. This is done to prevent pipe leaks due to not maintaining the plumbing system and water waste due to water coming out of leaking pipes.
2) Implement a waste water recycling system that comes from the bathroom, sink, and pantry in accordance with the Minister of Health Regulation No. 416 of 1990 concerning Water Quality Requirements and Monitoring to Meet the Need for Clean Water that can be reused as toilet flush water or watering plants.
3) The use of a drinking water filtration system by installing a device that can filter tap water so that it can be drunk directly in accordance with Permenkes No. 492 of 2010 concerning Drinking Water Quality Requirements. This system is much more efficient if you have to boil water or use refilled gallons.
4) Use water-saving faucets to reduce the amount of water required.The auto-stop faucet that is applied to save water is the press tap (push tap) that can close itself after being turned on by pressing (pushing) for a certain time, which can provide water savings of up to 50% from the usual faucet and the sensor faucet that opens when

the hand approaches the faucet. The water will stop flowing once the hand leaves the faucet, a more than 70% water savings compared to manual faucets. The specifications for each faucet are as follows:

a. Manual faucet with an average water flow of 7 L/min, but manual faucets often waste water due to forgetting to turn off the faucet rotation

b. Push-up faucet with an average water flow of 7 L/min, but this type of faucet has the advantage of an auto-stop feature that can support savings in water use.

c. The sensor faucet does not have specifications regarding the average water flow because the faucet only functions and releases water when the faucet sensor is active.

4. Conclusion

The conclusions obtained from the results of this study are as follows:

1) Based on the analysis of the application of water conservation that has been carried out on the legal tower based on the existing Greenship building, it has not implemented water conservation criteria properly because it only meets three of the eight criteria that have points, namely water sub-metering, fresh water efficiency, and deep well reduction, and fulfills one prerequisite criteria regarding campaigns in water saving with a total of 11 points.

2) Based on the analysis of the results of the water efficiency that has been applied to the legal tower based on the results of the EDGE system, it has met the Indonesian green building certification because the efficiency level is above the EDGE standard of 24.28%.

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