



## Evaluation of Green Material Selection at PGSD Laboratory Building Universitas Samudra

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**Abstract.** In today's modern era, infrastructure development should take into account environmental considerations, such as the use of green materials and eco-labeling. This approach is vital for ensuring the long-term well-being of humanity and preventing further increases in global warming caused by construction practices that disregard safe and environmentally friendly materials. This study is focused on evaluating the selection of green materials in the PGSD Laboratory at Universitas Samudra. The assessment is based on the standards set by the Green Building Council Indonesia (GBCI) for Material Sources and Cycles. Data collection involved interviews with the technical team responsible for construction, on-site observations to assess material usage, and a review of various building documentation files. The interviews revealed that the PGSD Laboratory at Universitas Samudra was designed with a 'green campus' or 'green building' concept, emphasizing the use of environmentally friendly materials. Analysis of the materials used in both the structural and architectural aspects of the PGSD Laboratory found that it met 8 out of 10 green building requirements, achieving an overall percentage of 80% in accordance with the Material Sources and Cycle assessment for GreenShip GBCI. The use of such materials has had a positive impact, contributing to energy conservation, the preservation of natural resources, environmental health, user comfort, and waste reduction.

Key word: GBCI, green material, Universitas Samudra.

### INTRODUCTION

The issue of global warming is a topic of international concern. This concern is substantiated by data from the Ministry of Environment of the Republic of Indonesia, which highlights the escalating emissions of carbon dioxide (CO<sub>2</sub>), chlorofluorocarbon (CFC), and methane into the atmosphere. These emissions have detrimental effects on the ozone layer, often referred to as the Ozone Depletion Potential (ODP). A higher ODP necessitates increased efforts to mitigate global warming. The exploitation of natural resources significantly contributes to global warming. An effective strategy for reducing its impact is energy conservation, especially in the domain of building infrastructure [1].

Green building practices represent a tangible commitment to environmental sustainability within the construction industry. The primary objective of green buildings is to minimize the ecological footprint of construction on both the environment and human health. The choice of building materials is paramount in achieving energy efficiency and environmental friendliness, with a focus on the utilization of sustainable materials. [2].

Green materials or environmentally friendly materials serve a broader purpose and hold a more comprehensive meaning than simply being eco-friendly. While environmentally friendly materials mainly pertain to the product's ecological impact during use, meaning it doesn't pose potential harm to the environment or human health, green materials encompass a more extensive scope. This includes aspects beyond the material product itself, extending to material sources, production, distribution processes, installation procedures, and their capacity to support energy conservation (electricity and water), enhance health, comfort, and improve building maintenance efficiency [3].

For this reason, all infrastructure development projects need to consider and prioritize environmental conditions. The utilization of green materials or Eco-labeling is a crucial aspect with far-reaching consequences for the well-being of future generations. The PGSD Laboratory Building at Universitas Samudra (UNSAM), completed on March 4, 2020, and covering a floor area of 2,275.00 m<sup>2</sup>, was conceived with a green campus concept. To mitigate the rising specter of global warming, the construction of the building incorporated the selection of safe and eco-friendly materials. This study seeks to evaluate the material selection process, assess the use of environmentally labeled building materials (Eco-labeling), and apply green material standards to determine the environmental impact of the materials employed in the PGSD Laboratory Building at Universitas Samudra.

## **Green Material**

Green material, in a broader context, encompasses more than simply materials that can be renewed. It signifies that the materials used should not pose a potential risk to the environment or human health, and should also contribute to saving electricity, conserving water, enhancing health and comfort, as well as improving the efficiency of building maintenance management [4].

Building materials are a significant source of carbon dioxide emissions, with concrete, ceramics, and steel being the top three contributors. Carbon dioxide emissions can occur at various stages throughout the life cycle of these materials. Therefore, it is essential to conduct life cycle assessments that monitor carbon dioxide emissions production at each construction stage to contribute to sustainable construction practices [1].

Sustainable construction involves applying the principles of sustainable development to the construction industry. Among various aspects, the choice of construction materials plays a pivotal role and requires careful consideration. Material selection is closely linked to environmental impact, particularly in terms of the product life cycle, which encompasses the process of transforming resources into ready-to-use products [5].

In the quest to reduce environmental impact and combat global warming, the 3R concept (Reduce, Reuse, Recycle) is a crucial framework for selecting sustainable building materials. Reducing involves minimizing materials and waste generation to safeguard the environment. Reuse focuses on utilizing used materials and products for specific purposes, with the aim of reducing landfill waste and extending product life. Recycling employs specific processes to reuse materials that would otherwise be discarded, for both similar or different purposes [5].

Sustainable building materials are those that are locally produced, reducing transportation costs and CO<sub>2</sub> emissions. They often consist of recycled or reclaimed materials, have a minimal negative impact on the environment, and are highly efficient. These building materials require less energy in their production compared to conventional materials, utilize renewable resources, emit fewer harmful substances, and are economically viable [6].

During the construction phase, significant amounts of materials and energy are consumed. These materials are typically sourced from natural resources through processes that generate waste and have a detrimental environmental impact [7].

The term 'environmentally friendly' pertains to the inherent characteristics of a material itself. Such materials do not harm the environment during their use or disposal and do not pose a threat to human health. They are often labeled as such due to their relatively low environmental impact [8].

Ecological materials encompass technologically advanced materials and material knowledge that introduce us to new materials, including synthetic materials and glass, while considering the technological aspects. However, this advancement has the potential to disrupt the balance and harmony between humans and their environment [9].

## **Source and Material Cycle of GreenShip Green Building Council Indonesia (GBCI)**

In this study, materials were assessed using the standardization outlined in GBCI 1.2. The Green Building Council Indonesia (GBCI) is an institution that offers green building certification services in Indonesia. This certification process involves evaluating the environmental performance of buildings and the implementation of an environmental monitoring system known as GREENSHIP. The assessment encompasses six categories, which include: [10]:

1. Appropriate Site Development/ASD
2. Energy Efficiency Refrigerant/EER
3. Water Conservation/WAC
4. Material Resource dan Cycle/MRC
5. Indoor Air Health & Conform/IAHC
6. Building & Environment Management

One aspect of the GREENSHIP assessment is Material Resource and Cycle (MRC), this category is further divided into one criterion, and there are 6 prerequisites for assessment criteria, namely [10]:

1. Fundamental Refrigerant (MRC P)
2. Building and Material Reuse (MRC 1)
3. Environmentally Friendly Material (MRC 2)
4. Non UDS Usage (MRC 3)
5. Certified Wood (MRC 4)
6. Prefab Material (MRC 5)
7. Regional Material (MRC 6)

**TABLE 1. Material Sourcing and Cycle Categories and Criteria**

Category	Source and Material Cycle	Maximum criteria value	Description Category
MRC P	<i>Fundamental Refrigerant</i>	P	
MRC 1	<i>Building Material Reus</i>	2	1 eligibility criterion; 6 credit criteria
MRC 2	<i>Environmentally Friendly Material</i>	3	
MRC 3	<i>Non ODS Usage</i>	2	
MRC 4	<i>Certified Wood</i>	2	
MRC 5	<i>Prefab Material</i>	3	
MRC 6	<i>Regional Material</i>	2	1 eligibility criterion; 6 credit criteria
<b>Total Category Value MRC</b>		<b>14</b>	<b>13,9%</b>

Source: [10].

In general, green building refers to architectural planning that aims to improve quality of life and meet the needs of future generations. This concept encompasses various types of structures, including homes, apartments, offices, and other buildings [11]. The key principles of green building include:

1. Energy Efficiency: Maximizing the use of natural energy sources in the building's vicinity.
2. Consideration of Local Climate: Designing structures that take into account local weather conditions and available energy sources.
3. Sustainable Material Use: Prioritizing the use of non-toxic, natural building materials that are inexhaustible and can be used in the future.
4. Health and Comfort: Ensuring that the building's construction and materials have no adverse effects on the health and comfort of its occupants.
5. Footprint Management: Addressing all building requirements while minimizing the building's environmental impact.
6. Integration of Green Architecture Principles: Incorporating all aspects of green architecture into the design

In the State Minister of Environment Regulation No. 8 of 2010, which outlines the criteria and certification for environmentally friendly buildings, Chapter II, Article 4 [12], environmentally friendly buildings are categorized based on criteria including:

1. Use of environmentally friendly building materials.
2. Water Resource Conservation Facilities, Features, and Infrastructure.
3. Energy Conservation and Diversification Facilities, Features, and Infrastructure.
4. Use of Non-Ozone-Depleting Materials.

5. Domestic Wastewater Management Facilities, Features, and Infrastructure.
6. Waste Sorting Facilities.
7. Consider the well-being of building occupants.
8. Sustainable site Facilities, Features, and Infrastructure.
3. Disaster mitigation Facilities, Features, and Infrastructure.

### **Use of Environmentally Friendly Materials**

Controlling the use of environmentally friendly materials in Green Building Buildings (BGH) has the purpose of reducing substances that pose risks to the health and comfort of building users while also ensuring the sustainable supply of such materials at a national level [13]. The utilization of certified ecological materials with environmentally friendly credentials is essential for promoting environmental sustainability, especially in terms of raw material production. Ecolabeling, which signifies the environmental attributes of a product or service, plays a vital role in fostering sustainable environmental practices. The ecolabel program is a voluntary, proactive environmental tool developed to enhance environmental quality in both product production and consumption processes [14].

**TABLE 2.** Assessment of Green Building Building Material Criteria

Review	Criterion
1. Dominant Roof Covering Material	An assessment of the criteria is given if the roof covering is not planned using abscesses.
2. Wood/ Bamboo/ Renewable Material	An assessment of the criteria will be given if there is no adhesive with harmful contaminants. And if renewable materials have legal provisions, and use recyclable wood / bamboo.
3. Metal Material	An assessment of the criteria will be given if the metal material does not use rust-resistant paint coatings containing harmful contaminants.
4. Structural Materials-Concrete-Sand- and Gravel	Assessment will be given if it comes from a local source of maximum 1000 km.
5. Material Structure-Concrete-Cement	Assessment will be given if it comes from a local source of maximum 1000 km.
6. Wall Covering Material	An assessment will be given if the use of material comes from a local source of a maximum of 1000 km.
7. Paint Material	An assessment will be given if the use of paint does not contain harmful substances.

Source: [7].

## **RESEARCH METHODOLOGY**

This research is qualitative in nature. Qualitative research is a methodology that emphasizes in-depth observation. Utilizing qualitative methods in research leads to a more comprehensive examination of a phenomenon [15]. This research intensively focuses on a single subject, specifically the PGSD Laboratory building of Universitas Samudra, with a primary emphasis on the selection and utilization of materials, as well as the impact of material use on the PGSD Laboratory building of Universitas Samudra.

The research employs interactive modeling data analysis techniques, commencing with the stages of data collection, followed by data reduction, data presentation, and culminating in the conclusion stage.

1. Commencing with the collection of secondary data, the Cost Budget Plan (RAB) was analyzed to categorize the environmentally friendly materials employed in the PGSD Laboratory building of Universitas Samudra.
2. The research instruments were prepared, encompassing the identification of variables and indicators for green construction materials with respect to the material source & cycle criteria.
3. Observations were conducted to correlate the data acquired from the technical team with the materials utilized on-site.
4. Interviews were carried out with the technical team responsible for the construction of the PGSD Laboratory building at Universitas Samudra.

5. Data reduction involved an examination of each material used, analyzing its adherence to the green criteria, and classifying materials as ecological or otherwise.
6. The subsequent technique, data presentation, enabled researchers to systematically process the acquired data, culminating in the formulation of conclusions.

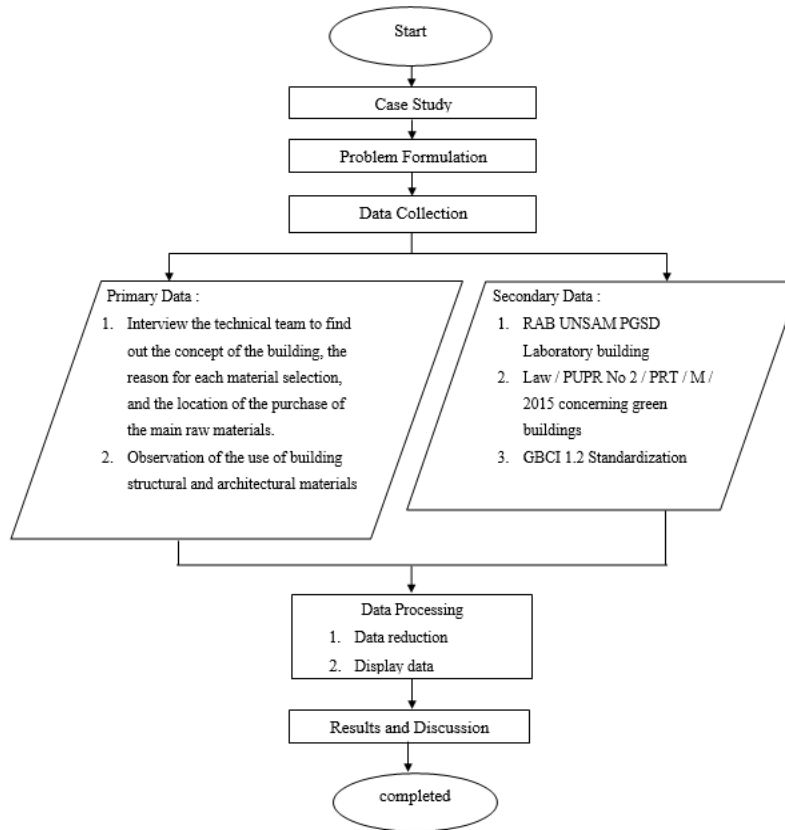


FIGURE 1. Flow Chart

## RESULT AND DISCUSSION

### Analysis of Work Items According to Construction Cost Estimate

Based on the results of this research analysis, the findings are presented in the table depicting the Evaluation of Green Material Selection at the PGSD Laboratory Building of Universitas Samudra. This evaluation is based on the work stages for assessing green materials, particularly focusing on the structure and architecture, as determined by the Construction Cost Estimate.

#### 1. Structural Work

TABLE 3. Structural Materials used and MRC points Source and Cycle of Greenship Materials

No	Work Items	Materials used	MRC Points that can be met						
			MRC P	MRC 1	MRC 2	MRC 3	MRC 4	MRC 5	MRC 6
1	Preparation	Wood					✓		
2	Soil	a. landfill soil							✓
		b. landfill sand							✓

No	Work Items	Materials used	MRC Points that can be met						
			MRC P	MRC 1	MRC 2	MRC 3	MRC 4	MRC 5	MRC 6
3	Foundation	a. Split stone							✓
		b. Portland cement			✓				
		c. Tidal sand							✓
		d. Concrete sand							✓
		e. landfill sand							✓
		f. Gravel							✓
4	Concrete	a. Portland cement			✓				
		b. Concrete sand							✓
		c. Gravel							✓
		d. Iron							✓
5	Wall	a. Red bricks							✓
		b. Portland cement			✓				
		c. Tidal sand							✓

Based on the results of the analysis in Table 3 above, the materials used in the structural components of the PGSD Laboratory building at Universitas Samudra that meet the MRC Point of GreenShip Material Source and Cycle include MRC 2 Environmentally Friendly Material, MRC 4 Certified Wood, and MRC 6 Regional Material.

## 2. Architectural Work

**TABLE 4.** Architectural materials used and MRC points Source and Cycle of GreenShip Materials

Work Items	Materials used	MRC Points that can be met						
		MRC P	MRC 1	MRC 2	MRC 3	MR C 4	MR C 5	MR C 6
1	Plaster	a. Portland cement			✓			
		b. Tidal sand						✓
2	Floor	a. Granite flooring, double loading						✓
		b. Roman equivalent floor						✓
3	Ceiling	UPVC Ceiling						✓
4	Tile	a. Metal tile						✓
		b. Onduline tile			✓			✓
5	Glass	Thick glass						✓
6	Painting	a. Jotun paint			✓			
		b. Vinilex paint			✓			
7	Door & Window	a. Glass door						✓
		b. UPVC door						✓
		c. UPVC window						✓
		d. UPVC Ventilation						✓

Based on the results of the analysis in Table 3 above, the materials used in the architectural aspects of the PGSD Laboratory building at Universitas Samudra that fulfill the MRC Point of Greenship Material Source and Cycle include MRC 2 Environmentally Friendly Material, MRC 5 Prefab Material, and MRC 6 Regional Material.

## Material Analysis Based on GBCI Standard

The discussion in this study is about the evaluation of the selection of green materials in the PGSD Laboratory building of Universitas Samudra, for the materials reviewed, namely structural and architectural materials are assessed based on the standardization of the Green Building Council Indonesia (GBCI) Material Cycle and Source.

### 1. Structural Work

#### a. MRC 2 Environmentally Friendly Material

**TABLE 5.** Environmentally friendly material analysis

<b>Theory and Data</b>	
a.	The purpose of using environmentally friendly materials is to increase efficiency in the use of materials and reduce construction waste.
b.	The benchmarks are: <ol style="list-style-type: none"> <li>1) Using materials certified ISO 14001 and the latest SNI or equivalent environmental management system certificates.</li> <li>2) Using materials that are recycled.</li> <li>3) Using materials from renewable resources.</li> </ol>

#### **Analysis**

Based on the survey, the PGSD Laboratory building of Universitas Samudra uses Portland cement that has been certified and labeled SNI.



**FIGURE 2.** Portland cement

#### **Conclusion**

Based on the benchmark, the Portland cement used by the PGSD Laboratory building of Universitas Samudra already has an environmentally friendly certificate or equivalent, namely the SNI label and gets 1 point from the assessment that is fulfilled

#### b. MRC 4 Certified Wood

**TABLE 6.** Certified wood analysis

<b>Theory and Data</b>	
a.	The purpose of using certified and legal timber is to avoid illegal timber traders and protect forest sustainability.
b.	The benchmarks are: <ol style="list-style-type: none"> <li>1) Using wood materials that are legally certified in by Government Regulations on the origin of wood and legally free from illegal timber trade has a certificate from the Indonesian Ecolabel Institute (LEI) or Forest Stewardship Council (FSC).</li> <li>2) Wood material comes from the territory of the Republic of Indonesia.</li> </ol>

#### **Analysis**

Based on the survey, the wood used by the PGSD Laboratory building of Universitas Samudra comes from forests owned by people who already have a certificate of community timber management permit.



**FIGURE 3. Wood**

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**Conclusion**

Based on the benchmark, the wood used in the PGSD Laboratory building of Universitas Samudra comes from the territory of the Republic of Indonesia and gets 1 point from the assessment that is fulfilled.

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c. MRC 6 Regional Material

**TABLE 7. Regional material analysis**

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**Theory and Data**

- a. The purpose of using regional materials is to reduce the carbon footprint of transportation modes for the distribution of material delivery to the site.
  - b. The benchmarks are:
    - 1) Using materials whose main raw material origin location is within a radius of 1000 km from the location.
    - 2) Using materials whose main location of origin is within the territory of the Republic of Indonesia.
- 

**Analysis**

Based on the survey, the PGSD Universitas Samudra laboratory building uses the main raw materials which are located not far from the location and are still within the territory of the Republic of Indonesia.

Material of landfill sand, tidal sand, and concrete sand comes from Sekrak District, Aceh Tamiang Regency which is located 58.9 km from the location.



**FIGURE 4. Landfill sand**



**FIGURE 5. Concrete sand**



**FIGURE 6. Tidal sand**

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**Analysis**

Stone material was imported from Pulo Tiga village, Aceh Tamiang Regency which is 61.5 km from the location.



**FIGURE 7. Split stone**

Gravel material was imported from Lokop, East Aceh which is 5.9km from the location with vehicle mileage.



**FIGURE 8. Gravel**

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Red brick material was imported from Birem Bayeun, East Aceh which is 19.2 km from the location.



**FIGURE 9.** Red bricks

Iron material is partly from the building shop in the city of Langsa which is not far from the location, and some are imported from Medan with a distance of 165.9 km from the location.



**FIGURE 10.** Iron

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### **Conclusion**

Based on the benchmark, the main raw material used by the PGSD Laboratory building of Universitas Samudra is located not far from the location and is still within the territory of the Republic of Indonesia and gets 2 points from the assessment that is fulfilled.

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2. Architecture work
  - a. MRC 2 Environmentally Friendly Material

**TABLE 8.** Environmentally friendly material analysis

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### **Theory and Data**

- a. The purpose of using environmentally friendly materials is to increase efficiency in the use of materials and reduce construction waste.
- b. The benchmarks are:
  - i. Using materials certified ISO 14001 and the latest SNI or equivalent environmental management system certificates.
  - ii. Using materials that are recycled.
  - iii. Using materials from renewable resources.

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### **Analysis**

Based on the survey, the PGSD Laboratory building of Universitas Samudra uses Portland cement products that already have an environmental management system certificate in the production process.

Portland cement material has been certified and labeled SNI.



**FIGURE 11.** Portland cement

Jotun paint products already have a green certification label from Green Label Singapore [16].

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**Theory and Data**

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**FIGURE 12.** Jotun paint  
Source: Internet

Vinilex paint products already have Green Label Singapore green certification label [17].



**FIGURE 13.** Vinilex paint  
Source: Internet

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The onduline roof is made of bituminous cellulose and organic fibers that can decompose naturally, making this material environmentally friendly [18].



**FIGURE 14.** Onduline roofing

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**Conclusion**

Based on the benchmark, the use of environmentally friendly materials gets 2 points from the assessment that is met.

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b. MRC 5 Prefab Material

**TABLE 9.** Prefab material analysis

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**Theory and Data**

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- a. The purpose of using prefabricated materials is to increase efficiency in the use of materials and reduce construction was.
- b. The benchmarks are:  
Design that uses modular or prefabricated materials.

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**Analysis**

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Onduline roofing	PVC Plafond	Glass door & Solarflat	UPVC door
The onduline roof is made of bituminous cellulose and organic fibers that can decompose naturally, making this material environmentally friendly [18].	The use of PVC material has many advantages including minimal plastic properties, no shrinkage expansion, leak resistance, soundproofing, easy maintenance and non flammability.	The use of glass material makes it easier for natural sunlight to enter the building.	The use of PVC material has many advantages including minimal plastic properties, no shrinkage expansion, leak resistance, soundproofing, easy maintenance and non flammability.



**FIGURE 15.** Onduline roofing



**FIGURE 16.** UPVC plafond



**FIGURE 17.** Glass door



**FIGURE 19.** UPVC door



**FIGURE 18.** Solarflat canopy



The use of PVC material has many advantages including minimal plastic properties, no shrinkage expansion, leak resistance,

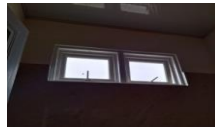
The use of PVC material has many advantages including minimal plastic properties, no shrinkage expansion, leak resistance,

Granite is a material that can save natural resources, this material is a non-renewable natural resource so it is difficult to renew,

soundproofing, easy maintenance and non flammability.

soundproofing, easy maintenance and non flammability.

but the use of granite has a durable durability, so that the use of natural resources becomes more efficient [5].



**FIGURE 21.** UPVC Ventilation



**FIGURE 22.** Granite and Ceramics



**FIGURE 20.** UPVC Window

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**Conclusio**

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ased on the benchmark, the PGSD Laboratory building of Universitas Samudra uses prefabricated materials to minimize residual materials and get 3 points from the assessment that is met.

c. MRC 6 Regional Material

**TABLE 10.** Regional material analysis

<b>Theory and Data</b>	
c.	The purpose of using regional materials is to reduce the carbon footprint of transportation modes for distribution of material delivery to the site.
d.	The benchmarks are:
3)	Using materials whose main raw material origin location is within a radius of 1000 km from the location.
4)	Using materials whose main location of origin is within the territory of the Republic of Indonesia.

**Analysis**

Based on the survey, the PGSD Laboratory building of Universitas Samudra uses the main raw materials from Sekrak District, from Aceh Tamiang Regency which is located 58.9 km to the location.



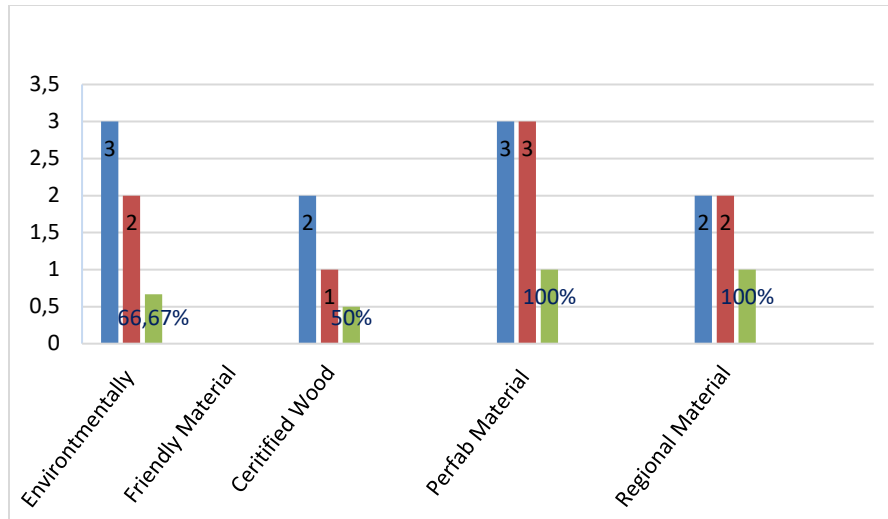
**FIGURE 23.** Tidal sand

**Conclusion**

Based on the benchmark, the main raw material used by the PGSD Laboratory building of Universitas Samudra, the location is not far from the location and is still within the territory of the Republic of Indonesia and gets 2 points from the assessment that is fulfilled.

**TABLE 11.** Material Valuation Table used from MRC Points Source and GreenShip Material Cycle that have been met

	<b>Category</b>	<b>Number of values for Source and Material Cycle</b>		
		<b>Requirement</b>	<b>Credit</b>	<b>Fulfilled</b>
1	MRC 2 Environmentally Friendly Material	3	2	66,67%
2	MRC 4 Certified Wood	2	1	50%
3	MRC 5 Prefab Material	3	3	100%
4	MRC 6 Regional Material	2	2	100%
	<b>Sum</b>	<b>10</b>	<b>8</b>	<b>80%</b>



**FIGURE 24.** Graph of the percentage of material credit fulfilled

Based on the results of the analysis, the materials under review, concerning both structure and architecture, have been evaluated according to the MRC (Material Resource Category) and the GreenShip Material Cycle criteria. The fulfillment of these criteria is then quantified in terms of a percentage value. The conclusions drawn from the assessment analysis of the materials used in the PGSD Laboratory at Universitas Samudra are presented in percentage form, as follows:

### **Impact of Material Use on PGSD Laboratory Building of Universitas Samudra**

#### 1. Energy Saving

Based on the study's findings, it can be concluded that the primary raw materials used in constructing the PGSD Laboratory building at Universitas Samudra were locally sourced, specifically from building suppliers in the city of Langsa. This approach was adopted to conserve energy and reduce the environmental impact. The use of fossil fuels can contribute to air pollution through vehicle emissions [19]. By opting for locally sourced materials within less than 1000 km from the construction site, the release of harmful emissions was minimized. This practice not only promotes human health but also mitigates the environmental impact..

#### 2. Save Natural Resources

Based on the study's findings, it was determined that the PGSD Laboratory building at Universitas Samudra incorporates wood as one of its primary construction materials. The use of wood is an environmentally sustainable choice as it relies on a renewable natural resource [20].

In addition to wood, the building also utilizes granite material for its entire flooring. Granite is considered a non-renewable natural resource, making it challenging to replenish. However, its durability ensures optimal and efficient utilization of natural resources [2].

#### 3. Environmental Health and Building Users

Based on the study's findings, it is evident that the choice of materials in the PGSD Laboratory building at Universitas Samudra places significant emphasis on environmental health and the well-being of building occupants. This focus extends from the construction phase to the building's post-construction use. One illustrative example is the utilization of Setara Jotun paint, which bears an environmentally friendly label, ensuring the safety and well-being of building users. This commitment to environmental health is further underscored by the presence of the 'Green Label Singapore' logo. Moreover, the sourcing of local primary materials contributes to a reduction in carbon emissions, mitigating potential air pollution in the surrounding environment.

#### 4. Reduce Waste

Based on the results of the study, the use of prefabricated materials in the PGSD Laboratory building of Universitas Samudra reduces the remaining material waste. This is evidenced by the use of prefabricated

materials such as the use of glass doors, UPVC doors, UPVC windows, UPVC ventilation, and thick glass for solar flat canopies on building terraces.

5. Building User Comfort

Based on the results of research on the use of building materials in the PGSD Laboratory building of Universitas Samudra in terms of architecture, it provides comfort for building users, to increase productivity during study time.

## CONCLUSION

Based on the results of research and discussion on the evaluation of green material selection in the PGSD Laboratory building of Universitas Samudra, it can be concluded:

1. PGSD Laboratory Building Universitas Samudra has the concept of a green campus building or commonly called a green building, every use of materials has been planned to use environmentally friendly materials, use prefabricated materials so that there is no material left or wasted, and use materials whose main raw materials mostly come from the city of Langsa.
2. The building material of the PGSD Laboratory of Universitas Samudra in terms of its structural work has met the green material standards variable MRC 4 certified wood and variable MRC 6 Regional Material.
3. The building material of the PGSD Laboratory of Universitas Samudra in terms of its architectural work has met green material standards with variables MRC 2 Environmentally Friendly Material and MRC 5 Prefabricated Material.
4. The use of building materials for the PGSD Laboratory of Universitas Samudra, when viewed from structural work and architectural work, has a positive impact related to energy saving, saving natural resources, environmental health and building users, reducing waste and comfort of building users.

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