# 添付資料

- 1. 横浜市とマカッサル市による都市間連携ワークショップ
  - 1.1 マカッサル市環境局 発表資料
  - 1.2 横浜市 発表資料
  - 1.3 日本工営㈱ 発表資料
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- 2. 交通シミュレーションのための交通データ
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  - 2.3 交通量調査結果
  - 2.4 交通シミュレーション結果(旅行時間)
  - 2.5 交通シミュレーション結果(待ち行列長)

- 1. 横浜市とマカッサル市による都市間連携ワークショップ
  - 1.1 マカッサル市環境局 発表資料

# GREEN AND CLEAN CITY OF MAKASSAR

THE WAY TO SUPPORT DECARBONIZATION PROGRAM IN INDONESIA

Dr. Bau Asseng, S.T., M.Si

Head of Waste Management, Hazardous waste and Capacity Enhancement Division

# **REGULATION**

Regulations regarding decarbonization in Indonesia focus on efforts to reduce greenhouse gas emissions and increase the use of renewable energy. Some of the main regulations and policies that support decarbonization in Indonesia include:

**The Indonesian Law Number 16 of 2016** concerning Ratification of the Paris Agreement, which sets out Indonesia's commitment to reduce greenhouse gas (GHG) emissions by 29% by 2030 independently and by up to 41% with international assistance.

**Presidential Regulation Number 61 of 2011** concerning National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) This regulation regulates strategic steps to reduce GHG emissions in various sectors, including the energy, forestry, industrial and agricultural sectors.

Presidential Regulation Number 22 of 2017 concerning General National Energy Plan (RUEN) In RUEN, Indonesia set a target to increase the proportion of renewable energy use, with a target of 23% of total energy consumption in 2025 and 31% in 2050

Minister of Energy and Mineral Resources Regulation No. 50 of 2017 concerning National Energy Policy and Strategy This regulation details steps to reduce CO2 emissions through increasing energy efficiency and implementing low-carbon technology

# • The population in Makassar is about 1,5 Million peope, Makassar city consist of land and 12 islands with total area 175,77 km2, consist of 15 subdistrict, and 153 Urban village. 35 km length of its coastline. \*\*SELAT MAKASSAR\*\* \*\*SELAT MAKASS



**Green Spaces and Parks**: Makassar is home to several parks and public green areas that provide recreational spaces for residents and visitors.

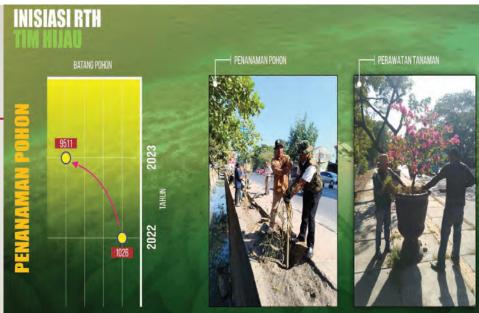
The green open space of Makassar city now about 11,47% still low from 30% national target.
They consist of City forest, green route, field, city park, Burial, mangrove, and river border

Consist of 1.166,86 Ha (public), and 861,66 Ha (privat) = 2.028, 52 Ha (Totally)

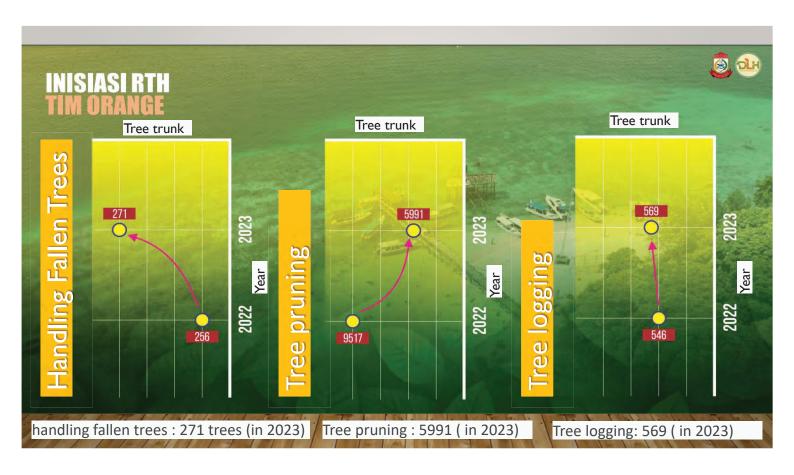


# GREENING ACTIVITY OF MAKASSAR CITY

- Some activity we do for conservation of Makassar green open space are:
  - I.Tree planting: in the middle of road, city park, in the mangrove area, and in the green channel
  - 2. Identification of green open space that involved education institution
  - 3. Verification of public utility and corporate resnponcibility
  - 4. Preparation of green open space planning













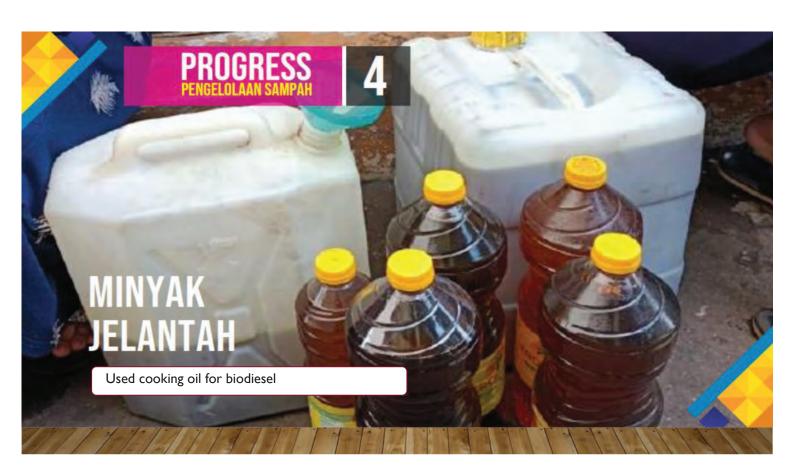
















- 1. 横浜市とマカッサル市による都市間連携ワークショップ
  - 1.2 横浜市 発表資料

# CITY OF YOKOHAMA

# City to City Collaboration for Greener Future

# Contents

- 1. Introduction of Yokohama city
- 2. Road network development in Yokohama
- 3. GHG Emissions in Transportation Sector
- 4. Our Roadmap toward Green Hub in Asia

Yasuaki Nakamura International Affairs Bureau, City of Yokohama, Japan January 15<sup>th</sup>, 2025



# CITY OF YOKOHAMA

1. Introduction of Yokohama city



# Since 19th century













# City Profile

- Area: Approx. 435 km<sup>2</sup>
- Population: Approx. 3.8 million (Second in Japan after Tokyo's 23 wards)
- Number of business establishments:
  Approx. 120,000
  (Fourth in Japan)
- Number of employees: Approx. 1.48 million (Third in Japan)

2

# New Slogan of Yokohama





Dr. Takeharu Yamanaka Mayor of Yokohama Member of OECD Champion Mayors for Inclusive Growth Board Member of Global Covenant of Mayors for Climate & Energy (GCoM)



"GO GREEN" means " to take environmentally friendly actions. "

"YOKOHAMA GO GREEN" was formulated as a slogan for the city, citizens, and businesses to work together to promote decarbonization and environmental measures toward the realization of a decarbonized society in 2050.

The slogan is set as a slogan for all environmental measures that will lead to the realization of a decarbonized society, including decarbonization measures, biodiversity, resource recycling, etc.

3

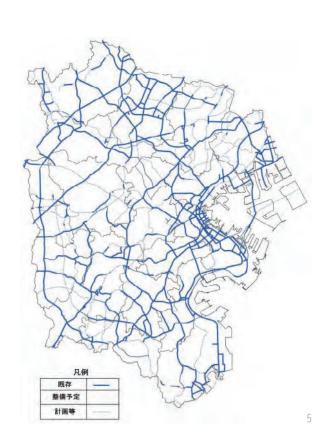
# CITY OF YOKOHAMA



明日をひらく都市
OPEN×PIONEER

# Situation of Roads in Yokohama

- Under the city's spatial plan of Yokohama, total length of urban planning road is around 682km.
   But its completion rate is still 69%, which is very low compared to other large cities in Japan.
- Arterial roads from the city center around the port to Tokyo along coastal area and radial roads from city center been relatively well developed, however, ring roads have been less developed, resulting in an overall inadequate development of the city's road network.



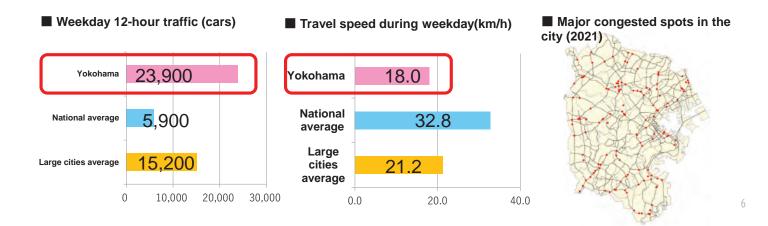
# Situation of Roads in Yokohama



YOKOHAMA

GO GREEN

- Compared to the average of large cities, weekday 12-hour traffic is high, and travel speed during congestion is slower. Congestion occurs across the city.
- Social damage due to congestion such as loss of time and environmental impacts is a major problem.



# **Development of road network**

 The City is promoting the development of three ring roads and ten radial roads as the backbone of the city.

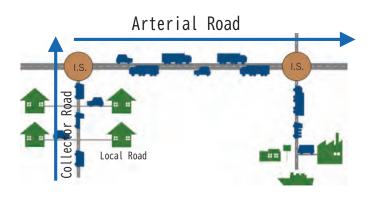
 Ring Road No.2 and three radial roads are fully open to traffic.

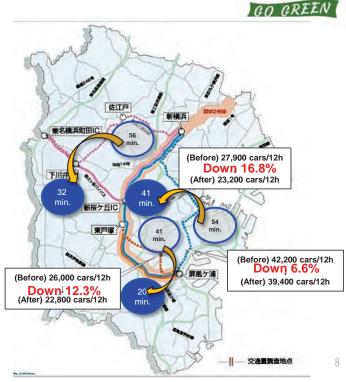




# **Effect of Development of Ring Road No.2**

- Ring Road No.2 works as a main arterial road to detour traffic from collector and local roads.
- Ring Road No.2 reduces traffic congestion on parallel collector.



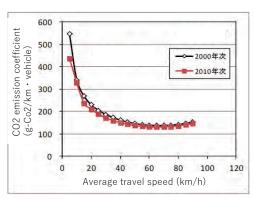


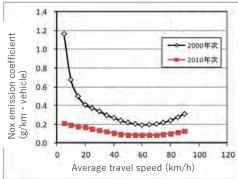
# Roadside Environment due to Exhaust Gas

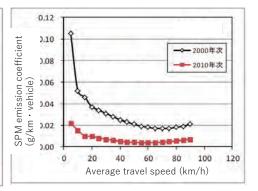


YOKOHAMA

# CO2, NOx and SPM emission coefficient from vehicle (2000 and 2010)







Grounds for the Calculation of Motor Vehicle Emission Factors using Environment Impact Assessment of Road Project etc.(Revision of FY 2010)
National Institute for Land and Infrastructure Management

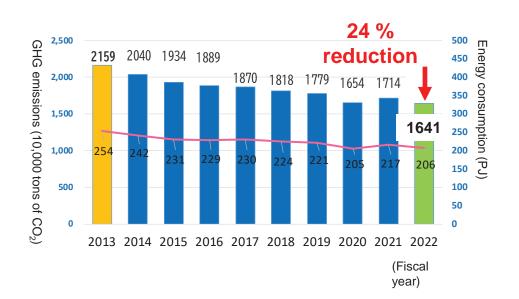
# CITY OF YOKOHAMA

# 2. GHG Emissions in Transportation Sector



# **GHG Emissions in Yokohama**





# **2027 GREEN**×**EXPO** 2027

# 2030

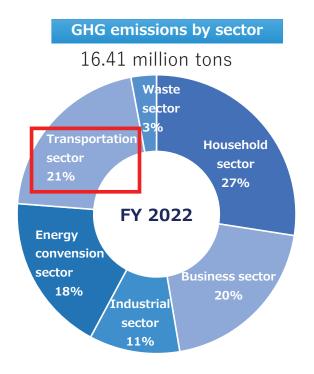
Achievement of 50% reduction in GHG emissions

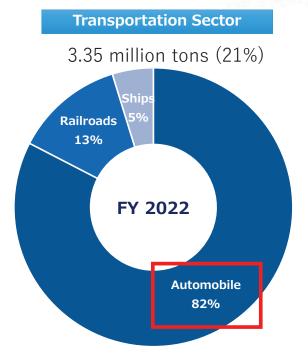
# 2050

Realizing a Net-Zero Society

# GHG Emissions by Sector in Yokohama





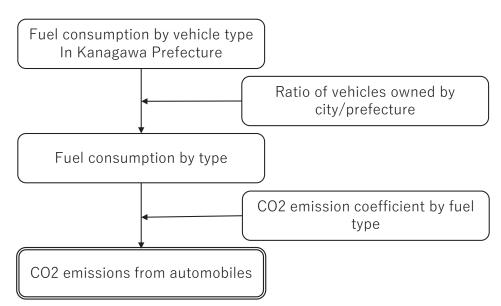


Calculation Method for Co2 Emissions from transportation sector (automobiles)



12

Co2 emissions from the transportation sector (automobiles) are calculated from fuel consumption.



13

# EV and PHV usage rate in Japan/Yokohama



# Number of EVs and PHVs registered (x 1,000 vehicle)

(As of March, 2024)

	ΕV	PHV	Other	Total
Japan	196 (0. 26%)	252 (0.33%)	76, 263	76, 712
Yokohama city	9 (0.65%)	6 (0.44%)	1, 299	1, 313

<sup>Excluding special (special) vehicles (Source: Japan Automobile Inspection & Registration Information Association)</sup> 

# Current status of charging infrastructure in Japan

- In Japan, 10,128 quick chargers and approximately 30,195 regular chargers are in service (as of March 31, 2024, Ministry of Economy, Trade and Industry). The government's goal is to install 300,000 units of charging infrastructure by 2030, including 30,000 fast chargers for public use.
- However, in urban area like Yokohama, the installation hurdles are high for store parking lots and apartment complexes, making it difficult to spread the use of charging facilities.

# Measures of Expansion of the use of electric vehicles

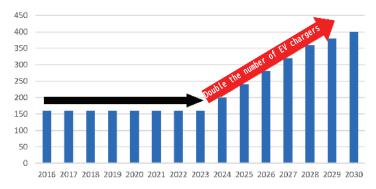


Yokohama City is now promoting installation of quick chargers through public-private partnership with <u>target to install 400 units by FY2030</u> (double the current number) in order to increase the number of EVs in the city.

Demonstration project for installation of chargers on public roads and in public facilities

Subsidies to promote installation in apartment complexes and

convenience store





- 6 Quick charging facilities at city halls and waste incineration plants
- 21 Normal recharging facilities at ward offices and municipal parking lots



Quick chargers at waste incineration plants



Quick chargers at Yokohama City hall

# 16

# Demonstration project for installation of quick chargers on public roads



# Purpose of the Demonstration Project:

The chargers will actually be installed on public roads and operated on a trial basis to verify the issues and usefulness for the police, road administrators, and installation operators.

# **Collaboration with the national government:**

Adopted for the "Local Demonstration Experiment (Social Experiment) for New Road Initiatives" by the Ministry of Land, Infrastructure, Transport and Tourism (2020). Rules on conditions for road occupancy established through the formulation of national guidelines (2024).

# **Collaboration with Private sector:**

The city selects the location and publicly solicits and decides on the operator, and the private operator installs and operates chargers.







# Demonstration project for installation of quick chargers on public roads on public roads



非公開

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# **CITY OF YOKOHAMA**

# 4. Our Roadmap Toward Green Hub in Asia



# **Yokohama Partnership of Resources and Technologies (Y-PORT)** with wide range of expertise of Yokohama companies



YOKOHAMA GO GREEN





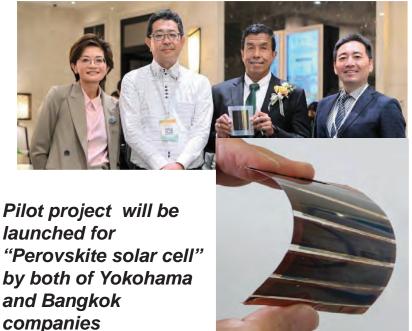
# YUSA's Achievement in Energy and Transport Sector in Thailand

Facilitating the innovation and deployment of cutting-edge











# Asia Smart City Conference in Yokohama



- A global conference where Asian cities, governments, international organizations, and corporations gather in Yokohama to share knowledge and introduce technologies and solutions for the realization of a sustainable green society.
- A Platform of Green Hub in Asia was disseminated from Yokohama to the international community.
- Held annually since 2012, the 13th conference was held in October under the theme of "Decarbonization." 2,200 participants from 46 countries attended the conference, which featured 18 sessions with approximately 90 speakers.

# <Supporters>



















ADB ASIAN DEVELOPMENT BANK





### 24

# The ASCC2024 Yokohama Declaration composed of following three YOKOHAMA pillars was affirmed by participating 39 cities and organizations





- 1. The Pivotal Role of Cities in the Global Climate Challenge
- 2. Strengthening Inter-City Solidarity and Cooperation
- 3. Elevating Asia's Leadership on the Global Stage

# **GREEN** × **EXPO** 2027



**Event Facts** 

Mar 19 - Sep 26, 2027

**■** Expected Visitors

 Official Participants
 70+ Countries and Int'l Organizations

10 million

Host City
Yokohama

Period

Yokohama will host a World Expo under the theme of "Sustainability" & "Green".





2024	2025	2027	2030	2050
13 <sup>th</sup> Asia Smart City Conference ASCC 13th Asia Smirt City Conference	14 <sup>th</sup> Asia Smart City Conference  TICAD9  TICA YOKOH 202	AMA	Half Carbon Emissions     SDGs Target Year	Net-Zero Emissions

- 1 横浜市とマカッサル市による都市間連携ワークショップ
  - 1.3 日本工営㈱ 発表資料 (事業進捗報告)



# City-to-City Collaboration for Zero Carbon Society Program (C3P) Ministry of the Environment, Government of Japan

# "Zero carbon city project with focus on transportation and energy through City-to-City Collaboration between Makassar City and City of Yokohama"

Workshop with Makassar City

日本工営株式会社

15 January 2025

Outline NIPPON KOEI

- 1. Project Overview
- 2. Project Progress
- 3. Schedule
- 4. Other

# 1. Project Overview

- Project Plan
- - Project Implementation Structure

2

# Project Plan

This project will promote the formation of Makassar city as a decarbonized city and contribute to the creation of a sustainable urban environment,

- 1) by combining the administrative experience of the City of Yokohama, which has made advanced efforts to decarbonize the city, including in areas where decarbonization has already taken place.
- 2) Specifically, the program aims to introduce technologies and products of companies-related to Yokohama such as the members of Yokohama Urban Solution Alliance (YUSA), of which contribute to decarbonization in the transportation and energy sectors in Makassar and the surrounding areas. City of Yokohama may provide specific advice on administrative measures to promote introduction of these technologies and applications more effectively.

Activity	Field/technology introduced	1 <sup>st</sup> Year (FY2024)	2 <sup>nd</sup> Year (FY2025)	3 <sup>rd</sup> Year (FY2026)
City-to-City Collaboration	Sharing experiences and knowledge of decarbonization by Yokohama city	Introduction of initiatives for decarbonization in the transportation sector	Introduction of decarbonization initiatives based on the needs identified in the 1 <sup>st</sup> year.	-
Activities	Support in the institutional development	-	Support for development a plan of carbon neutral (CN) in the city or priority areas within the city etc.	Support for development a plan of carbon neutral (CN) in the city or priority areas within the city etc.
	Autonomous and real-time signal control	Preliminary study, including confirmation of local standard specifications	Discussion on JCM application, Formulation of JCM Model project	Application for JCM Model project (or private JCM)
Studies for JCM Model	Solar-powered EV bike battery station	Discussion on JCM application, Formulation of JCM Model project	Application for JCM Model project (or private JCM)	Implementation of JCM Model project (or private JCM)
Project Identification & Formulation	Cement waste heat recovery power generation	Preliminary study, including checking the current state of equipment at the local cement plant.	Formulation of JCM Model project (including basic design)	Application for JCM Model project (or private JCM)
	Renewable energy and energy efficient technologies utilization	Assessment of needs in the local government and private sector	Formulation of JCM Model project	Application for JCM Model project (or private JCM)

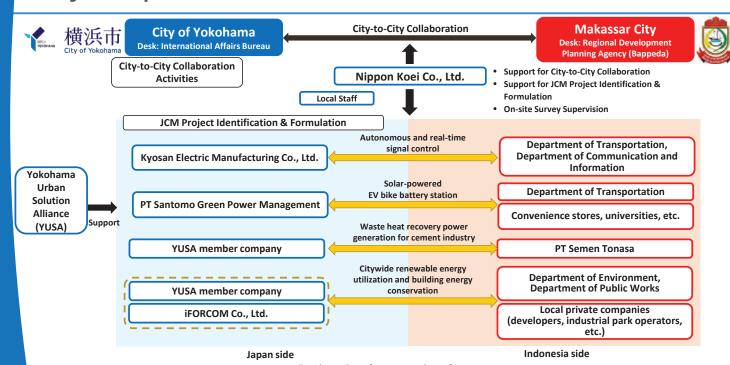
Important Note: This program is designed for 3 years as one phase (maximum two phases: 6 years), while it needs to be proposed and selected **every financial year** (Apr-Mar). If the progress is not good, it can be terminated in the second/third year. Achievement of **actual emission reduction activities** is the key.

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# **Project Implementation Structure**

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Project Implementation Structure

# 2. Project Progress

- City-to-City Collaboration Activities

- Studies for JCM project identification & Formulation

6

# City-to-City Collaboration Activities

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Sharing experiences and knowledge of decarbonization by City of Yokohama



- Introduction of initiatives for decarbonization in the transportation sector
- 2<sup>nd</sup> Year
- Introduction of decarbonization initiatives based on the needs identified in the 1st year.

# Introduction of initiatives for decarbonization in the transportation sector

- Introduction of road measures to combat traffic congestion through road network improvement, multi-level crossings, flat intersection improvements, and other initiatives
- ⇒Related to autonomous and real-time signal control project
- Introduction of measures to promote the introduction of EVs and EV infrastructure-related facilities such as charging stations, with a focus on regions with leading decarbonization
- ⇒Related to solar-powered EV bike battery station project

# Support in the institutional development

2<sup>nd</sup> Year (FY2025)

3<sup>rd</sup> Year (FY2026)

- Support for development a plan of carbon neutral (CN) in the city or priority areas within the city etc.
- Support for development a plan of carbon neutral (CN) in the city or priority areas within the city etc.

# **Activity Progress**

- The measures for mitigation of traffic jam and promotion of EV introduction by City of Yokohama were shared in the workshop
- Policy and certification system related to Green Building in City of Yokohama will be introduced in the workshop.





# **Transportation**

> Autonomous and real-time signal control

1<sup>st</sup> Year (FY2024)  Preliminary study, including confirmation of local standard specifications

2<sup>nd</sup> Year (FY2025)  Discussion on JCM application, Formulation of JCM project

3<sup>rd</sup> Year (FY2026) Application for JCM Model project (or private JCM)



Image of autonomous and real-time signal control

- Conduct preliminary study for introduction
- Confirmation of local technical specifications such as standard specifications for signal lights and controllers
- Traffic simulation based on actual local traffic conditions
- Estimation of CO2 emission reductions, etc.

### Study Progress

- It was clarified that the existing traffic light and communication line can be used for the autonomous and real-time signal controller of Kyosan.
- It is difficult to use CCTV cameras connected to War Room as vehicle detector for the signal control because of camera angle and quality of images.
- Based on the results of traffic simulations and traffic volume survey, annual GHG emission reduction was estimated as 261.4 t-CO2eq/year for 32 intersections, with a total economic benefit of approximately 463.2 million IDR for just 2 intersections.
- Detail of procurement system, certification system, and installation cost etc, shall be checked.

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# Studies for JCM project identification & Formulation

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# Transportation

> Autonomous and real-time signal control

OChecking the existing traffic signal equipment



Existing traffic signal controller (Point control / ITCS)



Existing traffic signal lamp (Point control / ITCS)



ITCS traffic control room inside DOT (Dishub)

# Studies for JCM project identification & Formulation



# **Transportation**

# > Autonomous and real-time signal control

OChecking possibility of utilization of CCTV cameras (War room)



Monitoring screen & server for CCTV cameras in War room



Traffic counting system using CCTV



Sample data of CCTV image

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# Studies for JCM project identification & Formulation





# **Transportation**

# > Autonomous and real-time signal control

OEstimation of GHG Reduction effect

# Analysis Flow of Improvements using Autonomous and real-time signal control

Select 2 intersections in Makassar City from field survey Conduct traffic volume surveys at the 2 intersections

Simulate traffic flow with autonomous signals using traffic microsimulation software

Calculate travel speed improvements

Estimate GHG reductions & economic benefits

# Annual GHG Emission Reduction = 261.4 t-CO2eq/year

#	Item	Value	Unit	Remarks
A	Annual GHG Emission Reduction per Autonomous Decentralized Signal Controller (per signalized intersection)	8.2	t-CO2eq/year	Average of intersection 1 (7.8 t-CO2) and intersection 2 (8.5 t-CO2)
В	Signalized Intersections with Manual Control in the City	32	Intersection	Information from DOT
С	Annual GHG Emission Reduction	261.4	t-CO2eq/year	$=A\times B$
D	Planned Subsidy Application Amount	15,686,999	JPY	=4,000 JPY/t-CO2eq x C x E
E	Project Duration (Service Life)	15	Year	Assumed by Kyosan (The fixed life expectancy of the control equipment was confirmed within this project. According to the National Police Agency's Infrastructure Longevity Plan, it is 19 years).





# **Transportation**

# Autonomous and real-time signal control

OEstimation economic benefit

# Key Assumptions:

- Fuel Savings: Reduced fuel consumption estimated using regular gasoline price (12,290 IDR/L ≈ 119 JPY/L)
- Time Savings: Based on traffic volume during peak hours and improved travel speeds, multiplied by value of time (GDP per workingage person: 46,059 IDR/hour ≈ 447 JPY/hour)
- Exchange rate:1 IDR =0.0097 JPY

Reference: Travel time measurement section (red line)







# Estimated Annual Benefits (2 Intersections):

# **Fuel Consumption Reduction**

Approx. 85.3 million IDR (Approx. 0.83 million JPY)



**Travel Time Savings** Approx. 377.96 million IDR (Approx. 3.68 million JPY)



**Total Economic Benefit** Approx. 463.2 million IDR (Approx. 4.51 million JPY)

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# Studies for JCM project identification & Formulation

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### **Transportation**

# Solar-powered EV bike battery station

Year (FY2024)  Discussion on JCM application, Formulation of JCM project



 Application for JCM model project (or private JCM)



 Implementation of JCM model project (or private JCM)





POC of PV installation for battery station in UNHAS Gowa

- Discussion on JCM application, Formulation of JCM project
  - Identification of candidate locations for installation of roof-mounted solar power generation facilities (e.g., convenience stores, university campuses, etc.)
- Examination of JCM methodology for JCM projects
- Examination of monitoring methods
- Calculation of CO2 emission reductions
- Study the feasibility of installing perovskite solar cells (lightweight, thin, next-generation solar cells for installation in facilities with low roof load-bearing capacity)

### Study Progress

- As a result of site survey in 17 Alfamarts, "Alfamart Daya Business Center" was tentatively selected as first site for the installation of PV on the rooftop.
- Opinion exchange meetings with Japanese JCM Secretariat and Indonesian JCM Secretariat for application of Private JCM project were done.
- Consideration of JCM methodology was done and GHG reduction effect was roughly calculated.
- Large scale fuel consumption of gasoline bike will be done for estimating more accurate GHG reduction effect compared with EV bike.





# **Energy**

# > Cement waste heat recovery power generation

1st Year (FY2024)  Preliminary study, including checking the current state of equipment at the local cement plant.

2<sup>nd</sup> Year FY2025 • Formulation of JCM project (including basic design)

3<sup>rd</sup> Year (FY2026 Application for JCM model project (or private JCM)

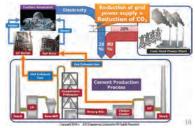


Image of cement waste heat recovery power generation facility

### Preliminary study

- On-site consultation and confirmation of current facilities: Gather basic information on changes in the estimated amount of electricity generated during the wet and dry seasons, availability of space to install facilities, etc.
- Preparation for schematic design and preparation of detailed estimates scheduled for the next fiscal year and beyond

### Study Progress

- According to the interview to PT Semen Tonasa, it was agreed that the list of required information for the consideration of GHG reduction effect will be provided from Study Team.
- Opinion exchange meeting between PT Semen
  Tonasa and one of Japanese Engineering Company in
  Yokohama which has installed WHR system to some
  cement factories in Indonesia will be done.

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Studies for JCM project identification & Formulation

NIPPON KOEI



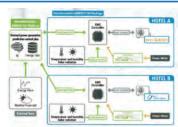
### **Energy**

# > Renewable energy and energy efficient technologies utilization

1<sup>st</sup> Year (FY2024)  Assessment of needs in the local government and private sector

2<sup>nd</sup> Year (FY2025) • Formulation of JCM project

3<sup>rd</sup> Year (FY2026) Application for JCM model project (or private JCM)



EMS of iFORCOM Co., Ltd.

- Assessment of needs in local government and private sector
  - Interview relevant organizations and conduct on-site surveys to identify needs for renewable energy facilities and energy-saving technologies, aiming to develop specific JCM projects in the next fiscal year and beyond.

# Study Progress

- Interviews to Kalla Group, Ciputra Development, PT KIMA, and Department of Public Works were done for understanding their interests in introduction of renewable energy system and building energy saving system to their facilities.
- 2<sup>nd</sup> meeting with Kalla Group will be done for discussing the possibility of introduction of building energy saving system for energy audit to Mall Ratu Indah.
- Interview to hotels in Makassar (ex. Four Points, Aston etc,) for asking their interests in introduction of Energy Management System will be conducted.

# 3. Schedule

- Work Schedule
- Travel Plans for 2<sup>nd</sup> Trip
- C3P Seminar in Osaka

# **Work Schedule**

# NIPPON KOEI

### Work Schedule

	2024 2025									
	Study Items		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1.	. City-to-City Collaboration Activities		1st trip		ASCC			2nd trip		
1	Sharing experiences and knowledge of decarbonization by Yokohama city									<b>→</b>
2	Discussion with counterparts (In Makassar and Japan)		(Kick-off) ♥					¥		
3	Discussions regarding city-to-city cooperation in the following fiscal year and beyond									<b>→</b>
2.	Studies for JCM project identification & Formulation									
1	Discussions with/support for parties involved in potential JCM applications	_	*					¥		<b>→</b>
2	Web-based discussions with companies regarding project formulation, information gathering	_								<b>→</b>
3	Study and information gathering in Makassar (On-site travel and Local Staff Support)		÷					٧		<b>→</b>
4	Discussion with local stakeholders		▼					¥		
5	Cooperation with support organizations other than the Ministry of the Environment (e.g., JICA field office)		¥					v		
6	Preparation for finding and forming JCM projects for the next fiscal year and beyond									<b>→</b>
3.	Workshop Event									
1	On-site Workshop							•		
2	Presentation at the City-to-City Collaboration Seminar								(Jan-F ▼	eb)
4.	Reports and deliverables									
1	Final Report							(Submis	sion) 🔻	+

# < First trip (Aug 2024) >

- Kick-off meeting
- Stakeholder consultation, courtesy
- Preparation and discussion for onsite Workshop
- On-site survey, information gathering

# <Invitation to Japan (Oct 2024)>

- Invitation of Makassar City Government to Asia Smart City Conference (ASCC) in Yokohama
- Discussion between Makassar City and Japan in Yokohama

### <Second trip (Jan 2025)>

- Discussions on the project
- Discussions with related parties
- Holding on-site Workshop

### <Invitation to Japan (Jan 2025)>

- Invitation of Makassar City Government (budget for one official) to C3P seminar by MOEJ/IGES in Japan (Osaka)
- Discussion between Makassar and Yokohama in Yokohama (optional)

#### Contents of the Activities

Date	13 Jan (Mon)	14 Jan (Tue)	15 Jan (Wed)	16 Jan (Thu)	17 Jan (Fri)
Activity	<ul> <li>Meeting with Four Points by Sheraton Makassar</li> </ul>	<ul> <li>Meeting with PT Ciputra Development</li> <li>Courtesy call on Consular Office of Makassar</li> <li>Meeting with Aston Hotel</li> </ul>	<ul> <li>Workshop with Makassar City Government</li> <li>Meeting with Kalla Group</li> </ul>	<ul> <li>Meeting with         Department of         Environment</li> <li>Meeting with         Department of         Spatial Planning</li> </ul>	<ul> <li>Meeting with         Department of         Transportation</li> <li>Meeting with         Bappelitbangda         Sulsel</li> </ul>

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#### C3P Seminar in Osaka

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Seminar name: Seminar on City-to-City Collaboration for Zero Carbon Society 2025 (C3P Seminar)

Organizer: Ministry of the Environment, Japan (MOEJ) \*Co-organizer: IGES

Date: 23 & 24 January 2025

Venue: Congrès Convention Center & Carbon Neutral Research Hub ANNEX of the OSAKA GAS CO.,LTD.

Date	Time	Program	Note
	10:00-12:30	Seminar on City-to-City Collaboration for Zero Carbon Society 2025 - Realizing a Local Decarbonization with Technologies & International Solidarity - (Presentations & Panel discussion)	The mayor has been selected as a panelist
23 Jan	12:30-14:30	Lunch break	The mayor and Ms. Adriana have been invited to the luncheon with MOEJ
	14:30-17:00	Mutual learning on local decarbonization initiatives (Workshop)	-
	17:00-19:00	Reception	-
24 Jan	8:00-13:00	Site visit on the local decarbonization initiatives at Carbon Neutral Research Hub ANNEX of the OSAKA GAS CO.,LTD. (Excursion)	-

## 4. Others

- Idea of Project Contents in 2<sup>nd</sup> Year
- Request to Makassar City Government

## **Idea of Project Contents in 2nd Year**

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#### Proposal of project contents in 2<sup>nd</sup> year (2025-2026)

Item	Field / technology introduced	Contents of activity / study
City-to-City	Sharing experiences and knowledge of decarbonization by City of Yokohama	Introduction of decarbonization initiatives based on the needs identified in the $1^{\rm st}$ year.
Collaboration Activities	Support in the institutional development	Support for development of mayor's regulation on Green Building (if Makassar City is interested in the field)
	Autonomous and real-time signal control	Formulation of JCM Model project (including consideration of JCM methodology and strategy for expansion to Indonesia)
Studies for JCM	Solar-powered EV bike battery station	Application for private JCM
Model Project Identification &	Smart Bus (EV Bus) with battery swapping technology	Preliminary study for checking potential of introduction of EV Bus
Formulation	Cement waste heat recovery power generation	Formulation of JCM Model project (including cost estimation and basic design)
	Renewable energy and energy efficient technologies utilization	Formulation of JCM Model project on introduction of building energy saving system in hotels and shopping malls etc,

#### Smart Bus (EV Bus) with battery swapping technology

## SB (Smart Bus)



Vehicle of Smart Bus (EV Bus)

#### Specification of Smart Bus

Item	Specification
Name of Manufacturer	ASSEMBLEPOINT
Capacity	10 + 1
Vehicle length	3.67 m
Vehicle width	1.68 m
Battery	5.0 kwh, 4.8V Swapping Li-on battery
Max speed	40 km/h
Driving range	± 70km

#### Items to be surveyed

- Possibility of introduction of the EV bus as public transportation like angkot
- Possibility of introduction of the EV bus as new mobility in private area like residential area, campus, industrial area etc,
- Possibility of expansion of EV factory from Philippines to Indonesia

## **Request to Makassar City Government**

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- Cooperation in the meetings with related departments and agencies of Makassar City Government by Study Team
- Support for the submission of the proposal document for the public call by MOEJ on next February (ex. Letter of consent by Mayor)



Terima kasih telah mendengarkan presentasi kami!

1. 横浜市とマカッサル市による都市間連携ワークショップ 1.4 日本工営㈱ 発表資料 (グリーンビルディング)



## Introduction of Green Buildings in Indonesia and Yokohama

2025.01.15 SAITO Tetsuya

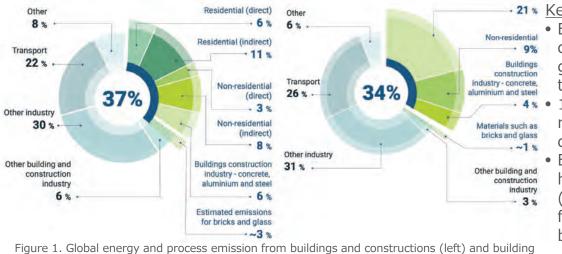
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## **Importance of Green Buildings**

Background

## Buildings and construction emissions and energy demand (UNEP Data, 2021)





sector energy demand (right). Source: UNEP, 2022.

- · 21 % Key points:
  - Building and construction generate 37% of total emission.
  - 17% from residential, 6% from construction.
  - Building generates highest demand (34%); 21% came from residential buildings<sup>1</sup>.
- •In developing economies, construction materials will consume most resources and GHG emissions will double by 2060.
- 9% of CO<sub>2</sub> emissions are from construction materials.
- •100 billion tons of waste is generated from construction, renovation, and demolition<sup>1</sup>.

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## Why is Green Building important in Indonesia?

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Building and construction are key sectors, as well as a prominent contributor of GHG emissions, which is projected to reach 40% of total emissions by 2030<sup>2</sup>.

Urban population is expected to reach 65% in 2050, on cities in Java and Sumatra islands.

Due to Indonesia's climate and climate change's impacts, it is estimated that over 500 million units of Air Conditioning (AC) will be purchased between 2022 and 2060 for thermal comfort<sup>2</sup>.

BGH adoption promotes net-zero carbon emission and has potential to achieve NDC faster.

## Green Building in Indonesia (1)

## Central Government Policy and Initiatives

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## Central government regulations on Bangunan Gedung Hijau (BGH)

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UU 28/2002 on Building.

UU 30/2007 on Energy Conservation.

UU 6/2023 on Job Creation (replacing PERPU 2/2022). Permen PUPR 2/2015 on Green Building.

Perpres 59/2017 on SDGs.

PP 16/2021 on Rules about Implementation of Laws 28/2002 about Building (mandate for Green Building Initiative).

Permen PUPR 21/2021 on Green Building Technical Standard (replacing Permen PUPR 2/2015).

PP 33/2023 on Energy Conservation.

Roadmap of Implementation and Development of Green Building (in 2023 and signed by 3 Ministries).

- BGH Definition: Building that meets the technical standards and have significant measurable performance in saving energy, water, and other resources, in accordance with its designated function and classifications in each stage of its implementation.
- Principles: efficient use of natural resources (Reduce, Reuse, Recycle), risk mitigation from safety, health, climate change, and disaster.

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## Green Building Assessment (Permen PUPR 21/2021)

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### Assessment is quantitative, implemented on all phase of building life cycle.

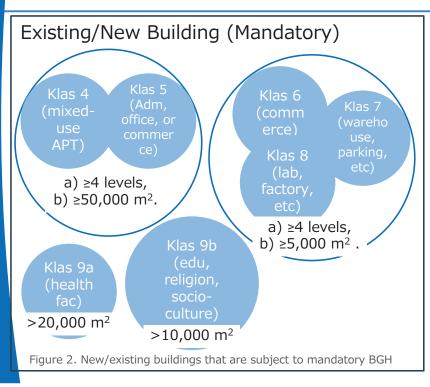
BGH Implementation Phase /Ordo class	Technical design/document	Construc tion	Use	Disassem bly
1. New buildings (mandatory)	V	V	V	V
2. New buildings (recommended)	V	V	V	V
3. Existing buildings (mandatory)			V	V
4. Existing buildings (recommended)			V	V
5. Green Housing Cluster (recommended)	V	V	V	V
6. New green space (recommended)	V	V	V	V
7. Existing green space (recommended)			V	V

Source: Permen PUPR 21/2021

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## **BGH Classification (Permen PUPR 21/2021)**

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#### Example:

- 1.Shopping mall might be classified under Klas 5 or 6.

  Depending on the structure (levels and planned area), it may be categorized as recommended/mandatory.
- 2.Hotels are categorized as Klas 5 (under commercial building), depending on the structure, it may be categorized as recommended/mandatory.

## Procedure for Mandatory (New) BGH (Permen PUPR 21/2021)

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- •Owner must self-evaluate which ordo their building is classified under (Fig 2).
- •Local gov. building/hotel are both classified under Klas 5 (Office or commercial).
- Fig. If the building has ≥4 stories and ≥50,000 m<sup>2</sup>

→ mandatory BGH.

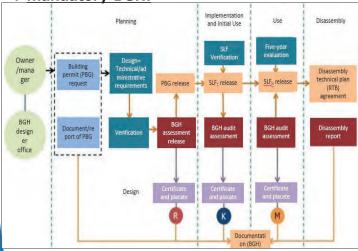


Figure 3. Certification Procedure (Mandatory New BGH).

#### 1. Programming and Technical Planning Phase

- Final report of programming.
- Documentation.
- Technical recommendation & criteria.
- Plan for next phases.
- · Final report of technical planning.
- Architectural plan.
- Building structure, inc. mechanical-electrical arrangement, interior and outside.
- Technical spec., and Budgeting plan (RAB).
- Calculation & plan of emission/carbon reduction, water and energy efficiency, management of solid waste and wastewater.
- Calculation of resources, and estimation of BGH life cycle.
- PBG form, then submit to Permission Agency (DPTSP).

#### 2. Construction phase.

- Final report.
- As-built drawing, BGH green supply and green construction.
- Documents of permission and documentation of construction process.

#### 3. Use phase

- Final report.
- Implementation of management, operational standards, and procedures.
- Guidelines for residents and users.
- Documents of maintenance and monitoring, and documentations.
- Release of functional certificate (SLF).

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## Procedure for Recommended (New) BGH (Permen PUPR 21/2021)

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- If the local gov. building/hotel have specifications listed below:
  - ➤If the building has <4 levels, or
  - Fig the building has ≥4 stories, but <50,000 m<sup>2</sup>
  - >→ recommended BGH.

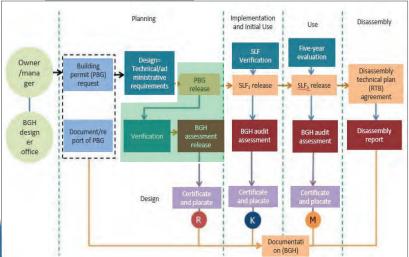


Figure 4. Certification Procedure (Recommended New BGH).

- •Fig 4. illustrates that the difference is in the planning phase (highlighted in green box).
- •Building owner may voluntarily apply for BGH certification after PBG (building permit) is released, by attaching technical criteria of BGH to Technical Final Report (plan of emission reduction, water conservation, energy efficiency, etc.).
- •Upon receiving the application request, local government should request for owners to go through with the assessment.
- BGH assessment follows the Mandatory BGH.

## Procedure for Retrofitting of Existing Building to satisfy BGH criterion (Permen PUPR 21/2021)

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- Adaptation to BGH can be implemented on three existing buildings:
- a. Without functional change or additional structure.
- b. With functional change that causes additional structure.
- c. Preserved Cultural Building.
- BGH adaptation to existing buildings are implemented gradually or partially (retrofitting).
- •Self-monitoring of BGH performance is done for first 3 months after retrofitting process is completed.
- •To get certification, owners should submit the selfmonitoring results and other documents: programming and technical plan, baseline audit results, and BGH form.

Programming phase.

 Adaptation principles, inc. functional appropriateness, operational and maintenance budget appropriateness, and structured performance targeting.

Audit of building system and component.

- Monitoring to obtain existing performance data.
- Data: energy, water consumption, and resource utilization.
- 6 months monitoring as baseline to set BGH target performance.

BGH target setting.

- Technology adaptation/implementation & feasibility.
- Setting targets on baseline data and potential improvement.

Reporting and decision for improvement.

- Technical requirements.
- BGH transformation steps:
  - With or without changes/additional structures.

## Green Building Roadmap 2023 - 2030

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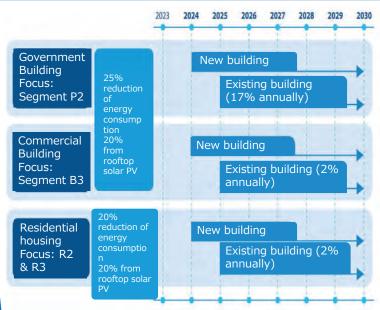


Figure 5. CO<sub>2</sub> reduction target on building segment Source: Green Building Roadmap (Ministry of PUPR)

Local Government Units are expected to:

- 1. Provincial Government:
- a. to encourage, supervise, and evaluate construction.
- to provide guidance, regulation, and supervision for Regency/Municipality Government, Community, Building Organizers) to meet standards.
- 2. Regency/Municipality Government:
- to provide regulation, guidance, and supervision of construction to meet standards for Community and Project Proponent.
- BGH incentives are made and implemented with consultation with stakeholders and central government.

## Green Building in Indonesia (2)

## Local Government Policy and Initiatives

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## **Green Building Initiatives in Indonesia**

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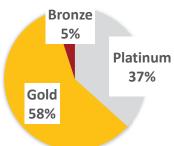
Source: gbcindonesia.org (2024)

Beauten

Rest Railmantan & Central Lava
South Sumarta
Rest Railmantan & Commercial Building
North Sumarta
South Sumarta
Rest Railmantan & Commercial Building
North Sulawesi
Bangka Belitung
North Malluku
Nort

Figure 7. Green Building Target 2030 (in thousands of m<sup>2</sup>) Source: Green Building Roadmap (Ministry of PUPR)

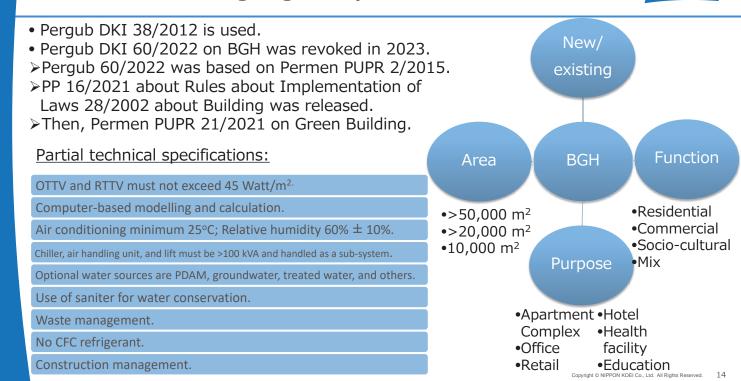
## GREEN BUILDING RATING (N=60) (GBCI, 2022)



Local regulations on Green Building (JDIH website):

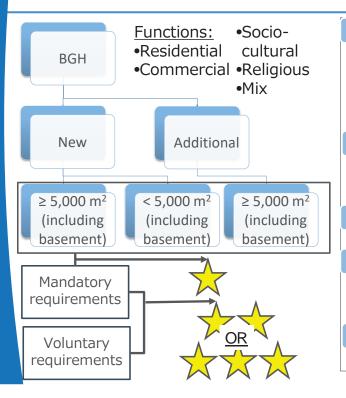
- 1. Pergub DKI 38/2012.
- 2. Perwalkota Bandung 1023/2016.
- 3. Perwalkota Gorontalo 53/2017.
- 4. Perwalkota Pariaman 33/2018.
- 5. Perwalkota Semarang 24/2019.
- 6. Pergub Bali 45/2019.

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## Perwalkota Bandung 1023/2016

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#### Energy

#### Mandatory requirements

1.Building envelope.

• OTTV and RTTV must not

exceed 45 Watt/m<sup>2</sup>

Use spreadsheet calculator

2. Air conditioning

• Minimum 25°C ± 1°C

3.Lighting

4.Indoor transportation

5. Electricity

#### Water use

- •PDAM, groundwater, rainwater harvesting, and/or treated water.
- •Volume of Infiltration wells: 0.025 m x ground floor area (m<sup>2</sup>).
- •Use of saniter for water conservation.

## Building management

•Mandatory for area of >10,000m<sup>2</sup> or central cooling system.

## Indoor air quality

- •Must be equipped with CO and CO2 detector.
- •CO concentration must not exceed 35 ppm.
- •CO2 concentration must not exceed 1000 ppm.

## Land management

•Green space, supporting facility, and waste management.

New and existing buildings are subject to BGH.

Implementation on 4 steps: programming, technical planning, construction, and use.

Technical criteria should consider site management, energy efficiency, water efficiency, indoor air quality, eco-friendly materials, solid and wastewater management.

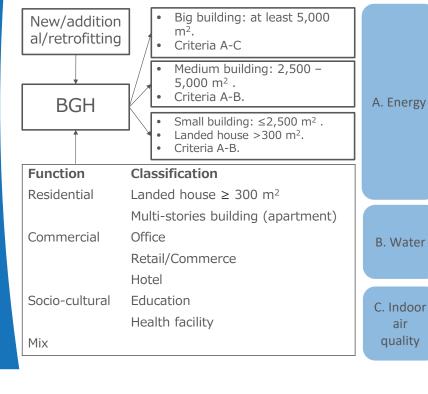
No reference value, so project builder should develop their own criteria and compile a technical planning document.

BGH facilities are including infiltration wells and biopori, planting canopy trees, green space, and prohibiting use of wooden rooftop.

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## Perwalkota Semarang 24/2019

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40 Watt/m<sup>2</sup>

calculator • U-Value: ≤ 1.2

must not exceed

watt/m<sup>2</sup>K 2. Air conditioning

• Minimum 25°C ±

• Relative humidity:

1.Building envelope. 60%

 OTTV and RTTV
 Thermal zoning approach.

3.Lighting

• Use spreadsheet • Sensor installment.

 Average building LPD <8watt/m<sup>2</sup>.

4.Indoor

transportation 5. Electricity

B. Water

• Highest flowrate management on plumbing appliances.

Rainwater harvesting.

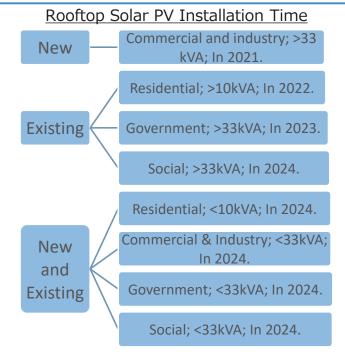
C. Indoor air quality

- Must be equipped with CO and CO2 detector.
- CO concentration must not exceed 35 ppm.
- CO2 concentration must not exceed 1000 ppm.

## Pergub Bali 45/2019 on Clean Energy

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- · Aim: Zero energy building.
- Design principles:
- 1. Accommodating local climate.
- 2. Balinese architectural style.
- 3. Natural lighting.
- 4. Eco-friendly materials.
- 5. Rooftop solar PV.
- 6. Water conservation.
- 7. Water management.
- Main targets:
- 1. Government building should install rooftop solar PV to supply at least 20% of electricity or 20% of rooftop area.
- 2.Commercial, industry, social, and residential with area of at least 500 m<sup>2</sup> should install rooftop solar PV to supply at least 20% of electricity or 20% of rooftop area.
- Incentive mechanism: green electricity tariff.



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## Green building in South Kalimantan

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#### Puskesmas Banjarbaru Selatan usung konsep "green building"

O Senin, 30 Oktober 2023 19:16 Will



mempelladian idekamen kuntuk peringia peringia peringia (ANTARA/10 Plumas Dinkes Benjadan/ Relativa Patris etablia (Inkapasa mempelladian idekamen kuntuk peringian peremasahan tehira perindianganan Pusikaman, Banjadan/ Relatar di Benjaba Sejini (20/10/2023) (ANTARA/10 Plumas Dinkes Benjadara)

Banjarbaru (ANTARA) - Pemerintah Kota Banjarbaru Kalimantan Selatan membangun Pembangunan Pusat Kesehatan Masyarakat (Puskesmas) Banjarbaru Selatan yang mengusung konsep bangunan hijau (Green Building).

Figure 8. News release of Green Building Puskesmas. Source: Kalsel Antara News (2023).

- In 2023, Banjarbaru City (South Kalimantan) signed an MOU to replace a traditional market 'Pasar Bauntung Banjarbaru' with a new Puskesmas (health facility).
- Green building targets: environmentally friendly and energy conservation.
- Area: around 5,000 m2; Klas 9a (health facility or hospital); Under recommended (Permen PUPR 21/2021).
- Construction completion target by the end of 2024.

## **Green Building in Yokohama**

## Introduction of CASBEE Yokohama

## Promotion of Green Buildings by CASBEE Yokohama

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- CASBEE (Comprehensive Assessment System for Built Environment Efficiency) is a program for assessing & rating environmental performance of buildings & built environments on a comprehensive evaluation of diverse factors.
- Ratings: S, A, B+, B-, C.
- CASBEE is implemented on three principles: building's lifecycle, evaluation of Built Environment Quality (Q) and Built Environment Load (L), and rank is based on indicator of BEE (Built Environment Efficiency).
- CASBEE Yokohama aims to:
  - 1. Have owners of new buildings being constructed set environmental performance standards and design targets that are mindful of the building's environmental impact (encouraging consideration for the environment).
  - 2. Make CASBEE Yokohama results available to the public to inform their building use/purchase decisions.

#### CASBEE Development Origin (2001)

Architectural firms, Construction companies, Specialized contractors, Energy Industry businesses, etc. overnment Academia

MLIT (Housing Bureau; Government Buildings Department; National Institute for Land and Infrastructure Management) Urban Renaissance Agency Tokyo Metropolitan Government Osaka Prefectural Government, etc.

Incorporated administrative agencies Construction research centers, etc.

Q1: Indoor environment	<ul><li>(1) Sound environment</li><li>(2) Thermal comfort</li></ul>	<ul><li>(3) Lighting &amp; illumination</li><li>(4) Air quality</li></ul>	Noise, sound insulation, room temperature control, daylight, etc.
Q2: Quality of service	<ul><li>(1) Service ability</li><li>(2) Durability &amp; reliability</li></ul>	(3) Flexibility & adaptability	Maintenance, earthquake resistance, system renewability, service life of components, etc.
Q3: Outdoor environment (on-site)	<ul><li>(1) Preservation &amp; biotope creation</li><li>(2) Townscape &amp; landscape</li></ul>	(3) Local characteristics & outdoor amenity	Greening of the premises (consideration for the ecosystem), landscape, etc.
L1: Energy	(1) Control of heat load on the outer surface of buildings	(3) Efficiency in building service system	Outer surfaces, energy efficiency, adoption of renewable energy, BEMS, etc.
	(2) Natural energy utilization	(4) Efficient operation	Ctci
L2: Resources	(1) Water resources	(3) Avoiding the use of	Water saving, use of rainwater, use
& materials	(2) Reducing use of non- renewable resources	materials with pollutant content	of recycled materials, etc.
L3: Off-site environment	(1) Consideration of global warming	(3) Consideration of surrounding environment	WLC, load on local infrastructure, air
environment	(2) Consideration of local environment		pollution, wind damage, etc.

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# Potential City-to-City Collaboration on Green Building

 With the existence of PP 16/2021 and Permen PUPR 21/2021, central government has determined that the authority to prepare the NSPK belongs to them.

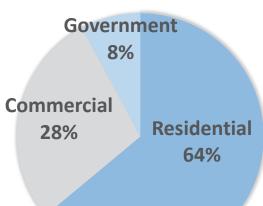
- Pergub 60/2022 was revoked in the context of good governance, but other regional regulations remain in effect because the contents of the regional regulations do not directly intersect with PP and Permen.
- There are several motives for creating BGH regional regulations:
- 1. PUPR Roadmap: achieving provincial targets.
- 2. Mandate to create regional regulations related to BGH incentives
- 3. Filling the limitations of the content of PP and Permen, especially regarding the use of renewable energy (rooftop solar PV), strengthening aspects of natural disaster mitigation (earthquakes, floods, fires), and focusing on residential buildings which are the largest contributors of GHG in the building group.
- 4. Contextualization into regional regulations is very important to ensure a smooth policy adoption process.
- 5. Example: the BGH order uses area as one of the consideration aspects (50,000 m<sup>2</sup>). Many buildings in the region do not target land efforts of this size.

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#### **BGH Collaboration**

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## SOUTH SULAWESI BGH **TARGET 2030**



Source: Green Building Roadmap 2023 (Ministry of PUPR)

Peraturan Walikota for BGH should address several key points:

- 1. Incentive mechanism to promote BGH adoption.
- 2. Contextualization of current PP and Permen, by addressing local needs of green building, renewable energy adoption, and safety from natural disaster.
- 3. Achieving BGH target in 2030.

Collaboration with Yokohama City:

- 1. CASBEE has an established and excellent reputation for green building assessment.
- 2. Yokohama City has experience in intercities collaboration.
- 3. Possibility of BGH Perwalkot and pilot project. Copyright © NIPPON KOEI Co., Ltd. All Rights Reserved. 25

## Klas (Permen PUPR 21/2021)

## NIPPON KOEI

Klas	Definition	Conditions	Mandatory/ Recommend ed
Klas 1	Residential building	-	Recommende d
Sub-klas 1a	Single house or adjacent houses	-	Recommende d
Sub-klas 1b	Dorm, hostel or etc.	<ul><li>≤ 300 m2, or</li><li>Resided by ≤ 12 people.</li></ul>	Recommende d
Klas 2	Residential building of at least two houses which are independent from each other.	-	Recommende d
Klas 3	Residential building outside of Klas 1 and 2, generally used as long-term or temporary residence of several individuals who are not blood relatives.  (Kontrakan or kos-kosan)	-	Recommende d
Klas 4	Residential building inside one building of Klas 5,6,7,8, or 9, and is used as residence.	<ul> <li>Lower than 3 stories, or</li> <li>Higher than 4 stories and area less than 50,000 m2</li> </ul>	Recommende d
		• At least 4 stories and area of at least 50,000 m2	Mandatory 7

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## Klas (Permen PUPR 21/2021)



Klas	Definition	Conditions	Mandatory/R ecommended
Klas 5	Buildings for professional/formal	<ul><li>Lower than 3 stories, or</li><li>Higher than 4 stories and area less than 50,000 m2</li></ul>	Recommended
	economy sector, administration purposes, and commercial purposes, outside of klas 6,7,8,9.	At least 4 stories and area of at least 50,000 m2	Mandatory
Klas 6	Shop, retail, or service building	<ul><li>Lower than 3 stories, or</li><li>Higher than 4 stories and area less than 5,000 m2</li></ul>	Recommended
		• Higher than 4 stories and area of at least 5,000 m2	Mandatory
Klas 7	Buildings for storage	<ul><li>Lower than 3 stories, or</li><li>Higher than 4 stories and area less than 5,000 m2</li></ul>	Recommended
		• Higher than 4 stories and area of at least 5,000 m2	Mandatory
Klas 8	Laboratory or production center/factory/assembly	<ul><li>Lower than 3 stories, or</li><li>Higher than 4 stories and area less than 5,000 m2</li></ul>	Recommended
	center, etc.	• Higher than 4 stories and area of at least 5,000 m2	Mandatory

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## Klas (Permen PUPR 21/2021)

#### NIPPON KOEI

Klas	Definition	Conditions	Mandatory/R ecommended
Klas 9a	Buildings for health	≤ 20,000 m2	Recommended
	service	> 20,000 m2	Mandatory
Klas 9b	Buildings for meeting,	≤ 10,000 m2	Recommended
	excluding other class	> 10,000 m2	Mandatory
Klas 10	Annex building or additional facility (non-residential purposes)	-	Recommended
Sub-Klas 10a	Structure of separated facility or infrastructure.	-	Recommended
Sub-Klas 10b	Non-residential building in the form of separated facility or infrastructure.	-	Recommended

## Shopping mall and hotel category

Klas	Definition	Conditions	Mandatory/ Recommended
Klas 5	Buildings for professional/formal	<ul> <li>Lower than 3 stories, or</li> <li>Higher than 4 stories and area less than 50,000 m2</li> </ul>	Recommended
	economy sector, administration purposes, and commercial purposes, outside of klas 6,7,8,9.	<ul> <li>New and existing</li> <li>At least 4 stories and area of at least 50,000 m2</li> </ul>	Mandatory
Klas 6	Shop, retail, or service building	<ul> <li>Lower than 3 stories, or</li> <li>Higher than 4 stories and area less than 5,000 m2</li> </ul>	Recommended
		<ul><li>New and existing</li><li>Higher than 4 stories and area of at least 5,000 m2</li></ul>	Mandatory

- Shopping mall may be classified under Klas 5 or 6. Depending on the structure (story and planned area), it may be categorized as recommended/mandatory.
- Hotels are most likely categorized as Klas 5 (under professional economy/commercial building), depending on the structure, it may be categorized as recommended/mandatory.

## **Jakarta Green Building Regulatory Instrument**

NIPPON KOEI

- In 2023, Pergub DKI 60/2022 on BGH was revoked by release of Pergub DKI 44/2023 to provide a more streamline framework about Green Building.
  - Pergub 60/2022 was based on Permen PUPR 2/2015. In 2021, Permen PUPR 21/2021 on Green Building Assessment was released.
  - ➤ Earlier in the same year, PP 16/2021 about Rules about Implementation of Laws 28/2002 about Building was released.
- Currently, BGH implementation is regulated in Pergub DKI 38/2012.
- The principles: conservation of natural resources.
- BGH is applicable to new and existing buildings, based on category (function and purpose) and area.
  - Function: residential, purpose: apartment complex, area: >50,000 m2.
  - Function: commercial, purpose: office, area: >50,000 m2.
  - ➤ Function commercial, purpose: retail, area: > 50.000 m2.
  - Function: multiple, area: > 50,000 m2.

- Function: commercial, purpose: hotel, area: >20,000 m2.
- Function: social and cultural, purpose: medical services, area: >20,000 m2.
- Function: social and cultural, purpose: education, area: 10,000 m2.

Technical requirements for new building is based on 5 principles:

- > Energy efficiency.
- > Water efficiency.
- Indoor air quality.
- > Land and waste management.
- Construction.
- Whereas existing building is based on 4:
  - Energy conservation and efficiency.
  - Water conservation and efficiency.
  - Indoor air quality and thermal comfort.
  - Operation and management.

## Perwalkota Bandung 1023/2016



- The object of BGH is classified on function, new/additional, and area. Functions that are subject to BGH include residential, commercial, socio-cultural, religion, and mixed-use.
  - A) New building or additional building part, with a cover of at least 5,000 m<sup>2</sup> (including basement).
  - B) New building, with a cover of less than 5,000 m<sup>2</sup> (including basement).
- Requirements are administrative and technical, which are further classified as mandatory or voluntary.
- Buildings that meet mandatory technical requirements are given one star, whereas those that meet mandatory and voluntary requirements are given two or three stars.
- Mandatory requirements for BGH category A) include energy efficiency, water efficiency, SPB/BMS, indoor air quality management, and land management, whereas voluntary requirements include construction of green space, better quality of building covers, indoor air quality, and waste management.
- Mandatory requirements for BGH category B) include energy efficiency, water efficiency, indoor air quality management, and land management, whereas voluntary requirements include RTH, KDH, better quality of building covers, and better management of water efficiency.

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## Perwalkota Semarang 24/2019

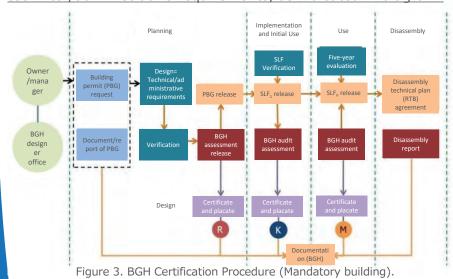
NIPPON KOEI

- The object of green building is classified based on function and classification, and area.
  - Function: residential, form: landed house, area: at least 300 m<sup>2</sup>.
  - Function: residential, form: apartment/multi stories.
  - > Function: commercial, purpose: office.
  - > Function: commercial, purpose: retail.
  - Function: commercial, hotel.
  - Function: social and cultural, purpose: education.
  - Function: social and cultural, purpose: medical.
  - ➢ Big building covers at least 5,000 m².
  - ➤ Medium building covers 2,500 5,000 m².
  - ➤ Small building covers maximum 2,500 m² and landed house covers at least 300 m².
- Big buildings are assessed based on energy efficiency, water efficiency, and indoor air quality.
- Medium buildings are assessed based on energy efficiency and water efficiency.
- Small buildings are assessed based on energy efficiency and water efficiency.
- Reporting includes annual electricity consumption, annual water consumption, and planning to achieve higher efficiency; for every 12 months to the relevant office for verification.
- Violation of this may result in administrative sanction, for example written warning.
- Incentives are given to buildings who meet technical criterion, based on energy and water conservation performance.

## **BGH Procedure (Permen PUPR 21/2021)**



<u>Mandatory BGH (new building) should satisfy</u> technical/administrative requirements, as indicated in diagram.



#### Programming and Technical Planning Phase

- Final report of programming.
- Documentation.
- Technical recommendation & criteria.
- Plan for next phases.
- Final report of technical planning.
- Architectural plan.
- Building structure, inc. mechanical-electrical arrangement, interior and outside.
- Technical spec.
- Budgeting plan (RAB).
- Calculation & plan of emission/carbon reduction, water and energy efficiency, management of solid waste and wastewater.
- Calculation of resources.
- Estimation of BGH life cycle.
- Proponent should also prepare PBG form, then submit to Permission Agency (DPTSP).s

#### Construction phase.

- Final report.
- As-built drawing.
- Green cycle supply and implementation.
- Documents of permission,

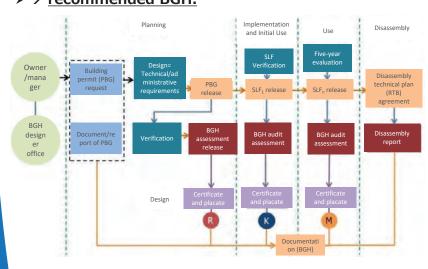
#### Documentations

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## Procedure for Recommended BGH (Permen PUPR 21/2021)

NIPPON KOEI

- If the local gov. building/hotel have specifications listed below:
  - ➤If the building has <4 levels, or
  - Fig the building has ≥4 stories, but <50,000 m<sup>2</sup>
  - >→ recommended BGH.



横浜市とマカッサル市による都市間連携ワークショップ
 7.5 アイフォーコム(株) 発表資料

# **Energy Management System by iFORCOM**



## **Company Profile**

Company Name iFORCOM Co.,Ltd.

Established December 1993

Address Yokohama-shi, Kanagawa, Japan

Capital 100 million yen

Employees 280 people (Foreign employees = 9 people)

CEO | Kagawa Hiroshi

Base Sapporo, Sendai, Morioka, Yokohama,

Sagamihara, Tokyo, Chiba, Nagoya,

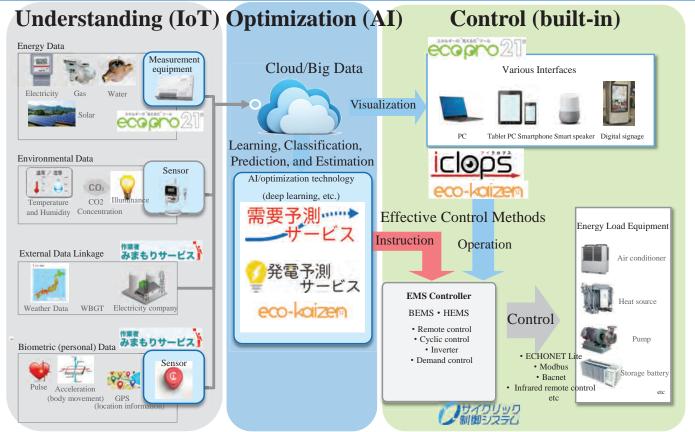
Osaka, Hiroshima, Fukuoka,

Jakarta





## Digitalization of the Entire City (Energy DX Platform)





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## **Product & Service**



Decarbonization and cost reduction with ZEB. ZEB solution service.



Immediate results for all measurement needs.



Reduce power consumption of air conditioners and refrigerators by energysaving control.



Highly accurate predictions with advanced AI technology and extensive experience



Prediction of power generation based on predicted solar radiation and actual power generation.

## Worker Monitoring Service

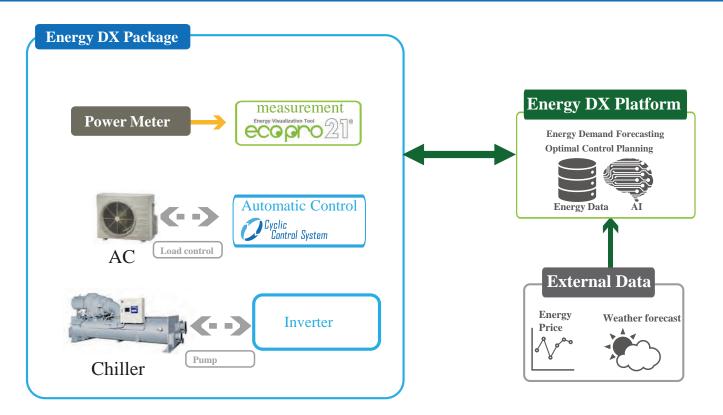
Quickly identify heat stroke, falls, and other problems.

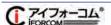


For improving work safety. Correct support for daily work.



## **Energy Saving Solution**



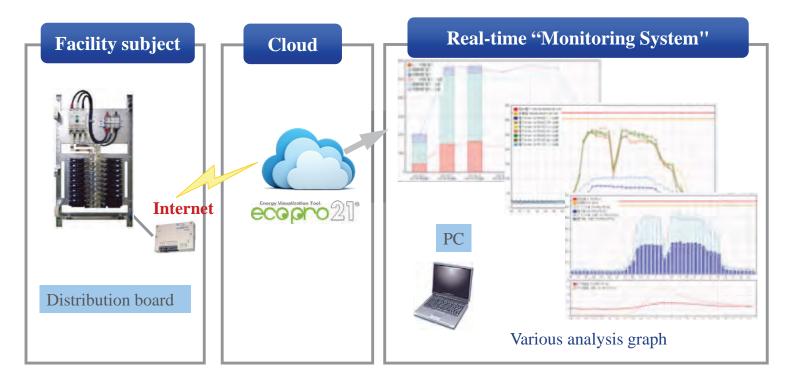


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4



## **Realtime Monitoring**





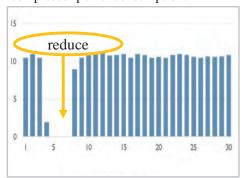
## Automatic Control (Split Air Conditioning)

Monitor the compressor of the outdoor unit and stop the compressor once every 30 minutes at a safe timing.

Since the indoor unit does not stop, no one notices the change in the indoor environment.

#### **Reduction mechanism**

Simplified compressor control reduces compressor power consumption.





The outdoor unit with cyclic control



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#### 6

## **②** Controllable Device (Packaged AC)







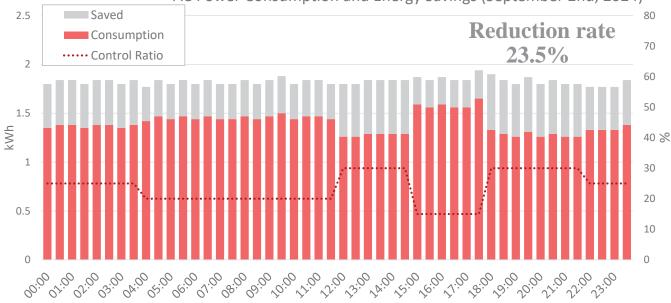






## Track Record as a Result





Location:

Pinetree Marina Resort 710, Johor Bahru



AC for main bedroom Capacity 1kW





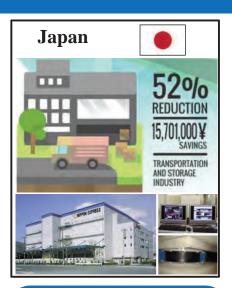
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DateTime

## 3 Track Record



2500+ installed



Japan Indonesia Malaysia Philippines Thailand Vietnam



Hotel
Factory
Office Building
Mall
School



## **4** Materials for Free Diagnosis

## 1. Equipment List

- The number of machines
- The number of actual operation
- Specification(kW)
- Total operating time (0-24)
- Location



**Equipment List** 

## 2. Electricity bill

- 12months

## nσ



Drawing

## 3. Location of outdoor unit of air conditioning

- Drawing



- 1. 横浜市とマカッサル市による都市間連携ワークショップ
  - 1.6. 南スラウェシ州地方開発企画・研究・評価庁 発表資料



# ARAH KEBIJAKAN JANGKA PANJANG PELAKSANAAN PROGRAM DEKARBONISASI DI SULAWESI SELATAN

Dr. SETIAWAN ASWAD, M.Dev.,Plg. KEPALA BAPPELITBANGDA PROV. SULSEL



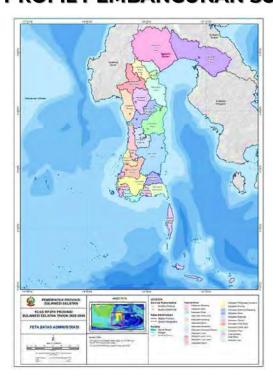
WORKSHOP FOR "CITY-TO-CITY COLLABORATION PROGRAM BETWEEN MAKASSAR CITY AND CITY OF YOKOHAMA"

Makassar, 15 Januari 2025





#### PROFIL PEMBANGUNAN SULAWESI SELATAN

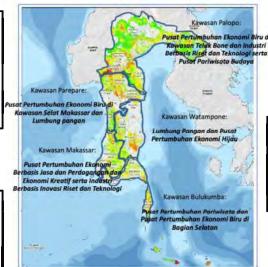


- ❖ Sulawesi Selatan terdiri dari 21 kabupaten dan B kota dengan luas wilayah sebesar 4.533.100 Ha;
- ❖ Memiliki garis pantai sepanjang 2.702,81 Km;
- ♦ Kondisi wilayah 59,37% dataran rendah; dataran tinggi 16,71%; dan pegunungan sebesar 23,92%;
- ❖ Jumlah penduduk: ₱.463.390 Jiwa
- ❖ Pertumbuhan ekonomi Prov. Sulsel sebesar 4,98%;
- ❖ Neraca Perdagangan sebesar 77,76 Juta US\$;
- ❖ Nilai Ekspor sebesar 194,86 Juta US\$; ¹
- ❖ PDRB ADHK sebesar 377.162,17 Miliar Rupiah;
- ❖ PDRB ADHB sebesar 652.574,05 Miliar Rupiah;

#### PROFIL KAWASAN PEMBANGUNAN SULAWESI SELATAN

#### Tematik Transformasi Ekonomi Berdasarkan Kawasan Pembangunan

- Kawasan Parepare meliputi: Kota Parepare dan Kabupaten Barru, Pinrang, Enrekang dan Sidenreng Rappang;
- Jumlah penduduk 11.543.620 Jiwa
- Kontribusi PDRB Kaw terhadap PDRB Prov. Sulsel sebesal 10,95%
- Kawasan Makassar meliputi: Kota Makasser dan Kabupaten Takalar, Gowa, Mares, dan Pangkajene Kepulauan; /
  - Jumlah penduduk: 11.066.830 Jiwa
- Kontribusi PDRB Kaw terhadap PDRB Prov. Sulsel sebesar 50,01%



Sumber: Rencana Tata Ruang Wilayah Provinsi Sulawesi Selatan, diolah Tahun 2023

- Kawasari Palopo meliputi: Kota Palopo dan Kabupaten Luwu, Luwu Utara, Luwu Timur, Tana Toraja dan Toraja Utara:
- Jumlah penduduk 11.800,550 Jiwa
- Kontribusi PDRB Kaw terhadan PDRB Prov. Bulsel sebesar 15,65%
- Kawasan Watampone melipulti: Kabupaten Bone, Soppend, dan Wajd;
- Jumlah penduduk: II 458.530 Jiwa
- Kontribusi PDRB Kaw terhadap PDRB Prov. Sulsel sebesar 1821%
  - Kawasan Bulukumba meliputi: Kabupaten Bulukumba, Sinjai, Jeneponto, Pantaeng; Kepulauah Selayar,
  - Jumlah penduduk 1.492.240 Jiwa
  - Kontribusi PDRB Kaw terhadap PDRB Prdv. Sulsel sebesar 10,17%

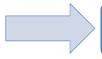
#### SASARAN PEMBANGUNAN JANGKA PANJANG SULAWESI SELATAN (RPJPD PROV. SULSEL 2025-2045)







17 ARAH PEMBANGUNAN; 8 MISI; 45 INDIKATOR UTAMA PEMBANGUNAN



SULAWESI SELATAN MANDIRI, MAJU DAN BERKELANJUTAN

#### Terwujudnya VISI SULSEL 2045, dicerminkan dalam 5 (lima) Sasaran Utama:



## 8 MISI PEMBANGUNAN; 10 SASARAN POKOK; 17 ARAH PEMBANGUNAN

(RPJPD PROV. SULSEL 2025-2045)

MISI	SASARAN POKOK	ARAH PEMBANGUNAN	MISI	SASARAN POKOK	ARAH PEMBANGUNAN
1. Mewujudkan Transformasi Sosial	Terwujudnya     Sumberdaya Manusia     Sulawesi Selatan yang	SSo1. Kesehatan Untuk Semua SSo2. Pendidikan Berkualitas	4. Memantapkan keamanan daerah tangguh, demokrasi substansial, dan	7. Terwujudnya Sulawesi Selatan sebagai daerah aman, demokratis dan stabil	SS10. Ketaatan Hukum, Ketertiban dan Keamanan Tangguh, dan Demokrasi Substansial
JUSIAI	Sehat, Cerdas, Dan	yang Merata	yang Merata stabilitas ekonomi makro daerah SSo3. Perlindungan Sosial yang Adaptif 5. Memelihara ketahanan		SS11. Stabilitas Ekonomi Makro
	Sejahtera			9. Terwujudnya Sulawesi Selatan sebagai daerah	SS13. Beragama Maslahat dan Berkebudayaan Maju
2. Mewujudkan Transformasi Ekonomi	Terwujudnya Sulawesi Selatan sebagai lokomotif pertumbuhan ekonomi berbasis	SSo4. Iptek, Inovasi, dan Produktivitas Ekonomi	sosai saaaya aan exologi	dengan ketahanan sosial budaya dan ekologi yang tinggi	SS14. Keluarga Berkualitas, Kesetaraan Gender, dan Masyarakat Inklusif
	Iptekin  3.Terwujudnya Sulawesi Selatan sebagai lumbung pangan pendukung IKN berbasis ekonomi hijau dan transformasi digital	SS05. Penerapan Ekonomi Hijau			SS15. Berketahanan Energi, Air, dan Kemandirian Pangan
		sebagai	6. Mewujudkan pembangunan kewilayahan yang merata dan berkeadilan 7. Mewujudkan pemenuhan kebutuhan sarana prasarana yang	5. Terwujudnya Sulawesi Selatan sebagai penggerak agropolitan	SSo8. Perkotaan dan Perdesaan
		SSo6. Transformasi Digital			sebagai Pusat Pertumbuhan Ekonomi
	4. Terwujudnya Sulawesi Selatan sebagai Hub	SSo7. Integrasi Ekonomi Domestik dan Global		10.Terwujudnya Sulawesi Selatan dengan kapasitas adaptasi dan mitigasi yang	SS16. Lingkungan Hidup Berkualitas
	Perdagangan Kawasan Timur Indonesia dan Internasional	berkualitas dan ramah lingkungan	tinggi terhadap bencana dan perubahan iklim, didukung ketersediaan sarana dan	SS17. Resiliensi terhadap Bencana dan Perubahan Iklim	
3.	6. Terwujudnya	SSo9. Regulasi dan Tata kelola		prasarana yang berkualitas	
Mewujudkan Transformasi Tata Kelola	Pemerintahan Sulawesi Selatan yang berintegritas dan adaptif	yang Berintegritas dan Adaptif	Mendorong daya saing daerah untuk kesinambungan pembangunan	Terwujudnya Sulawesi Selatan sebagai daerah dengan daya saing yang optimal	SS12. Ketangguhan Diplomasi dan Pertahanan Berdaya Gentar Kawasan

## ARAH KEBIJAKAN PEMBANGUNAN TERKAIT DEKARBONISASI (RPJPD PROV. SULSEL 2025-2045)

SASARAN POKOK	ARAH PEMBANGUNAN	TARGET DAERAH 2045	ARAH KEBIJAKAN TRANSFORMASI
10.Terwujudnya Sulawesi Selatan dengan kapasitas adaptasi dan mitigasi yang tinggi terhadap bencana dan perubahan iklim, didukung ketersediaan sarana dan prasarana yang berkualitas	5. Penerapan Ekonomi Hijau	18.a.Indeks Ekonomi Hijau sebesar 77,03	<ol> <li>Peningkatan kapasitas sumberdaya pelaku sektor ekonomi dalam praktik budidaya yang rendah karbon, cerdas iklim, dan produktif serta inklusif;</li> <li>pengembangan dekarbonisasi pembangkit fosil melalui cofiring dan peralihan menjadi pembangkit terbarukan</li> <li>Pemenuhan pasokan listrik rendah karbon terintegrasi dengan industri melalui pemanfaatan sumber energi tersedia</li> </ol>

## ARAH KEBIJAKAN PEMBANGUNAN TERKAIT DEKARBONISASI (RPJPD PROV. SULSEL 2025-2045)

SASARAN POKOK	ARAH PEMBANGUNAN	TARGET DAERAH 2045	ARAH KEBIJAKAN TRANSFORMASI
3. Terwujudnya Sulawesi Selatan sebagai lumbung pangan pendukung IKN berbasis ekonomi hijau dan transformasi digital	16. Lingkungan Hidup Berkualitas	43.a. Indeks Kualitas Lingkungan Hidup sebesar 84,75;  45.a. Persentase penurunan emisi GRK Kumulatif  45.b. Persentase penurunan emisi GRK Tahunan	<ul> <li>pemanfaatan energi baru terbarukan, termasuk pengupayaan dekarbonisasi sumber energi</li> <li>2. Pengembangan transportasi publik dan transportasi berkelanjutan serta elektrifikasi transportasi.</li> <li>3. Dukungan insentif fiskal, pendanaan hijau (green financing) dan pembiayaan alternatif lainnya</li> </ul>

## **AKSI MITIGASI PENURUNAN EMISI GRK**

SEKTOR	JENIS AKSI MITIGASI
HUTAN DAN LAHAN	1) Pengembangan Agroforestry; 2) Rehabilitasi Hutan dan Lahan; 3) Rehabilitasi Mangrove; 4) Pehutanan Sosial; dan 5) Perlindungan Hutan
PERSAMPAHAN DAN LIMBAH	1) Pembangunan Fasilitas Pengelolaan Sampah; 2) Penerapan 3R; 3) Penangkap Gas Metan; 4) Pengurangan open burning; 5) Pembangunan fasilitas pengelolaan sampah
ENERGI	1. Pembangunan PLTMH; 2) Pembangunan Instalasi biogas rumah; 3) Pembangunan PLTS terpusat; 4) Pengadaan lampu jalan tenaga surya; 5) Pengadaan lampu tenaga surya hemat energi (LTSHE)
TRANSPORTASI	1) Pembangunan ITS/ATCS; 2) Car free day; 3) Peremajaan angkutan umum; 4) Reformasi sistem transit (BRT) dan angkutan umum massal; 5) Pelatihan dan sosialisasi <i>Smart Driving</i>
PERTANIAN DAN PETERNAKAN	1) Penggunaan pupuk organic; 2) Penggunaan varietas benih rendah emisi; 3) Penerapan SRI ( <i>System of Rice Intensification</i> ); 4) Pembangunan digester biogas; 5) Penambahan pakan konsentrat; 6) Pengembangan hijauan makanan ternak (HMT)
LAUT DAN PESISIR	Penanaman/rehabilitasi mangrove

## CAPAIAN PEMBANGUNAN RENDAH KARBON SULAWESI SELATAN TAHUN 2024

(APLIKASI AKSARA)

Tematik Transformasi Ekonomi Berdasarkan Kawasan Pembangunan

- TOTALL 2873 KEGIATAN AKSI PRK PERUBAHAN YANG TELAH DILAKSANAKAN
- 3,254 JUTA TON COZEQTOTAL POTENSI PENURUNAN EMISI KUMULATIF
- Kawasan Palopo:

  Pusat Pertumbuhan Ekonomi Biru di
  Xowasan Teluk Bone dan Industri
  Berbasis Rusel dan Teknologi serta
  Pusat Pertumbuhan Ekonomi Birudi
  Kawasan Selat Makassar dan
  Lumbung pangan
  Lumbung pangan
  Lumbung Pangan dan Pusat
  Pertumbuhan Ekonomi Berbasis Jasa dan Perdagangan dan
  Ekonomi Kreatif serta Industri
  Berbasis Inovasi Riset dan Teknologi

  Kawasan Bulukumba:
  Pusat Pertumbuhan Pariwisata dan
  Pasat Pertumbuhan Ekonomi Biru di
  Bagian Selatan
  - Sumber: Rencana Tata Ruang Wilayah Provinsi Sulawesi Selatan, diolah Tahun 2023

- ♦ 4,24 TON CO2EQ/MILYAR RUPIAH
- KONTRIBUSI, PENURUNAN EMISI BERDASRKAN SEKTOR TAHUN 2023
- ❖ PERTANIAN 64,34%
- ♦ PESISIR LAUT 1,05%
- ♦ PERSAMPAHAN 10,93%
- A HUTAN DAN LAHAN 20,213%
- TRANSPORTASI 0,57%
- ENERGI 2,88%

#### ISU STRATEGIS PENERAPAN PROGRAM DEKARBONISASI



#### ISU STRATEGIS PENERAPAN PROGRAM DEKARBONISASI

- Kebijakan dan Regulasi → RPJPD Provinsi Sulawesi Selatan mengarahkan kebijakan dekarbonisasi melalui penerapan ekonomi hijau;
- 2. Infrastruktur → Masih terbatasnya penerapan pembangunan infrastruktur hijau di Sulawesi Selatan;
- 3. Kesadaran Publik → Belum meluasnya pemahaman dan implementasi kebijakan terkait pentingnya dekarbonisasi di lingkup pemerintah daerah Prov. Sulsel.

### PERMASALAHAN PENERAPAN PROGRAM DEKARBONISASI



#### **PERMASALAHAN**

- 1. Masih besarnya ketergantungan pada energi fosil, diantaranya penggunaan bahan bakar kendaraan dan pembangkit tenaga listrik;
- 2. Terbatasnya pemahaman pemerintah daerah dan masyarakat terkait kebijakan dekarbonisasi
- 3. Keterbatasan teknologi terkait dekarbonisasi untuk diadopsi secara luas;
- 4. Masih terbatasnya perangkat dan informasi pemerintah daerah dalam melakukan evaluasi terhadap pelaksanaan program pengurangan emisi GRK.

# POTENSI KERJASAMA DENGAN PEMERINTAH JEPANG PELAKSANAAN DALAM PROGRAM DEKARBONISASI DI SULAWESI SELATAN

### PEMBANGUNAN PEMBANGKIT ENERGI BARU TERBARUKAN

- ❖ PEMBANGKIT LISTRIK TENAGA AIR → TANA TORAJA, PINRANG, GOWA, SINJAI, ENREKANG, LUWU, LUWU UTARA DAN LUWU TIMUR;
- ❖ PEMBANGKIT LISTRIK TENAGA BAYU → SIDENRENG RAPPANG, JENEPONTO, KEPULAUAN SELAYAR, BANTAENG DAN TAKALAR;
- **♦ PEMBANGKIT LISTRIK TENAGA PANAS BUMI →**TANA TORAJA, SIDENRENG RAPPANG DAN LUWU UTARA.





# POTENSI KERJASAMA DENGAN PEMERINTAH JEPANG PELAKSANAAN DALAM PROGRAM DEKARBONISASI DI SULAWESI SELATAN ...(2)

PERTANIAN BERKELANJUTAN (MENDORONG PERTANIAN RAMAH IKLIM) → KAWASAN SENTRA PERTANIAN PANGAN UNGGULAN:

- ♦ KABUPATEN BONE → Produksi beras 486.323 Ton;
- ★ KABUPATEN WAJO → Produksi beras 366.576
   Ton;
- **★** KABUPATEN PINRANG → Produksi beras 260.585 Ton:
- ♦ KABUPATEN LUWU → Produksi beras 167.602 Ton;
- ★ KABUPATEN SIDENRENG RAPPANG → Produksi beras 277.661 Ton

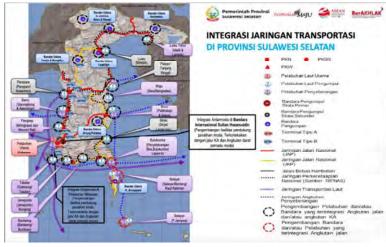




# POTENSI KERJASAMA DENGAN PEMERINTAH JEPANG PELAKSANAAN DALAM PROGRAM DEKARBONISASI DI SULAWESI SELATAN ... (3)

2. TRANSPORTASI HIJAU →
PENGEMBANGAN TRANSPORTASI
MASSAL KAWASAN PERKOTAAN
DAN INTEGRASI ANTAR MODA DI
KAWASAN MAMMINASATA
(TRANSIT ORIENTED
DEVELOPMENT)







# 2. 交通シミュレーションのための交通データ

## 2.1 交通シミュレーション設定条件

シミュレーションを実施するにあたり、使用した各種データは以下のとおり。

i) 道路形状

車線数や一方通行等の道路形状は、事前の現地調査結果を反映している。

### ii) 信号機のパラメータ

信号の現示や秒数等は、事前の現地調査結果を反映している。

### iii) 交通データ

各流入路の流入交通量と分岐率は、事前の現地調査結果を反映している。車種は、図 2.1 の 8 種類を以下の 3 種類にまとめて実施した。

- ① 2輪車として処理
  - 1. Motor Bike
  - 2. Bentor
  - 3. Bajai
- ② 普通車として処理
  - 4. Pete Pete
  - 5. Passenger Car
  - 7. Mini Truck
- ③大型車として処理
  - 6. Bus
  - 8. Truck

#### iv) 計測時間(シミュレーション時間帯)

朝ピーク時間帯(平日7:30~8:30)とした。

#### v) 旅行時間計測区間

旅行時間計測区間は、待ち行列長が信号制御の影響を受けるため、対象交差点の手前から交差 点進入までとした。したがって、計測結果には信号待ち時間も含まれる。また、旅行時間計測の 結果から、平均速度の改善効果も算出した。

#### vi) 待ち行列長計測流入路

待ち行列長計測流入路は、全流入路とした。



図 2.1 主な車種一覧

# 2.2 交差点形状及び信号機パラメータ調査結果

各交差点の事前の現地調査結果について、図 2.2 以降に示す。

(1) 交差点 No. 1 の事前調査結果

交差点 No. 1 の道路形状と信号機のパラメータ調査結果を図 2. 2 に示す。

署名	サブエリ	ア番号	交	差点	番	号	交差	生点	名								メーフ	カー	形式	t		設置	<b>雪年</b>	1	_
ハサッサル	ú			1				J	I. K	akat	tua	- JI	. Ris	sadji	u	1									
<b>季月日</b>		2事			交差	<b></b>	図	Ф1							Φ2	1						- Φ3	至No.	2	
1 2 3 4 5 6 6 77 8	器番号/階	3	1	2	3	4 WW.	5	6	7	8	9	10	11	12	13		15	16	17 1	18 1	19 2	20 21	222	23	2
0 1 2 3 3 4 5 6	ステップ監社 AB信号 同期点	見	0	•	0																				
保 AB AA	ギャップ 安秒数 車動条件 Y 2点	55     流れ図	22	3	27	3																			

図 2.2 交差点 No.1 の道路形状と信号機のパラメータ

#### (2) 交差点 No. 2 の事前調査結果

交差点 No. 2 の道路形状と信号機のパラメータ調査結果を図 2.3 に示す。

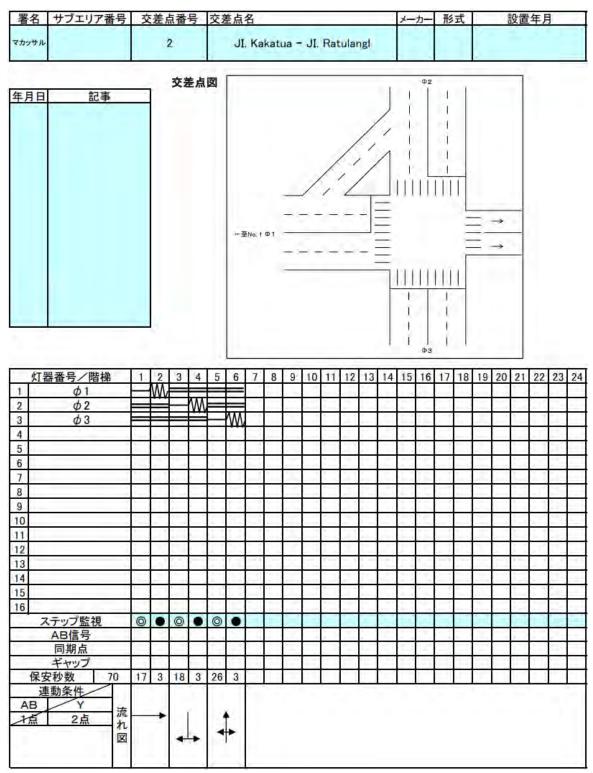


図 2.3 交差点 No.2 の道路形状と信号機のパラメータ

# 2.3 交通量調査結果

### (1) 交差点 No.1 の事前調査結果

交差点 No. 1 の事前交通データ調査結果を図 2.4 と表 2.1 に示す。

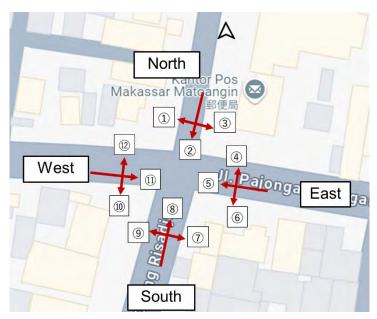


図 2.4 交差点 No.1 の事前交通データ

表 2.1	お羊占 No	1の事前交通データ
18 4. I	'X' /= !!! N().	

	集計対象	2輪車	普通車	大型車
①From North To West	南進	96	34	1
②From North To South	南進	683	259	4
③From North To East	南進	212	107	3
4 From East To North	西進	543	146	0
⑤From East To West	西進	460	119	0
<b>6</b> From East To South	西進	410	99	3
Trom South To East	北進	655	145	4
8 From South To North	北進	2857	732	2
	北進	160	25	0
®From West To South	東進	74	11	0
①From West To East	東進	656	160	4
<sup>12</sup> From West To North	東進	119	29	1

### (2) 交差点 No. 2 の事前調査結果

また、交差点 No. 2 の事前交通データ調査結果を図 2.5 と表 2.2 に示す。

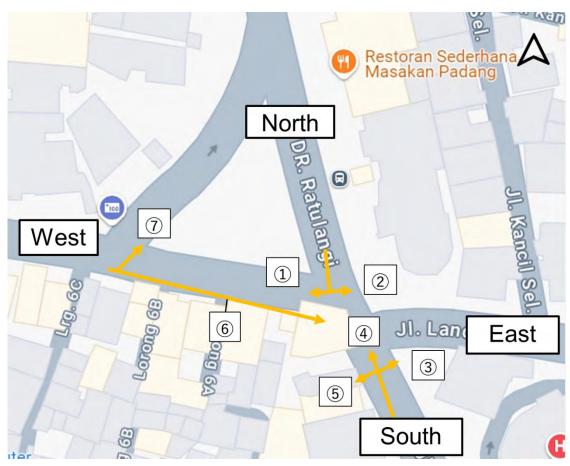


図 2.5 交差点 No.2 の事前交通データ

表 2.2 交差点 No.2 の事前交通データ

	集計対象	2輪車	普通車	大型車
①From North To West	南進	492	145	0
②From North To East	南進	554	264	2
③From South to East	北進	567	114	0
4From South to North	北進	1691	436	1
⑤From South to West	北進	1299	306	4
⑥From West to East	東進	1027	251	6
7From West to North	東進	759	211	3

# 2.4 交通シミュレーション結果(旅行時間)

### 2.4.1 交差点 No.1 の調査

旅行時間計測区間を図2.6に示す。

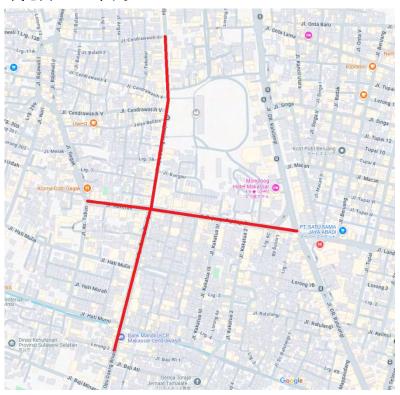


図 2.6 旅行時間計測区間(赤線部)

シミュレーションで交差点 No. 1 の自律分散導入前後の旅行時間の計測を行った。図 2.6 の赤線部が計測区間である。

表 2.3 旅行時間計測結果

	東進	西進	南進	北進
朝ピーク導入前(秒)	45	86	79	89
朝ピーク導入後(秒)	43	76	78	87

自律分散導入前後の旅行時間比較結果を図 2.7 に、旅行時間改善効果を表 2.4 に、平均速度改善効果を表 2.5 に示す。

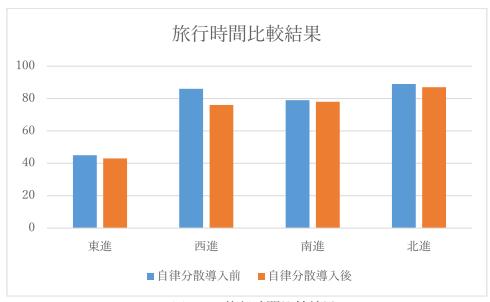


図 2.7 旅行時間比較結果

表 2.4 旅行時間改善効果

	東進	西進	南進	北進
朝ピーク導入前 A (秒)	45	86	79	89
朝ピーク導入後 B (秒)	43	76	78	87
朝ピーク短縮秒数 C=A-B (秒)	2	10	1	2
朝ピーク改善率 C/A×100 (%)	4.4	11. 6	1. 3	2. 2

表 2.5 平均速度改善効果

	東進	西進	南進	北進
朝ピーク旅行時間計測区間 D (m)	257	501	574	519
朝ピーク導入前 D/A×3.6 (km/h)	20.6	21. 0	26. 2	21.0
朝ピーク導入後 D/B×3.6 (km/h)	21. 5	23. 7	26. 5	21.5

### 2.4.2 交差点 No.2 の調査

旅行時間計測区間を図2.8に示す。



図 2.8 旅行時間計測区間(赤線部)

シミュレーションで交差点 No. 2 の自律分散導入前後の旅行時間の計測を行った。図 2.8 の赤線部が計測区間である。

表 2.6 旅行時間計測結果

	東進	西進	南進	北進
朝ピーク導入前(秒)	90	-	80	109
朝ピーク導入後(秒)	86	-	78	104

自律分散導入前後の旅行時間比較結果を図 2.9 に、旅行時間改善効果を表 2.7 に、平均速度改善効果を表 2.8 に示す。

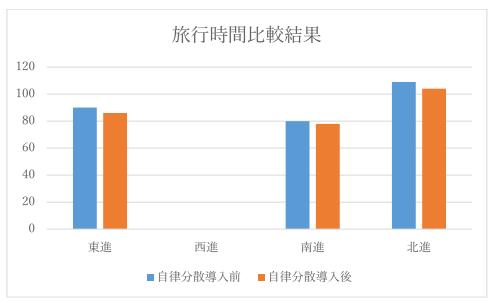


図 2.9 旅行時間比較結果

表 2.7 旅行時間改善効果

	東進	西進	南進	北進
朝ピーク導入前 A (秒)	90	-	80	109
朝ピーク導入後 B (秒)	86	_	78	104
朝ピーク短縮秒数 C=A-B (秒)	4	_	2	5
朝ピーク改善率 C/A×100 (%)	4.4	_	2. 5	4.6

表 2.8 平均速度改善効果

	東進	西進	南進	北進
朝ピーク旅行時間計測区間 D (m)	537	-	573	606
朝ピーク導入前 D/A×3.6 (km/h)	21. 5	-	25. 8	20.0
朝ピーク導入後 D/B×3.6 (km/h)	22. 5	_	26. 4	21.0

# 2.5 交通シミュレーション結果(待ち行列長)

### 2.5.1 交差点 No.1 の調査

シミュレーションで交差点 No. 1 の自律分散導入前後の待ち行列長の計測を行った。

表 2.9 待ち行列長計測結果

	東進	西進	南進	北進	全体
朝ピーク導入前(m)	23	51	18	29	121
朝ピーク導入後(m)	19	31	16	26	92

自律分散導入前後の待ち行列長比較結果を図 2.10 に、待ち行列長改善効果を表 2.10 に示す。

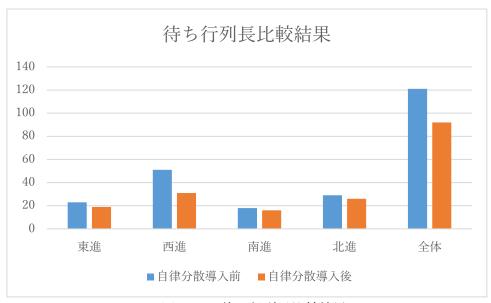


図 2.10 待ち行列長比較結果

表 2.10 待ち行列長改善効果

	東進	西進	南進	北進	全体
朝ピーク導入前 E (m)		23 51	18	29	121
朝ピーク導入後 F (m)		19 31	16	26	92
朝ピーク短縮長 G=E-F	(m)	4 20	2	3	29
朝ピーク改善率 G/E×100	(%) 17	39. 2	11. 1	10.3	24.0

### 2.5.2 交差点 No.2 の調査

シミュレーションで交差点 No. 2 の自律分散導入前後の待ち行列長の計測を行った。

 東進
 西進
 南進
 北進
 全体

 朝ピーク導入前(m)
 20
 19
 31
 20

 朝ピーク導入後(m)
 16
 13
 23
 16

表 2.11 待ち行列長計測結果

自律分散導入前後の待ち行列長比較結果を図 2.11 に、待ち行列長改善効果を表 2.12 に示す。

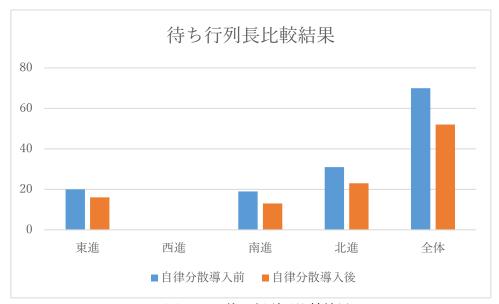


図 2.11 待ち行列長比較結果

表 2.12 待ち行列長改善効果

	東進	西進	南進	北進	全体
朝ピーク導入前 E (m)	20	_	19	31	70
朝ピーク導入後 F (m)	16	_	13	23	52
「朝ピーク短縮長 G=E-F (利	) 4	-	6	8	18
朝ピーク改善率 G/E×100 (%	20.0	_	31.6	25.8	25. 7

### 2.5.3 交差点全体の集計結果

交差点全体の自律分散導入前後の待ち行列長の集計結果を表 2.13 に示す。

表 2.13 待ち行列長集計結果

	No.1 全体	No. 2 全体	全交差点
朝ピーク導入前(m)	121	70	191
朝ピーク導入後(m)	92	52	144

自律分散導入前後の待ち行列長比較結果を図 2.12 に、待ち行列長改善効果を表 2.14 に示す。

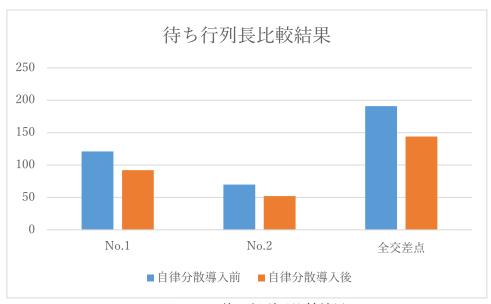


図 2.12 待ち行列長比較結果

表 2.14 待ち行列長改善効果

	No.1 全体	No. 2 全体	全交差点
朝ピーク導入前 E (m)	121	70	191
朝ピーク導入後 F (m)	92	52	144
朝ピーク短縮長 G=E-F (秒)	29	18	47
朝ピーク改善率 G/E×100 (%)	24.0	25. 7	24.6