Mapping the Opportunity of Green and Affordable Housing Implementation in Jakarta Greater Area

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A Thought about Green and Affordable Housing

According to United Nations, 62% of world population is projected to live in urban area by 2050. The increase of the population in urban area will lead urban growth by putting stress on land use as for housing and other facilities provision. Ensuring the deliverability of affordable housing becomes a task yet a growing challenge for governments around the world. The growth of urban population causes more people seek the affordable living space in urban area. This situation leads to the increasing land and housing prices within the cities. Meanwhile, during this pandemic situation, the needs of housing is not limited on the affordability issues but shall be expanded into the environmental and also health issues. According to these needs, the provision of sustainable and affordable housing shall not be seen as an option but as a compulsion.

Green building concept is still seen as relevant solution for housing provision by minimizing the resources use and reducing the impact to the environment while not compromising human health and comfort. As a part component of built environment, a building shall not be detached from its environment. Once a building becomes a building clusters or high density building complex, it becomes something that will significantly consume resources and generate environmental impacts. So, it shall be assured that the located area has adequate carrying capacity to accommodate its existence. As a living system, building has its own life cycle: design, construction, operation and demolition. In order to earn sustainable benefits, it is necessary to design with a vision not only limited on 'how to construct' but also should be extended to 'how to operate and maintain' it in a sustainable manner.

According to Ministry of Public Works and Housing or MPWH, in 2015, DKI Jakarta Province had the lowest of home ownership rate in Indonesia, about 51,09%. At the same time, the highest of home ownership rate reached up to 91,47% in the West Sulawesi Province. Nowadays, the total of housing backlog in Indonesia reached up to 7,2 million units for low income housing and about 1,5 million backlog of housing units for DKI Jakarta. From these figures it can be said that the market of social housing in DKI Jakarta still widely opened. At the same time, it means that the opportunity green and affordable housing is available both in DKI Jakarta itself and in its surrounding cities such as Bogor, Depok, Tangerang, and Bekasi.

The Challenges for Affordable Housing in Green Building Implementation

From spatial use perspective, due to land scarcity in the city center, one of the solutions is pushing the location of low-income housing to city perimeter or any outside city area. Without any spatial plan and control, the provision of affordable housing and its facilities may cause sprawling urban growth. The unplanned and uncontrolled growth may lead to land conversion massively into settlement area. Once it exceeds the carrying capacity of the area, several environmental problems will occur.

From green building regulation perspective, green building implementation in Indonesia is regulated under MPWH Ministry Regulation No. 2/2015 about Green Building[1]. Basically, there are three scheme categories in implementing green building principles based on building classes that can be seen on the following table:

Scheme Category	Targeted Building Class	Building Height	Building Complexity	Building Area
Mandatory	4, 5, 6, 7, 8, 9	Middle and High Rises	High	(not defined)
	6, 7, 8, 9a, 9b	Low Rise (up to 2 floors)	Low	>5000 sqm
Recommended	1, 2, 3	Middle and High Rises	High	(not defined)
	8, 9a, 9b	Low Rise (up to 2 floors)	Low	500 sqm. to 5000 sqm.
Voluntary	4, 5, 6, 7, 8, 9	(not defined)	Low	< 500 sqm
	1, 2, 3	Low Rise	Low	(not defined)

Table 1. Degree Compliance in Green Building Implementation based on Building Class under MPWH Ministry Regulation No. 2/2015 about green building

Accordance with Ministry of Settlement and Regional Infrastructure Decree No. 403/KPTS/M/2002 about Technical Guidance of Low Income (Healthy) Housing, the specification of affordable housing can be referred to the building class 1

[1] This Regulation has a role as guidance for all local governments at city/municipality level to develop their own regulation. Through local regulation, local government authority to determine its incentive and disincentive to assure the regulation. Effectiveness. Currently, in Indonesia, there area still three cities only that have local regulation about green building: DKI Jakarta; Bandung and Semarang. According to DKI Jakarta Governor Regulation No. 38/2012 about Green Building, it is stated that the green building implementation target for residential only apartment with minimum area about 50000sqm.

for landed house and class 2 for apartment with low rise and low complexity. It means that affordable housing has voluntary scheme to implement green building or in other words, this building type has no obligation to implement green building.

From developer's perspective**,** green building is still considered as a difficult task to be implemented. The most barrier that still haunted many developers or building owners is about its incremental cost. It is still seen that only prominent players in property sector that has ability to implement green building and frequently associated with upper class segments. As affordable housing developers, they should face in maintaining the ceiling price to follow the regulation that assuring the houses will be delivered to the targeted society. At the same time, due to the construction cost, they need to assure that the house is corresponded to their targeted profit margin without neglecting the quality of the low-income housing that is determined in Ministry of Settlement and Regional Infrastructure Decree No. 403/KPTS/M/2002 about Technical Guidance of Low Income (Healthy)Housing.

The House is Seen as a Part of Its Environment: The Roles of Spatial Planning

In order to assure the compact urban growth, the sprawling behavior shall be tackled by controlling the growth through spatial planning. As a part of the environment, housing provision will be seen has alignment with green building principles once it is located in area that correspond to its spatial planning. Moreover, it is already stated in Law No. 1/2011 about Public Housing and Settlement that the provision of housing shall correspond to spatial planning. In the context of housing provision in Jakarta Greater Area, it is recommended to understand about the spatial planning at regional and local level. At regional level, DKI Jakarta is identified as core urban area, meanwhile Bogor, Depok, Tangerang, Bekasi, Cianjur (Jabodetabek – Punjur) as its surroundings urban area under spatial plan of national strategic area for metropolitan area in Presidential Regulation No. 60/2020. At local level, DKI Jakarta that determined in its Local Regulation No. 1/2014 about Detailed Spatial Planning and Zoning. Other surrounding cities in this metropolitan area has already had its local spatial planning and territory which on process to be developed into their own detailed spatial plan.

The House is Seen as Living System: The Roles of Green Building Assessment Tool

EDGE is a standard, building design tool and certification system for green building implementation that developed by IFC-World Bank Group. The standard consists of three green building categories: energy, water and material, which each of category has several criteria that can be chosen to be complied by the building owner or developer in order to reach certain efficiency. For housing, EDGE already developed its assessment method by considering income segmentation into four categories: low; lower middle, higher middle and high. Moreover, EDGE already has the option for assessment based on the housing typology as well, whether it is landed house or apartment.

Since EDGE has a design tool that has ability to measures the environmental and economic impacts at once, a model of low-income housing is prepared to be assessed. The model is taken in Jakarta and can be applied in Jakarta Greater Area as well with specification accordance with Ministry of Settlement and Regional Infrastructure Decree No. 403/KPTS/M/2002 about Technical Guidance of Low Income (Healthy) Housing[2]; Ministry of Public Work Regulation No. 5/2007 about Technical Guidance of Low-Income Flats Housing; and other references from common practices that conducted by low income housing developers. This Table 2 below will show the EDGE criteria that already accommodated both by technical guidance and common practices.

Energy	Water	Material
Window to Wall Ratio	Low Flow Shower Faucet	Roof: Clay Tile with Timber Rafter
Reflective Paint for Wall	Low Flow Kitchen Faucet	External Wall: - Red Brick with two-sided plaster for landed house - Precast Concreate Panel for Apartment
Reflective Paint for Roof for apartment only	Low Flow Bathroom Faucet	Internal Wall: Red Brick with two-sided plaster
AASF	Dual Flush Closet	Flooring: ceramic tile
Natural Ventilation	Single Flush Closet	Window frame: timber

Table 2. List of EDGE Measurement Correspond to LIH Specification that define in Regulation and Implement as BAU

As certification system, EDGE has a minimum benchmark for efficiency for buildings that have willingness to be EDGE certified. The minimum efficiency that need to be achieved for certification is 20% for each category. Although the goal of the

[2] General requirement that stated is minimum building area 9sqm per person, comply with health and comfort such as natural and artificial lighting, natural ventilation and minimum safety and security in terms of building structure. Since it is assumed with 4 persons home occupant or a family with two children, so the model has building area with 36 sqm.

study is not for certification purpose, the 20% efficiency will be set as a minimum compliance whether the house can be claimed as a green building.

The assessment[3] of default model[4] shows that its specification already complied minimum EDGE benchmark in terms of water and material categories. Meanwhile, to achieve minimum benchmark in energy category, the default model should have additional measurement which is to install efficient light bulb. This additional measurement is chosen because it is seen the most affordable[5] and possible that can be done by developers and/or occupants. The summary result of the assessment can be seen on the table 3 below.

Category	Jakarta – Landed		Jakarta – Apartment	
Energy	efficiency according to default model	efficiency w/ additional measure	efficiency according to default model	efficiency w/ additional measure
	19,80%	59,42%	3,02%	47,83%
Water[6]	% efficiency according to default model		% efficiency according to default model	
	26,34%		35,39%	
Material	% efficiency according to default model		% efficiency according to default model	
	33,63%		64,75%	

Table 3. The Achieve Efficiency in Energy, Water and Material Categories

The impact of all those selected measurements can give benefits both environmentally and economically. The benefits occur in occupancy phase and it will be experienced by the building occupant[7]. It can be depicted from the utility cost reduction and the operational CO2 saving on these following table 4:

Benefits	Jakarta – Landed		Jakarta – Apartment	
	efficiency according to default model	efficiency w/ additional measure	efficiency according to default model	efficiency w/ additional measure
Utility Cost Reduction (Thousand IDR/Month/Unit)	22,47	167,48	31,07	180,29
Operational CO2 Saving (ton Co2 per year per unit)	0	1,15	0,01	1,19

Table 4. The Environmental and Economic Benefits Result of The Default and Improved Model

Conclusion

The green or sustainable housing for low income in Jakarta Greater Area is possible to be implemented. This can be achieved by seeing the house both as a part of its environment through its compliance with determined spatial planning by the local government, and as a single entity through its compliance with EDGE Green Building Standard.

Through EDGE Green Building Standard, the efficiency for the three categories: energy, water and embodied energy is possible to be complied. Energy efficiency can be achieved by optimizing the measurement in passive instead of active approaches; and water efficiency can be achieved through the selection of water fixtures instead of water treatment plant. Meanwhile, the embodied energy efficiency from the material is possible to achieve because the common specification already responded to the efficiency requirement.

The beauty of green building application tool such EDGE Building Application can be seen through its ability in showing both environmental and economic benefits at once. This approach is quite relevant for society in developing countries such Indonesia that still have reluctancy to implement green buildings because only see its challenge instead of its benefits.

At macro level, spatial planning in each local area plays important role to assure the building has proper location that will support its sustainability. It is because spatial planning is provided by considering the balance in the certain area between its allocation and carrying capacity.

[3] The assessment is conduct using EDGE Building Application Version 2.1.5

[4] Default model means the model that developed according to Ministry of Settlement and Regional Infrastructure Decree No. 403/KPTS/M/2002 about Technical Guidance of Low Income (Healthy) Housing and other references from common practices that conducted by low income housing developers

[5] Developers are not necessary to add electricity provision, since it is already included in default model. So only light bulbs are needed

[6] Note: since the common practices of the LIH construction has local content technology, there are several approaches that has done by the writer. For the shower calculation, the writer used wall tap with common flow rate; For the Water Closet calculation, the writer calculated by using water bucket for different purpose with result: 7,63 liters for defecation and 4,578 liters for urination

It should take a note that keeping green performance in occupancy phase need to be done by the building occupant in order to maintain its benefits.

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Ministry of Public Work Regulation No. 5/2007 about Technical Guidance of Low-Income Flats Housing

Ministry of Settlement and Regional Infrastructure Decree No. 403/KPTS/M/2002 about Technical Guidance of Low Income (Healthy) Housing

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