International Journal of Global Community
Volume VI No. 3 (November), 2023

Green Construction In The Framework Of Sustainable Development Goals

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Abstract
Indonesia already has regulations regarding construction and environmental services. However, the extent to which these regulations promote environmentally-friendly construction needs further study to ensure that development policies are friendly to the environment. Considering that environmental sustainability is one of the principles of the Sustainable Development Goals (SDGs), the 'Green Building-Green Construction' concept is one of the measures put in place to support the achievement of sustainable construction, which will ultimately contribute to reducing the impact of global warming. Since they form the basis for green construction, the SDGs needs to be studied. This research uses the normative legal research method with field data as support. This research has theoretical benefits, namely the development of methods that add to scientific knowledge in the fields of construction and environment. The developed methods can be used by the construction service community to perform green or sustainable construction. In Indonesia, in line with developments in international law, several regulations related to green construction and sustainable development have been enacted. Furthermore, regarding the SDGs, seven goals are directly related to green construction, even though all of the SDG goals correlate with green construction. Moreover, the concept of sustainability is a condition that must be achieved to ensure a future for humanity.

Keywords: environmental, sustainability, green construction, regulation

Introduction

The use of the Sustainable Development Goals (SDGs) principles in green construction is intended to present a broad picture of opportunities and challenges in order to show the actual and potential contribution of green development to achieving the SDGs, from the planning stage to the implementation and maintenance stages of building construction. The inclusion of SDG instruments in the core green construction business is a new, better step and has gained support from the government and abroad.

Specifically, green construction is associated with only nine of the SDGs, including goal 3, healthy and prosperous life; goal 7, clean and affordable energy; goal 8, decent work and economic growth; goal 9, industry, innovation, and infrastructure; goal 11, sustainable cities and settlements; goal 12, sustainable consumption and production; goal 13, tackling climate change; goal 15, land ecosystems; and goal 17, partnerships to achieve the goals (Green Building: Improving the Lives of Billions by Helping to Achieve the UN Sustainable Development Goals, n.d.), as indicated in Picture 1.

Image 1. SDGs World Green Building Council

Source: https://elemental.green/what-are-the-17-un-sdgs/

Furthermore, the stages of construction projects are planning (pre-construction), contract execution (construction stage), and maintenance (post-construction) (Diantha 2016). In these three phases, all must pay attention to the green construction scheme. Therefore, it is vital to discuss the following issues: the meaning of green construction, how to regulate green construction, which sustainable development goals can be realized by green construction, and the role

of universities in green construction, also known as sustainable construction (Utama and Irsan, 2022).

Research Method

The purpose of this research is to evaluate the above issues systematically, factually, and accurately as well as describe green construction to reduce the impact of global warming. The study uses deductive approach, based on theories and concepts commonly applied to explain a set of data or indicate comparisons or relationships of the data (Winch and Kelsey 2005).

This research uses the normative legal research approach, which involves describing, analysing, and systematizing green construction laws (Irwansyah 2020). Further, the economic approach to law is essential to obtain an effective and efficient settlement mechanism.

The data used are secondary data, comprising primary, secondary, and tertiary legal materials. The secondary data were compiled through documentation and literature study. This compilation process was based on the relevance of related material to support the research substance, theoretical framework, analysis, and in-depth interviews to obtain supporting data (Winch and Kelsey 2005).

The processing and analysis of legal materials were carried out qualitatively. The holistic and comprehensive use of this analysis method is based on the following considerations (Soerjono Soekanto, 2012). First, the analyzed data are diverse, have different essential characteristics, and are not easy to quantify. Second, the analyzed data are comprehensive and constitutes a holistic entity. Third, the processing and analysis of legal materials were used to find a green construction concept within the SDGs framework to reduce the impact of global warming (Benuf and Azhar 2020).

Result and Discussion

Green Construction

The Environmental Protection Agency (EPA) of the United States was established in July 1970. Its establishment followed the event of the first Earth Day, which was took place in April 1970 (Eisner 2007). The formation of this protection agency (EPA) was the first step towards achieving an environment with clean air and water and protection for living things.

The United Nations (UN) Conference in Stockholm, Sweden, was held two years later (E 2021), on June 5, 1972, and the agenda was the human environment, comprising issues in the fields of education, science, economic and social development, resources and pollution. That day (June 5) was later designated as World Environment Day (HLHS). The Stockholm conference is one of the milestones achieved by the global environmental movement, and it has influenced many countries, including Indonesia. Responding to the conference, in 1978, Indonesia formed the State Ministry for Supervision of Development and the Environment. Then on October 15, 1980, an environmental monitoring network

known as the Indonesian Forum for the Environment (WALHI) was formed. Furthermore, in 1992, the United Nations Conference on Environment and Development, also known as the Earth Summit, was held in Rio de Janeiro, Brazil. It was attended by the leaders of 179 countries (including Indonesia). The conference was a response to environmental and natural resource issues, including pollution, environmental destruction, and wastage of natural resources. Then in 2007, the United Nations Climate Change Conference (UNCCC) in Bali called for the transfer of environmentally friendly technologies.

Environmental issues are fundamental. The phenomenon of global warming, caused by the effect of greenhouse gases on the earth, is believed by researchers to be the effect of development activities (Mikhaylov et al. 2020). Applying the concept of sustainable development reduces global warming. Sustainable development contains three primary, interrelated, mutually supporting pillars: economic development, social development, and environmental preservation (B, 2000).

The SDGs, which were established in 2015, are an agreement of 193 member countries of the United Nations. The purpose of the SDGs is to increase the welfare of the global community, including Indonesia. Therefore, the SDGs, as a global development agenda, are in line with the National Medium Term Development Plan of Indonesia and are an inseparable part of the national development agenda (SDGs DashBoard, 2022).

Therefore, measures to protect the environment while carrying out developmental projects must be put in place. In accordance with the concept of Sustainable Development Goals, green construction promotes sustainable development (Khairarizki and Iyati 2017). Green construction is the planning and managing of a construction project according to the contract document to minimize the impact of the construction process on the environment. Therefore, the contract documents of construction projects must contain plans and arrangements on how the impact of the projects on the environment can be minimized. Hence, green construction is a sustainable activity that aspires to manage the planning, implementation, and use stages of construction products to ensure that they are environmentally friendly, efficient in energy use and resources, and low cost (Ervianto 2012). Green building covers efficiency in the use of land, energy, and water, as well as ensures friendly surroundings and healthy indoor air.

Sustainable Development Goals

The SDGs are a 2015–2030 agenda that aims for economic development that is just, socially inclusive, and environmentally sustainable. The SDGs provide a general framework for navigating the most pressing economic, social, and environmental challenges of each stakeholder in society in achieving sustainable development (Mapping Mining to the Sustainable Development Goals: A Preliminary Atlas 2016).

Sustainable development has 3 (three) beneficial aspects, namely economic, social, and environmental benefits, which must be pursued in a balanced

manner. Therefore, mining activities are not only associated with economic profit alone but also have great social and environmental responsibilities so that the hopes for people's prosperity can be achieved.

Through the SDGs, companies can improve their environmental and social impact, protect the health of their workers, achieve energy efficiency, respect and support human rights, provide decent work opportunities, promote economic development, and so on (F. S, F, and R 2022). The inclusion of SDG instruments in the core construction business is a new and better step, and it has gained support from the government and abroad.

To realize their potential and contribute to achieving the SDGs, companies must continue to work to integrate change into their core business and, together with the mining industry as a whole, increase collaboration and partnerships with governments, civil society institutions, communities, and other stakeholders (Mapping Mining to the Sustainable Development Goals: A Preliminary Atlas 2016).

The 17 Sustainable Development Goals (SDGs) and 169 targets, which were put together by the United Nations, indicates the scale and ambition of this new universal agenda. The pillars of sustainable development include social development, economic development, environmental development, and development of law and governance (Table 1).

Table: Grouping of SDGs into Pillars of Sustainable Development and Governance that Supports Sustainable Development

Social Development Pillars	Economic Development Pillars	Environmental Development Pillars	Law and Governance Development Pillar
Goal 1. No Poverty	Goal 7. Affordable and Clean Energy	Goal 6. Clean Water and Sanitation	Goal 16. Peace, Justice and Strong Institutions
Goal 2. Zero hunger	Goal 8. Decent Work and Economic Growth	Goal 11. Sustainable Cities and Communities	
Goal 3. Good Health and Well Being	Goal 9. Industry, Innovation and Infrastructure	Goal 12. Responsible Consumption and Production	
Goal 4. Quality Education	Goal 10. Reduced Inequalities	Goal 13. Climate Action	
Goal 5. Gender Equality	Goal 17. Partnerships for the Goals	Goal 14. Life Below Water Goal 15. Life on Land	

Source: Armida Salsiah A, Endah Murniningtyas. 2018. "Tujuan Pembangunan Berkelanjutan di Indonesia: Konsep, Target dan Strategi Implementasi". Bandung: Unpad Press.

Global Warming

Global warming is a serious international issue today. This issue has become one of the important topics since the 1992 Earth Summit held in Rio de Janeiro (W. S 2012). Also, during the Earth Summit in Johannesburg in 2002, the Climate Change Conference in Bali in 2007 and the Climate Change Conference in Poland in 2008, discussions were held on ending the controversies associated with global warming. These conferences are also meant to strengthen the commitments of the international community in solving global warming. Global warming means that the temperature of the earth's surface, both land and water, is rising (K. S 2020).

The issue of global warming, which stems from the greenhouse effect, is constantly being discussed and is a problem that must be resolved (Rusbiantoro 2008). Greenhouse gases are generally produced from fossil fuels, such as gasoline, diesel, kerosene, coal, natural gas, and many more. They are produced by industrial activities and the accumulation of organic waste

An international treaty that discussed emission reduction and further prevention of global warming is the Kyoto Protocol of 1997. It was agreed that greenhouse gas emissions (mainly CO_2, CH_4, and NOx) should be reduced. To calculate the amount (percentage) of reduction, the emission level of 1990 was set as baseline. The principles of the Kyoto Protocol are the same for all signatory countries, but countries have different responsibilities. For example, developed industrial countries (called Annex 1 countries) are required to commit to reducing their emissions. In contrast, developing countries (non-Annex 1) are not obliged to reduce emissions but must report the status of their emissions (*Viva News*, n.d.).

Indonesia ratified this agreement in 2004 and has designed a greenhouse gas reduction programme. However, the programme is different from those of neighboring countries, such as Malaysia. In the 2000s, Indonesian stakeholders offered several programs. However, only six projects have been recognized as Clean Development Mechanism (CDM) programme.

CDM is a mechanism whereby countries that are members of Annex 1 (OJ 2019), which must reduce greenhouse gas emissions to a certain amount by 2012 as stipulated in the Kyoto Protocol, help non-Annex 1 countries to implement projects capable of reducing or absorbing emissions of at least one of the six greenhouse gases. The non-Annex 1 countries in question are those that signed the Kyoto Protocol but have no obligation to reduce their emissions. Units of greenhouse gas (GHG) emissions that can be reduced are converted into credits known as Certified Emissions Reductions (CERs) - emission reduction units that have been certified (BS 2019).

Annex 1 countries can utilize this CER to help them meet emission reduction targets as stipulated in the UNFCCC Clean Development Mechanism protocol, which is an aspect of the Kyoto protocol contained in the Flexible Mechanism agenda. Flexible Mechanisms include Joint Implementation, Emission Trading, and the Clean Development Mechanism (The Kyoto Protocol, The Clean Development Mechanism, and The Building and Construction Sector: A Report for The UNEP Sustainable Buildings and Construction Initiative 2008).

The Clean Development Mechanism includes three implementation categories: Clean Production, Saving Energy, and Fuel Switching. The objective of the CDM programme is to reduce greenhouse gas emissions and enhance carbon sequestration (absorption) by planting trees.

1. *Regulations in the field of construction related to green or sustainable construction.*

   Environmentally friendly construction (green construction) is a building concept in which the processes of planning, building, operating, maintaining, and demolishing buildings constantly prioritize saving natural resources to the greatest possible extent, using land wisely, reducing the impact on the environment, maintaining air quality, and ensuring the health of inhabitants by prioritizing sustainable development.

   According to the Regulation of the Minister of State for the Environment No. 8 of 2010 concerning Criteria and Certification of Environmentally Friendly Buildings, green construction involves applying environmental principles in the design of a building, its construction, operation, and management. It is an essential aspect of handling the impacts of climate change. The environmental principle in question is a principle that prioritizes and pays attention to elements of environmental function preservation.

   Green construction also includes a mix or combination of energy efficiency and material impact on occupants. It is a holistic concept that begins with the understanding that the built environment can have both positive and negative impacts on the environment and the people who live in the buildings daily. Green construction is an attempt to magnify positive impacts and prevent negative impacts during the lifetime of buildings.

   The following are definitions of green construction or environmentally friendly buildings from several book sources:

   a. According to the Indonesian Engineers Association (2016), green construction is a building concept that uses natural resources to a minimum, uses land wisely, and reduces environmental impact during the planning, construction, operation, and maintenance periods as well as creates good indoor air quality, health and comfort during its utilization period.
   b. According to A Public Private Partnership for Advancing Housing (2005), green building is a conceptual approach to building design and assessment that minimizes environmental impact, reduces energy consumption from buildings, and supports the health and productivity of its occupants.
   c. According to the US EPA (2009), green building is a concept of sustainable development that leads to the structure and

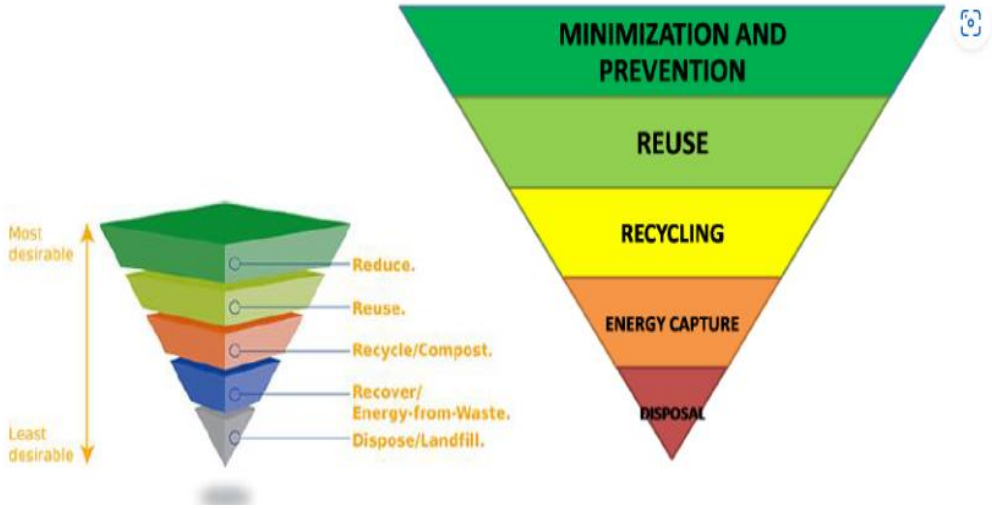
application of processes that create a resource-efficient environment throughout the building's life cycle, from site selection to construction design, maintenance, renovation, and demolition.

d. According to the Green Building Council Indonesia (2012), a green building is a building which, from the planning, construction, and operation stages to the maintenance stage, shows and pays attention to aspects of protecting, saving, reducing the use of natural resources, maintaining air quality in the room and prioritizing the health of its occupants, all of which adhere to the principles of sustainable development (BG, X, and J 2019).

A comprehensive list of the regulations related to green construction is given below:

1. Law Number 16 of 2016;
2. Regulation of the Governor of DKI No. 38 of 2012;
3. Law No 28 of 2002;
4. Law No 26 of 2007;
5. Law No 32 of 2009;
6. Government Regulation No. 5 of 2010;
7. Government Regulation No. 68 of 2010;
8. Instruction of the Minister of Home Affairs No. 1 of 2007;
9. Regulation of the Minister of Public Works No. 5 of 2008;
10. Regulation of the Minister of Public Relations No. 32 of 2006;
11. Regulation of the Minister of Public Works No 30 of 2006;
12. SNI-03-6389-2000;
13. SNI-03-6390-2000;
14. SNI-03-7065-2005;
15. Regulation of the Minister of Health No. 416 of 1990;
16. Presidential Decree No 23 of 1992;
17. Decree of the Minister of Trade No. 790/MPP/Kep/12/2002;
18. Ministry of Environment and Forestry Regulation No. 33/Menlhk-kum.1/3/2016;
19. SNI 03-6572-2001;
20. SNI 19-0232-2005;
21. Law No. 28 of 2002;
22. Decree of the Minister of Health: 1405/Menkes/SK/XI/2002;
23. SNI 03-6197-2000;
24. Law No. 18 of 2008;
25. Regulation of the Minister of Public Works No 29 of 2006;
26. Regulation of the Minister of Public Works No 24 of 2008;
27. Minister For Public Works and Human Settlement or Public Housing Regulation No 15 of 2015.

Image 2. Green Building Background



Source: MRC For New Building: MRC-NB – Green Building Consultant. Via bangunanhijau.com

With regard to sustainable development, regulatory support is essential. The existing regulations that govern sustainable development in Indonesia are:

1. Presidential Instruction Number 2 of 2008 Concerning Energy and Water Saving.
2. Decree of the State Minister for the Environment Number 17 of 2001 concerning Types of Business Plans and/or Activities that Must Be Completed with an Analysis of Environmental Impacts.
3. Decree of the Minister of State for Public Works Number 10 of 2000 concerning Technical Provisions for Security Against Fire Hazards in Buildings and the Environment.
4. Decree of the Minister of Settlement and Regional Infrastructure Number 17 of 2003 concerning the Determination of Types of Businesses and/or Activities in the Field of Settlements and Regional Infrastructure that Must Be Completed with Environmental Management Efforts and Environmental Monitoring Efforts.
5. Regulation of the State Minister for the Environment Number 08 of 2010 concerning Criteria and Certification of Environmentally Friendly Buildings.
6. Government Regulation Number 27 of 1999 concerning Environmental Impact Analysis.
7. Law Number 18 of 2002 concerning Waste Management.
8. Law Number 23 of 1997 concerning Environmental

Management.
9. Law Number 24 of 1992 concerning Spatial Planning.
10. Law Number 28 of 2002 Concerning Buildings.
11. Law Number 32 of 2009 concerning Environmental Protection and Management.
12. Law of the Republic of Indonesia Number 18 of 2008 concerning Waste Management.

Globally, the goal is to move construction towards sustainable construction. Indonesia is already heading towards this goal by enacting the above regulations. However, along with the development of the times, technology, and sustainability, the regulations must be updated. At least an action plan that refers to green or sustainable construction should be prepared.

2. *Goals of sustainable development that will be achieved by the implementation of green construction*

Green construction is designed to reduce the impact of the built environment on human and natural health through efficiency in the use of energy, water, and other resources; protect the health of the occupants and increase worker productivity; reduce solid, liquid and gas wastes; reduce pollution (solid, liquid and gas pollutions); and reduce environmental damage (Z, C, and B 2014). Some of the benefits of green buildings or environmentally friendly buildings include the following:

a. Environmental benefits
    1. Increase and protect the diversity of ecosystems.
    2. Improve air quality.
    3. Reduce waste.
    4. Conserve natural resources.
b. Economic benefits
    1. Reduce operational costs.
    2. Create and expand markets for green products and services.
    3. Increase occupant productivity.
    4. Optimize economic lifecycle performance.
c. social benefits
    1. Improve the health and comfort of occupants.
    2. Improve aesthetic quality.
    3. Reduce problems with local infrastructure.

About the SDGs

The 17 Sustainable Development Goals (SDGs) and 169 targets demonstrate the scale and ambition of the new universal agenda. The basic idea of the pillars of sustainable development can be described as social pillars, economic development pillars, environmental development pillars, and law and governance

development pillar (Picture 3).

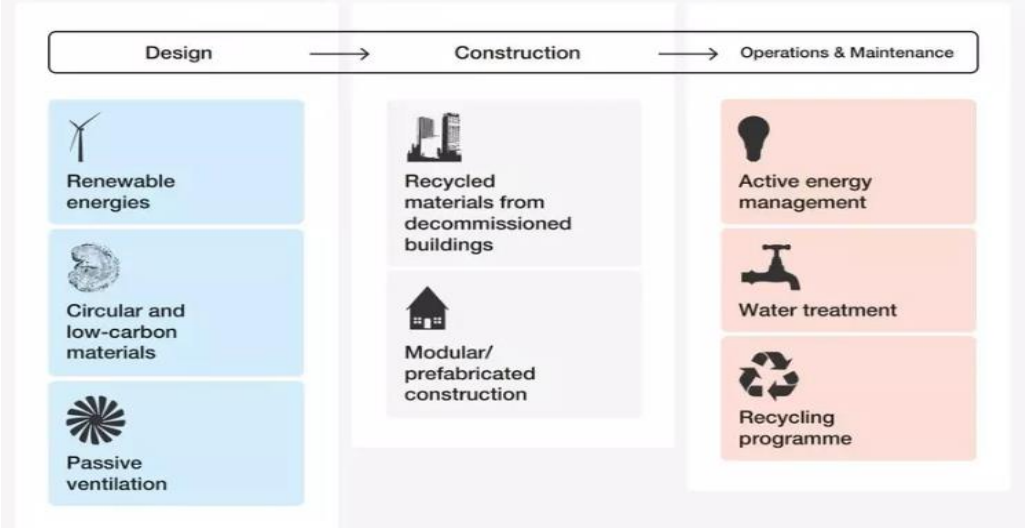
Image 3. Categorizing SDGs according to the Pillars of Sustainable Development

Source: https://www.researchgate.net/figure/Illustrative-map-of-SDGs-dependence-on-construction-and-real-estate-activities-The-size_fig3_336893661

The use of the SDG principles in green construction is intended to present a broad picture of opportunities and challenges in order to show the actual and potential contribution of green development (from the planning to the maintenance stage of building construction) in achieving the SDGs (G. S 2019), especially Goal 3, Goal 7, Goal 8, Goal 9, Goal 11, Goal 12, Goal 13, Goal 15 and Goal 17. All of the SDG goals correlate with green construction directly or indirectly, so the existence of green construction will help to achieve the SDGs. However, in particular, only the above-mentioned goals are significantly associated with green construction.

This is in line with the various standards set by practitioners in the field of world construction, as shown in the following diagram:

Image 4. Measures can be undertaken on all steps of the project life cycle



Source: https://www.weforum.org/agenda/2021/11/cop26-buildings-green-architecture-build-better-now-climate-change/

The picture explains sustainable goals associated with green construction at the levels of planning, development, and even maintenance and utilization. All of them consider development standards based on green or sustainable construction.

Conclusion

Presently, efforts are being made globally to achieve the goal of moving the construction industry towards sustainable construction. Indonesia is not left out of the global efforts to achieve this goal. The country has enacted many regulations in the field of construction services, and these regulations are aimed at achieving green or sustainable construction. At least these regulations can be the basis for all stakeholders' actions in the construction services field.

All the 17 SDGs correlate with green construction, but only nine goals (Goal 3, Goal 7, Goal 8, Goal 9, Goal 11, Goal 12, Goal 13, Goal 15 and Goal 17) are significantly associated with green construction, i.e. the presence of green construction is directly related to the achievement of these goals. Green construction will enhance the achievement of all the SDG goals, but specifically, the above goals are most significantly achieved with green construction.***

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