Appendix1 JCM proposed methodology

1-1 JCM proposed methodology(PV)

1-2 Spread sheet(PV)

1-3 JCM proposed methodology(HE)

1-4 Spread sheet(HE)

1-5 JCM proposed methodology(HB)

1-6 Spread sheet(HB)

Joint Crediting Mechanism Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Philippine
Name of the methodology proponents submitting this form	Oriental Consultants Co., Ltd
Sectoral scope(s) to which the Proposed Methodology applies	Renewable Energy
Title of the proposed methodology, and version number	Title: Solar PV System Introduction to Factories Version number: 01.001.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PH-PDD: ☐ Additional information
Date of completion	14 February 2018

History of the proposed methodology

Version	Date	Contents revised
01.0	14 February 2018	

A. Title of the methodology

Solar PV System Introduction to Factories

B. Terms and definitions

Terms	Definitions
Solar photovoltaic (PV) system	An electricity generation system which converts sunlight into electricity by the use of photovoltaic (PV) modules. The system also includes ancillary equipment such as power conditioner required to change the electrical current from direct current (DC) to alternating current (AC).
Grid	Spatial extent of the power plants that are physically

	connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved).

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Displacement of grid electricity and/or captive electricity by installation and operation of the solar PV system(s).
Calculation of reference emissions	Reference emissions are calculated on the basis of the AC output of the solar PV system(s) multiplied by either 1) the conservative emission factor of the grid, or 2) conservative emission factor of diesel power generator.
Calculation of project emissions	Project emissions are calculated on the basis of electricity consumption of the solar PV system(s) multiplied by either 1) the conservative emission factor of the grid, or 2) conservative emission factor of diesel power generator.
Monitoring parameters	(i)The quantity of electricity generated by the project solar PV system(s). (ii)The quantity of electricity consumed by the project solar PV system(s).

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	Projects for construction and operation of a new solar PV system or capacity addition of an existing power generation unit that uses renewable energy sources.
Criterion 2	Projects that displacement of electricity that would be provided by a grid or captive power generator.
Criterion 3	Net electricity generated from the solar PV system can be measured and monitored.
Criterion 4	The PV modules are certified for design qualifications (IEC 61215, IEC 61646

	or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).
Criterion 5	Power conditioners in the solar PV system have efficiencies higher than 95%.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG type
Emission from consumption of electricity from the grid	CO_2
Project emissions	
Emission sources	GHG type
Electricity consumption of the system	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants or captive power generators.

F.2. Calculation of reference emissions

$$RE_p = \sum_i (EC_{p,i} \times EF_{co2})$$

RE_P : Reference emissions during the period p [tCO_2/p]

$EG_{p,i}$: Quantity of electricity consumed or sold to the power company from electricity generated by the project solar PV system i during the period p (MWh/p)

EF_{co2} : Reference CO_2 emission factor [tCO_2/MW h]

G. Calculation of project emissions

On the other hand, the project emission is the CO_2 emission from the electricity consumption of the solar PV system and calculated as follows.

$$PE_p = EC_{PJ,p} \times EF_{co2}$$

PE_p : Project emissions during period p [t CO_2/p]

$EC_{PJ,p}$: Electricity consumption by the project solar PV system [MWh/ p]

$\mathbf{EF_{co2}}$: Reference CO_2 emission factor [tCO_2/MWh]

H. Calculation of emissions reductions

$ER_p = RE_p - PE_p$

RE_p: Reference emissions [t CO_2/p]

PE_p: Project emissions [t CO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameters	Reference CO_2 emission factor. In the case of the PV system connecting to the national grid, a conservative grid emission factor is applied. In the case of the project replacing a captive power generator, the lower emission factor between the grid emission factor and a captive power generator is applied. EF_{CO2} = min (EF_{grid}, $EF_{captive}$)	Grid emission factor: Grid emission factor published by the host country (If there is no any requirement from Joint Committee) （(IGES's List of Grid Emission Factors updated in August 2017)). 0.670 tCO_2/MWh (Philippine Combined margin） Captive power generator (diesel power generator):

		（Table２ I.F.1, Small Scale CDM Methodology: AMS I.F. ver.2）。 0.8 kgCO2/kWh

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (input sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$EG_{PJ,p}$	Electricty generated by solar PV system	407.024	MWh/p	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
（2）	$EC_{PJ,p}$	Electricty consumed by solar PV system	20	MWh/p	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	

Table 2: Project-specific parameters to be fixed *ex ante*

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	Description of data	Estimated Values	Units	Source of data	Other comments
EF_{elec}	CO_2 emission factor of electricity	0.6700	t CO_2/MWh	Grid emission factor of Philippine	

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
259	tCO_2/y

20.351232

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period of p		259	tCO_2/p	ERp
2. Selected default values, etc.				
CO_2 emission factor of electricty	Electricity	0.67	t CO_2/MWh	$EF_{CO2,ele}$
3. Calculations for reference emissions				
Reference emissions during the period of p		273	tCO_2/p	REp
Electricty generated by solar PV system		407.024		EC
4. Calculations of the project emissions				
Project emissions during the period of p		14	tCO_2/p	PEp
Electricty consumed by solar PV system	Coal	20	Ton/p	$FC_{PJ,p}$

[List of Default Values]

Joint Crediting Mechanism Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Philippine
Name of the methodology proponents submitting this form	Oriental Consultants Co., Ltd
Sectoral scope(s) to which the Proposed Methodology applies	Waste energy recovery
Title of the proposed methodology, and version number	Title: Waste Heat Recovery and Utilization in Textile and Garment Factory Version number: 01.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PH-PDD: ☐ Additional information
Date of completion	14 February 2018

History of the proposed methodology

Version	Date	Contents revised
01.0	14 February 2018	

A. Title of the methodology

Waste Heat Recovery and Utilization in Textile and Garment Factory

B. Terms and definitions

Terms	Definitions
Textile dyeing and finishing	The procedures from fabric pre-treatment to finishing in textile and garment dyeing houses. Including main procedures of fabric pre-treatment, dyeing and finishing (washing, drying) that is the chemical and physical treatments consuming heat and steam.

Waste heat	Heat energy of boiler exhaust gas and/or waste water from dyeing machines

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Recovered waste heats are used for preheating feed-water to boilers and dyeing machines so that reduce fuel consumption of boilers that provide steam or heat for dyeing and finishing process.
Calculation of reference emissions	Reference emission is calculated based on the amount of waste energy/heat utilized, boiler efficiency and CO2 emission factor of the fossil fuel that is used for providing energy to the dyeing process. Conservative values of the parameters are used to ensure the reference emission is lower than BaU emission.
Calculation of project emissions	The project emission is calculated based on the electricity consumption of waste heat recovery system and CO2 emission factor of electricity.
Monitoring parameters	The following parameters need to be monitored. The temperature and amount of feed-water for boiler and/or dyeing machines through heat exchangers in the project. The temperature of feed-water at the inlet of heat exchangers. The amount of electricity consumed by the waste heat recovery system.

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	Waste heat (heat from dyeing waste water) recovery from dyeing and finishing process in the existing or new textile and garment factories.
Criterion 2	Spiral heat exchanger is applied for heat recovery.
Criterion 3	Targeting factories with dyeing capacity more than 10 ton/day

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Fossil fuel consumption for getting the same amount of energy (steam and heat) recovered from waste heat recovery and utilized	CO_2
Project emissions	
Emission sources	GHG types
Electricity consumption by the waste heat recovery system	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

The reference emission is the emission from consumption of fossil fuel to gain the same amount of energy utilized from waste heat recovery system.

F.2. Calculation of reference emissions

$$RE_{\mathrm{p}} = (T_P - T_{Re}) \times \mathrm{W}_{th} \times \mathrm{F_w} \times \frac{1}{\mathrm{Ef}} \times \mathrm{EF_{CO2,fuel}} \times 10^{-6}$$

$\mathrm{RE_p}$: Reference emission [tCO_2/p]

$\mathrm{T_P}$: Temperature of feed-water to machines through heat exchanger in the project [℃]

$\mathrm{T_{Re}}$: Temperature of feed-water at the inlet of heat exchanger system in the project [℃]

$\mathrm{W_{th}}$: The specific heat of water [kJ/kg.℃]

$\mathrm{F_w}$: The amount of the feed-water to machines through heat exchanger in the project [t/p]

Ef: Boiler efficiency [ratio]

$\mathrm{EF_{CO2,fuel}}$: CO_2 emission factor the fossil fuel that is used to provide energy for dyeing and finishing process [tCO_2/TJ]

G. Calculation of project emissions

Project emission is calculated based on the amount of electricity consumed by the waste heat recovery system and electricity CO_2 emission factor.

$PE_p = EC_{PJ,y} \times EF_{elec}$

PE_p : Project emissions [t CO_2/p]

$EC_{PJ,p}$: Electricity consumption by the waste heat recovery system [MWh/p]

EF_{elec} : CO_2 emission factor of electricity [t CO_2/MWh]

H. Calculation of emissions reductions

$ER_p = RE_p - PE_p$

RE_p: Reference emissions [t CO_2/p]

PE_p: Project emissions [t CO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
Ef	Boiler efficiency	Textile factories (100% is used for conservativeness)
$EF_{CO2,fuel}$	CO_2 emission factor of the fuel used for steam generation Coal: 87.3 tCO_2/TJ (lower case of default value)	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2.
EF_{elec}	CO_2 emission factor of electricity In the case of grid: 0.670 tCO_2/MWh In the case of captive power plant (diesel): 0.8 tCO_2/MWh	In the case of grid (Official data from Philippine Government). ((IGES's List of Grid Emission Factors updated in August 2017)).

		In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology: AMS I.F. ver.2).

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (input sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$T_{af,ta}$	Temperature of feed-water at the outlet of waste heat recovery system in the project	70	℃	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(2)	$T_{be,ta}$	Temperature of feed-water at the inlet of waste heat recovery system in the project	30	℃	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(3)	$F_{w,ta}$	The amount of the feed-water to machines through the waste heat recovery system in the project	163,296	t/p	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(4)	$EC_{PJ,y}$	Electricity consumption by the waste heat recovery system	124	MWh/p	Option C	Monitored data	Collecting electricty consumption data with validated/calibrated monitoring devices and inputting to a spreadsheet electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	

Table 2: Project-specific parameters to be fixed *ex ante*

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	Description of data	Estimated Values	Units	Source of data	Other comments
Ef	Boiler efficiency	1.00	Ratio	0.75 from the manufacture specification (however, 1 is taken for ensure conservativeness)	
EF_{elec}	CO_2 emission factor of electricity	0.6700	t CO_2/MWh	Grid emission factor of Philippine	

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
2,358	tCO_2/p

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period of p		2358	tCO_2/p	ERp
2. Selected default values, etc.				
The specific heat of water	Water	4.18	kJ/kg.℃	W_{th}
CO_2 emission factor the fossil fuel that is used to provide energy for dyeing and finish	Coal	87.3	t CO_2/TJ	$EF_{CO2,fuel}$
3. Calculations for reference emissions				
Reference emissions during the period of p		2386	tCO_2/p	REp
Temperature of feed-water in the project		70	℃	$T_{af,ta}$
Temperature of feed-water in the case of without the project		30	℃	$T_{be,ta}$
Boiler efficiency		1.00	ratio	Ef
The amount of the feed-water in the project		163,296	t/p	$F_{w,ta}$
4. Calculations of the project emissions				
Project emissions during the period of p		27	tCO_2/p	PEp
Emission from electricty consumption by the waste heat recovery system				
Electricity consumption by the waste heat recovery system		41	MWh/p	$EC_{PJ,p}$
CO_2 emission factor of electricity		0.670	t CO_2/MWh	EF_{elec}

[List of Default Values]

Specific heat	W_{th}	
Water	4.184	kJ/kg. ℃
CO_2 emission factor of the fossil fuel that is used to provide energy for dyeing and finishing process	$EF_{CO2,fuel}$	
Coal	87.3	t CO_2/TJ

Joint Crediting Mechanism Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Philippine
Name of the methodology proponents submitting this form	Oriental Consultants Co., Ltd
Sectoral scope(s) to which the Proposed Methodology applies	Energy Efficiency
Title of the proposed methodology, and version number	Title: High Efficiency Boilers to Factories Version number: 01.001.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PDD: ☐ Additional information
Date of completion	14 February 2018

History of the proposed methodology

Version	Date	Contents revised
01.0	14 February 2018	

A. Title of the methodology

High Efficiency Boilers to Factories

B. Terms and definitions

Terms	Definitions
High efficiency boilers (HEB)	Coal boilers with efficiency higher than 85%, which provide steam or heat for production processes in factories

C. Summary of the methodology

Items	Summary

GHG emission reduction measures	This project involves the installation of new HEB or rehabilitation of existing boilers for steam or heat supply. The boiler efficiency of the reference scenario is typically lower than that of the project HOB. Therefore, the project activity leads to the reduction of coal consumption, resulting in lower emission of GHGs as well as air pollutants.
Calculation of reference emissions	Reference emissions are calculated by the net heat quantity supplied by the project HOB, boiler efficiency of the reference boiler and CO2 emission factor of fuel boiler used.
Calculation of project emissions	The sources of project emissions are fuel consumption of the project HEB.
Monitoring parameters	The amount of fuel consumed the project HEB

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	The technology to be employed in this methodology is a coal boiler for providing steams or heat to production processes
Criterion 2	Projects install coal boilers with efficiency higher than 85%
Criterion 3	Project activities installing new boilers or conducting rehabilitation of existing boilers
Criterion 4	Boilers are equipped with an operation and maintenance manual and fulfill the requirements of environment standards in host countries

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG type
Emissions from consumption of coal by reference boilers	CO_2
Project emissions	
Emission sources	GHG type

Emissions from consumption of coal by project boilers	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Without financial assistance from the project, it is expected that the existing conventional type of coal boilers, which have efficiency 70~75% are continuously used.
Reference emissions are calculated by the amount of the reference coal consumption and CO_2 emission factor of coal. The amount of fuel consumption in the reference scenario is calculated by dividing net heat quantity supplied by the project by boiler efficiency of the reference boiler. This is because the net heat quantity of the reference boiler is equal to the net heat quantity of the project boiler. Both "CO_2 emission factor of coal" and "boiler efficiency of the reference and project are set as default values.

F.2. Calculation of reference emissions

$$RE_p = \mathrm{PT_p}/\eta_{\mathrm{Re}} \times \mathrm{EF_{co2,coal}}$$

$\mathrm{RE_p}$: Reference emissions [tCO_2/p]
$\mathrm{PT_p}$: Amount of heat provided by the project in the period of p [TJ/p]
η_{Re}: Efficiency of reference boiler
$\mathrm{EF_{co2,coal}}$: CO_2 emission factor of coal used by boilers [tCO_2/TJ]

Here,

$$\mathrm{PT_p} = \mathrm{FC_{RE,p}} \times \mathrm{NCV_{coal}}/\eta_{\mathrm{P}}$$

$\mathrm{FC_p}$: Amount of coal consumed by the project boiler in the period of p [t/p]
$\mathrm{NCV_{coal}}$: Net caloric value of coal used by boilers [TJ/Gg]
η_{P} : Efficiency of project boiler

G. Calculation of project emissions

Project emissions are calculated by the amount of the project fuel consumption and CO_2

emission factor of the fuel

$PE_p = FC_{PJ,p} \times NCV_{coal} \times EF_{co2,fuel}$

PE_p : Project emissions [t CO_2/p]

$FC_{PJ,p}$: Amount of coal consumed by project boiler in the period of p [t/p]

$EF_{co2,fuel}$: CO_2 emission factor of coal use by boilers[tCO_2/TJ]

NCV_{fuel}: Net caloric value of fuel use by boilers [TJ/Gg]

H. Calculation of emissions reductions

$ER_p = RE_p - PE_p$

RE_p: Reference emissions [t CO_2/p]

PE_p: Project emissions [t CO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameters	Description of Data	Sources
Ef	Boiler efficiencies Reference boiler 75% Project boiler 85%	Boiler catalogs
$EF_{CO2,fuel}$	CO_2 efficiency of fuel Coal: 87.3 tCO_2/TJ	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2. (Table 1.4)
NCV_{coal}	Net caloric value of fuel Coal: 24 TJ/Gg	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2. (Table 1.2)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (input sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$FC_{PJ,p}$	Amount of fuel consumptioon in the project (coal)	6,090	Ton/p	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	For each fedd	

Table 2: Project-specific parameters to be fixed *ex ante*

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	Description of data	Estimated Values	Units	Source of data	Other comments
Ef_{Re}	Boiler efficiency	0.75	Ratio	0.75 from the manufacture specification	
Ef_{P}	Boiler efficiency	0.85	Ratio	0.75 from the manufacture specification	
EF_{elec}	CO_2 emission factor of electricity	0.6700	t CO_2/MWh	Grid emission factor of Philippine	

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
1,701	tCO_2/y

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period of p		1701	tCO_2/p	ERp
2. Selected default values, etc.				
Net caloric value of fossil fuel used by boiler	Coal	24.00	TJ/Gg	NCV_{coal}
CO_2 emission factor the fossil fuel used by boiler	Coal	87.3	t CO_2/TJ	$EF_{CO2,coal}$
3. Calculations for reference emissions				
Reference emissions during the period of p		14461	tCO_2/p	Rep
Boiler efficiency		0.75	ratio	Ef_{Re}
4. Calculations of the project emissions				
Project emissions during the period of p		12760	tCO_2/p	PEp
Emission from fuel consumption by project boiler				
Fuel consumption by project boiler	Coal	6,090	Ton/p	$FC_{PJ,p}$
Efficiency of project boiler	Coal	0.850		Ef_P

[List of Default Values]

Net calorif value of fossil fuel used by boiler	NCV_{coal}	
Coal	24	TJ/Gg
CO_2 emission factor of the fossil fuel that is used by boiler	$EF_{CO2,fuel}$	
Coal	87.3	t CO_2/TJ

Appendix2　PDD

2-1 PDD（PV）

2-2 PDD（HE）

2-3 PDD（HB）

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Solar PV System Introduction in Textile Factory in Quezon, the Philippines

A.2. General description of project and applied technologies and/or measures

The project introduces a solar PV system to a textile factory in Quezon, the Philippines. A 264 kW solar PV system is introduced to [redacted], one of the biggest textile factories in Quezon City. The project utilizes rooftop of workshops and empty spaces in the factory to install the solar PV system. In Philippine, capacity limit for connecting to grid through "net metering system" is up to 100kW. So the system in the project is an off-grid standalone system, which provides electricity to the factory for its own consumption. Regarding the solar PV system, Japanese solar panels and power conditioners are applied to ensure the efficiency of the system. The estimated CO_2 emission reduction from the project is 343 ton/year.

A.3. Location of project, including coordinates

Country	Philippine
Region/State/Province etc.:	Metro Manila
City/Town/Community etc:	Quezon
Latitude, longitude	[redacted]

A.4. Name of project participants

The Socialist Republic of Viet Nam	[redacted]
Japan	TBD

A.5. Duration

Starting date of project operation	TBD
Expected operational lifetime of project	15 years

A.6. Contribution from Japan

The proposed project will receive financial support from the government of Japan. The project is to apply for JCM model projects by the Ministry of the Environment, Japan (MOE). As a result of the financial support provided by MOE program, the initial investment cost of the proposed project has

been partially financed by Japanese government (up to 50% of the initial investment cost). Further, the proposed project promotes diffusion of low carbon technologies within Viet Nam. Through the MOE program, spiral type heat exchangers can be applied in textile and other food processing factories.

B. Application of an approved methodology(ies)

B.1. Selection of methodology (ies)

Selected approved methodology No.	A new methodology has developed for the project which needs to be approved by Joint Committee
Version number	

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Projects for construction and operation of a new solar PV system or capacity addition of an existing power generation unit that uses renewable energy sources.	The project installs a new solar PV system
Criterion 2	Projects that displacement of electricity that would be provided by a grid or captive power generator.	The project displaces electricity that would be provided by a grid in the case of without the project
Criterion 3	Net electricity generated from the solar PV system can be measured and monitored.	The solar PV system includes monitoring system with a display that measures net electricity generated and electricity consumed by the system itself
Criterion 4	The PV modules are certified for design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	The PV modules applied in the system are Sharp-made multi-crystalline solar panels
Criterion 5	Power conditioners in the solar PV system have efficiencies higher than 95%.	The project apples power conditioners with efficiency higher than 95%.

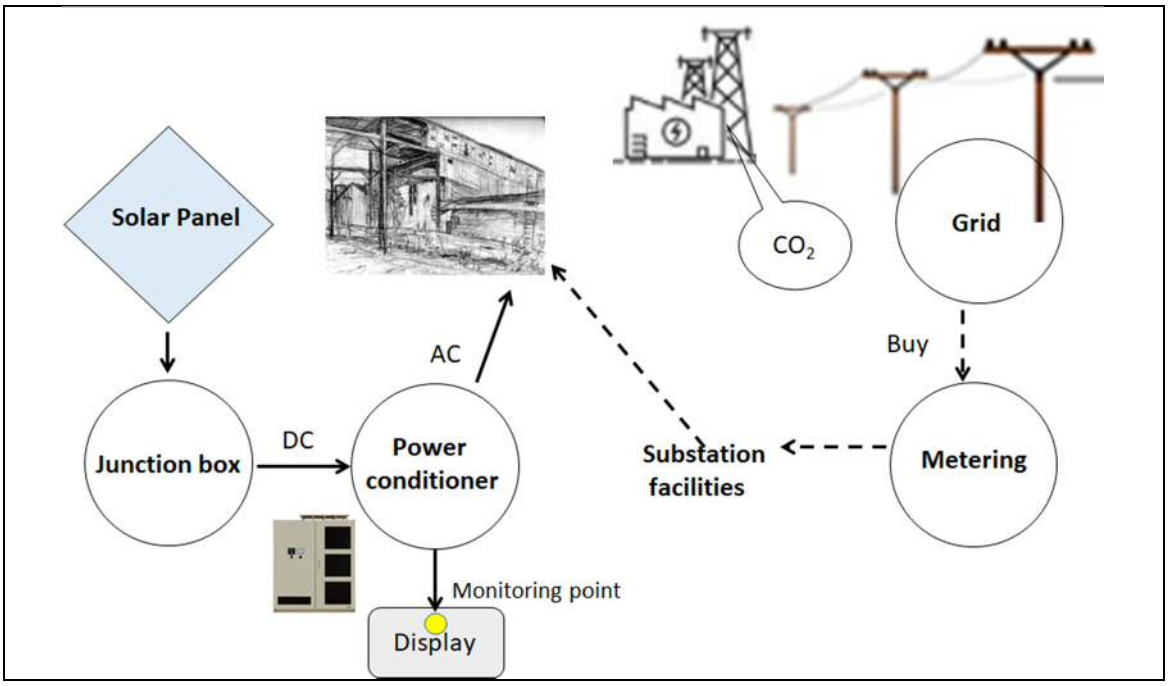
C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type

Emission from consumption of electricity from the grid	CO_2
Project emissions	
Emission sources	GHG type
Electricity consumption of the system	CO_2

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2019	361	18	343
2020	361	18	343
2021	361	18	343
2022	361	18	343
2023	361	18	343
2024	361	18	343
2025	361	18	343
2026	361	18	343
2027	361	18	343
2028	361	18	343
Total	3,610	180	3,430

(tCO_{2e})			

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Stakeholder meetings regarding the project will be organized in due course.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received

F. References

Reference lists to support descriptions in the PDD, if any.

Annex

Revision history of PDD

Version	Date	Contents revised
01.0	14 February 2018	First edition

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Waste Heat Recovery from the Dyeing and Finishing Process of Textile Factory in Quezon, the Philippines

A.2. General description of project and applied technologies and/or measures

The project introduces a waste heat recovery system to dyeing and finishing section of a textile factory in Quezon, the Philippines. As a waste heat recovery system, a spiral type heat exchanger from a Japanese company is applied to [redacted], one of the biggest textile factories in Quezon City. In textile factories, dyeing and finishing processes consume a huge amount of steam and water. Steam is used for drying and increasing the temperature of water in dyeing machines; after the dyeing contaminated water with high temperature, in most cases, is drained to waste water treatment facility directly. In this project, the waste heat recovery system (a spiral heat exchanger and pumps) installed will recover the heat of waste water from the dyeing machines and use the recovered energy is used to increase the temperature of feed water (fresh water) so that decrease the amount of steam used for increasing the temperature of the feed water. The steam reduction will result in decrease in the fuel consumption of boiler in the factory. A waste heat recovery system to be installed in the factory to recover heat from waste water in dyeing process. The estimated CO_2 emission reduction from the project is 2,358 ton/year.

A.3. Location of project, including coordinates

Country	Philippine
Region/State/Province etc.:	Metro Manila
City/Town/Community etc:	Quezon
Latitude, longitude	[redacted]

A.4. Name of project participants

The Socialist Republic of Viet Nam	[redacted]
Japan	TBD

A.5. Duration

Starting date of project operation	TBD

Expected operational lifetime of project	15 years

A.6. Contribution from Japan

The proposed project will receive financial support from the government of Japan. The project is to apply for JCM model projects by the Ministry of the Environment, Japan (MOE). As a result of the financial support provided by MOE program, the initial investment cost of the proposed project has been partially financed by Japanese government (up to 50% of the initial investment cost). Further, the proposed project promotes diffusion of low carbon technologies within Viet Nam. Through the MOE program, spiral type heat exchangers can be applied in textile and other food processing factories.

B. Application of an approved methodology(ies)

B.1. Selection of methodology (ies)

Selected approved methodology No.	A new methodology has developed for the project which needs to be approved by Joint Committee
Version number	

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Waste heat (heat from dyeing waste water) recovery from dyeing and finishing process in the existing or new textile and garment factories.	The project recoveries waste heat from dyeing and finishing processes of an existing textile factory
Criterion 2	Spiral heat exchanger is applied for heat recovery.	The project applies spiral type heat exchangers provided by [redacted]
Criterion 3	Targeting factories with dyeing capacity more than 10 ton/day	The production capacity of the target factory is around 20 ton/day

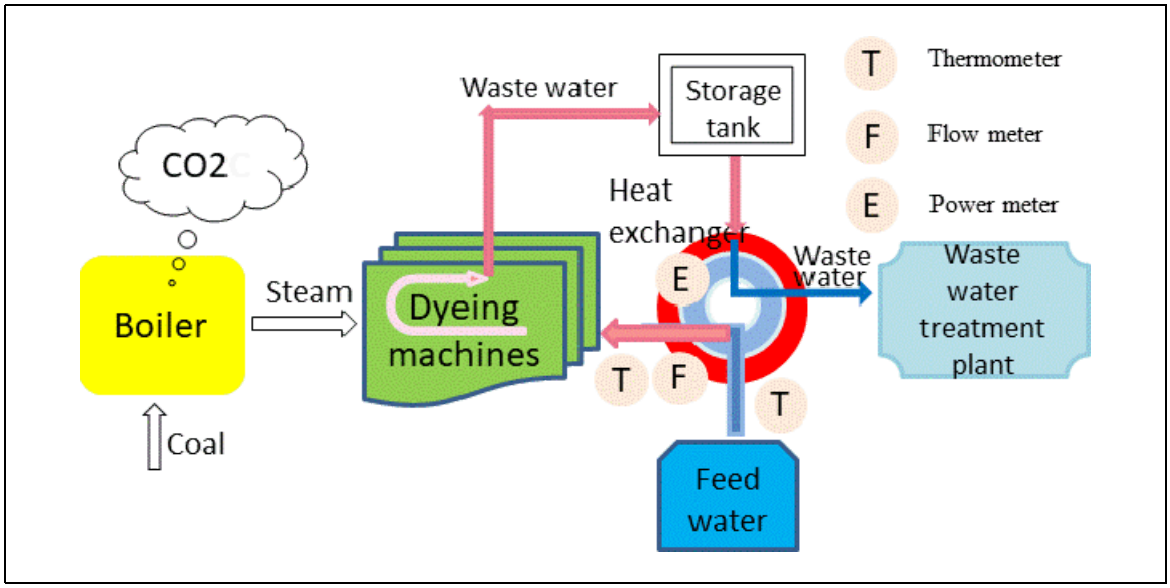
C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Combustion of coal used for providing steam for dyeing and finishing processes	CO_2
Project emissions	
Emission sources	GHG type

Electricity consumption of waste heat recovery system	CO_2

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2019	2,386	27	2,368
2020	2,386	27	2,368
2021	2,386	27	2,368
2022	2,386	27	2,368
2023	2,386	27	2,368
2024	2,386	27	2,368
2025	2,386	27	2,368
2026	2,386	27	2,368
2027	2,386	27	2,368
2018	2,386	27	2,368
Total (tCO_{2e})	23,860	270	23,680

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Stakeholder meetings regarding the project will be organized in due course.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received

F. References

Reference lists to support descriptions in the PDD, if any.

Annex

Revision history of PDD		
Version	Date	Contents revised
01.0	14 February 2018	First edition

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

High Efficiency Boiler Introduction in Textile Factory in Quezon, the Philippines

A.2. General description of project and applied technologies and/or measures

The project introduces a high efficiency coal boiler to a textile factory in Quezon, the Philippines. A fluidized bed boiler with efficiency 85% is introduced to [redacted], one of the biggest textile factories in Quezon City. The factory is using coal as fuel for its existing boilers to provide steam and heat to dyeing and finishing processes in the factory. The fuel consumption of a exiting boiler (with efficiency 70~75%) is around 40 ton/day. The estimated CO_2 emission reduction from the project is 1,701 ton/year.

A.3. Location of project, including coordinates

Country	Philippine
Region/State/Province etc.:	Metro Manila
City/Town/Community etc:	Quezon
Latitude, longitude	[redacted]

A.4. Name of project participants

The Socialist Republic of Viet Nam	[redacted]
Japan	TBD

A.5. Duration

Starting date of project operation	TBD
Expected operational lifetime of project	15 years

A.6. Contribution from Japan

The proposed project will receive financial support from the government of Japan. The project is to apply for JCM model projects by the Ministry of the Environment, Japan (MOE). As a result of the financial support provided by MOE program, the initial investment cost of the proposed project has been partially financed by Japanese government (up to 50% of the initial investment cost). Further, the proposed project promotes diffusion of low carbon technologies within Viet Nam. Through the MOE program, spiral type heat exchangers can be applied in textile and other food processing

factories.

B. Application of an approved methodology(ies)

B.1. Selection of methodology (ies)

Selected approved methodology No.	A new methodology has developed for the project which needs to be approved by Joint Committee
Version number	

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

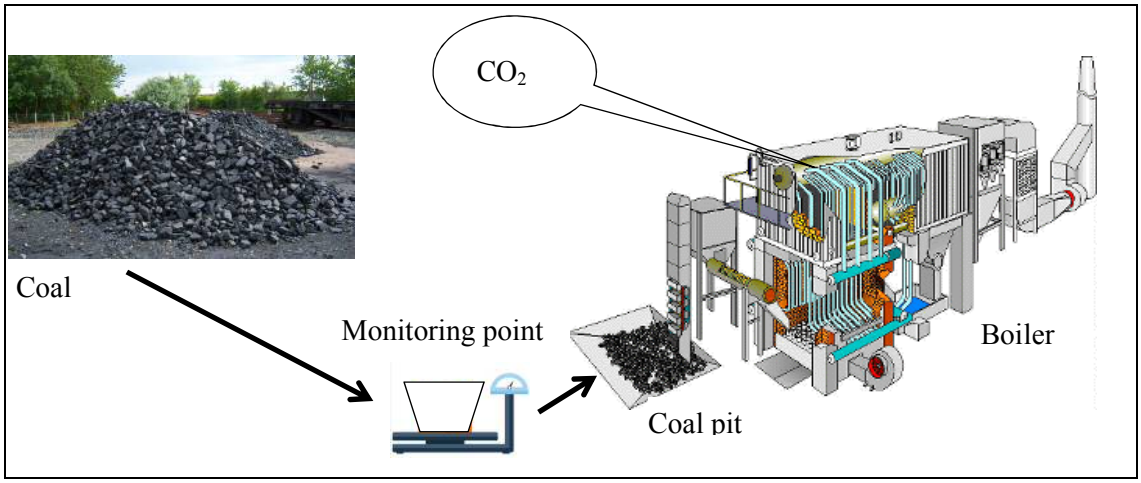
Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	The technology to be employed in this methodology is a coal boiler for providing steams or heat to production processes	The project installs a coal boiler in the factory to provide steam to dyeing and finishing processes.
Criterion 2	Projects install coal boilers with efficiency higher than 85%	The boiler in the project has efficiency of 85%
Criterion 3	Project activities installing new boilers or conducting rehabilitation of existing boilers	The project installs a new coal boiler
Criterion 4	Boilers are equipped with an operation and maintenance manual and fulfill the requirements of environment standards in host countries	The coal boiler in the project meets all environmental requirements and standards in Philippine regarding coal boilers and operation and manual is provided to the factory along with training related staff of the factory.

C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Emissions from consumption of coal by the reference boiler	CO_2
Project emissions	
Emission sources	GHG type
Emissions from consumption of coal by the project boiler	CO_2

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2019	14,461	12,760	1,701
2020	14,461	12,760	1,701
2021	14,461	12,760	1,701
2022	14,461	12,760	1,701
2023	14,461	12,760	1,701
2024	14,461	12,760	1,701
2025	14,461	12,760	1,701
2026	14,461	12,760	1,701
2027	14,461	12,760	1,701
2028	14,461	12,760	1,701
Total (tCO_{2e})	144,610	127,600	17,010

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Stakeholder meetings regarding the project will be organized in due course.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received

F. References

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Annex

Revision history of PDD		
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Appendix3　JCM Manual

Joint Crediting Mechanism (JCM) Manual

1. Background

The Philippines has become the 17th member country of Joint Crediting Mechanism (JCM), which can provide technological and financial support for climate change mitigation projects in member countries. So, JCM may help facilitate the existing energy efficiency and renewable energy promotion programs in Philippine such as the Philippine Energy Efficiency Roadmap 2014–2030 and the National Renewable Energy Program (NREP).

The Energy Efficiency Roadmap shall guide the Philippines in building an energy-efficient nation, and in making energy efficiency and conservation a way of life for all Filipinos. The NREP signals the country's big leap from fragmented and halting renewable energy initiatives into a focused and sustained drive towards energy security and improved access to clean energy.

Along with a JCM feasibility study in the field of promoting energy efficiency and renewable energy projects under the City and City Collaboration between Osaka and Quezon, the JCM manual is developed to accelerate the development and implement of JCM projects in Philippine and to promote Quezon Climate Change Action Plan as well. The objective of the manual is to provide consice information for persons involved on the procedures of JCM project implementation and the method of estimating Green House Gas (GHG) emission reduction for the projects on waste heat recovery from dyeing section, introduction of high efficiency boilers and solar power generation.

2. Introduction of JCM

2.1 Basic Concepts of JCM

The Joint Crediting Mechanism (JCM) is a project-based bilateral offset crediting mechanism initiated by the Government of Japan. JCM aims to facilitate diffusion of leading low carbon technologies, products, systems, services and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries. JCM also seeks to contribute to GHG emission reductions or removals by facilitating global actions.

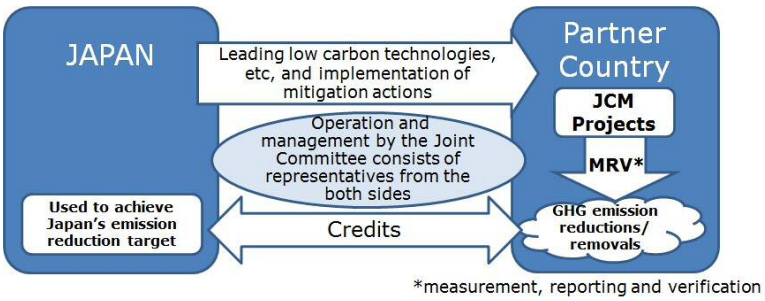


Figure 1 JCM Scheme

The JCM is implemented by Japan and a host JCM partner country through bilateral agreements. A JCM project is implemented in the host country using an advanced low carbon technology to reduce GHG emissions.

The JCM was designed to take into consideration robust methodologies, transparency, and environmental integrity of its procedures, rules, and guidelines, while maintaining simplicity and practicality. JCM procedures also address double counting of emission reductions by establishing registries, which track relevant information for the issued credits. The registries will also prevent registered JCM projects from being used under any other international climate mitigation mechanisms.

Emission reductions are calculated as the difference between "reference emissions" defined as emissions estimated below business-as-usual (BaU), and the "project emissions." The reference emissions and the project emissions can be calculated based on an approved methodology

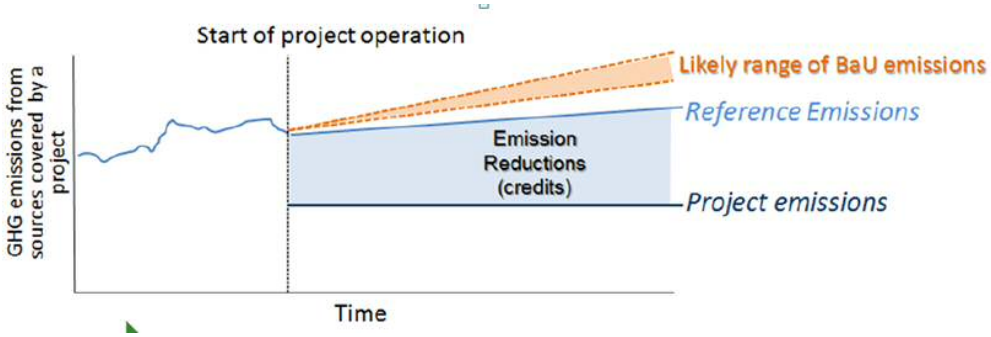


Figure 2 Emission Reduction Calculation Concept

2.2 JCM Stakehloders

Figure 3 below provides an overview of the various stakeholders involved in the JCM and their interface during the implementation of a JCM project.

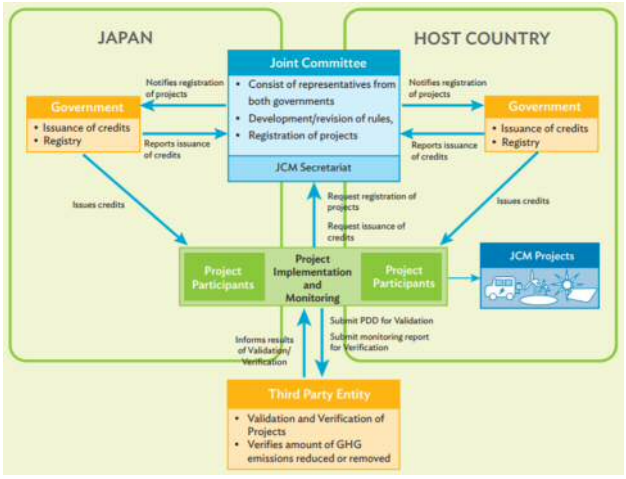


Figure 3 Overview of JCM Stakeholders

2.3 JCM Project Cycle

Figure 4 below depicts the project development cycle of of JCM.

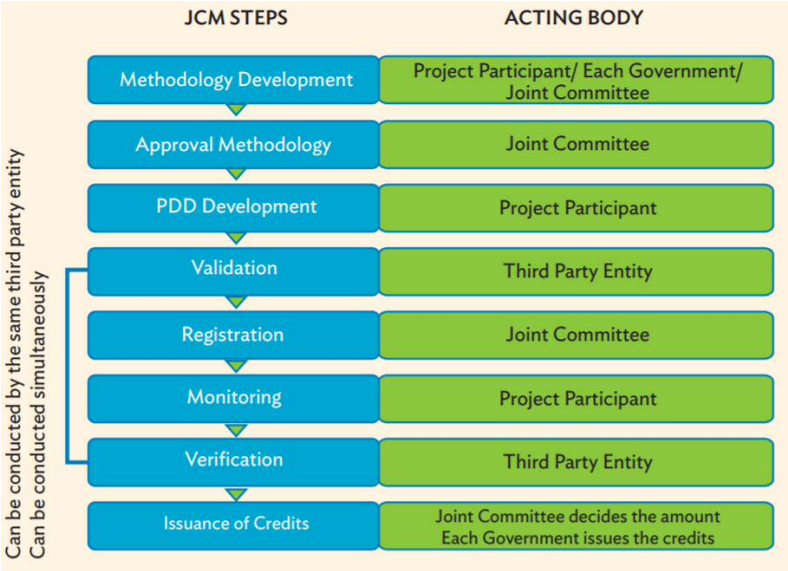


Figure 4 JCM Project Developmet Cycle

PDD:Project design document

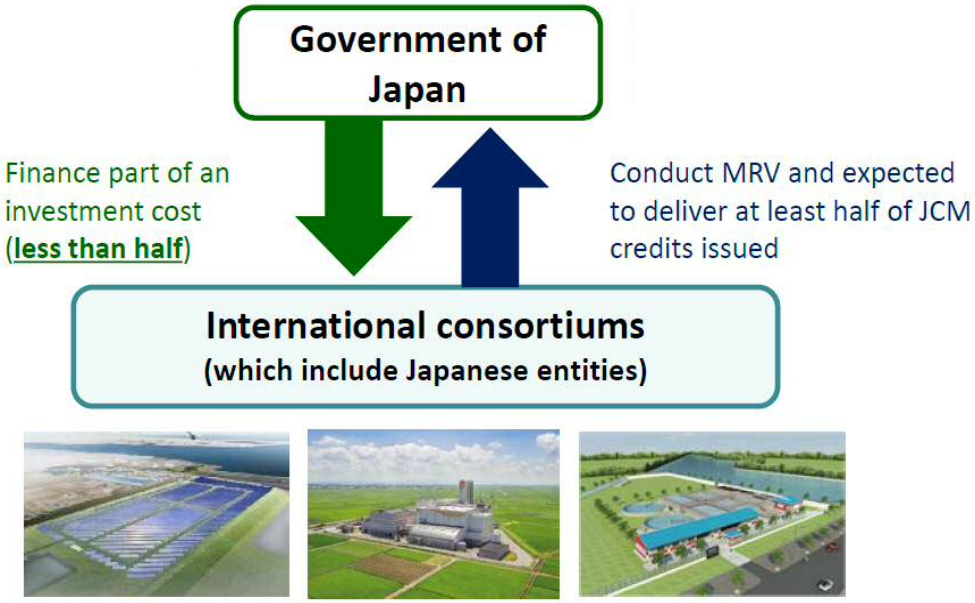
2.4 Eligible Projects under the JCM

There are 15 sectors under the JCM which are based on the CDM sectoral scopes. A JCM project may fall within more than one sectoral scope.

(i) Energy industry (renewable and nonrenewable sources) (ii) Energy distribution (iii) Energy demand (iv) Manufacturing industries (v) Chemical industry (vi) Construction (vii) Transport (viii) Mining/mineral production (ix) Metal production (x) Fugitive emissions from fuel (solid, oil, and gas) (xi) Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride (xii) Solvent use (xiii) Waste handling and disposal (xiv) Afforestation and reforestation15 (xv) Agriculture

2.5 JCM Model Projects

Japanese Government facilitate JCM model projects by providing subsidy up to 50% of the investment cost of a JCM model project. The subsidy covers contruction and cost of facilities, equipment, vehiceles, etc which directly contribute to reduction of CO2 emission reduction. Model projects should complete installation and contruction of systems within 3 years.



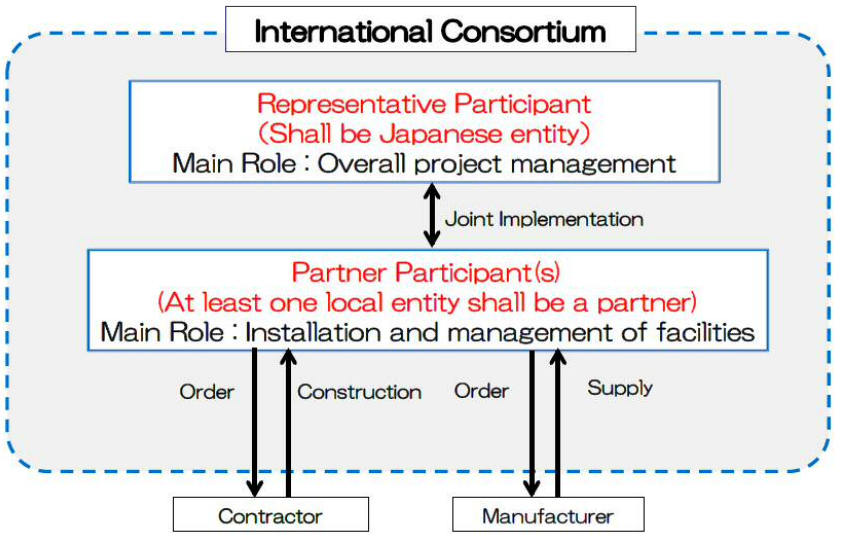


Figure 5 Example of International Consortium

The functions of Japanese participant are as follows.

- Applying for the model project
- Project management and coordination
- Introducing technology
- Purchasing, installing facilities using the construction period and managing the facilties during the project period (life time of the technology stipulated by Japanesse law)

- Return and compensate the finance resulting from any violation of financial regulation by any of the project participants

.

3. Technologies Examples

3.1 Waste Heat Recovery

In most cases, a WHR system generates electricity through the recovery of exhaust heat from production facilities such as textile, cement, and other type of industries. In the case of textile or food processing factories , it is possible to recover heat from waste water from dyeing processes.

Table 1 Charateristics of Textile Industry Energy Consumption

	Spinning	Knitting	Dyeing	Sewing
Electric energy	◎	◎	○	○
Heat energy	×	×	◎	×

In the textile industry, electric energy is mostly consumed by motors and compressors (partly). On the other hand, dyeing process also consumes a large amount of heat energy, which is provided by boilers. Dyeing process also generates a huge amount of heated wastewater.

From the perspective of energy saving potentiality in textile factories, introducing energy saving technologies or practices to dyeing and finishing process promises significant energy saving results.

Heat exchangers are the technology for recovering and applying waste heats from waste water generated in dyeing processes. Recovered waste heat is used to heat up the temperature of supply water (clean water) to the dyeing process or boilers. Generally, the temperature of the supply water is increased if necessary by using steam from boilers.

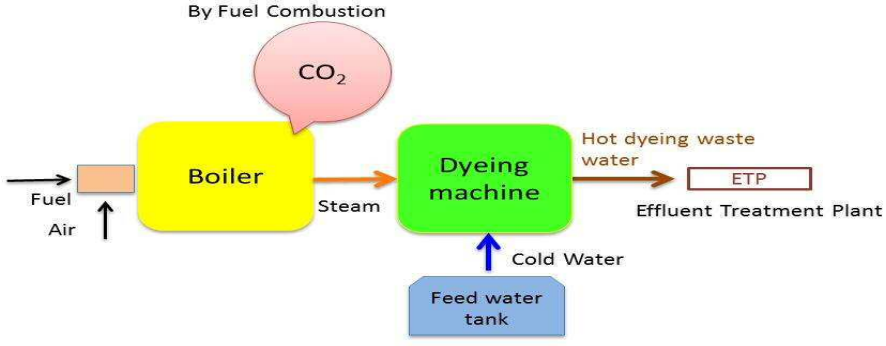


Figure 5 A Situation without Waste Heat Recovery

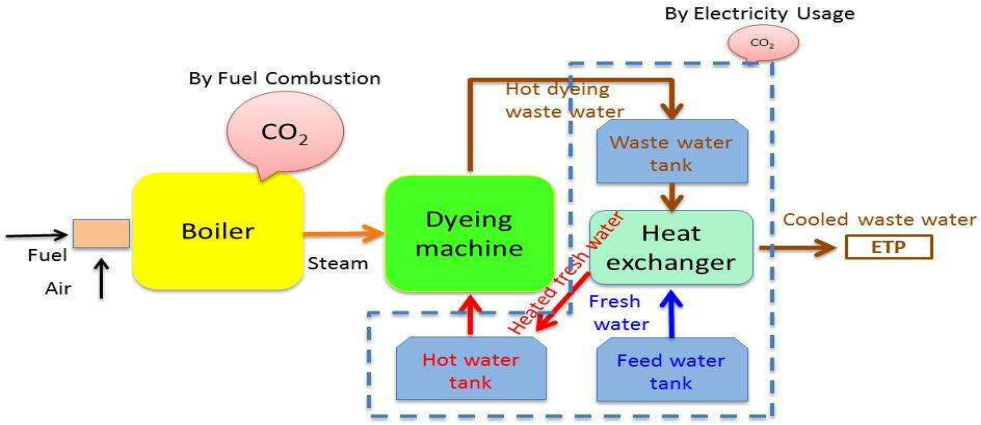


Figure 6 A Case of Introduction of Waste Heat Recovery

There are several types of heat exchangers such as tube types, plate types and spiral types. The comparison of different type of heat exchangers is given in the table below.

Table 2 Comparison of Different Types of Heat Exchangers

	Advantages	Disadvantage
Shell & Tube type	Long history High temperature & pressure	Low efficiency Large space Easy to be fouled and clogged.
Plate type	High efficiency Low initial cost Compact	Easy to be fouled and clogged. Expensive rubber packing & maintenance.
Spiral type	High efficiency Suitable for dirty fluid Low cost for maintenance Compact	Pressure drop of the spiral flow is slightly high.

As depicted in the table above, the spiral type heat exchangers are suitable for recovering waste heat from fluids containing suspended solids such as hairs, threads and films. Therefore, for projects which try to recover waste heat from waste dyeing water in textile industries, the spiral type heat exchangers are recommended to be applied.

This type of heat exchangers can also be applied to recover and apply heat from edible oil used for frying foods in restaurants and plants.

3.2 The GHG Emission Reduction Estimation Methodology for Waste Heat Recovery and Utilization in Textile Industries

3.2.1.Terms and Definitions

Textile dyeing and finishing: The processes from pre-treatment to finishing in yarn and garment dyeing houses.Including main procedures of pre-treatment, dyeing and finishing (washing/rinsing) of yarns or fabrics that is the chemical and physical treatments of yarn and fabrics by consuming heat (steam).

Waste heat: Heat energy from boiler exhaust air and/or waste water from dyeing machines.

3.2.2. Summmary of the Methodology

Items	Summary
GHG emission reduction measures	Recovered waste heat is used for preheating feed-water to boilers and dyeing machines so that reduce the fossil fuel consumption of boilers which provide steam for dyeing and finishing process.
Calculation of reference emissions	Reference emission is calculated based on the amount of waste energy/heat utilized, boiler efficiency and CO2 emission factor of the fossil fuel that is used in boilers for providing energy to the dyeing process. Conservative values of the parameters are used to ensure the reference emission are lower than BaU emissions.
Calculation of project emissions	The project emission is calculated based on the electricity consumption of waste heat recovery system and CO2 emission factor of the electricity .
Monitoring parameters	The following parameters need to be monitored. The temperature and the amount of feed-water for dyeing machines and/or boiler in the project. The amount of electricity consumed by the waste heat recovery system.

This methodology is applicable to the projects of recovering heat from waste water generated in the processes of yarn and fabric dyeing in the textile factories or food processing factories.

3.2.3. Establishment of Reference Emissions

The reference emission is the emission from the consumption of fossil fuel to gain the same amount of waste energy utilized.

3.2.4. Calculation of Reference Emissions

$$RE_y = (T_P - T_{Re}) \times W_{th} \times F_w \times \frac{1}{Ef} \times EF_{CO2,fuel} \times 10^{-6}$$

RE_y: Reference emission [tCO_2/y]

T_P: Temperature of feed-water to the heat exchanger the project [degree C]

T_{Re}: Temperature of feed-water from the heat excher to dyeing machines in the case the project [degree C]

W_{th}: The specific heat of water [kJ/kg degree C]

F_w: The amount of the feed-water in the project [t/y]

Ef: Boiler efficiency [ratio]

$EF_{CO2,fuel}$: CO_2 emission factor the fossil fuel that is used to provide energy for dyeing or other production processes[tCO_2/TJ]

3.2.5. Calculation of Project Emissions

Project emission is calculated based on the amount of electricity consumed by the waste heat recovery system and electricity CO2 emission factor.

$PE_y = EC_{PJ,y} \times EF_{elec}$

PE_y : Project emissions [t CO2/y]

$EC_{PJ,y}$: Electricity consumption by the waste heat recovery system [MWh/y]

EF_{elec} : CO2 emission factor of electricity [t CO2/MWh]

3.2.6. Calculation of Emissions Reduction

$ER_y = RE_y - PE_y$

RE_y: Reference emissions [t CO_2/y]

PE_y: Project emissions [t CO_2/y]

3.2.7. Data and Parameters Fixed Ex-ante

Parameter	Description of data	Source
Ef	Boiler efficiency	Factories (100% is used for

		conservativeness)
$EF_{CO2,fuel}$	CO_2 emission factor of the fuel used for steam generation Natural gas:54.3 t CO_2/TJ (54.3–58.3) Coal:87.3 t CO_2/TJ (87.3–101) Heavy oil:71.1 t CO_2/TJ (71.1–75.5)	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2.
EF_{elec}	CO_2 emission factor of electricity In the case of grid: 0.508 tCO_2/MWh In the case of captive power plant (diesel): 0.8 tCO_2/MWh	In the case of grid (Combined margin emission factor for Philippine) (IGES's List of Grid Emission Factors)). In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology: AMS I.F. ver.2).

3.3. Energy Efficient Boiler

Boiler is an important equipment of the most industrial facilities and power plants. Boiler is a closed pressure vessel used to produce high pressure or low pressure steam or to produce hot water, heat for industrial or domestic use. Industrial steam boilers are classified in too many ways like. According to type of fuel used, there are coal fired boilers, oil fired boilers, gas fired boilers, biomass boilers and electric boilers and waster heat recovery boilers; according to steam pressure, there are low pressure boilers, medium pressure boilers and high pressure boilers.

Nippon Thermoener is a manufacturer of boilers and provides high efficient boilers, such as steam boilers, hot-water heaters, and heat medium boilers, and other energy-saving and environmentally friendly equipment and systems. As a boiler needs a huge amount of investment, the feasibility of replacement of exisiting boilers with high effiency boilers relies on the timing, condition of existing boilers and type of fuel the boiler using.

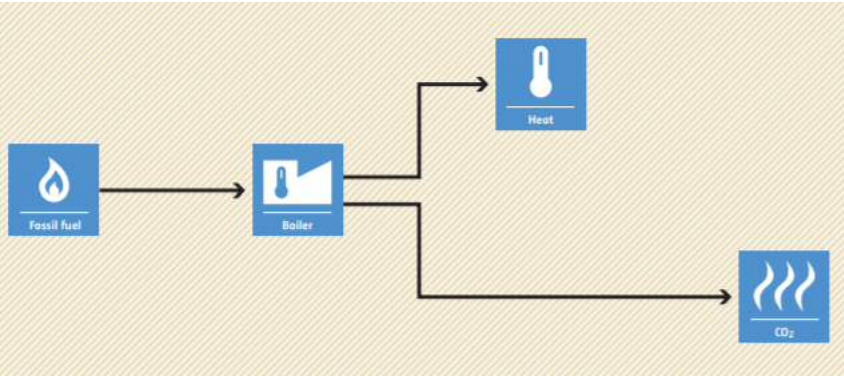


Figure 7 Reference Scenario (without project)

Without introduction of high efficiency boilers (HOB), boiler(s) with lower efficiency will continue to operate at multiple locations, thereby consuming high amounts of fossil fuel. Employing HOBs through their rehabilitation or replacement will result in a reduction of fossil fuel consumption and related CO2 emissions.

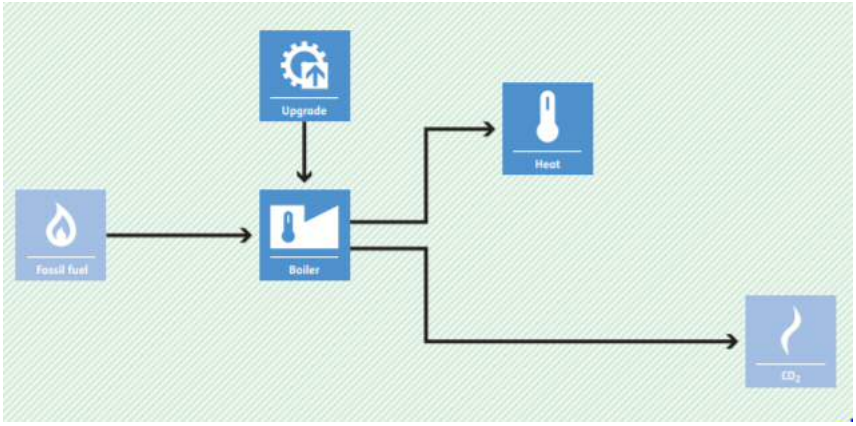


Figure 8 Project Sceneario

3.4. The GHG Emission Reduction Estimation Methodology for High Efficiency Boilers

3.4.1.Terms and Definitions

HOB: The HOB is defined as a boiler to supply steam or heat or hot water.

3.4.2. Summmary of the Methodology

Items	Summary
GHG emission reduction measures	Installation of new HOB for steam or heat or hot water supply system and the replacement of existing coal or gas or oil fired boiles.The boiler efficiency of the reference

	HOB is typically lower than that of the project HOB. Therefore, the project activity leads to the reduction of coal consumption, resulting in lower emission of GHGs as well as air pollutants.
Calculation of reference emissions	Reference emissions are calculated by the net heat quantity supplied by the project HOB, boiler efficiency of the reference HOB and CO2 emission factor of the fuel
Calculation of project emissions	The sources of project emissions are the fuel consumption and electricity consumption of project HOB.Project emissions are calculated by the net heat quantity supplied by the project HOB, boiler efficiency of the project HOB and CO2 emission factor of coal. In addition, project emissions due to auxiliary electricity consumption are included, on the basis of electricity consumption and CO2 emission factor of the grid.
Monitoring parameters	The quantity of fule used by the project HOB. Total hours of the project HOB operation during the monitoring period .

3.4.3. Establishment of Reference Emissions

Reference emissions are calculated by the amount of the reference fuel consumption and CO2 emission factor. The amount of fuel consumption in the reference scenario is calculated by dividing “net heat quantity supplied by the project HOB” by “boiler efficiency of the reference HOB”. This is because the net heat quantity of the reference HOB is equal to the net heat quantity of the project HOB. Both “CO2 emission factor” and “boiler efficiency of the reference HOB” are set as default values. The reference emissions are calculated as follows.

3.4.4. Calculation of Reference Emissions

$$RE_p = FC_{P,y} \times NCV_{P,fuel} \times \eta_{P,HOB} / \eta_{RE,HOB} \times EF_{CO2,coal}$$

Where;

RE_y : Reference emissions during the period y [tCO2/y]

$FC_{P,y}$: Quantity of fuel used by the project HOB during the period y [t/y]

$NCV_{P,fuel,y}$:Net calorif value of the fuel used by the project HOB during the period y [GJ/t]

$\eta_{RE,HOB}$: Boiler efficiency of the reference HOB [-]
$\eta_{P,HOB}$:Boiler efficiency of the project HOB [-]
$EF_{CO2,coal}$: CO2 emission factor of coal [tCO2/GJ]

The reference HOB may use electricity,but it is not counted to ensure conservativeness (less reference emission).

3.4.5. Calculation of Project Emissions

Project emissions are calculated by "the amount of the project fuel consumption" and "CO2 emission factor of the fuel". Both "CO2 emission factor" and "boiler efficiency of the project and reference HOB" are set as default values. Additionally, electricity consumption of the project HOB is calculated in a conservative manner.
Therefore, the project emissions are calculated as follows.

$PE_y = FC_{P,y} \times EF_{CO2,fuel} + EC_{P,y} \times EF_{CO2,grid}$
Where;
PE_p : Project emissions during the period y [tCO2/y]
$PC_{P,y}$: Quantity of fuel used by the project HOB during the period y [t/y]
$EF_{CO2,fuel}$: CO2 emission factor of fuel [tCO2/GJ]
$EC_{P,y}$:Electricity consumption of the project HOB during the period p [MWh/y]
$EF_{CO2,grid}$:CO2 emission factor of the grid electricity consumed by the project HOB [tCO2/MWh]

$EC_p = RPC_{PJ,HOB} \div 1000 \times HMP_p$
Where;
EC_y : Electricity consumption of the project HOB during the period y [MWh/y]
$RPC_{PJ,HOB}$: Rated power consumption of the project HOB [kW]
HMP_y : Total hours of the project HOB operation during the monitoring period y [h/y]

3.4.6. Calculation of Emissions Reduction

$ER_y = RE_y - PE_y$
RE_y: Reference emissions [t CO_2/y]
PE_y: Project emissions [t CO_2/y]

3.4.7. Data and Parameters Fixed Ex-ante

The source of each data and parameter fixed ex ante is listed as below.

Parameter	Description of data	Source
$\eta_{RE,HOB}$	Boiler efficiency of the reference HOB calculated from published information and measured data	Actual measured values.
$\eta_{P,HOB}$	Boiler efficiency of the project HOB calculated from published information and measured data	Actual measured values.
$EF_{CO2,coal}$	CO2 emission factor of fuel Natural gas:54.3 t CO_2/TJ (54.3–58.3) Coal:87.3 t CO_2/TJ (87.3–101) Heavy oil:71.1 t CO_2/TJ (71.1–75.5)	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2.
$EF_{CO2,\text{grid}}$	CO2 emission factor of the grid electricity consumed by the project HOB. In the case of grid: 0.508 tCO_2/MWh In the case of captive power plant (diesel): 0.8 tCO_2/MWh	The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. In the case of grid (Combined margin emission factor for Philippine) (IGES's List of Grid Emission Factors)). In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology: AMS I.F. ver.2).
$\text{RPC}_{PJ,HOB}$	Rated power consumption of the project HOB	Catalog value provided by the manufacturer of the project HOB

3.5. Solar Photovoltic Power Generation

A photovoltaic system, also PV system or solar power system, is a power systemdesigned to supply usable solar powerby means of photovoltaics. It consists of an arrangement of several components, including solar panels to absorb and convert sunlight into electricity, a solar inverter to change the electric current from DC to AC, as well as mounting, cablingand other electrical accessories to set up a working system.

It may also use a solar tracking system to improve the system's overall performance and include an integrated battery solution, as prices for storage devices are expected to decline. Strictly speaking, a solar array only encompasses the ensemble of solar panels, the visible part of the PV system, and does not include all the other hardware. Moreover, PV systems convert light directly into electricity and shouldn't be confused with other technologies, such as concentrated solar power or solar thermal, used for heating and cooling.

PV systems range from small, rooftop-mounted or building-integratedsystems with capacities from a few to several tens of kilowatts, to large utility-scale power stations of hundreds of megawatts. Nowadays, most PV systems are grid-connected, while off-grid or stand-alone systemsonly account for a small portion of the market.

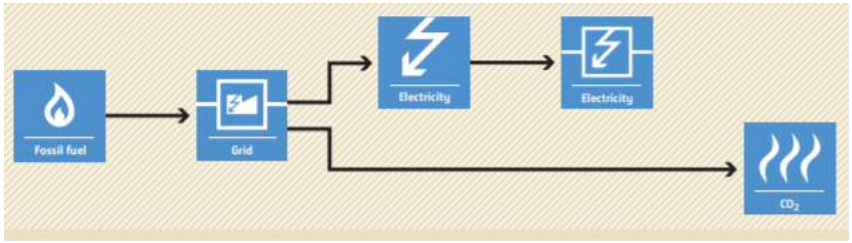


Figure 9 Reference Scenario (without project)

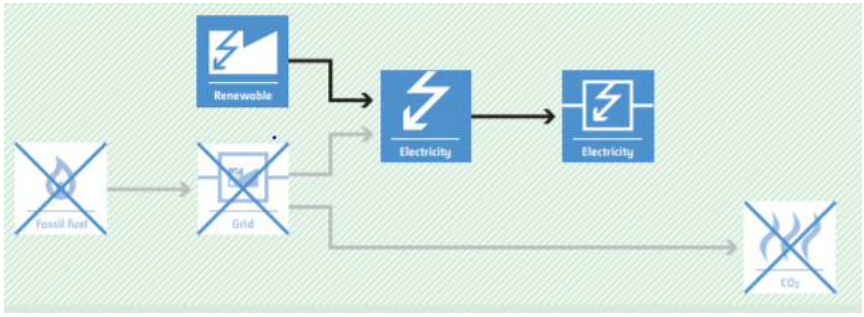


Figure 10 Project Sceneario

A complete PV system includes different components that should be selected taking into consideration your individual needs, site location, climate and expectations.

Grid-connected PV systems are designed to operate in parallel with and interconnected with the electric utility grid. The primary component is the inverter, or power conditioning unit (PCU). The inverter converts the DC power produced by the PV array into AC power consistent with the voltage and power quality required by the utility grid. The inverter automatically stops supplying power to the grid when the utility grid is not energized. A bi-directional interface is made between the PV system AC output circuits and the electric utility network, typically at an on-site distribution panel

or service entrance. This allows the power produced by the PV system to either supply on-site electrical loads, or to back feed the grid when the PV system output is greater than the on-site load demand. During periods when the electrical demand is greater than the PV system output (night-time), the balance of power required is received from the electric utility This safety feature is required in all grid-connected PV systems, it also ensures that the PV system will not continue to operate and feed back onto the utility grid when the grid is down for service or repair.

3.6 The GHG Emission Reduction Estimation Methodology for Solar PV System Introduction

3.6.1.Terms and Definitions

Solar photovoltaic (PV) system:An electricity generation system which converts sunlight into electricity by the use of photovoltaic (PV) modules. The system also includes ancillary equipment such as inverters required to change the electrical current from direct current (DC) to alternating current (AC).

3.6.2. Summmary of the Methodology

Items	Summary
GHG emission reduction measures	Displacement of grid electricity and/or captive electricity by installation and operation of solar PV system(s).
Calculation of reference emissions	Reference emissions are calculated on the basis of the AC output of the solar PV system(s) multiplied by either; 1) the conservative emission factor of the grid, or 2) conservative emission factor of diesel power generator.
Calculation of project emissions	Project emissions are the emissions from the solar PV system(s), which are assumed to be zero.
Monitoring parameters	The quantity of the electricity generated by the project solar PV system(s).

3.6.3. Establishment of Reference Emissions

The reference emission is the emission from the grid or a captive disel generator to generate the same of amout of electricity as the PV system in the project.

In the case of grid, a combined margin emission factor (IGES's List of Grid Emission Factors)) of host country is used. Foe example, 0.508 tCO_2/MWh for Philippine.

In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology:

AMS I.F. ver.2), 0.8 tCO_2/MWh is used.

3.6.4. Calculation of Reference Emissions

$$RE_p = \sum_i (EG_{i,p} \times EF_{RE,i})$$

REp :Reference emissions during the period y [tCO2/y]
EGi,p :Quantity of the electricity generated by the project solar PV system i during the period y [MWh/y]
EFRE,i : CO_2 emission factor of grid or a captive generation which is replaced by the project solar PV i [tCO2/MWh]

3.6.5. Calculation of Project Emissions

Project emissions are not counted in the methodology as electricity consumption by any PV system is negligible.

PEp = 0

PEp : Project emissions during the period y [tCO2/y]

3.6.6. Calculation of Emissions Reduction

$$ER_y = RE_y - PE_y$$

RE_y: Reference emissions [t CO_2/y]

PE_y: Project emissions [t CO_2/y]

3.6.7. Data and Parameters Fixed Ex-ante

Parameter	Description of data	Source
EF_{elec}	CO_2 emission factor of electricity or a captive generator. In the case of grid: 0.508 tCO_2/MWh In the case of captive power plant (diesel): 0.8 tCO_2/MWh	In the case of grid (Combined margin emission factor for Philippine) (IGES's List of Grid Emission Factors)). In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology: AMS I.F.

		ver.2).

4. Points for JCM project implementation

The following points need to be determined to implement a model project. These are also seen as challeneges to realize JCM model projects.

- Determination of a representative project participant early
- Confirmation of local participants an their decision
- Conclusion of international consortium agreement
- Confirmation of the budget adjustment of local participants
- Financing plan
- Profitability analysis
- Project schedule
- Confirmation of law, regulations and licenses.

5. Future prospects

5.1. Expansion of JCM project

JCM model project supports initial investment cost and contribute to CO_2 reduction. However, recognition of JCM is insufficient in Philippines. Therefore, it is important to introduce technologies to potential counterparts such as industrial parks, hotels, hospitals, schools, and public buildings with huge energy consumption. Introduction to successful JCM model projects into an overall country is a key challenge forward.

5.2 Populirize JCM

JCM scheme has been evolved into a win-win scheme which requires various players participation and open to different business models such as ESCO, lease and PPP. Therefore, it is important to activate industrial association groups to encourage their members to benefit from JCM through applicable business models.

Workshop on the Promotion of Low Carbon Development in Quezon City under the City to City Cooperation between Quezon and Osaka

November 20th , 2017

Environmental Protection and Waste Management Department

QUEZON CITY
LOCAL CLIMATE CHANGE ACTION PLAN
(QC LCCAP)
2017-2027

Outline

- Laws and Policies
  - International Policies and Initiatives
  - National Policies and Initiatives
  - National Climate Change Action Plan (NCCAP) Seven Priority Areas
- QC LCCAP
  - Background
  - Chapters
  - Workshops Conducted
  - Survey Sample

International Policies and Initiatives

- Paris Agreement, a new legally-binding framework for an internationally coordinated effort to tackle climate change, UN Climate Change Conference (COP21) Paris 2015.

- UN Framework Convention on Climate Change (commission enforce, 1994)

- Kyoto Protocol, (adopted, 1997) (entered into force 2005) Bali Plan of Action, etc.

National Policies and Initiatives

- Republic Act 9729 or the Climate Change Act of 2009
- Framework Strategy on Climate Change 2010 – 2022
- National Framework on Strategy on Climate Change (2010-2022)
- National Climate Change Action Plan 2011 – 2028
- Republic Act 10174 or People's Survival Funds Act 2012

National Policies and Initiatives

- Other Related Legal Mandates and Policies
  - DILG Memorandum Circular 2008 – 69
  - DILG Memorandum Circular 2008 – 161
  - DILG Memorandum Circular 2009 – 73
  - DILG Memorandum Circular 2009 – 164
  - DILG Memorandum Circular 2011 – 27
  - DILG Memorandum Circular 2011 – 166
  - DILG Memorandum Circular 2012 – 02
  - DILG Memorandum Circular 2012 – 73
  - NDRRMC-DBM and DILG Joint Memorandum Circular(JMC) No. 2013-1

Republic Act 9729 or the Climate Change Act of 2009

Section14 of Republic Act No.9729 also known as Climate Change Act of 2009 states that:

"The LGUs shall be the front line agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the National Framework Strategy on Climate Change and the NCCAP.

Barangays shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Municipal and city governmSection14 of Republic Act No.9729 also known as Climate Change Act of 2009 states that: "The LGUs shall be the front line agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the National Framework Strategy on Climate Change and the NCCAP. Barangays shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Municipal and city governments shall consider climate change adaptation, as one of their regular functions.

LGUs shall regularly update their respective action plans to reflect changing social, economic, and environmental conditions and emerging issues. The LGUs shall furnish the Commission with copies of their action plans and all subsequent amendments, modifications and revisions thereof, within one (1) month from their adoption."
(R.A.9729, Sec. 14)

National Climate Change Action Plan (NCCAP)

- The NCCAP was prepared to identify adaptation gaps, needs and initial strategies in the Philippines

- To provide the logical bridging among CC related phenomena (Hazards), CCA Priority areas, Institutional and personnel Adaptive capacity assessment factors, Hazard's threat level assessment parameters.

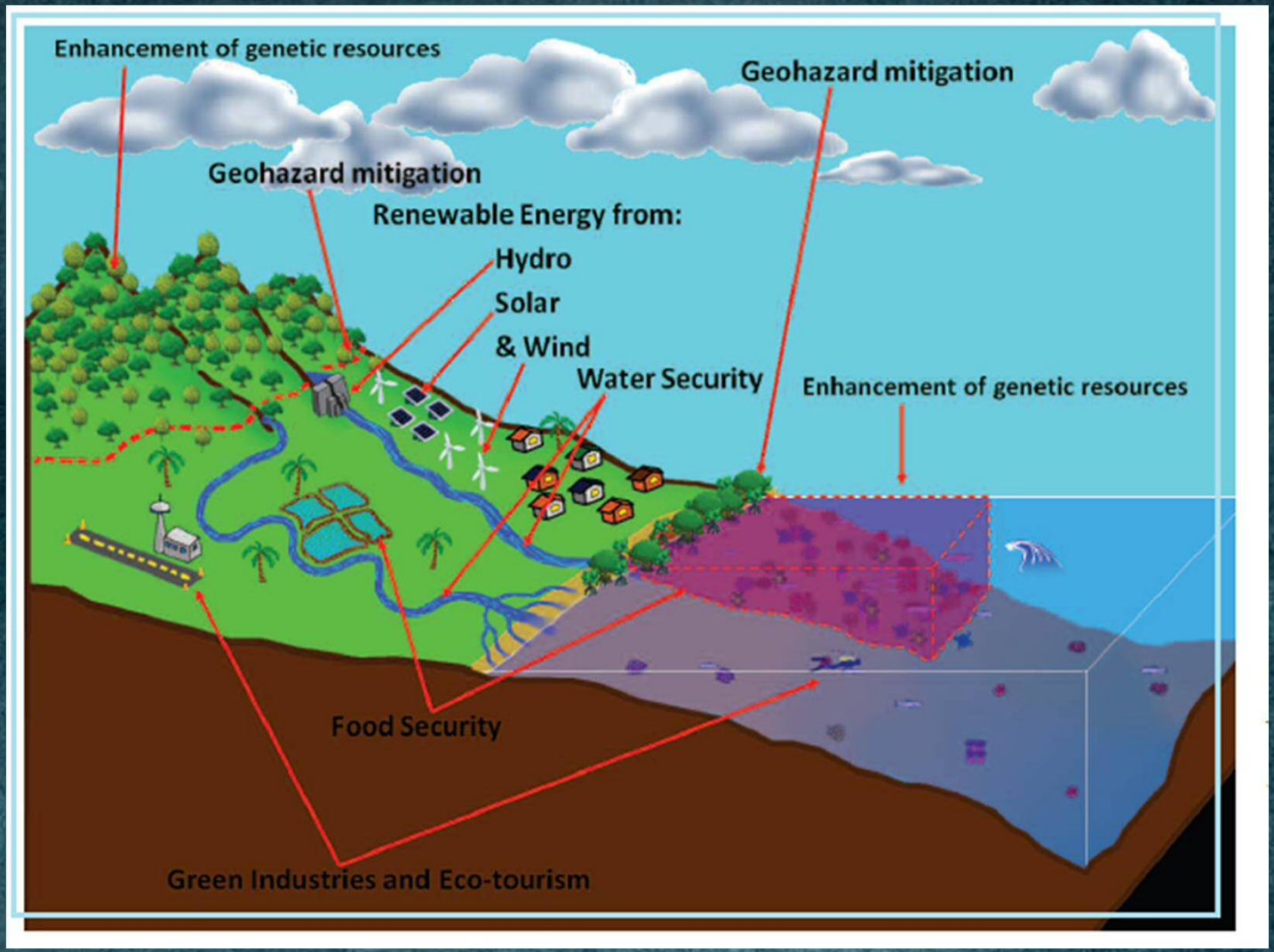
- To provide an overview on how to assess Institutional and personnel threat and adaptive capacity.

Seven Climate Change Priority Areas (NCCAP)

PRIORITIES	OUTCOMES
1. Food security	The objective of the national strategic priority on food security is to ensure availability, stability, accessibility, and affordability of safe and healthy food amidst climate change.
2. Water sufficiency	In light of climate change, however, a comprehensive review and subsequent restructuring of the entire water sector governance is required. It is important as well to assess the resilience of major water resources and infrastructures, manage supply and demand, manage water quality, and promote conservation.
3. Environmental and ecological stability	Ecosystem resilience and environmental stability during the plan period is focused on achieving one immediate outcome: the protection and rehabilitation of critical ecosystems, and the restoration of ecological services.
4. Human security	The objective of the human security agenda is to reduce the risks of women and men to climate change and disasters.
5. Climate-friendly industries and services	NCCAP prioritizes the creation of green and eco-jobs and sustainable consumption and production. It also focuses on the development of sustainable cities and municipalities.
6. Sustainable energy	NCCAP prioritizes the promotion and expansion of energy efficiency and conservation; the development of sustainable and renewable energy; environmentally sustainable transport; and climate-proofing and rehabilitation of energy systems infrastructures.
7. Knowledge and capacity development	The priorities of the NCCAP on knowledge and capacity development are: • Enhanced knowledge on the science of climate change; • Enhanced capacity for climate change adaptation, mitigation and disaster risk reduction at the local and community level; and • Established gendered climate change knowledge management accessible to all sectors at the national and local levels.

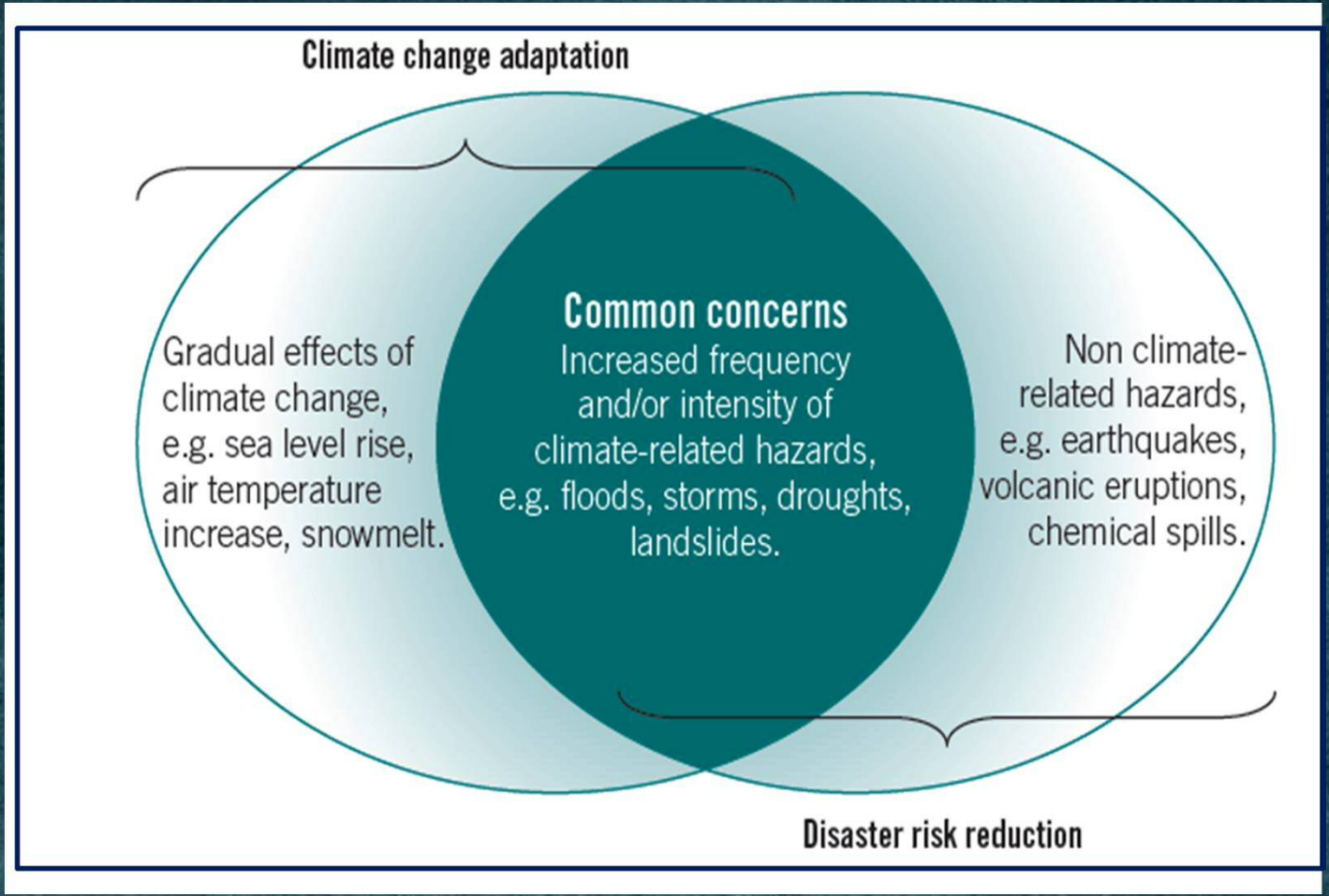
Source: RP-CCC, 2011

Seven Climate Change Priority Areas (NCCAP)



Source: RP-CCC, 2011

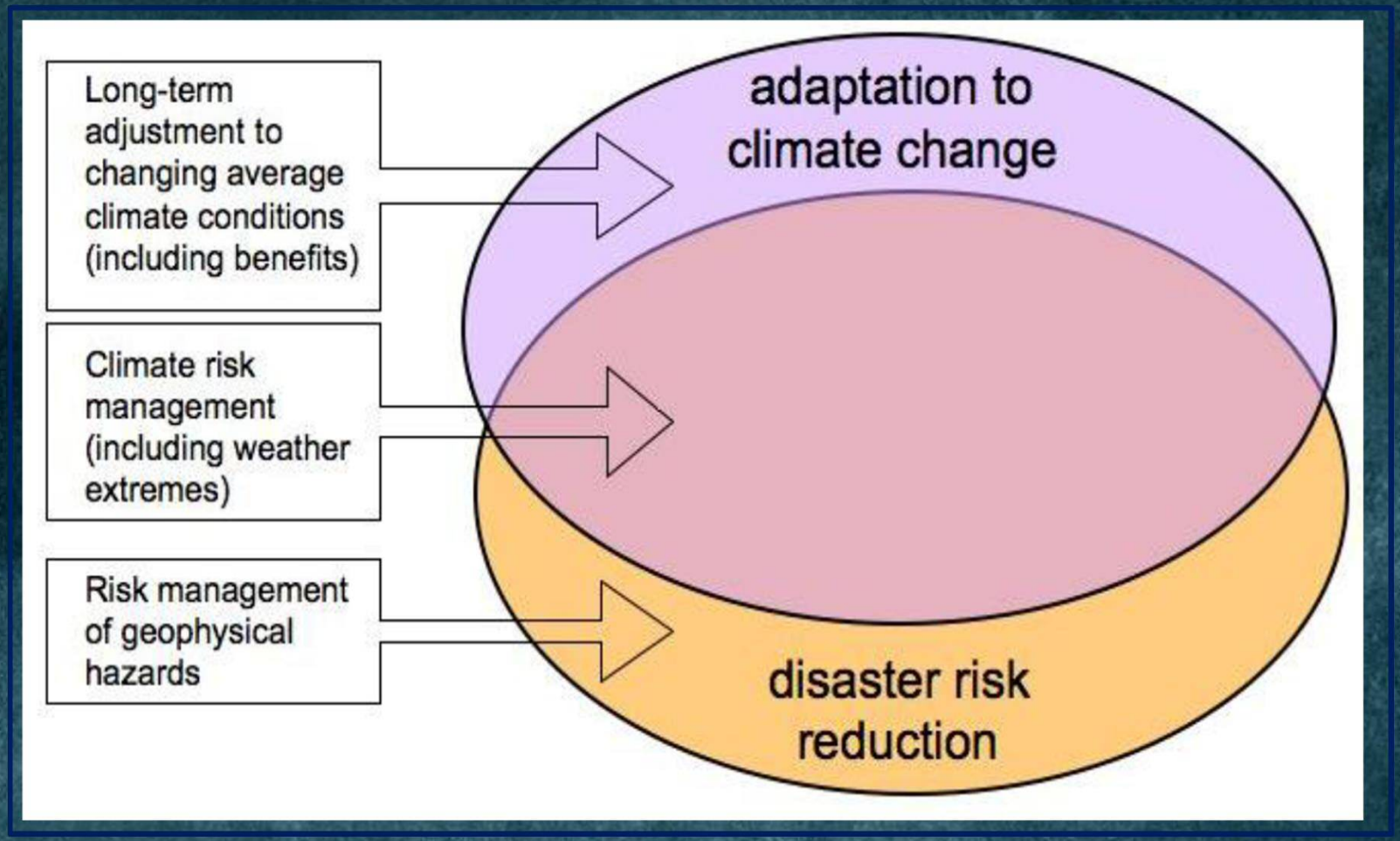
Integration of CCAM and DRRM



(Source: Mitchel and VAN Aalst, 2008)

Table 1 : Common Concerns of Climate Change Adaptation and Disaster Risk Reduction

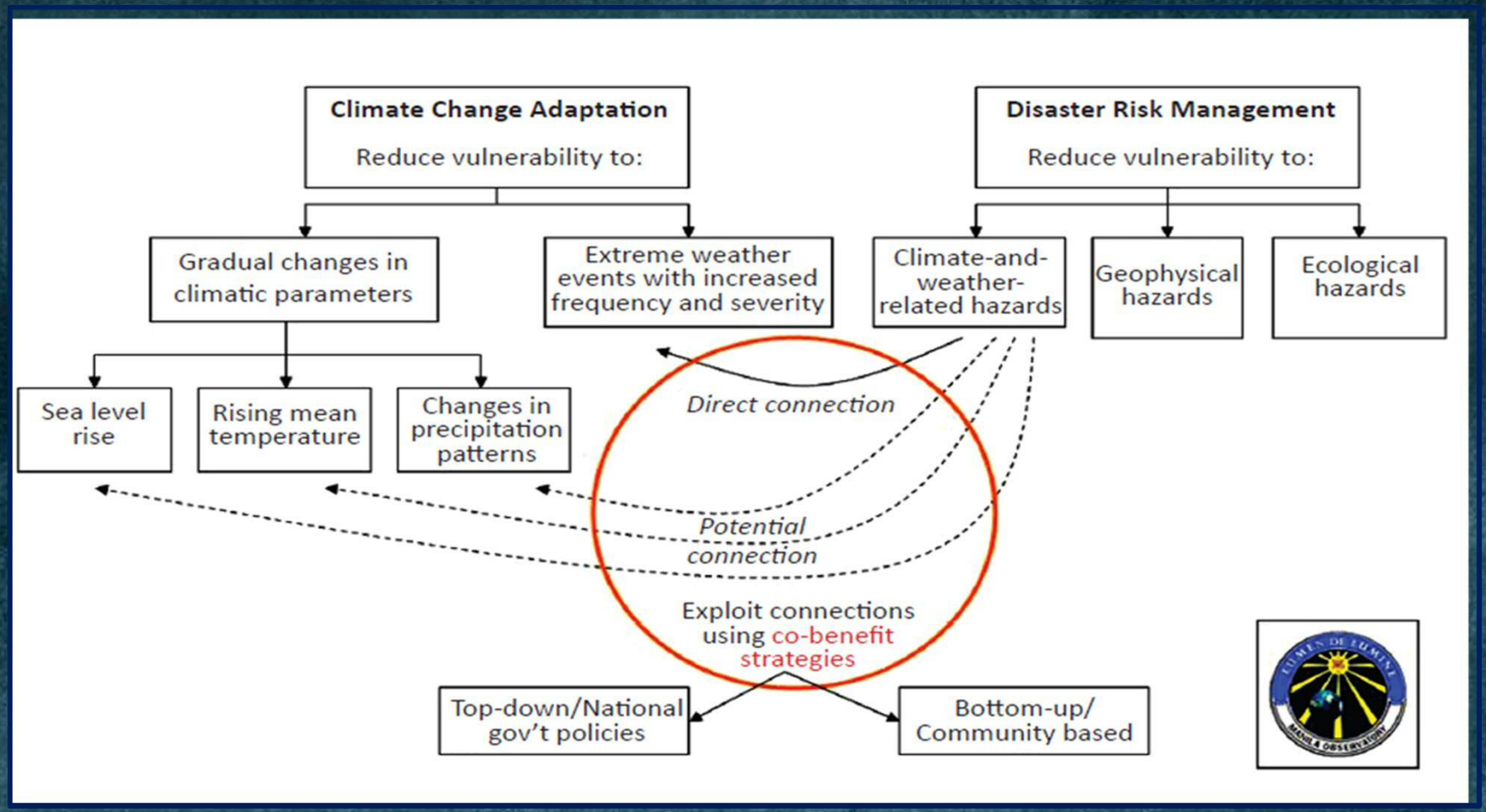
Integration of CCAM and DRRM



(Source: Mitchel and VAN Aalst, 2008)

Table 2 : Overlap Between DRR and Climate Change Adaptation

Integration of CCAM and DRRM



(Source Castillo, Charlotte Kendra G, 2007)

Table 3 : Conceptual Linkages of Climate Change Adaptation and Disaster Risk Management

QUEZON CITY LOCAL CLIMATE CHANGE ACTION PLAN

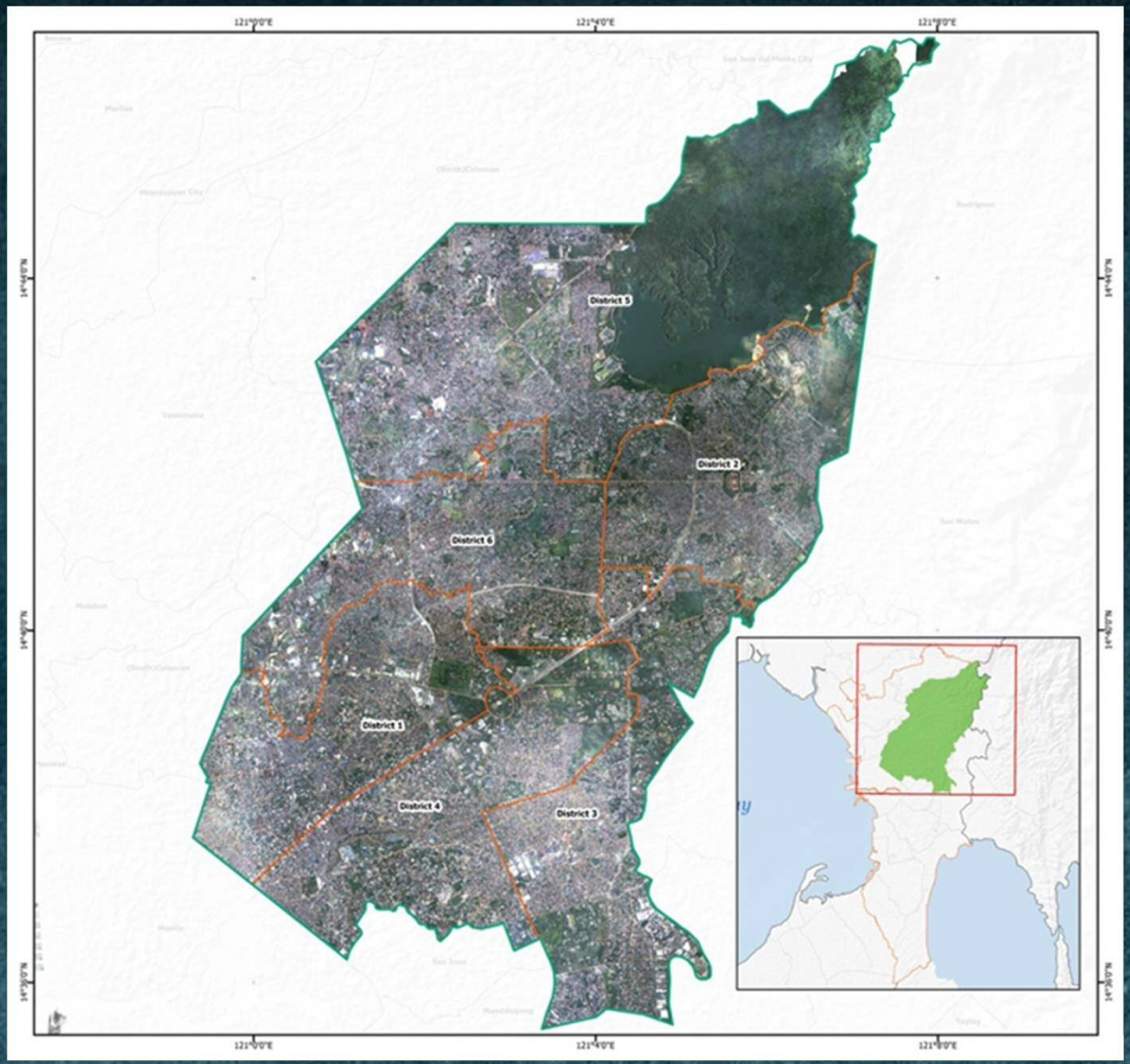


Table 4: Location Map of Quezon City

(Source: Mid-Term Report – Quezon City Climate Change Action Plan (LCCAP) 2017-2027)

Quezon City
Local Climate Change Action Plan (LCCAP) 2017 - 2027

May 2017

Quezon City Government
&
UP Planning and Development Research Foundation, Inc

The Quezon City Local Climate Change Action Plan (QC LCCAP) 2017-2027 is the consolidation of following documents:

a. Legal Mandates
b. Background on Quezon City
c. Climate Change Vulnerability
d. Mission, Vision and Objectives
e. Climate Change (CC) Vulnerability/Sensitivity Analysis
f. GHG Emissions and Opportunities for Reductions
g. Situation Analysis
h. Climate Change Adaptation and Mitigation Programs, Projects and Activities

***The above documents are the outputs of the workshops and forums conduct with direct and indirect stakeholders of Quezon City Government (QCG) during the Project period.**

Summary of the Quezon City Local Climate Change Action Plan 2017-2027

Objectives of the Project

- To review the legal mandate for climate change adaptation and mitigation institutional building in Quezon City.
- To create a Technical Working Group (TWG) comprised of direct and indirect stakeholders including Non-Government Organizations (NGOs), Civic and Private sector representatives accredited by the City Government and are members of the City Development Council.
- Develop the Background on Quezon City which includes: (a) Physical Environment Profile; (b) History of the City; (c) Population and Demographics; (d) Settlement Patterns and Housing; (e) Economic Trends; and (f) Planning Context.

Objectives of the Project

- Set the Mission, Vision and Objective to establish climate change priorities using the National Climate Change Action Plan (NCCAP) priority areas.

- Workshops for Quezon City Technical Working Group (TWG) and other Stakeholders covering following areas:

  - Quezon City Climate Change Vulnerability: Climate Change Variation Impact Characterization
  - Climate Change Vulnerability/Sensitivity Analysis
  - Scope of Greenhouse Gases (GHG) Emission and Identify Opportunities for Reduction
  - Situation Analysis
  - Climate Change Adaptation and Mitigation (CCAM) Unit Functions and Priority Programs, Projects and Activities (PPAs) on the 7 priority areas.

Workshops Conducted

- Scoping LGU Mission and Goals for LCCAP, Reality Check and Finding Gaps
- Climate Change Vulnerability Analysis using Geographic Information System (GIS)
- Training on Developing a Framework to integrate DRRMP and LCCAP into IAP, for Mainstreaming IAP in Existing CLUP and CDP, and for Monitoring and Evaluation of the LCCAP

Workshops Conducted

- Workshop on Land Use Mapping using ArcGIS and Urban Morphology Type (UMT) Classification
- Training and Workshop on Scope of Greenhouse Gas (GHG) Emissions and Identify Opportunities for Reduction and
- Writeshop and survey on Institutional Adaptive Capacity

Bridging Among CC Related Phenomena (Hazards), CCA Priority Areas and Threat Level

Climate Change (CC) Sensitivity or Climate Related Phenomena/ Incidents	Please Indicate by putting cross abreviation of CC Phenomena i.e. W, P, and/or T that may have tendency to be impacted by these CC incidents	Priority Area/Sector/Hazrad Area (Seven Pillars of NCCAP)	5 (High) 4 (Medium High) 3 (Medium) 2 (Medium Low) 1 (Low) Indicate below the score/threat level of W, P, and/or T to exposure elements using levels provided in above table			Impact /Exposure Element (Who and What are exposed – by sector-
			W	P	T	
Extreme Weather Events with increased frequency and severity (tropical cyclones, storm surges, riverine floods and rainfall) W		1. Food Security 1. Agriculture and Fisheries Production and Distribution System. 2. Agriculture and Fishing Communities				Availability
						Stability
						Accessibility
						Affordability of safe and healthy food
						Sustainability of Water Resource

Institutional and Personnel Adaptive Capacity Assessment Factors

ADAPTIVE CAPACITY FACTOR	ADAPTIVE CAPACITY SCORE/LEVEL				
	5 (High)	4 (Medium High)	3 (Medium)	2 (Medium Low)	1 (Low)
ECONOMIC WEALTH	• have adequate and available financial resources for assistance to all affected sector • the people in the affected areas have their own resources to respond to a hazard	• have enough financial resources for assistance to some affected sectors • the people in the area have access to resources to respond to a hazard	• with limited financial resources for assistance for priority affected sectors • the people in the area have limited access to resources respond to a hazard	• have very limited financial resources for assistance to affected sectors • affected people have very limited access to resources to respond to a hazard	• no available financial resources for assistance to affected sector • affected people don't have their own resources to respond to a hazard
TECHNOLOGY	• there are equipment available for use and facilities to communicate directly with the people/sector affected	• there are some equipment for use and facilities to communicate with the affected people /sector	• limited equipment and facilities for assistance and communication	• very limited equipment and facilities for assistance	• very few facilities and equipment for use and communication with affected sector/people is difficult

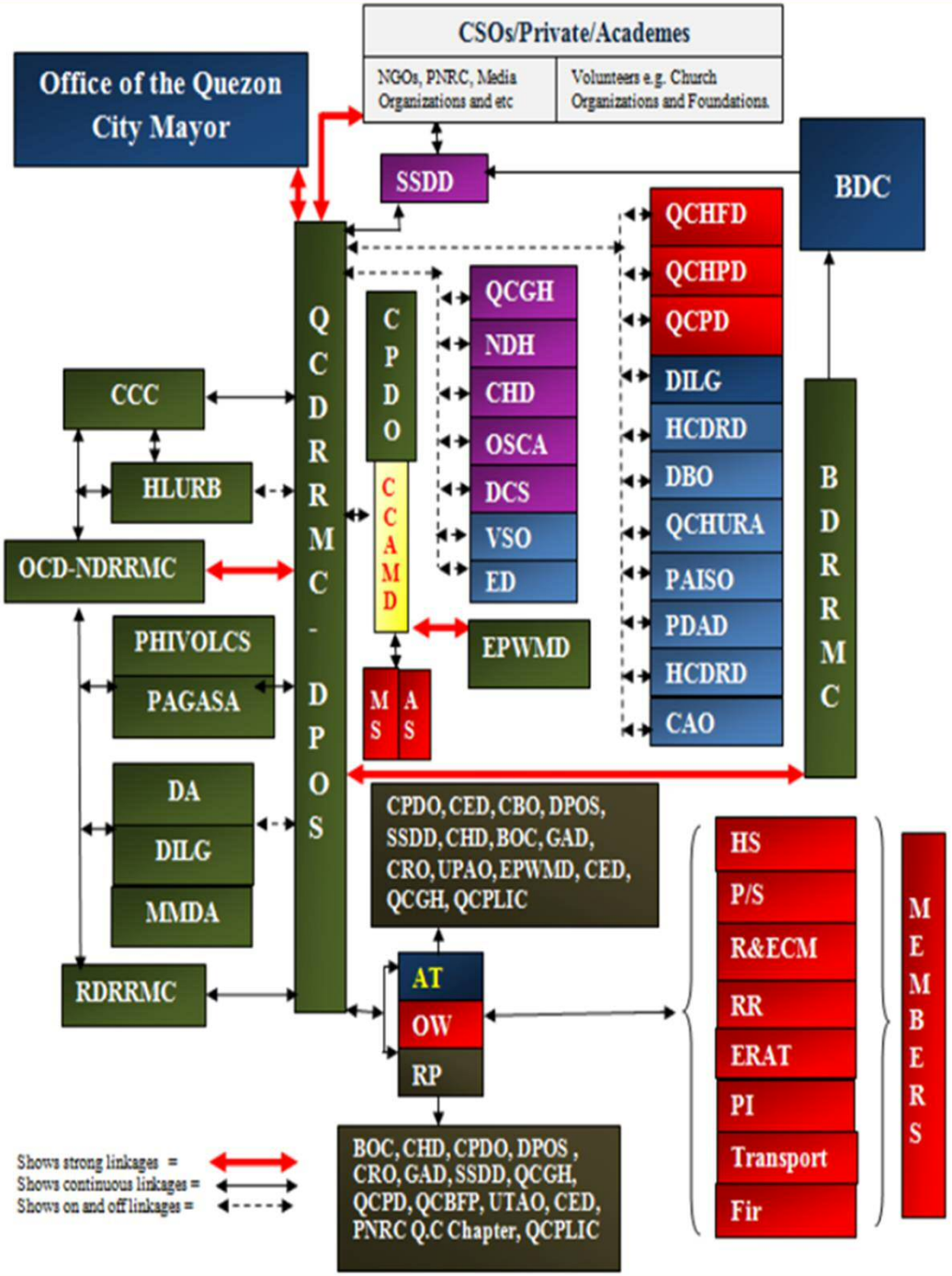
Institutional and Personnel Adaptive Capacity Assessment Factors

SECTION III – Institutional Adaptive Capacity

Please assess the adaptive capacity of your office by assigning the adaptive capacity score/ level to each Climate Change priority sub areas vis-à-vis six adaptive factors i.e. Economic Wealth, Technology, Institutions, Infrastructure, Information, and Social Capital. You can consult Adaptive Capacity Score / Level Matrix in Annex B.

Adaptive Assessment Factors:		***Economic Wealth***	***Technology***	***Institutional***	***Infrastructure***	***Information***	***Social Capital***
CC Priority area/ Pillar	**Adaptive Demands**						
1. Food Security							
a	On the vulnerability of agriculture and fisheries to the impacts of climate change.						

AS = Adaptation Section
AT = Administration and Training
BDO = City Budget Office
BOC = Barangay Operations Center
CAO = City Administrative Office
CCAMD = Climate Change Adaptation and Mitigation Division
CCC = Climate Change Commission
CED = City Engineering Department
CHD = City Health Department
CRO = Community Relation Office
CSO = Civil Society Organization
DA = Department of Agriculture
DCS = Division of City Schools
DILG = Department of Interior and Local Government
DBO= Department of Building Official
DPOS= Department of Public Order and Safety
EPWMD= Environmental Protection And Waste Management Department
ERAT = Emergency Rapid Assessment Team
GAD = Gender and Development
HLURB = Housing and Land Use Regulatory Board
HCDRD = Housing And Community Development And Resettlement Department
MS = Mitigation Section
MMDA = Metro Manila Development Authority
MS = Mitigation Section
NGO = Non Government Organization
NDH = Novaliches District Hospital
OCD-NDRRMC = Office of Civil Defense – National Disaster Risk Reduction Management Council
OSCA = Office of Senior Citizens Affairs
OVM = Office of the Vice Mayor
OW = Operations and Warning
PAGASA = Philippines Atmospheric Geophysical and Astronomical Services Administration
PAISO=Public Affairs And Information Services Office
PI = Public Information
PC = Police / Security
PDAD = Parks Development And Administration Department
PHILVOLCS = Philippine Institute of Volcanology and Seismology
PDAD = Parks Development And Administration Department
PNRC = Philippine National Red Cross



QCDRRMC = Quezon City Disaster Risk Reduction Management Council
QCGH = Quezon City General Hospital
QCBFP =
QC-HURA = Quezon City Housing And Urban Renewal Authority
QCPLIC = Quezon City Public Library And Information Center
RDRRMC = Regional Disaster Risk Reduction Management Council
QCPD= Quezon City Hall Police Detachment
REC = Relief and Evacuation CTR Mgt
RP = Research and Planning
RR = Rehabilitation and Relocation
RR = Rescue and Recovery
SSDD = Social Services Development
VSO = Veterinary Services Office Service

Inter-Office Linkages Framework of QC towards DRR and CCA

THE END

Workshop on the Promotion of Low Carbon Development in Quezon City
under the City to City Cooperation between Quezon and Osaka

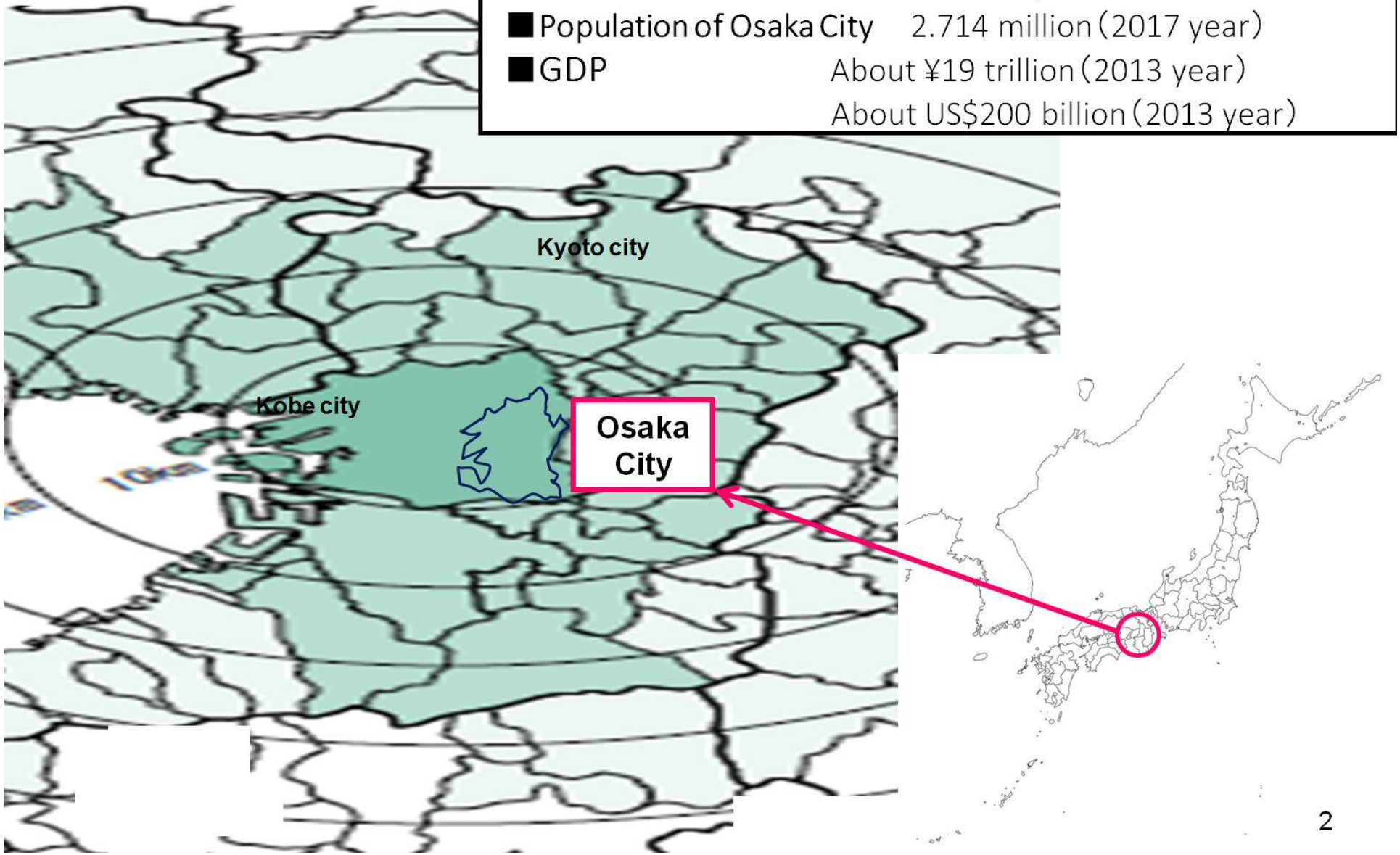
Osaka City Initiatives on Climate Change

Makoto Mihara

Osaka City Government

General Information on Osaka City

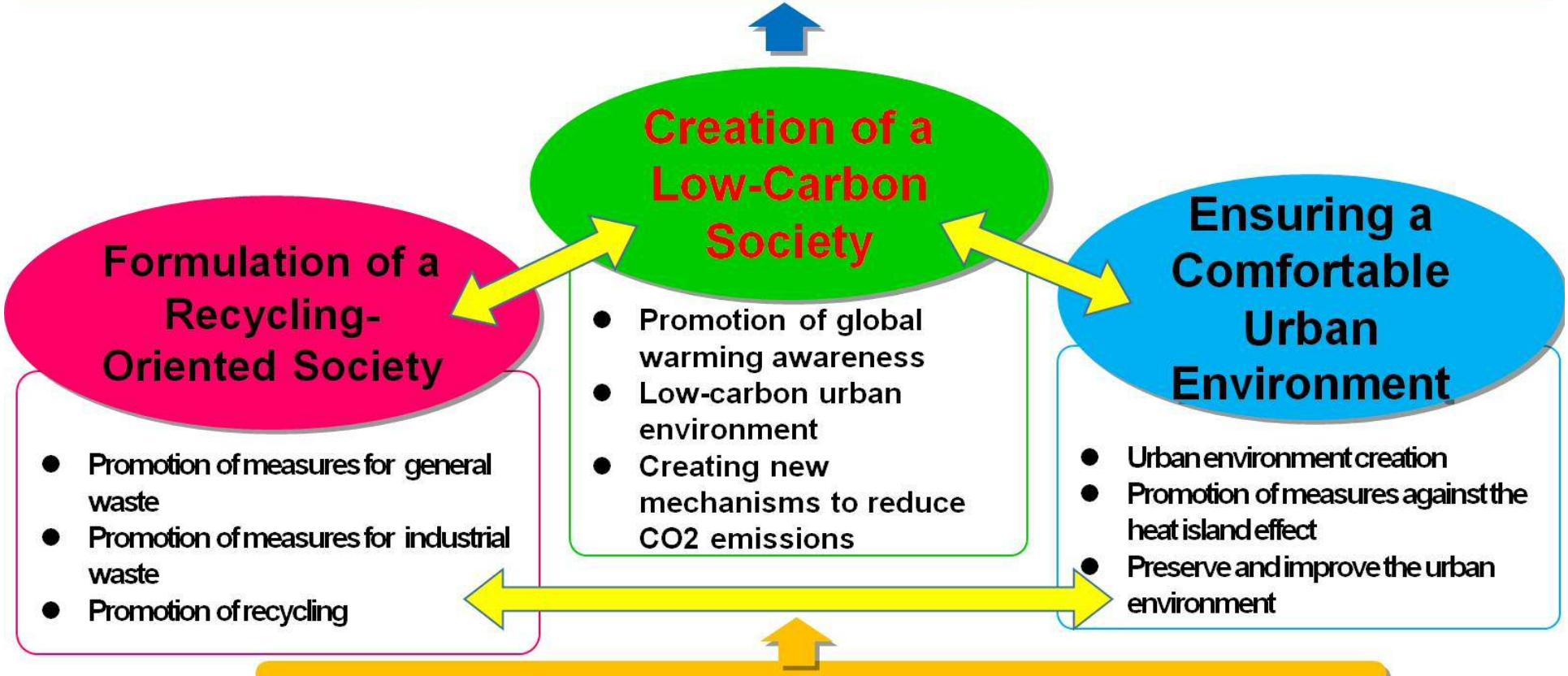
■Area 225k㎡（2017 year）
■Population of Osaka City 2.714 million（2017 year）
■GDP About ¥19 trillion（2013 year）
About US$200 billion（2013 year）



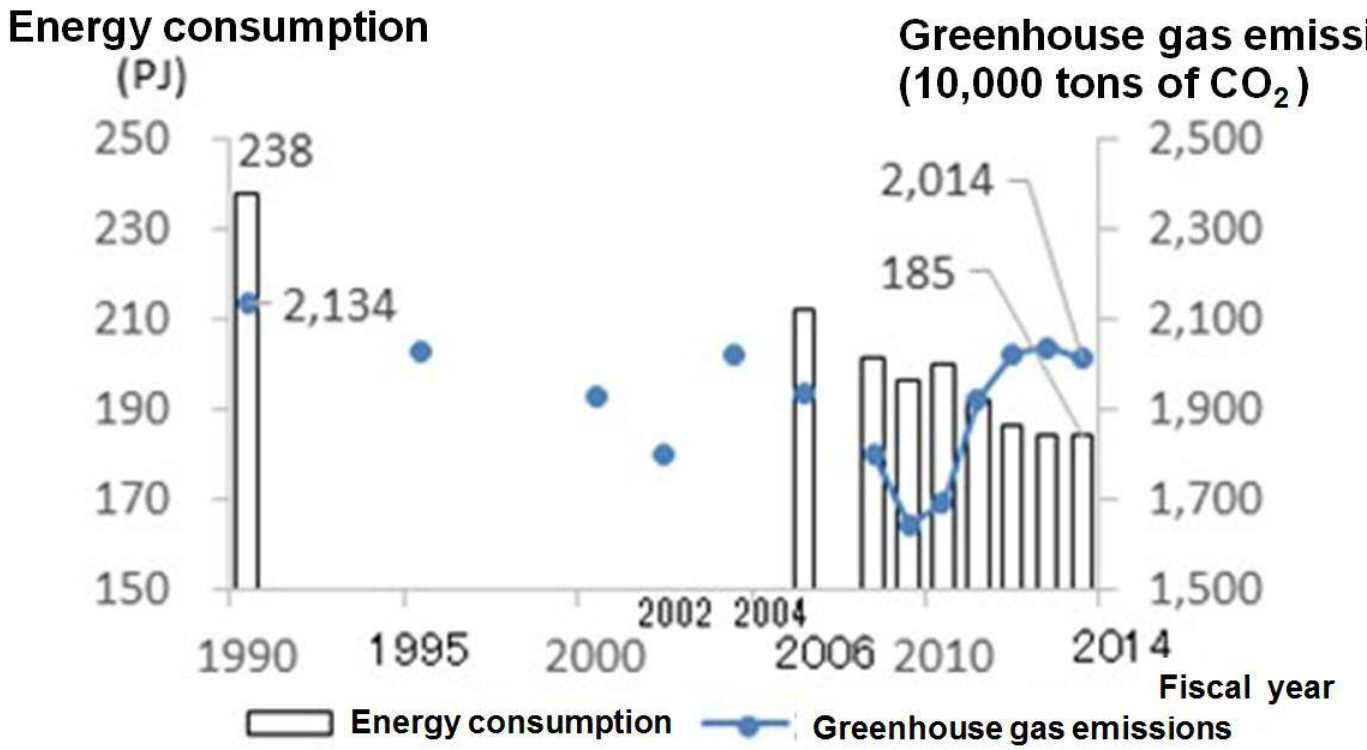
Osaka City Environmental Policy

"The Environmentally Advanced City of Osaka"

—The realization of a sustainable metropolitan model—



Changes in Greenhouse Gas Emissions



- Osaka City greenhouse gas emissions decreased by 4.4% in FY2013 compared with FY1990.(10.8% increase nationwide)
- Emissions in FY 2014 decreased 1.4% compared with the previous year.

Osaka City Climate Change Action Plan

Basic overview of climate change action plan (CCAP)

Plan	• Midterm review of Osaka City's Global Warming Action Plan (Mar. 2011) • Response to "Global Warming Measures Plan" (which received Cabinet approval May 2016) and other domestic actions, aiming to decrease greenhouse gas emissions by 26% from FY2013 in FY2030 • Development of initiatives aims for the medium to long term • Adaptation to the effects of climate change
Important goals	• Contribution to achieve national greenhouse gas reduction goals and global warming counter measures, as a major city/representative of Japan. • Achieving a safe, secure and sustainable society
Specific measures	• Reduction of greenhouse gas emissions (mitigation measures) • Adaptation to the impact of climate change (adaptation measures) • Plan support organization (promotion/management)

Outline of CCAP

1. Goal

30% below FY2013 levels by FY2030 compared to 26% for the national government

2. Main efforts of action plan

a:Efforts for meeting plan targets

- Promotion of energy efficiency and CO2 reduction by citizens and businesses

  (CO_2 emissions from small- and medium-sized businesses, including offices and factories, amount to 2/3 of those from all businesses, equivalent to 40% of those from the entire city area)

- Installation of low carbon technology at Osaka City facilities

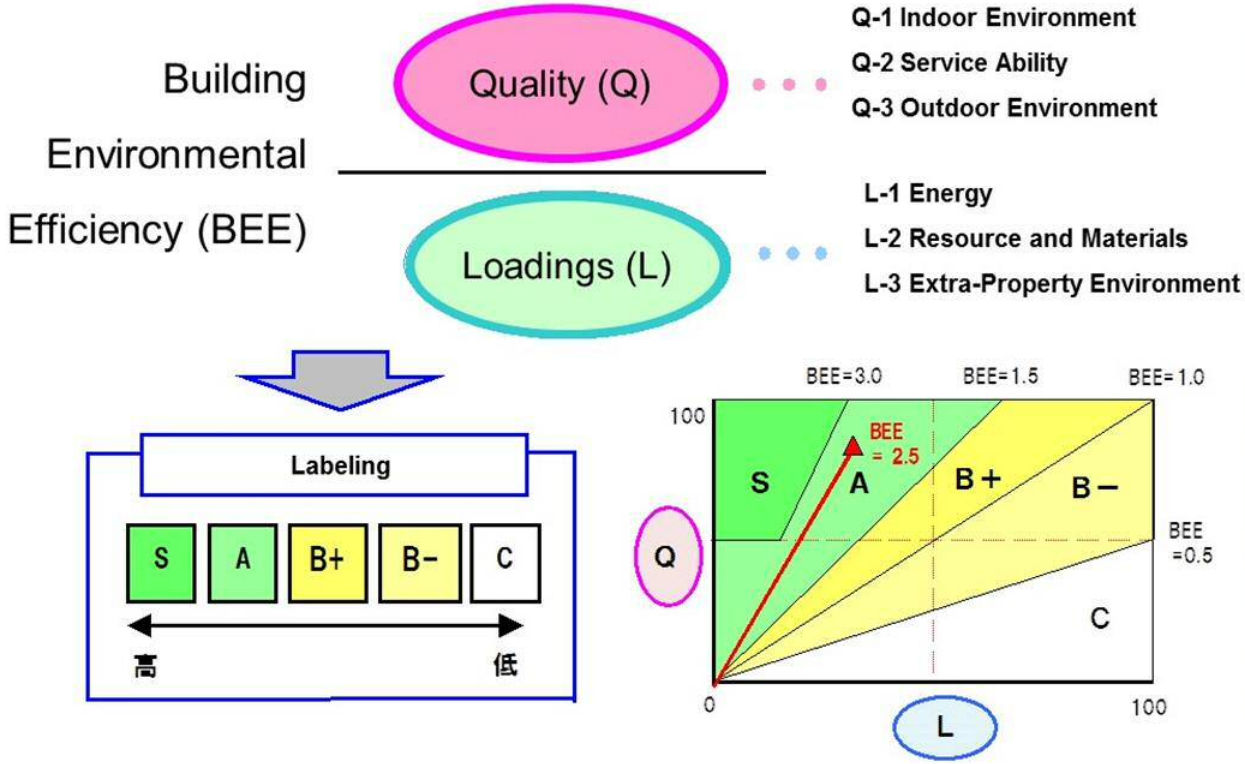
b:Efforts over the medium and long term

- Installation of new energy systems
- Adaptation measures for climate change
- Supporting low-carbon city development projects in Asian cities through city to city cooperation

Efforts for meeting plan targets

Promotion of Energy Efficiency and CO2 Reduction by Citizens and Businesses

Comprehensive assessment system for building environmental efficiency (CASBEE)

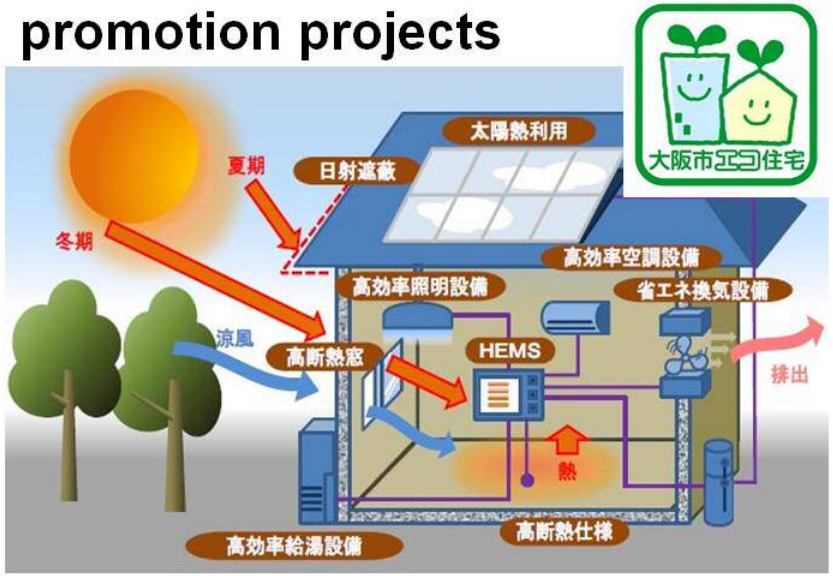


Labeling

CASBEE Osaka award building

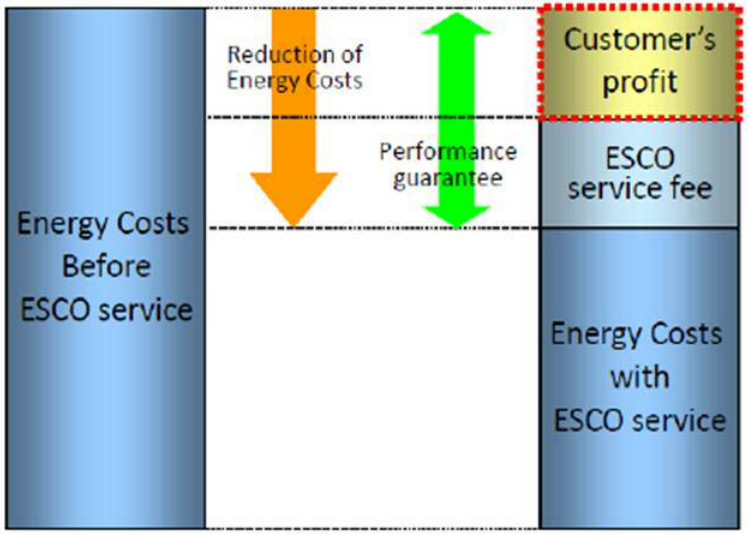
Promotion of Energy Efficiency and CO2 Reduction by Citizens and Businesses

Osaka City eco housing promotion projects



Zero energy house

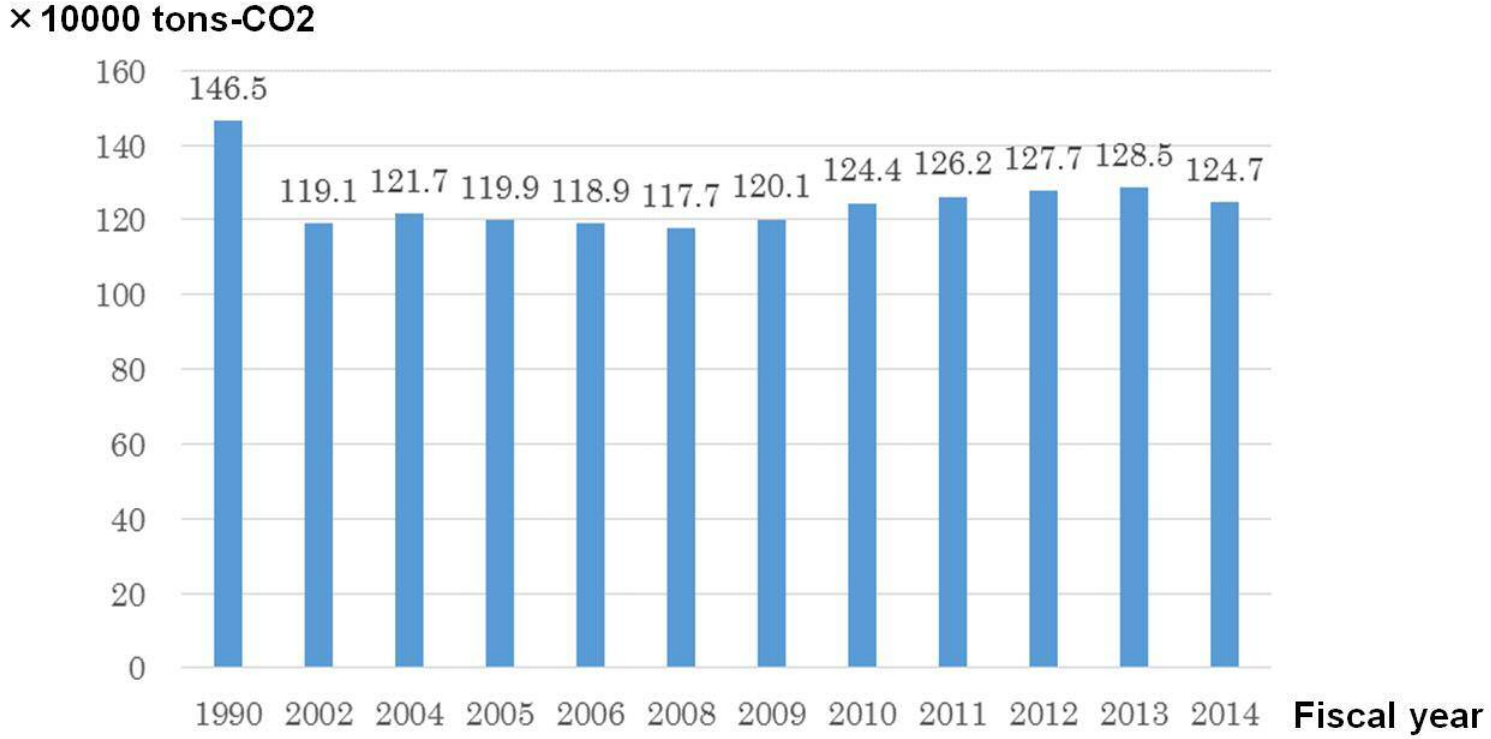
Promotion of ESCO projects



Energy saving diagnosis for small and medium-sized enterprises

Initiatives of Osaka City Administration Offices

Changes in greenhouse gas emissions from Osaka City administration offices



Goal: Decrease of 8.4% from 2013 by the year 2020

Period of Plan	2016 to 2020
Completion Year	2020
Base Year	2013

Initiatives of Osaka City Administration Offices

Basic policy for achieving goals

Basic policy	Major actions
1. Promotion of low carbon emissions in public facilities	・Large-Scale introduction of LED ・Expansion of ESCO projects ・Equipment upgrades for energy efficiency ・Large-Scale introduction of solar power generation ・Continual improvement in operation management of facilities and equipment
2. Promotion of waste reduction and recycling	・Reduction of waste incineration
3. Promotion of energy efficient vehicles and subways	・Introduction of energy-efficient city buses ・Introduction of energy-efficient subways
4. Enhancement of environmental management	・Efforts to turn lights off ・Efficient utilization of air conditioning ・Review of operation methods at facilities, etc.
5. Promotion of the practical use of unused energy (indirect GHG reduction)	・Digestion gas power generation project ・Introduction of small hydroelectric power ・Waste power generation

Installation of Low Carbon Technology at Osaka City Facilities

Effective GHG emission reduction initiatives in the field of energy

LED lighting (station, park)

Solar panels(School)

Hydroelectric power facility

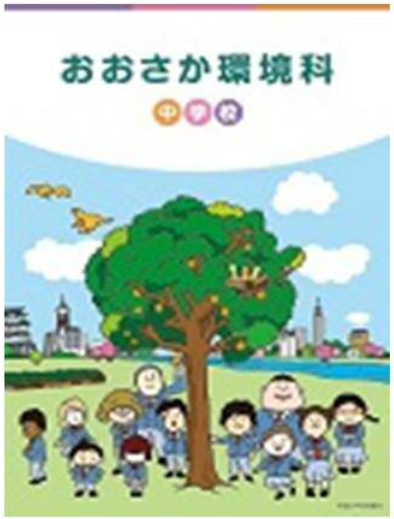
Waste to Energy (Incinerator heat recovery)

Energy-saving vehicles

Promotion of Public Awareness on Global Warming

Seminars

ECO fair



Environmental education

Osaka City prepares “Osaka Environment Class,” a side reader to be used in classes of elementary schools and junior high schools for sufficient environmental education which covers global warming, biodiversity, waste reduction and urban environment conservation. Through the education, Osaka City aims at creating sustainable society.

Efforts over the medium and long term

Installation of New Energy Systems

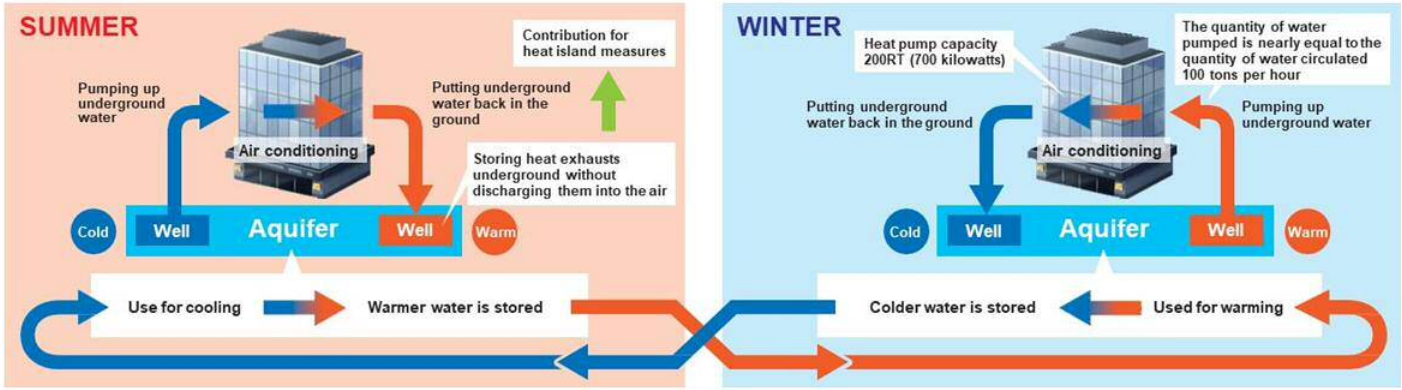
Promotion of the use of area energy networks

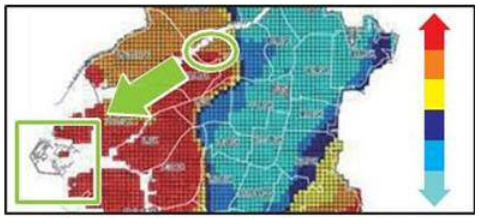
Osaka City is creating a mechanism for introducing self-reliance/distributed energy, such as cogeneration systems, and promoting the use of area energy networks that connect buildings.

Ensuring the supply of energy for business continuation in times of disaster

Promotion of the earth thermals introduction

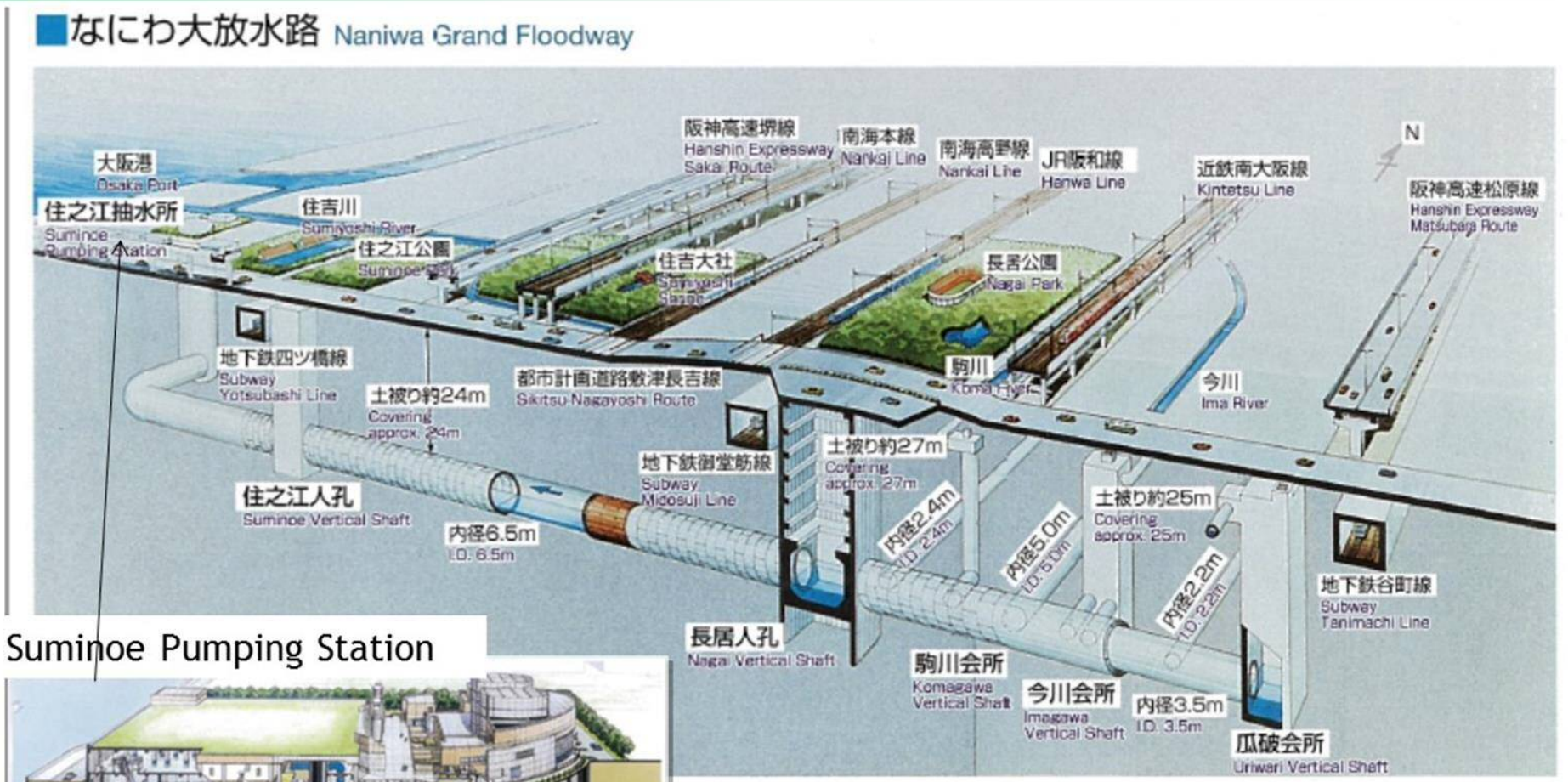
Aquifer thermal storage utilization system demonstration project



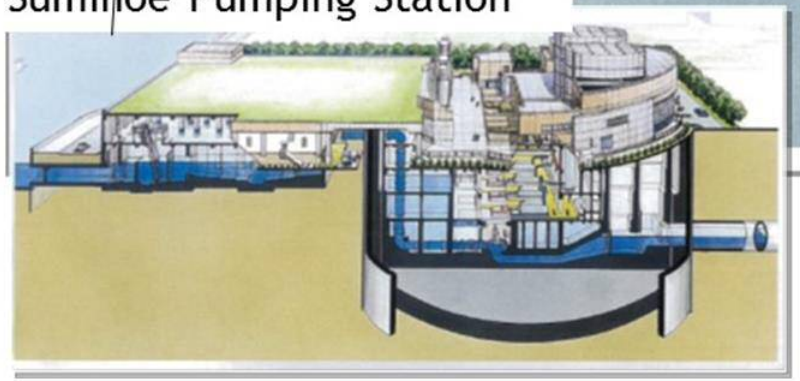


The potential for aquifer thermal storage utilization in the Osaka City.

Adaptation Measures for Climate Change



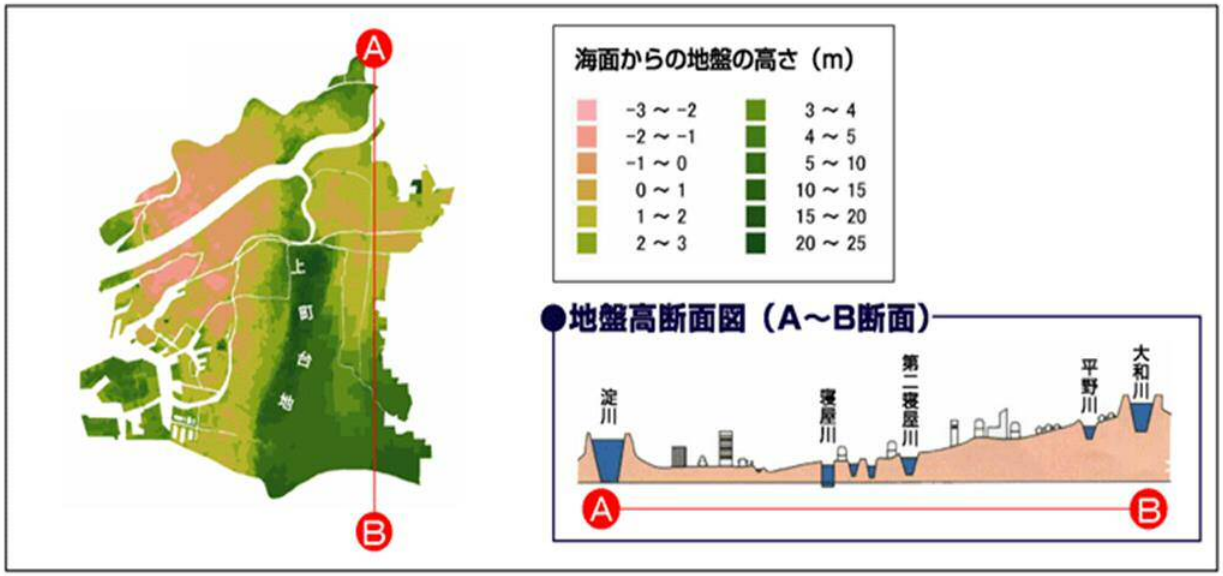
Suminoe Pumping Station



Naniwa Grand Floodway(Con ; 1984-2000)
(φ2.2～6.0 m, L = 12.2 km)

Grand Floodway

Adaptation Measures for Climate Change



Flood hazard map

Flood stop doors

Green space at Buildings

Supporting Low-Carbon City Development Projects in Asian Cities

Strengthen city to city cooperation

Latest low carbon technology

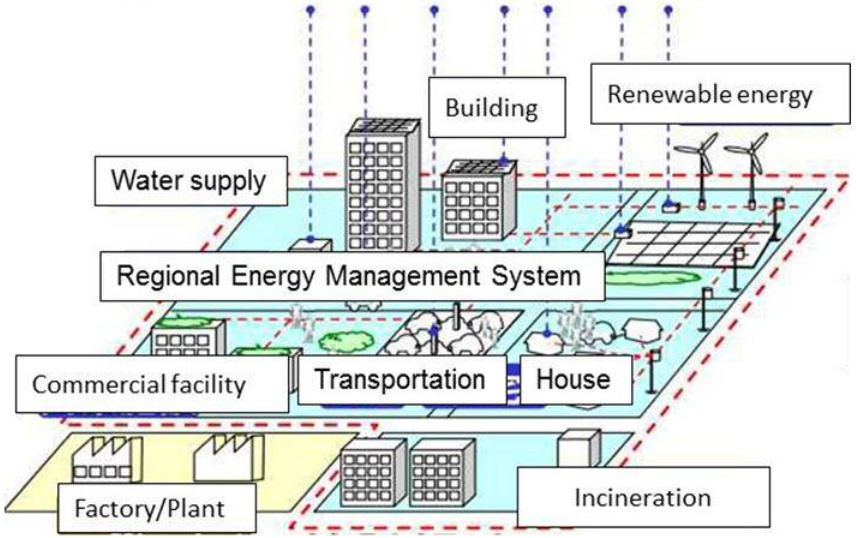
+

Transfer of Japanese cities experience and expertise

→ Development of low carbon cities in Asia

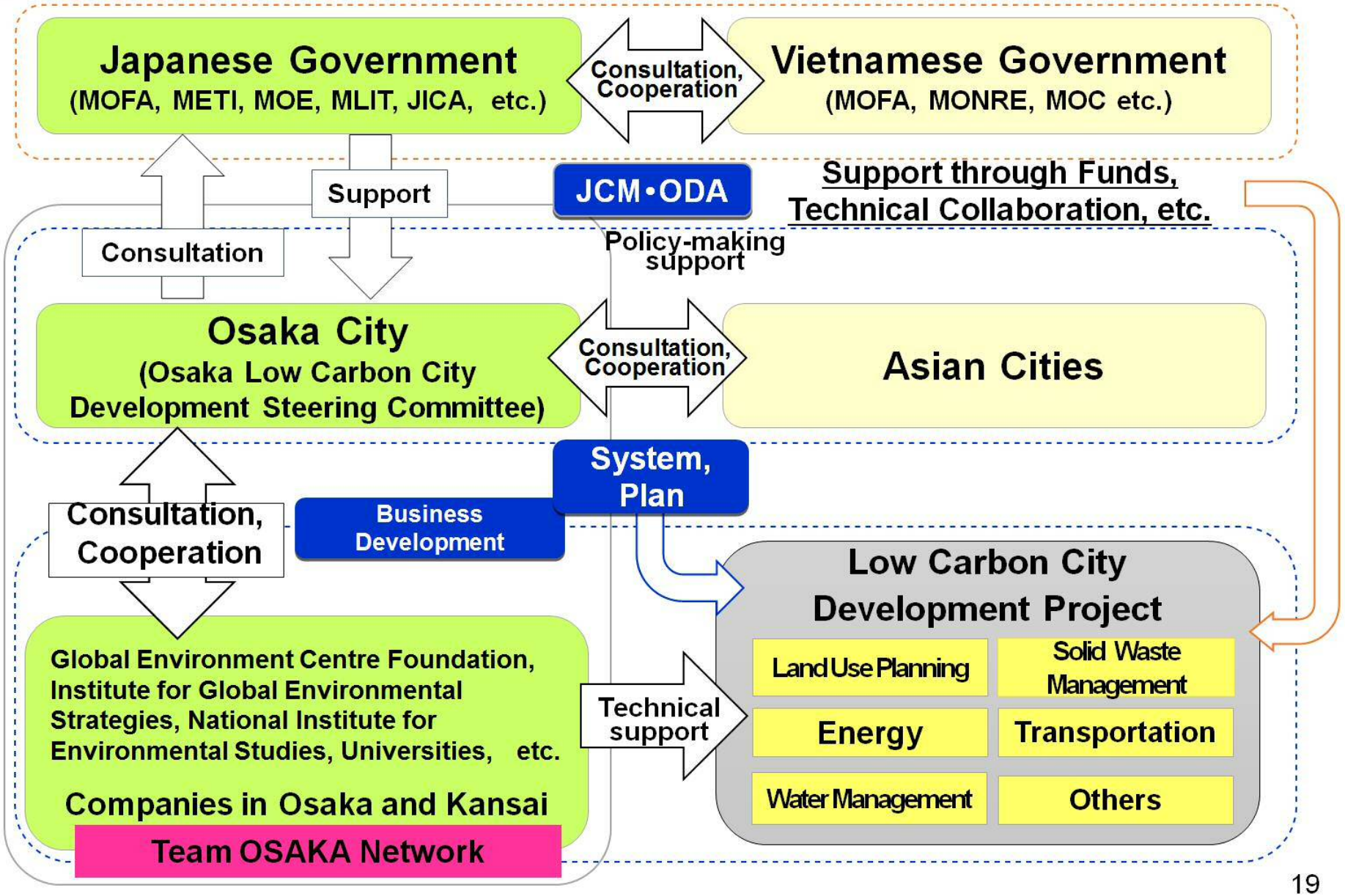
- Support for the formulation of a climate change action plan
- Sharing of knowledge and solutions for environmental issues
- Creating projects through public-private partnerships

Japanese low carbon technologies



Expanding low carbon city planning

Cooperative Framework Between Asian Cities and Osaka city



Promotion of Public-Private Partnership Projects in Asian Cities

Team Osaka Network

Creating low carbon projects in Asian Cities, forming of platform through cooperation with industry, the Global Environment Centre Foundation (GEC), academia, etc.

Cooperation with participants in TeamOSAKA Network


Team OSAKAネットワーク登録事業者リスト

City-city cooperation between Osaka City and Asian cities

Discussion
- Environmental needs
- Project proposals

Training in Japan

Creating projects through public-private partnership and city-city cooperation

Support for low carbon city development projects in the cities of Ho Chi Minh and Quezon

GHG Inventory

GHG emission =

∑ (Activity date × Emission factors × Global warming potential(GWP))

Statistical data　　Research data　　Report of IPCC

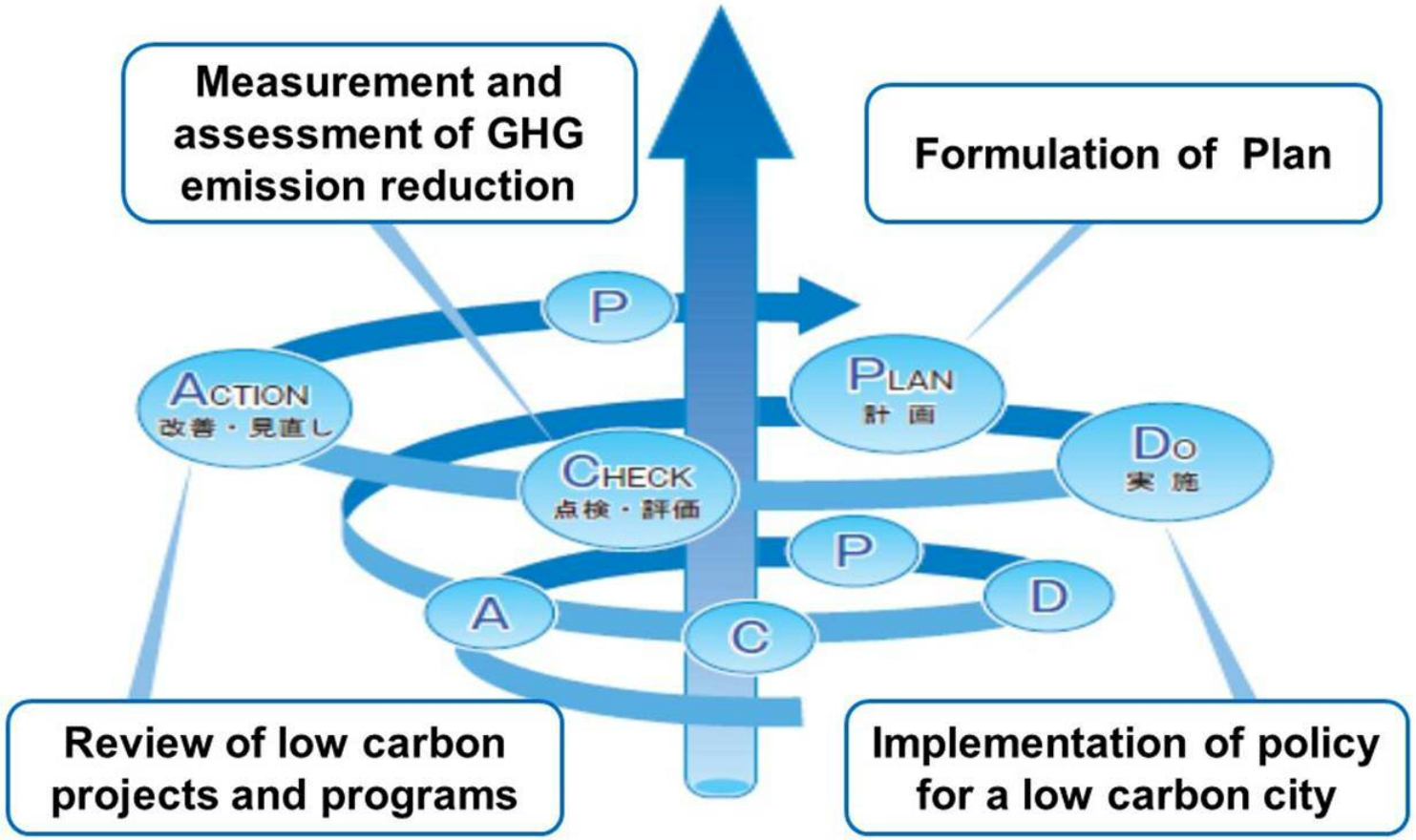
Field	Statistical data(e.g.)
Energy	Fossil fuel consumption
Industry	Shipment amount of products
Waste management	Amount of landfill waste
Transportation	Automobile mileage
Agriculture	Number of cows

Type of greenhouse gas	Business Activities for which the Emission Calculation is Required
○Energy-derived carbon dioxide (CO_2) (Carbon dioxide emitted in connection with fuel combustion or the use of electricity or heat supplied by another party.)	Use of fuels Use of electricity supplied from another party Use of heat supplied from another party
Greenhouse gases other than the above ○Non-energy derived CO_2 ○Methane (CH_4) ○Nitrous oxide (N_2O) ○Hydrofluorocarbons (HFC) ○Perfluorocarbons (PFC) ○Sulfur hexafluoride (SF_6) ○Nitrogen trifluoride(NF_3)	**Non-energy derived CO_2** Production of cement, Production of ethylene, etc. **CH_4** Mining of coal, Waste disposal by landfill, Treatment of sewage, night soil, etc. **N_2O** Use of fertilizer on cultivated land, Management of livestock excrement, etc. **HFC** Use of sprayers, etc. **PFC** Production of aluminum , etc. **SF_6** Production of SF6,etc **NF_3** Production of NF_3, etc.

GHG	GWP
CO_2	1
CH_4	25
N_2O	298
HFC	1,430,etc
PFC	7,390,etc
SF_6	22,800
NF_3	17,200

Plan Support Organization

Efforts to reduce greenhouse gas emissions at all bureaus are led by the Osaka City Global Warming Prevention Headquarters headed by the mayor.



Thank you very much!

Workshop on the Promotion of Low Carbon Development in Quezon City

Nov. 20th 2017

Osaka Water & Environment Solutions Association (OWESA)

～Kansai；Delivering Global Solutions Through PPP～

Kozo SAKAMOTO

Secretary General of OWESA

Contents

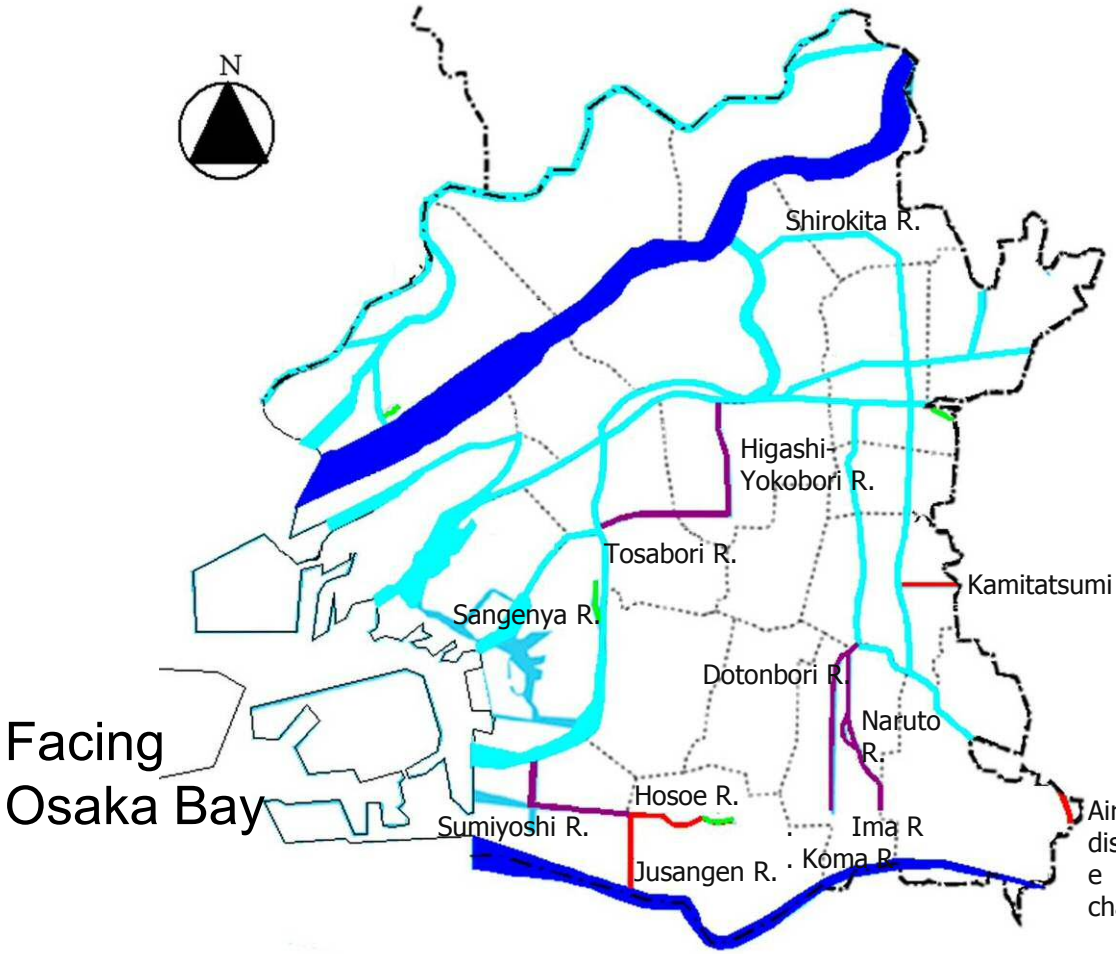
1. Osaka City

Location of Osaka City

Profile of KANSAI and OSAKA City

	KANSAI Area (approximately)	OSAKA City (Census 2015)
Population	22,583,000	2,691,185 3.6 million in daytime
Land area (km^2)	33,126	225.21 E⇔W 15 km N⇔S 15 km
Population Density (persons／km^2)	682	11,949.7
Household (households)	9,668,800	1,352,413

Rivers in Osaka City



Legend	Classification of Rivers	Administrator
	Class A rivers:	MLIT ※
	Class A rivers:	Governor of Osaka Prefecture
	Class A rivers:	Mayor of Osaka
	Locally designated rivers:	Mayor of Osaka
	Non-classified rivers:	Mayor of Osaka
	City boundary	
	Ward boundary	

※ Minister of Land, Infrastructure, Transport and Tourism.

Rivers account for 10% of city area


Osaka City Hall
© Osaka Convention & Tourism Bureau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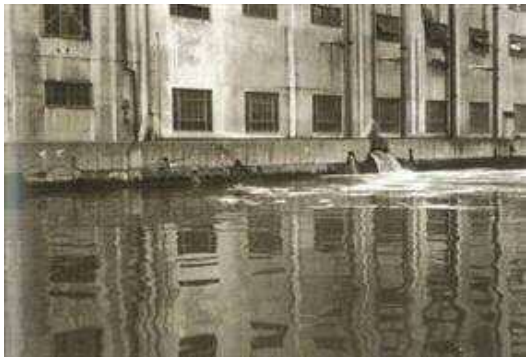
© Osaka Convention & Tourism Bureau


(c) Osaka Convention & Tourism Bureau

2. OWESA (Osaka Water and Environment Solutions Association)

Past problems in Osaka City

Problems in the past　(Water , Air Pollution, Solid waste) 1960's



After extensive countermeasures



Osaka Water & Environment Solutions Association （As of the year 2017）

OWESA

Partner Cities

Request,
Needs

Consultation,
Solutions,

- Osaka City
- Osaka Prefecture

Accumulated Know-how and experience of urban management

- Kansai Economic Federation
- Osaka Chamber of Commerce and Industry

- JICA KANSAI

Close cooperation

Leading technologies

Member companies dealing with water and environment

Osaka Water & Environment Solutions Association （As of the year 2017）

Chairperson
- ♢Deputy Mayer of Osaka City

Members & Observers
- ♢Kansai Economic Federation
- ♢Osaka Chamber of commerce and Industry
- ♢Osaka City
  - Public Works Bureau
  - Waterworks Bureau
  - Environment Bureau
  - Economic Strategy Bureau
- ♢Osaka Prefecture
  - Department of Commerce, Industry and Labor
  - Department of Urban and Public Works
- ♢JICA KANSAI

Objective 1

Contribute to solve the global water and environmental issues by mobilizing public and private sector in Kansai region

Objective 2

Propose total solutions harmonizing economic development and conservation of water and environment to the partner countries.

Objective 3

Support business matching based on the needs and seeds and create Win-Win relationship with partners.

The cooperation in the field of Sewerage in Ho Chi Minh City

The Project For Capacity Development of Sewerage Management in Ho Chi Minh City Phase 2

【2011～2014】

- Sending experts to Ho Chi Minh City（long term, short term）
- Providing the sewerage register system for efficient maintenance and management

JICA Partnership Project

【2013～2015】

- Improvement of inspection, cleaning, maintenance, etc. maintenance technology of sewer pipes
- The effective utilization of sewerage register system

JICA Collaboration Programme with the Private Sector for Disseminating Japanese Technology and the Preparatory Survey

【2015～】

- Executing the test construction of trenchless pipe rehabilitation
- Promotion Seminar

Project Study of Water Supply (Ho Chi Minh City)

Main Issues of HCMC water supply

Rapid increase in water demand and insufficient water supply capacity

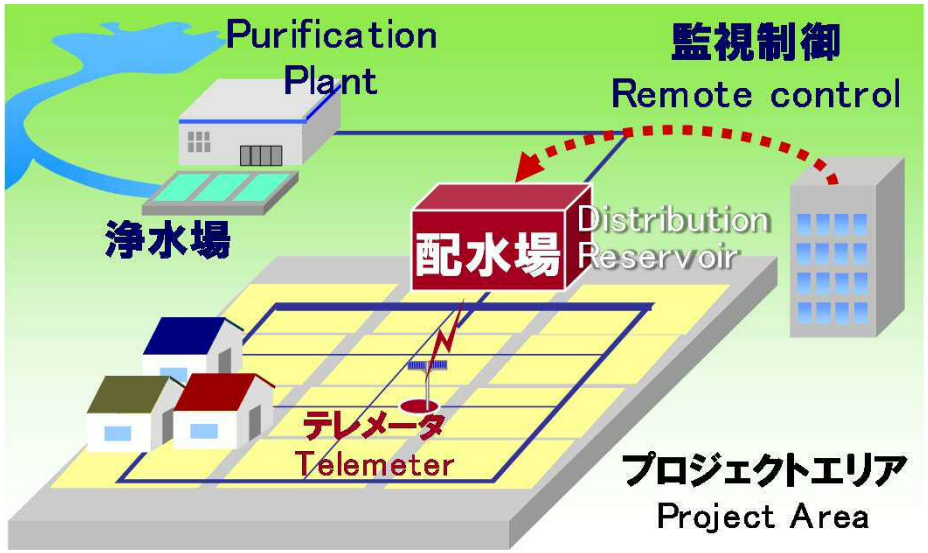
High rate of Non-Revenue Water

Low-hydraulic pressure (Also influence water quality)

Proposal of water distribution control system including the construction of water distribution reservoir

Water pressure check

Image of water distribution control system



Meeting with SAWACO

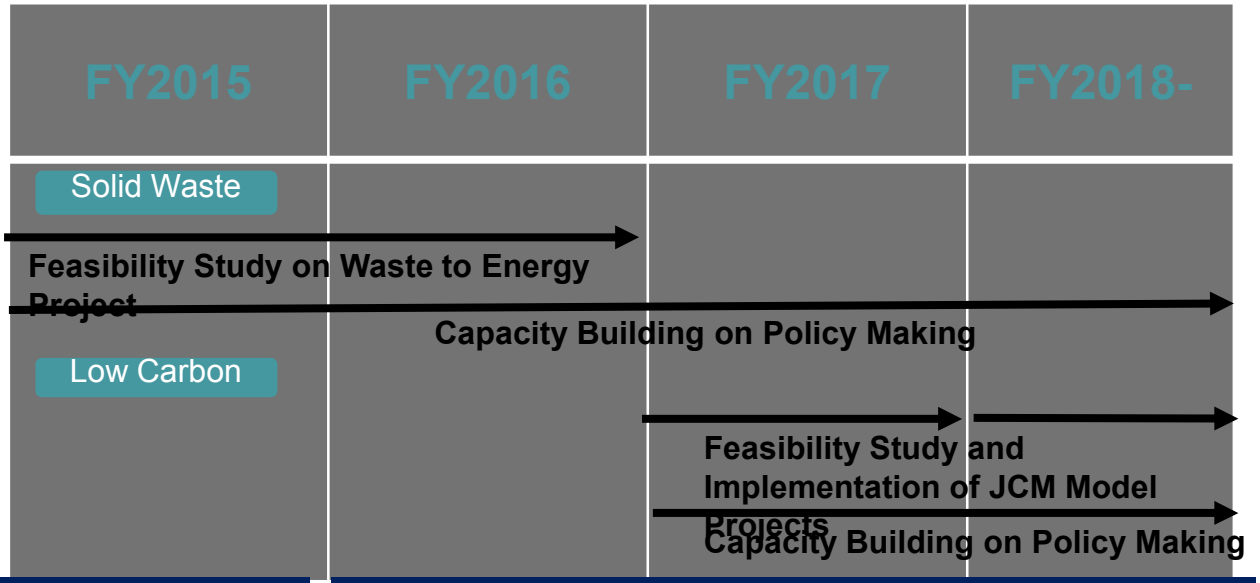
OWESA

City to City Cooperation between Osaka City and Quezon City

Major Field

- Management of solid waste
- Diffusion of low carbon technologies

Process of Cooperation



Efforts for Solid Waste Management

Osaka City Government provide knowledge, experiences, technologies and systems with the followings:

- Study visit at WtE factory
- Lessons for environment monitoring
- Lessons for waste collection

Efforts for Creating Low Carbon City

Osaka City Government supports Quezon City's low carbon activities with the followings:

- Feasibility study on JCM model projects solar power, energy saving technologies
- Capacity building on policy making

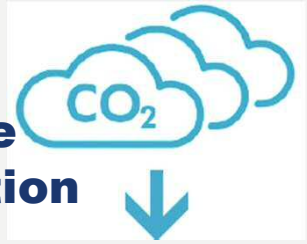

OSAKA-JO HALL
大阪城ホール
Thank you for your kind attention

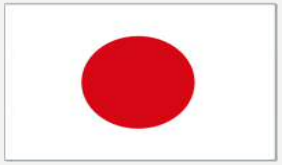
JOINT CREDITING MECHANISM

CLIMATE CHANGE DIVISION
DEPARTMENT OF ENVIRONMENT AND NATURAL REASOURCES
PHILIPPINES

THE JCM IMPLEMENTATION IN THE PHILIPPINES

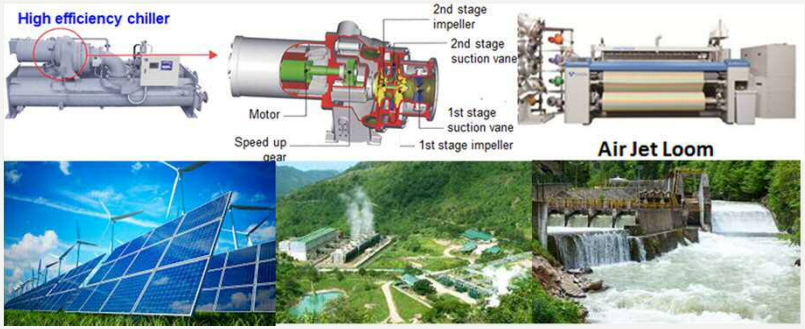
CO_2 and Greenhouse Gases Reduction





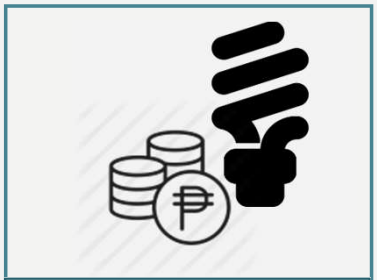
Carbon Credit to be purchased by Japan and offer technologies and investments

Technology Transfer & benefits

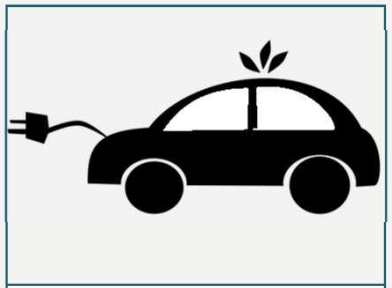


- **Communities,**
- **private sectors,**
- **local government units**

BENEFITS TO COMMUNITIES IN THE PHILIPPINES

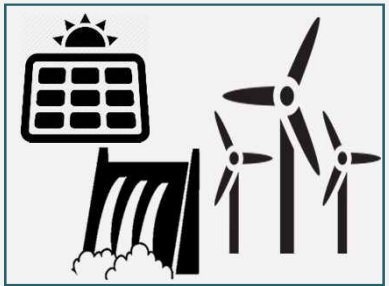


Energy Savings



Improved Transport Sector

Low Carbon Technology



Renewable Energy Options

Low-Carbon Community Development

Economic Development

Employment and Livelihood Programs

Food Security

Proper Solid Waste Management

Better Water Quality

THE ROLE OF DENR IN THE PHILIPPINE JCM IMPLEMENTATION

JOINT COMMITTEE

Ministry of Environment
Ministry of Foreign Affairs
Ministry of Economy, Trade and Industry
Foresty Agency
Embassy of Japan

JOINT COMMITTEE

DENR Secretary – Co-Chair
DENR-Environmental Management Bureau
DENR-Forest Management Bureau
DEPARTMENT OF ENERGY
DEPARTMENT OF TRANSPORT
Private/Industry/Academe
CLIMATE CHANGE COMMISSION

JOINT COMMITTEE SECRETARIAT

CLIMATE CHANGE DIVISION -EMB

TECHNICAL EVALUATION TEAM

EMB-FMB-DOE-ACADEME-DOTr

INVESTORS/PROJECT DEVELOPERS & FINANCING PROGRAMMES THAT SHOWED INTEREST ON JCM

IGES (Institute for Global Environmental Strategies)	financing programmes
ADB (Asian Development Bank)	financing programmes/ technical support
MOEJ (Ministry of Environment, Government of Japan)	financing programmes
NEDO (New Energy & Industrial Technology Development Organization)	financing programmes(promotion scheme) - conducts demonstration program & MRV Application Study
METI (Ministry of Economy, Trade and Industry) and Mr. Haruka Fukuju	financing programmes(promotion scheme) - conducts JCM Feasiblity Study and Capacity building/ investors for e-Jeepneys
GEC (Global Environment Centre Foundation)	Financing programmes/project developer-electric vehicles
Mr. Hagashi of a Japanese Solar Technology	investors/project developers of solar technology
One Renewable Energy Enterprise, Inc. - One Renewable Energy Enterprise, Inc. -	investors/project developer
Mr. Masami Tadokoro of Overseas Environmental Cooperation Center (OECC) of Japan	investors/project developers
Mr. Koichi Yamamoto of Tokyo Electric Power Company, Inc. (TEPSCO)	Investors/project developers
Deloitte Touche Tohmatsu on Geothermal Projects	investors/project developers-geothermal projects
Kokuka Co. Ltd.	Investors/project developers- Diesel Dual Fuel (DDF) Engines
Energy Development Corporation	investors/project developers on renewable energy projects
Oriental Consultants Global Company Limited	investors/project developers (infrastructure/

CHALLENGES/ WAY FORWARD

- Ratification of the MoC at the Executive Level
- Establishment of the Joint Committee
- Designation of the government agency as authority to implement the JCM in the Philippines (?)
- Establishment of internal guidelines and procedures including institutional arrangements
- Development of promotional materials

Thank you.

Workshop on the Promotion of Low Carbon Development in Quezon City under the City to City Cooperation between Quezon and Osaka

Japan's support for low carbon projects in Asian Cities and Introduction of Joint Crediting Mechanism (JCM)

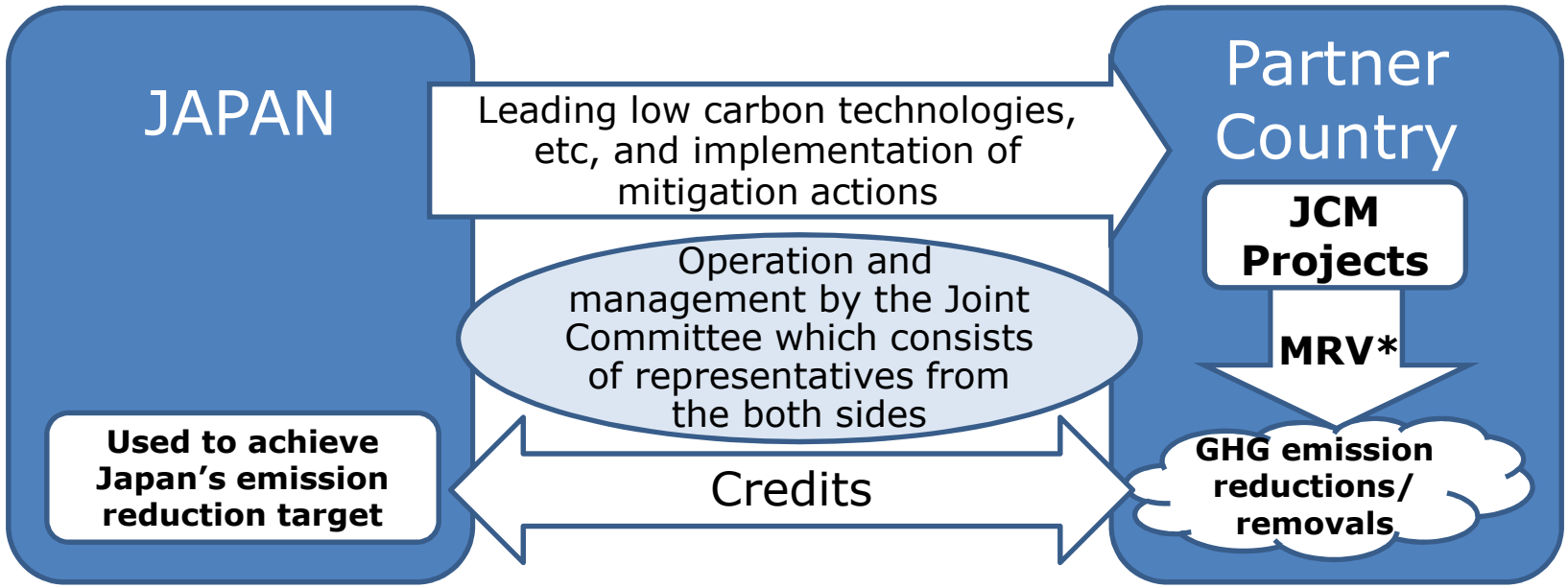
November 20th, 2017

Shiko Hayashi
Programme Manager,
Sustainable City Group (Kitakyushu Urban Centre)

IGES
Institute for Global Environmental Strategies

Basic Concept of JCM

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.

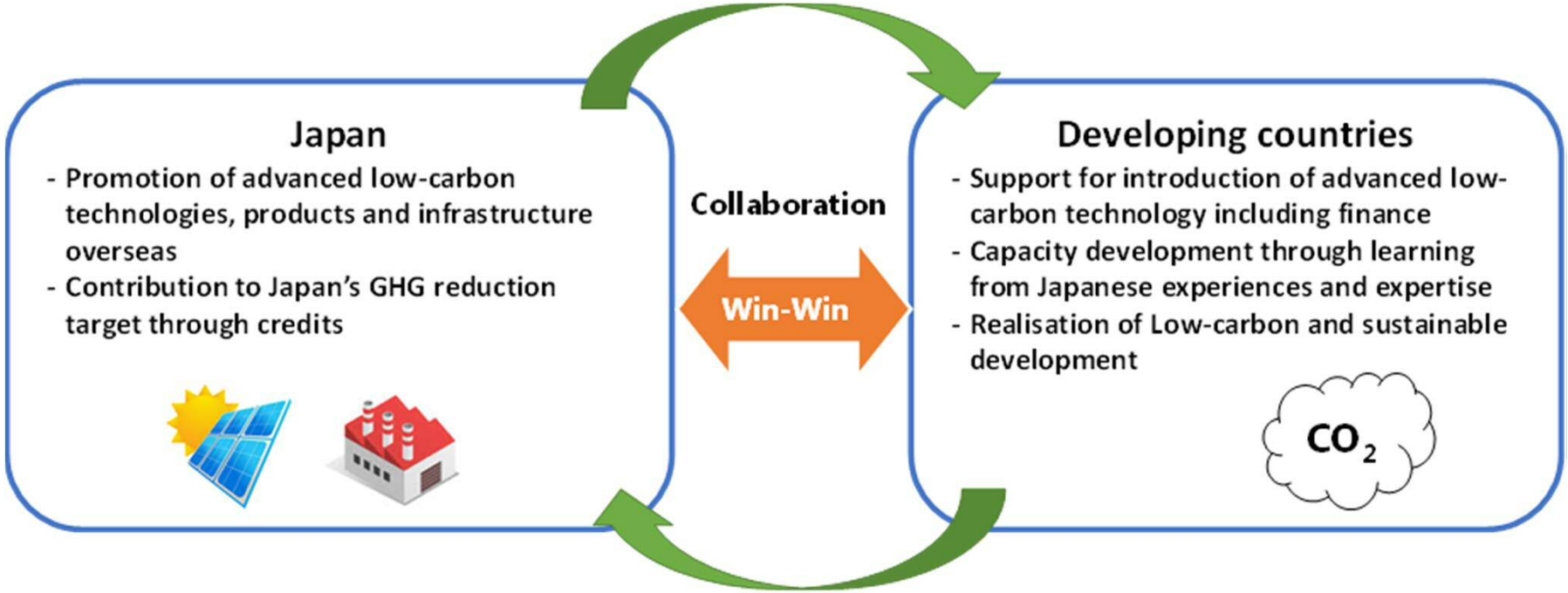


*measurement, reporting and verification

Source: Ministry of the Environment, Japan

Benefits of the JCM

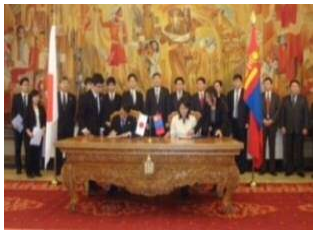
- Initial cost of advanced low-carbon technologies and products in the environmental performance is relatively high.
- By using the JCM Financing Programme, the barriers to the introduction of advanced low-carbon technologies and products can be reduced.



Source: Ministry of the Environment, Japan

JCM Partner Countries

Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand and Philipine.



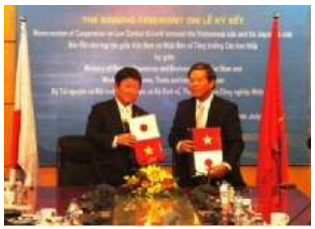
1. Mongolia
Jan. 8, 2013
（Ulaanbaatar）

2. Bangladesh
Mar. 19, 2013
(Dhaka)

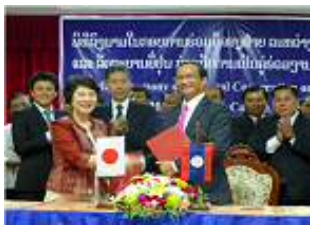
3. Ethiopia
May 27, 2013
(Addis Ababa)

4. Kenya
Jun. 12,2013
(Nairobi)

5. Maldives
Jun. 29, 2013
(Okinawa)

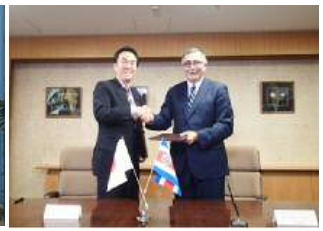


6. Viet Nam
Jul. 2, 2013
(Hanoi)



7. Lao PDR
Aug. 7, 2013
(Vientiane)

8. Indonesia
Aug. 26, 2013
(Jakarta)



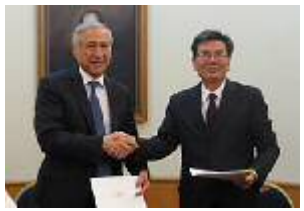
9. Costa Rica
Dec. 9, 2013
(Tokyo)

10. Palau
Jan. 13, 2014
(Ngerulmud)

11. Cambodia
Apr. 11, 2014
(Phnom Penh)

12. Mexico
Jul. 25, 2014
(Mexico City)

13. Saudi Arabia
May 13, 2015



14. Chile
May 26, 2015
(Santiago)

15. Myanmar
Sep. 16, 2015
(Nay Pyi Taw)

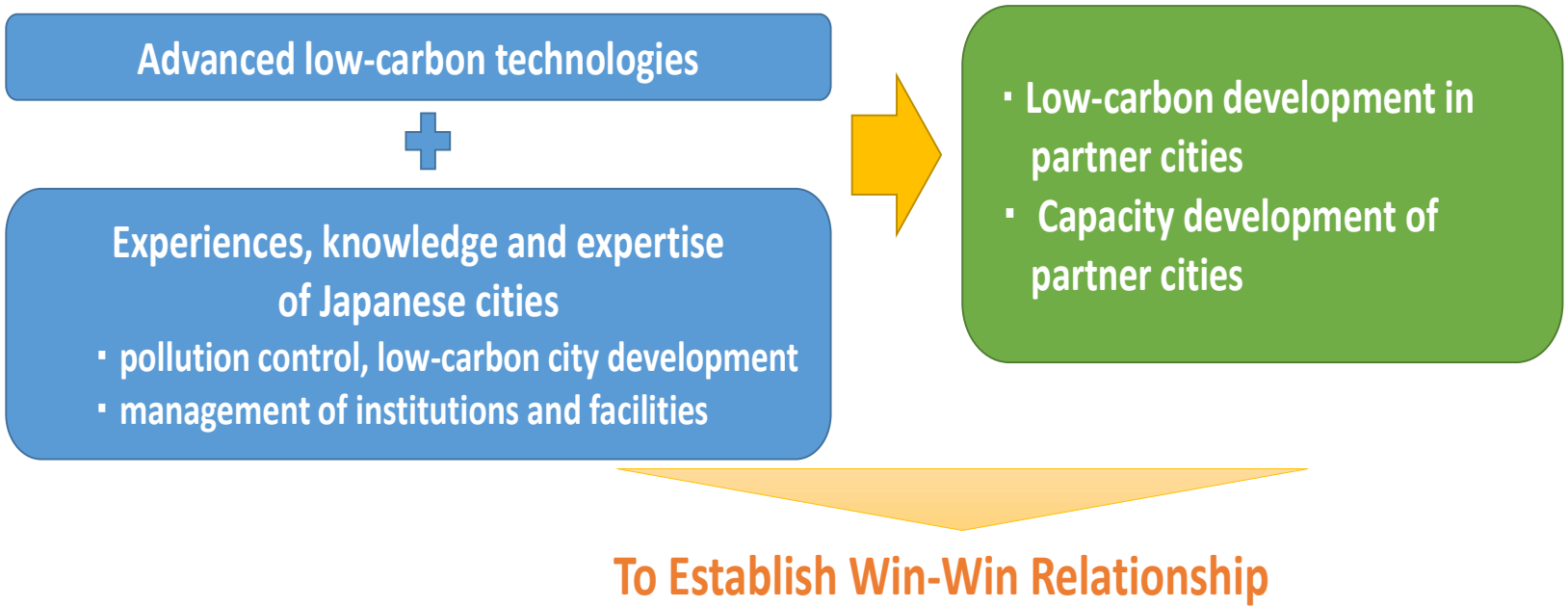
16. Thailand
Nov. 19, 2015
(Tokyo)

17. Philipine
Jan. 12, 2017(Manila)

Source: Ministry of the Environment, Japar

Core Concept of the City-to-City Collaboration Progamme

- The City-to-City Collaboration Programme of MOEJ started in FY2013
- The Programme aims to realise low-carbon development of overseas cities in an effective and efficient manner under the partnership of Japanese cities and partner cities.
- The Programme also aims to enhance the capacity of partner cities by drawing up a master plan, carrying out evaluation and selection of appropriate technologies, and sharing expertise in project management.
- By February 2017, 11 Japanese cities and 19 partner cities participated in the Programme.



Source: Ministry of the Environment, Japan

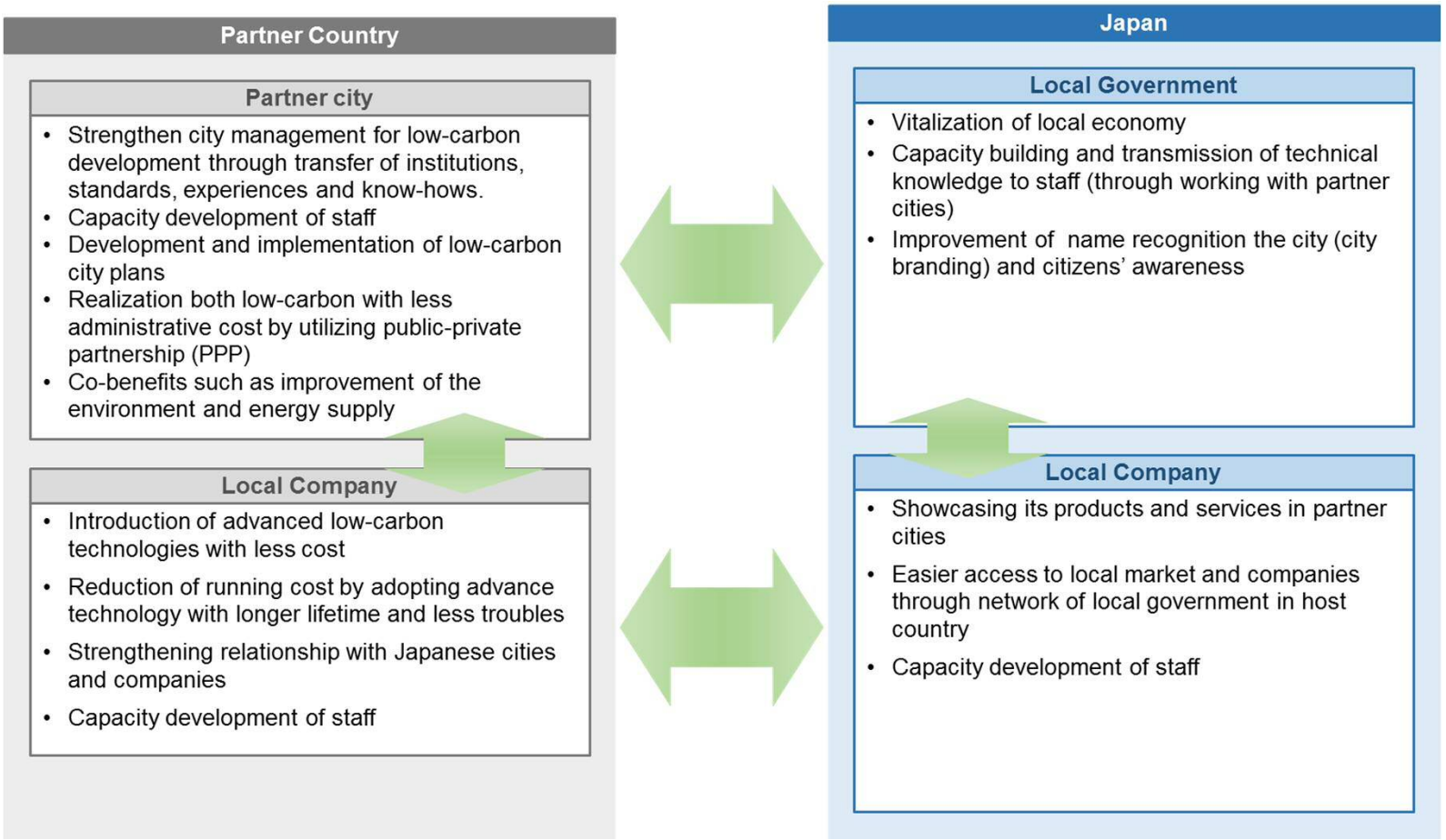
Japanese Cities and Partner Cities participating to the City-to-City Collaboration Progamme

(as of November 2017)

Japanese city	Partner city/region	Year of Implementation (Japanese fiscal year)
Hokkaido*	Ulaanbaatar, Mongolia	2016
Sapporo City*	Ulaanbaatar, Mongolia	2016
Fukushima City	Ayeyarwady, Myanmar	2015, 2016, 2017
Clean Authority of Tokyo	Bali, Indonesia	2016
Kanagawa Prefecture	Siem Reap, Cambodia	2015, 2016
	Phnom Penh Province, Cambodia	2017
Kawasaki City	Bandung, Indonesia	2015
	Penang, Malaysia	2013
	Yangon, Myanmar	2015, 2016, 2017
	Jakarta, Indonesia	2017
Yokohama City	Batam, Indonesia	2015, 2016, 2017
	Bangkok, Thailand	2014, 2015, 2016, 2017
	Bangalore, India	2015
	Da Nang, Viet Nam	2015
Toyama City	Butuan, the Philippines	2017
	Semarang, Indonesia	2017
Kyoto City	Vientiane, Laos	2014
Osaka City	Ho Chi Minh City, Viet Nam	2013, 2014, 2015, 2017
	Quezon City, Philippines	2017
Kobe City	Kien Giang, Viet Nam	2014
Kitakyushu City	Surabaya, Indonesia	2013, 2014, 2015
	Hai Phong, Viet Nam	2014, 2015, 2016, 2017
	Rayon-Map Ta Phut, Thailand	2015, 2016
	Chaing Mai, Thailand	2017
	Iskandar, Malaysia	2015
	Phnom Penh, Cambodia	2013, 2016, 2017
	Mandalay, Myanmar	2017

Benefits for Stakeholders participating to the City-to-City Collaboration Porgramme

- As well as Japanese cities and partner cities in developing countries, private sectors which possess advanced low-carbon technologies and those intending to introduce such technologies, participate in the City-to-City Collaboration Programme.



Source: Ministry of the Environment, Japan

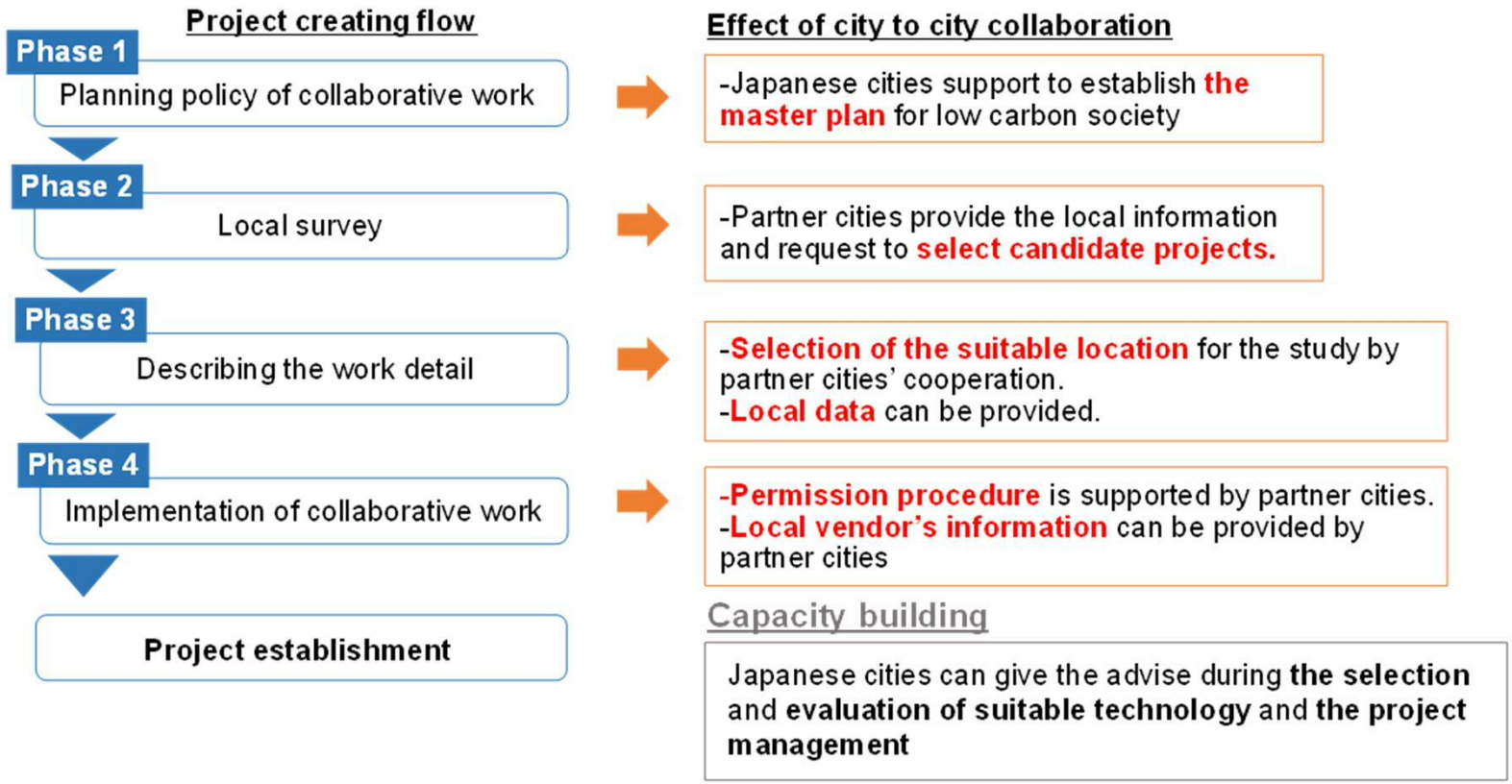
Steps and Timeframe of the City-to-City Collaboration Porgramme

- the collaborative activities under the City-to-City Collaboration Programme are implemented from April to March.
- When promising low-carbon technologies to promote low-carbon society development are identified in partner countries under the Programme, in many cases, this will move on to the project implementation stage with the submission of an application to the JCM Model Project.
- Normally, the open call for proposals to the JCM Model Project is made in late April and an application for grants for financial assistance must be made within three months of the internal announcement of the adopted projects, which is made in June.
- In either case, applicants should note that this timeframe is executed in line with Japan's budgetary fiscal year (April to the following March).

Source: Ministry of the Environment, Japan

Roles of local governments in the City-to-City Collaboration Programme

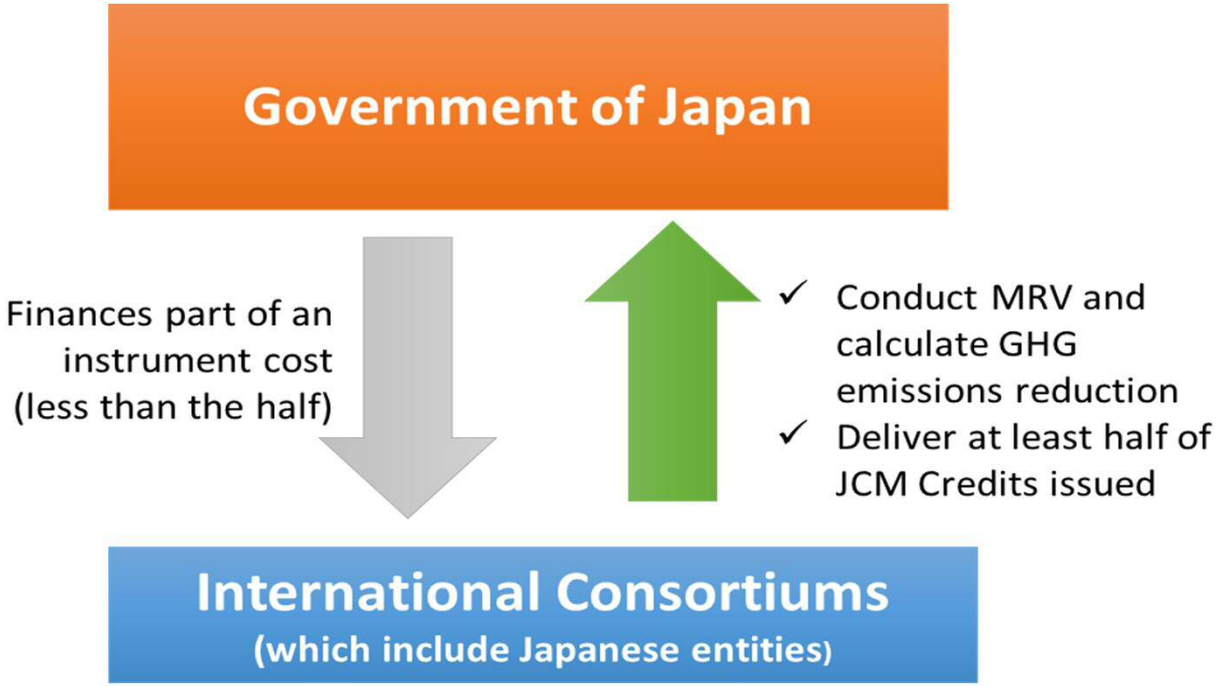
- Coordination with existing urban planning and other plans/strategies
- Mediation with related administrative organizations
- Matching with local companies
- Support for administrative procedures
- Advice on local situations and support in responding to issues



Source: Ministry of the Environment, Japan

JCM Model Project

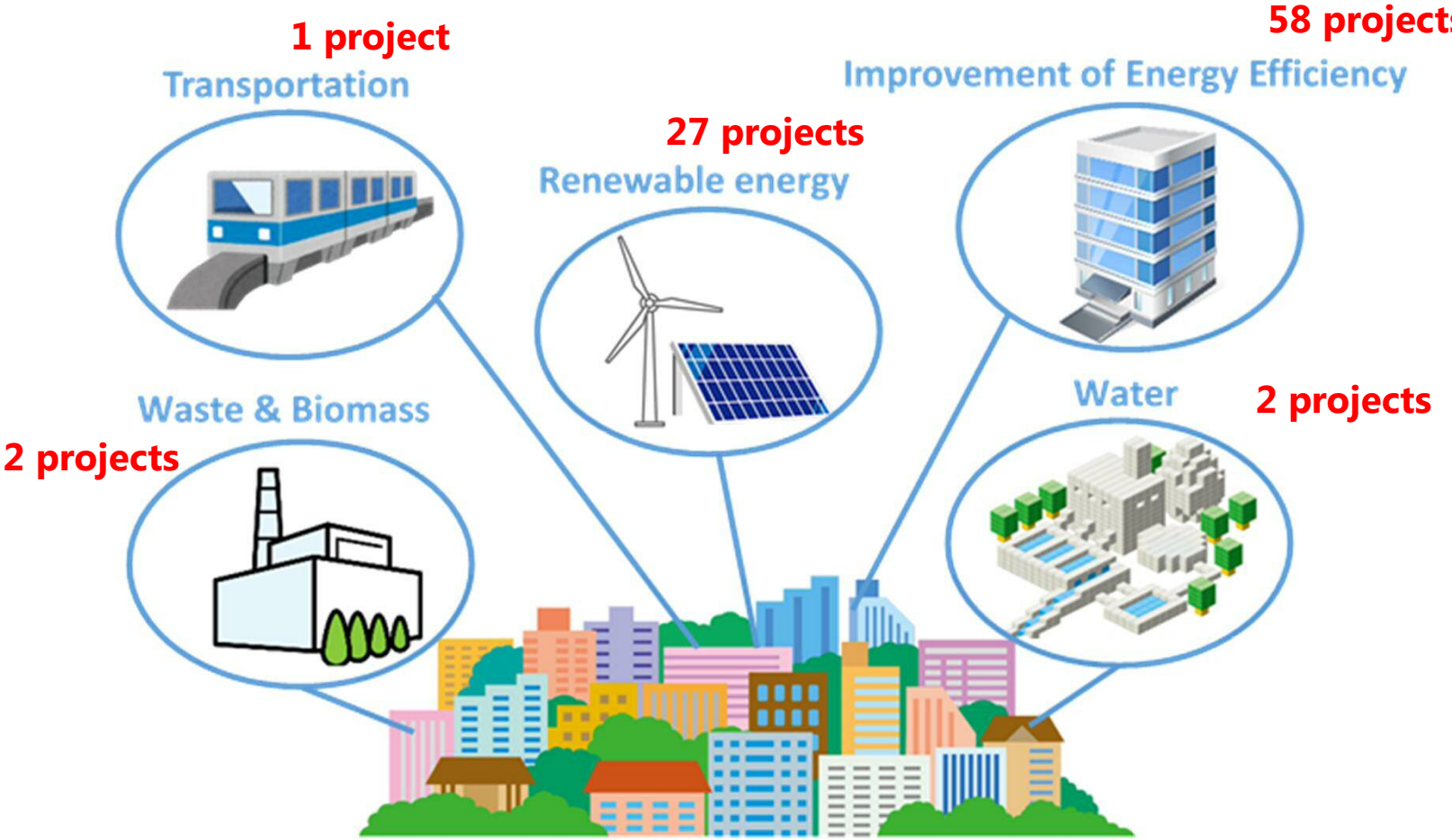
- JCM Model Project is a financing programme provided by MOEJ.
- It covers less than half of the initial costs in introducing facilities, equipment and vehicles that reduce CO_2 emissions derived from fossil fuel combustion.
- CO_2 emission reduction realised by the project – which is measured, reported and verified – releases JCM credits.
- At least half of JCM credits issued is delivered to the Government of Japan.



Source: Ministry of the Environment, Japan

Sectors supported by JCM Project

- 90 JCM Model Projects are awarded as of March 2017
- Most are in energy efficiency improvement, followed by renewable energy, energy efficiency-renewable energy generation (co-generation), waste-to-energy, heat recovery and transportatio



Source: Ministry of the Environment, Japan

Related websites

(as of November 2017)

Name of the website	Outline	URL
JCM Homepage	JCM Homepage, jointly managed by Ministry of Trade and Industry and Ministry of the Environment, Japan	https://www.jcm.go.jp/
Web Portal for Low Carbon Development in Asia	Portal site for low carbon development of Asia provided by Ministry of the Environment, Japan	http://www.env.go.jp/earth/coop/low-carbon-asia/english/index.html
Carbon Markets Express	Introduce JCM and carbon markets in the world, based on the information released by the government of Japan	https://www.carbon-markets.go.jp/eng/

Source: Ministry of the Environment, Japan

Thank you.

Support for Low Carbon Development Projects through Intercity Cooperation between Osaka and Quezon

Osaka City

Oriental Consultants Co., Ltd

November 20, 2017

Background

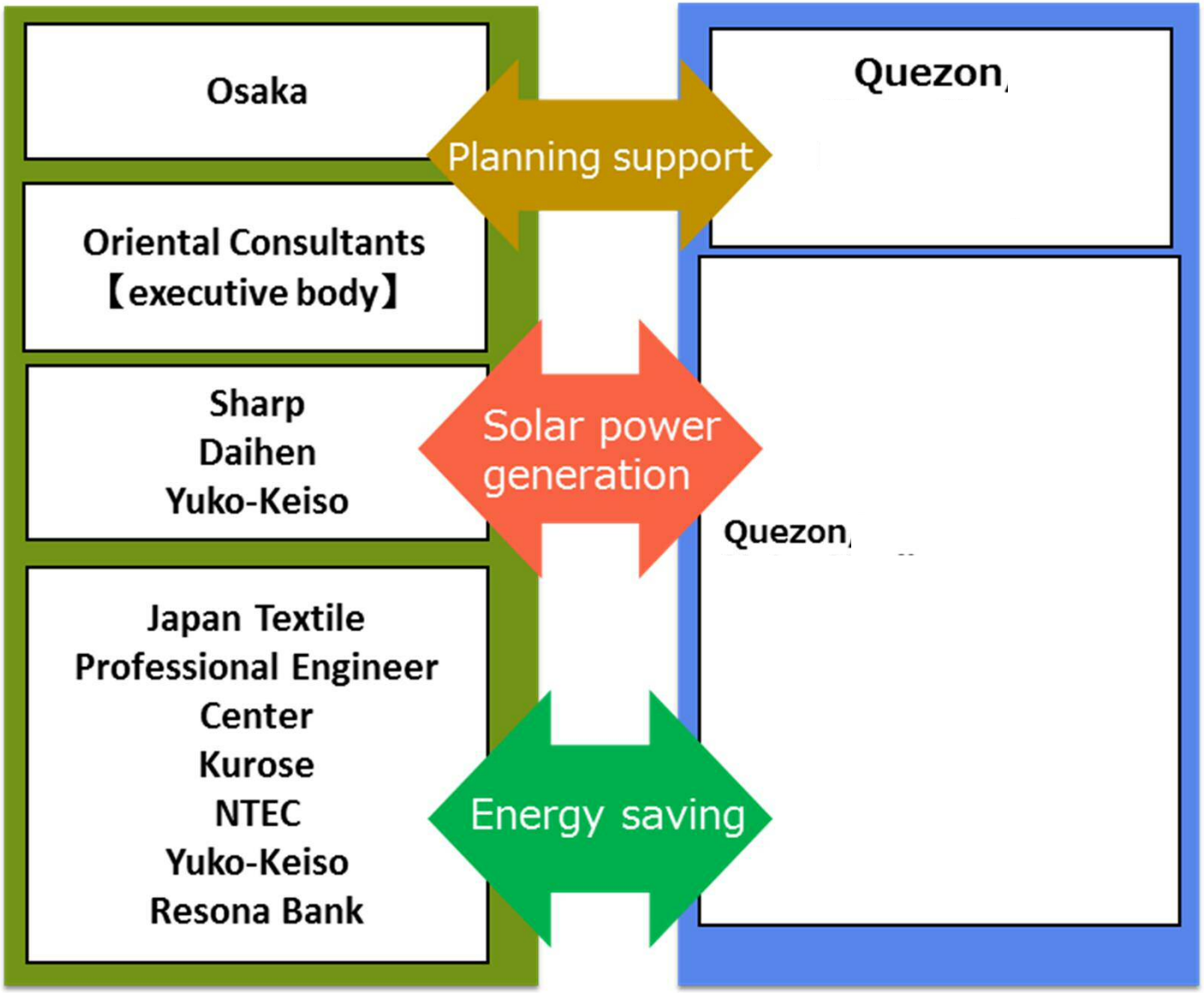
- On January 12th, 2017, to the Republic of the Philippines and Japan signed the bilateral document of the Joint Crediting Mechanism (JCM) in the Republic of the Philippines.

- Republic of the Philippines becomes the 17th JCM member country after Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar and Thailand.

- There has been cooperation between Osaka, and Manila and Quezon cities under the projects of Ministry of Environment and other human resource development projects.

- For deepening the cooperation, JCM scheme can be applied for developing low-carbon promoting projects to realize low-carbon development in the cities

Project Framework



Project Outline

- Exchange views and know-how on low carbon city development between the cities
- Develop potential JCM projects related to solar power generation and energy saving in a factory.
- Organize workshops for capacity building and training in Japan and Quezon

Solar Power Generation

Develop a mega solar power generation project as a potential JCM project in Quezon

- Discuss with Quezon or other related parties to select a candidate project
- Develop JCM methodology for calculating and monitoring CO_2 emissions
- Observe regulation and procedures for introduction of solar power generation system
- Develop a JCM project development manual for solar power generation projects

Project Outline

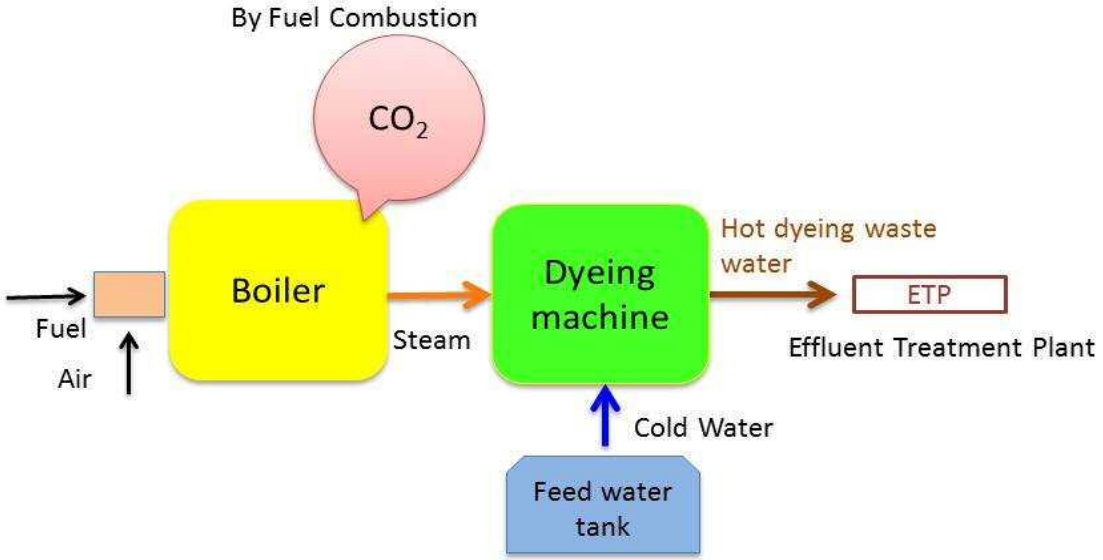
Energy Saving

Develop an energy saving project at a factory by introducing efficient boilers, and heat exchangers for waste heat recovery.

- Discuss with Quezon or other related parties to select a candidate factory
- Conduct an energy auditing at a factory to clarify the potentiality of energy saving in the factory
- Introduce technologies, optimal operation and energy management practices
- Develop JCM methodology for calculating and monitoring CO_2 emissions
- Develop a JCM project development manual for energy efficiency improvement projects

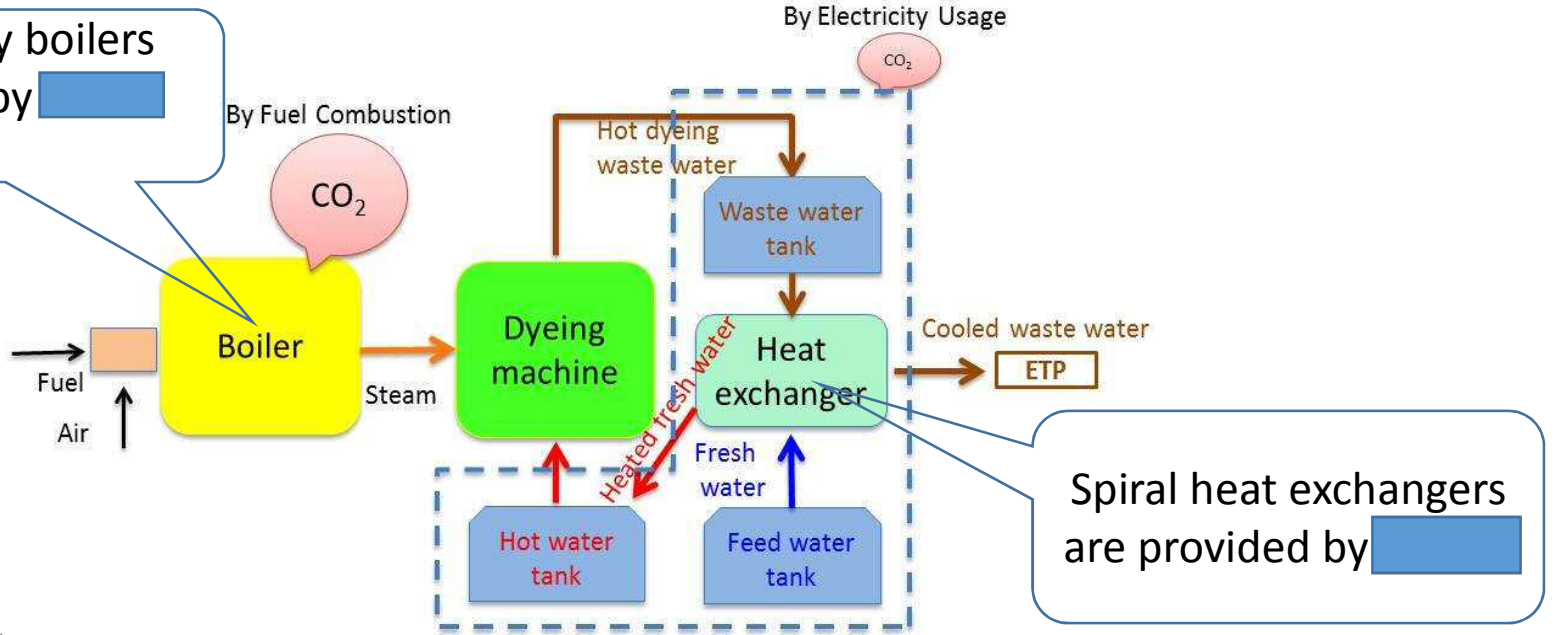
Project Image (Energy saving)

Before



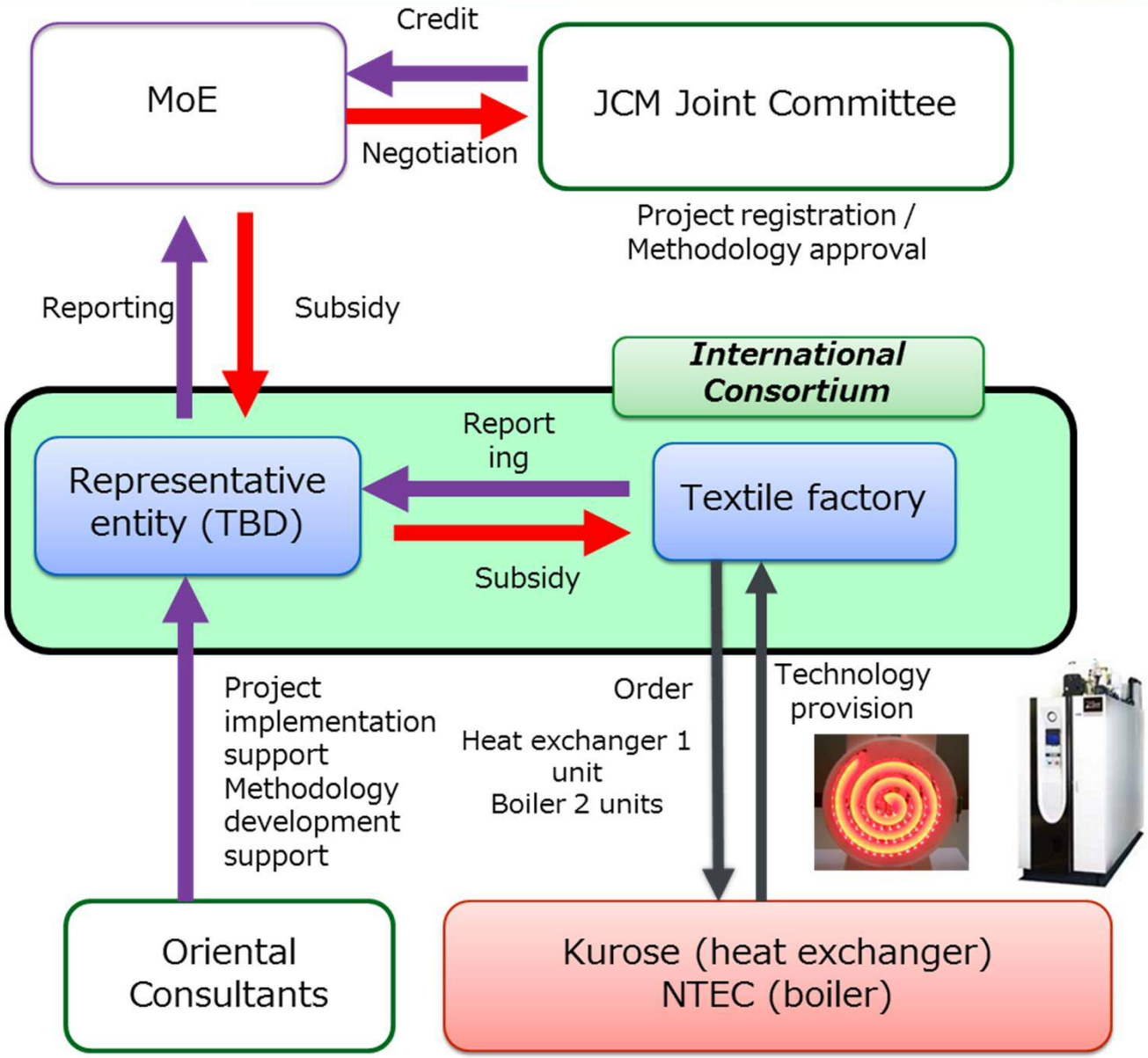
After

High efficiency boilers are provided by [redacted] (if necessary)



Spiral heat exchangers are provided by [redacted]

Project Implementation Scheme



Waste Heat Recovery (Case Study)

Production capacity	Amount of waste water	Average temperature of waste water	Boiler (efficiency)
14 ton/day	353 ton/day	66 ℃	Gas boiler (CNG) (87%)

Waste water temperature (℃)	Waste water flow rate (t/day)
40～59℃	141
50～79℃	141
>80℃	71
Total	353

Waste water inlet temperature (℃)	61
Supply water flow rate (t/hr)	14.7
Supply water inlet temperature (℃)	26
Surface area of heat exchanger (m^2)	32
Waste water outlet temperature (℃)	37
Supply water outlet temperature (℃)	50

300 days/year

Recovered energy 10,637,867 MJ/year → Saved natural gas 335,728 m3/year → CO2 reduction 585 t/year

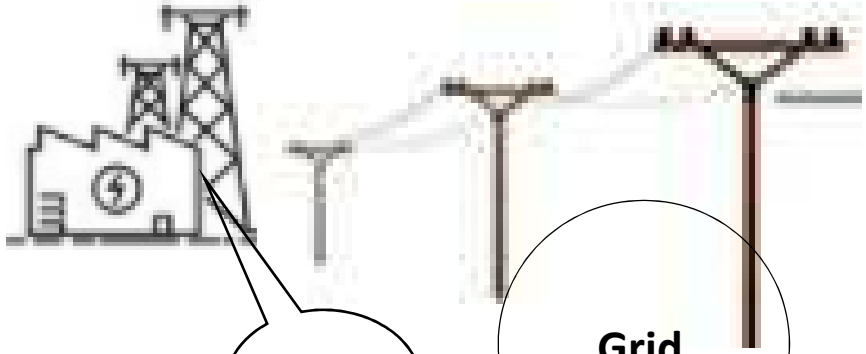
	Heat exchanger	Wiring work piping work	Underwater pump	Ancillary equipment	Control board	Auto valve	Flow meter (with transmitter)	Export packing freight	Others	Total
JPY										
US$										

With 50% subsidy => IRR

In the case of coal (in Philippine)

Boiler efficiency	80%
Net caloric value of coal (TJ/Gg)	31
Coal CO_2 emission factor (CO2 kg/TJ)	87.3
Coal saved (t/year)	428,946
CO_2 reduction (t/year)	1,051

Project Image



Solar Panel

CO_2

Grid

Buy

Sell

Junction box

DC

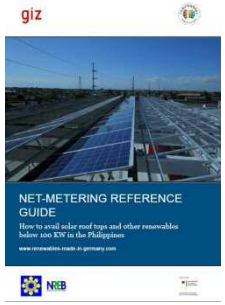
Power conditioner

AC

Substation facilities

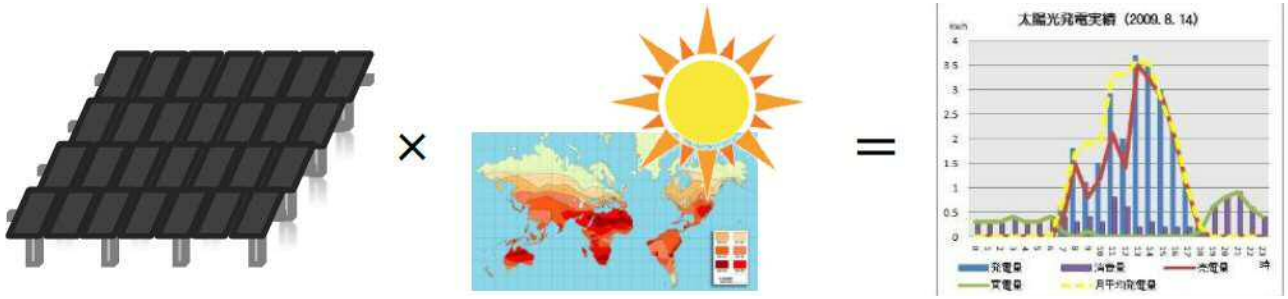
Metering

Monitor



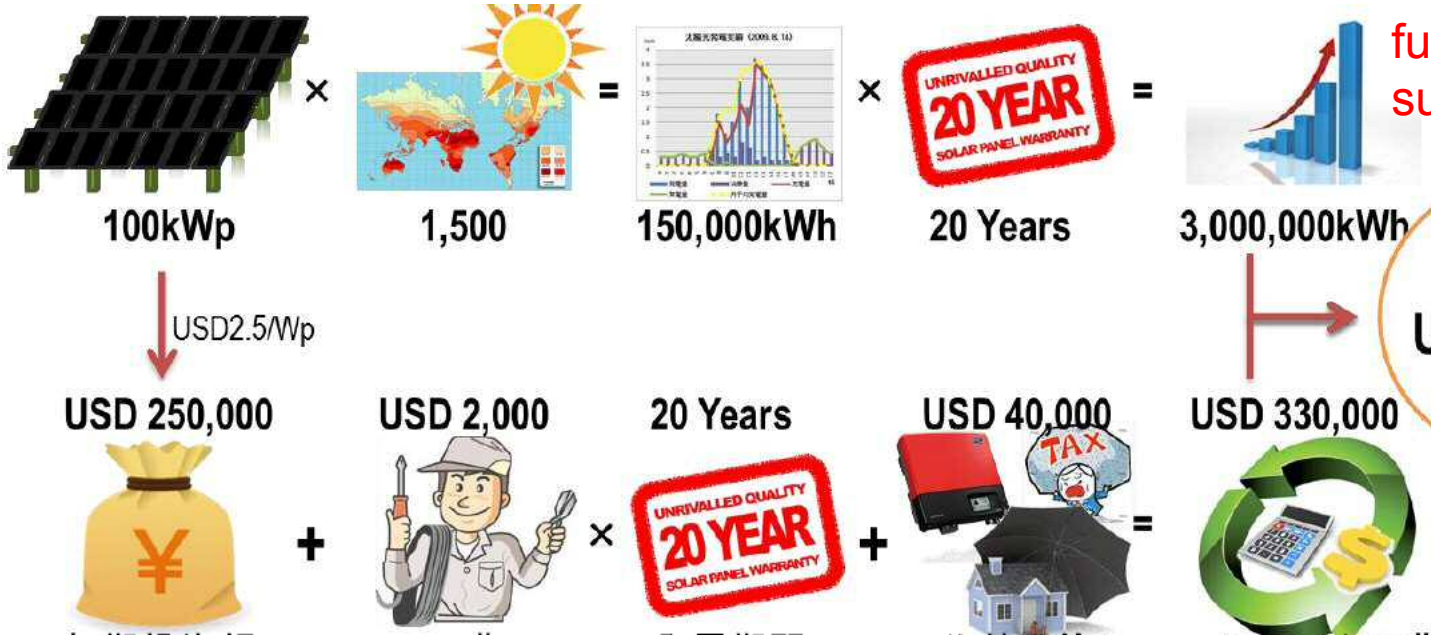
Solar Power Generation (Case Study)

System size | Annual solar radiation | Annual power generation



100 kWp | 1,500 kWh/m2/year | 150,000kWh/year

Annual CO2 emission reduction:
76 ton CO2/year



LCOE decrease furthermore with JCM subsidy (40%)

LCOE
USD 0.11
(PHP 4.8)

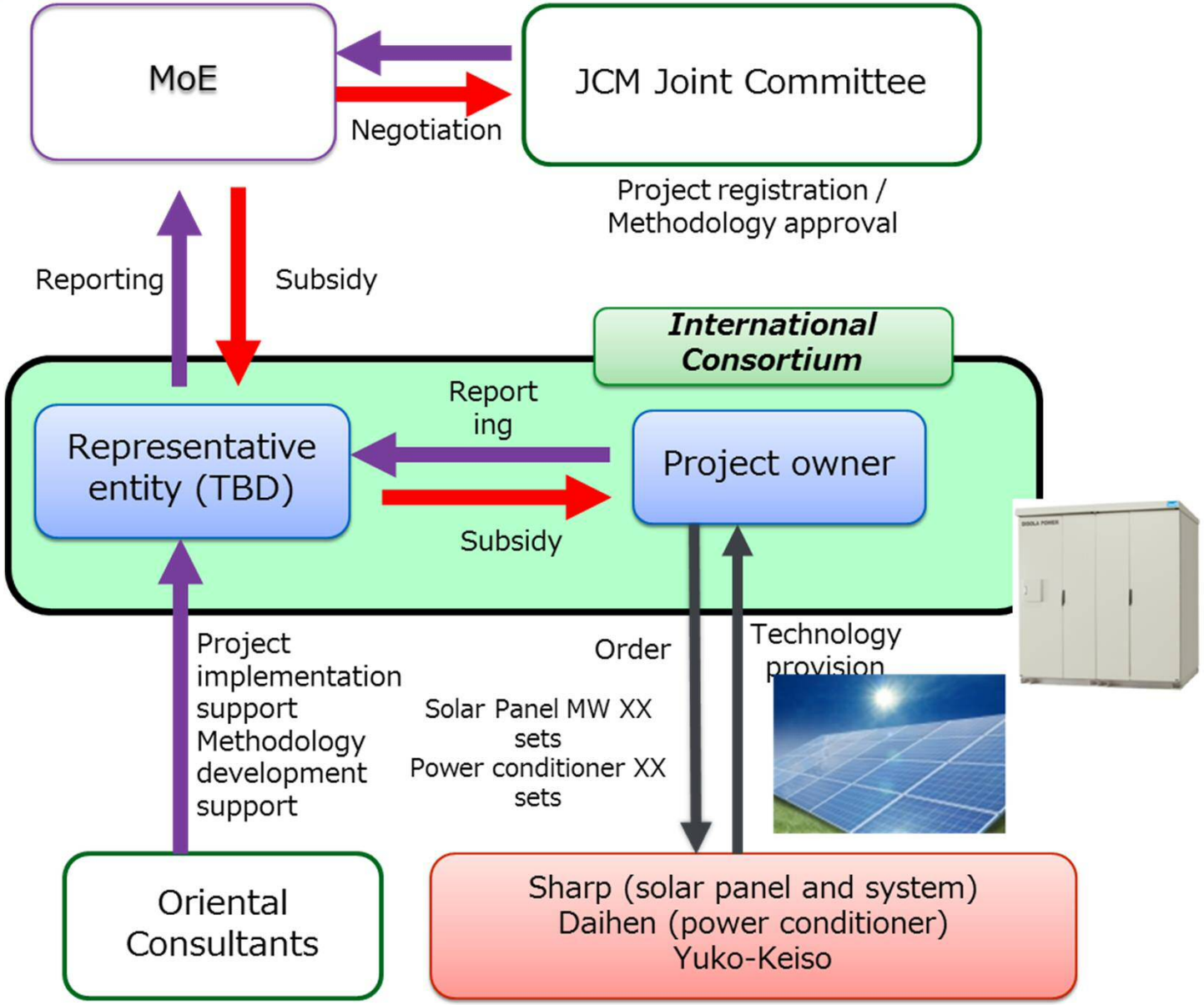
Leverage Cost of Electricity

50%▽

P9.6/kwh
(Nov.)

Grid emission factor: 0.508 tCO2/MWh（combined margin)

Project Implementation Scheme



Project Schedule and Activities

Time	Tasks	Note
Beginning of June	・Pre-survey	Completed
End of July	・Workshop in Japan	Completed
End of August	・The first field survey ・Kick off meeting	Completed
Middle of October	・Workshop in Japan	Completed
End of November	・The second field survey ・Workshop in Manila Energy auditing (factory)	Team members: Osaka, OC and JTCC and NTEC
Middle of next January	・The third field survey ・Workshop in Manila	Team members: Osaka, OC and other members
End of next January	・Workshop in Japan	Two delegates from Quezon City

Workshop on the Promotion of Low Carbon Development in Quezon City under the City to City Cooperation between Quezon and Osaka

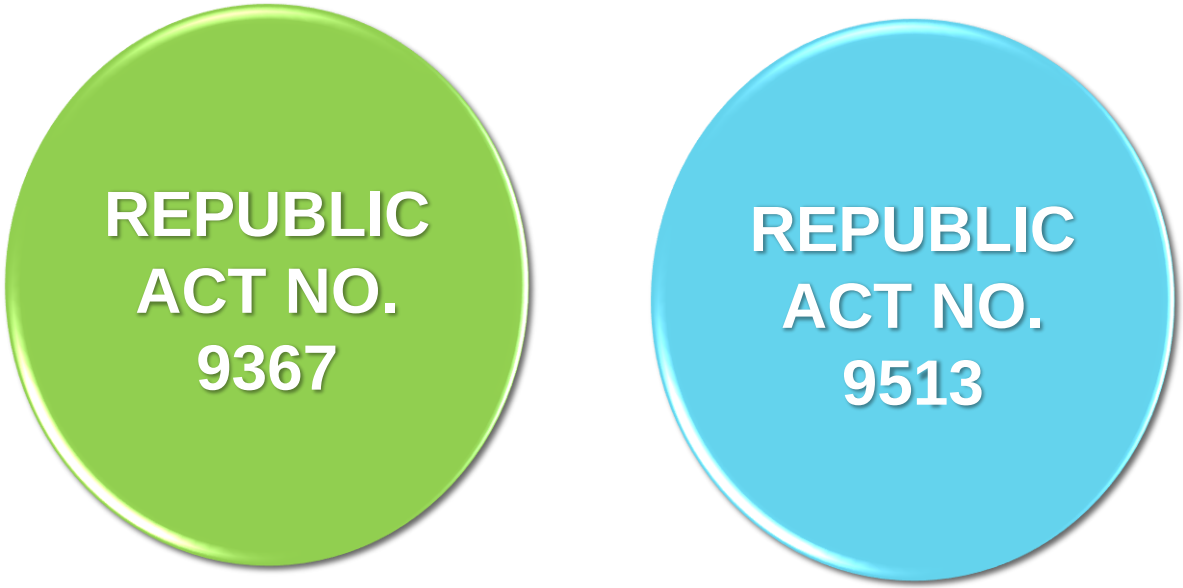
20 November 2017

RUBY B. DE GUZMAN
Division Chief
Biomass Energy Management Division
Renewable Energy Management Bureau
Department of Energy

Outline of Presentation

- Enactment of Landmark Laws
- Where we are now
- Policy Directions and Mechanisms
- Policies and Development Status
- New Policy Initiatives

Landmark Laws

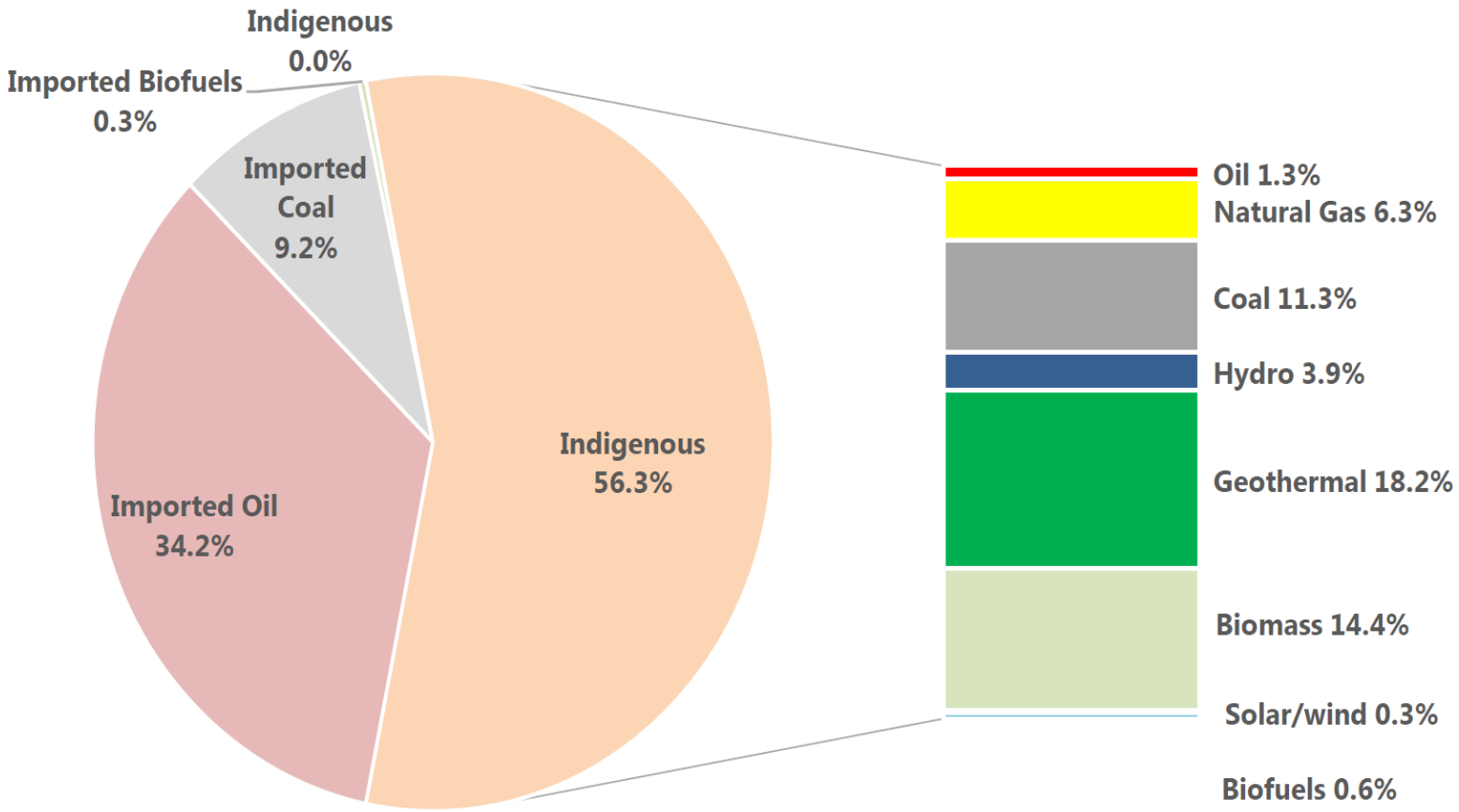


The primary bioenergy policy of the country is governed by two landmark laws.

Renewable Energy

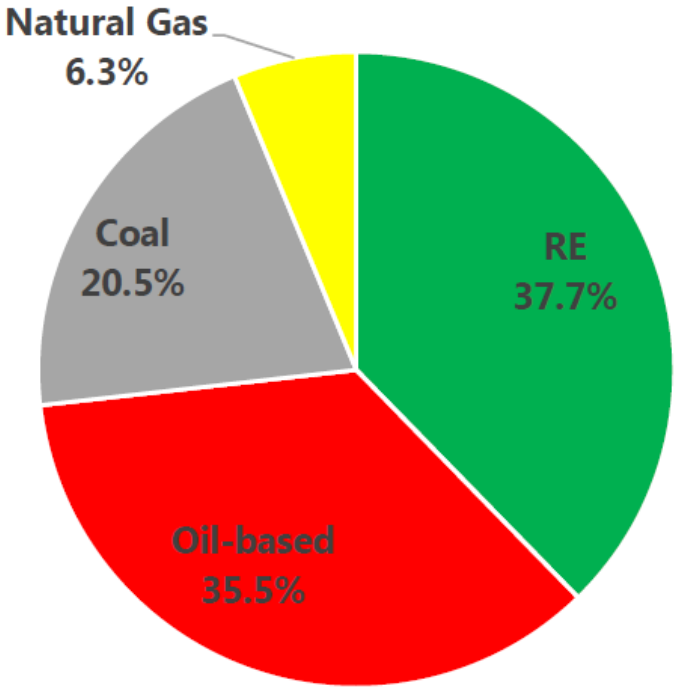
- **B**iomass / **B**iofuels
- **G**eothermal
- **S**olar Power
- **H**ydropower
- **O**cean
- **W**ind Power

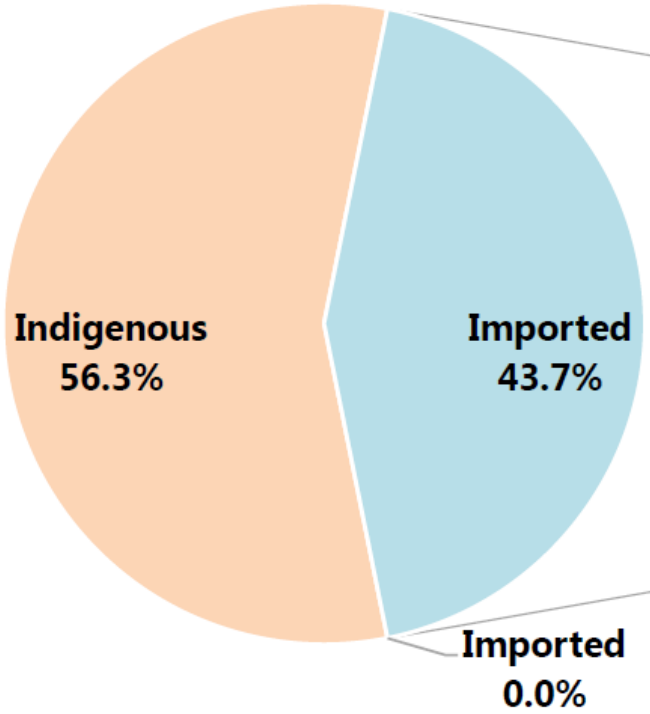
Where we are now: 2016 Energy Supply

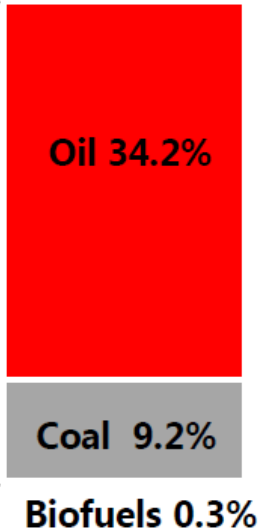


Total Energy:	52.21 MTOE
Self-sufficiency:	56.3%
Renewable Energy:	37.7%
RE + Nat Gas:	44.0%

Where We are Now: 2016 Energy Supply



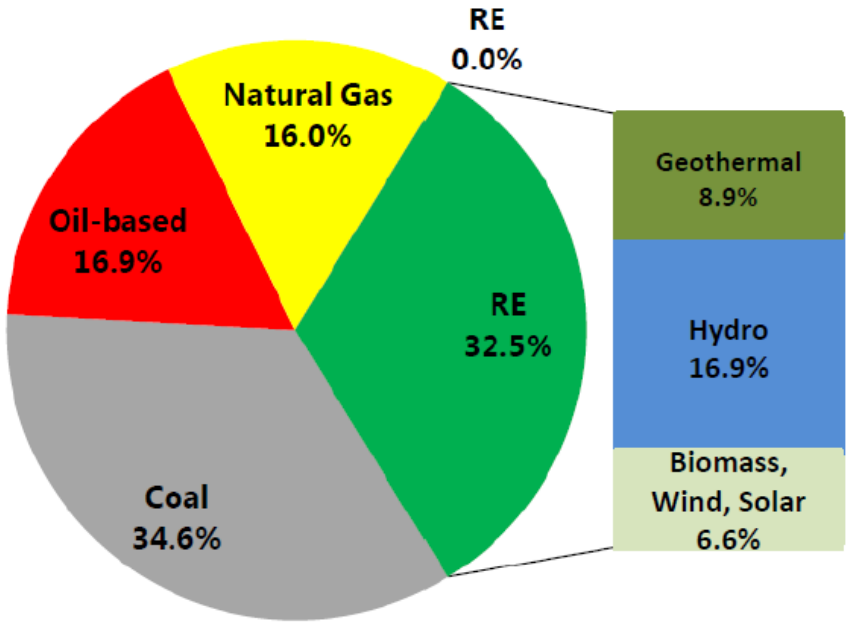




Total Energy:	52.21 MTOE
Self-sufficiency:	56.3%
Renewable Energy:	37.7%
RE + Nat Gas:	44.0%

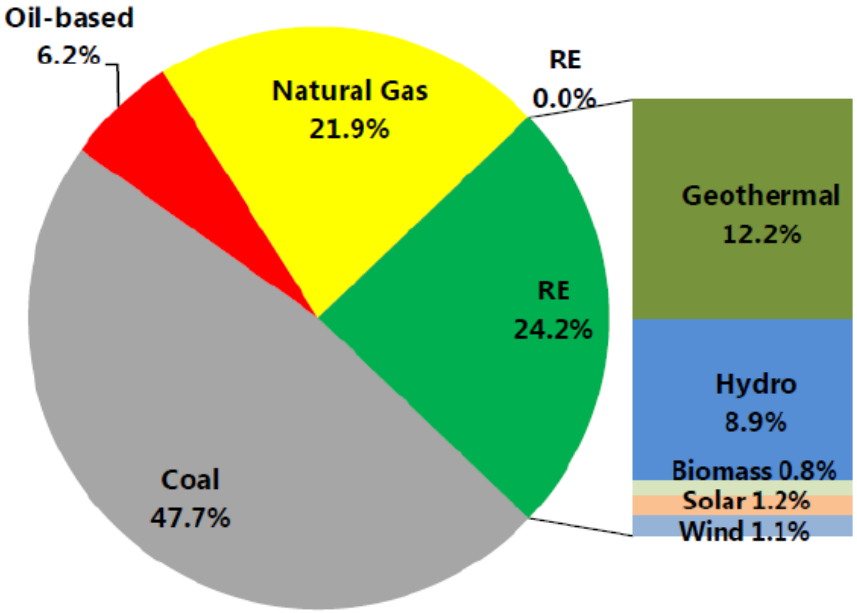
2016 Power Capacity and Gross Generation

Installed Capacity



Total Installed Capacity:	**21,424 MW**
Renewable Energy Share:	**32.5%**

Gross Generation



Total Generation:	**90,797 GWh**
Renewable Energy:	**24.2%**
RE + Nat Gas:	**46.1%**

Summary of Projects (as of September2017)

RESOURCES	AWARDED PROJECTS		POTENTIAL CAPACITY (MW)		INSTALLED CAPACITY (MW)	
	GRID-USE	OWN-USE	GRID-USE	OWN-USE	GRID-USE	OWN-USE
Hydro Power*	445	-	13,419.73	-	965.04	-
Ocean Energy	6	-	26.00	-	-	-
Geothermal	41	-	575.00	-	1,906.19	-
Wind	62	1	2,381.50	-	426.90	0.0006
Solar	186	16	5,181.67	4,286.00	900.18	3.218
Biomass	52	24	338.68	16.15	389.58	119.86
Sub-total	**792**	**42**	**21,910.58**	**27.356**	**4,587.89**	**123.08**
TOTAL	**831**		**21,937.94**		**4,710.97**	

RESOURCES	AWARDED	REGISTERED CAPACITY (million liters/year)	COR (w/ notice to proceed)	REGISTERED CAPACITY (million liters/year)
Bioethanol	10	282.12	3	149.00
Biodiesel	11	574.90	2	165.00
TOTAL	**21**	**857.02**	**5**	**314.00**

Summary Biomass/Biofuels Projects under Biofuel and RE Laws (as of September 2017)

	# OF PROJECTS	INSTALLED CAPACITY (MW)	POTENTIAL CAPACITY (MW)	TOTAL (MW)
BREOC	52	389.58	338.68	728.26
COR for OWN-USE	24	126.78	16.15	142.93
TOTAL	**75**	**516.36**	**342.83**	**871.19**

RESOURCES	AWARDED	REGISTERED CAPACITY (million liters/year)	COR (w/ notice to proceed)	REGISTERED CAPACITY (million liters/year)
Bioethanol	10	282.12	3	149.00
Biodiesel	11	574.90	2	165.00
TOTAL	**21**	**857.02**	**5**	**314.00**

Registered Biomass Projects per Feedstock

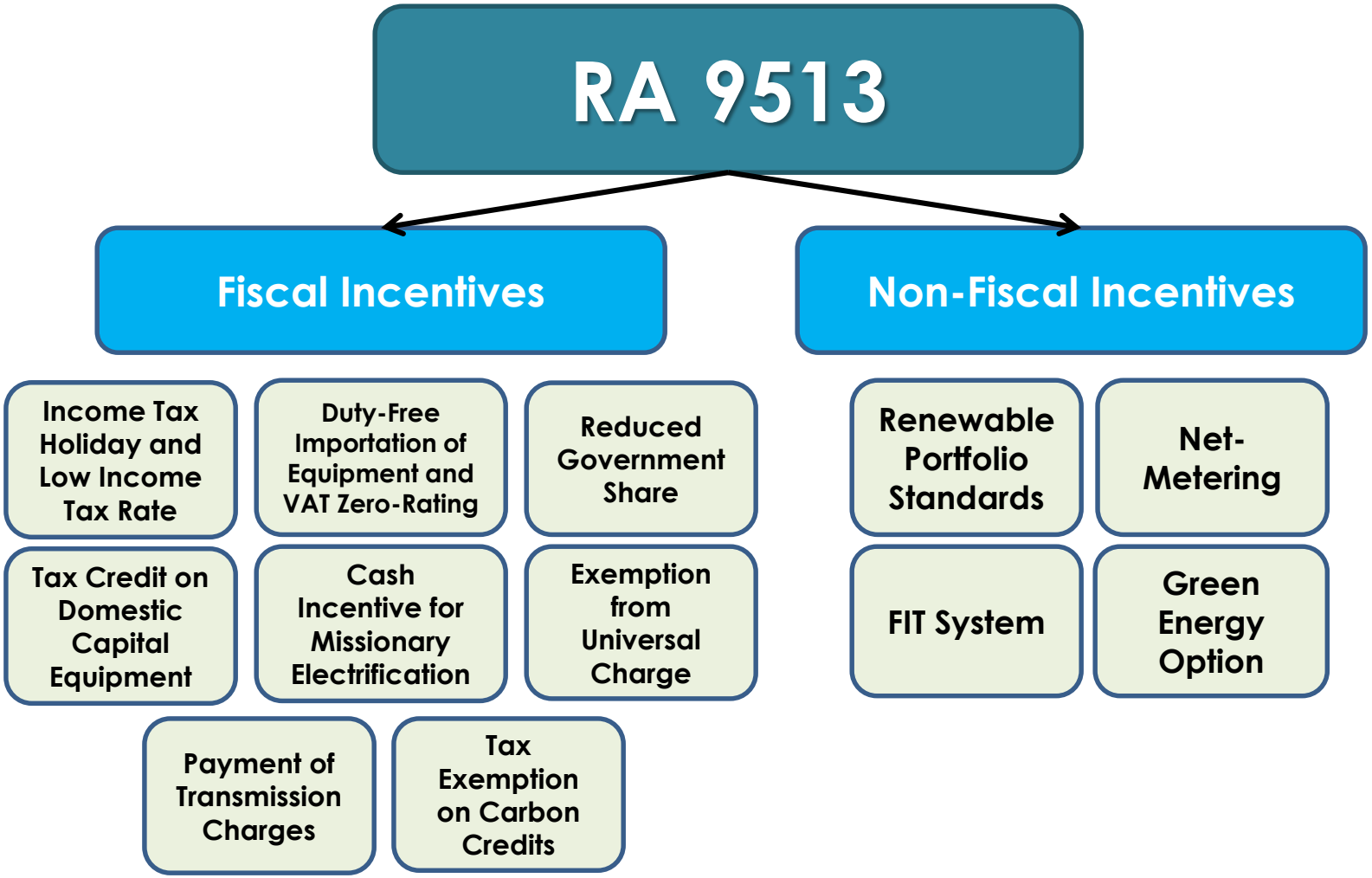
INSTALLED CAPACITY (MW)

	# of Projects	BREOC	# of Projects	COR for OWN-USE
Bagasse	9	279.78	14	121.05
Rice Husk	9	84.10	2	3.55
Napier Grass	-	-	-	-
Animal Manure	2	-	2	1.56
Coconut Waste	1	0.07	-	-
Distillery Waste	2	11.80	-	-
Sugarcane Trash	-	-	-	-
Empty Fruit Bunch	-	-	-	-
Wood Chips	-	-	-	-
Municipal Solid Waste	3	13.83	1	0.624
Multi-Feedstock	-	-	-	-
TOTAL	**26**	**389.58**	**19**	**126.784**

POTENTIAL CAPACITY (MW)

	# of Projects	BREOC	# of Projects	COR for OWN-USE
Bagasse	2	59.00	-	-
Rice Husk	6	43.00	1	3.00
Napier Grass	7	101.00	-	-
Animal Manure	-	3.20	2	8.85
Coconut Waste	3	14.00	-	-
Distillery Waste	-	-	1	4.2
Sugarcane Trash	1	25.00	-	-
Empty Fruit Bunch	1	3.50	-	-
Wood Chips	1	23.50	-	-
Municipal Solid Waste	3	26.48	1	0.10
Multi-Feedstock	3	40.00	-	-
TOTAL	**27**	**338.68**	**5**	**16.15**

Incentives under the RE Act



Policy Mechanisms

Net-Metering Rules and Interconnection Standards

- Connection/sale of customers' RE generation to the grid
  - Connection/sale The ERC approved the Net Metering Rules on 27 May 2013
  - As of February 2017, there are 773 customers connected to 10 different Distribution Utilities in the Country under Net-Metering agreements, amounting to 4.752 MWp in capacity

Renewable Portfolio Standards (RPS)

- Mandated minimum percentage of RE generation
  - RPS for Missionary Areas - For NREB's finalization
  - RPS for On-Grid Areas
    - Public consultations held in Cebu and Davao last July 2017
    - Final consultation held last Aug. 11, 2017 at DOE
  - RPS for Off-Grid Areas
    - Public consultations held in Palawan and Cebu last October 2017

Green Energy Option Program

- End-users' option to purchase electricity from RE facilities (open access)
  - Conducted public consultation in 3 major cities nationwide to gather comments/inputs

Updates on RE Project/Development

Department Order No. DO2017-04-0005

- Prescribing the new guidelines in the processing of applications for renewable energy service/operating contract
- Further enhances the transparency in processing and issuance of service contracts and permits and shorten the time frame to 25 days

Executive Order No. 30

- Creating the Energy Investment Coordinating Council (EICC) in order to streamline the regulatory procedures affecting energy projects
- Declares energy projects as projects of national significance
- **DOE** to chair the EICC and shall be composed of **DENR**, **NEA**, **NGCP**, **NPC**, **TransCo**, **DOF**, **DOJ**, **DOTr**, **HLURB**, **Palawan Council for Sustainable Development** and other agencies deemed necessary by the council.

Market Options for RE

- Feed-in-Tariff (FiT) - REPA
- Bilateral Contracts - PPA
- Spot Market - Price Taker / Actual Bidding
- Net Metering Program
- Green Energy Option - Retail Competition and Open Access
- Renewable Portfolio Standards (RPS) for On and Off Grid Areas

Feed-in-Tariff Updates

Feed-in-Tariff (FIT) Rates

RE Technology	Approved Rates (PHP/kWh)	Degressed Rates (PHP/kWh)	Installation Target (MW)
Run-of-River Hydro	5.90	5.8705*	250
Biomass	6.63	6.5969*	250
Wind	8.53	-	200
Solar	9.68	-	50

Feed-in-Tariff (FIT) 2 Rates

RE Technology	Approved Rates (PHP/kWh)	Installation Target (MW)
Wind	7.40*	400**
Solar	8.69*	500**

** The second FIT rate for wind energy was issued by the ERC at Php 7.40/kWh covering additional target of 200MW under ERC Resolution No. 14, series of 2015. Feed in Tariff (FIT) rates for solar was revised in April 2015 (Resolution No. 6, series of 2015) from Php 9.68 to 8.69/kWh covering additional target of 450 MW and the second FIT rate. ERC Resolution signed by the ERC on January 24, 2017 the degressed FiT rates for January to December 2017 hydro and biomass plants with commercial operations within the year are P5.8705/kWh and P6.5969/kWh, respectively.*

*** Amended targets for wind energy and solar power up to March 15, 2016.*

Summary of FIT-Eligible Projects as of September 2017

RESOURCE	FOR NOMINATION / CONVERSION		WITH CERTIFICATE OF CONFIRMATION OF COMMERCIALITY		WITH CERTIFICATE OF ENDORSEMENT TO ERC	
	NO. OF PROJECTS	CAPACITY (MW)	NO. OF PROJECTS	CAPACITY (MW)	NO. OF PROJECTS	CAPACITY (MW)
HYDRO		-	103	841.80	5	34.60
WIND	7	1,023.55	12	987.30	6	393.90
SOLAR	15	565.18	51	1,320.60	24	525.95
BIOMASS			18	153.76	15	125.16
TOTAL	**22**	**1,588.73**	**184**	**3,303.46**	**50**	**1,079.61**

Biomass FIT-Eligible Projects as of September 2017

With Certificate of Endorsement

ITEM NO.	PROJECT NAME	COMPANY NAME	LOCATION	CAPACITY
1	1.2 MW Payatas Landfill Methane Recovery and Power Generation Facility	Pangea Green Energy Philippines, Inc.	Metro Manila	1.500
2	19 MW Bagasse-fired Cogeneration Power Plant	Green Future Innovations Inc.	Isabela	14.00
3	14.8 MW Montalban Landfill Methane Recovery and Electricity Generation	Montalban Methane Power Corporation	Rizal	2.175
4	12.5 MW Bataan 2020 Rice Husk-Fired Biomass Power Plant	Bataan 2020, Inc.	Bataan	11.10
5	24 MW SJCiPower Rice Husk-Fired Biomass Power Plant Project	San Jose City I Power Corporation	Nueva Ecija	12.00
6	20 MW Rice Husk-Fired Biomass Power Plant Project	Isabela Biomass Energy Corporation	Isabela	18.00
7	12 MW HPCo Bagasse Cogeneration Plant	Hawaiian-Philippine Company	Negros Occidental	2.00
8	46 MW Bagasse-Fired Cogeneration Power Plant Project	Universal Robina Corporation	Negros Occidental	20.00
9	12 MW Rice Husk-Fired Biomass Power Plant Project	Green Innovations for Tomorrow Corporation	Nueva Ecija	10.80
10	3.6 MW Rice Husk-Fired Biomass Gasification Power Plant	Lucky PPH International, Inc.	Isabela	3.60

Biomass FIT-Eligible Projects as of September 2017

With Certificate of Endorsement

ITEM NO.	PROJECT NAME	COMPANY NAME	LOCATION	CAPACITY
11	5 MW Rice Husk-Fired Biomass Power Plant Project	Bicol Biomass Energy Corporation	Camarines Sur	4.40
12	34 MW Bagsse-Fired Biomass Power Plant	Victorias Milling Company, Inc.	Negros Occidental	2.50
13	21 MW FFHC Bagasse-Fired Cogeneration Power Plant	First Farmers Holdings Corporation	Negros Occidental	8.00
14	8.8 MW Biomass Power Plant Project	AseaGas Corporation	Batangas	2.21
15	15 MW Biomass Power Plant Project	Lamsan Power Corporation	Maguindanao	13.5

Strategic Directions 2017 – 2040

1. ENSURE ENERGY SECURITY
2. EXPAND ENERGY ACCESS
3. PROMOTE A LOW CARBON FUTURE
4. STRENGTHEN COLLABORATION AMONG ALL GOVERNMENT AGENCIES INVOLVED IN ENERGY
5. IMPLEMENT, MONITOR AND INTEGRATE SECTORAL AND TECHNOLOGICAL ROADMAPS AND ACTION PLANS
6. ADVOCATE THE PASSAGE OF THE DEPARTMENT'S LEGISLATIVE AGENDA
7. STRENGTHEN CONSUMER WELFARE AND PROTECTION
8. FOSTER STRONGER INTERNATIONAL RELATIONS AND PARTNERSHIPS

Nine-Point Energy Agenda

DOE's Nine-Point Energy Agenda

1. ACCESS TO BASIC ELECTRICITY FOR ALL FILIPINOS BY 2022
2. ADOPTING A TECHNOLOGY NEUTRAL APPROACH FOR AN OPTIMAL ENERGY MIX
3. IMPROVING THE SUPPLY OF POWER THAT IS RELIABLE, TO MEET DEMAND NEEDS BY 2040
4. DEVELOPING LNG NEEDS FOR THE FUTURE IN ANTICIPATION OF THE MALAMPAYA DEPLETION
5. FACILITATING THE COMPLETION OF TRANSMISSION PROJECTS BY 2020
6. PRO-CONSUMER DISTRIBUTION FRAMEWORK FOR AFFORDABILITY, CHOICE AND TRANSPARENCY
7. STREAMLINING DOMESTIC POLICY TO CUT RED TAPE
8. DOE TO DELIVER ON PSALM PRIVATIZATION
9. PROMOTING EFFICIENT USE OF POWER AMONG CONSUMERS THROUGH AN IEC

RENEWABLE ENERGY ROADMAP

	Short-Term (2017-2018)	Medium-Term (2019-2022)	Long-Term (2023-2040)
ACCELERATION OF RE POSITIONING	• Review and update 2011-2030 NREP • Monitor and assess RESCs awarded for the conversion of indicative projects to committed • Finalize rules and implement RPS and REM • Finalize rules and implement Green Energy Option • Conduct detailed RE technology and resource assessment • Review other RE policy mechanisms	• Intensify development in off-grid areas for wider populace access to energy • Determine realistic RE potential • Update the NREP 2017 – 2040	• Continue and accelerate implementation of RE projects • Conduct regular updating of RE resource database
CREATION OF CONDUCIVE BUSINESS ENVIRONMENT	• Streamline administrative processes of RESC applications • To work on DOE energy projects to be declared as projects of national significance • Enhance EVOSS for RE projects • Provide technical assistance to lower investment cost • Promote and incentivize local technology producers • Establish RE Information Exchange • Explore and initiate on the harmonization of LGU and national government related programs /policy		
RELIABLE AND EFFICIENT INFRASTRUCTURE	• Strengthen resiliency of RE systems and facilities • Harmonize transmission Development Plan with RE targets • Develop geographical installation target • Enhance local technical capabilities • Conduct R&D on the efficiency of RE technologies on the Smart Grid System		

INCREASED RE INSTALLED CAPACITY TO AT LEAST 20,000 MW

RENEWABLE ENERGY ROADMAP

	Short-Term (2017-2018)	Medium-Term (2019-2022)	Long-Term (2023-2040)
PROMOTE AND ENHANCE RD&D AGENDA	• Strengthen the management and operation of ARECS • Continue conduct of RE technology research and development studies • Identify viability of new technologies • Construct Ocean pilot/demo Energy projects • Implement, monitor and evaluate pilot/demo projects for new RE technologies		
OTHER ACTIVITIES	• Identify parameters to determine the viable Ocean Energy tariff rate • Continue technical capacity building on RE • Conduct research and promote low-enthalpy geothermal areas for power generation and direct use/non-power application for development • Harmonize the DOE related programs with agro-forestry policies for an integrated use of biomass • Continue the conduct of IEC to attain social acceptability		

INCREASED RE INSTALLED CAPACITY TO AT LEAST 20,000 MW

Process Flow for Renewable Energy Power Projects

Registration

- **DOE** (Certificate of Endorsement)
- **SEC** (Certificate of Registration)
- **LGU**
- Brgy (Barangay Clearance
- Municipal/City (Business Permit)
- **BIR** (Certificate of Registration, TIN)
- **SSS** (Employer & Employees Registration)
- **HDMF** (Pag-IBIG Employer's Registration)
- **PhilHealth** (Employer's Registration)
- **DOLE** (Business Registration)

Pre-Development

- **DOE** (RE Pre-Dev't Service Contract/Certificate of Registration)
- **DENR** (ECC, SLUP, FLAg, etc.)
- **NCIP (**CNO/CP)
- **NWRB** (Certificate of Water Availability/ CWP/Water Permit)
- **DAR / DA** (Land Use Conversion)
- **LGU** (Endorsements, Resolution)
- **NGCP** (SIS)/ **DU** (DIS)
- **BOI** (Project Registration)

Conversion

- **Developer** (Declaration of Commerciality & Application of Conversion)
- **DOE** (Certificate of Confirmation of Commerciality [CoCoc])

Development [Construction & Commissioning]

- **DOE** (RE Dev't. Service Contract, Certificate of Endorsement)
- **LGU** (Permits)
- **BOC** (Importation)
- **NGCP** (Transmission Service Application)
- **ERC** (Cert. of Compliance, FIT Eligibility)
- PEMC (WESM Registration)
- **TRANSCO** (REPA)

Monitoring

- **DOE**
- **DENR**
- **ERC**
- **BOI**
- **LGU**

New Policy Initiatives

- **Executive Order No. 30 (EO 30)**
  - Creating the Energy Investment Coordinating Council (EICC) in Order to Streamline the Regulatory Procedures Affecting Energy Projects
  - Classification of Energy Projects of National Significance (EPNS)
    - Capital Investment of at least PhP 3.5 Billion
    - Contribution to the country's economic development
    - Consequential economic impact
    - Potential contribution to the country's balance of payments
    - Impact on the environment
    - Complex technical processes and engineering designs
    - Infrastructure requirements

The Way Forward

- **Full implementation of the Renewable Energy Act**
  - Promulgate Implementing Rules on remaining RE Policy Mechanisms (Renewable Portfolio Standard (RPS), Green Energy Option, etc.)
  - Updated NREP
  - Implement Energy Virtual One Shared System (EVOSS)
  - Resource Inventory and Establishment of RE Database
  - Capacity Building / Information, Education and Communication Campaigns

Thank You!

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 @doe_ph

Workshop on the Promotion of Low Carbon Development in Quezon City under the City to City Cooperation between Quezon and Osaka

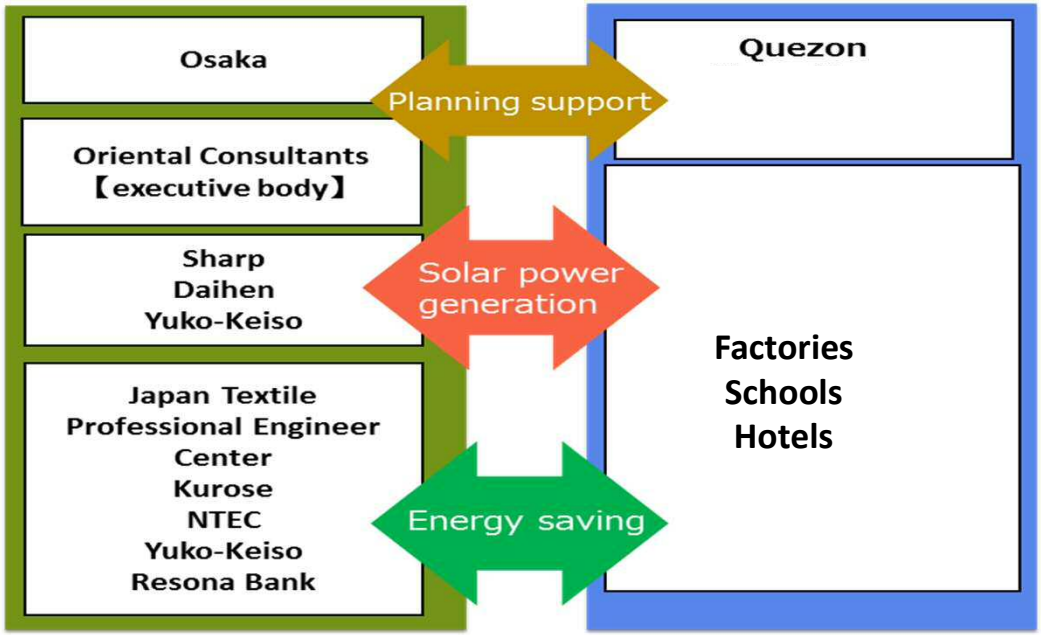
February 6th , 2018
Environmental Protection and Waste Management Department

Outcome of the JCM Feasibility Study under Cooperation between Quezon and Osaka

Osaka City
Oriental Consultants Co., Ltd
Japan Textile Consultants Center
Kurose Chemical Equipment Co., Ltd
Nippon Thermoener Co., Ltd
Yuko-Keiso Co., Ltd
Resona Bank Ltd

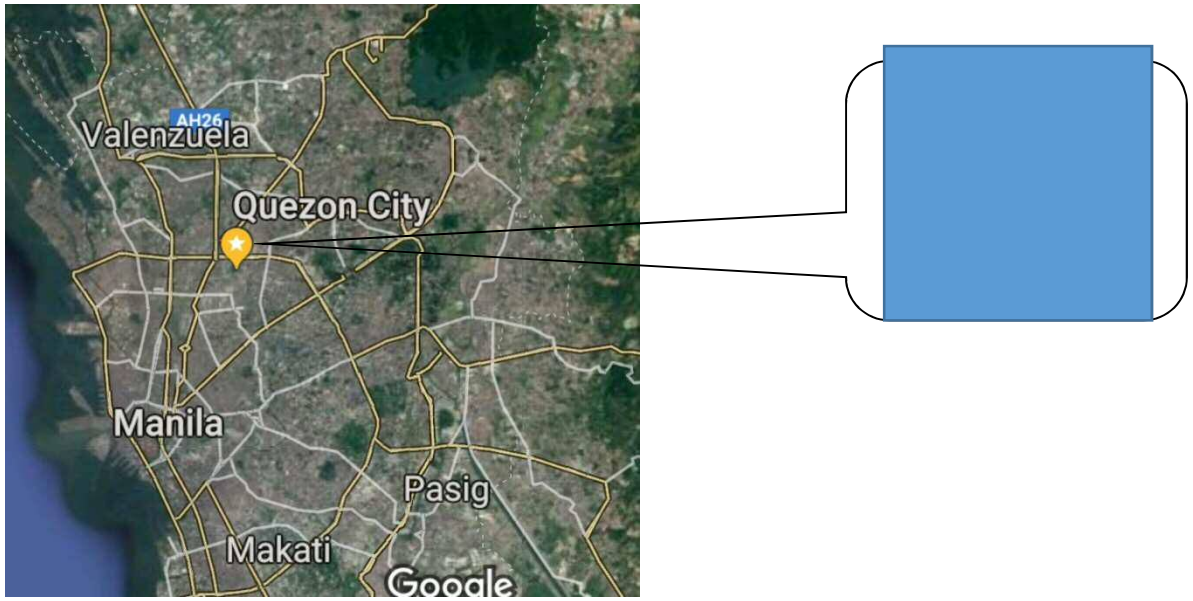
Study Outline

- Conduct energy auditing in a textile factory in Quezon City to confirm energy saving potentiality for
  - Introduction of high efficiency boilers
  - Introduction of solar power generation system
  - Heat recovery from the waste water of dyeing process through application of heat exchangers.
- Organize workshops on the promotion of JCM projects



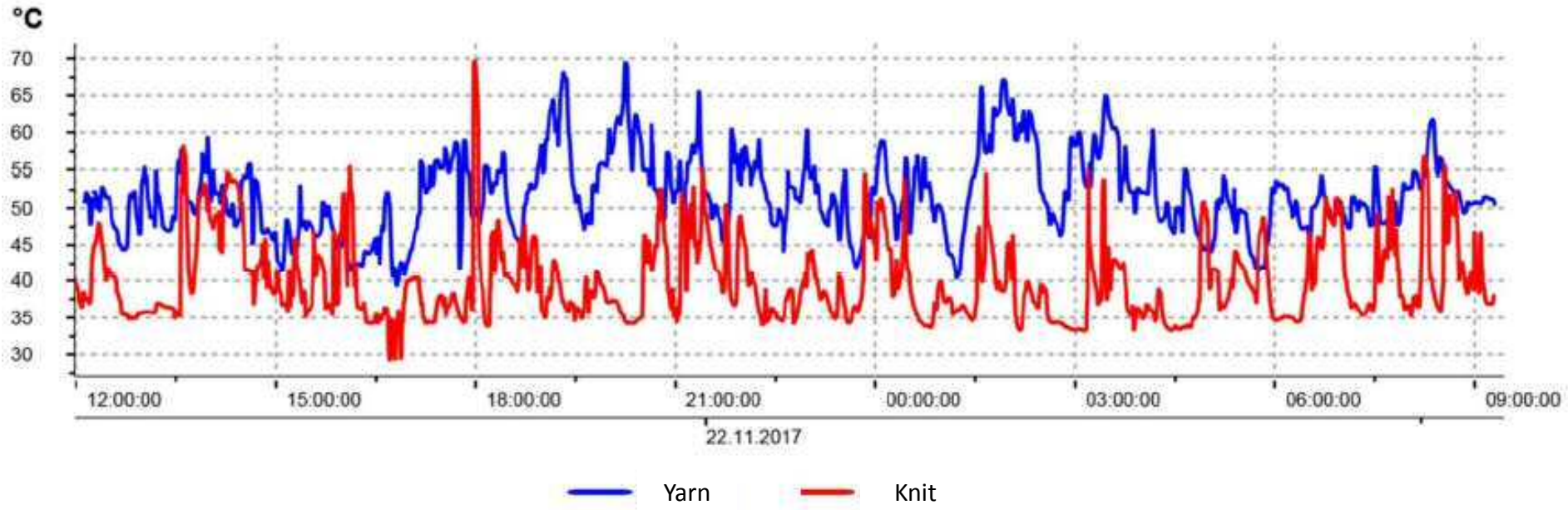
Energy Auditing

- Targets factory: [redacted]
- Schedule: Nov.19~25, 2017 (two and a half days)
- Objectives:
  - ✓ Observe operation condition of boilers
  - ✓ Confirm operation condition of dyeing, washing and drying
  - ✓ machines
  - ✓ Observe the volume and temperature of waste water



Energy Auditing

- Temperature of waste water from yarn and knit dyeing



- This is the temperature of all waste water from process machines (yarn, knit dyeing and others) measured at 2 gathering points.

- The temperature of waste water at the dropping point of machines is far higher than the above temperature.

Energy Recovery

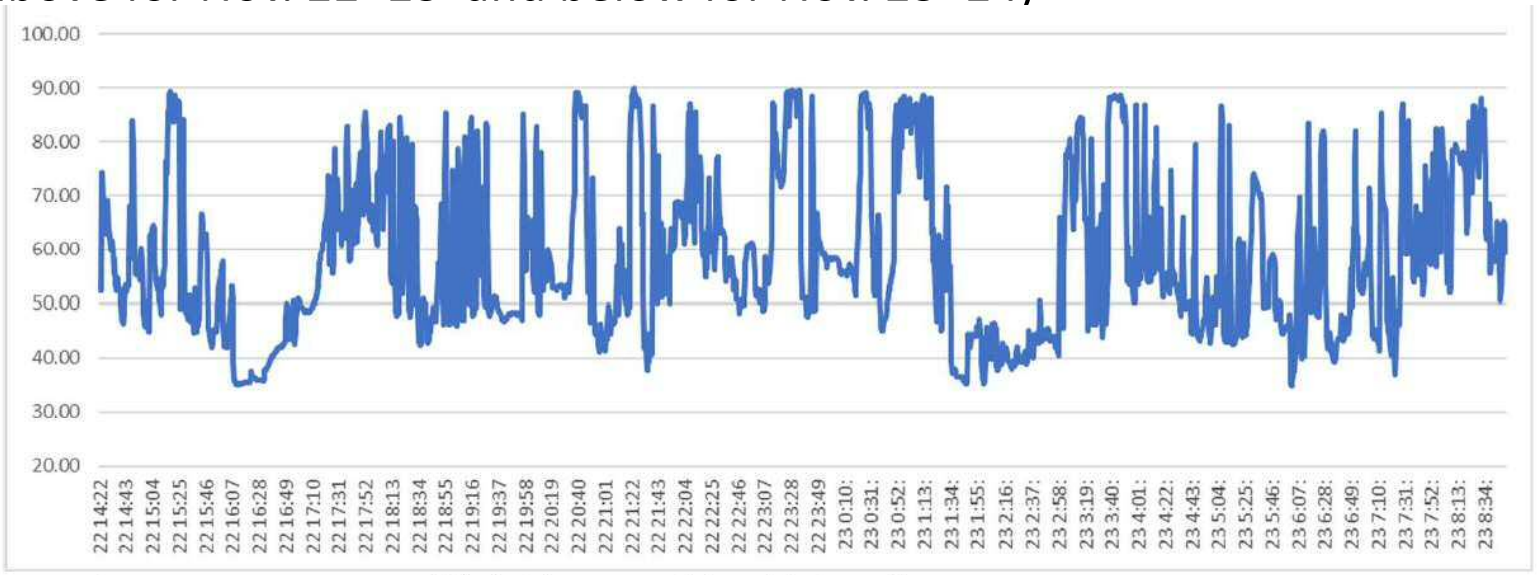
- Heat recovery potentiality from knit dyeing section.

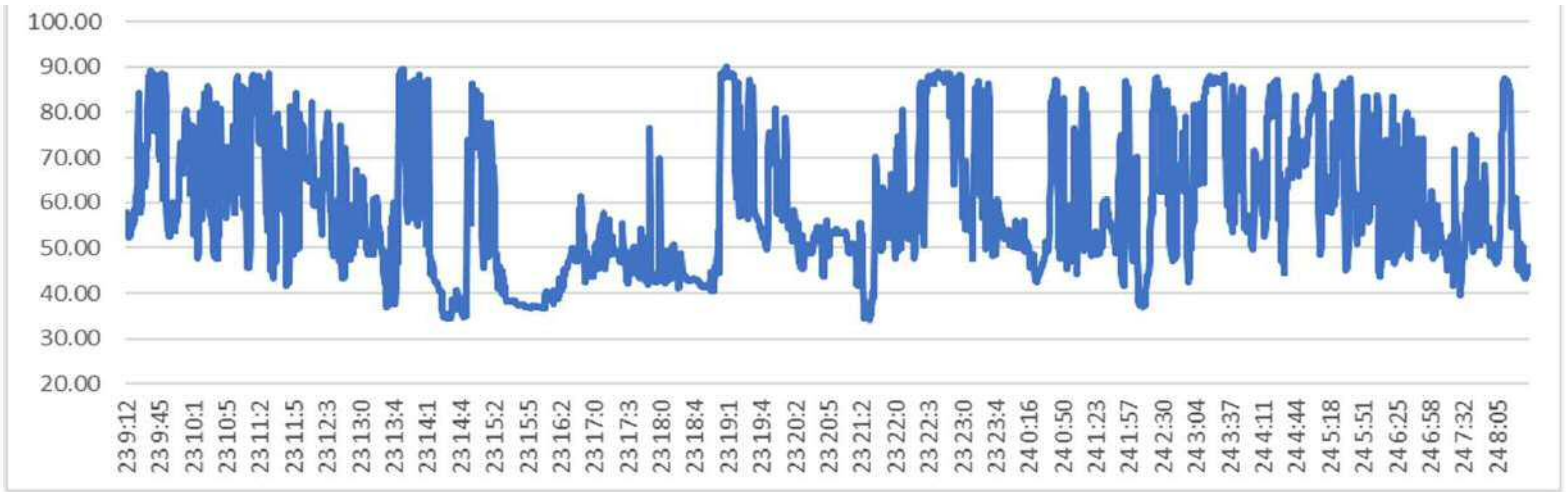
Processes	Machines	Weight	Batches	Bleaching/ Dyeing=15%	Water (ton)	Heat up times	Fresh water temp	30								Total
	Sets	kg	/day	kg/day	/Batch		1	2	3	4	5	6	7	8	9	Mcal
Bleaching	2	2,000	3	2,250	22.5	3	60	80	80							
					67.5		675	1,125	1,125							2,925
Poly100%	2	700	3	2,100	21.0	4	60	80	80	80						
					84.0		630	1,050	1,050	1,050						3,780
Cotton100%	3	1,500	1.5	2,250	22.5	6	60	80	90	80	90	90				
					135.0		675	1,125	1,350	1,125	1,350	1,350				6,975
CVC.T/C	22	10,600	1	10,600	106.0	9	60	80	80	80	80	80	80	80	80	
					954.0		3,180	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300	45,580
Total	30	14,800		17,200	1,240.5											59,000
														Average temp		78

- Average temperature is 78 ℃ as freshwater temperature is 30 ℃。
- Potential energy is 59,000 Mcal/day = 13 ton coal/day (with 75% boiler efficiency and net caloric value of coal 5,900 kcal/kg, a higher value of Indonesian coal)
- Around 6,000 t CO_2/year can be reduced.

Energy Auditing

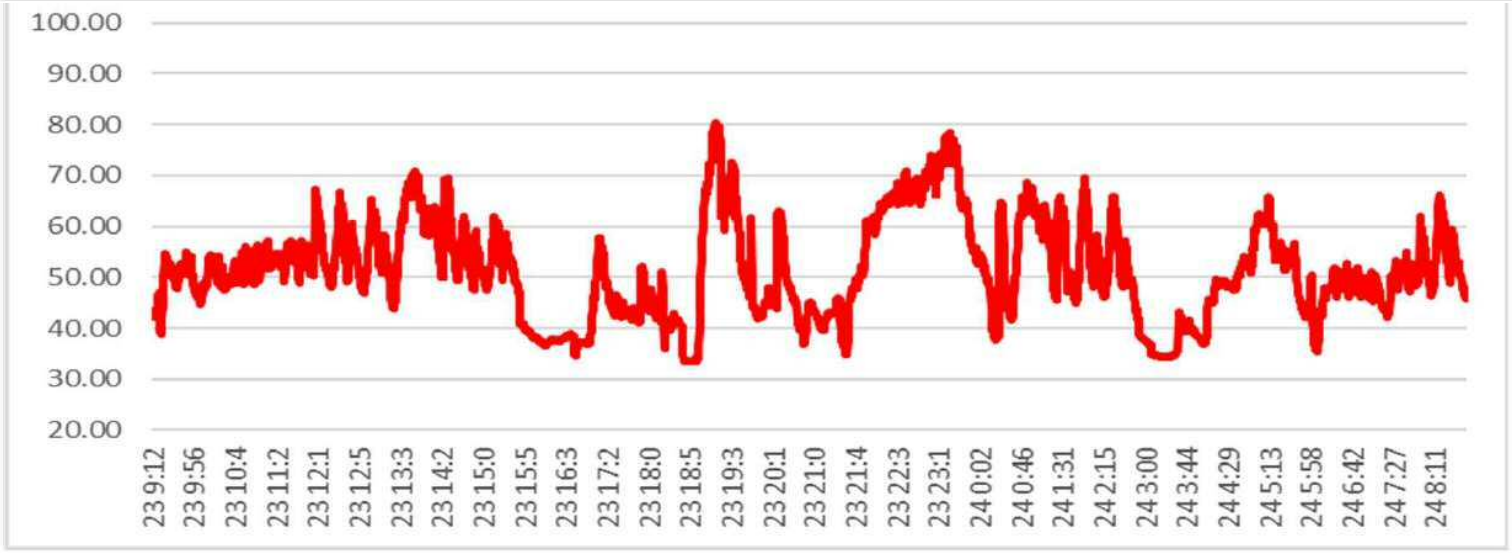
- Waste water temperature from yarn dyeing section
  (P14, above for Nov. 22~23 and below for Nov. 23~24)





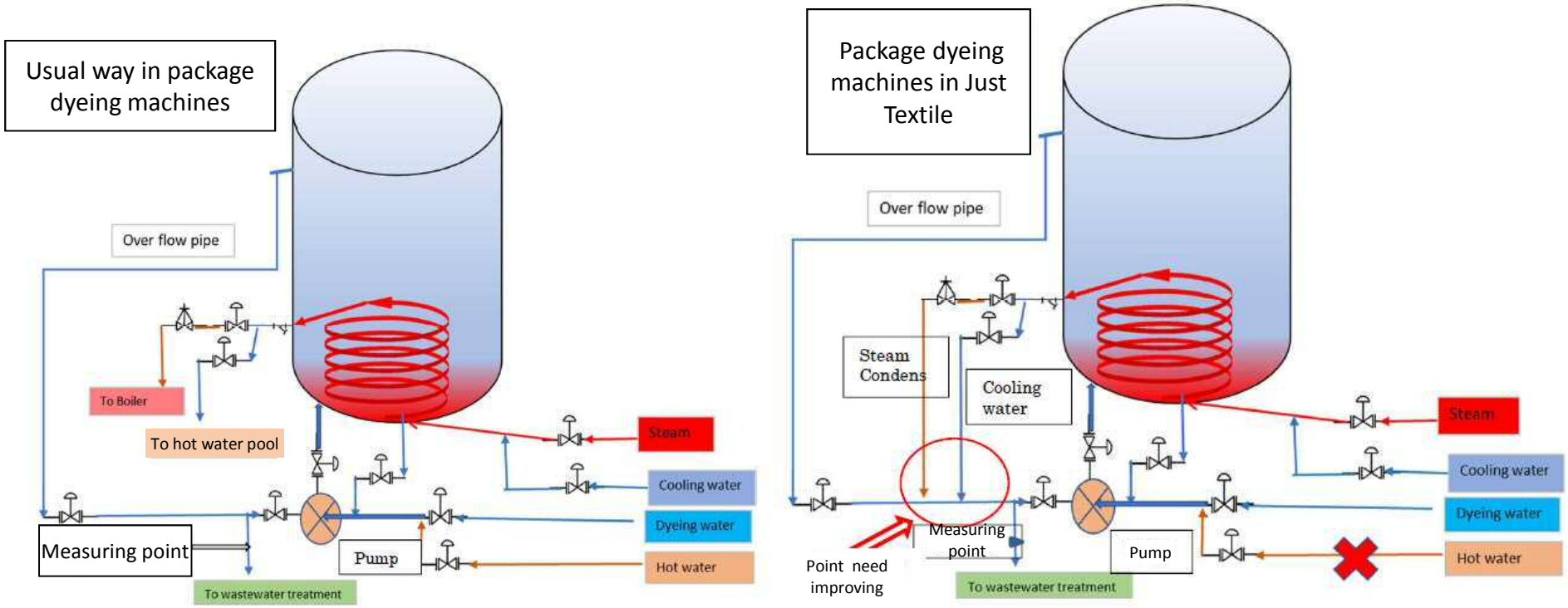
Energy Auditing

- Waste water temperature from yarn dyeing section
  (P9, above for Nov. 22~23 and below for Nov. 23~24)



Energy Auditing

Yarn dyeing section.



- It is important to separate pipes for collecting steam condense, cooling water and waste water to recover waste heat efficiently.

Energy Recovery

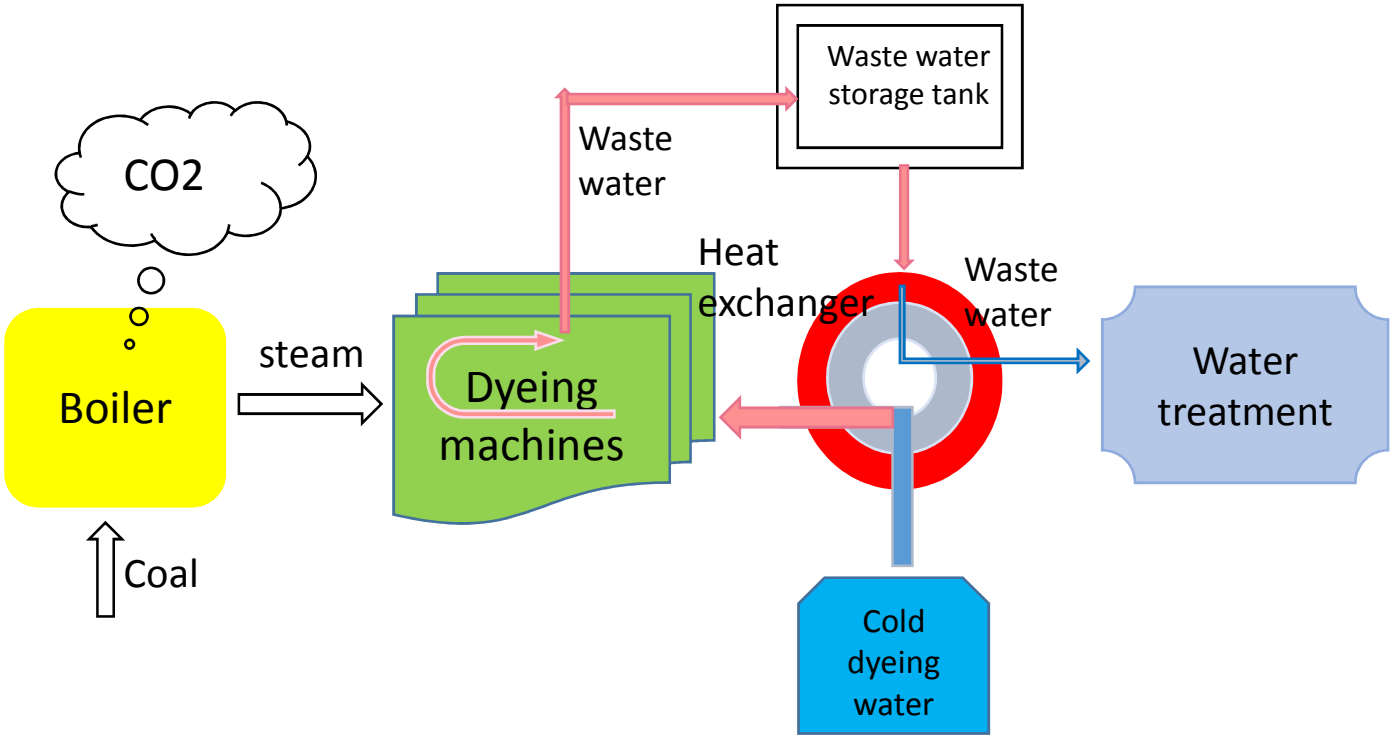
- Heat recovery potentiality from yarn dyeing section.

Processes	Machines	Weight	Batches	Weight	Water	Heat up times	Fresh water temp	30								Total
	Sets	kg/batch	/day	kg/day	ton/batch		1	2	3	4	5	6	7	8	9	Mcal
Bleaching	2	1,000	2	2,000	20.0	3	60	90	90							
					60.0		600	1,200	1,200							3,000
Cotton100%	4	1,700	3	5,100	51.0	6	60	90	90	70	90	90				
					306.0		1,530	3,060	3,060	2,040	3,060	3,060				15,810
CVC.T/C	11	3,400	1.5	5,100	51.0	9	60	90	90	90	80	90	80	90	90	
					459.0		1,530	3,060	3,060	3,060	2,550	3,060	2,550	3,060	3,060	24,990
Total	17			12,200	825.0											44,000
														Average temp		83

- Average temperature is 83 ℃ as freshwater temperature is 30 ℃。
- Potential energy is 44,000 Mcal/day = 9 ton coal/day (with 75% boiler efficiency and net caloric value of coal is 5,900 kcal/kg, a higher value of Indonesian coal)
- Around 4,500 t CO_2/year can be reduced.

Energy Recovery

- Heat recovery from yarn dyeing section.



- Recover waste water from the yarn dyeing process by installing a heat exchanger and prepare a waste water storage tank accordingly.
- A heat exchanger with 56 m^2 heat exchange surface is recommended.

Energy Recovery

Heat Exchanger Outcome

Waste water inlet temperature (℃)	83
Supply water inlet temperature (℃)	30
Surface area of heat exchanger (m^2)	56
Waste water outlet temperature (℃)	51
Supply water outlet temperature (℃)	69
Inlet waste water flow (m3/h)	32
Outlet supply water flow (m3/h)	26

Recovered Waste Energy

Boiler efficiency	75%
Net caloric value of coal (Kcal/kg)	5,900
Coal CO_2 emission factor (t C02/TJ)	87.3
Coal saved (t/year)	1,599
CO_2 reduction (t/year)	2,628

The specific heat of water:4.184kJ/kg･℃ and
1 k Cal = 4.184 kJ

- Through a heat exchanger with 56 m^2 heat exchange surface, 1,625 ton/year coal can be saved.
- It contributes to reduction of 2,628 ton CO_2 per year.

Investment Analysis

Total Cost of Waste Heat Recovery System Introduction

Unit: 10 thousand Japanese yen

Heat exchanger (one unit)	Piping and installation of the exchanger and other works	Pumps, flow and temperature meters , control panel and their installation	Packaging and transportation	Custom and other taxes	Total

The coals price is 9,000 yen/ton (field survey) => × 9,000 = thousand yen/year can be saved.

No	Items	Total	Construction Period										
			0	1	2	3	4	5	6	7	8	9	10
1	Cash inflow	14,390	0	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439
1.1	Saved coal cost	14,390	0	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439	1,439
2	Cash outflow	3,602	3,102	50	50	50	50	50	50	50	50	50	50
2.1	Initial cost	3,102	3,102	0	0	0	0	0	0	0	0	0	0
2.2	Maintenance	500	0	50	50	50	50	50	50	50	50	50	50
3	Net cash flow	**10,788**	-3,102	1,389	1,389	1,389	1,389	1,389	1,389	1,389	1,389	1,389	1,389

Payback period (year)	2.2
Net benefit	10,788
IRR	44%

Energy Auditing

Boiler operation improvement

Section		Before	After (higher)	After (lower)	Average
		ton coal/year	ton coal/year	ton coal/year	ton coal/year
Steam boiler	Waste heat reduction	-	-	-	-
	Fuel air ratio adjustment	14,875	14,325	14,772	327
	Excess air reduction	14,875	14,797	14,836	58.3
	Total	-	-	-	385
	Reduction the times of blowing	14,875	14,776	14,825	74.6
	Exhaust gas recovery	14,875	14,479	14,677	297
Heat boiler	Waste heat reduction	-	-	-	-
	Fuel air ratio adjustment	3,500	3,107	3,474.1	209
	Excess air reduction	3,500	3,461	3,481	29.2
	Total	–	-	-	239

Energy Auditing

High efficiency boiler introduction

- Introduce a 16 ton/h standby boiler with 85% efficiency
- Without the subsidy from JCM, the same boiler as the existing one with 75% efficiency is mostly applied.
- Over 600 ton/year coal can be saved by introducing the high efficiency boiler
- The cost for the boiler is around 200 million yen (50% of that can be covered by JCM if the factory wants to finance the rest of the cost by itself.
- The new boiler should be operated in turns with the existing one to promise contributing to Greenhouse emission reduction one of the conditions of JCM.

Solar Power Generation

- Solar power generation
  - The factory has space to install solar panels around 350kW.
  - Public and private schools in Quezon have big potentiality
  - Hotels can also benefit from the scheme (rooftop has capacity for 50kW system)
  - As the capacity limit for net metering is 100 kW, a standalone system is a option for systems beyond 100kW (such as factory)
  - Subsidy ranges 30~40%, if apply for JCM model project.
  - As the cost of electricity in Philippine is very high, solar power generation is a best option to reduce electricity cost for consumers.
  - First come, first served as the annual budget for Model projects is also limited

Scheme of JCM Model Project

- Subsidy includes cost for facilities, equipment and vehicles, which contribute to reduction of CO_2 emission as well as cost for installing these facilities.

Number of already selected project(s) using a similar technology in each partner country	Percentage of financial support
None (0)	Up to 50%
Up to 3 (1 – 3)	Up to 40%

JCM Project Implementation

- Things to be considered to implement JCM model project
  - ✓ Investment decision of factories and their preparation of the finance
  - ✓ Agreement on the formulation of international consortium between Japanese company and factories.
  - ✓ Agreement on the Allocation of Joint Crediting Mechanism(between the members of international consortium)
  - ✓ Project implementation plan and schedule

- Next actions
  - ✓ Confirm the schedule of MoE Japan's open recruitment for public JCM model project
  - ✓ Prepare things mentioned above.
  - ✓ Other things as necessary

Strictly Confidential

東京センチュリー株式会社
Tokyo Century Corporation

BPI Century Tokyo
Lease & Finance Corporation

Introduction of JCM and Achievement of Tokyo Century Group

Feb. 6 / 2018

Contents

1. Company Background –
   Tokyo Century Corporation
   BPI Century Tokyo Lease & Finance Corporation

2. Overview of JCM Financing program

3. Strength of Tokyo Century Group on JCM

4. Case Study – JCM projects of Tokyo Century Group

1. Company Background – Tokyo Century Corporation BPI Century Tokyo Lease & Finance Corporation

2-1. Company Background- Tokyo Century

Company Name

Tokyo Century Corporation

Founded

July 1, 1969

Paid-in Capital

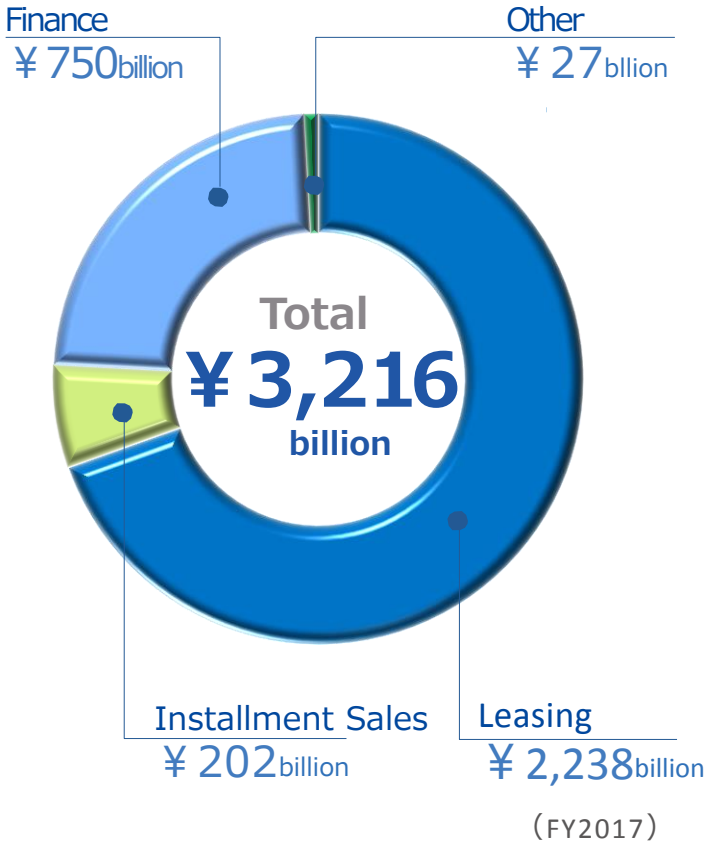
¥ 34billion

Stock Listing

Tokyo Stock Exchange,
First Section

Tokyo Century

Operating Assets



Employees (As of March 31,2017)

5,430
(Consolidated)

1,032
(Non- Consolidated)

Total Assets

¥ 3,580billion

Revenues

¥ 976billion

Operating Income

¥ 72billion

2-2. Global Network

Overseas Network

Tokyo Century has 37 subsidiaries and affiliates oversea. In South East Asia countries, Tokyo Century has 7 subsidiaries and affiliates.
Tokyo Century provide various finance service depends on clients demand.

Note: Hong Kong is included in China. Taiwan is counted as a separate country.

Equity-Method Affiliates

- President Tokyo Corporation
- Tong-Sheng Finance Leasing Co., Ltd.
- Dalian Bingshan Group
  Hua Hui Da Financial Leasing Co., Ltd.
- Suzhou New District Furui Leasing Co., Ltd.
- BPI Century Tokyo
  Lease & Finance Corporation
- PT. Hexa Finance Indonesia
- GA Telesis, LLC

Japan Desk

- TATA Capital Financial Services Limited

Consolidated Subsidiaries

- Tokyo Century Leasing China Corporation
- Tokyo Century Factoring China Corporation
- Tokyo Century Leasing (Singapore) Pte. Ltd.
- Tokyo Century Capital (Malaysia) Sdn. Bhd.
- PT. Century Tokyo Leasing Indonesia
- PT. TCT Indonesia
- TISCO Tokyo Leasing Co., Ltd.
- TC Advanced Solutions Co., Ltd.
- TC Car Solutions (Thailand) Co., Ltd.
- HTC Leasing Co., Ltd.
- Tokyo Leasing (Hong Kong) Ltd.
- CSI Leasing, Inc.
- Tokyo Century (USA) Inc.
- TC Aviation Capital Ireland Ltd.
- TC Skyward Aviation U.S., Inc.
- TC Skyward Aviation Ireland Ltd. Tokyo Leasing (UK) Plc

2-3. Company Background
- BPI Century Tokyo Lease & Finance Corporation

Strictly Confidential

Joint Venture
December 2014

BPI Century Tokyo Lease & Finance Corporation

51%

Founded : August 1st, 1851
Investor : Ayala Corporation 21.8%,
Ayala DBS Holdings 21.3% and others
Line of Business : Banking

49%

Founded : July 1st, 1969
Investor : Mizuho Financial Group 35%,
ITOCHU Corporation 25% and others
Line of Business : Diversified leasing business,
Various types financing

One of the largest leasing companies in the country with 40 years of expertise

Strategic partnership with multinational manufacturers (whose products could be financed)

2. Overview of JCM Financing program

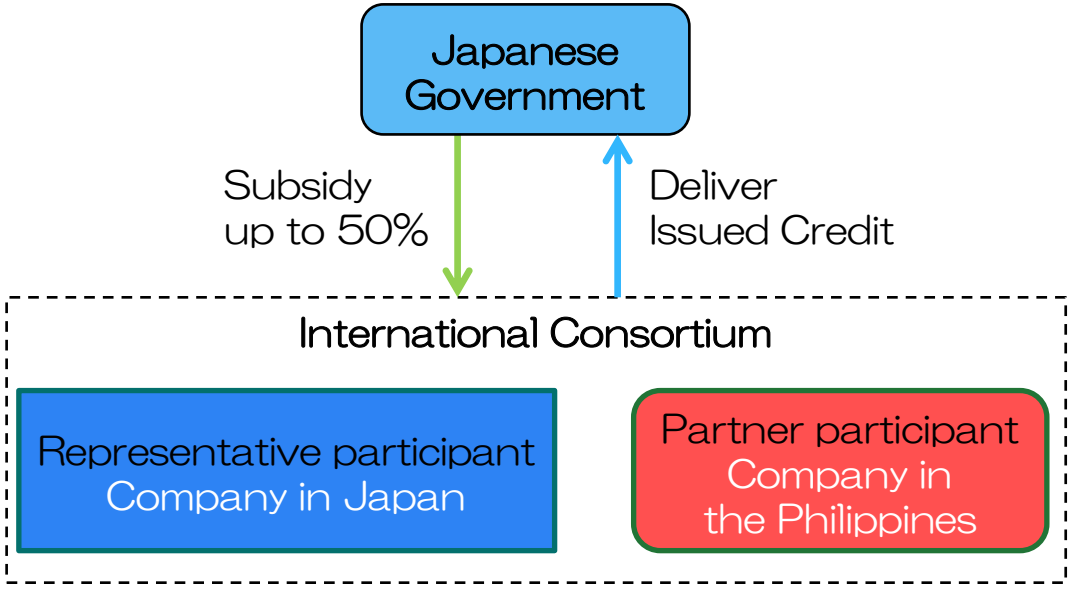
3-1. Outline of JCM (The Joint Crediting Mechanism)

JCM (The Joint Crediting Mechanism) is…

- the mechanism for the Japanese government to achieve the goal of CO2 emission reduction by introducing low-carbon technologies to developing countries.
- Up to 50% of the initial cost of low-carbon technology is subsidized by the Japanese government.

【Scheme of JCM】

(Reference) http://gec.jp/jcm/about/index.html



【Steps to receive subsidy】

(1) Consortium members install the low-carbon technology.

(2) Japanese government gives subsidy.

(3) Consortium members will monitor & report the amount of CO2 emission reduction in return.

3-2. JCM Partner Countries

【Partner Countries】 (Reference: Website of GEC)

Mongolia
Jan. 8, 2013
(Ulaanbaatar)

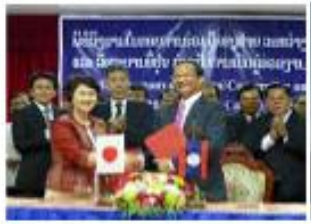
Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
Jun. 12,2013
(Nairobi)

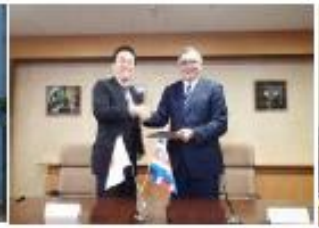
Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)



Lao PDR
Aug. 7, 2013
(Vientiane)

Indonesia
Aug. 26, 2013
(Jakarta)



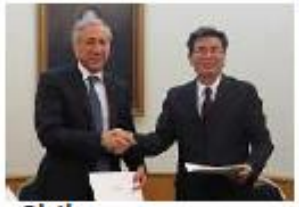
Costa Rica
Dec. 9, 2013
(Tokyo)

Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)

Saudi Arabia
May 13, 2015



Chile
May 26, 2015
(Santiago)

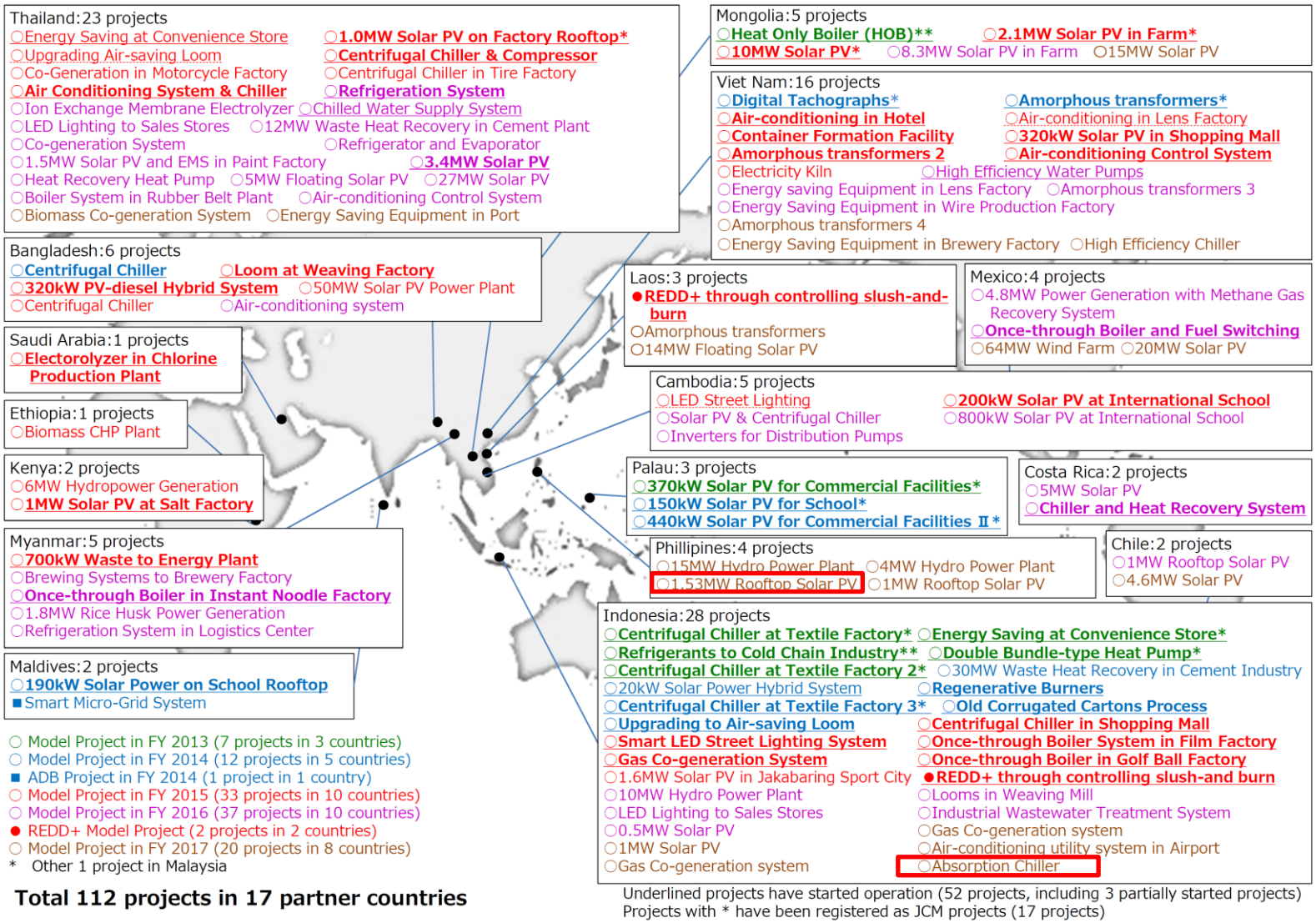
Myanmar
Sep. 16, 2015
(Nay Pyi Taw)

Thailand
Nov. 19, 2015
(Tokyo)

the Philippines
Jan. 12, 2017
(Manila)

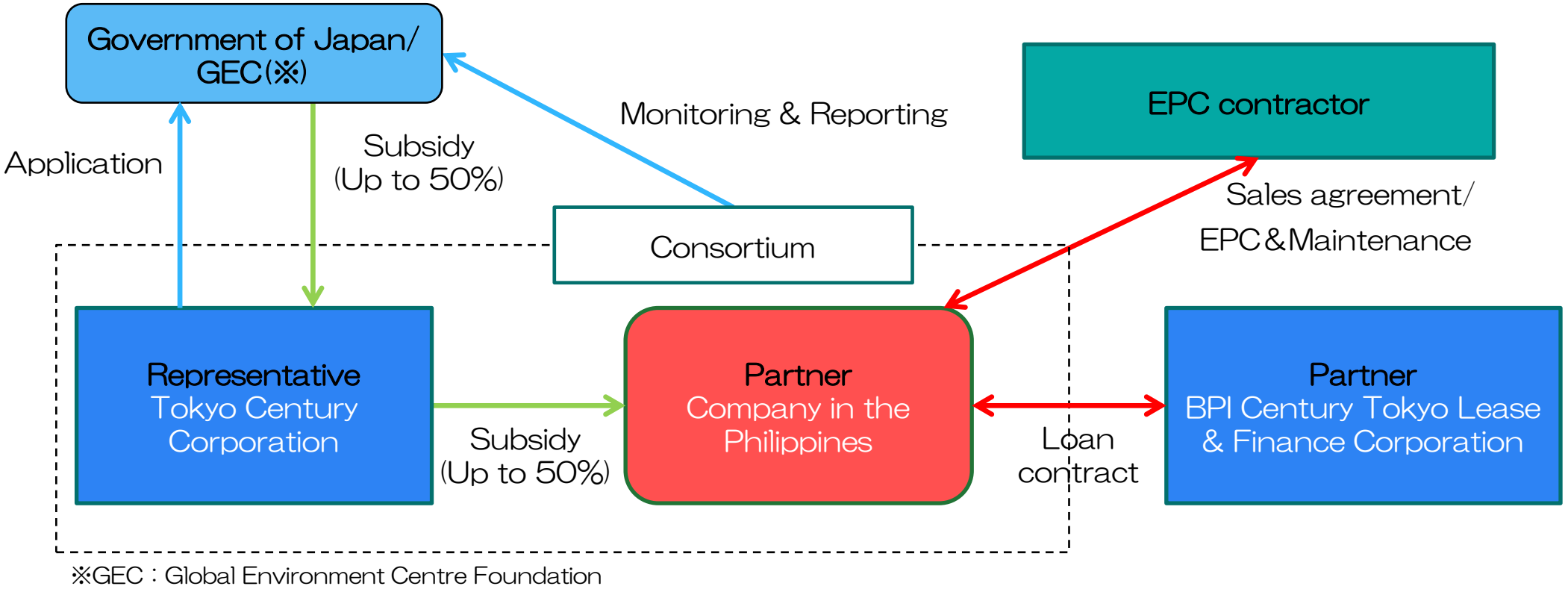
3-3. JCM Financing program

JCM Financing programme by MOEJ (FY2013～2017) as of December 7, 2017



3-4. Scheme Example

[Scheme Example]



※GEC：Global Environment Centre Foundation

[Project flow]

(1) Representative applies to GEC (The Global Environment Centre Foundation), an affiliate of the Ministry of Environment of Japan.
(2) Partner issues PO to EPC contractor, and start constructing low carbon technology.
(3) After the completion of the construction, the Japanese government remits subsidy to Representative.

3-5. Roles of Each Entity & Project Term

【Representative】

- Apply to the GEC
- Develop methodology to calculate CO2 emission reduction
- Manage & control the project
- Monitor & report the amount of CO2 emission reduction during the project term
- Issue & deliver the credit
- Accept the investigation by the Third Party Entity

【Partner】

- Use low carbon technology properly
- Deliver the data necessary to calculate CO2 emission reduction
- Accept the investigation by the Third Party Entity

【EPC Contractor】

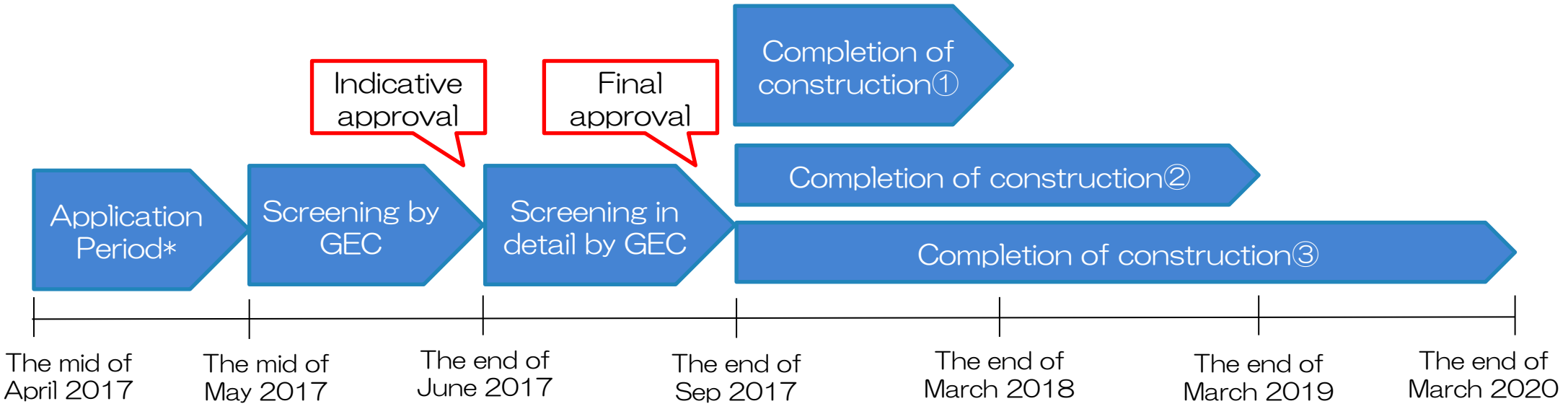
- Provide Representative with the data such as quotation, performance of CO2 reduction etc.
- Engineer & construct low-carbon technologies
- Provide maintenance

【Project term】

- Depends on projects (Designated by the Japanese government)

3-6. Schedule

[Schedule Example (FY2017)]



- Application period of First Call (FY2017) : Apr 7th to May 15th (Facility: USD 54,545K)
- Application period of Second Call (FY2016) : Sep 5th to Dec 16th (Facility: USD 9,091K)

[Note]

- ✓ Must finish construction of Low-Carbon Technology within three fiscal years.
- ✓ Necessary to submit documents such as Partner's financial information, articles of incorporation and those required by the Japanese government.
- ✓ Necessary to submit LOI to Participant this project from Partner by the end of application date.

3. Strength of Tokyo Century Group on JCM

1-1. Achievement of Tokyo Century Group on JCM

- ✓ ***Tokyo century corporation is the first Japanese financial services company to undertake a representative participant role on a JCM model Project.***
- ✓ ***"Introduction of 1.53MW Rooftop Solar Power System in Auto Parts Factories" is one of the first JCM model projects since the Philippines became a JCM partner country in January 2017.***

Strength of TC

- ✓ Strong relationship with Japanese clients
- ✓ Partnership with Japanese excellent corporations
- ✓ Extensive network in ASEAN countries

Tokyo Century

Synergy

Strength of BPI

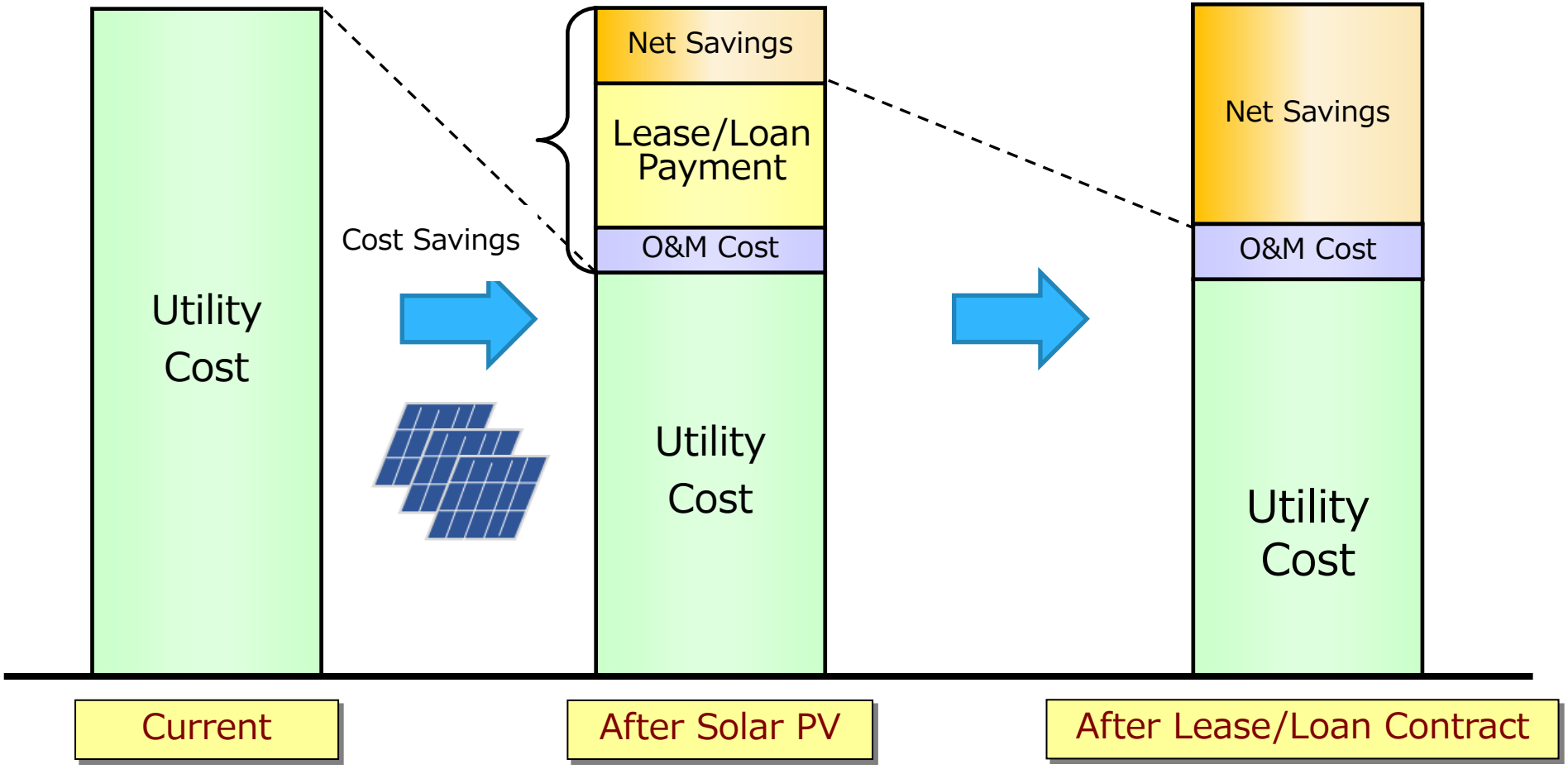
- ✓ Strong relationship with local clients
- ✓ Offer various financial service to local clients

BANK OF THE PHILIPPINE ISLANDS

1-2. Concept of Lease/Finance Proposal

Saving Image(e.g. Solar PV)

➢ Compensate monthly Lease/Loan payment with future reduction of Utility Cost.



※O&M Cost：Operating and Maintenance Cost

4. Case Study –
JCM projects of Tokyo Century Group

4-1. JCM Project in the Philippines(1)

JCM Projects in FY2017 (1st call) / Host Country：the Philippines

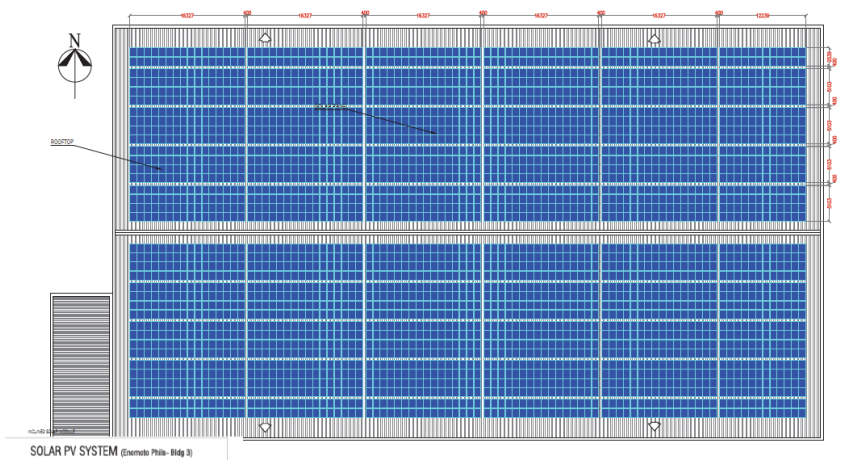
Name：Introduction of 1.53MW Rooftop Solar Power System in Auto Parts Factories

◆ **This is one of the first selected JCM model projects since the Philippines became a JCM partner country in 2017**

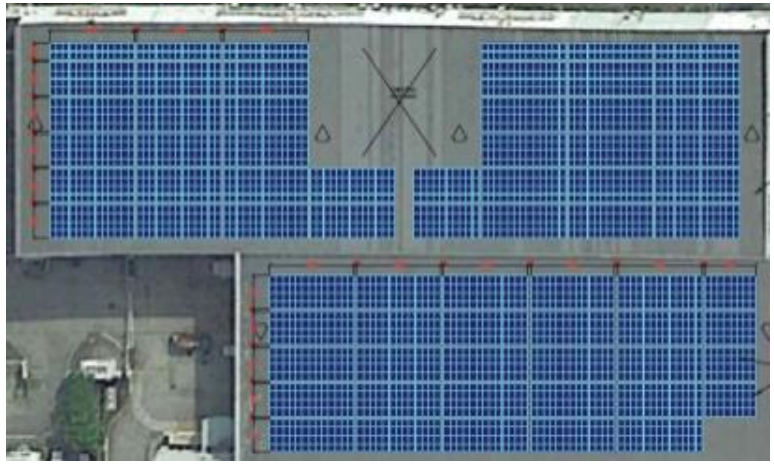
Participants：【Japan】 Tokyo Century Corporation 【Philippines】Japanese auto manufacturing Companies(Two companies)

Outline of GHG Mitigation Activity

This project is to install 1.53MW solar panel on the rooftop of factories in the south of Manila.
Solar energy is used for their power-consumption, and CO2 emission is reduced by displacing part of the grid electricity.



Solar Panel Layout 1
(175W x 5,408 panel = 946.4kW）



Solar Panel Layout 2
(175W x 3,328 panel = 582.4kW)

Expected GHG Emission Reduction

1,124 tCO2/year =(Reference CO2 emissions)[tCO2/year]-(Project CO2 Emission) [tCO2/year]

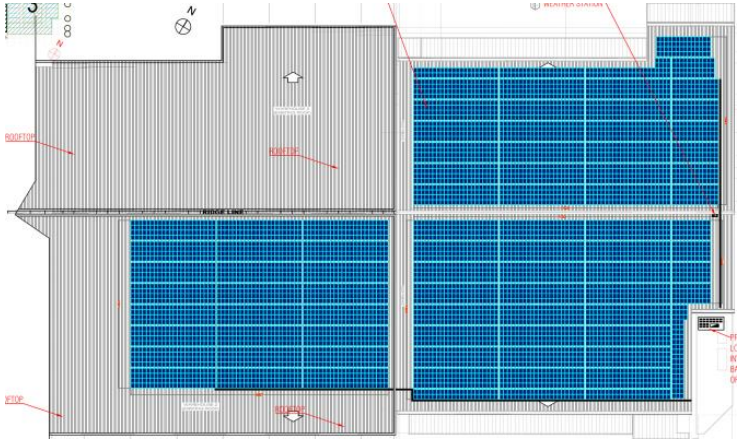
4-2. JCM Project in the Philippines(2)

JCM Projects in FY2017 (2nd call) / Host Country：the Philippines

Name：Installation of 1.2MW Rooftop Solar Power System to the Cold Storage
Participants： 【Japan】Tokyo Century Corporation 【Philippines】A Local Company

Outline of GHG Mitigation Activity

- This project is to install 1.2MW solar panels on the rooftop of a cold storage in Manila.
  The local company owns and operates the solar panels.
- Solar energy is consumed by owners of the storage and CO2 emission is reduced by displacing part of the grid electricity.



(Solar Panel Layout)

(Photo of the Project Site)

Expected GHG Emission Reduction

838.13 tCO2/year =(Reference CO2 emissions)[tCO2/year]-(Project CO2 Emission) [tCO2/year]

4-3. JCM Project in Indonesia

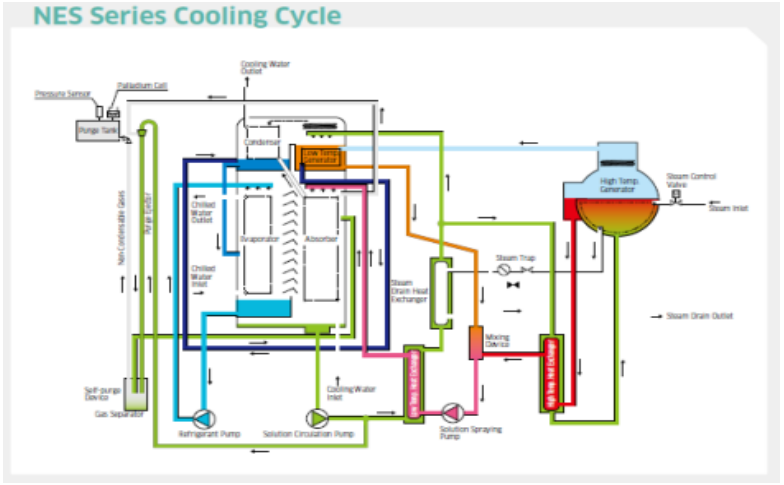
JCM Projects in FY2017 (2nd call) / Host Country：Indonesia

Name：Introduction of Absorption Chiller to Chemical Factory
Participants：【Japan】Tokyo Century Corporation 【Indonesia】PT. Timuraya Tunggal

Outline of GHG Mitigation Activity

This project is to install an absorption chiller to the chemical factory of PT Timuraya Tunggal in Karawang, West Java Province.
The absorption chiller produces chilled water from wasted steam, and reduces the power consumption of electric chiller and GHG emission.

(Absorption Chiller)



(Cooling Cycle)

Expected GHG Emission Reduction

917 tCO2/year =(Reference CO2 emissions)[tCO2/year]-(Project CO2 Emission) [tCO2/year]

Contacts

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2nd Workshop on the Promotion of Low Carbon Development in Quezon City under the City to City Cooperation between Quezon and Osaka

Future City-City Cooperation Projects

Makoto Mihara

Osaka City Government

Osaka City

City-City Projects in 2018

Activity plans with support from the Japanese government and other agencies

1. **Proposal for mitigation measures in the Quezon City Climate Change Action Plan**

2. **Technical assistance on data analysis for climate change measures from different sectors**

3. **Implementation of JCM model project feasibility studies through city-city collaboration**

Proposal for Mitigation Measures in the Quezon City Climate Change Action Plan

Osaka City

Making of project lists for mitigation on climate change measures

Legend
- Project already begun for preparation
- Project already partially under operation/construction, or project to be prioritized by the proposal from Osaka City
- Project to be implemented in the future

No	Sector	Project	Description of Project	Target of Project (*Underlined site means that project with concrete implementation plan.)	Related plans/programmes of HCMC	Merits of Project Implementation	Experience of Osaka City	Relevant request from HCMC
IE-1	Transportation	Traffic [illegible]emand Management	Optimization of tr[illegible] demand of private vehicle and [illegible] transportation in pr[illegible] and smooth transportation comprehensively ena[illegible] Specifically, route gui[illegible] control/integr[illegible] of information, detour route[illegible] traffic demand measure/route, effective use car sharing, [illegible]	Urban area	- HCMC CCAP 2015 Appendix 1-#19 "Develop of green transportation in HCMC" (DOT, 2013-2018) Appendix 1-#33 "Technical assistance project in the implementation of climate change national target program in transportation and energy sectors" (DONRE, 2013-2014) - Eco-drive Project in Logistics (Nihtsu)	- Mitigation of traffic jams - Improvement of air quality	Osaka City Basic Environmental Plan (Promotion of Traffic Demand Management (TDM) method) - Seek to the restraint of demand for vehicles due to the promotion of TDM methods 4,000 traffic signals (Presentation at High-Level Symposium held in Osaka, 21 Oct. 2013)	- "HCMC does not have appropriate transportation policy and system." (Comment from Dept. of Planning and Investment [illegible]PI), at meeting with DPI on 2 Oct. 2013)
IE-2	Transportation	Promotion [illegible] with	Promote eco-[illegible] truck/vehicle [illegible] driving programme based on the collection and analysis of data of fuel consumption, run distance, driving attitude, etc.		Project FS 2013 (by Nippon Express) => JCM Model Project with Financial Support from MOEJ in 2014	- Improvement of fuel efficiency - Reduction of traffic accidents	Practice of eco-driving	[illegible] efficiency and load [illegible] gned by mayors of HCMC and [illegible]ct. 2013, and presentation at [illegible]ation at Osaka, on 21 Oct. 2013) [illegible] system including [illegible] are appreciated" [illegible] in HCMC, on 14
IE-3	Transportation	Construction of Subway	Modal shift to public transportation by construction of subway	Urban area	Construction of Metro #1 of HCMC	- Mitigation of traffic congestion - Improvement of air quality	[illegible] passengers/day use them. In addition, Osaka City promotes the further utilization.	[illegible]-carbon city" [illegible]2 held at [illegible]
IE-4	Transportation	Development of underground malls	Creating pedestrian space in the underground area by developing underground malls	Urban area	Construction of Metro #1 of HCMC	- Mitigation of traffic jams - Pedestrian's safety - Development of underground malls	Management of 6 underground malls in Osaka city by a Osaka local company (Osaka Chikagai Corp.,co.,ltd.) - In order to secure pedestrian's safety - Contribution to the mitigation of traffic jams	"The management of underground infrastructures such as underground electric cables and pipes should be undertaken because they are under disorder." (Comment from HCMC, at WG-CCAP#2 held at Rex Hotel on 21 Aug. 2014)
IE-5	Transportation	Promotion of Use of Subway	Promote the use of subway as an alternative transportation mode, to achieve modal shift to public transportation	Urban area	Construction of Metro #1 of HCMC	- Mitigation of traffic congestion - Improvement of air quality	Osaka City has 9 subway lines (total rail distance is 137.8km) and approximately 2.3 million passengers/day use them. In addition, Osaka City promotes the further utilization.	"Subway will contribute to a low-carbon city" (comment at the at WG-CCAP#2.2 held at DONRE on 22 Aug. 2014)
IE-6	Transportation	Collection and management of traffic information	Collect and manage information on traffic volume, occurrence status of congestion, required travel time, etc. as basic information for traffic demand management	Urban area		- Mitigation of traffic jams - Improvement of air quality	Road traffic census (amount of traffic, speed and road conditions) of national and prefectural roads (including some city roads) are conducted once every 5 years.	
IE-7	Transportation	Wide-range traffic control	Mitigate traffic congestion by traffic light cycle management by collecting information on traffic volume and congestion	Urban area		- Mitigation of traffic jams - Improvement of air quality	Road traffic census (amount of traffic, speed and road conditions) of national and prefectural roads (including some city roads) are conducted once every 5 years.	

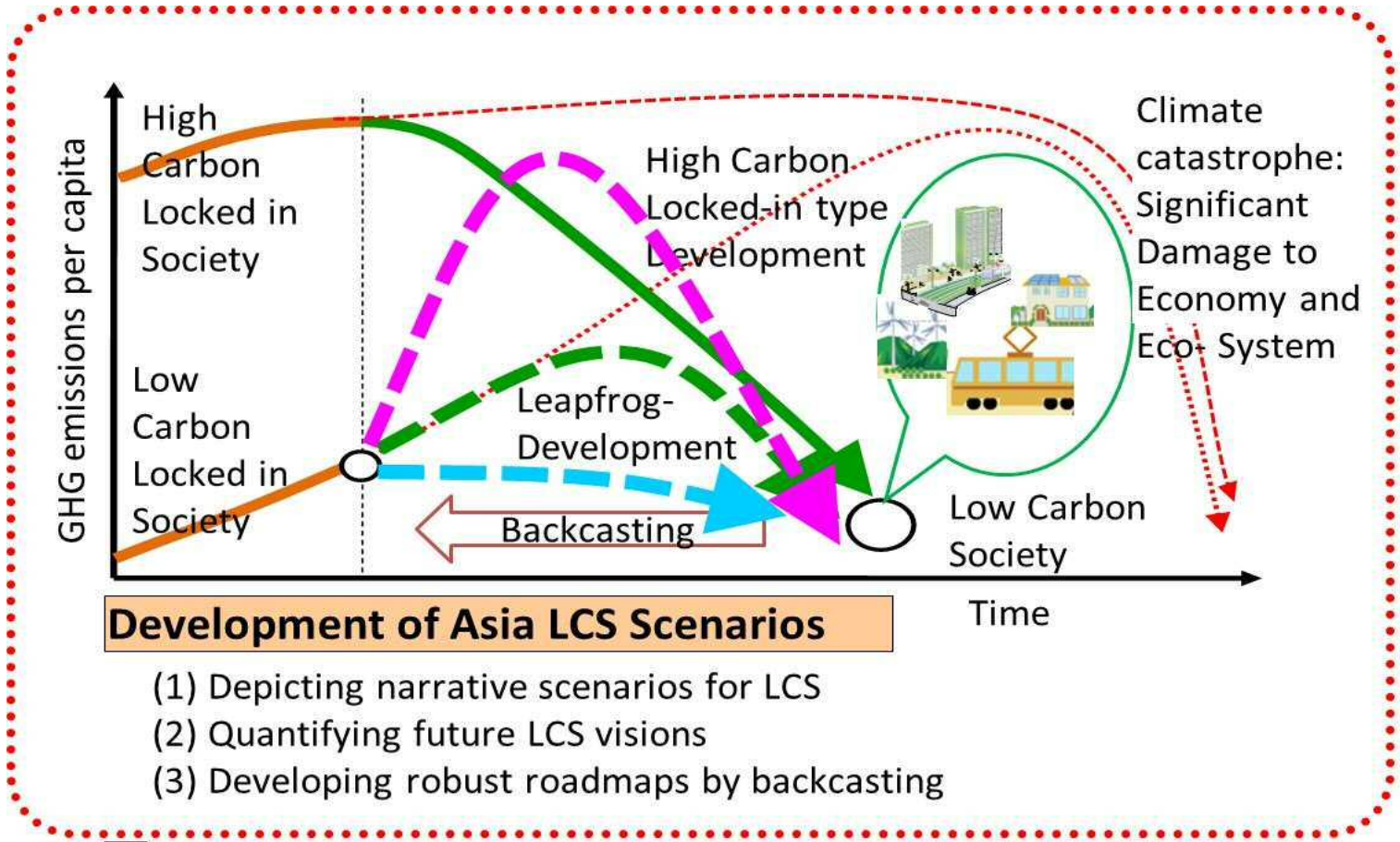
Outline of Project

Name of project

Relevant requests from Quezon City

Quezon Low Carbon Society Scenarios

Creation of low carbon society (LCS) scenarios, using the suggested mitigation projects



Adapted from :IGES/NIES

Technical Assistance on Data Analysis for Climate Change Measures from Different Sectors

1. Proportional division using statistical data

GHG emissions =
∑ (Activity date × Emission factors × Global warming potential(GWP))

Statistical data　　Research data　　Report of IPCC

Field	Statistical data(e.g.)
Energy	Fossil fuel consumption
Industry	Shipment amount of products
Waste management	Amount of landfill waste
Transportation	Automobile mileage
Agriculture	Number of cows

Type of greenhouse gas	Business Activities for which the Emission Calculation is Required
○Energy-derived carbon dioxide (CO_2) (Carbon dioxide emitted in connection with fuel combustion or the use of electricity or heat supplied by another party.)	Use of fuels Use of electricity supplied from another party Use of heat supplied from another party
Greenhouse gases other than the above	Non-energy derived CO_2
○Non-energy derived CO_2	Production of cement, Production of ethylene, etc.
○Methane (CH_4)	CH_4 Mining of coal, Waste disposal by landfill, Treatment of sewage, night soil, etc.
○Nitrous oxide (N_2O)	N_2O Use of fertilizer on cultivated land, Management of livestock excrement, etc.
○Hydrofluorocarbons (HFC)	HFC Use of sprayers, etc.
○Perfluorocarbons (PFC)	PFC Production of aluminum , etc.
○Sulfur hexafluoride (SF_6)	SF_6 Production of SF6,etc
○Nitrogen trifluoride(NF_3)	NF_3 Production of NF_3, etc.

GHG	GWP
CO_2	1
CH_4	25
N_2O	298
HFC	1,430,etc
PFC	7,390,etc
SF_6	22,800
NF_3	17,200

- Training
  Methods of GHG inventory
- Workshop
  Support for assessment of GHG emissions

Transportation	Automobiles	∑(Number of automobiles in each type × annual mileage per automobile)
	Railways	GHG emissions from railway companies / real distance

2. Summary of GHG emissions at each site

Implementation of JCM Model Project Feasibility Studies

Osaka City

1. Energy saving and renewable energy

Thailand・Bangkok ×Japan ・Yokohama

Project Outline

- Introducing energy management system which has functions of peak shaving and emergency power, by implementing solar power generation system on the roof of port facilities together with LED lighting and cargo handling equipment etc.
- Promoting efficient cargo handling and low carbon efforts by introducing hybrid Rubber-Tired Gantry Cranes (RTGs), LED lighting for container yards etc.

LED Yard Lighting

Solar power generation system on port facility

From feasibility studies to JCM model projects

As well, Quezon City and Osaka City

Cambodia・Siem Reap × Japan・Kanagawa

Project Outline

- Install solar panels on the roof of five-stars hotels
- Consider the possibility of community solar using public high schools since there is limited space on the roof of hotels
- Make a business plan for IPP (Independent Power Provider) company
- Conduct MRV (Measurement, Reporting and Verification) methodology

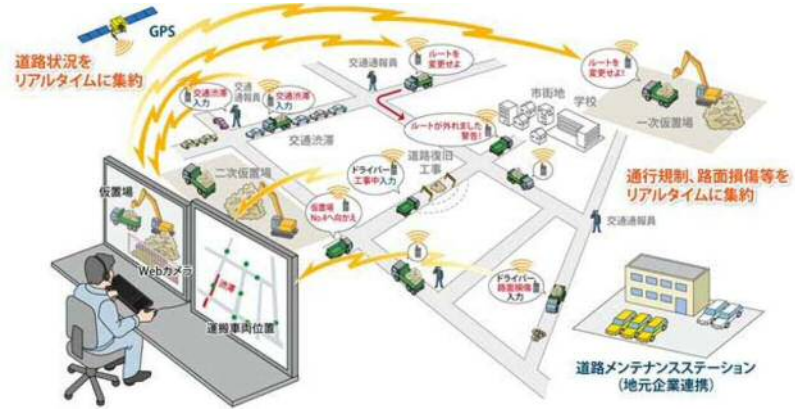
Target rooftop community solar

Osaka City

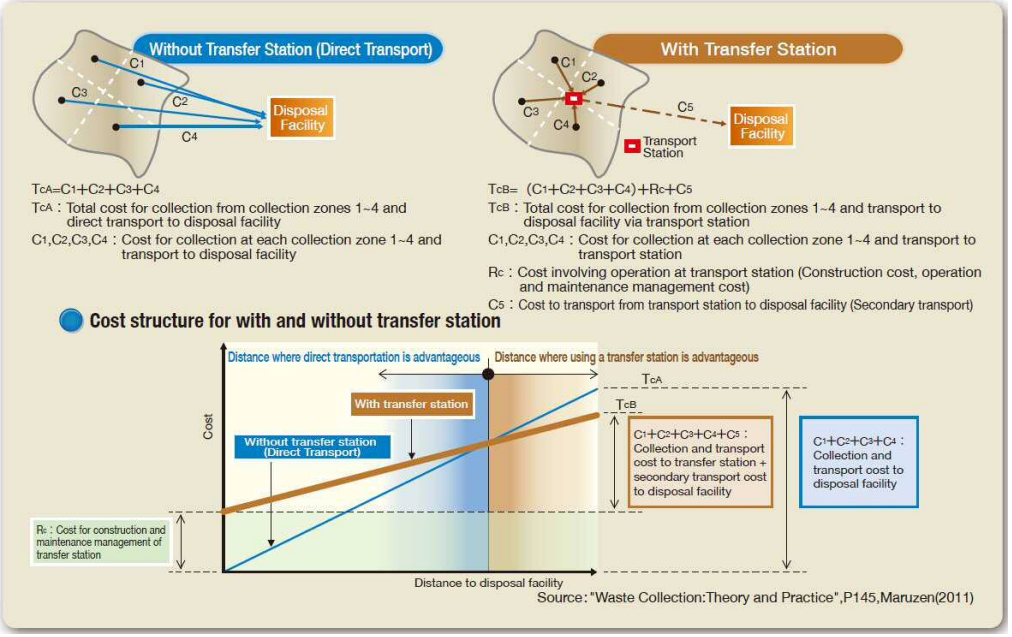
Implementation of JCM Model Project Feasibility Studies

2. Efficient waste collection and transportation

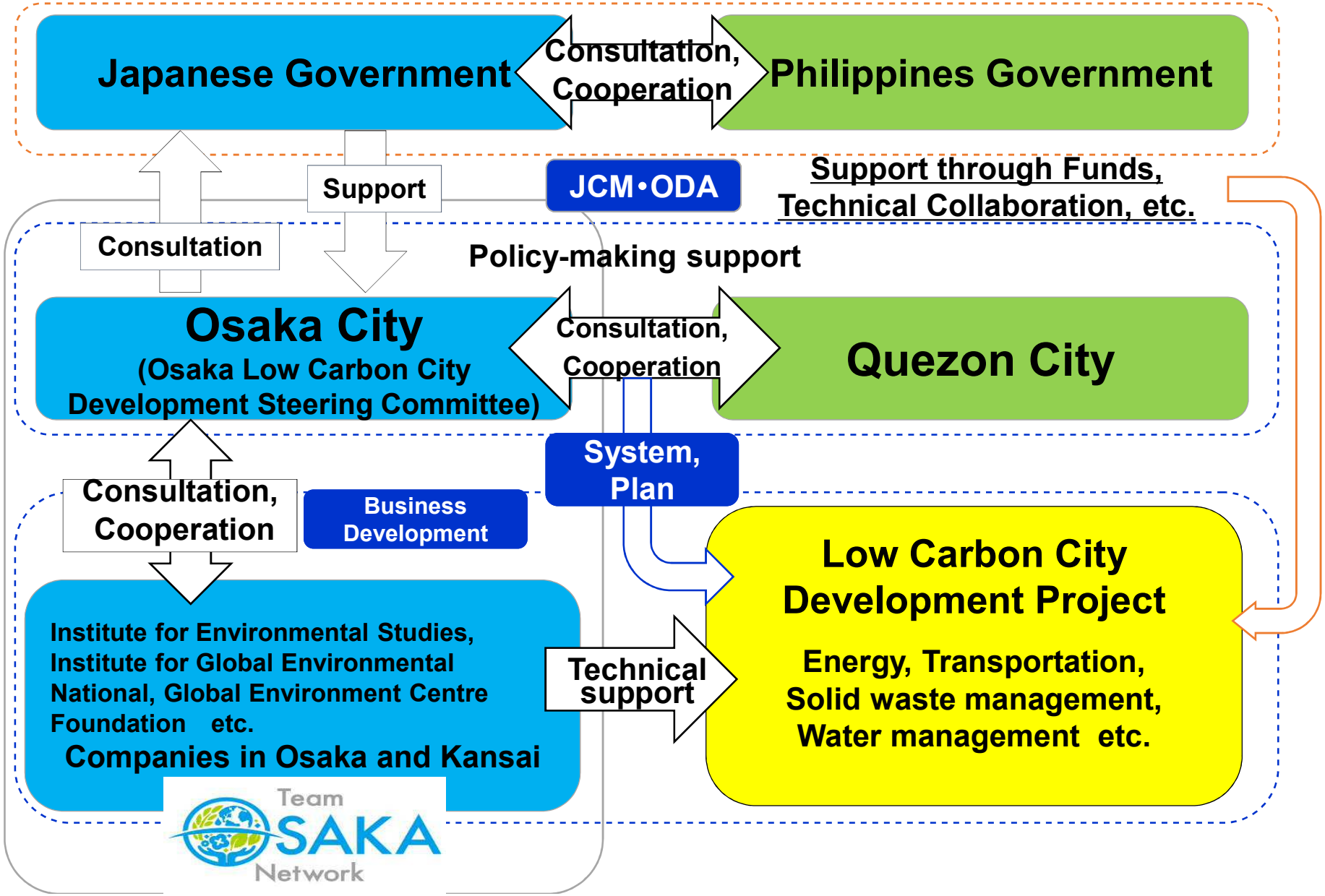
Vehicle operation management systems



Setting up transportation stations to streamline collection and transportation operations



Cooperative Framework Between Quezon City and Osaka City



Thank you very much!

QUEZON CITY LOCAL CLIMATE CHANGE ACTION PLAN (QC LCCAP) 2017-2027

Outline

- Laws and Policies
  - International Policies and Initiatives
  - National Policies and Initiatives
  - National Climate Change Action Plan (NCCAP) Seven Priority Areas
- QC LCCAP
  - Background
  - Chapters
  - Workshops Conducted
  - Survey Sample

International Policies and Initiatives

- Paris Agreement, a new legally-binding framework for an internationally coordinated effort to tackle climate change, UN Climate Change Conference (COP21) Paris 2015.

- UN Framework Convention on Climate Change (commission enforce, 1994)

- Kyoto Protocol, (adopted, 1997) (entered into force 2005) Bali Plan of Action, etc.

National Policies and Initiatives

- Republic Act 9729 or the Climate Change Act of 2009
- Framework Strategy on Climate Change 2010 – 2022
- National Framework on Strategy on Climate Change (2010-2022)
- National Climate Change Action Plan 2011 – 2028
- Republic Act 10174 or People's Survival Funds Act 2012

National Policies and Initiatives

- Other Related Legal Mandates and Policies
  - DILG Memorandum Circular 2008 – 69
  - DILG Memorandum Circular 2008 – 161
  - DILG Memorandum Circular 2009 – 73
  - DILG Memorandum Circular 2009 – 164
  - DILG Memorandum Circular 2011 – 27
  - DILG Memorandum Circular 2011 – 166
  - DILG Memorandum Circular 2012 – 02
  - DILG Memorandum Circular 2012 – 73
  - NDRRMC-DBM and DILG Joint Memorandum Circular(JMC) No. 2013-1

Republic Act 9729 or the Climate Change Act of 2009

Section14 of Republic Act No.9729 also known as Climate Change Act of 2009 states that:

"The LGUs shall be the front line agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the National Framework Strategy on Climate Change and the NCCAP.

Barangays shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Municipal and city governmSection14 of Republic Act No.9729 also known as Climate Change Act of 2009 states that: "The LGUs shall be the front line agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the National Framework Strategy on Climate Change and the NCCAP. Barangays shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Municipal and city governments shall consider climate change adaptation, as one of their regular functions.

LGUs shall regularly update their respective action plans to reflect changing social, economic, and environmental conditions and emerging issues. The LGUs shall furnish the Commission with copies of their action plans and all subsequent amendments, modifications and revisions thereof, within one (1) month from their adoption." (R.A.9729, Sec. 14)

National Climate Change Action Plan (NCCAP)

- The NCCAP was prepared to identify adaptation gaps, needs and initial strategies in the Philippines

- To provide the logical bridging among CC related phenomena (Hazards), CCA Priority areas, Institutional and personnel Adaptive capacity assessment factors, Hazard's threat level assessment parameters.

- To provide an overview on how to assess Institutional and personnel threat and adaptive capacity.

Seven Climate Change Priority Areas (NCCAP)

PRIORITIES	OUTCOMES
1. Food security	The objective of the national strategic priority on food security is to ensure availability, stability, accessibility, and affordability of safe and healthy food amidst climate change.
2. Water sufficiency	In light of climate change, however, a comprehensive review and subsequent restructuring of the entire water sector governance is required. It is important as well to assess the resilience of major water resources and infrastructures, manage supply and demand, manage water quality, and promote conservation.
3. Environmental and ecological stability	Ecosystem resilience and environmental stability during the plan period is focused on achieving one immediate outcome: the protection and rehabilitation of critical ecosystems, and the restoration of ecological services.
4. Human security	The objective of the human security agenda is to reduce the risks of women and men to climate change and disasters.
5. Climate-friendly industries and services	NCCAP prioritizes the creation of green and eco-jobs and sustainable consumption and production. It also focuses on the development of sustainable cities and municipalities.
6. Sustainable energy	NCCAP prioritizes the promotion and expansion of energy efficiency and conservation; the development of sustainable and renewable energy; environmentally sustainable transport; and climate-proofing and rehabilitation of energy systems infrastructures.
7. Knowledge and capacity development	The priorities of the NCCAP on knowledge and capacity development are: • Enhanced knowledge on the science of climate change; • Enhanced capacity for climate change adaptation, mitigation and disaster risk reduction at the local and community level; and • Established gendered climate change knowledge management accessible to all sectors at the national and local levels.

Source: RP-CCC, 2011

QUEZON CITY LOCAL CLIMATE CHANGE ACTION PLAN

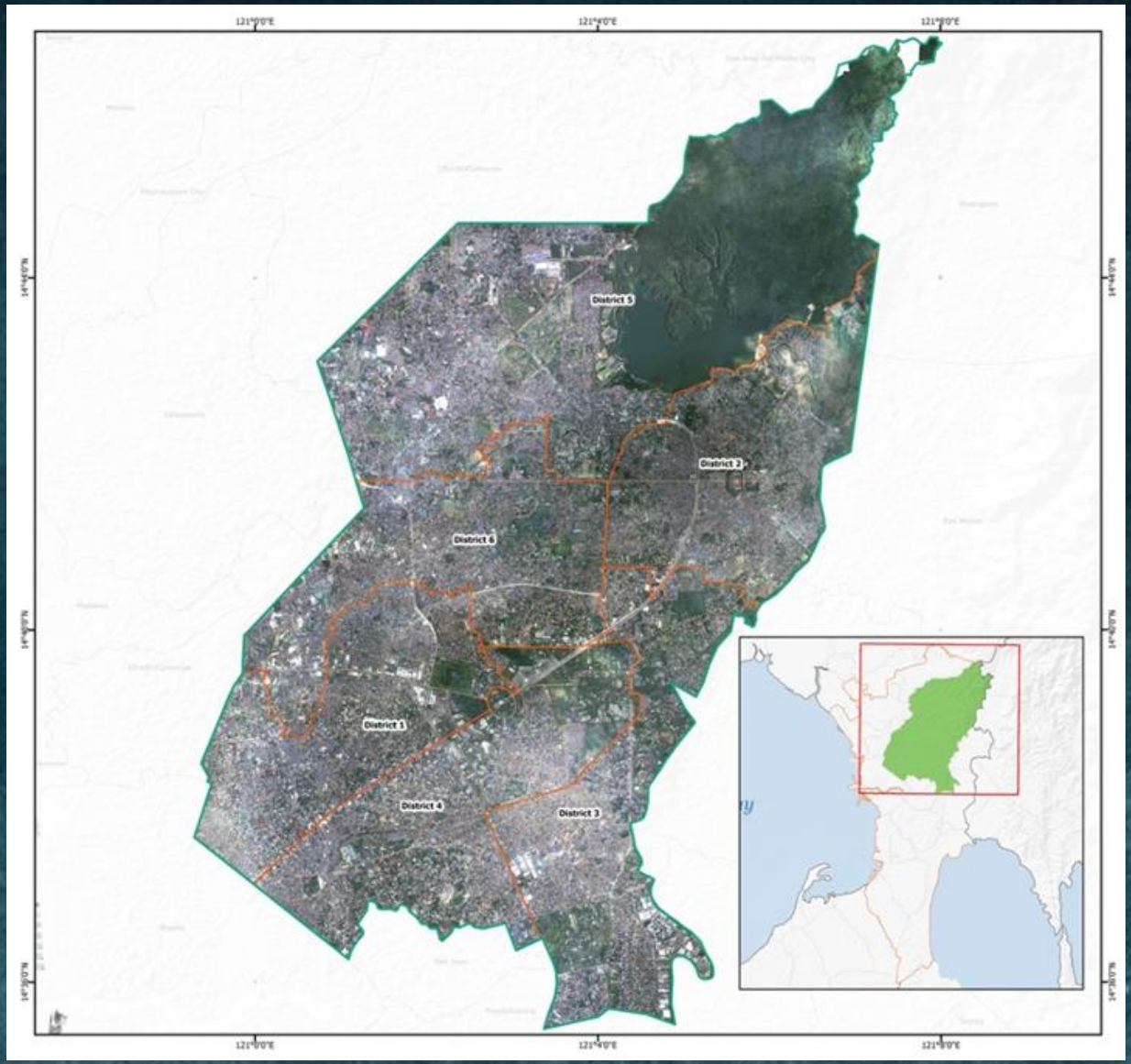


Table 4: Location Map of Quezon City

(Source: Mid-Term Report – Quezon City Climate Change Action Plan (LCCAP) 2017-2027)

Quezon City Local Climate Change Action Plan (LCCAP) 2017 - 2027

May 2017

Quezon City Government
&
UP Planning and Development Research Foundation, Inc

The Quezon City Local Climate Change Action Plan (QC LCCAP) 2017-2027 is the consolidation of following documents:

a. Legal Mandates
b. Background on Quezon City
c. Climate Change Vulnerability
d. Mission, Vision and Objectives
e. Climate Change (CC) Vulnerability/Sensitivity Analysis
f. GHG Emissions and Opportunities for Reductions
g. Situation Analysis
h. Climate Change Adaptation and Mitigation Programs, Projects and Activities

***The above documents are the outputs of the workshops and forums conduct with direct and indirect stakeholders of Quezon City Government (QCG) during the Project period.**

Summary of the Quezon City Local Climate Change Action Plan 2017-2027

Objectives of the Project

- To review the legal mandate for climate change adaptation and mitigation institutional building in Quezon City.

- To create a Technical Working Group (TWG) comprised of direct and indirect stakeholders including Non-Government Organizations (NGOs), Civic and Private sector representatives accredited by the City Government and are members of the City Development Council.

- Develop the Background on Quezon City which includes: (a) Physical Environment Profile; (b) History of the City; (c) Population and Demographics; (d) Settlement Patterns and Housing; (e) Economic Trends; and (f) Planning Context.

Objectives of the Project

- Set the Mission, Vision and Objective to establish climate change priorities using the National Climate Change Action Plan (NCCAP) priority areas.

- Workshops for Quezon City Technical Working Group (TWG) and other Stakeholders covering following areas:

  - Quezon City Climate Change Vulnerability: Climate Change Variation Impact Characterization
  - Climate Change Vulnerability/Sensitivity Analysis
  - Scope of Greenhouse Gases (GHG) Emission and Identify Opportunities for Reduction
  - Situation Analysis
  - Climate Change Adaptation and Mitigation (CCAM) Unit Functions and Priority Programs, Projects and Activities (PPAs) on the 7 priority areas.

Workshops Conducted

- Scoping LGU Mission and Goals for LCCAP, Reality Check and Finding Gaps

- Training on Developing a Framework to integrate DRRMP and LCCAP into IAP, for Mainstreaming IAP in Existing CLUP and CDP, and for Monitoring and Evaluation of the LCCAP

Workshops Conducted

- Workshop on Land Use Mapping using ArcGIS and Urban Morphology Type (UMT) Classification

- Climate Change Vulnerability Analysis using Geographic Information System (GIS)

Workshops Conducted

- Training and Workshop on Scope of Greenhouse Gas (GHG) Emissions and Identify Opportunities for Reduction

- Writeshop and survey on Institutional Adaptive Capacity

Bridging Among CC Related Phenomena (Hazards), CCA Priority Areas and Threat Level

Climate Change (CC) Sensitivity or Climate Related Phenomena/ Incidents	Please Indicate by putting cross abreviation of CC Phenomena i.e. W, P, and/or T that may have tendency to be impacted by these CC incidents	Priority Area/Sector/Hazrad Area (Seven Pillars of NCCAP)	5 (High) 4 (Medium High) 3 (Medium) 2 (Medium Low) 1 (Low) Indicate below the score/threat level of W, P, and/or T to exposure elements using levels provided in above table			Impact /Exposure Element (Who and What are exposed – by sector-
			W	P	T	
Extreme Weather Events with increased frequency and severity (tropical cyclones, storm surges, riverine floods and rainfall) W		1. Food Security 1. Agriculture and Fisheries Production and Distribution System. 2. Agriculture and Fishing Communities				Availability
						Stability
						Accessibility
						Affordability of safe and healthy food
						Sustainability of Water Resource

Institutional and Personnel Adaptive Capacity Assessment Factors

ADAPTIVE CAPACITY FACTOR	ADAPTIVE CAPACITY SCORE/LEVEL				
	5 (High)	4 (Medium High)	3 (Medium)	2 (Medium Low)	1 (Low)
ECONOMIC WEALTH	• have adequate and available financial resources for assistance to all affected sector • the people in the affected areas have their own resources to respond to a hazard	• have enough financial resources for assistance to some affected sectors • the people in the area have access to resources to respond to a hazard	• with limited financial resources for assistance for priority affected sectors • the people in the area have limited access to resources respond to a hazard	• have very limited financial resources for assistance to affected sectors • affected people have very limited access to resources to respond to a hazard	• no available financial resources for assistance to affected sector • affected people don't have their own resources to respond to a hazard
TECHNOLOGY	• there are equipment available for use and facilities to communicate directly with the people/sector affected	• there are some equipment for use and facilities to communicate with the affected people /sector	• limited equipment and facilities for assistance and communication	• very limited equipment and facilities for assistance	• very few facilities and equipment for use and communication with affected sector/people is difficult

Institutional and Personnel Adaptive Capacity Assessment Factors

SECTION III – Institutional Adaptive Capacity

Please assess the adaptive capacity of your office by assigning the adaptive capacity score/ level to each Climate Change priority sub areas vis-à-vis six adaptive factors i.e. Economic Wealth, Technology, Institutions, Infrastructure, Information, and Social Capital. You can consult Adaptive Capacity Score / Level Matrix in Annex B.

Adaptive Assessment Factors:		***Economic Wealth***	***Technology***	***Institutional***	***Infrastructure***	***Information***	***Social Capital***
CC Priority area/ Pillar	**Adaptive Demands**						
1. Food Security							
a	On the vulnerability of agriculture and fisheries to the impacts of climate change.						

QUEZON CITY'S INITIATIVES

Renewable Energy (Solar)

Waste to Energy

Waste to Energy

Sustainable Trasportation

THE END