Strengthening green building policies in Indonesia

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Abstract. Currently, Indonesia has several regulations governing the implementation of green buildings. The primary reference for implementing green buildings is the regulation of the Minister of Public Works no 2 of 2015 concerning Green Buildings. Several rules at the regional level are Governor and Mayor Regulations. This study aims to determine the completeness of green building policy in Indonesia. This study will examine the existing regulations and financial support in Indonesia relevant to green buildings' implementation. Regulatory tracing is carried out using the online method by searching various ministry websites and various online sites documenting regulations issued by the Republic of Indonesia's government. The collected data were then analyzed by comparing it with the green building concept from diverse literature. The results show that there are still a few regulations available to support green building policy. This condition will affect the intensity of the green building implementation directly and also will affect directly to the quality of green building in Indonesia.

1. Introduction
The DKI Jakarta Governor's Regulation on Green Buildings has been enacted since 2012. According to data from the International Finance Corporation [1], from 2012 to June 2019, a total of 389 buildings or approximately 25,000,000 sqm of building floor area have met the requirements of the Governor's regulation. This performance is equivalent to a reduction in CO2 emissions of 1,079,361 metric tons or equivalent to an energy saving of 1,399,728 MWh or equal to a savings of US $ 117,172,248 in electricity costs. According to Pergub 38/2012, the only buildings required to comply with the regulations are buildings with a minimum 10,000 sqm area. If the code is applied to all Jakarta buildings, the positive impact will undoubtedly be even more significant. Whereas in Bandung, the Bandung mayor's regulation on green buildings has been established since 2016. According to the same source [1], from July 2017 to June 2019, 5615 buildings or a total of 1,420,000 sqm of building floor area have met the green building regulations. This performance is equivalent to a reduction in CO2 emissions of 57,440 Metric tons or equivalent to energy savings of 68,381 MWh or equal to savings in electricity costs of 7,521,872 $.

One of the critical goals of implementing the green building concept is reducing or saving energy consumption. Several countries have set targets for achieving energy savings, which are then achieved in various sectors. Buildings are one of the big contributors to energy saving. Efforts to achieve significant energy reductions in the building sector are not a momentary effort but a long-term effort to follow the building life cycle (Figure 1) from when the building is planned to the building being recycled.
Energy-saving efforts need to be designed from the start, and its performance regularly monitored so that additional actions can be made according to the performance monitoring results. Green buildings are expected to save energy consumption not only when they are built or operated or maintained or when they are dismantled. Moreover, green buildings need to check the embodied energy possessed by the materials it uses (Figure 2). A comprehensive lifecycle assessment of the building is required to calculate each material's embodied energy used in the construction. The evaluation starts with the mining process until it is sent to the factory. After arriving at the factory, the material is processed and then sent to the building project and installed. After the installation is complete, the material can be operated, treated, disassembled, and reprocessed [2]. Attention to things like this is significant so that green buildings do not get trapped just in appearance. Thus, it is hoped that the green building stakeholders understand how green the building they have is.

Figure 1. Building life cycle.

Figure 2. The operational and embodied energy of a building through its lifecycle [2].
2. Methods
This study aims to determine the completeness of green building policy in Indonesia. Policy tracing is carried out using the online method by searching various ministry websites and various online sites documenting policy issued by the Republic of Indonesia's government. Among the many policy manifestations, this research will only focus on regulation and financial support. Law [3] and financial support [4] are essential components in encouraging increased green buildings' implementation and performance. The collected data were then analyzed by comparing with the green building criteria found from various literature.

3. Results and discussion
One of the essential keys for future policies is that buildings must improve their performance to meet higher demands [5]. The demand for better performance can be contained in regulations that are part of the policy. To be implemented well and broadly, this policy needs to be outlined in various forms, including law, financial and fiscal, information and awareness, qualification, training, and quality assurance, market-based, voluntary action, infrastructure investments, and others [6]. Table 1 below is a detail of the completeness of the policy.

| Table 1. Categorization of policy measures [6]. |
|-----------------------------------------------|
| Regulatory                                    |
| Building codes                               |
| Minimum energy performance standard for new and existing building |
| Energy efficiency standard for appliances and equipment’s |
| Refurbishment obligation                      |
| Procurement regulation                       |
| Phase-out of inefficient equipment           |
| Financial and fiscal                         |
| Grants / subsidies                           |
| Preferential loans                           |
| Tax incentives                               |
| Energy taxation                              |
| Information and awareness                    |
| General information                          |
| Information campaigns                        |
| Information centers                          |
| Energy audit                                 |
| Energy labelling scheme                      |
| Governing by examples                        |
| Information exchange                         |
| Awareness campaign                           |
| Demonstration programmers                    |
| Qualification, training and quality assurance |
| Professional training                        |
| Training courses                             |
| Vocational education                         |
| Quality standards                            |
| Market based                                  |
| Incentives facilitating third party financing |
| Energy efficiency obligation scheme          |
| White certificate                            |
| Incentives for the producers of innovative technologies |
| Technology deployment scheme                 |
| Voluntary action                             |
| Voluntary certification and labelling program |
| Voluntary and negotiated agreements          |
| Infrastructure investment                    |
| Investment in transportation infrastructure   |
| Energy infrastructure                        |
| Smart meter roll-out                         |
| Other                                        |
| Other measures that do not fall under one of the above categories |
Currently, we have four regulations that specifically regulate green buildings, namely the Ministry of Public Works Regulation Number 2 of 2015 regarding Green Buildings, the law of the Governor of DKI Jakarta Number 38 of 2012, the Mayor of Bandung Regulation Number 1023 year 2016, and the Mayor of Semarang Regulation Number 24 of 2019. The ministry of public works law applies to all Indonesia regions, while the other three rules only apply to the specific areas. There has been no constitution on green buildings as the primary regulation, so that the ministry of public works law on green buildings refers to the Building's Act number 28 of 2002. This act states that buildings must be harmonious and balance with the environment and do not significantly impact the environment.

According to the hierarchy of legislation, under the Building's Act are more technical government regulations, which can reference all ministries to carry out their duties. The law is the Government Regulation (PP) No. 36 of 2005 about buildings. Like Building's Act No. 28/2002, Government Regulation No. 36 of 2005 also does not explicitly mention the term green building but says about harmony and balance to the environment. This Government regulation (PP) also mentions the importance of environmental carrying capacity and the need for facilities to consider energy-saving and conservation principles. This PP also says the importance of choosing building materials that are safe for users' health (humans) and do not impact the environment but has not mentioned embodied energy even though this term has appeared since the late 70s [7]. The term environmental impact is a general term. However, the government can carry out specific studies on ecological effects following the conditions of each city so that the derivative regulations of the PP can also be specific [8].

Efforts to maintain environmental quality were also carried out by the Ministry of Energy and Mineral Resources with the stipulation of Ministry Regulation number 26 of 2018 concerning the implementation of respectable mining principles and mineral and coal mining supervision. Through this regulation, it is hoped that mining actors can carry out a mining process that is friendly to the environment. This regulation is part of the effort to ensure that good building materials are also obtained or mined in a good way. The Ministry of Energy and Mineral Resources also encourages savings in electricity consumption through the Minister of Energy and Mineral Resources number 13 of 2012. It promotes energy management through the Ministry of Energy and Mineral Resources number 14 of 2012. This regulation requires energy audits, although it is still limited to only for state-building, BUMN building, BUMD, and BHMN.

In 2010 the Ministry of the Environment pioneered concern on the impact of building construction by stipulating Permen No. 8 of 2010. This Ministry Law regulates the characteristics of environmentally friendly buildings and the certification process for an ecologically friendly building and registration of institutions that provide certification. The definition section states that the environmentally friendly building in question is the same as a green building. Furthermore, the Ministry of Environment and Forestry has also stipulated ministerial regulation number 5/MenLHK/Setjen/Kum.1/2/2019 concerning procedures to implement environmentally friendly labels to procure environmentally friendly goods and services. This regulation is a form of the ministry of the environment's concern for the void in policies regulating eco-labeling.

In terms of the regulation's stipulation, the green building regulation first appeared was the DKI Jakarta Governor Regulation number 38 the year 2012. The secondly appeared was The Public Works Ministerial Regulation number 2, the year 2015. The thirdly appeared was A Mayor of Bandung City Regulation number 102 the year 2016, and the last was Mayor of Semarang City Regulation Number 24 the year 2019. What is somewhat odd is the Governor's regulation in Jakarta earlier than the Ministry of Public Works regulation. Hierarchically, a governor's regulation emerges after a ministerial regulation. It is feared that the Governor Regulation's appearance earlier will conflict with the ministerial laws that are hierarchically above it. At that time, the consideration of the urgency made the DKI Jakarta provincial government determine it first.

In terms of content, ministerial regulation has included various green building principles (including reuse, reduction, and recycling). It has also included considerations about the building life cycle from programming, technical planning, construction, utilization, and demolition. According to the hierarchy, this ministerial regulation is enforced throughout Indonesia. However, considering the variations in the
cities' conditions, The Governor and The Mayor need to determine the technical implementation. Jakarta, Bandung, and Semarang have established green building regulations in Governor and Mayor regulations following ministerial regulations and practical mandates. Although it will have more legal force if it is stipulated in the form of a regional regulation passed together with the people's representatives in the local people's representative council. The power of law is essential concerning enforcement of rules, especially the imposition of sanctions and incentives contained in these regulations. The DKI Governor Regulation 38/2012 has not included incentives, while the Bandung Regulations 1023/2016 and Semarang City Regulations 24/2019 have listed them. The Bandung Regulation promises incentives in the form of additional building areas or reduction of land and building tax. At the same time, Semarang Regulation does not specify the form of incentives it will provide. For sanctions, only Bandung city regulations mention in the regulations.

Starting in 2017, the Financial Service Institution provides incentives for developers or building owners who apply green building principles. The Financial Service Institution provides these incentives as part of implementing The Regulation of the Financial Services Authority Number 51 / POJK.03 / 2017. The regulation requires Financial Services Institutions to set aside a portion of the Social and Environmental Responsibility (CSR) budget for sustainable development activities. One of the parties entitled to receive these funds is a building owner or developer who has implemented green building regulations or has received a green building rating. Incentives for both developers and building owners tend to encourage increased implementation of green buildings [4]. This government policy is provided for new buildings and old buildings that are retrofitted [9]. A continuous effort is needed to review policies that encourage green building implementation through incentive methods [10].

### Table 2. Existing regulation.

| Layer              | Name of Regulation | Issue                                                                 |
|--------------------|--------------------|----------------------------------------------------------------------|
| First layer        | The constitution   | UUD 1945                                                             |
| Second layer       | The act            | Building’s act no. 2 year 2002                                       |
| Third layer        | The government regulation | PP No. 36 year 2005                                              | Building should respect the environment |
| Fourth layer       | The ministry regulation | The ministry of public works regulation no. 2 year 2015              | Green building |
|                    |                    | The ministry of energy and mineral resources regulation no. 26 year 2018 | Respectable mining principles (include for building materials) |
|                    |                    | The ministry of energy and mineral resources regulation no. 13 year 2012 | Saving in electricity consumption |
|                    |                    | The ministry of energy and mineral resources regulation no. 14 year 2012 | Energy management |
|                    |                    | The ministry of environment regulation no. 8 year 2010               | Characteristic of environment’s friendly building |
|                    |                    | The ministry of environment regulation no. 5/MenLHK/Setjen / Kum.1 / 2 / 2019 | Environment’s friendly labels |
|                    |                    | The regulation of the financial services authority no. 51 / POJK.03 / 2017 | Environment’s friendly labels |
| Fifth layer        | The governor regulation | Governor of DKI Jakarta NO. 38 year 2012                         | Green building |
|                    | The mayor regulation | Mayor of Bandung regulation no. 1023 year 2016                       | Green building |
|                    |                    | The mayor of Semarang regulation no. 24 year 2021                    | Green building |
4. Conclusion
The availability of regulations is an essential component of a policy. The law will be effective when the form, hierarchy, and content are complete. Even though there are various regulations related to green buildings, green buildings' implementation still needs more rules at multiple levels to make the application of the green building principle a priority in the future. Without regulations at the lower level, namely regional laws, Governor's regulations, and Mayor's regulations, stakeholders do not feel the need to apply the green building principle. Regulations at the top level in the form of Laws, Government Regulations, and Ministerial Regulations are needed to confirm their implementation obligations and complement the void of relevant green buildings regulations throughout the building life cycle. This completeness is required so that the claim for achieving our green buildings' performance is limited to quantity and quality. The author recommends the government to re-coordinate the various regulations that have been established. Furthermore, all stakeholders of the green building are expected to be able to support the government's effort. This coordination and support are needed to cover deficiencies and optimize green buildings' performance in the future.

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