

## WELCOME

# PARTICIPANTS OF ENERGY EFFICIENCY

## **TRAINING WEEK**

**JAKARTA, 18 JULY 2018** 

## MINISTRY OF PUBLIC WORKS AND HOUSING

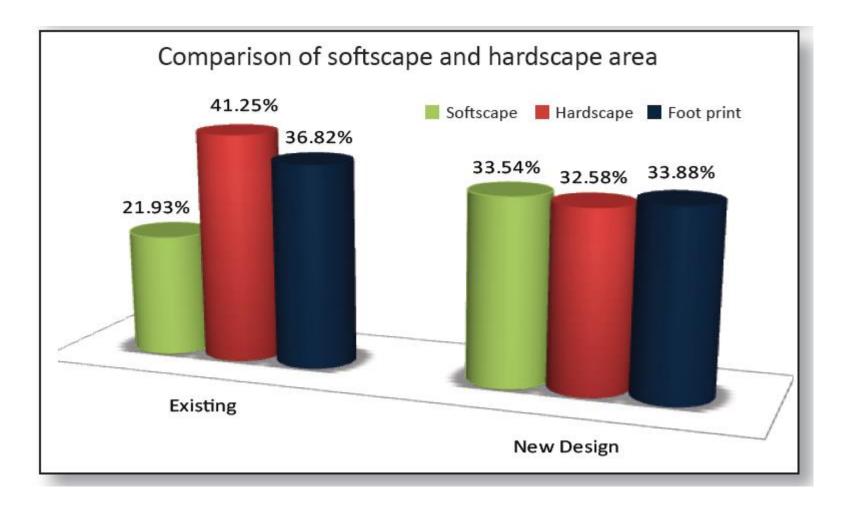
SECRETARIAT GENERAL BUREAU OF PUBLIC AFFAIR

#### THE EXISTING SITE PLAN



#### THE NEW MASTER PLAN



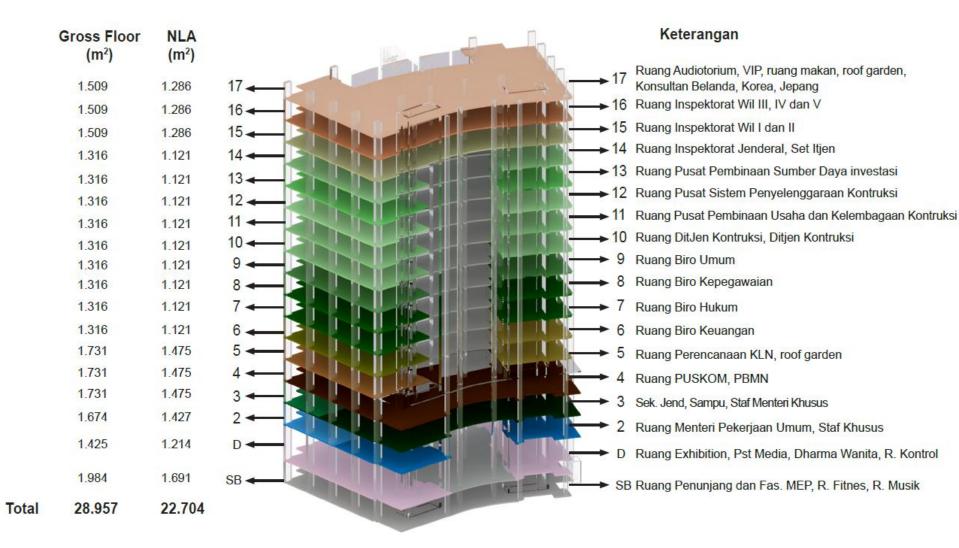


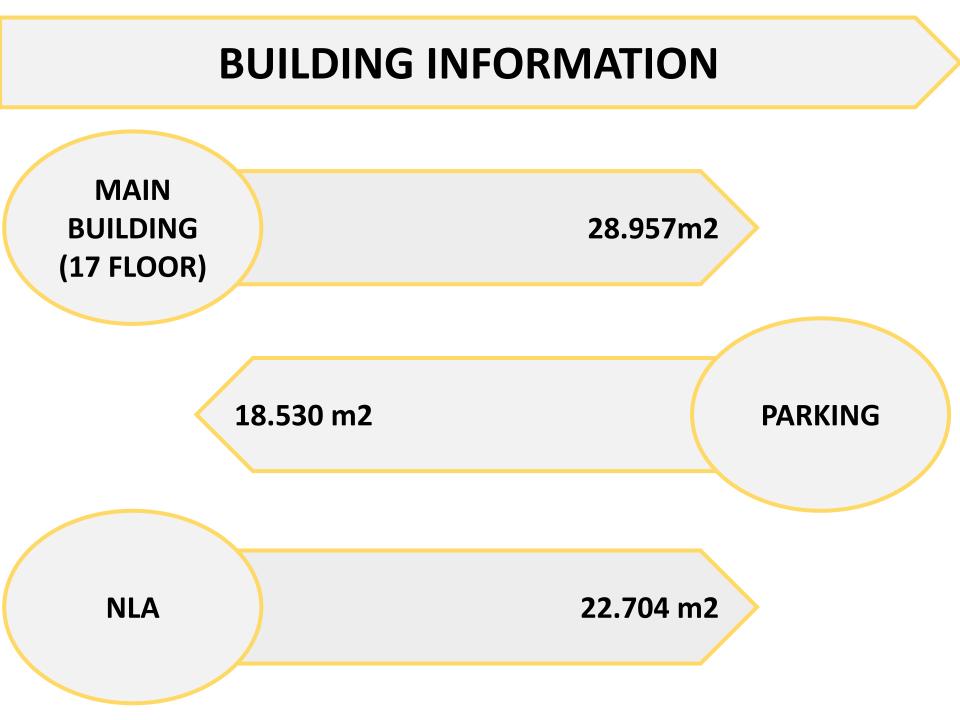


### MAIN BUILDING

The Ministry of Public Works and Housing

#### **BUILDING INFORMATION**





#### **GREEN BUILDING CERTIFICATION**

by: Green Building Council Indonesia (GBCI)



#### PLATINUM

for New Building Category (2013)

New Building



#### PLATINUM

for Existing Building Category (2016)

**Existing Building** 

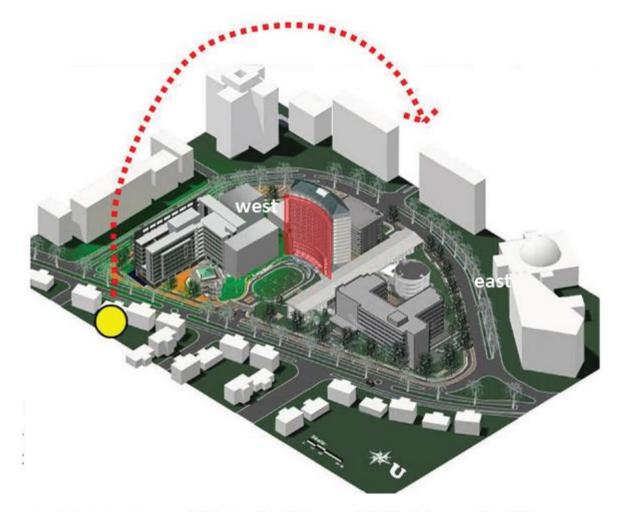
Main Building of Ministry Office of Public Works & Housing

EE Index (Kwh/m<sup>2</sup>.year)

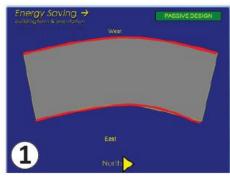


#### **PASSIVE DESIGN STRATEGIES**

#### **Orientation and Building Design**



Initial design of Main Building of Ministry of Public Works that has widest building envelope area face to east and west



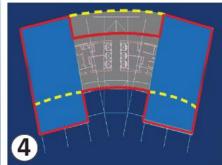
1. Rectangular form (initial design)



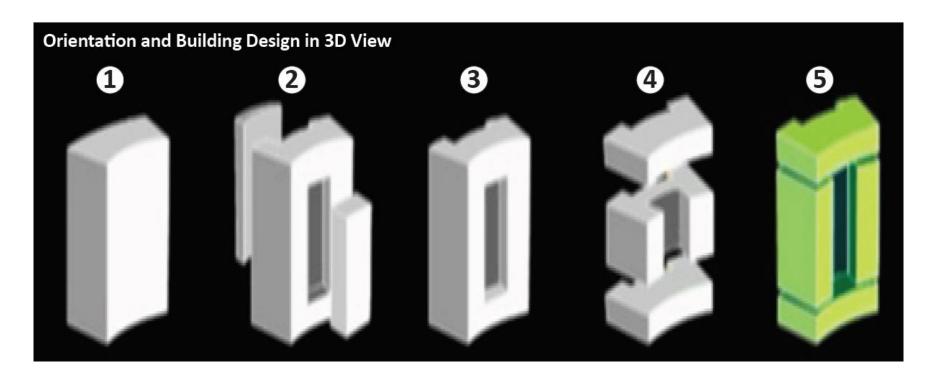
2. Reduce envelope area of west and east side



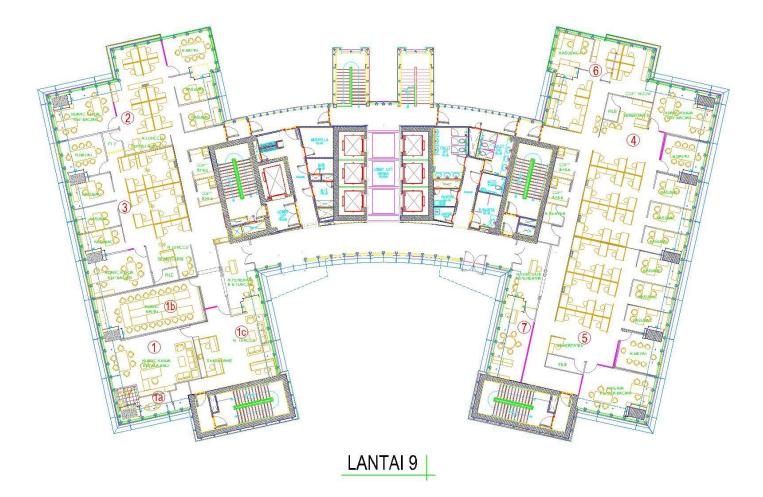
3. Solar path that affects heat gain from solar radiation



4. Design modification from "rectangular" to "H" form



#### TYPICAL FLOOR PLAN

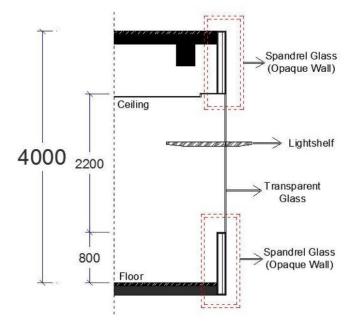


#### FAÇADE OR ENVELOPE DESIGN

Strategies to reduce solar heat radiation:

- Modification of building form and orientation
- Use thermal resistant glass for window to support the energy efficiency program, which are: stopsol super silver dark blue 8 mm (U value= 5.739 W/m<sup>2</sup>.K, SHGC 0.423).
- Add insulation on wall: external surface film, cladding aluminum (k= 211 W/m.K), calcium silicate/gypsum (k=0.170 W/m.K), fiberglass insulation internal surface film (k= 0.035 W/m.K).
- Install sunshading on window
- Install perforated material at west side to decrease solar radiation and increase natural lighting.

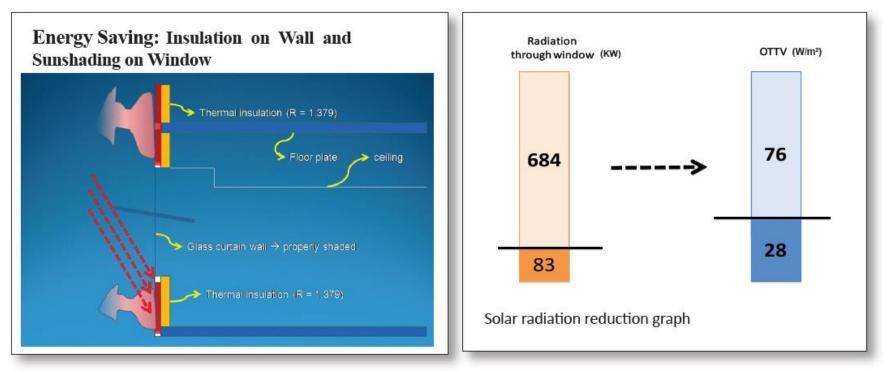




#### West Elevation Facade



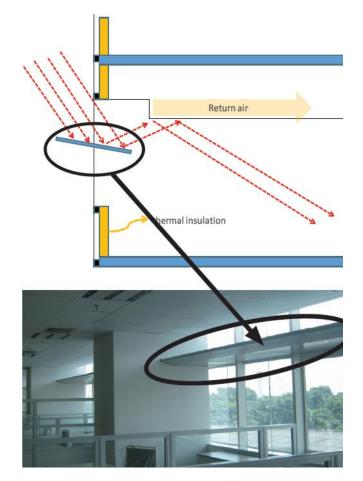
Perforated metal inside and outside room

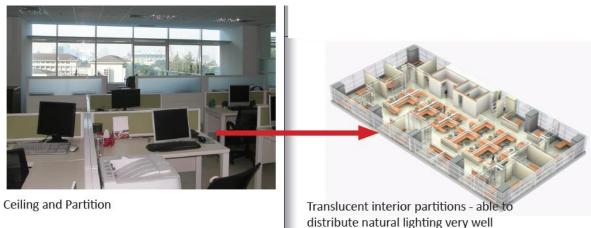


Initial solar radiation through window is 684 kW can be dramatically decreased to 83 kW. It affects to OTTV value which decrease from 76 W/m<sup>2</sup> to 28 W/m<sup>2</sup>. That reduction equal to carbon saving as 1880 ton/year and also equal to CO<sub>2</sub> absorbtion by 165 banyan trees.

#### NATURAL LIGHTING

- Installing sunshading on window to adjust and divert sun light directly, so that natural lighting can optimally gained by making it reflected to ceiling and redistributed to floor to expand the daylighting area.
- By applying strategy above, artificial lighting can be reduced at noon because lamps at outer zone (near to window) can be turned-off by that time.
- Sunshading installation resulting 43% room area illuminated by sun light with illumination value of 300 lux.
- Office room designed with clear glass partition with many openings, so that natural lighting can be distributed to deepest area of room.





#### **INTEGRATED ELEVATOR AND CIRCULATION STAIRS**

Stairs placed on edge of elevator lobby corridor that has function to make reduction of lift usage. This facility expects tenants to use stairs when going to neighboring floor (one or two floors upward or downward).



#### PARKING BUILDING







- Natural ventilation
- Natural lighting

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Also acted as the shading for the Main Building at the west elevation

#### **ACTIVE DESIGN STRATEGIES**

#### AIR CONDITIONING SYSTEM

#### **Conditioned area:**

- Office rooms
- Server room,
- Hub room
- Archive storages

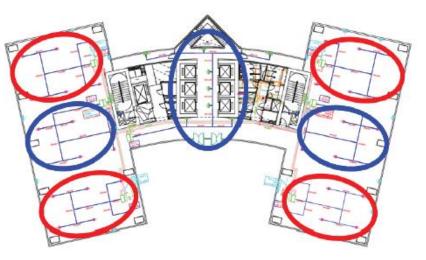
#### **Unconditioned area:** (natural ventilation)

- Lobby
- Toilet
- Pantry
- Corridor

#### **Indoor Air Quality:**

The indoor temperature is maintained at

- 25 deg C
- 60-65% RH



#### Air conditioning zoning control

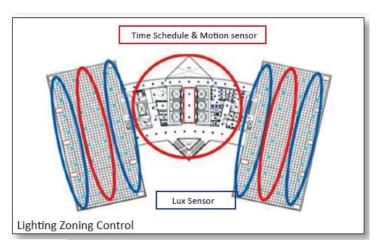
Air conditioning is designed by central air conditioning system that has several energy efficiency features, that are

- Use 3 (three) units water cooled screw chiller (2 chillers running and 1 chiller standby) with capacity for each 300 RT that has efficiency 0.569 KW/RT. The chiller is using environmental-friendly refrigerant: R-134a.
- b. Chilled and condenser water pump equipped with Variable Speed Drive (VSD).
- c. Use 2 (two) units cross flow closed type cooling tower each of 3 (three) cells system with heat rejection capacity for each is 510 RT and make-up water consumption is 30% less compared to open type cooling tower.

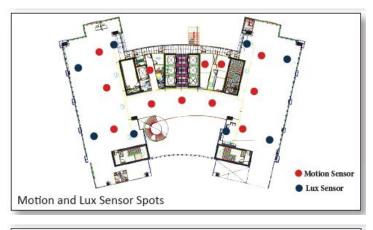
- d. On the airside using with Fan Coil Unit (FCU) to allow for individual control.
- Motorized modulating two way valves installed on every FCU to control cooling capacity to overcome varies cooling load.
- f. Chiller system controlled by Building Automation System (BAS), the Set Point (SP) determined appropriately with load condition per FCU. BAS can monitor temperature at rooms (Point Value, PV) and also can monitor opening percentage of Motorized two way Valve (MV) for every FCU.

#### **ARTIFICIAL LIGHTING SYSTEM**

Lamps installed in this building are: T5 (52%), LED (4%), PLC (34%), TL (10%). The artificial lighting illumination maintained on 350 lux corresponds to Indonesian National Standard. Some strategies to get energy efficiency from lamps are using: lux sensors, motion sensors and scheduling.



The lighting system was designed by applying zoning system between natural and non-natural lighting.





Lux sensor installed to monitor the illuminance level of the room, which will turn off automatically the artificial lighting within natural lighting area if the room illuminance more than 300 lux. Therefore it reduce energy consumption of artificial lighting.

Motion sensor will turn off lamps if it detects no movement inside the room and in vice versa will turn on lamps if detecting any movement inside the room. While, scheduling control the on-off of lamps at designated time.

#### VERTICAL TRANSPORTATION SYSTEM



#### The elevators consist of:

- 6 units passenger lift
- 1 unit executive lift
- 1 service lift

Power for each lift is 12 kW

#### **Energy Efficiency Feature:**

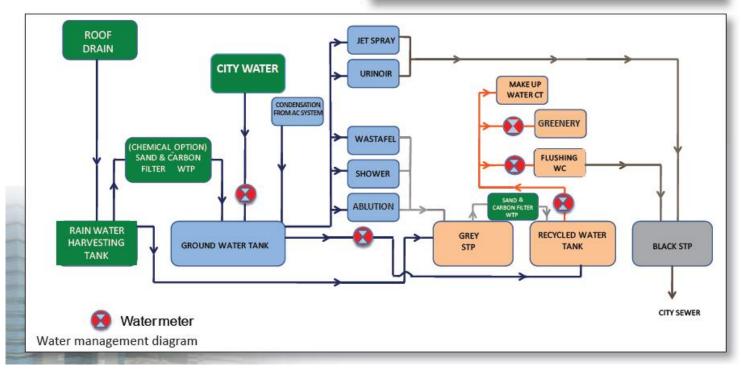
- Variable Voltage Variable Frequency (VVVF)
  This feature will cause rotation of motor become softer (soft starting) and inrush current become lower.
- Car light/Fan shut off also applied to decrease energy consumption. This feature will automatically shut lamp and fan in lift off when lift idle

#### WATER MANAGEMENT

A strategy to decrease water consumption is by using low flow water fixture, such as: low flow sink taps, wall taps and showers.

Grey water is processed in Sewage Treatment Plant (STP) so that will produce recycle water that used for water landscaping, flushing and make up water cooling tower. Used water from jet spray, urinary and flushing will processed before wasted to city sewer.



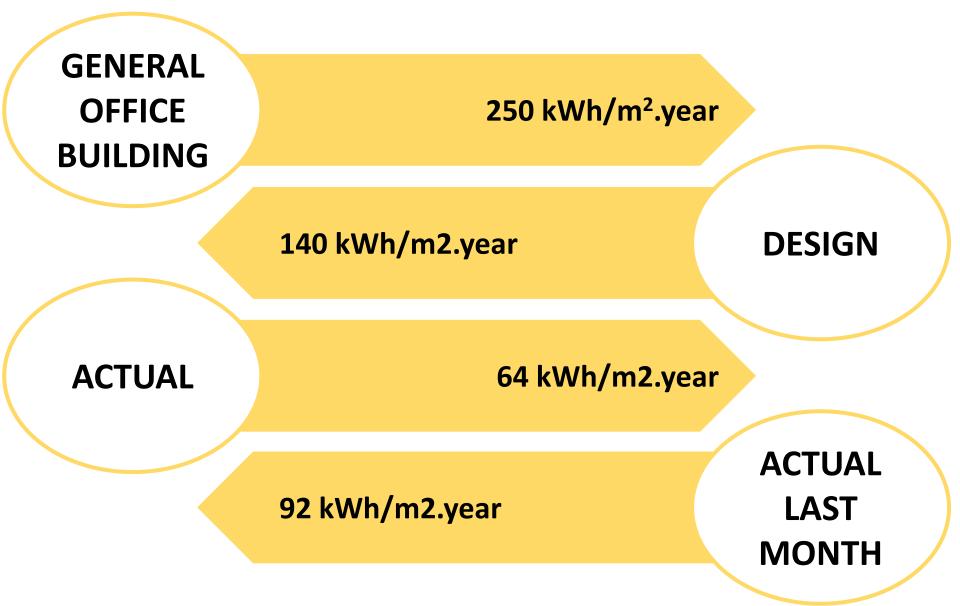


#### **OPERATIONAL PHASE STRATEGIES**

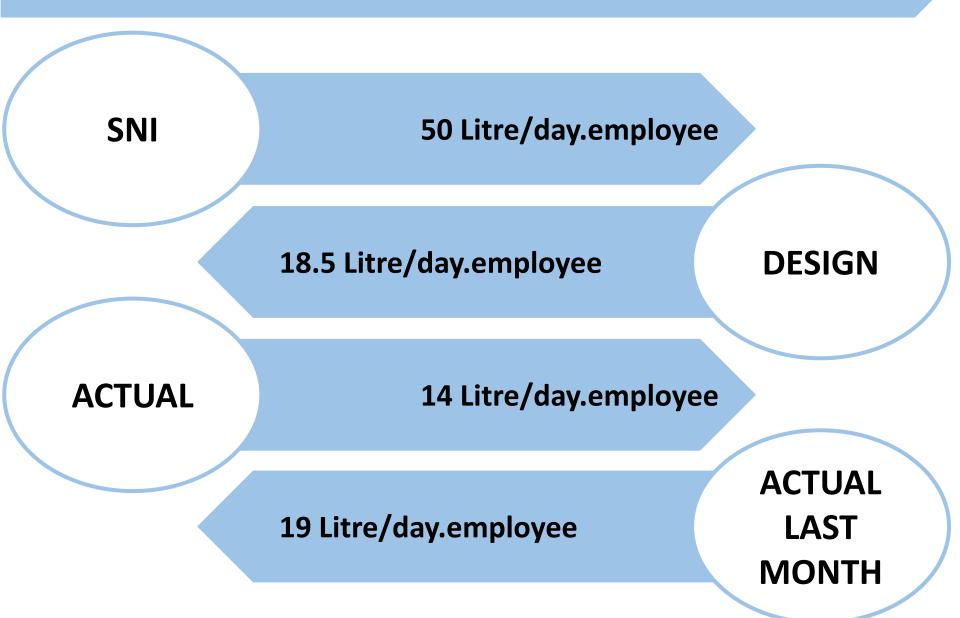
#### **Key Performance Indicator (KPI)**

Deskripsi KPI	KPI	Acuan
Penggunaan energi terhadap acuan	Kurang dari 10%	140 KWh/m².tahun
Penggunaan air terhadap acuan	Kurang dari 10%	18.5 liter/pegawai.hari (musim kemarau 9.5 liter/pegawai.hari (musim hujan)
Pencapaian penanggapan keluhan dalam 20 menit	5 keluhan per bulan	Jumlah WO tiap bulan
Pencapaian Presentasi Preventive	Minimal 75%	Jumlah Preventive Maintenance
Rata-rata efisiensi energi chiller	5% berdasarkan AHRI Standard 550/590	KW/TR = 0.569 pada saat beban penuh
Rata-rata jumlah keluhan yang tertunda	2 keluhan per bulan	Jumlah WO tiap bulan

## **MONTHLY ELECTRICITY ACHIEVEMENT : JUNE**

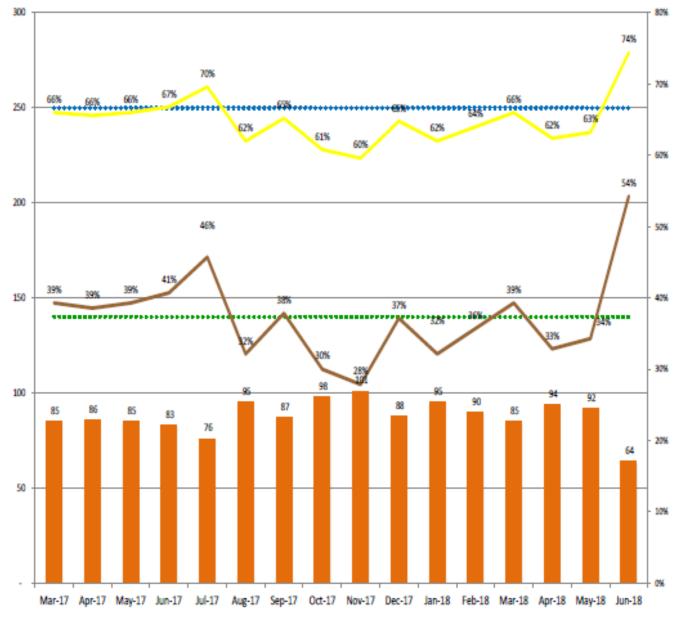


## **MONTHLY WATER ACHIEVEMENT : JUNE**



## GRAPHIC INDEX CONSUMPTION

ELECTRICITY

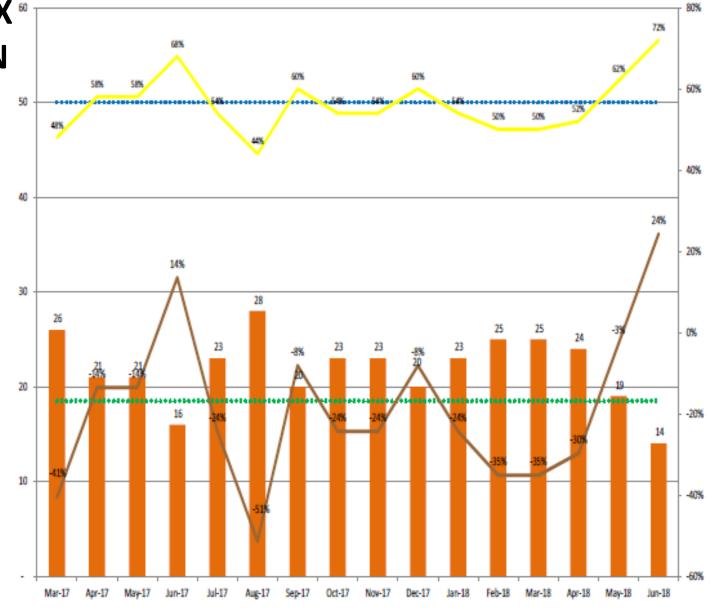


- Actual Energy Consumption
- --- Energy Consumption by Design
- ---- Energy Saving based on Design

Energy Saving based on GBCI Standard
 Avg. Office Energy Consumption (GBCI)

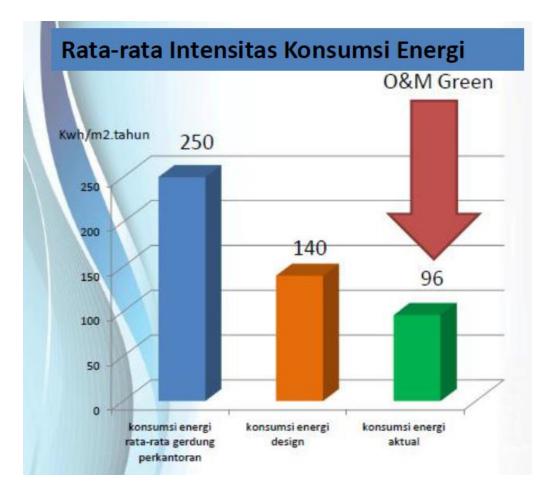
## GRAPHIC INDEX <sup>®</sup> CONSUMPTION

ELECTRICITY



- Actual Water Consumption
- --- Water Consumption by Design

Water Saving based on SNI Standard
 Standard Water Consumption (SNI)





### THANK YOU