

Analysis of Green Building Criteria Based on GreenShip Homes V.1.0 (Case Study Malang City Residential)

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Abstract— *GreenShip Homes V.1.0 is an assessment tool in Indonesia, acting as a transformation tool in realizing the creation of an environmentally friendly house that is efficient and effective in the use of energy and water, paying attention to the conservation of materials and natural resources. This study aims to analyze the benchmark criteria for green homes in greenShip buildings and ratings of greenShip homes in greenShip buildings and analyze the most important factors for residents of green housing in Malang City based on the GreenShip Rating Tools standard for Residential Homes Version 1.0 belonging to GBCI. The analysis and calculations carried out relate to several things, namely calculating the score; determine rating. The results of the study based on the analysis of the application of GreenShip Homes V.1.0 found that Residential C was the highest value (55), the second highest was Residential B (54) and the third highest was Residential A. From the results of the GreenShip rating, the three housing estates are in the GOLD category with the percentage of Residential C 71%, Residential B 70% and Residential A 65%.*

Keywords— *Scoring, Ranking, GreenShip.*

I. INTRODUCTION

The environment and energy crisis are global issues facing humanity today. The limited availability of energy available in nature along with the increase in population and utilization of energy sources will cause an energy crisis. Energy savings, both in the use of materials and savings in the use of electricity and water can be done by applying the concept of green building.

Green building is the practice of creating structures and using environmentally responsible and resource-efficient processes throughout the life cycle of a building from placement to design, construction, operation, maintenance, renovation and deconstruction. The standard to be achieved in implementing GreenShip is the realization of an environmentally friendly green building from the planning, development, to day-to-day operation and maintenance stages. GreenShip Homes is an assessment tool in Indonesia as a transformation tool to create an environmentally friendly home (green home).

Residence B offers a safe, comfortable environment equipped with modern facilities such as hotels and resorts, swimming pool halls and restaurants, jogging tracks and charming views with the coolness of Malang City. Residence C housing with a township development format equipped with modern residential facilities such as Mall, international standard golf, University, Hotel and Hospital and various other facilities that support modern living. Residence A offers a comfortable stay for families with a "modern green" concept. The type and form of the building offered is the natural atmosphere of the mountains. By observing the existing conditions, namely the existence of several housing estates introduced with the concept of green housing and having green areas, as well as the potential for having received a green property award, it turns out that there has not been a single building that has received a Green Building certificate

from GBCI for the green homes category. This attracts the attention of the author to examine the level of application of the green homes concept in several housing areas in Malang City so that it can determine the level of green home implementation in accordance with GBCI's GreenShip Homes standard.

II. LITERATURE REVIEW

Green Building

Green building is a structure and building design that is environmentally friendly and its construction is efficient, both in design, construction, maintenance, renovation and even renovation. Green building must be economical, effective, durable, and comfortable. Green building is designed to reduce the negative impact of buildings on human health and the environment by using energy, water, etc. efficient, maintain the health of residents and can reduce waste, pollution and environmental damage.

GreenShip

GreenShip is a building assessment system which is a form of one of the efforts to bridge the concept of environmentally friendly and sustainability principles with real practice.

Green Homes / Eco-Friendly Houses

An eco-friendly house is a house that is wise in using land, efficient and effective in the use of energy and in using water, paying attention to the conservation of natural resource materials as well as being healthy and safe for the occupants of the house. The GreenShip Rating Tools Assessment for Residential Houses Version 1.0 consists of 6 categories, namely: appropriate land use, energy conservation and efficiency, water conservation, material sources and cycles, air quality and air comfort, building environmental management.

GreenShip Benchmark

The measurement benchmarks according to GreenShip Homes V.1.0 are: green area, supporting infrastructure, rainwater handling, artificial lighting, air conditioning, heat reduction, renewable energy sources, water-saving output devices, use of rainwater, water-saving irrigation, non-refrigeration refrigerants. ozone depleting (BPO), the use of old materials, materials from environmentally friendly sources, materials with environmentally friendly production processes, certified wood, prefabricated materials, local materials, waste sorting, clean air circulation, minimizing pollutant sources, maximizing natural lighting, friendly activities environment, home building guidelines, safety, sustainable design and construction.

Rating System

The rating system is a tool that contains items from the assessed aspects called ratings and each rating item has a value (point). If a building succeeds in implementing the ranking item, it gets the value of that item. The sum of all the values that the building has collected in implementing the rating system in achieving a specified amount, then the building can be certified at a certain level of certification. The ranking here is according to GreenShip Homes V.1.0, in the form of a percentage value of the green home level. Percentage of green home housing = (Total value of housing)/(Total value of greenship home) x 100 %.

III. METHOD

The location of this research is three green housing, namely Residence A, Residence B and Residence C. The types and sources of data used in this study are primary data which refers to information obtained first hand by researchers, namely data sources that are directly collected from sources and recorded by researchers and secondary data, namely data obtained by researchers from existing sources as data. research support. The data processing stage in this study is to process all the data obtained to be used as initial data in conducting analysis and calculations.

The analysis and calculations carried out are related to several things, namely:

1. Calculating the scoring of the application of GreenShip homes in the Residence A, Residence B and Residence C estates.

TABLE 1. Value and Percentage of GreenShip Homes

Code	Criteria	Value		Percentage
		Credit	Bonus	
ASD	Appropriate Site Development	13		16,88%
EEC	Energy Efficiency and Conservation	15	2	19,48%
WAC	Water Conservation	13		16,88%
MRC	Material Resource and Cycle	11		14,28%
IHC	Indoor Health and Comfort	13		16,88%
BEM	Building Environment Management	12		15,58%
Total		77	4	100%

Source: GBCI, 2014

2. Ranking GreenShip Homes v. 1.0 in the houses of Residence A, Residence B and Residence C.

TABLE 2. GreenShip Homes Benchmark Rating V.1.0

Minimum	Percentage	Percentage Rating
Platinum	73%	56
Gold	57%	43
Silver	46%	35
Bronze	35%	26

Source: GBCI, 2014

IV. RESULTS AND DISCUSSION

Analysis of GreenShip Homes V. 1.0

1. Assessment of Land Use Appropriate Benchmarks (ASD)

TABLE 3. Assessment of Land Use Appropriate

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Green Area	3	3	3	22	20,3	20
2.	Supporting Infrastructure	2	2	2			
3.	Community Accessibility	2	2	2			
4.	Pest Control	1	1	1			
5.	Public transportation	1	1	1			
6.	Handling of Rainwater	2	2	2			
Total ASD		11	11	11			

The results of the benchmark assessment of the land use category (ASD) criteria for the GreenShip Rating Tools for Residential Houses Version 1.0 of each housing are the same (11). This shows that each housing almost meets the maximum value applied by the Green Building Council Indonesia (GBCI) of 13

2. Energy Conservation and Efficiency Benchmark Assessment (EEC)

TABLE 4. Energy Conservation and Efficiency Benchmark Assessment

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Sub Metering	1	1	1	14	16.67	18.18
2.	Supporting Infrastructure	2	2	3			
3.	Air Conditioning	0	2	2			
4.	Heat Reduction	2	2	2			
5.	Energy Saving Home Appliances	2	2	2			
6.	Renewable Energy	0	0	2			
Total ASD		7	9	10			

The results of the benchmark assessment of the category of energy efficiency and conservation (EEC) criteria of the GreenShip Rating Tools for Residential Houses Version 1.0 of each housing can be seen that housing is 3 (three) higher than other housing. However, the results of the assessment show that housing still does not pay attention to energy efficiency and conservation (EEC).

3. Assessment of Water Conservation Benchmarks (WAC)

TABLE 5. Assessment of Water Conservation Benchmarks

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Water Meter	2	2	2	12	11,11	10,91
2.	Water Saving Output Device	1	1	1			
3.	Rainwater Usage	0	0	0			
4.	Water Saving Irrigation	1	1	1			
5.	Wastewater Management	2	2	2			
Total ASD		6	6	6			

The results of the assessment of the water conservation category benchmarks (WAC) with the GREENSHIP criteria for residential houses from each housing are the same (6). This shows that each housing is still not paying attention to the water conservation (WAC) category of Greenship Rating Tools criteria for Residential Houses Version 1.0 with a maximum value applied by the Green Building Council Indonesia (GBCI) of 15.

4. Material Source and Cycle Benchmark Assessment (MRC)

TABLE 6. Material Source and Cycle

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Non-Ozone Depleting Refrigerant	0	0	0	8	7,41	7,27
2.	Use of Old Material	0	0	0			
3.	Materials from Environmentally Friendly Sources	1	1	1			
4.	Material With Environmentally Friendly Production Process	0	0	0			
5.	Certified Wood	1	1	1			
6.	Prefabricated Material	0	0	0			
7.	Local Material	2	2	2			
8.	Carbon Footprint	0	0	0			
Total ASD		4	4	4			

The results of the benchmark assessment of the source category and material cycle (MRC) criteria of the Greenship Rating Tools for Residential Housing Version 1.0 for each housing are the same (4). This shows that each housing is still not paying attention to the source category and material cycle (MRC) criteria of Greenship Rating Tools for Residential House Version 1.0 with a maximum value applied by the Green Building Council Indonesia (GBCI) of 11.

5. Assessment of Air Quality and Air Comfort Benchmarks

The results of the benchmark assessment of the air quality and air comfort (IHC) criteria for the Greenship Rating Tools criteria for Residential Homes Version 1.0 are the same for each housing (12). This shows that each housing is very concerned about air quality and air comfort which is applied by the Green Building Council Indonesia (GBCI) of 13.

TABLE 7. Assessment of Air Quality and Air Comfort Benchmarks

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Clean Air Circulation	5	5	5	24	22,22	21,81
2.	Minimization of Pollutants	3	3	3			
3.	Maximizing Natural Lighting	2	2	2			
4.	Visual Comfort	1	1	1			
5.	Visual Comfort	1	1	1			
6.	Partial Convenience	1	1	1			
Total ASD		12	12	12			

6. Assessment of Building Environmental Management Benchmarks (BEM)

TABLE 8. Assessment of Building Environmental Management Benchmarks (BEM)

No	Indicator	Score			Percentage		
		A	B	C	A	B	C
1.	Sustainable Design and Construction	4	4	4	20	22,22	21,81
2.	House Building Guide	2	2	2			
3.	Security	0	1	0			
4.	Eco-Friendly Activities	1	1	1			
5.	Waste management	0	1	1			
6.	Innovation	1	1	2			
7.	Growing House Design	2	2	2			
Total ASD		12	12	12			

The results of the benchmark assessment of the category of building environmental management (BEM) criteria for Greenship Rating Tools for Residential Houses Version 1.0 of each housing can be seen that housing 3 and 2 pay attention to building environmental management (BEM) than other housing, by obtaining the maximum value applied by Green Building Council Indonesia (GBCI) of 12.

Rating Analysis Greenship Rating Tools for Residential Homes Version 1.0

Greenship Rating Tools for Residential Homes Version 1.0

TABLE 9 Greenship Rating Tools for Home

No	Criteria	Value			Percentage		
		A	B	C	A	B	C
1.	Appropriate Site Development	11	11	11	22	20.37	20
2.	Energy Efficiency and Conservation	7	9	10	14	16.67	18.18
3.	Water Conservation	6	6	6	12	11.11	10.90
4.	Material Resource and Cycle	4	4	4	8	7.41	7.27
5.	Indoor Health and Comfort	12	12	12	24	22.22	21.81
6.	Building Environment Management	10	12	12	20	22.22	21.81
Jumlah		50	54	55	65	70	71
Rating		Gold	Gold	Gold			

From the ranking results of the GreenShip Rating Tools for Residential Houses Version 1.0 of each housing, it can be seen that Residence C is higher than other housing. This shows that housing Residence C pays more attention to the GreenShip Homes standards applied by the Green Building Council Indonesia (GBCI).

V. CONCLUSIONS

Based on results and discussion from this research, the following conclusions can be follows:

1. Calculation results of the implementation of the GreenShip Rating Tools for Residential Houses Version 1.0, it can be seen that Residence C has the highest score with a score (55) and the second highest is Residence B (54) and the third highest is the jewel orange housing (50).
2. Results of the GreenShip Rating Tools rating for Residential Houses Version 1.0 of each housing, it can be seen that the three housings are in the gold category based on the GreenShip Homes V.1.0 rating, however, Residence C has a higher total score than other housing (71%).

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