FY2019 Project for Ministry of the Environment Japan

## FY2019 City-to-City Collaboration Programme for Low-carbon Society

Support on Tourism Future City of Bali Province through City-to-City Collaboration

# Report

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Nippon Koei Co., Ltd. Toyama City

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### FY2019

## City-to-City Collaboration Programme for Low-carbon Society Support on Tourism Future City of Bali Province through Cityto-City Collaboration

### Report

### **Table of Contents**

page
CHAPTER 1 OUTLINE OF THE PROJECT
1.1 BACKGROUND1
1.1.1 Activities for Low Carbon Society in Indonesia
1.1.2 Activities of Bali province for Low Carbon Society
1.1.3 Activities of Toyama City for Low Carbon Society
1.2 PURPOSE OF THE PROJECT
1.3 STRUCTURE OF CITY-TO-CITY COLLABORATION
1.4 SCHEDULE
1.5 OUTLINE OF THE FIELD SURVEY
CHAPTER 2 STUDY FOR JCM MODEL PROJECT FORMULATION9
2.1 CONFIRMATION OF BUILDING PERMISSION
2.2 CONSIDERATION OF INTRODUCING ENERGY SAVING TECHNOLOGY
AND RENEWABLE ENERGY IN TOURISM FACILITY9
2.3 POTENTIAL FOR JCM MODEL PROJECT
2.4 SELECTION OF TARGET HOTEL11
2.5 CONSIDERATION OF FORMULATION OF PROJECT
CHAPTER 3 SUPPORT ON JCM PROJECT FORMULATION THROUGH CITY TO CITY COLLABORATION
3.1 ACTIVITIES TOWARD LOW CARBON SOCIETY IN BALI PROVINCE
3.2 GOVENER'S REGULATION FOR CLEAN ENERGY IN BALL PROVINCE18
3.3 EXISTING ENERGY PLAN OF PLN BALL
3.4 NEW COOPERATION BETWEEN BALL PROVINCE AND SEMARAN CITY 19
CHAPTER 4 CITY TO CITY COLLABORATION ACTITIVY
4.1 OUTLINE OF CITY TO CITY COLLABORATION ACTIVITY
4.2 KICKOFF MEETING IN BALI PROVINCE
4.3 WORKSHOP IN BADUNG REGENCY
4.4 CITY TO CITY COLLABORATION SEMINAR IN JAPAN
4.5 JOINT WRAP-UP MEETING/WORKSHOP BETWEEN BALI PROVINCE AND
SEMARAN CITY
4.6 INTRODUCTION JCM TO BALI HOTELS ASSOCIATION MEETING25
CHAPTER 5 RESULTS AND ISSUES/PROPOSAL IN FY 2020

5.1	RES	ULTS OF CITY TO CITY COLLABORATION IN FY2019	27
5.2	PRO	POSAL OF JCM MODEL PROJECT IN FY2020	27
5.3	ISSU	JE AND PROPOSAL FOR CITY TO CITY COLLABORATI	ON IN FY2020
	28		
5.3	.1	Issues	
5.3	.2	Proposal for support on JCM project formulation	29
5.4	PLA	N FOR CITY-TO-CITY COLLABORATION IN FY2020	

#### **List of Attachments**

- Attachment 1 Governor's Regulation for Clean Energy in Bali (Oct.2019)
- Attachment 2 Presentation materials for Kickoff meeting in Bali (Oct.2019)
- Attachment 3 Presentation materials for Local Workshop in Bali (Nov.2019)
- Attachment 4 Presentation materials for City-to-city collaboration seminar in Japan (Jan. 2020)
- Attachment 5 Presentation materials for Joint Wrap-up meeting in Bali (Feb. 2020)
- Attachment 6 Presentation materials for Bali Hotel Association meeting (Feb. 2020)

### List of Tables

Table 1-1	Activities of Toyama city for sustainable city and City-to-city collaboration	
	between Bali and Toyama	2
Table 1-2	Main activities in the field survey	7
Table 2-1	Interview list and results	9
Table 2-2	Number of Hotels by Stars (ranking) in 2017	11
Table 2-3	Outline of target facility for JCM model project	15
Table 2-4	Confirmation items of SDIP in target hotel	16
Table 3-1	Potential of GHG emission reduction in Bali province	18
Table 3-2	Considered Measurements of Energy saving in Bali	18
Table 4-1	City-to-City collaboration activity	20
Table 4-2	Agenda of kickoff meeting in Bali province	21
Table 4-3	Participant organization list of kickoff meeting in Bali province	21
Table 4-4	Agenda of local workshop in Badung Regency	22
Table 4-5	Participant organization list of local workshop in Badung Regency	23
Table 4-6	Agenda of Joint wrap-up meeting/workshop in Bali	24
Table 4-7	Participant organization list of Joint wrap-up meeting/workshop in Bali	25
Table 5-1	Proposal of JCM model project in FY2020	27

### List of Figures

Figure 1-1	Activity items of the project and potential technologies	4
Figure 1-2	Structure of City-to-City Collaboration between Bali and Toyama	5
Figure 1-3	Schedule of the project	6
Figure 2-1	Plan drawing of PV system	13
Figure 2-2	Implementation structure of JCM model project	16
Figure 5-1	Process of JCM application public tender	29
Figure 5-2	Three-year plan for City-to-City collaboration in Bali province	

### **Abbreviations**

Items	Description
AHU	Air Handling Unit
BAPPEDA	Badan Perencanaan Pembangunan Daerah
BAU	Business as usual
BHA	Bali Hotel Association:
CNG	Compressed Natural Gas
COP	Conference of Parties
DDF	Diesel Dual Fuel
DLH	Dinas Lingkungan Hidup
DPMPTSP	Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kabupaten Badung (Office of Investment and Integrated Services One Door)
EIA	Environmental impact assessment
EPC	Engineering, Procurement and Construction
ESDM	Ministry of Energy and Mineral Resource
GHG	Greenhouse Gases
IPP	Independent Power Producer
KEN	Kebijakan Energi Nasional
METI	Ministry of Economy, Trade and Industry
NDC	Nationally Determined Contribution
JICA	Japan International Cooperation Agency
JCM	Joint Crediting Mechanism
MRV	Measurement, Reporting and Verification
DIN	State Electricity Company
PLN	(Perusahaan Listrik Negara)
PPA	Power Purchase Agreement
PV	Photovoltaics
RAD-GRK	Regional Action Plan for Greenhouse Gas Emission Reduction
RAN-GRK	National Action Plan for Greenhouse Gas Emission Reduction
RUEN	Grand National Energy Plan 2015-2050
SE4ALL	Sustainable Energy for All
SDGs	Sustainable Development Goals
SDIP	Sustainable Development Implementation Plan
RC100	100 Resilient Cities

### **CHAPTER 1 OUTLINE OF THE PROJECT**

### 1.1 BACKGROUND

#### 1.1.1 Activities for Low Carbon Society in Indonesia

In December 2015, all countries participated in United Nations Framework Convention on Climate Change 21st Conference of the Parties (COP21) which was held in Paris, France. In the COP21, Paris Agreement was adopted as a legal framework of fair and practical countermeasure to climate change after 2020. Paris Agreement aims at keeping global warming below 2 degrees Celsius above pre-industrial level, and it requires efforts to keep it below 1.5 degrees Celsius by promoting activities for decarbonization. In addition, it was decided that activities by non-state actors (including cities) and efforts by all non-governmental entities (cities and other local governments etc.) are acknowledged and encouraged to be scaled out in COP21. Cities are the places to support social and economic growth since a lot of people live there. Although the total of urban areas is only 2% of all land in the world, approximately half of world population lives in urban areas and the percentage is predicted to increase to 70% by 2050. Also, it is estimated that more than 70% of global CO2 emissions are emitted from cities as of 2006. Hence, cities have important roles for mitigation of climate change. Thus, implementation of countermeasures to climate change and greenhouse gas (GHG) emission reduction in cities are important for achievement of the goal of Paris Agreement.

In Indonesia, the Government of Indonesia established National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK), and each regional government enacted Regional Action Plan for Reducing Greenhouse Gas Emissions (RAD-GRK) in 2013. In addition, Grand National Energy Plan 2015-2050 (RUEN) formulated in January 2017, particularly considers promoting energy saving and utilization of natural gas in Indonesia as priority countermeasures. Furthermore, Indonesian Government has promised to reduce 29% of GHG emission compared to Business As Usual (BAU) according to their NDC, and in case international assistance such as JCM is introduced, their target is 41% in NDC. Therefore, Indonesia is expecting to implement JCM, which Indonesia and Japan signed, for achievement of the target in NDC.

### 1.1.2 Activities of Bali province for Low Carbon Society

The Bali province, where is in the eastern part of Java island, consists of Bali island with surrounding small islands. The capital of Bali is Denpasar, and the population is around 4.2 million people in 2016. The population density is 745 people/km2, and total area of the province is around 5,600 km2 which is 0.29% of Indonesia. Total distance of coastline is 610 km. Bali is one of the most famous tourism cities in the world and received 5.7 million foreign/domestic visitors in 2017.

RAD-GRK (2012), governor's degree No.49, is one of the policies of climate change in Bali was developed based on national policy RAN-GRK. The GHG inventory team for RAD-GRK was formulated under the RUEN and Governor's order (529/03-X / HK / 2018) regarding structure of the member had been issued in 2018.

"Governor's regulation for Clean Energy in Bali Province (2019/No.45)" was issued in October 2019. To reduce GHG emissions throughout the province, the introduction of renewable energy technologies such as PV generation and small hydroelectric power generation, the introduction of energy-saving technologies such as high-efficient air conditioning, and the spread of fuel conversion technologies will be promoted.

It is also necessary to establish a practical regulation including incentives and penalties for private companies as well as to provide capacity building for proper operation and maintenance on the technologies.

### 1.1.3 Activities of Toyama City for Low Carbon Society

Recently, Toyama city has implemented many activities for development of sustainable society and has appealed the activities both domestically and internationally.

Year	Activity	Descriptions				
2008	ECO Model City	Toyama city was evaluated by activities regarding to advanced				
		low carbon society and CO2 emission reduction plan for				
		developing compact city.				
2011	Future City	The strategy of compact city was evaluated as a solution				
		model of the problems of local governments. The Toyama has				
		been expected to promote of its knowledge and experiences of				
		activities to other cities.				
2014	Sustainable Energy for All	Toward goal proposed by the United Nations SE4ALL,				
		Toyama city formulated own plan that can expect				
		improvement of energy efficiency in the future.				
2014	100Resilient City	Toyama city was selected as one of the 100 resilient cities by				
		Rockefeller Foundation. The definition of RC100 has				
		resilience to the risks and challenges of cities such as natural				
		disasters.				
2014	Technical cooperation	Under the cooperation between Tabanan prefecture of Bali				
	between Tabanan prefecture	province and Toyama city, four micro hydropower facilities				
	and Toyama city	were installed by private companies of Toyama in November				
		2017.				

Table 1-1Activities of Toyama city for sustainable city and City-to-city collaboration<br/>between Bali and Toyama

Year	Activity	Descriptions
2015	Applied JICA study	Applied JICA study for micro hydropower project in Tabanan
2016	G7 Environment Ministerial	To promote resilient city through city collaboration for
	Meeting in Toyama	achieving a best balance on the quality of life, economic
		growth and the environment, Toyama city mayor summarized
		the discussion about roles of city in the session.
2017	Applied JICA	Applied JICA implementation project for micro hydropower
	implementation project	project in Tabanan.
2017	Implementation agriculture	Project for promoting agriculture industry using renewable
	project using renewable	energy generation renewable energy and held a completion
	energy	ceremony for micro hydropower facilities (4 sets).
2017	Agreement of promotion of	Agreement of promotion of Environmental technology between
	Environmental technology	Bali and Toyama
2017	Agreement of collaboration	Agreement of collaboration between Udayana Uni. and Toyama
2018	FY2018 City-to-City	The project aims to share knowledges of Toyama as Future
	Collaboration Programme	city with Bali province and to introduce JCM model project
	for Low-carbon Society	using low carbon technologies (such as energy saving,
		renewable energy and fuel switch) provided by Toyama
		private companies.
2018	"SDGs Future City" &	Toyama city was selected as a municipality that integrates
	"Municipalities' SDGs	efforts on a wide range of subjects related to social and
	Model project"	environmental fields by Japanese government.
2019	FY2019 City-to-City	The project aims to support on promotion clean energy policy
	Collaboration Programme	in Bali province and to introduce JCM model project using
	for Low-carbon Society	low carbon technologies (such as energy saving, renewable
		energy and fuel switch) provided by Toyama private
		companies.

Source: Toyama city edited by Nippon Koei

In 2014, Toyama city concluded an agreement for technical cooperation with Tabanan regency, which has famous tourist spots such as rice terraces registered as World Heritage, to promote sustainable energy supply by renewable energy. Based on the agreement, there was a small hydro power generation project that has introduced technologies from Toyama city company.

Toyama city has been promoting City-to-City collaboration based on Future City Plan certified by UN. As a part of cooperation activities with foreign local governments, an agreement of promotion of environmental technology between Bali province and Toyama city was signed in November 2017.

In this context, Toyama city has start City-to-City collaboration project with Bali province from 2018 to promote environmental/energy policy more effectively toward low carbon society.



#### **1.2 PURPOSE OF THE PROJECT**

This project aims to support activities related to low-carbon society of tourism sector, core industry of Bali province for realization of "Tourism Future city" by sharing Toyama city's knowledges and experiences regarding sustainable development under City-to-City collaboration.

Also, by utilizing low/zero-carbon technologies (energy saving, renewable energy and fuel conversion) of private companies in Toyama, project formulation was carried out to develop JCM model project to contribute to GHG emission reduction. The main activities and proposed technologies are as shown below.

W	/ork Items	Description	Р	Proposed Technology		
J	Energy Saving Solar PV	Energy efficiency project and renewable energy project in the hotels of Badung regency <u>Target organizations</u> Local Gov. and transportation association etc		a) High-efficiency Chillers 600 USRT 2units(plan) b) Roof-top solar panels 0.6MW(plan)		
M	Fuel Switch	Fuel switch on public transportation in Denpasar city and Badung regency. <u>Target organizations</u> Transportation agency of local Gov. etc.	$\Box$	Introduction of CNG compatible vehicle (Fuel switch from Oil to Gas)		
Support on city-to-city collaboration		Support on formulation of JCM model project, discussion to promote CNG through the collaboration, support on cross development and holding workshop etc. Support	rt			

Figure 1-1 Activity items of the project and potential technologies

### **1.3 STRUCTURE OF CITY-TO-CITY COLLABORATION**

At the beginning of this project, main counterpart of Bali province was Badan Perencanaan Pembangunan Daerah (BAPPEDA) which is responsible for planning, approval and implementation of various development activities in Bali. In February 2020, Bali provincial government decided to transfer the responsibility to Dinas Lingkungan Hidup (DLH) which is in charge of environmental policies and plans.

On the other hand, Environmental Policy Division of Toyama city is in charge of this project to discuss related topics of City-to-City collaboration, to share information and to request support for private entities in Toyama. Additionally, Toyama city concluded another MoU with Tabanan of Bali on cooperation in transportation sector.

Private entities in Toyama propose environmental technologies to solve the social issues and develop JCM model project under City-to-City collaboration. Nippon Koei is in charge of supporting field survey, formulation of JCM model project to introduce energy-saving/renewable energy technologies under the collaboration and considering MRV plan.

Implementation structure of the project and roles of each stakeholders are shown below.



Figure 1-2 Structure of City-to-City Collaboration between Bali and Toyama

### 1.4 SCHEDULE

The schedule of	City-to Cit	v collaboration	project in FY	<sup>7</sup> 2019 is shown	helow.
The senedule of	City to Cit	y condooration	project mr i	2017135110 WI	

Thomas	Category	2019					2020	
Items		Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1. Formulation of JCM model project								
1) Consideration of formulation of JCM mode	l project							
a)Consideration and Selection of target	plan							
facilities for JCM	Achievement							
b) Implementation plan and project evaluation	plan							
b) implementation plan and project evaluation	Achievement							
c) Funding plan	plan							
	Achievement							
d) Project scheduling	plan							
	Achievement							
2) MRV Planning	1	1	1		1	1		
a) Preparation of draft Methodology and PDD	plan							
	Achievement							
b) Preparation of MRV Plan	plan							
2) Discussion for formulation of international	Achievement							
3) Discussion for formulation of international	consortium							
a) Consideration of implementation structure	pian							
	Achievement							
b) Preparation of draft consortium agreement	Achievement							
2. City-to-City collaboration activity	richeveniene	1				1		x/////////////////////////////////////
	plan							
1) Discussion in Bali	Achievement							
	plan						Δ	
2) Business matching	Achievement							
3. Other activity								
2.1 Monthly report	plan		$\triangle$	$\triangle$	$\triangle$	$\triangle$	$\triangle$	$\triangle$
	Achievement		$\triangle$	$\triangle$	$\triangle$	$\bigtriangleup$	$\triangle$	
3-2 Progress report to MOE	plan	$\triangle$			$\bigtriangleup$	$\triangle$		$\triangle$
	Achievement	$\triangle$			$\bigtriangleup$			$\triangle$
3-3 Meeting with Toyama city/company	plan		$\triangle$		$\bigtriangleup$	$\triangle$		$\triangle$
	Achievement		$\triangle$		$\triangle$	$\triangle$		
3-4 Field survey	plan							
,	Achievement				<b></b>			
3-5 Local workshop in Bali	plan							
	Achievement							
3-6 Presentation of the project in City to City	plan						△1/16,17	
Seminar	Achievement						△1/16,17	
3-7 Final report	pian A shisus marat							
<ul> <li>Activity in Bali(plan) A + Activity in Japan (plan)</li> </ul>	achievement					nlan		
Activity in Bali(achieved) $\triangle$ : Activity in Japan					pian		, terne ved	

Source: Nippon Koei

Figure 1-3	Schedule of the	project
I Igui C I C	Schedule of the	project

### **1.5 OUTLINE OF THE FIELD SURVEY**

In FY2019, seven times of field survey and two times of City-to-City collaboration meeting between Bali province and Toyama city were conducted. The contents of main activity are shown as below.

Activities	Date	Outlines
1 <sup>st</sup> field survey	Aug. 4 - 10, 2019	Meeting with JCM secretariat and collection of
	(In Jakarta)	information from Japanese companies in Jakarta.
2 <sup>nd</sup> field survey	Sept. 24 – Oct. 4, 2019	Holding kick-off meeting between Toyama city and
		Bali province on Oct. 1st of 2019. Implementation
		of interview survey of large hotels and private
		factories to introduce JCM scheme.
3 <sup>rd</sup> field survey	Oct. 23 – 30, 2019	Interview survey for introducing JCM scheme to
		large hotels and private factories.
4 <sup>th</sup> field survey	Nov.20 – 25, 2019	Holding local workshop for hotels in Badung region
		on Nov. 21, 2019., Site visit of PV generation
		project and continuous discussion for formulation
		of JCM model
5 <sup>th</sup> field survey	Dec. 19 – 22, 2019	Continuous discussion for formulation of JCM
		model project
6 <sup>th</sup> field survey	Jan. 20, 2020	Continuous discussion for formulation of JCM
		model project
7 <sup>th</sup> field survey	Feb. 10 – 12, 2020	Holding joint wrap-up meeting in Bali on Feb 10
		2020 and continuous discussion for formulation of
		JCM model project

 Table 1-2
 Main activities in the field survey



Discussion for introduction of PV system to the new university building (Oct.2019)



Discussion for introduction of PV system to private factory (Oct.2019)



Local workshop in Badung region (Nov.2019)



Survey of existing boiler (Nov.2019)



Discussion for JCM project formulation at the<br/>candidate hotel (Nov. 2019)Bali/Semarang<br/>workshop (Feb.2020)Joint<br/>wrap-up<br/>meeting/local

### **CHAPTER 2 STUDY FOR JCM MODEL PROJECT FORMULATION**

City-to-City collaboration project between Bali province and Toyama city has been conducted since 2018 and formulation of JCM model project for private sector such as large hotels and shopping malls in Bali has been continued in this fiscal year. The proposed technology is mainly PV generation (renewable energy) and high-efficient equipment (energy saving technology) provided by Nihon Air-conditioning Hokuriku from Toyama city.

Since natural gas is not distributed in Bali, Hokusan (Toyama city company), which has experience in installation of fuel switch technology (Diesel Dual Fuel:DDF) as JCM model project in Semarang city, collected information for future JCM formulation.

### 2.1 CONFIRMATION OF BUILDING PERMISSION

Buildings are required to protect the cultural landscape of Bali according to building standards, so it has been said that there are restrictions on the color of the roof and the number of floors of the building, and it was unknown whether PV panels can be installed. Thus, it was necessary to make this point clear for formulation of JCM model project in FY2019.

As a result of the interview survey to "Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kabupaten Badung (DPMPTSP,Office of Investment and Integrated Services One Door)" in charge of licenses for business and construction in Badung regency, there is a conventional building regulation but not any rule for installing PV panel on the rooftop. Therefore, PV panels can be installed at any facility if the structural material and strength (load capacity is 15 kg / m2 or more) are sufficient.

#### 2.2 CONSIDERATION OF INTRODUCING ENERGY SAVING TECHNOLOGY AND RENEWABLE ENERGY IN TOURISM FACILITY

Formulation of JCM model project in large shopping malls, private power plant and public transportation were carried out last fiscal year. However, the application was not reached due to some restrictions such as shortage of finance and unmatching procurement schedule. The result of interview survey of FY2019 for promotion of JCM scheme in several facilities are shown below.

Through Bali Hotels Association (BHA), feasibility study was conducted for hotels with high potential of JCM. As requested from a private university and some private company, specification of technology with appropriate amount of GHG emissions reduction were considered. In addition, the outline of JCM scheme has been widely introduced to more than 40 companies at the local workshop and meetings.

#	Facility	Position	Result of interview/site visit
1	Watermark hotel	Sales Manager	Large-scale renovation of guest rooms has been
			implemented. High interest in the problem of hotel
			waste. Requested information provision from a
			group hotel. It has been confirmed that the
			possibility of JCM formulation is low at this time.

Table 2-1	Interview	list and	results

#	Facility	Position	Result of interview/site visit
2	The Ritz Carlton Bali	Sales Manager.	A technical proposal for rooftop PV system was
		facility	provided. At present, the room renovation is the first
		manager	priority, so that it has been confirmed that the
		C	possibility of JCM formulation is low.
3	Bvlgari Hotel	Sales Manager,	Renovation of all guest rooms(villa) has been
		facility	implemented. There is no facility to be replaced
		manager	using JCM, but only high interest in updating the
		~	electric carts.
4	The MULIA	Sales Manager	The hotel has around 700 rooms as one of largest
			hotel in Bali. There is high interest of reducing
			electric cost. The rooftop PV system was proposed, but no possibility of the investment
5	DAMAVANA Group	Ganaral	but no possibility of the investment.
5	KAMATANA Oloup	manager	27 supermarkets besides botels in Bali and is very
		manager	interested in reducing electricity cost. It has been
			confirmed that the possibility of JCM formulation is
			low at this time.
6	Grand Hyatt Bali	Deputy facility	It has been confirmed that the possibility of JCM
		manager	formulation is low at this time.
7	Swiss-Bel resort Watu	Room manager	It has been confirmed that the possibility of JCM
	Jimbar		formulation is low because the scale of rooftop is
		<b>N</b> 11	quite small.
8	Private Ice maker factory	President,	It has been confirmed that the possibility of JCM
		technical	formulation is low because purchase order of the
		manager	strength was not anough. It was agreed to consider
			possibility of ICM for other facility next time
9	Discovery shopping mall	Facility	The technical proposal for replacement of air-
-	2 is configuration of the second seco	manager, other	conditioning equipment and introduction of PV
		staff	system was prepared based on the discussion since
			FY2018. After large renovation of the building,
			consideration of JCM formulation will be restart.
10	Conrad Bali	Facility	After participation in the local workshop in Badung
	(Candidate facility of JCM	manager	region, it started discussion for introducing PV
	model project)		system and replacement of chiller/boiler through
			facility survey. It was almost agreed to apply JCM
			model project in FY2020.
11	Hotel Nikko Bali Benoa	General	High interest in low carbon technology using JCM,
	Beach	manager	but there is no facility to be replaced using JCM,
			High interest in water-saving toilets and power
10	Mahagaraguati Universita	Vice president	UISITIOUTION FOR a new university building man
12	wanasaraswati University	and other staff	r v system for a new university building was
		and other stall	proposed, but it has been committee that the possibility of ICM formulation is low because of
			luck of budget.

Source: Nippon Koei

### 2.3 POTENTIAL FOR JCM MODEL PROJECT

According to 2017 census, there are around 550 hotels in Bali province and 80% of hotels located in Badung Regency. The number of tourists from overseas has been increasing to more

than 6 million visitors (total population of Bali is around 4 million), but there is competition between hotels.

Generally, luxury resort hotels are trying to differentiate themselves from others and are aggressive to contribute to the environment as a factor of customer evaluation and satisfaction. Therefore, the hotels of 4 stars or 5 stars are considered to be potential facilities for JCM model project.

1 abit 2-2	Tumber		Jy Blais (I	anking) m	2017	
Decement/oitre	Number of Hotel by Stars (5 stars: the highest rank)					Tetal
Regency/city	5	4	3	2	1	Totai
Jembrana	0	1	3	1	0	5
Tabanan	2	1	2	0	0	5
Badung	58	123	190	57	15	443
Gianyar	6	4	7	3	4	24
Klungkung	0	0	0	0	3	3
Bangli	0	0	0	0	0	0
Karangasem	1	4	2	1	0	8
Buleleng	2	4	9	2	0	17
Denpasar (Capital city)	4	7	16	15	4	46
Total (Bali province)	73	144	229	79	26	551

Table 2-2Number of Hotels by Stars (ranking) in 2017

Source: BPS-Statistics Bali, 2017

As a result of filed survey, many hotels have common features such as open structure of lobby without walls, the limited number of large-scale air-conditioning system, and utilize natural light during daytime, therefore it was found that electricity consumption is already saved.

It is necessary to find high-potential facility for JCM model project, it was selected some largescale hotels which have large number of rooms and relatively high energy consumption as target facility of this fiscal year.

Under the cooperation with Badung regional government, the local workshop targetting large-scale hotels with five and four stars, was held in December 2019.

Twenty-six hotels which participated in the workshop, had interests in replacement of existing old equipment and utilizing JCM subsidy scheme by explanation of energy saving technology and renewable energy. After the workshop, individual discussion was carried out with hotels representatives. The detail of the workshop is described in 4.3.

### 2.4 SELECTION OF TARGET HOTEL

Through individual discussion with candidate private companies which described in Table 2-1, one of the largest hotels in Nusa dua, Badung regency has been selected as candidate entity of JCM model project with following reasons.

- 1) Existence of plan to replace of existing Chiller and Boiler
- 2) High interest in introduction rooftop PV system under JCM model project

- 3) Understanding on improvement of value of company by implementing JCM model project with installation of low-carbon/zero-carbon technologies.
- 4) Agreed on JCM application with manager level

![](_page_16_Picture_3.jpeg)

### 2.5 CONSIDERATION OF FORMULATION OF PROJECT

Nihon-Air-conditioning Hokuriku has many experiences of installation and maintenance of airconditioning equipment, sales of PV system and electricity generation business in Hokuriku area. Also, in 2019, the company was in charge of procurement of PV panels (SHARP's PV panels, Approx.30kW) in a project for installation of small-scale roof-top PV system for electricity source of water pump for irrigation in Klungkung Regency, Bali Province. Therefore, it can be said that Nihon Air-conditioning meets the conditions to be a representative entity. In addition, Nihon Air-conditioning Hokuriku attended to meetings with the target hotel, implemented facility survey in an existing equipment and almost agreed to apply for JCM model project with the target hotel.

The target hotel purchases the electricity from PLN Bali and fuel(diesel) for the boiler from PERTAMINA GAS. According to the hotel, annual consumption of electricity was around 10,000kWh and fuel consumption was around 137,000L. Annual expenses of both electricity and fuel in total reached to Rp.1.2 billion. Therefore, the hotel has a strong interest in JCM subsidy scheme for reducing consumption of energy and initial investment at the same time.

### 1) Proposal of roof-top PV system

It is proposed to introduce the roof-top PV system for self-consumption to existing roof of the target hotel. Based on the result of field survey, Nihon Air-conditioning Hokuriku proposed specification and layout of PV panels as below.

Proposed specification/model/layout of PV panel are as below,

### SHARP: NU-AF345H

• 345W/panel

• Salinity tolerance

![](_page_17_Figure_2.jpeg)

• Experience of JCM model project

Source: Nippon Airconditioning Hokuriku

### Figure 2-1 Plan drawing of PV system

According to the layout of the roof-top, 738 PV panels can be installed and estimated output of power generation was 254kW. Annual power generation was 360MWh using simple model. GHG emission reduction by introducing PV system was tentatively calculated based on the approved methodology (ID\_ AM013) as below. For this calculation, as GHG Emission factor 0.613tCO2/MW was used.

Emission reduction = Reference emission - Project emission  
= 360 [MWh] 
$$\times$$
 0.613 [tCO2/MWh] - 0  
= 220.68 [tCO2/y]

Project terms for PV generation project might be around 10 years. Thus, estimated total GHG emission reduction was **2,200** [tCO2].

### 2) Proposal of replacement of Boiler

Proposed specification/model of Boiler are as below,

### MIURA EX-500H

- High efficiency
- Reduce 75% of electricity consumption by Inverter system
- Stable steam pressure
- Low Nox and CO emission
- Compact body
- Experience of JCM model project

It is planned to replace one old boiler to high efficiency gas boiler in the hotel in 2020. Introduced technology suits for JCM model project but it is necessary to coordinate schedule of JCM application and purchase order, in advance.

GHG emissions reduction by introducing gas boiler was tentatively calculated based on the approved methodology (ID\_ AM015) as below. For this calculation, as GHG Emission factor 0.877tCO2/MW was used.

Emission reduction = Reference emission — Project emission = 377 [tCO2/MWh] - 261 [tCO2/MWh]= 116 [tCO2/y]

### 3) Proposal of replacement of high efficiency chiller

Proposed specification/model of Chiller are as below,

### Ebara RTBF series

- High efficiency
- Prevention of leakage of refrigerant
- Periodical checks by remote and continuous monitoring
- Lower Global Warming Potential (GWP) refrigerant
- Experience of JCM model project

The target hotel plans to install one unit of chiller in 2020 but consider products from other manufacturers with conventional specification. It is necessary to change to proper specification chiller and coordinate schedule to suit JCM application and purchasing.

GHG emission reduction by replacement of chiller was tentatively calculated based on the approved methodology (ID\_ AM002) as below. For this calculation, as GHG Emission factor 0.877tCO2/MW was used.

Emission reduction = Reference emission — Project emission = 1,769 [MWh] - 1,562 [tCO2/MWh]= 207 [tCO2/y]

#### 4) Proposal of replacement of desalination system

The target hotel has domestic desalination system and it has interested in reducing electricity consumption from the system. At present, it is discussed the possibility of replacement with existing system by high-efficient system using high performance of membrane.

The update and introduction of the four equipment above are summarized as follows.

rusic 2 c - Guillie of unger tachty for gent model project					
Target facility	Capacity /number	<b>Tentative GHG</b>	Tentative project		
		emission reduction	period		
1.PV system	345W/738 modules	221 (tCO2/y)	10 year		
2.Gas boiler	500kg/h, 1unit	116(tCO2/y)	10 year		
3.Chiller	400RT/1unit	207 (tCO2/y)	10 year		
4.Desalination system	400 ton/d, 1unit	200 (tCO2/y)	under consideration		
Total	—	744 (tCO2/y)	—		

Table 2-3	Outling of target facility for ICM model project
Table 2-5	Outline of target facility for JCM model project

Source: Nippon Koei

#### 5) Consideration of funding

There are plans to replacement of existing boiler and chiller by own funds but purchase of the PV panels has been not budgeted yet. It is necessary to discuss with owner of the hotel continually to consider JCM application and budget allocation in next fiscal year.

#### 6) Consideration of MRV

Procedure of Measurement, Reporting and Verification (MRV) will be considered after selection of target equipment. Generally, electricity and fuel consumption of individual equipment in the facility is not monitored and no experience of MRV in any hotel including target one. In FY2019, implementation of a simple energy-saving diagnosis of existing equipment which is a very effective for consideration of JCM, was not possible due to limited period and budget. Therefore, it is necessary to consider MRV practically in next fiscal year.

### 7) Consideration of International Consortium

Nihon Air-conditioning Hokuriku and the target hotel will conclude an agreement to formulate International consortium for JCM model project through discussion. By consulting with PLN Bali which plans some large-scale PV generation in Bali, the skilled EPC (Engineering, Procurement and Construction) will be selected by the consortium.

![](_page_20_Figure_1.jpeg)

Source: Nippon Koei

Figure 2-2 Implementation structure of JCM model project

#### 8) Consideration of the Indonesian law

This JCM model project will install PV system onto the roof-top of target hotel. Thus, EIA(AMDAL) in not required. However, Sustainable Development Implementation Plan (SDIP) will be required as requirements of Indonesian JCM secretariat.

8				
Items	Items # Questions		Y/N	If answer is Yes, please describe the action plans.
EIA	1	Does the proposed project require official/legal process of EIA?	No	
	2	Does the proposed project emit air pollutants?	No	
Pollution	3	Does the proposed project discharge water pollutants or substances which influence BOD, COD or pH, etc.?	No	
Control (No mood to	.4	Does the proposed project generate waste?	Yes	Package
answer if EIA	5	Does the proposed project increase noise and/or vibration from the current level?	No	
is required)	6	Does the proposed project cause ground subsidence?	No	
	7	Does the proposed project cause odor?	No	
Safety and health	8	Does the proposed project create dangerous condition for local communities as well as individuals involved in the project, during either its construction or its operation?	No	
	9	Is the proposed project site located in protected areas designated by national laws or international treaties and conventions?	No	
Natural Environment and biodiversity	10	Does the proposed project change land use of the community and protected habitats for endangered species designated by national laws or international treaties and conventions?	No	
	11	Does the proposed project bring foreign species?	No	
	12	Does the proposed project include construction activities	No	

 Table 2-4
 Confirmation items of SDIP in target hotel

Items	#	Questions		If answer is Yes, please describe the action plans.
		considered to affect natural environment and biodiversity (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?		
	13	Does the proposed project use surface water, ground water and/or deep ground water?	No	
Economy	14	Does the proposed project have negative impact on local workforce capacity?	No	
Economy	15	Does the proposed project have negative impact on local community's welfare?	No	
	16	Does the proposed project cause any resettlement or other types of conflict?	No	
Social Environment and	17	Does the proposed project fail to involve activities to respond to, and follow up, comments and complaints that have been received from local communities, particularly from the public consultation?	No	
Participation	18	Do the project participants violate any laws and/or ordinances associated with the working conditions of local communities which the project participants should observe in the project?	No	
	19	Does the proposed project fail to involve activities to build capacity of human resources through technology transfer and technical assistance?	No	
Technology	20	Does the proposed project fail to describe information of technology specification that consists of manual book and ways to overcome the problems that may occur when being operated on the site, at least in English and in Bahasa Indonesia as applicable?	No	

Source: JCM Sustainable Development Implementation Plan Form

It seems that there is no big problem of the SDIP in this project, but it is planned to confirm above items with hotel owner after detail implementation plan is decided.

### CHAPTER 3 SUPPORT ON JCM PROJECT FORMULATION THROUGH CITY TO CITY COLLABORATION

### 3.1 ACTIVITIES TOWARD LOW CARBON SOCIETY IN BALI PROVINCE

The potential of GHG emission reduction until 2020 was tentatively calculated by Environment management department (DLH) of Bali province as follows. It was also recognized that utilizing JCM contributes both stability of energy supply and CO2 emission reduction by DLH.

Table 3-1 I otential of GIIG emission reduction in Dan province					
#	Items	Potential of CO2emission			
		reduction [tCO2]			
1	Premium fuel and PV	38,970,000			
2	Reduction of electricity consumption	37,250,000			
3	Reduction by using LPG for fuel and	5,260,000			
	cooking				
4	Reduction of methane gas emissions	169			
	caused by livestock				

Table 3-1	Potential of GHG	emission reduction	in Bali	nrovince
1 abic 5-1		chillion i cuucuon	m Dan	province

Source: Nippon Koei based on the documents provided by DLH of Bali

Additionally, the following items are listed as energy saving measures, especially No.3, No.4, No.8 and No.10, that will be considered to implement JCM model project by Bali province in the future.

 Table 3-2
 Considered Measurements of Energy saving in Bali

#	Items
1	Fuel saving
2	Management of use of premium fuel for certain types of vehicles
3	Promoting Oil to gas (CO2emission reduction by2020:1.6million tCO2)
4	Saving electric energy
5	Formulation a power saving cluster team
6	Electric energy management in industry
7	Introduce LED widely (CO2emission reduction by2020:1.5million tCO2)
8	Renewable energy development (CO2emission reduction by2020:0.47million tCO2)
9	Micro hydropower
10	PV
11	Wind power
12	Biogas production

Source: Nippon Koei based on the documents provided by DLH of Bali

Based on the countermeasures from Bali province as above, it was decided to support on "Governors' regulation for clean energy" which aims to introduce renewable energy/fuel conversion(from oil to natural gas) and promote JCM model project through City-to-City Collaboration between Bali province and Toyama City in FY2019.

### 3.2 GOVENER'S REGULATION FOR CLEAN ENERGY IN BALI PROVINCE

The main policy of "Governor's regulation for clean energy in Bali province" which was announced on 28 October 2019(See attachement-1) is summarized as below.

- 1) By 2022, industrial and commercial facilities and houses over 500m2 need to have between 20% and 100% of their power consumption covered by clean energy (renewable or natural gas).
- 2) Incentives for reducing electricity rates are provided for facilities that have introduced the clean energy.
- 3) Facilities that have introduced clean energy will be given "Clean energy certification".

There is high affinity between this new regulation and low/zero carbon technologies introduced by JCM, therefore it was effective to formulate projects based on the above requirements and incentives under City-to-City Collaboration.

On the other hand, communication to local government (regional level) is at a future stage, and the private sector takes more time to get information. For private companies that had participated in local workshop, it planned to share information in advance and promotes proper technology.

#### **3.3 EXISTING ENERGY PLAN OF PLN BALI**

In November 2019, it conducted an interview with PLN Bali to explain JCM scheme and confirm the present situation of energy supply/consumption and plan of renewable energy in Bali. As result, there were 75 private PV generation projects in Bali province, and it was possible to exchange electricity between both sides under a special contract different from a normal electricity sales contract.

In this power sharing system, for example, if private power generation facility sends 100kWh of renewable energy to PLN Bali, 65kWh of electricity could be returned from PLN Bali.

On the other hand, PLN Bali expects that the sales will be decreasing around 30% when the clean energy regulation is activated and promoted clean energy in Bali. Therefore, they are considering new business models, such as providing PV panel installation and operation services.

PLN Bali set a target that exchange 25% of power generation from grid to renewable energy by 2025. At present, they have a plan to introduce 25MW PV project in two places (in total 50MW) by public tender and also additional power generation plan of the same size in 2023. From the viewpoint of the implementation stage, PLN Bali has a potential to be a partner entity (or EPC) in the international consortium of JCM.

At the target facilities are considered only PV generation for self-consumption in this time, but I n the future, activities according to energy plan in above will increase, and private companies will consider power sales business.

In this case, it is necessary to obtain a permit from an independent power producer (IPP) and a power purchase agreement (PPA) by PLN Bali.

In order to build a system for smooth project formation, it is necessary to keep good relationship with PLN Bali.

#### **3.4** NEW COOPERATION BETWEEN BALL PROVINCE AND SEMARAN CITY

Through Joint wrap-up meeting among Bali province and Semarang city in February 2020, it was recognized that there were good achievements of City-to-city Collaboration and promotion of JCM scheme in both local governments. Because there is an on-going JCM model project in Semarang city, Bali provincial government is willing to corporate with Semarang city to share the experiences of JCM in the next fiscal year.

### **CHAPTER 4 CITY TO CITY COLLABORATION ACTITIVY**

### 4.1 OUTLINE OF CITY TO CITY COLLABORATION ACTIVITY

Based on the collected information from previous year, it was considered to formulate JCM model project at facilities which have high potential of introducing renewable energy and energy saving technology. Achievements of City-to-City collaboration activity in this fiscal year are summarized as following table.

Item	Date	Description
Kickoff meeting at MOE	Aug. 16, 2019	Explained to MOE the plan/activity of both city -to- city collaboration and JCM formulation in FY2019 which aim to 1) Introduce energy saving technology/renewal energy to large-scale
		commercial facility and 2) promote fuel conversion technology for transportation sector in Bali province.
1 <sup>st</sup> field survey	Aug. 4 - 10, 2019 (In Jakarta)	Held the meeting with JCM secretariat and collection of information from Japanese companies in Jakarta.
2 <sup>nd</sup> field survey	Sept. 24 – Oct. 4, 2019	Held the kick-off meeting between Toyama city and Bali province on Oct. 1st of 2019. Interview survey of large hotels and private factories to introduce JCM scheme.
3 <sup>rd</sup> field survey	Oct. 23 – 30, 2019	Conducted the interview survey for introducing JCM scheme to large hotels and private factories.
Progress report meeting at MOE	Nov. 7, 2019	Reported to MOE progress of field survey to promote JCM in hotel sector and confirmed project schedule.
4 <sup>th</sup> field survey	Nov.20 – 25, 2019	Held the local workshop for hotels in Badung regency on Nov. 21, 2019., Site visit of PV project and continuous discussion for formulation of JCM model
Training for realization of low- carbon society through city to city collaboration at Toyama city	Nov. 27 – 29, 2019	To deepen understanding about City-to-City Collaboration and share know-how of Japanese local governments, Toyama city mainly had presentation to introduce environment project and background of city collaboration in abroad.
5 <sup>th</sup> field survey	Dec. 19 – 22, 2019	Continued discussion for formulation of JCM model project
6 <sup>th</sup> field survey	Jan. 20, 2020	Continued discussion for formulation of JCM model project
Workshop for promotion of city to city collaboration to develop zero emission society at Yokkaichi city	Feb. 3 - Feb.5, 2020	The workshop aimed to find potential of wide spread of cooperation among local governments in Japan and share good experience of city to city collaboration project in abroad. Toyama city made a presentation on the background of the city-to-city cooperation agreement with Bali and Semarang and exchanged opinions with participants.
7 <sup>th</sup> field survey	Feb. 10 – 12, 2020	Held the joint wrap-up meeting with Bali province and Semarang city and discussed for the collaboration and potential of JCM model project in both city.

 Table 4-1
 City-to-City collaboration activity

Item	Date	Description
Final report	Feb. 26, 2020	Reported to MOE the achievement of city-to-city
meeting at MOE	(Scheduled)	collaboration activity and results of JCM
		formulation.

Source: Nippon Koei

#### 4.2 KICKOFF MEETING IN BALI PROVINCE

Date/Time	October 1, 2019 (Tue) 10:00~12:00
Venue	BAPPEDA office, Denpasar, Bali
Number of Participant	56 people

Outline of JCM scheme, project activity and schedule in FY2019 were explained to BAPPEDA as main counterpart at the time and regional officers by Toyama city and Nippon Koei at kickoff meeting in Bali province. It was discussed that energy/environmental issues and potential of JCM model project in each regional level. The presentation materials of the meeting are attached in Attachmet-2.

 Table 4-2
 Agenda of kickoff meeting in Bali province

	0 0	
#	Program	Speaker
1	Opening remarks	Toyama city/Bali province
2	Introduction of the participants	All attendance
3	Introduction of activities regarding Low carbon society	Toyama city
	and tourism city in Toyama	
4	Outline of Joint Crediting Mechanism (JCM) and its	Nippon Koei
	potential sector in Bali	
5	Current status of energy and environmental policy in	Bali Province
	Bali	
6	Current status/issues in energy, environment and	Each Municipality
	tourism sectors	
7	Free discussion (Q & A)	MC: Nippon Koei
8	Further collaboration in FY 2019	Toyama City

Source: Nippon Koei

 Table 4-3
 Participant organization list of kickoff meeting in Bali province

#	Organization
1	Bali Province/BAPPEDA
2	Badung Regency
3	Gianyar Regency
4	Tabanan Regency
5	Buleleng Regency
6	Toyama City
7	Nippon Koei
0	

![](_page_26_Picture_1.jpeg)

### Kickoff meeting at BAPPEDA office in Bali

### 4.3 WORKSHOP IN BADUNG REGENCY

Date/Time	November 21, 2019 (Thu) 10:00~12:00
Venue	DLH office, Badung Regency, Bali
Number of Participant	44 people

The local workshop which aimed to introduce JCM scheme to large hotels which is registered as five stars and four stars, was organized by Badung regional government and Toyama city jointly. It was confirmed that participants had interests for replacement of facility with JCM subsidy. On the other hand, understanding of owner of hotel is essential for starting consideration and it was requested to hold workshop for hotel owners in next time.

The presentation materials of the workshop are attached in Attahcmnet-3.

		buuung negenej
#	Program	Speaker
1	Opening Remarks	Toyama City/
		Badung regency
2	The background and purpose of the workshop	Nippon Koei
3	City-to-City Collaboration Project between Bali Province	Toyama City
	and Toyama City	
4	Potential of low-carbon technology projects in Private	Nippon Koei
	sector and progress of field survey in hotels and shopping	
	malls.	
5	Introduction of potential technologies applicable in Bali	Nippon Air-conditionning
	Province	Hokuriku
	-PV generation on the rooftop	
	-High efficiency air conditioning equipment	
	-Energy management system	
6	Introduction of project example with "Joint Crediting	Nippon Koei
	Mechanism (JCM)" subsidy and other Japanese scheme	
	for low-carbon project	
	Q&A and Discussion session	
7	Closing remarks	Badung Regency

#### Table 4-4 Agenda of local workshop in Badung Regency

#	Organization	#	Organization
1	Hard Rock Hotel Bali	16	Discovery Shopping Mall
2	Grand Bali Sani Suite	17	Kempinski
3	Bali Garden	18	KPH
4	The St. Regis Bali Resort	19	Hotel Conrad Bali
5	The Laguna Resort Nusa Dua	20	Hotel Nangsa Benoa
6	W Hotel	21	Belmond Jimbaran Puri
7	Atanaya Hotel	22	Discovery Kartika Plaza Hotel
8	Watermark Hotel	23	Four Seasons Resort Bali Jimbaran
9	Ramada Bali Sunset Road	24	J Boutique Hotel
10	Bintang Bali Resort	25	Alam Kul Boutique
11	Bali Tropic Resort & Spa	26	Disparda (12)
12	Bali Mandira	27	Biro Pem Bali
13	Hotel Nikko Bali	28	Toyama City (2)
14	Bali Paragon Hotel	29	Nippon Air-conditioning Hokuriku (1)
15	Mall Bali Galeria	30	Nippon Koei (2)

#### Table 4-5 Participant organization list of local workshop in Badung Regency

Source: Nippon Koei

![](_page_27_Picture_4.jpeg)

#### Local workshop in Badung provincial office

#### 4.4 CITY TO CITY COLLABORATION SEMINAR IN JAPAN

Date/Time	January 16 (Thu) and 17(Fri), 2020
Venue	Day 1 <sup>st</sup> at Shinagawa prince hotel, Day 2 <sup>nd</sup> at International Convention Center
	PAMIR, Grand prince hotel Takanawa

Unfortunately, official from Bali province was not able to participate in City-to-City Collaboration Seminar in FY2019, Toyama city and Nippon Koei made presentation for introduction of outline and progress of city-to-city collaboration between Bali province and Toyama city. The presentation materials for the seminar are attached in Attachmet-4.

#### 4.5 JOINT WRAP-UP MEETING/WORKSHOP BETWEEN BALI PROVINCE AND SEMARAN CITY

Date/Time	February 10, 2020 (Mon) 15:00~17:00
Venue	DLH office, Bali province
Number of Participant	40 people (including 2 officers from Semarang city)

The Joint wrap-up meeting of Bali province and Semarang city was held in 10<sup>th</sup> of February 2020 organized by Toyama city and Bali province to share achievement and experiences in City-to-City Collaboration in FY2019 each other. The presentation materials of the meeting/workshop are attached as Attachemet-5.

At the direction of the provincial government, Bali's department in charge of the collaboration was changed from BAPPEDA to Dinas Lingkungang Hidup (DLH) just before the meeting. Therefore, most of participants from Bali province did not have enough information about the collaboration and JCM scheme.

To improve the situation, the background and achievement of JCM model project under the collaboration between Semarang City and Toyama City was explained by Semarang City officer, and participants understood the purpose of the collaboration.

To deepen understanding in JCM scheme between Bali province and Semarang city, time was used for discussion instead of some presentations. Opinions and questions were raised by each organization such as Bali DLH and PLN Bali. One of the achievements of the meeting was the creation of a cooperative relationship between the two Indonesian cities through active exchange of opinions.

#	Program	speaker
1	Opening remarks	Bali province (DLH)
		Toyama city
2	Introduction of the participants	All attendance
3	Achievement of JCM model project in Bali Province and	Nippon Koei
	Semarang City from Aug.2019 to Feb.2020	
4	Presentation of Low carbon technology	Hokusan/Nippon Koei *
5	Introduction of governor's clean energy regulation and	Bali province*
	other related policy in Bali	
6	Plan and target of introducing of renewal energy under	PLN Bali*
	the clean energy regulation	
7	Introduction of Low carbon scenario 2030, SDGs and	Semarang city
	Green Building regulation in Semarang	
8	Closing remarks	Bali province (DLH)

Table 1 C	A good of Toint was up	ma a atim a / manla ala an	In Dall
1 able 4-0	Agenua of Joint wrap-up	meeting/workshop	і ш дап

\* To prioritize discussions between Bali province and Semarang city, some presentations were changed to only distribute materials.

#	Organization	Sub-organization (number of participants)
1	Bali Province	Assistant of secretary of Bali province and staff (5)
	Ditto	Environmental management of Bali province/DLH (18)
	Ditto	Bureau of General Affairs and Protocol of Bali Province (1)
	Ditto	Bureau of Government and Regional Autonomy of Bali Province (1)
	Ditto	Public Works and Housing of Bali Province (1)
	Ditto	Manpower - Energy and Mineral Resources of Bali Province (1)
2	PLN Bali	(4)
3	PERTAMINA	(2)
	Gas, Jakarta	
4	Semarang City	BAPPEDA (1), Department of Regional Autonomy of Semarang city (1)
5	Toyama City	Toyama officers (2) and related company staff (2)
6	Nippon Koei	(2)
Course	Ninnon Vosi	

#### Table 4-7 Participant organization list of Joint wrap-up meeting/workshop in Bali

Source: Nippon Koei

![](_page_29_Picture_4.jpeg)

Joint wrap-up meeting/workshop at DLH office, Bali province

#### INTRODUCTION JCM TO BALI HOTELS ASSOCIATION MEETING 4.6

Date/Time	February 12, 2020 (Wed) 16:00-17:30		
Venue	Ruwha Luwih Resort&Spa Hotel		
Number of Participant	Around 20 General managers from BHA member's hotel		

On 12 February 2020, it has an opportunity to make presentation for general managers of large hotels at the monthly regular meeting organized by Bali Hotels Association (BHA). The presentation materials of the meeting are attached in Attahcmnet-6.

In the meeting, outline of JCM scheme, economic benefit for hotels, sample of JCM model project, the minimum requirements of JCM (the formulation of international consortium, proper scale of CO2 emissions reduction an application schedule etc.) were introduced to participants. Since member hotels had interests in JCM scheme, it is expected that new candidate hotels will be discovered in the future.

![](_page_30_Picture_1.jpeg)

Introduction of JCM to BHA meeting at Ruwha Luwin Resort&spa hotel

### CHAPTER 5 RESULTS AND ISSUES/PROPOSAL IN FY 2020

### 5.1 **RESULTS OF CITY TO CITY COLLABORATION IN FY2019**

Under City-to-City Collaboration in FY2019, at the kick-off meeting and the Joint wrap-up meeting in Bali, information exchange regarding three themes, renewable energy, energy saving technology and energy switch was carried out among Toyama city, Bali province (BAPPEDA and DLH etc.) and other local government.

Based on the clean energy regulation in Bali province, the information about an energy management plan and a business policy of both PLN Bali and PERTAMINA Gas was collected. It was confirmed the possibility for cooperation between existing plan/policy and proposed technology by JCM.

Regarding the formulation of JCM model project, one of the results of FY2019 was obtained in cooperation with Badung regional government (DLH) and Bali Hotel Association (BHA), in parallel with the individual approach to private companies. Under the support from these organizations, it was able to meet more than 40 large-scale hotels, and discussions are preceded with some hotels which has high potential of JCM formulation.

In addition, through Joint wrap-up meeting in February 2020, Semarang City government (BAPPEDA) and Bali provincial government (DLH) had good communication and exchanged opinion about City-to-City Collaboration and JCM formulation. Bali province recognizes that it is necessary to provide advice from Semarang City, which has an experience of JCM model project, through City-to-City collaboration with Toyama City in order to formulate JCM model project in the public sector.

### 5.2 PROPOSAL OF JCM MODEL PROJECT IN FY2020

Based on the result of JCM formulation, the following two projects are scheduled to apply JCM in FY2020. Item 2 in the table below has been under consideration since last year and is expected to be applied as soon as the budget is secured.

Representative /partner company	Title (tentative)	Project scale	GHG emission reduction (tentative)	
1.Nihon Air- conditioning Hokuriku/Conrad hotel	Project for replacement of high-efficiency chiller and boiler and introduction of roof-top PV system in hotel	Boiler:500kg/hour, 1unit Chiller:400RT,1unit Output of PV panel : 250kw Capex: Under calculation	Around 550 tCO2/year with replacement of desalination system: around 750 tCO2/year)	
2. Nihon Air- conditioning Hokuriku/ Discovery shopping mall	Project for introduction of roof-top PV system at large scale shopping mall	Output of PV panel : 660kw Capex: Around 75,000,000 JPY	Around 600 tCO2/year	

Table 5-1Proposal of JCM model project in FY2020

### 5.3 ISSUE AND PROPOSAL FOR CITY TO CITY COLLABORATION IN FY2020

Under City-to-City Collaboration with Bali province, JCM formulation was conducted base on three themes such as renewable energy (introducing PV system), energy saving technology (replacement of air-conditioning system) and energy switch (utilize natural gas) in FY2019. The following issues have been identified and solutions have been considered.

### 5.3.1 Issues

### 1) Issues on project scale for the introduction of renewable energy in Bali

Since 2018, the study was conducted to introduce renewable energy (mainly PV system) as JCM model project for large-scale shopping malls and hotels, but most buildings have traditional tiled roofs for tourism value, not uniform roofs such as factory buildings which suit for JCM.

It means that the installation area of the roof is limited in Bali. Even at the largest hotel in Bali, an estimation of GHG emissions reduction is normally lower than the standard (around 1000t CO2/year) of JCM, and it is necessary to combine renewable energy and replacements of equipment for more energy saving, however the investment of both PV system and replacement of large equipment at the same time is very difficult on the budget.

On the other hand, there is a possibility to introduce PV system in Badung regional office buildings in private sector using JCM. However, it is difficulty to coordinate schedule between JCM application and the public tender by private entity. It is expected that it would take time for administration procedures to make an international consortium because of partner entity being public sector.

### 2) Issues on monitoring skills for introduction of high-efficiency facility

As described in Chapter 2, an issue of introducing energy saving project is the difficulty of data collection of actual electric/fuel consumption in existing facility.

The hotel is interested in energy saving, but it has no experience to monitor the energy consumption, which takes time to select the appropriate scale and equipment for JCM because of lack of actual data. Additionally, Measurement, Reporting and Verification (MRV) is essential activities for the implementation of JCM model project, and the hotel needs to understand the importance of the monitoring.

### 3) Issues on CNG supply for introduction of fuel switch project

Although LPG is widely spread in hotels and houses in Bali, it takes long time for introducing fuel switch technology by stable CNC supplied with proper infrastructure. In order to obtain the mid-to-long term planning and support, it is not able to provide enough support by annual contract of City-to-City collaboration project.

### 5.3.2 Proposal for support on JCM project formulation

### 1) <u>Proposal for small-scale JCM model project (simple application procedure)</u>

In terms of number of commercial facilities, there is big potential of JCM model project in Bali province as one of the famous international tourism cities. However, the scale of individual project is relatively small. Therefore, it is necessary to compile several equipment to be replaced as package. Compare with large-scale project, it takes relatively more effort than others, for example for getting acceptance of owner company.

If the application process is easier than large scale project, it will be more effective to be spread similar package JCM model project in Bali.

### 2) Proposal for public tender (flexible application procedure)

It is necessary to coordinate schedule among JCM application and public tender as a critical point. If the public tender is required for implementing the project, the tender schedule should be confirmed and considered to suit JCM application. It is difficult to adopt the project to introduce advanced technology with high price before the tender, on the other hand, it is difficult to reduce JCM subsidy in advance from total project cost because the subsidy will be paid after completion of the payment.

To be adopted JCM model project through public tender in Indonesia, the public tender period and open tender need to be done between unofficial contract and official contract in JCM application process as shown in Figure 5-1.

It is impossible to coordinate both schedule by private company itself, so that proper explanation of benefit of JCM to partner organization under the City-to-City Collaboration.

On the other hand, the scale of public project is relatively larger than private sector project. Considering such contribution of GHG emissions reduction by public project, it is recommended to be flexible application procedure and selection process of JCM, not avoid public project.

![](_page_33_Figure_10.jpeg)

Source: Nippon Koei

![](_page_33_Figure_12.jpeg)

### 1) Proposal for training of monitoring work (Invitation of private company to Japan)

Due to the limited opportunity to know the actual monitoring tools of energy consumption, most private organization which is a candidate of partner company in JCM model project is lack of knowledge about energy saving. Therefore, it tends to select cheaper equipment with low quality than the economic effectiveness from energy saving equipment and consideration of contribution to society. In order to raise awareness of private companies, it is recommended to offer an opportunity to be participated in the City-to-City Collaboration seminar in Japan which provides useful information such as activities of JCM model project in other countries and Japanese technology.

### 2) Proposal for CNG supply in Bali (Medium/long term support)

Fuel switch project which has a high potential of JCM model project, contributing GHG emission reduction has been widely applied from private sector to public transportation sector. However, it is necessary to discuss and negotiate about gas supply system and business model not only with Bali province but also central government (especially ESDM). Regarding the scope that cannot be handled by City-to-City collaboration project, advice and support on the coordination from Ministry of the Environment, Japan (MOE) is effective.

### 5.4 PLAN FOR CITY-TO-CITY COLLABORATION IN FY2020

In FY2019, based on the three-year plan in Figure 5-2, Clean Energy Regulation was supported under City-to-City Collaboration as an activity toward "Tourism Future City" to Bali province.

Because the regulation has an affinity with "Toyama City's SDGs Future City Plan (Realization of a sustainable value added to innovative city by applying a compact city strategy) ", it plans to support on promoting activation of public transportation and spreading of energy saving and renewable energy (Goal 7: Affordable and clean energy).

In addition, due to reduced inequality tourism income disparity issues in Bali province, identification of local issues and needs for creating tourism value and regional activation, and information exchange was carried out among local governments in FY2019.

While formulation of JCM model project directly is related to energy policy depending on the scale of project and field, some other options would be suggested for other schemes such as Japan International Cooperation Agency (JICA) and Ministry of Economy, Trade and Industry (METI).

![](_page_35_Picture_1.jpeg)

Source: Nippon Koei

Figure 5-2 Three-year plan for City-to-City collaboration in Bali province

In the next fiscal year, it is planned to involve engineering companies to this project which are specialized in monitoring and management of energy consumption in large facility. Due to deepened understanding of stakeholders about the necessity of monitoring activity, it also scheduled to visualize energy saving by monitoring with analysis monitoring data as trial.

In addition, through Joint wrap-up meeting in February 2020, Semarang city government (BAPPEDA) and Bali provincial government (DLH) had good communication and exchanged opinion about City-to-city Collaboration and JCM formulation.

Therefore, it is planned to support continuously on environmental regulation/policy of Semarang city and promote JCM model project in both public and private sectors in the next fiscal year under City-to-City Collaboration. As an additional activity of Toyama city, providing opportunity would also be included for supporting Bali province which has not experiences of JCM.