# Green Metro Convention Center Performance Building Design in Metro City

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**Abstract.** The theater is a building that can accommodate thousands of people were enabled to hold an event of music and theater arts and dance opera large scale. Genre or affect the shape of the stage show and the needs of the audience seats. Besides the need for energy to realize an environmentally friendly building that has been applied to several attempts namely, Rainwater harvest and photovaltaic. Tancangan create an architecture that requires a large energy but energy can be reduced or replaced by these technologically. Not forgetting also not forget the architectural design that characterize the city's Metro itself and the use of geometric shapes that respond to environmental conditions. *Keywords. Performance; Art; Energy; Green;Environmental*

## 1. Introduction

Art music and the performing arts can be enjoyed by anyone. Electrical energy use excess then the required resource supply power plants that many games for the sake of saving resources, the determination of this theme background design of the theater will take the use of energy that many therefore, the theme of *green architecture* is very effective to support the performance of building this show in the application of energy storage technologies from nature and how to save energy.

### *1.1 Performance Building*

An art performance hall has a different shape and size adapted to the type of show that is displayed (Strong, 2010: 7). According to Judith Strong in his book *Theater Building a Design Build* the *genre* suitable musicalis as follows:

a. SymphonyConcert
b. Orchestra
c. Blues and Country
d. Jazz
e. Pop / Rock

### *1.2 Performance Building Component*

1. Needs space in theaters
   by Quentin Pickard, in a building arts performances, there 3 groups of space separating each activity based on the hierarchy is as follows:
   a. Reception: Entrance hall, foyers, ticket box, restrooms, corridors and stairs
   b. Auditorium
   c. stage / back stage: the main stage, dressing room, backstage area.

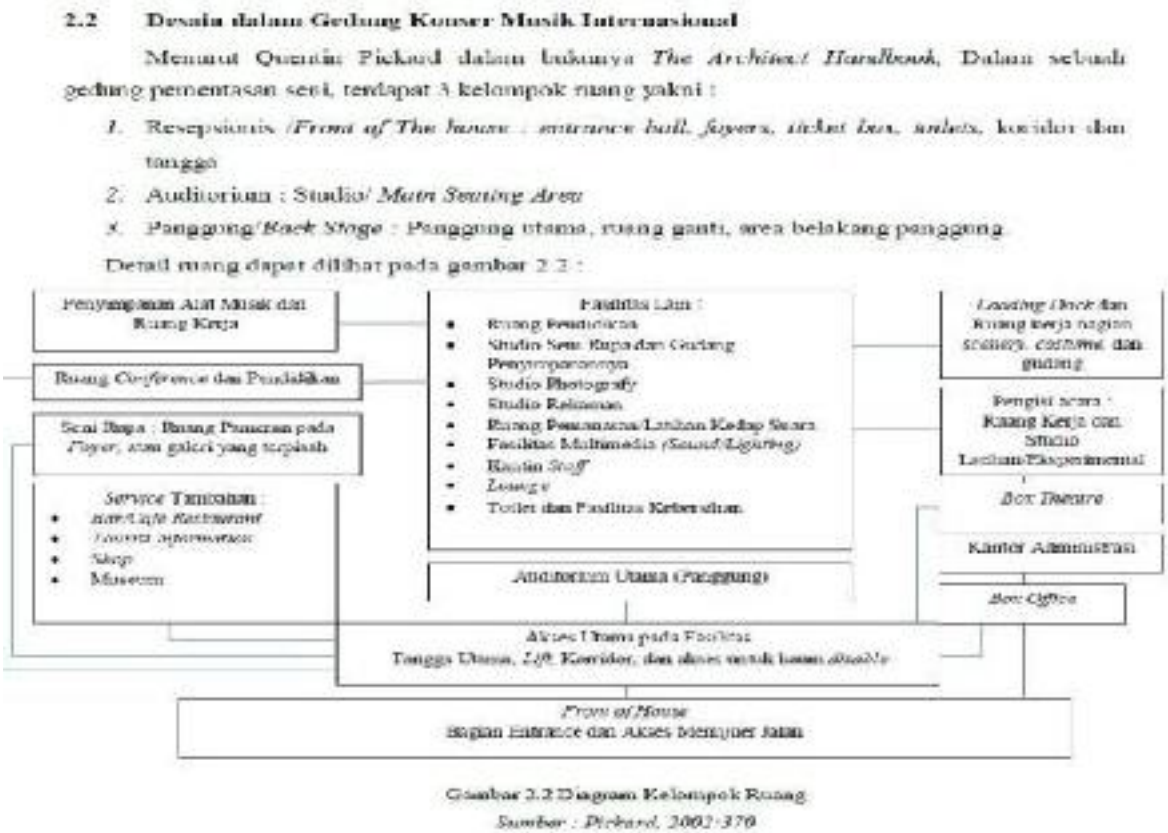


**Figure 1.** Three Group Performance Building Space

2. The stage

Based on the classification, each staging musical performances to own some type of stage design that adapts to the genre of music that is displayed, including the following:

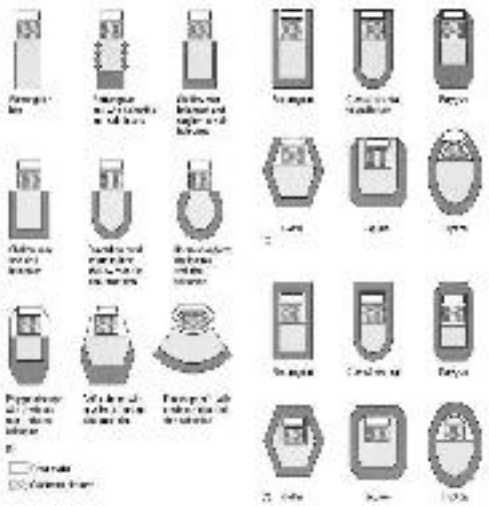

**Figure 2.** *Orchestra* and *Classical MusicChoral*

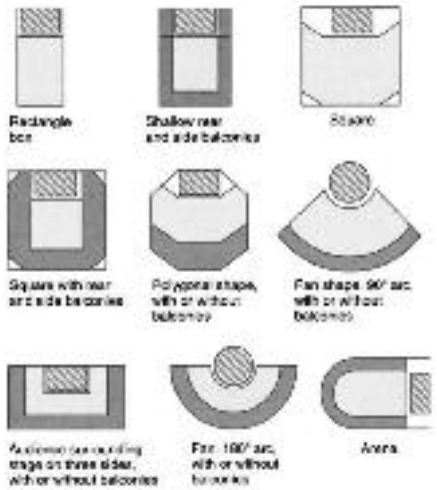


**Figure 3.** Jazz / Blues, Pop / Rock

*1.3 Green Architecture*

*Green architecture* has some application to achieve eco-friendly architecture including the following:

**Figure 4.** Rainwater Harvest

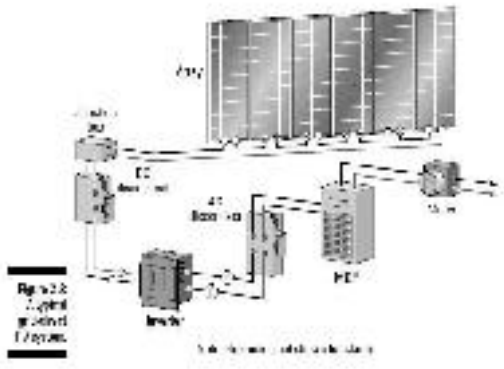

**Figure 5.** Photovaltaic

This method merupkan effective way to conserve the use of water, by means of rainwater that falls keatap circulate into the water container. This technology is a technology that is used in an attempt to save the use of excess electricity by converting solar power into electricity.

*1.4 Comparative Study*

Of the few studies on pertujukan building, just 2 representing the design criteria theaters Green Metro Convention Center.

**Table 1.** Comparison Table Case Study

| **Building Name** | **Location** | **Facilities** | **Order Form Stage** |
|---|---|---|---|
| **Disney Concert Hall** | Los Angles, United States | f. Concert Organ<br>g. Restaurant<br>h. Gallery | *Elliptical* |
| **Acros,** | Fukuoka,Japan | i. Cultural & Tourist Information<br>j. Ticket Center<br>k. Arena Hall<br>l. Area Communication<br>m. Cultural Gallery<br>n. Event Hall<br>o. Foyer Gallery<br>p. Symphony Hall<br>q. Parking Information<br>r. Practice room<br>s. Seminar room<br>t. Art & Craft Gallery | *Rectangle Box* |

underlying the use of 2 this case study as a guideline is, Disney concert very well as a reference for the design of the concert hall were ideal, whereas Across made reference to some of the facilities therein in which not only functions theater, meeting and entertainment; it functions.

1. The location

has been known underlying this study, and here is the location that has been determined in this scheme and also some information about the site terbut include:

**Figure 6.** Location Site Jl. AH Nasution

Location is located at Jl. AH. Nasution with site specifications as follows:

Name of Design : Green Metro Convention Center
Building Function : Meetinghouse and Entertainment
Location : Jl. AH. Nasution, Metro, Lampung Province
Site Area : 1.6 Ha
Theme : Green Architecture

2. Problem

Metro City is divided into 5 districts of Metro City Regional Regulation No. 25 of 2000 on the Expansion of the Village and District in Metro City, Metro City administrative area expanded into 5 districts covering 22 villages under (Central Bureau of Statistics of Metro City). In the sphere of education in Metro cities are 67 elementary schools (SD) public and private of all districts in the Metro, 22 Junior High School (SMP), 29 high school (SMA), as well as 11 colleges.

*1.5 Electricity Consumption*

**Table 2.** Table Power Usage Statistics City Metro

| **Customer Type** | | **2010** | **2011** | **2012** | **2013** | **2014** |
|---|---|---|---|---|---|---|
| ***Type of Consumer*** | | *2010* | *2011* | *2012* | *2013* | *2014* |
| **(1)** | | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| **Social** | | | | | | |
| | General | 8 | 10 | 9 | 9 | 10 |
| | Special | 8 | 6 | 7 | 8 | 8 |
| **Non-Commercial** | | | | | | |
| | Households | 910 | 1027 | 1161 | 1256 | 1486 |
| | Government Agencies | 3 | 3 | 3 | 4 | 3 |
| **Commercial** | | | | | | |
| | Small | 2 | 3 | 2 | 2 | 1 |
| | Large | | | | | |
| **Industry** | | | | | | |
| | Small | 1 | 1 | 1 | 1 | 0 |
| | Large | 0 | 0 | 0 | 0 | 0 |
| **Specific** | | | | | | |
| | Ports | 0 | 0 | 0 | 0 | 0 |
| | Other | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| **Total** | | **932** | **1050** | **1183** | **1280** | **1508** |

According to the above data in a vulnerable period of 5 years electrical use the city's Metro continues to rise that looks statistical data on the number of users from year to year increase in the use of

household electricity, which is increasing residential development in the city's Metro and boosting the number of household electric users increased by about 15% each year.

*1.6 City Water Consumption*

**Table 3.** Table Statistics PenggunaanAir in Metro City

| **Customer Number taps by Type of Consumers in Metro City, from 2010 to 2014** | | | | | | |
|---|---|---|---|---|---|---|
| ***Numbers of PDAM's Customer by Type of Consumer in Metro City, 2010-2014*** | | | | | | |
| | | | | | | |
| **Consumer Type** | | **2010** | **2011** | **2012** | **2013** | **2014** |
| ***Type of Consumer*** | | *2010* | *2011* | *2012* | *2013* | *2014* |
| **(1)** | | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| **Social** | | | | | | |
| | General | 8 | 10 | 9 | 9 | 10 |
| | Special | 8 | 6 | 7 | 8 | 8 |
| **Non-Commercial** | | | | | | |
| | Households | 910 | 1027 | 1161 | 1256 | 1486 |
| | Government Agencies | 3 | 3 | 3 | 4 | 3 |
| **Commercial** | | | | | | |
| | Small | 2 | 3 | 2 | 2 | 1 |
| | Large | | | | | |
| **Industry** | | | | | | |
| | Small | 1 | 1 | 1 | 1 | 0 |
| | Large | 0 | 0 | 0 | 0 | 0 |
| **Specific** | | | | | | |
| | Ports | 0 | 0 | 0 | 0 | 0 |
| | Other | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| **Total** | | **932** | **1050** | **1183** | **1280** | **1508** |

## 3. Analysis

In doing designing architectural analysis is required to assist in the discovery process geometries as well as the installation of the devices building refers to the concept and theme specified, the analysis is as follow :

*3.1 Environmental Analysis and footprint*

characteristics of the environment in macro diantarnya seen in the caption below:

**Figure 7**. Photovaltaic

**Figure 8.** Noise Analysis

*3.2 Noise Analysis*

noise analysis below can be seen from the following figure and some keterangnan about the noise level in this area. So, based on data from existing noise that vibration noise generated from the noise of the motor vehicle that is found on average the highest number of 80dB, can be reduced by approximately 50% shrub reducing them by 40dB.

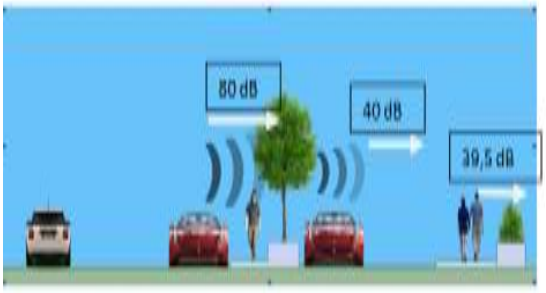


**Figure 9.** Noise Analysis

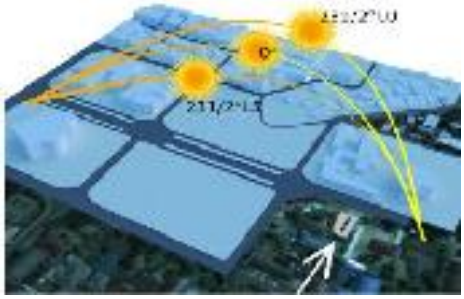

**Fig 10.** Photovaltaic

*3.3 Solar analysis*

This analysisregarding Indonesia's geographical condition where lies the path of the sun is located at 231/2º LU / LS month of June and December, and March and September were straight at 0˚ of the equator. The orbits the sun in Indonesia is not very significant shift, this can be helpful in determining the placement photovaltaic to get the whole solar maximum light without shadow.

*3.4 Zoning Analysis*

The figure below explains the zoning footprint in the laying of buildings and green space and circulation. Zoning indicated on several stages of analysis, including the analysis of noise, view, sun, wind, currents kendaraam.


**Figure 10.** Tread Zoning

*3.5 Needs and Amount of Space*

From the table below have been obtained spaces with the main functions and some support functions, this space needs terinidikasi of several analysis: analysis of the characteristics of the surrounding environment, and some references regarding kebuituhan standard theater.

**Table 4.** Needs and Amount of Space

| | | | | |
|---|---|---|---|---|
| **1.** | Concert Hall | seating 1500 | 1750 $m^2$ | 1 |
| **3** | Theater | Seating1500 | 1750$m^2$ | 1 |
| **4.** | Event Room Convention | 3000 People | 1500$m^2$ | 1 |
| **4** | Art Gallery | 150 People | 252 $m^2$ | 1 |
| **6.** | Museum | 150 People | 252 $m^2$ | 1 |
| **7.** | spaceEducation Arts | 30 | 72 $m^2$ | 3 |

| | | | | |
|---|---|---|---|---|
| | Performing Arts Dance Modern and Traditional<br>Arts Modern and Traditional Music | 30<br><br>30 | 72 $m^2$<br><br>72 $m^2$ | |
| **9.** | Conference room | 150 seating<br>50 seating | 160$m^2$<br>80$m^2$ | 4<br>10 |
| **10 .** | Café and Restaurant | | | 1 |
| **11.** | ExerciseLounge | | | 12 |
| **12.** | Lobby | | | 1 |
| **13.** | Shop | | | 20 |
| **14.** | Information | - | | 3 |
| **15.** | Toilet<br>MaleToilet<br>Toilet Female | <br>5 WC, 4 Urinal<br>4 Wastafle<br>5 WC, 5 Wastafle | 65$m^2$ | 10 |
| **16.** | Warehouse | - | | 1 |
| **17.** | space Administration | - | | 1 |
| **18.** | Office | | | |

## 4. Concept and Design

Concept and design by some of the results of the analysis didsari earlier to find a suitable design, here is the concept and design:

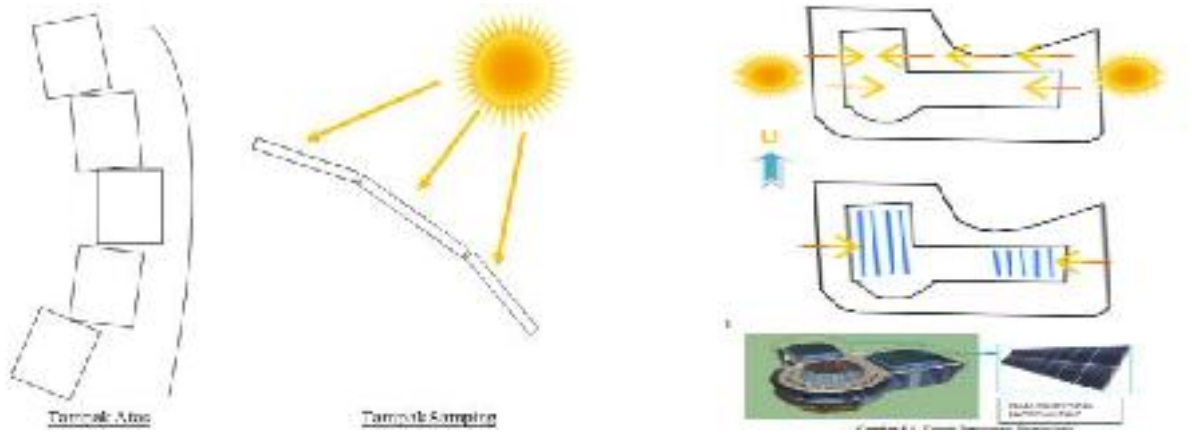

**Figure 11.** The concept of Photovaltaic

Installation is oriented east-west, but the preparation is almost formed a parabola, so that when the inclusion of phase change orbits the sun, photovaltaic will remain optimal in absorbing sunlight without being missed. For the completion of the shadow factor, it is no problem for this site area no building exceeds the 5th floor that could potentially cover the surface of the PV.

**Figure 12.** The concept of Rainwater Harvest

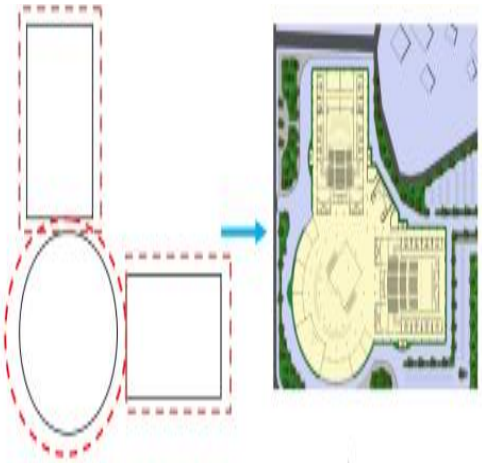

**Figure 13.** The Shape Future Buildings

Rainwater that falls above and keperkeransan ditapak will be channeled into underground water reservoirs, partly left in the soil watered landscape to maintain the ground water supply. Following geometry is based on the analysis of wind pressure that many leads from south to north, organic shapes (circles) to help the wind blows through seamlessly linked to aerodynamics, it can help to maintain the structure for durability.

**Figure 14.** The Shape Futurebuilding

**Figure 15.** The Shape Future Building

Notchinglike this is also assumed in the sunlight filtering as a canopy, and tried to adjust the angle in accordance with the movement of the parabola in the sun. Whole solar rays in the morning were not too hot at certain hours such as at 6-9 morning filtered can flow right into revival.

This concept aims to provide a new icon for the city's Metro and Metro reaffirm that the city is a city of green and revealing to the community as well government agencies in order to retain the green Metro yan city sustainable gmasih lingannya.


**Figure 16.** The concept of Zoning

Judging from the hierarchy, the determination of zoning in the room have been adjusted and the results obtained from the analysis include noise analysis, site zoning analysis, analysis of environmental activities. Qualifications included in the private zone is the space that can be accessed by certain people who already have permission or authority, for example: Kariyawan, business, tenant facilities. Qualifications include semi-private room is, the function-sungsi entertainment or leased spaces, which have been registered users only. Qualifications include public space is an area that can be touched by siapapun.Kualifikasi which includes semi-public space is a space that can be passed which is a public facility within the building that can be enjoyed sipapun. Qualifications include room service is, the space serves as a service to visitors / users and operators who need all the needs in the form of information and facilities.

**Figure 17.** The concept of interior

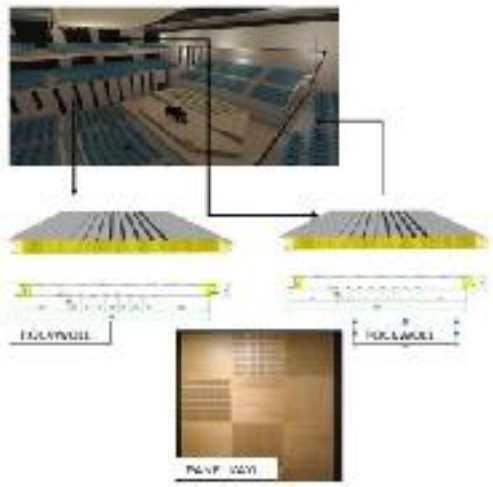

**Figure 18.** The concept of Interior Wall and Floor

Acoustic palafond principle to bounce the sound to the optimum, then seen from the above table reflects the metal excellent in sound. The principle underlying the use of metal materials in acoustic ceiling installation because of the metal is very good as a reflector. Usesrockwoll on the core wall and floor acoustics with a layer of wood can absorb at once menatulkan sound. Material above is very effective as a good acoustic quality coatings although the outside is not carpeted. Wood can absorb sound principle in order to avoid *the echo* or reverberation.

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