Appendix

Appendix I Overview and Key Outcomes of the Project

Appendix II Reference Data and Materials from the Study

Appendix III Overview and Materials from Workshops and Local Surveys

Appendix IV Materials on Pathein Industrial City

Appendix V MRV Methodology and PDD (Draft)

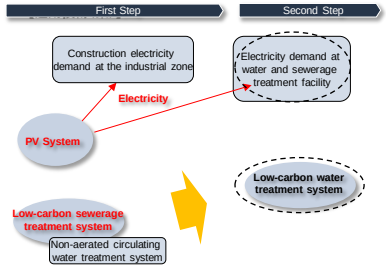
Appendix I
Overview and Key Outcomes of the Project

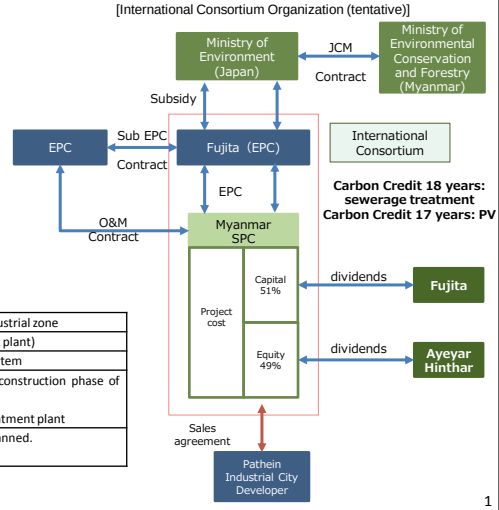
Appendix I includes the overview and key outcomes of this project.

Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region (Study of a low-carbon water and sewerage treatment system in Pathein Industrial City)

"Low-carbon water and sewerage treatment plant with PV system" (PV: 1 MW scale)

Construction of water and sewerage treatment plant for industrial water are planned in Pathein Industrial City; as an independent distributed energy source at the treatment plant, mega solar will be implemented. In Pathein City, water and sewerage are not in place; in the future, with further economic development, there will be higher demand for water and sewerage treatment plant in the city, not only the industrial zone. Mega solar installed low-carbon water and sewerage facility can be diffused as a regional model (to surrounding areas and other regions).

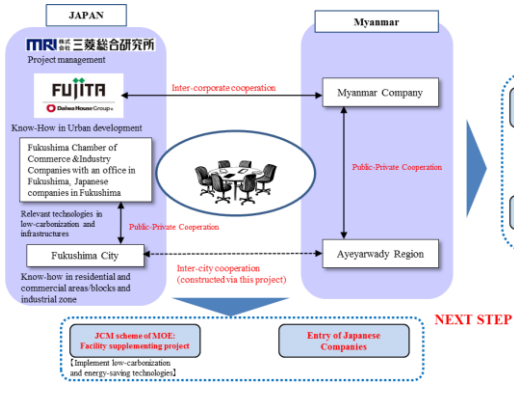




Site	Water and sewerage treatment plant site in the industrial zone
Size	1MW scale (PV), 4800 m3/day (sewerage treatment plant)
Technology	Mega solar, Energy efficient sewerage treatment system
Electricity (PV)	(for now) Supplied for electricity demand during construction phase of the industrial zone (in the future) Supplied for water and sewerage treatment plant
Project Scheme	SPC (e.g. Japanese company and local partner) is planned. JCM equipment subsidy utilization is planned.

Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region (Study of a low-carbon waste treatment system in Pathein Industrial City)

Mitsubishi Research Institute, as the representative proposer, will conduct the research in cooperation with Fujita, its partner, Fukushima City, and Fukushima Chamber of Commerce and Industry. Ayeyar Hinthar, a local major company (developing various businesses including rice industry, urban development industry, financial industry with its business area in Ayeyarwady Region), to coordinate with the local stakeholders, and to obtain cooperation from the regional government officials.



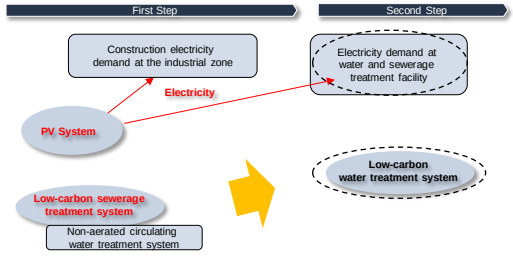
[Research Items]

- Overview and local needs
- Japanese experiences, know-how, and technologies for utilization
- Consideration of JCM project formulation (identifying project site and installed technology)
- Consideration of GHG reduction (considering MRV method and creating PDD, etc.)
- Consideration of project and policy proposal (environmental and societal impact, project scheme, policy proposal consideration)
- Holding workshops and other meetings

<Goal>

- Creating project plan
- Creating MRV and PDD plans
- Organizing cooperation structure of stakeholders through policy dialogue, and creating platform for consideration of regional masterplan

Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region
(Study of a low-carbon waste treatment system in Pathein Industrial City)



Low-carbon sewerage treatment system	PV System
● Annual electricity consumption reduction: 268 MWh	● Site: treatment plant site ● Capacity: 1 MW ● Capacity factor: 0.8 ● Annual electricity sales: Approx. 1,542 MWh (Average radiation 19MJ/m2/day, solar irradiance 1)

Item	Cost(w/o subsidy)	Cost(w/ subsidy)	Estimation method
1. Approximate equipment cost	410,000,000 JPY		only includes equipment for subsidy application (sewerage treatment system 160 million JPY, PV 250 million JPY)
2. Subsidy	–	205,000,000 JPY	½ of 1
3. Equipment cost- subsidy	410,000,000 JPY	205,000,000 JPY	1-2
Energy derived CO2 reduction	268 MWh×0.230 t-CO2/MWh=約 62 t-CO2/year 1,542 MWh×0.8 t-CO2/MWh=約1,234 t-CO2/year Total 1,296 t-CO2/年		Sewerage treatment plant: grid substitution, PV: off grid substitution (could be substituting diesel during construction phase)

3

JCM Model Project organized by City-to-City Collaboration — Host Country Myanmar

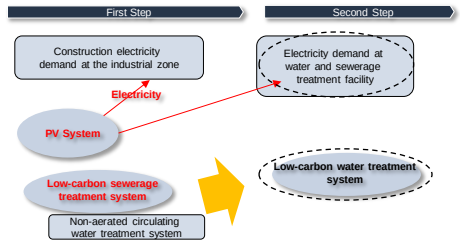
Project Title : Low-carbon water and sewerage treatment system in Pathein Industrial City
PP (Japan): Fujita Corporation / **PP(Myanmar):** SPC (Related companies such as Ayeyar Hinthar will take part.)

Outline of GHG Mitigation Activity

The following equipment will be installed to achieve low-carbon water and sewerage treatment system in Pathein Industrial City.

(1) Low-carbon sewerage treatment system
Non-aerated circulating water treatment system will be installed.

(2) PV System installed at treatment plant
1 MW scale system installed at the plant



GHG Emission Reductions and Project Site

1,296 tCO2/Year

Project conducted in "Pathein Industrial City" in Pathein City, capital of the Ayeyarwady Region

Merits of City-to-City Collaboration to Realize JCM Projects

Sharing knowledge of low-carbon sewerage treatment system

Measures for promoting PV system in public facilities (using experiences in Fukushima City Renewable Energy Promotion Plan)

Training human resources in the PV sector

4

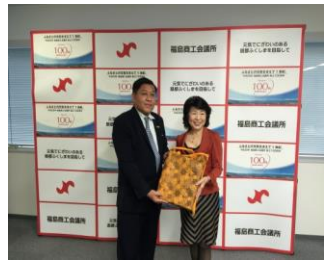
Snapshot of Inter-city cooperation

Workshop in Pathein City

Meeting in Fukushima City

Dialogue in Pathein City

Networking event with Fukushima Chamber of Commerce &Industry



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Appendix II
Reference Data and Materials from the Study

Appendix II includes the reference data from the study.

PART 1: Sewerage Treatment in Myanmar

Public Restrooms in Pathein City (Right: Septic Tank)

Utilization of Sewerage Sludge

Industrial Effluent

Costruction of Gutters

Gutters in the City

PART2: Water Treatment Facility Plan in Pathein City

There is a plan for constructing a water treatment facility in Pathein City. The center of the city is divided into 15 areas; in the first phase, the 13 areas in the east of Pathein River will be under construction and the rest will be under construction during the second phase. With the new treatment facility there will be 140,000 people who will receive the treated water, with processing amount of 3.1 MG/day. Pathein Industrial City is out of the scope in this plan.

There are 155 workers at PCDC with no experiences in water treatment facility. Therefore, 100 new workers will be employed under the plan, and will be working to collect bills and to operate the facility.

PART3: Fukushima City Renewable Energy Introduction Promotion Plan and its Overview

<Excerpt>

Chapter 1 Purport of Establishing a Renewable Energy Introduction Promotion Plan

1. Purpose of Establishing the Introduction Promotion Plan

The purpose is to establish a renewable energy introduction plan of Fukushima City (hereinafter called the "Plan") to show the direction of introducing renewable energy sources suitable for regional characteristics of Fukushima City and concrete approaches to realize an "environmentally most-advanced city", as a means of further promoting the introduction of renewable energy sources and to aim at realizing "Environmentally Most-Advanced Fukushima City" through collaboration among the municipal government, citizens and business operators as a unified body.

2. Status of the Plan

The Plan is intended to be a concrete plan to promote various measures to introduce renewable energy sources stated in the "Basic Environment Plan of Fukushima City", as well as in the "Action Plan for Global Warming Countermeasures of Fukushima City".

3. Planning period

(Contents omitted)

4. Types of Power Generation covered by the Plan

The types of power generation subject to the Plan are those generally referred to as "new energy sources" as listed below, out of all kinds of renewable energy sources. It is hereby noted that the small-scale hydro power generation shall be of a capacity of 1,000 kW or less and that the geothermal power generation shall be that based on the binary method.

(i) Photovoltaic power generation
(ii) Wind power generation
(iii) Biomass power generation
(iv) Small-scale hydro power generation

(v) Geothermal power generation
(vi) Solar thermal utilization
(vii) Temperature difference utilization
(viii) Biomass thermal utilization
(ix) Snow and ice thermal utilization
(x) Biomass fuel production

Chapter 2 Regional Characteristics and related Issues

1. Energy Consumption

The amount of power consumed by general households and business facilities in this City was 1,824,452,000 kWh in FY 2013 (A).

2. Energy Self-sufficiency Rate

The energy self-sufficiency rate means the ratio of the power generation from renewable energy sources (including medium-scale hydro power generation) generated in this City, against the annual aggregate power consumption in this City. The estimated amount of renewable energy generation in this City for FY 2013 was 429,506,000 kWh (B), and thus, the energy self-sufficiency rate for that year was 23.5% (B / A).

3. Issues related to the Promotion of Introducing Renewal Energy Sources to this City

(Contents omitted)

Chapter 3 Renewable Energy Introduction Policy

1. Future Vision of Fukushima City

This City has been actively promoting the introduction of renewable energy sources suitable for the regional characteristics of this City through collaboration among the municipal government, citizens and business operators, based on the Action Plan for Global Warming Countermeasures established by this City, together with the promotion of energy saving measures, while maintaining the harmony with Fukushima's unique features characterized by its rural and "Satoyama" landscape, natural environment and scenery filled with lush greenery, historic and cultural landscape, as well as the natural environment rich in water resources.

This City aims at realizing a vigorous “environmentally most-advanced urban community” with well-advanced regional production for regional consumption based on safe and secure energy sources, and contributes to the creation of society that does not depend on nuclear energy in the future, by endeavoring to prevent global warming and promote the creation of low-carbon circular-type society that gives low burden on the environment through utilization of renewable energy sources, in parallel with the restoration from the nuclear disaster, revitalization of local communities, and creation of townships resilient to disasters and emergencies.

2. Renewal Energy Introduction Policy

(1) To increase the degree of self sufficiency by taking advantage of the characteristics of the Region.
(2) To promote the diffusion of energy self-consumption-type facilities.
(3) To define the division of roles among the municipal government, citizens and business operators, and to work in a unified body.

3. Numerical Targets of the Plan

(1) Establishment of numerical targets

We establish a numerical target for the increase in the rate of energy self-sufficiency owing to an increase in power generation from renewable energy sources. We also establish another numerical target for the degree of diffusion of energy self-consumption-type facilities which take the initiative of utilizing regionally generated renewable energy within the same region. In establishing these two numerical targets, it is assumed that there is no influence from “answers on hold” to the requests for grid connection.

(2) Numerical targets

(i) Energy self-sufficiency rate (A) / (B)

Here, (A) stands for the amount of renewal energy generation in Fukushima City in a given year, and (B) stands for the aggregate amount of power generation in Fukushima City in the same year.

(ii) Diffusion rate of energy self-consumption-type facilities (C) / (D)

The diffusion rate of energy self-consumption-type facilities is established for public facilities and for residential buildings, respectively.

Chapter 4 Renewable Energy Promotion Measures

1. Measures to be implemented by the municipal government, citizens and business operators, individually (Contents omitted)

2. Measures to be implemented by the municipal government, citizens and business operators through mutual collaboration among them

For the promotion of introducing renewable energy sources by this City, we will examine the mechanism to expand the scope of measures from the phase of approaches where each introducing entity works individually at public facilities, households, and business places, to the phase of approaches where each regional segment considers measures of effectively utilizing renewable energy sources in which the municipal government, citizens and business operators share the future vision aimed at by Fukushima City and work together through mutual collaboration among them.

Chapter 5 Institutional Promotion System

1. Roles of Individual Introducing bodies

(1) The municipal government: To demonstrate its attitude and commitment vis-à-vis citizens and business operators, by introducing renewable energy sources.

(2) Citizens: To have interest in energy issues and to take positive approaches towards the introduction of renewable energy sources.

(3) Business operators: To give careful thoughts to the local production of energy and local consumption of the produced energy, and to endeavor to introduce renewable energy sources, through examination of the mechanism to return the profit to the own region.

2. Creation of a Promotion System within the Municipal Government

(1) As the internal system, to establish a consulting service counter on renewable energy sources within Environment Division of the municipal government and to examine a programmatic introduction promotion system at the “Environment Preservation Promotion Liaison Conference”.

(2) As the external system, to supervise the progress on the level of the “Council for the Basic Promotion Plan for the Environment of Fukushima Prefecture”.

(3) To promote the Plan by collaborating and cooperating closely with the national government, other prefectural governments and research institutions.

Chapter 6 Towards the Realization of the Plan (Contents omitted)

Source) Excerpt from “Fukushima Renewable Energy Promotion Plan (Digest version, in Japanese) “. [Provisional Translation Only].

Appendix III
Overview and Materials from Workshops and Local Surveys

Appendix III includes minutes and materials from workshops and local surveys of this study.

Appendix III
Overview and Materials from Workshops and Local Surveys

PART1: Overview of Workshops and Local Surveys

[Overview of first meeting in Fukushima City]

*Waste treatment sector and water treatment sector were discussed in the same meeting.

Date: 2016/7/13 14:00-15:15

Venue: Corasse Fukushima

Participants:

Fukushima City, Fukushima Chamber of Commerce and Industry, Fujita Corporation, Mitsubishi Research Institute

Agenda:

(1) Minutes of the Kick-off Meeting with the Ministry of Environment in Japan

(2) Plan and current status of this year's study

(3) Plans for city-to-city collaboration

(4) Plans for site collection of plastic bottles

Discussion topics from the meeting

- The local government officials have high interest in the waste treatment of rice husks. Inducing measures and restrictions on waste treatment will be one important topic for this year's city-to-city collaboration.
- It may be difficult for the counterpart government officials to clearly show their needs, but some information on their concerns and challenges they are facing would enable Fukushima City to provide more effective support.
- There is high interest for renewable energy in Fukushima City; there are probably some companies that would be interested in this project as well. Disseminating information about this project to companies in Fukushima City is important.
- There are many barriers for a single company to start a new business in Myanmar on its own; it may be easier for multiple companies to cooperate in starting new businesses. Fukushima City does not have much experience in such activities, but this project may serve as one opportunity for matching between different companies.

- Official participation in the site collection scheme of plastic bottles for this year's research may be difficult for Fukushima City; however, donation of stationary goods can be collected by volunteers.
- The local government is not looking for large-scale businesses. It is important that we propose businesses and activities that are suitable for Myanmar. Smaller projects that may be conducted in a similar way in other areas would be preferable to large projects that the local government is unable to manage.

[Overview of first networking event in Fukushima City]

*Waste treatment sector and water treatment sector were discussed in the same meeting.

Date: 2016/7/13 16:00-17:30

Venue: Corasse Fukushima

Participants:

Fukushima City, Fukushima Chamber of Commerce and Industry, Fujita Corporation, Mitsubishi Research Institute

Agenda:

(1) Opening note

(2) Introduction of Myanmar, Ayeyarwady Region, and Pathein City

(3) Discussion

Discussion topics at the event

- It would push companies to start new businesses in Myanmar if Fukushima City can propose how they can support.
- When we invited government officials from Myanmar to Japan, they were amazed at the agricultural goods in Fukushima City. In the future, Fukushima City may be able to provide support in the agricultural sector.
- Regulations and policies in developing countries that change on the day to day basis stand as a huge risk for medium and small enterprises. The connection with the local stakeholders through this project can be utilized for collecting the local updates.

- The word “Fukushima” possesses a negative image after the Great East Japan Earthquake. We would like to promote the brighter side of Fukushima City through this project.

[Overview of first workshop in Pathein City]

*Waste treatment sector and water treatment sector were discussed in the same meeting.

Date: September 20th, 2016 13:30-17:00

Venue: Pathein City, Ayeyarwady Region

Participants:

<Japan> Mitsubishi Research Institute, Fujita Corporation

<Myanmar> Ayeyarwady Regional Government, Pathein Industrial City developer

- Opening note was given by the Prime Minister of Ayeyarwady Region.
  - As tackling climate change is a global issue today, Myanmar has been experiencing disasters such as floods; it is important for Ayeyarwady Region to take measures against them.
  - Ayeyarwady Region holds numerous environmental concerns, such as water quality, land quality, air quality, waste treatment, etc. The most important driver for economic development is agriculture.
  - I would like to kindly request that Japan provides cooperation for development of agriculture in Myanmar and the Ayeyarwady Region.
  - Through discussions in today’s workshop, I would like to develop action plans for the future and to cooperate with each other.
- The Japanese delegates expressed their gratitude towards those in Myanmar for their cooperation in holding the workshop, and explained about their activities in Japan.

- The Japanese delegates explained the overview of “Partnership for Low Carbon Initiative in Ayeyarwady,” activities taken last year, the summary of the report, and overview of the activities for the year 2016-2017. Furthermore, they introduced the Japanese experiences of environmental problems during its economic development and measurements taken against such issues.

- Participants from Myanmar introduced their current situation, and the Japanese delegates explained some ideas for projects; afterwards, discussion was conducted amongst the delegates.

Overview of discussions for waste treatment (rice husk treatment) sector

<Current Situation in Myanmar>

- Legislations are being developed in Myanmar such as regulations on effluent, and how to develop detailed measures have become the issue. Effluent from factories in particular is of high interest.
- Tap water treatment is being prepared by JICA ODA. Pathein City considered some plans and proposed them as well. The details are being discussed with JICA professionals.

<Proposals by the Japanese Delegates>

- Based on past experiences of water quality issues in Japan, it is likely that such issue will worsen as economic development and urban development proceed. Before such issue becomes serious, it is important to conduct measures against it. In Japan, the administration establishes emission standards, and monitors the effluent at the same time, and supervision scheme by the administration is established. Various activities for enforcing such standards for existing factories are conducted as well. Such administrative know how would be insightful for Pathein City as well.
- Not only technical know-how but also project know-how such as construction fee financing and collection of bills is important for sewerage treatment and water treatment projects.

<Local Needs>

- Considering the situation in Pathein City, it is important that the treatment method is low cost.
- How administration can work toward such activities (e.g. scheme for enforcing regulations, applying regulations for existing factories, scheme for sewerage treatment and water treatment, etc.) is of high interest.

[Overview of courtesy call with the Fukushima City Mayor]

*Waste treatment sector and water treatment sector were discussed in the same meeting.

Date: 2016/10/18 9:15~9:45

Venue: Fukushima City Hall

Participants:

<Myanmar> Environmental Conservation Department Ayeyarwady Region, Ayeyarwady Region Development Affair

<Japan> Fukushima City, Fukushima Chamber of Commerce and Industry, Fujita Corporation, Mitsubishi Research Institute

Overview:

- There was an opening note by development director for Pathein City, where he showed his appreciation towards those who had supported his visit to Japan. He introduced Pathein City and Ayeyarwady Region, and explained the current situation of water treatment and waste treatment. Finally, he showed his high expectations for Japan in supporting the improvement of such situation for water and waste treatment.
- The mayor of Fukushima City gave a welcome speech. He explained the vision of Fukushima City to realize its vision “Cutting-Edge Environmental City “that does not rely on nuclear power. In achieving such vision, the city is working on promoting renewable energy, and developing solar power, small scale hydropower, geothermal binary power, and large scale wind power. High quality of water in Fukushima City was introduced as well. In order to maintain the water quality in rivers, residents along river basin provide cooperation, such as by equipping septic tanks are in residences. He expressed that he would like to provide knowledge and experiences of Fukushima City for waste treatment as well.

[Overview of the lecture for water treatment sector in Fukushima City]

Date: 2016/10/18 10:00-11:30

Venue: Fukushima City Hall

Agenda: Sewerage treatment in Fukushima City

Overview:

Sewerage treatment in Fukushima City (lectures and discussions)

- There was an explanation of the history of sewerage treatment in Fukushima City, overview of current sewerage treatment business, and agricultural community effluent treatment programs. Necessary cost for conducting sewerage treatment was explained, and financial sources were introduced along with their pro's and con's. Aside from sewerage treatment, effluent treatment facility in individual factory and septic tanks in individual residence were explained.
- In conducting sewerage treatment in Myanmar, preliminary sewerage treatment scheme would be appropriate. In such case, agricultural community effluent treatment programs would be insightful. Such programs can reduce initial investment cost as well.

[Overview of the meeting for Partnership for a Low-Carbon Initiative in Ayeyarwady]

Date: 2016/10/18 13:10~14:30

Venue: Corasse Fukushima

Agenda:

(1) Opening Note by Myanmar and Japan

(2) Activities in Ayeyarwady Region and Pathein City

(3) Activities in Fukushima City

(4) Discussion

(5) Wrap-up

Discussion topics:

- There is no high consciousness for environmental conservation in industrial and commercial sector; it is an issue that spending cost on such measures is avoided.
- It is important that plans are well balanced between measures and regulations for future considerations in Ayeyarwady Region for waste and water treatment. If there are

strict regulations when appropriate measures are not in place, the regulations may become a mere façade.

- Environmental emission standards were established in 2015 in Myanmar with the support of JICA and ADB. However, its enforcement is the current challenge. Most factories in Myanmar do not have high awareness on environmental conservation, and they have tendency to avoid allocating cost for such measures.
- Educational Center is constructed in Pathein Industrial City. At the center, environmental education for citizens on latest environmental technologies and environmental conservation is conducted. Penetration of internet is not high in Myanmar, so environmental education at such facility is extremely important.
- Volunteer-based beautification/cleaning groups are active in Fukushima City; the city welcomes and recommends activities of such groups.
- Environmental regulations are posed by different organizations, based on the scale of facility. For large scale projects, regulations are posed at the national level by Myanmar Investment Committee. For middle and small scale projects, regulations are posed by each administrative region. In the past, enforcement of environmental regulations was not considered as important, but in the future, gradual enforcement is planned, such as by giving penalties.

[Overview of the networking event for Partnership for a Low-Carbon Initiative in Ayeyarwady]

Date: 2016/10/18 afternoon

Participants:

(From Fukushima City) Fukushima Chamber of Commerce and Industry, Fukushima Prefecture Industrial Promotion Center, Fukushima City

Agenda:

(1) Opening Note

(2) Introduction of Fukushima City

(3) Introduction of Pathein City, Myanmar

(4) Discussions

(3) Closing Note

- Overview of Ayeyarwady Region and Pathein City was introduced by Mr. Aung Min Naing.
- Yangon City, and region around Pathein Industrial City were introduced by Mitsubishi Research Institute. Waste treatment facility in Pathein City and water treatment facility in Yangon City were introduced at the same time.

[Overview of second workshop in Pathein City]

*Waste treatment sector and water treatment sector were discussed in the same meeting.

Date: 2017/1/25 13:30~17:00

Venue: Pathein Industrial City

Participants:

<Japan> Fukushima City, Mitsubishi Research Institute, Fujita Corporation

<Myanmar> Ayeyarwady Regional Government, Pathein Industrial City

Overview:

- As an opening note, it was explained from the Ayeyarwady Regional Government official that the government is aiming to make an environmental friendly region and that the power demand is increasing as factories are increasing. It was stated that

Waste treatment sector

- Future perspectives (Mitsubishi Research Institute)
- Project proposals (Fujita)
- Experiences in Fukushima City and possible future cooperation (Fukushima City)
- Relevant information from Myanmar
- Discussion

Water treatment sector

- Future perspectives (Mitsubishi Research Institute)
- Project proposals (Fujita)
- Experiences in Fukushima City and possible future cooperation (Fukushima City)
- Relevant information from Myanmar
- Discussion

- The regional government is considering environmentally friendly policies.
- Rice husk power plant in discussion would be a wonderful project as it generates power from waste, and that the regional office would like to support such project.
- Some rice husks are used in brick factories; therefore influence on them should be considered as well. Many workers in brick factories do not have much money, so additional support should be considered if rise in price of rice husks is expected.
- Ayeyarwady Region suffers from natural disasters. It is considering measures against flood as well. We welcome environmental conservation measures. There will be higher power demand as factories increase. The government is trying to become an environmentally friendly region.
- The region is willing to offer support in various activities discussed in this workshop. We would like to provide support at any time anywhere.

- Pathein City is currently considering water treatment plant with the support of JICA. It is planning to supply water by taking water from the river.
- The city has not conducted discussions for sewerage treatment plants. Proposed small scale distributed water treatment system (energy efficient and with PV) is of high interest. The region would like to install such system. Such system would solve issues of water treatment and power supply in the region.

- There have been past projects for small scale PV power plant, but there were some troubles such as maintenance.
- Power supply is a serious issue in the region. There are small villages within the region and power supply is not enough. There are high expectations for generating electricity.

- Based on the discussion, future perspectives for cooperation for establishing low carbon city in Ayeyarwady Region under city to city cooperation were proposed by Japan.
- This year projects for rice husk power plant and sewerage treatment plant were discussed, but in the future, based on the city to city collaboration, promotion of

renewable energy and resource circulation in other cities of the region and other industrial parks (for instance, MyaungMyau industrial park in which the first JCM project rice husk power plant is conducted) will be considered as well. It is important that model projects for environmentally cutting edge city in Ayeyarwady Region is conducted and cooperation with Japan is expected.

FY2016 JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region
Study of a low-carbon water and sewerage treatment system in Pathein Industrial City

Appendix III
Overview and Materials from Workshops and Local Surveys

PART2: Photos from Workshops and Surveys

1. Workshop and Networking Event in July (Fukushima City)

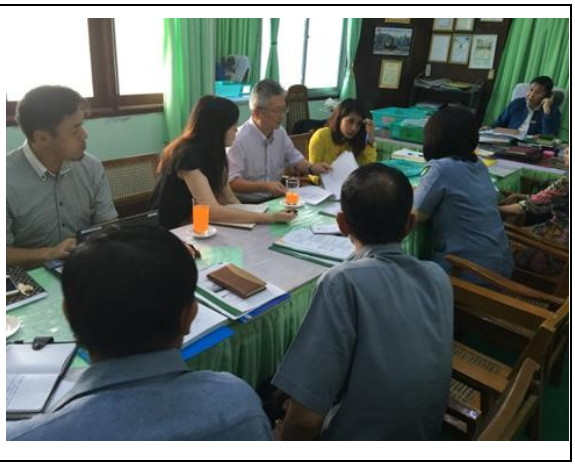
Workshop

Networking Event

Presentation	Food from Myanmar

2. Workshop in September (Myanmar)

Workshop

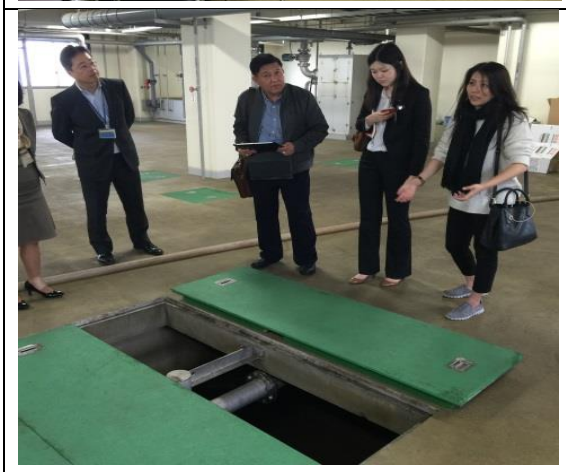


Pathein Industrial City

Pathein Industrial City

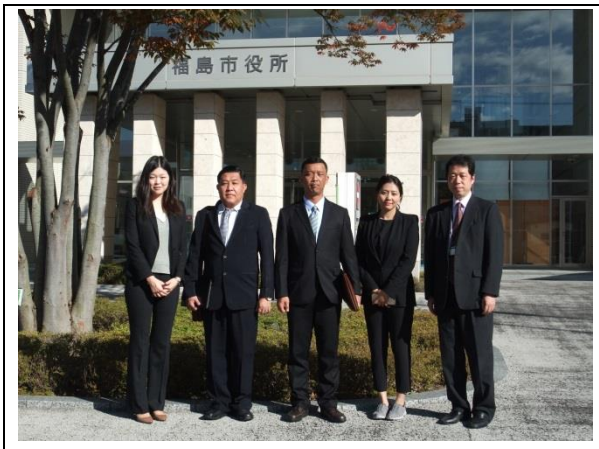
3. Workshop and Networking Event in October (Fukushima City)

Agricultural community effluent treatment programs



Waste water treatment in final landfill site

Courtesy Call with the Fukushima City Mayor



Lectures by City Officials

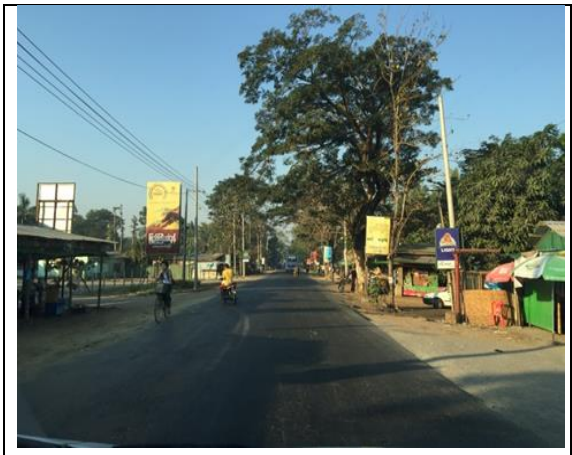
Workshop

Networking Event

4. Workshop in January (Japan and Myanmar)

Workshop

Ayeyarwady Region



Elementary School near Pathein Industrial City






Industrial Park near Pathein City and Surrounding area

Thilawa Special Economic Zone

Appendix III
Overview and Materials from Workshops and Local Surveys

PART3: Distributed Materials from Workshops and Local Surveys

Study of a low-carbon water and sewerage treatment system in Pathein Industrial City

FIRST WORKSHOP IN PATHEIN CITY

Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

Date September 20, 2016. 13:30~17:00

Place Meeting room of Pathein Industrial City, Pathein, Ayeyarwady

Program
Opening remark
Greeting & Speech (Myanmar side)
Opening & Greeting (Japanese side)

Presentations, Q&A, and Discussion

Closing Remark

Language
Interpretation between Burma and Japanese will be provided.

Presentations, Q&A, and Discussion

<Session1: Water treatment field>

- Background and Outline of Project (Japanese side)
  (including experience in Japan, concept proposal)
- Water treatment and water supply in Pathain
  (Myanmar side)
  - Current situation and prospective
  - Idea for cooperation
- Idea for water treatment and water supply (Japanese side)
  including renewable energy, experience in Japan, and
  candidate project proposal

Presentation
(Japanese side)

- Background and Outline of Project
- Idea for water treatment and water supply

Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

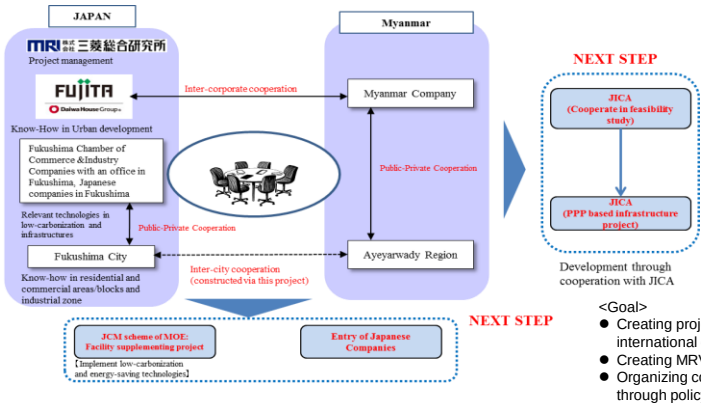
Background and Outline of Project

September 20, 2016

Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region
1) Study of a low-carbon waste treatment system in Pathein Industrial City
2) Low-carbon water and sewerage treatment system in Pathein Industrial City

Research Overview

Mitsubishi Research Institute, as the representative proposer, will conduct the research in cooperation with Fujita, its partner, Fukushima City, and Fukushima Chamber of Commerce and Industry with the local stakeholders, and to obtain cooperation from the regional government officials.



[Research Items]
- Overview and local needs
- Japanese experiences, know-how, and technologies for utilization
- Consideration of JCM project formulation (identifying project site and installed technology)
- Consideration of GHG reduction (considering MRV method and creating PDD, etc.)
- Consideration of project and policy proposal (environmental and societal impact, project scheme, policy proposal consideration)
- Holding workshops and other meetings

<Goal>
- Creating project plan and preparing to form international consortium
- Creating MRV and PDD plans
- Organizing cooperation structure of stakeholders through policy dialogue, and creating platform for consideration of regional masterplan

What is a “master plan” for urban development?

A master plan sets the vision/goal of the area, and it describes specific plans and projects to achieve the goal.

Step 1: Analyze the current situation

What is the current situation of the area? Are there any issues/challenges or room for improvement?
Ex) Environment, economy, poverty, infrastructure(electricity, water…), population…

Step 2: Set the development vision

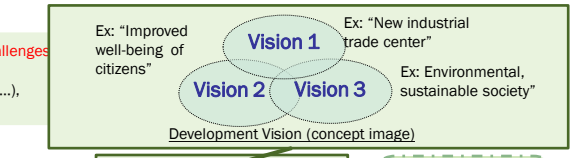
Development visions are ideal future images of a city to be realized based on the citizens’ needs and foresight of the stakeholders and experts.

Step 3: Develop an urban structure plan

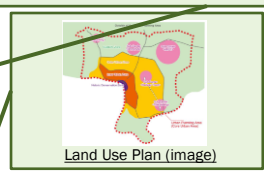
Urban structure plan (land use plan) is developed. Which area is for factories? Where are offices located? Where do the residents live?

Step 4: Make infrastructure development plans

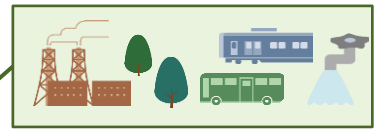
After the big picture is drawn in development vision and urban structure plan, specific infrastructure projects are designed.
Ex) Electricity, water treatment, waste, transport, greenery, etc.



Development Vision (concept image)


Land Use Plan (image)

***Other industrial zones in Myanmar also have master plans.
・Thilawa SEZ: Master plan by the Japanese government
・Dawei SEZ: Master plan support by Japan



Expected outcome:
- Attraction of factories to the industrial zone and accelerated foreign investment
- Regional development and increased higher standard of living

JCM Model Project organized by City-to-City Collaboration — Host Country Myanmar

Project Title : Low-carbon water and sewerage treatment system in Pathein Industrial City

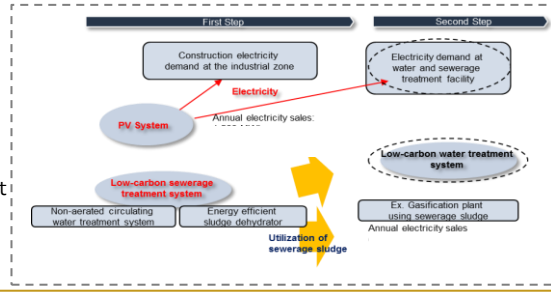
Outline of GHG Mitigation Activity

The following equipment will be installed to achieve low-carbon water and sewerage treatment system in Pathein Industrial City.

(1) Low-carbon sewerage treatment system

(2) PV System installed at treatment plant

In the future, low-carbon water treatment plant and utilization of generated sludge can be expected.



Project Site

Project conducted in “Pathein Industrial City” in Pathein City, capital of the Ayeyarwady Region

Merits of City-to-City Collaboration to Realize JCM Projects

Sharing knowledge of low-carbon sewerage treatment system

Measures for promoting PV system in public facilities (using experiences in Fukushima City Renewable Energy Promotion Plan)

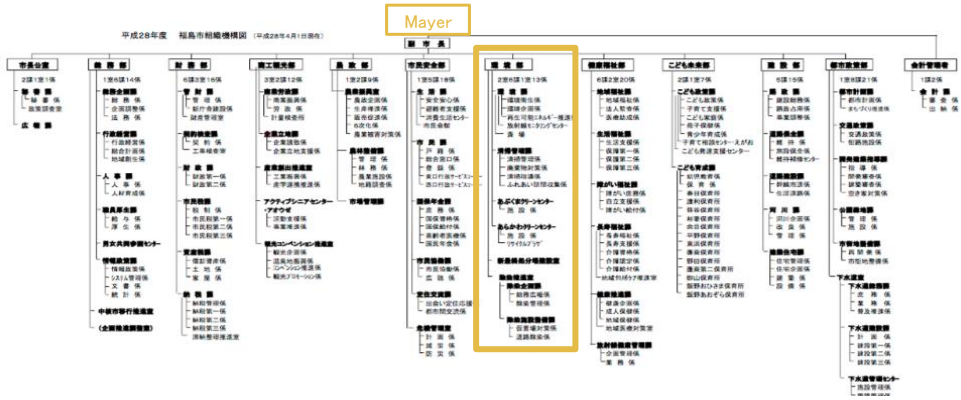
Training human resources in the PV sector

Measures for promote the health of the city

~An example, in Fukushima city~

Fujita Corporation

A Chance to change the system for water treatment

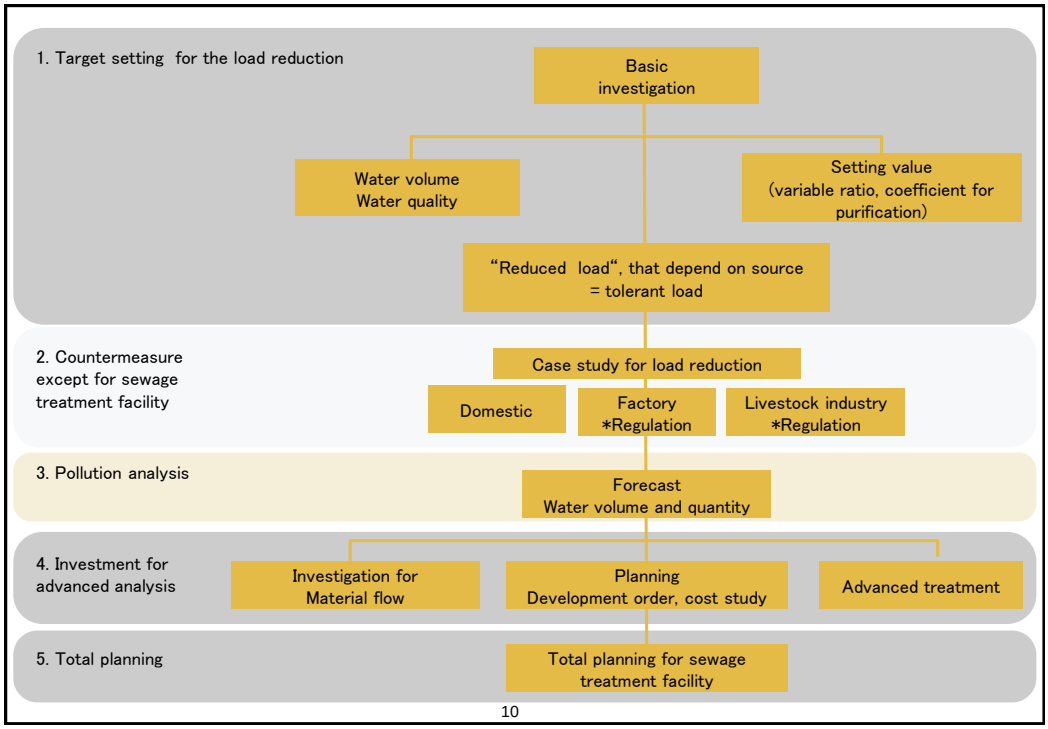


In Case of Fukushima city, for the purpose of establishment for Pollution prevention system

1970 Pollution Control Dept. in Hygiene Division,

1973 Environmental Protection Engagement

2008 Environmental Planning Engagement



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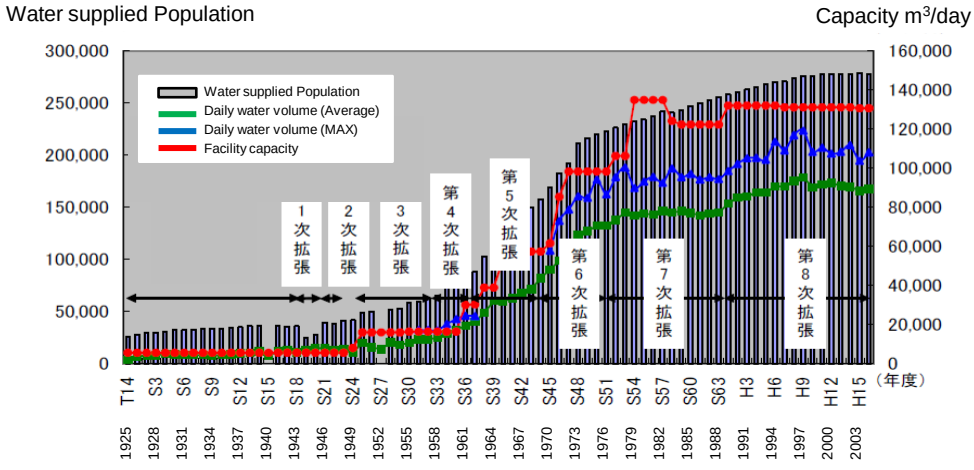
Rete of Spread of **Water Supply** (Fukushima City)



Average Rate of Spread
FUKUSHIMA City 97%, Domestic 96%

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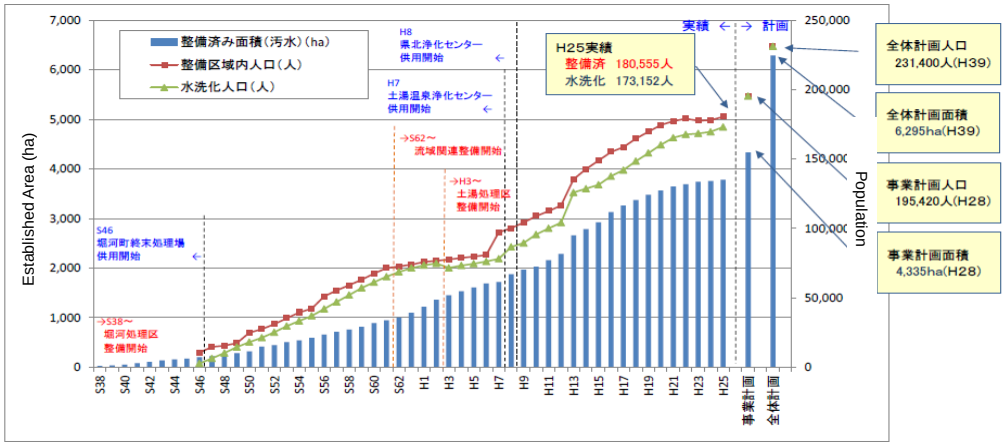
Rete of Spread of **Sewage System** (Fukushima City)



<Rate of spread>

For sewage facility
Fukushima City 51.2%
Domestic 77.6%

For sewage treatment
Fukushima City 79.7%
Domestic 89.5%

Fore cast in Fukushima
In 2030
Rate of spread for sewage treatment
100%

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Environmental standard (basic environmental law)

1. Environmental standard for protection for human health
2. Environmental standard for protection for life environment
   _river (depend on the glade of river)
   _lake
   _Aquatic organism

Environmental standard for protection for human health

items	regulation	items	regulation	items	regulation
Cadmium	0.003 mg/L	Carbon tetrachloride	mg/L	Thiuram	mg/L
Cianus	N.D.	1.2-Dichloroethane	mg/L	Simazine	mg/L
Lead	0.01 mg/L	1.1-Dichloroethylene	mg/L	Thiobencarb	mg/L
Crome (6+)	0.05 mg/L	Cis-1.2-Dichloroethylene	mg/L	Benzene	mg/L
Arsenic	0.01 mg/L	1.1.1- Trichloroethane	mg/L	Seren	mg/L
Total mercury	0.0005 mg/L	1.1.2-Trichloroethane	mg/L	Nitric acid Nitrous acid	mg/L
Alkyl mercury	N.D.	Trichloroethylene	mg/L	Fluorine	mg/L
PCB	N.D.	Tetrachloroethylene	mg/L	Boron	mg/L
Dichloromethane	mg/L	1.3-dichloropropene	mg/L	1,4-dioxane	mg/L

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Regulation for industrial wastewater

Related Law
Water Pollution Control Low (National low)
Water Monitoring Low (Prefecture low)

Water Standard
Water Pollution Control Low (National low)
Additional standard (prefectural regulation)

Monitoring
_Voluntary monitoring
Report to public department, stock the register
_Compulsory monitoring
Regularly site inspection

Ex in Fukushima City (2014)
Specific factory:656
Target for discharge regulation:154　Regularly site inspection :74

Discharge capacity	Monitoring items		Minimum Monitoring frequency
	Water quality	Water volume	
Contamination with toxic materials	○	–	1/month
30m³/day~500m³/day	○	–	1/month
500m³/day~1,000m³/day	○	○	1/month
Over 1,000m³/day	○	○	2/month

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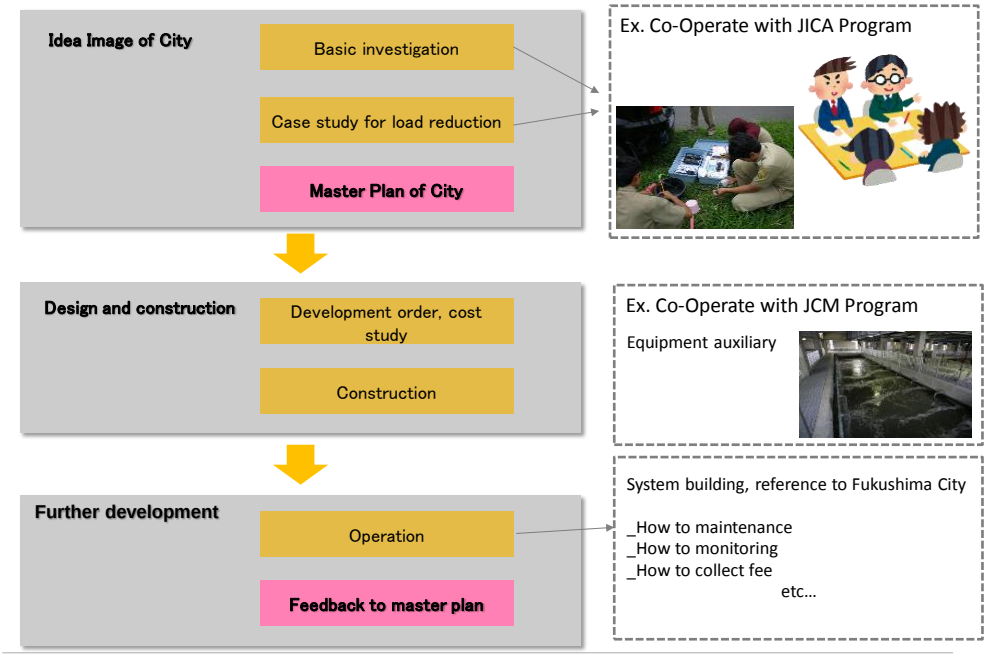
Feasible procedure for improvement



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FY2016 Feasibility Studies on Joint Crediting Mechanism Projects towards Environmentally Sustainable Cities in Asia

Study for building a sustainable low carbon city around the industrial zone in Pathein city, Ayeyarwady Division, Myanmar

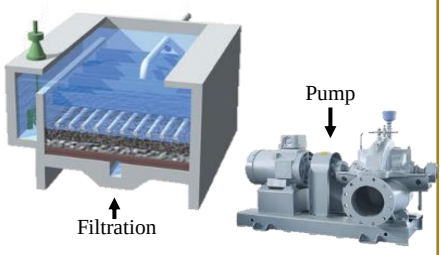
Workshop of Partnership for Low Carbon Initiative
In Ayeyarwady

Idea of JCM Projects
☐Renewable Energy
☐Waste Treatment

September, 2016

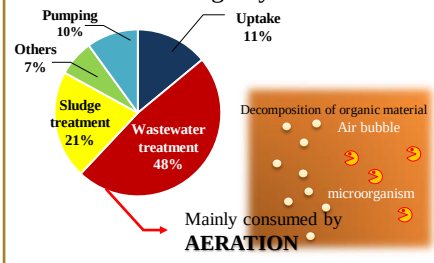
Electricity Demand for Water Facility

Water supply system



Treatment: 6,000 m^3/day
Total demand:1,367 kW/day

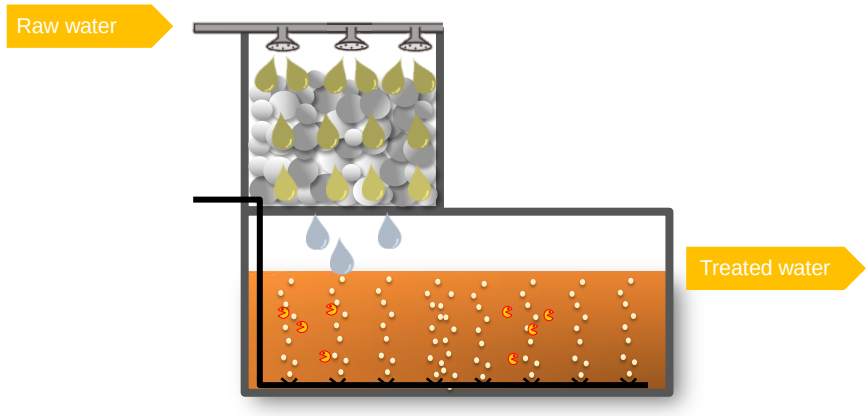
Sewerage System



Treatment : 4,800m^3/day
Total demand :2,361kW/day

Electricity demand Total : 3,728 kWh/day

Energy conservative treatment system



Over 50% of Aeration energy will be cut off with “Trickling filter process”

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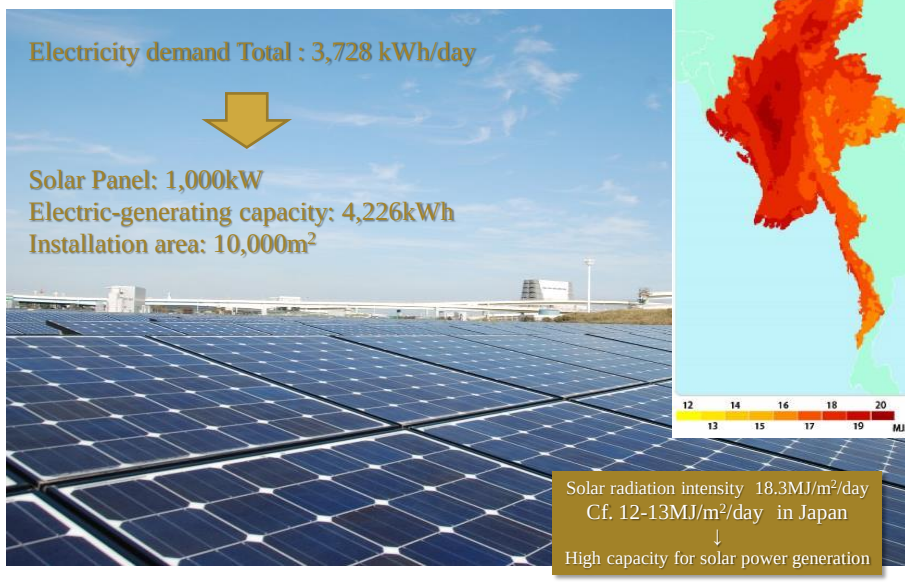
Solar Power Generation (image)



Solar radiation intensity 18.3MJ/m²/day
Cf. 12-13MJ/m²/day in Japan
↓
High capacity for solar power generation

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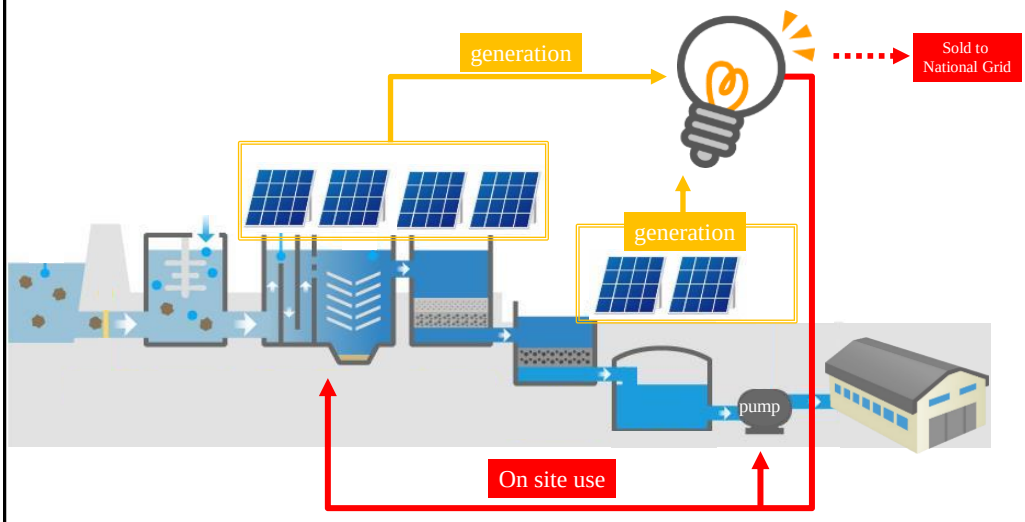
Electricity usage around water facility



Contribute to stale power supply for water facility,
Contribute to provide good hygiene environment

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MEETING FOR PARTNERSHIP FOR LOW CARBON INITIATIVE IN FUKUSHIMA CITY

Partnership for Low Carbon Initiative in Ayeyarwady

Discussion points

October 18, 2016

Background and Outline of Project

Ayeyarwady Division

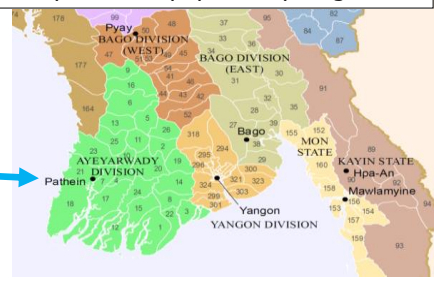
Location

Southernmost region of Central Myanmar Delta region of Ayeyarwady river

Pathein City

The capital city of Ayeyarwady Div.
Population: about 300,000

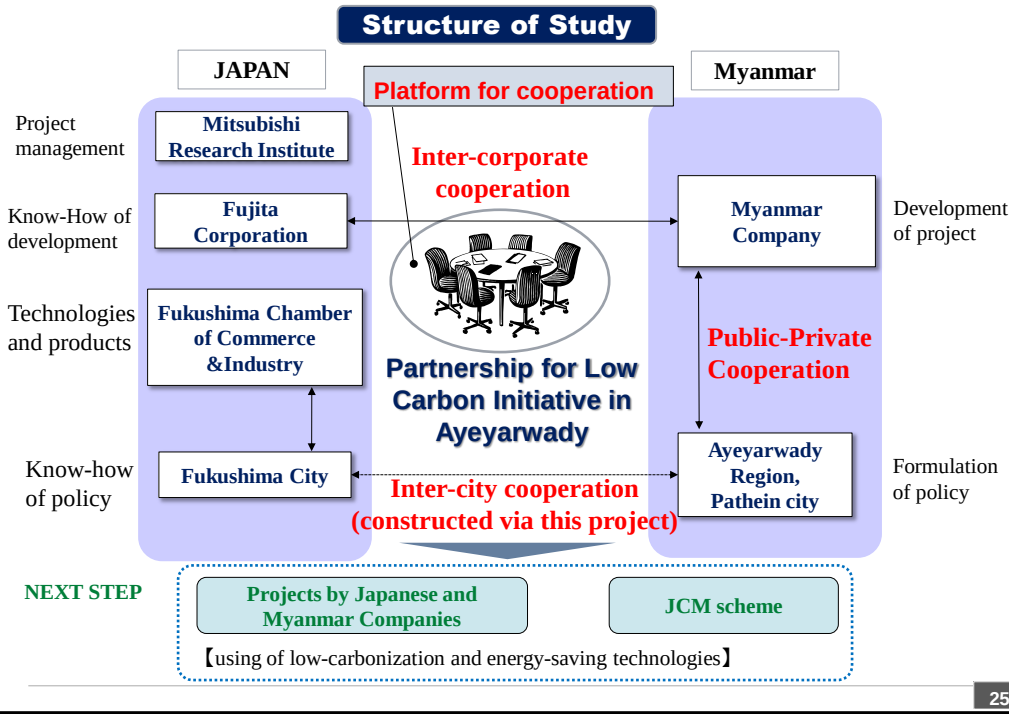
Myanmar/Ayeyarwady Region



Pathein Industrial City

- Ayeyarwady region is planning to develop a new industrial zone in order to facilitate industrial development primarily in Pathein district.
- New industrial infrastructures with development of apartments, large-scale commercial properties, and hotels and leisure facilities

Structure of Study




Central part of Pathein City

Scattered waste in Pathein

Landfill site in Pathein


Pathein Industrial City (under construction)

Background and Current Activities

The dawn of economic development, lack of knowledge and skills in various fields is evident in Myanmar.

Japanese technology and knowledge in the aspects of industrial infrastructure, energy, and environment are necessary in the development of industrial zone in Pathein district.

Chief Minster Ayeyarwady Region visited Japan April 2015

Chief Minister had chance to know challenges for "Cutting-edge Environmental City" in Fukushima City.

Letter of Intent (June 2015)

From Chief Minster Ayeyarwady Region
To Mayor of Fukushima City

to establish an inter-city cooperation with the city of Fukushima for building a sustainable low carbon city.

Starting "Partnership for Low Carbon Initiative in Ayeyarwady"

- Dialogue in workshop (Pathein, and Fukushima)
- Site visiting (Pathein, and Fukushima)

<FY2015>
- Local workshop (September 2015, Pathein)
- Workshop in Fukushima City (October 2015, Fukushima City)
- Discussion in Japan with visitors from Myanmar, site visits (January 2016, Tokyo)
- Local workshop (February 2016, Pathein)

<FY2016>
- Local workshop (September 2016, Pathein)
- Workshop in Fukushima City (October 2016, Fukushima City)

Discussion with the mayor of Fukushima City

Sightseeing of waste collection in Fukushima City

Meeting with members of Fukushima Chamber of Commerce &Industry

Workshops in Pathein

Discussion in Pathein

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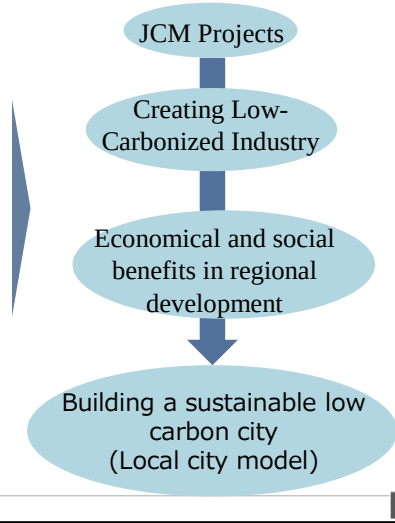
JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region, Myanmar

Goal of the study

- **Finding candidate projects for Low Carbon Initiative in new industrial zone in Pathein city**
  - Low-carbon waste treatment system
  - Low-carbon water and sewerage treatment system
- **Formation of a low-carbon city under inter-city cooperation, as well as public-private partnerships, and formulation of JCM projects, will be promoted.**



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JCM Model Project organized by City-to-City Collaboration Host Country: Myanmar

Project Title : Low-carbon water and sewerage treatment system in Pathein Industrial City

Outline of GHG Mitigation Activity

The following equipment will be installed to achieve low-carbon water and sewerage treatment system in Pathein Industrial City.
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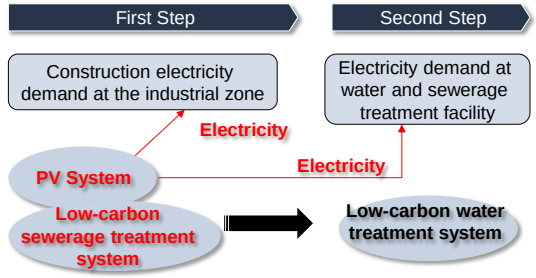
In the future, low-carbon water treatment plant and utilization of generated sludge can be expected.



Project Site

Project conducted in "Pathein Industrial City" in Pathein City, capital of the Ayeyarwady Region

Merits of City-to-City Collaboration to Realize JCM Projects

Sharing knowledge of low-carbon sewerage treatment system, and PV systems

Ideas for future collaboration
- Measures for promoting PV system in public facilities (using experiences in Fukushima City Renewable Energy Promotion Plan)
- Training human resources in the PV sector

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Discussion Points

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Outcomes of dialogue

-tentative-

Project Development Using JCM Scheme

- Through Business Sector Collaboration -

● Candidate projects in the waste management field

Biomass power plant in an industrial city

- Partially building a power plant prior to attracting factories
- Biomass power plant using rice husks is under consideration. (*Need to use rice husks from many rice mills in the local area)
- Separation and disposal of garbage is a topic of government interest: as the first step, the idea of collecting and co-firing plastic waste, etc. will be considered.

● Candidate projects in the renewable energy field

Solar at a water treatment plant in an industrial city

- A large scale solar power plant will be installed as an independent distributed power source for a water treatment facility to be constructed in an industrial city.

→Development into low-carbon water treatment system can be expected as well.

Framework for Supporting Project Deployment

- Through Policy Dialogues -

● Advanced development with local aspects

- Using advanced technologies will rapidly raise the area to an advanced low-carbon Asian city, promoting a new development model in Myanmar
- Great opportunity to promote a low-carbon city (cutting-edge environmental city) in Pathein

Building a sustainable low carbon city (Local city model)

● Need for a Comprehensive Approach

- From Japanese experiences, a comprehensive framework for individual projects is necessary for developing renewable energy and waste management projects.

<Areas for applying Japanese experiences >

"Comprehensive Regional Plan," "Renewable Energy Promotion Plan," "Waste Management Plan," etc.

Yearly plans towards establishing a low-carbon city (leading environmental city) in Pathein

FY2015: <Step for obtaining a common understanding> of the objective and benefits of the scheme

FY2016: <Step for developing a grand design>establishing a city vision and development plans (considering local aspects)

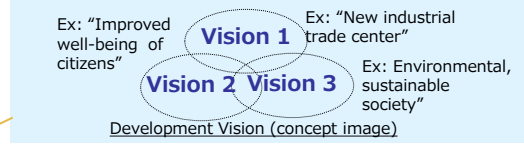
FY2017: <Step for preparing action plans>City planning through inter-city cooperation using various tools etc.

What is a "master plan" for urban development?

A master plan sets the vision/goal of the area, and it describes specific plans and projects to achieve the goal.

Step 1: Analyze the current situation

What is the current situation of the area? Are there any issues/challenges or room for improvement?
Ex) Environment, economy, poverty, infrastructure(electricity, water…), population…



Development Vision (concept image)

Step 2: Set the development vision

Development visions are ideal future images of a city to be realized based on the citizens' needs and foresight of the stakeholders and experts.

Step 3: Develop an urban structure plan

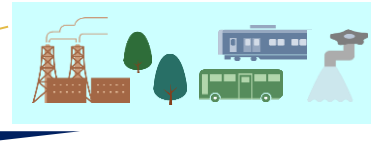
Urban structure plan (land use plan) is developed. Which area is for factories? Where are offices located? Where do the residents live?

Land Use Plan (image)

Other industrial zones in Myanmar also have master plans.
・Thilawa SEZ: Master plan by the Japanese government
・Dawei SEZ: Master plan support by Japan

Step 4: Make infrastructure development plans

After the big picture is drawn in development vision and urban structure plan, specific infrastructure projects are designed.
Ex) Electricity, water treatment, waste, transport, greenery, etc.



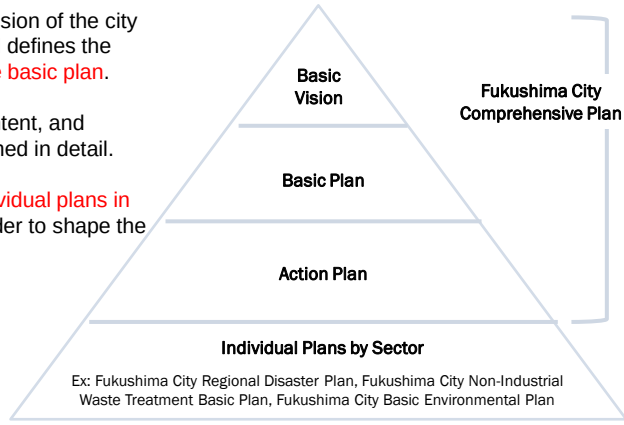
Expected outcome:

- **Attraction of factories to the industrial zone and accelerated foreign investment**
- **Regional development and increased higher standard of living**

Japanese experiences

- Japanese municipalities, based on past economic development, have experience-based knowledge of challenges that cities face, and know-how of various solutions.
- In Fukushima City, for instance, Fukushima City Comprehensive Plan is established on top of the various plans in the city. The plan shows principles in urban development based on the characteristics and issues of the city; it is composed of basic concept, basic plan, and action plan.

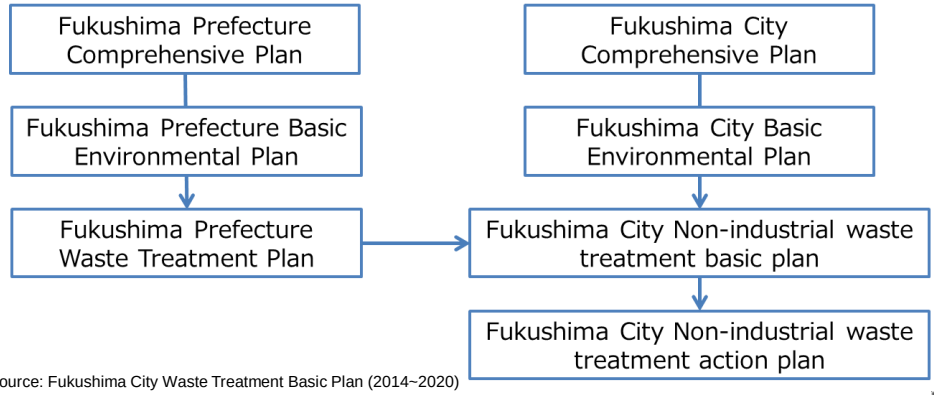
- The basic concept shows an ideal vision of the city and the direction of the policies, and defines the structure of specific measures in the basic plan.
- In the action plan, the schedule, content, and funding for various projects are defined in detail.
- Under the comprehensive plan, individual plans in each policy sector are created in order to shape the concept in comprehensive plan.
- The individual plans are associated with each other; in Fukushima City, development is promoted with each individual policy sharing the big picture (vision).



Source: Fukushima City Comprehensive Plan, edited by MRI

Japanese experiences

- Fukushima Prefecture establishes its waste treatment plan under the national legislation, and Fukushima City, in accordance with this plan, establishes its Fukushima City Waste Treatment Basic Plan.
- This plan defines basic rules from waste generation and emission regulations.
- The plan applies to non-industrial waste.
- On top of this plan, there are Fukushima City Basic Environment Plan and Fukushima City Comprehensive Plan.



Source: Fukushima City Waste Treatment Basic Plan (2014~2020)

Discussion points in dialogue (tentative version)
– Mapping issues and idea of action plan in the water treatment field

In addition to electricity demand at the industrial zone, electrification in the rural area is an important policy issue.

Through site visits in Fukushima City, understanding of distributed energy systems that are locally produced and consumed was deepened.

Water treatment system

- Forming of organizations that have local people as the main stakeholders, and the role of the government and the private sector
- Funding process and policy support: cases in Japan where local organizations are operating small-scale power plant projects, an important schemes in electrification measures, etc..

~Possibility of cooperation is explored, and specific measures are proposed through policy dialogue~

Local needs

Policy-side approach such as planning

- Consideration of vision (basic concept)
- Main issues for realization and action plans
- Strengthening local distributed energy resource (industrial zone)

Japanese experiences and technologies
(Ex: cooperation among business owners, citizens and government)

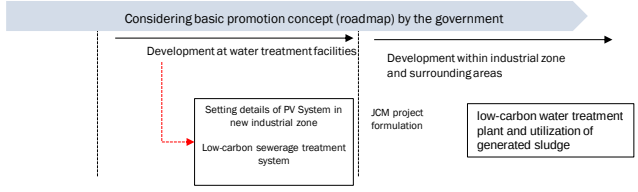
Project-side approach

- Proposal of project scheme
- Calculation of CO_2 emission reduction
- Combination with other projects

(1) Proposal of a model scheme (Installation at water treatment facility)
Consideration of electricity demand
Since electricity demand is higher during the daytime, it combines well with PV system.
System
Utilization of Japanese technologies and panels by foreign manufacturers (cost , performance)

(2) Items for promotion of renewable energy (policy side: significance of installation and preferential measures
Example: Stable power supply

<Steps for formulating JCM project> (tentative)



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SECOND WORKSHOP IN PATHEIN CITY

Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

Date January 25, 2017. 13:30~17:00

Place Meeting room of Pathein Industrial City, Pathein, Ayeyarwady

Program
Opening remark
Greeting & Speech (Myanmar side)
Opening & Greeting (Japanese side)

Presentations, Q&A, and Discussion

Closing Remark

Language
Interpretation between Burma and Japanese will be provided.

Presentations, Q&A, and Discussion

<Session1: Water treatment field>

- Key outcomes and future direction (Japanese side)
- Proposal of project(Japanese side)
- Lessons in Fukushima and Implications of city to city cooperation (Japanese side)
- Current situation and policy perspectives of waste (Myanmar side)
- Q&A, Discussion

Presentation
(Japanese side)

- Key outcomes and future direction
- Proposal of project
- Lessons in Fukushima and
  Implications of city to city cooperation

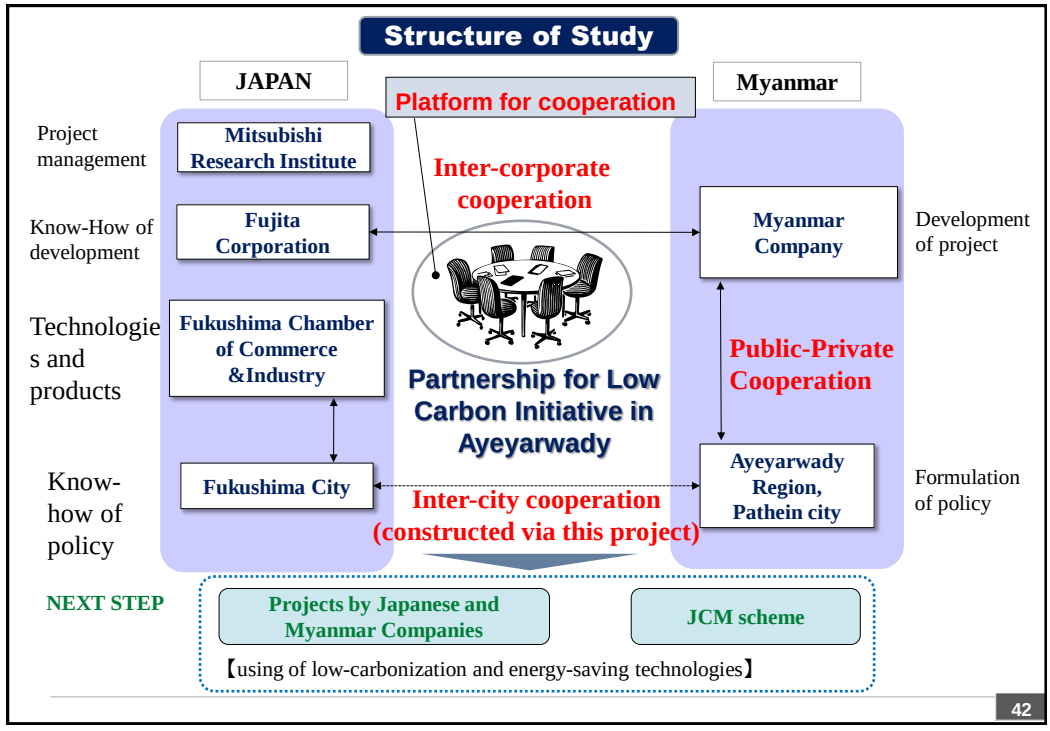
Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

Session1: Waste field

Key outcomes and future direction

January 25, 2017

Structure of Study



Background and Current Activities

The dawn of economic development, lack of knowledge and skills in various fields is evident in Myanmar.

Japanese technology and knowledge in the aspects of industrial infrastructure, energy, and environment are necessary in the development of industrial zone in Pathein district.

Chief Minster Ayeyarwady Region visited Japan April 2015

Chief Minister had chance to know challenges for "Cutting-edge Environmental City" in Fukushima City.

Letter of Intent (June 2015)

to establish an inter-city cooperation with the city of Fukushima for building a sustainable low carbon city.

From Chief Minster Ayeyarwady Region
To Mayor of Fukushima City

Starting "Partnership for Low Carbon Initiative in Ayeyarwady"

- Dialogue in workshop (Pathein, and Fukushima)
- Site visiting (Pathein, and Fukushima)

<FY2015>
- Local workshop (September 2015, Pathein)
- Workshop in Fukushima City (October 2015, Fukushima City)
- Discussion in Japan with visitors from Myanmar, site visits (January 2016, Tokyo)
- Local workshop (February 2016, Pathein)

<FY2016>
- Local workshop (September 2016, Pathein)
- Workshop in Fukushima City (October 2016, Fukushima City)
- Discussion in Japan with visitors from Myanmar, site visits (January 2017, Tokyo)
- Local workshop (January 2017, Pathein)

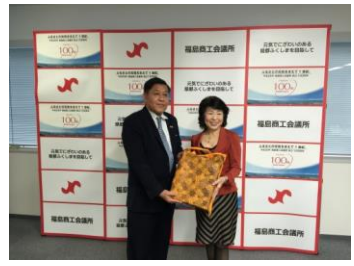
Snapshot of Inter-city cooperation

Workshop in Pathein City

Meeting in Fukushima City

Dialogue in Pathein City

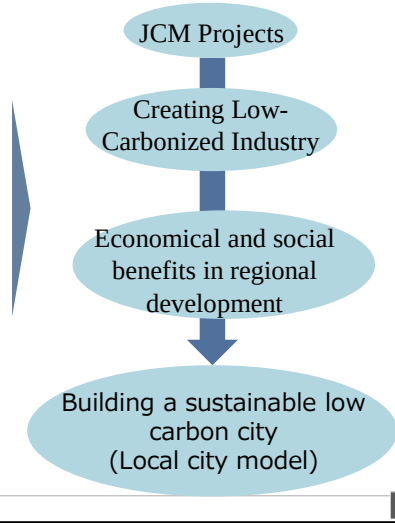
Networking event with Fukushima Chamber of Commerce &Industry



JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region, Myanmar

Goal of the study

- **Finding candidate projects for Low Carbon Initiative in new industrial zone in Pathein city**
  - ☐ Low-carbon waste treatment system
  - ☐ Low-carbon water and sewerage treatment system
- **Formation of a low-carbon city under inter-city cooperation, as well as public-private partnerships, and formulation of JCM projects, will be promoted.**



Challenges of Low Carbon Initiative

(Tentative analysis)

Approaches

- Accelerating energy access (for industry and local communities)
- GHG reduction in local development

Key issues

- Vision, Master Plan (especially long term)
- Experience for best available solution adapted to the current local situation (both of technology and policy)
- Collaboration of public, private, and community

catalytic

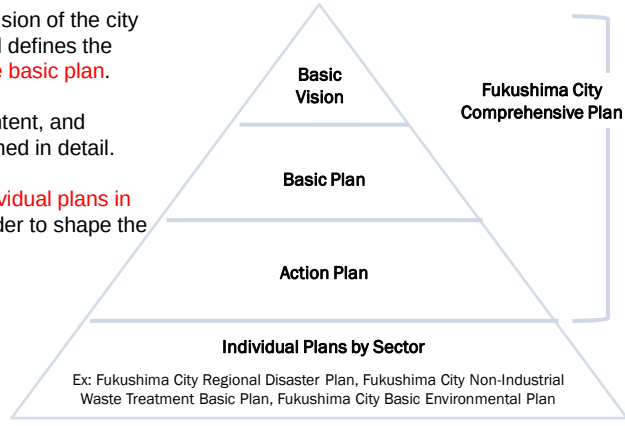
catalytic

Expectation of city-to-city cooperation, and JCM

- Knowledge (i.e. policy) and Technology transfer
- Financial support
- Platform for cooperation in project base

Japanese experiences

- Japanese municipalities, based on past economic development, have experience-based knowledge of challenges that cities face, and know-how of various solutions.
- In Fukushima City, for instance, Fukushima City Comprehensive Plan is established on top of the various plans in the city. The plan shows principles in urban development based on the characteristics and issues of the city; it is composed of basic concept, basic plan, and action plan.
- The basic concept shows an ideal vision of the city and the direction of the policies, and defines the structure of specific measures in the basic plan.
- In the action plan, the schedule, content, and funding for various projects are defined in detail.
- Under the comprehensive plan, individual plans in each policy sector are created in order to shape the concept in comprehensive plan.
- The individual plans are associated with each other; in Fukushima City, development is promoted with each individual policy sharing the big picture (vision).



Source: Fukushima City Comprehensive Plan, edited by MRI

Key messages of dialogue

(tentative version)

Project Development Using JCM Scheme

- Through Business Sector Collaboration -

● Candidate projects in waste management field

Biomass power plant in an industrial city

- Partially building a power plant prior to attracting factories
- Biomass power plant using rice husks is under consideration. (*Need to use rice husks from many rice mills in the local area)
- Separation and disposal of garbage is a topic of government interest: as the first step, the idea of collecting and co-firing plastic waste, etc. will be considered.

● Candidate projects in water treatment field

Water treatment plant with energy saving technology and PV in an industrial zone

- Solar power plant will be installed as an independent distributed power source for a water treatment facility to be constructed in an industrial city.

→Development into low-carbon water treatment system can be expected as well.

Framework for Supporting Project Deployment

- Through Policy Dialogues -

● Advanced development with local aspects

- Using advanced technologies will rapidly raise the area to an advanced low-carbon Asian city, promoting a new development model in Myanmar
- Great opportunity to promote a low-carbon city (cutting-edge environmental city)

Building a sustainable low carbon city (Local city model)

● Need for a Comprehensive Approach

- From Japanese experiences, a comprehensive framework for individual projects is necessary for developing renewable energy and waste management projects.

<Areas for applying Japanese experiences >

"Comprehensive Regional Plan," "Renewable Energy Promotion Plan," "Waste Management Plan," awareness building etc.

Promoting a low-carbon city (cutting-edge environmental city) and Building a sustainable low carbon city (Local city model)

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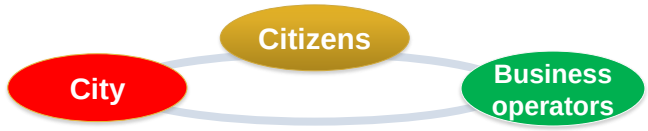
Fukushima City's Future Vision

Contributing to the creation of a society that is not dependent on nuclear power in the future



Reduce global warming and develop a low-carbon, recycling-oriented society with minimal environmental impact

Regional revitalization

Adoption of renewable energy

Recovery from the nuclear disaster

Promotion of town planning for resistance to disasters and emergencies

A lively Advanced Environmental City with an advanced level of local production for local consumption based on safe and reliable energy

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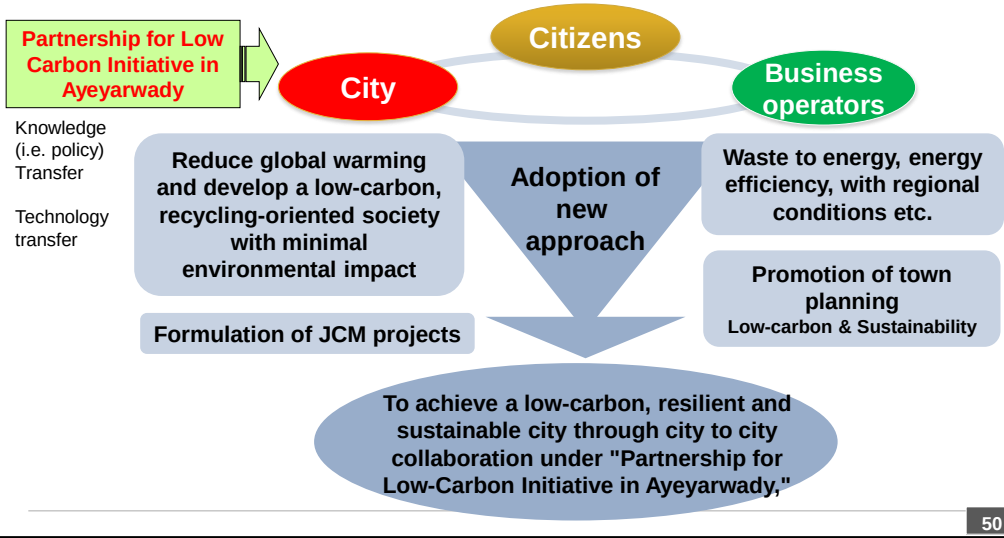
(tentative version)

Key approach for Low-Carbon City in Ayeyarwady Region

Promoting a low-carbon city (cutting-edge environmental city) and Building a sustainable low carbon city (Local city model)



Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

Session2: Water treatment field

Lessons in Fukushima and Implications of city to city cooperation

January 25, 2017

Fukushima City

Water Quality Conservation Policy in Fukushima City

Status of "Sewerage Vision in Fukushima City"

National Level: New Sewerage Vision (July 2014)

Prefectural Level : Initiative for the Development of Beautiful Water Environment in Fukushima Prefecture (June 2010)

Municipal Level: Fukushima City Comprehensive Plan (Basic Concept : 2011-2020)

Sewerage Vision in Fukushima City (2016-2025) Medium Term Plan
– Policy of Overall Sewerage Works –

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Water Quality Conservation Policy in Fukushima City

Basic Principles of Sewerage Vision

Basic Principles of Sewerage Vision in Fukushima City
"Effort to create an environment-friendly beautiful city"

Pillar 1 : Beautiful city (Creation of an environment-friendly city)

"Beautiful city" aims at promoting the creation of an environment-friendly city. Increase of sewage treatment facilities, water quality conservation of public waters through combined sewer system improvement projects and reduction of environmental burdens by utilizing sewerage resources were stipulated in basic principles of the Sewerage Vision.

Pillar 2 : Safe and secure city (Creation of a disaster-prevention/reduction city)

"Safe and secure city" aims at promoting the creation of a disaster-prevention/reduction city. Basic principles of the Vision set the goal to develop a rainwater management system to deal with frequent heavy rains and an earthquake-proof sewerage system to create a disaster-proof safe city.

Pillar 3 : Continuing to live in (Creation of a sustainable city)

" Continuing to live in" means the creation of a sustainable city. Fukushima City will introduce appropriate management and life extension of sewerage facilities as well as efficient management method to reinforce management foundation of the sewerage system. Also, easy-to-understand information will be provided for citizens to understand the sewerage system, which helps implement sewerage projects in a sustainable way. The goal ,through these measures, is to create a city people love to live in for a long time, according to basic principles of the Vision.

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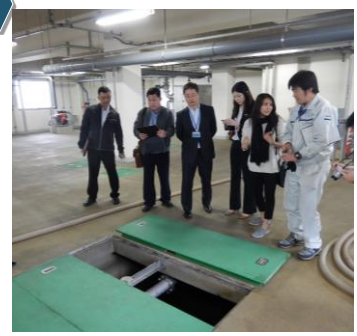
Water Conservation Policy in Fukushima City



Rural Sewerage Systems:

Small-scale Wastewater Facilities for Rural Communities

Providing low-density population districts with large-scale sewage systems is costly. Therefore, the installation of small-scale sewage systems is being promoted for small rural villages.
(Source: https://www.env.go.jp/en/water/wq/lakes/method.html)

Drainage treatment plant in Oda District

Drainage treatment plant in Yamaguchi District

Enlightenment of Awareness
～Reforming the mindset of companies towards drainage treatment～

Industry associations proactively learn and collect information about drainage treatment measures including amendment of the Law. Such efforts can be accomplished in Fukushima (Japan).

Task force meeting in the Chamber of Commerce

Facility tour organized by the Chamber of Commerce

Water Conservation Policy in Fukushima City

Monthly water quality measurement and water contamination surveillance are conducted for major rivers (17 rivers and 23 points) in Fukushima City.

Checking drainage from the office during on-site inspection

Collecting water from the river for water quality measurement

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Water Conservation Policy in Fukushima City

Environment beautification organizations (about 220 organizations including companies, shops and neighborhood associations)

River protection organizations (about 50 organizations including neighborhood associations and cooperatives)

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Enlightenment of Awareness
～Environmental Education at Elementary Schools～

【Torikawa Elementary School in Fukushima City】

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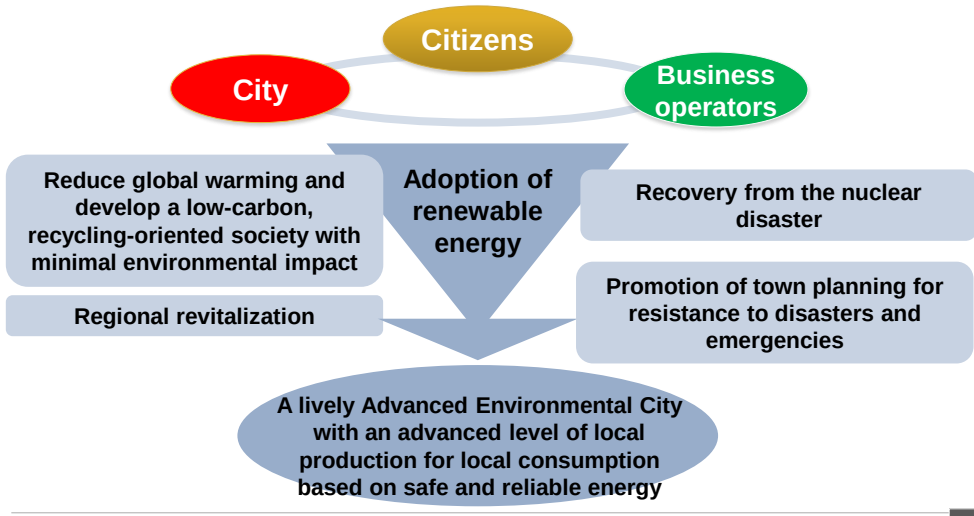
Fukushima City's Future Vision

Contributing to the creation of a society that is not dependent on nuclear power in the future



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Fukushima City Next-generation Energy Park Plan

The Ministry of Economy, Trade and Industry's Agency for Natural Resources and Energy authorizes on October 30, 2015

1. JR Fukushima Station

Solar power generation facilities

2. Industrial Exchange Plaza

The Permanent Exhibition Room includes an area where visitors can learn about various types of renewable energy

3. Ara River Clean Center

Aiming for the local generation and consumption of renewable energy, surplus power is supplied.

4. Village of Four Seasons small hydro power generation facility

The Village of Four Seasons' small hydro power generation facility leverages local resources and the technologies of a local corporations .

5. Tsuchiyu-Onsen Higashikarasu River Hydro power Plant And Tsuchiyu-Onsen No. 16 Source Binary Cycle Power Plant

Small hydro power plant utilizes check dams

The existing hot spring instead of digging a thermal well for power generation.

5

Promoting the Installation of Renewable Energy Power Generation Equipment, Etc.

We are installing solar power generation equipment with storage cells at designated evacuation centers on a priority basis and promoting the expansion of disaster-prevention base functions and adoption of renewable energy.

Number of installations as of March 31, 2016: 14/145 facilities

2040 (long-term target): 145/145 facilities=100%

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Solar Power Generation System Subsidy Program

We are providing subsidies for the installation of residential solar power generation systems to encourage households to adopt renewable energy.

1) Subsidy amount: 30,000 yen/kW
Upper limit: 4kW/120,000 yen

2) Number of subsidies: Around 600/year

Numerical Targets and Progress of Renewable Energy Scheme in Fukushima City

Index	FY2013 (actual)	FY2014 (actual)	FY2015 (actual)	FY2020 target	FY2030 mid-term	FY2040 long-term	Note
Energy self-sufficiency	23.5%	27.8%	28.0%	30.0%	40.0%	50.0%	Percentage of renewable energy electricity in the total annual energy generation in the City.
Penetration rate of energy self-consumption type facilities【public facility】	5.5%	9.7%	9.7%	20.0%	60.0%	100.0%	Percentage of establishments which introduced self-consumption type renewable energy power facilities in 145 establishments including shelters in the City
Total number of facilities	8	14	14	30	88	145	
Penetration rate of energy self-consumption type facilities【private homes】	5.4%	6.2%	6.8%	13.0%	25.0%	40.0%	Percentage of residential houses which introduced self-consumption type home solar power systems out of all single-family houses in the City
Total number of of housing units	4,378	5,021	5,513	10,000	20,000	31,000	

Initiatives by Business Operators

Mega solar projects utilizing idle land

Large-scale solar power generation facility in Fukushima City
(Photograph provided by Apollo Gas Co., Ltd.)

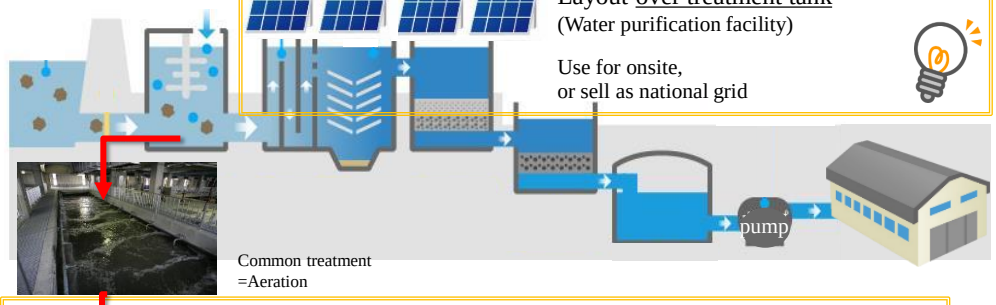
Work shop, 2nd

Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

Water Treatment

January 25, 2017

Subsidy condition: Inducing "low CO_2 emission technologies"



Strategy1
Solar power generation
Layout over treatment tank
(Water purification facility)

Use for onsite,
or sell as national grid

Common treatment
=Aeration

Strategy2
Without aeration wastewater treatment system

Save 50% of electricity for wastewater treatment

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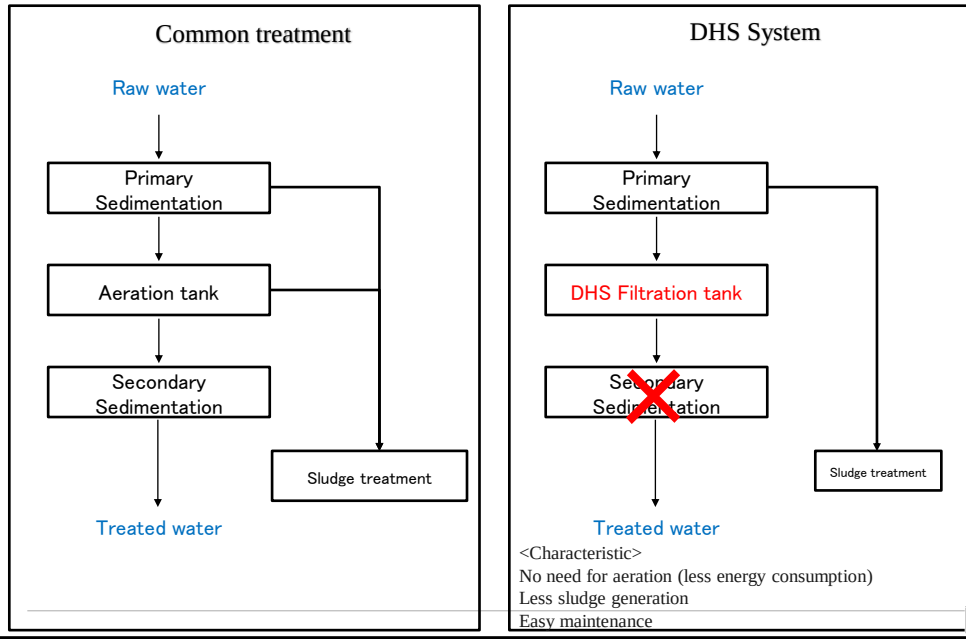
Strategy2 Without aeration wastewater treatment system



<Characteristic>
No need for aeration (less energy consumption)
Less sludge generation
Easy maintenance

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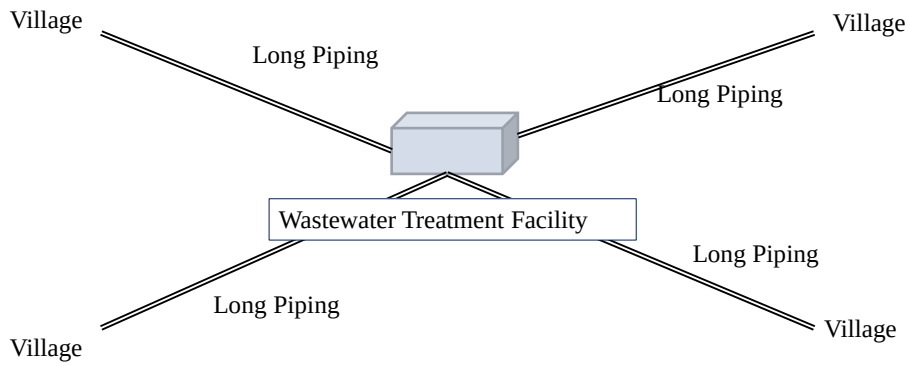
General Public Wastewater System

Piping in the village and long distance piping required

Long distance piping is expensive to construct



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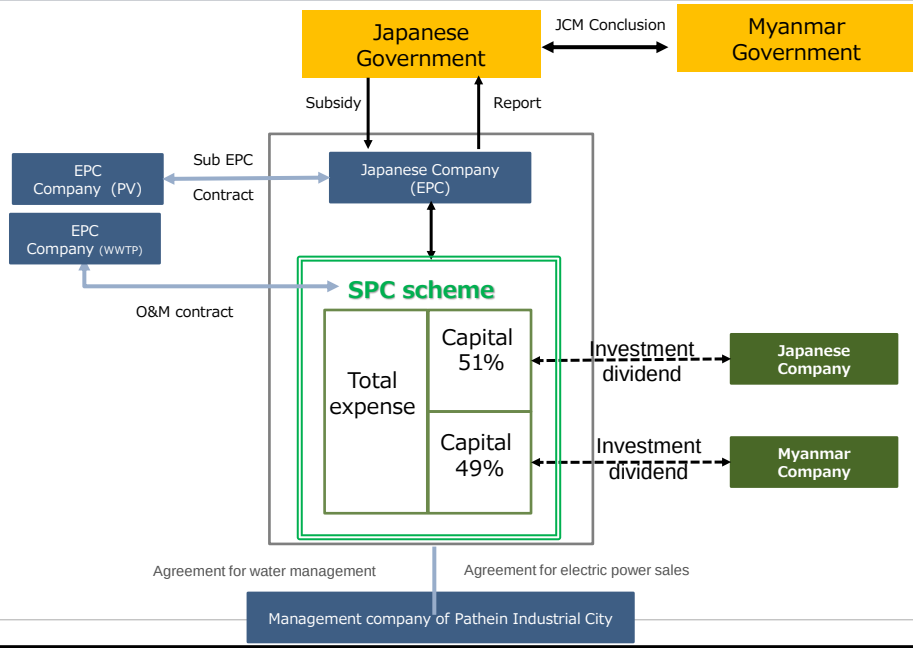
With apply for JCM scheme



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Presentation
(Myanmar side)

- Current situation and policy perspectives

Appendix IV
Materials on Pathein Industrial City

Appendix IV includes the details of Pathein Industrial City.

Materials on Pathein Industrial City

From the second workshop in Pathein City

Source : Booklet of Pathein Industrial City

ZONE CONCEPTUAL PLAN

Industrial Development
ZONE [A-1] **607.33 Acres**
Salable Area: 460.41 Acres
Utility & Green Space: 146.92 Acres

Industrial Development
ZONE [A-2] **553.48 Acres**
Salable Area: 390.83 Acres
Utility & Green Space: 162.65 Acres

Port Area **48.82 Acres**

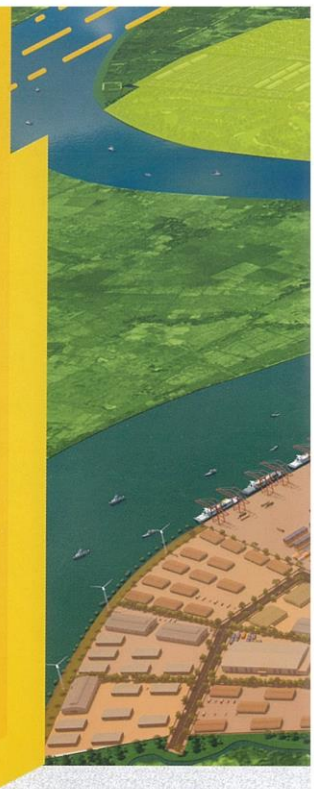
Forecast Industries

(A) Food Processing
- Fishery Processing
- Canned Food
- Food Seasonings

(B) Labour Intensive
- Garment, textile and apparels

(C) Domestic Market-Based
- Rice Mill and downstream rice production
- Consumer products
- Fertilizer
- Agricultural Machinery
- Plastic Products
- Construction Materials
- Others

(D) Forestery Based
- Plywood / Veneer factory
- Teak conversion factory
- Furniture, pulp & paper manufacturing



PATHEIN INDUSTRIAL CITY

RANK	INDUSTRIAL ZONE	TOTAL WEIGHTED SCORE
1	Pathein Induystrial City	**7.32**
2	VSIP Quang Ngai	**7.14**
3	Phong Dien IZ	**7.10**
4	Tran Quoc Toan IZ	**6.89**
5	Dong Mai IZ	**5.76**
6	Kabinburi IZ	**4.25**
7	Navanakorn IZ	**2.90**
8	Nong Khae IZ	**2.83**

09

Full support from the Ayeyarwaddy Regional GOVERNMENT

1988	2011	2015
-Military Government assumed state responsibility	-Semi Civilian Government took office in 2011	-Previous Government 5-year term, had established 7 new industrial zones with extension of existing 18 zones.
-Industrialisation market has been partially opened to outside world	-Industrialisation market has only shown significant changes	-New laws and regulations enacted to make the country investor friendly.

Despite the government efforts, Industrial zones in Myanmar suffer
-Poor management and
-Bad infrastructure due to the lack of private sector involvement in developing the zones.

STRONG TRACK RECORD

PIC can draw upon and expand the existing strong ties with multinational and domestic corporations to develop a much enhanced manufacturing sector.

SUCCEEDED

2012
- Support from Regional Goverment
- Feasibility Study successfully carried out

2014
- Started Land acquisition
- Finalized design report

2015
EIA/SIA successfully carried out

2016
- Received MIC permit
- Ground Breaking

2019
MARCH 2019
- Phase Completion

FIRST OF ITS KIND, AYEYARWADDY DEVELOPMENT CO., LTD IS DEVELOPING INDUSTRIAL ZONE IN PATHEIN WITH PROPER PLANNING WHICH WILL LEAD TO GETTING BACK MIGRANT WORKERS HOME, CREATE JOB OPPORTUNITIES AND DEVELOP THE REGION, AND THEREFORE RECEIVED FULL SUPPORT FROM THE REGIONAL GOVERNMENT SINCE 2012.
WITH THE REGIONAL GOVERNMENT'S CONTINUOUS SUPPORT, AYEYARWADDY DEVELOPMENT CO., LTD HAS SUCCESSFULLY CARRIED OUT THEIR STAGES OF PROJECT PLAN AS SHOWN:

INFRASTRUCTURE and UTILITIES Availability

HIGH QUALITY INFRASTRUCTURES AND LINKAGES

State-of-the-art infrastructure services, including power, water, wastewater, telecommunication and transport linkages will be provided to investors.

RAW WATER SUPPLY
- 23,000 m^3 per day

CLEAN WATER SUPPLY
- Treatment capacity of 24,000 m^3 per day

ELECTRICITY SUPPLY
- 120 MW Electricity Supply
- Electrical supply system (33kV overhead distribution line)

INDUSTRIAL ELECTRICITY RATE

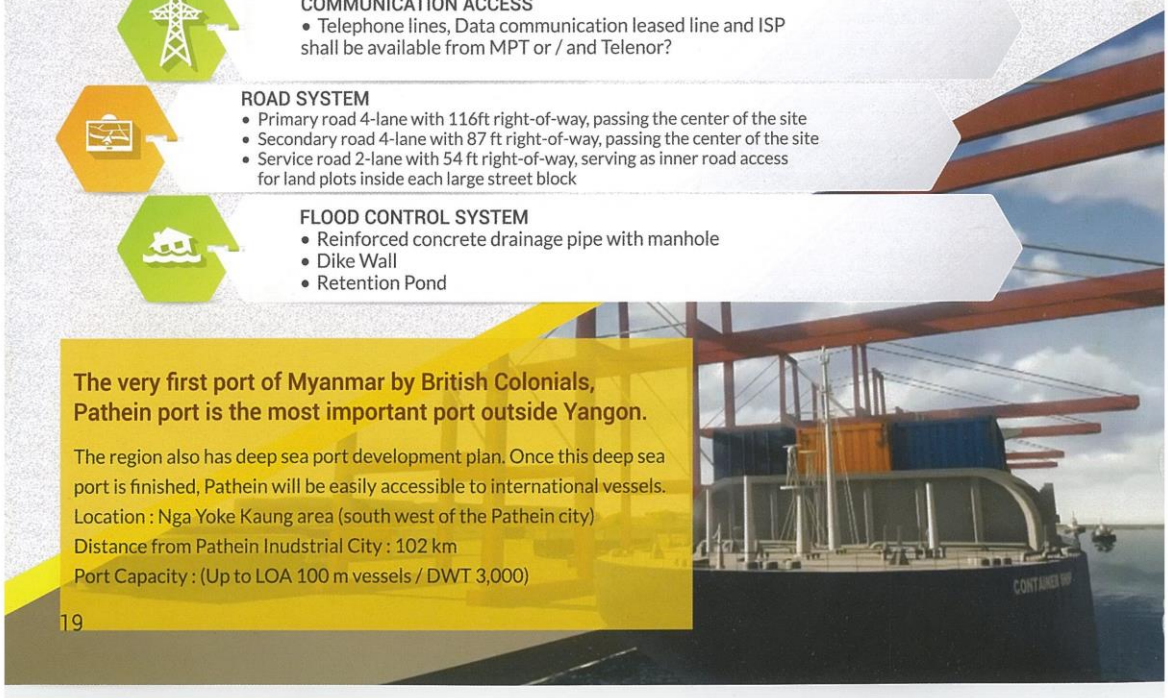
Electricity charge rate for Industrial users is K75 per unit up to 500 units, K100 from 501 to 10,000 units, K125 from 10,001 to 50,000 units, and K150 from 50,001 to 300,000 units. Above 300,000 units, the unit price will drop to K100.

WASTE WATER TREATMENT
- Treatment capacity of 22,000 m^3 per day

COMMUNICATION ACCESS
- Telephone lines, Data communication leased line and ISP shall be available from MPT or / and Telenor?

ROAD SYSTEM
- Primary road 4-lane with 116ft right-of-way, passing the center of the site
- Secondary road 4-lane with 87 ft right-of-way, passing the center of the site
- Service road 2-lane with 54 ft right-of-way, serving as inner road access for land plots inside each large street block

FLOOD CONTROL SYSTEM
- Reinforced concrete drainage pipe with manhole
- Dike Wall
- Retention Pond



The very first port of Myanmar by British Colonials, Pathein port is the most important port outside Yangon.

The region also has deep sea port development plan. Once this deep sea port is finished, Pathein will be easily accessible to international vessels.
Location : Nga Yoke Kaung area (south west of the Pathein city)
Distance from Pathein Inudstrial City : 102 km
Port Capacity : (Up to LOA 100 m vessels / DWT 3,000)

Appendix V
MRV Methodology and PDD (Draft)

Joint Crediting Mechanism Proposed Methodology Form (Draft)

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Republic of the Union of Myanmar
Name of the methodology proponents submitting this form	
Sectoral scope(s) to which the Proposed Methodology applies	3. Energy Demand
Title of the proposed methodology, and version number	Installation of Non-Aeration Wastewater Treatment System, Ver00.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☒Additional information i) Grid Electricity Emission Factor in Myanmar ii)Power consumption efficiency of reference wastewater treatment system
Date of completion	17/2/2017

History of the proposed methodology

Version	Date	Contents revised
00.0	17/2/2017	Zero Edition (Draft)

A. Title of the methodology

Installation of Non-Aeration Wastewater Treatment System, Ver00.0

B. Terms and definitions

Terms	Definitions
Non-Aeration Wastewater Treatment System	The system consists of DHS (Down-flow Hanging Sponge). DHS purifies wastewater using oxygen in the air by microorganism fixed in the sponge, which contribute to saving energy due to no need for aeration.
Conventional Activated Sludge System	Conventional activated sludge system commonly include an aeration tank and secondary clarifier. Aerobic biomass reduces BOD and ammonia concentrations in the aeration tank. Biomass then flows to the secondary clarifier, where it is separated into clarified water and thickened biomass by gravity sedimentation. The clarified treated water overflows at the top of the secondary clarifier, and the thickened biomass is recycled to the aeration tank or managed at sludge dewatering facilities.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	This methodology applies to the project that aims for saving energy by introducing Non-Aeration Wastewater Treatment System in Myanmar, with lower energy consumption and less amount of excess sludge
Calculation of reference emissions	Reference emissions are GHG emissions from using reference wastewater treatment system such as conventional activated sludge system, calculated with total power consumption of project wastewater treatment system, power consumption efficiency and CO2 emission factor for consumed electricity.
Calculation of project	Project emissions are GHG emission from using project

emissions	wastewater treatment system, calculated with total power consumption of project wastewater treatment system, and CO2 emission factor for consumed electricity
Monitoring parameters	The amount of electricity consumed by the project

D. Eligibility criteria

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

Criterion 1	Non-Aeration Wastewater Treatment System is newly installed or installed to replace existing wastewater treatment system

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity consumption by reference wastewater treatment system	CO_2
Project emissions	
Emission sources	GHG types
Electricity consumption by project wastewater treatment system	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated with total power consumption of project wastewater treatment system, power consumption efficiency and CO2 emission factor for consumed electricity.

Reference scenario is the scenarios that wastewater is treated to the target quality of treated wastewater by reference wastewater treatment system such as Conventional Activated Sludge System.

F.2. Calculation of reference emissions

$$RE_p = EC_{PJ,p} \times (\eta_{PJ} \div \eta_{RE}) \times EF_{elec}$$

RE_p	Reference emissions during the period p [tCO_2/p]
$EC_{PJ,p}$	Total power consumption of project wastewater treatment system during the period p [MWh/p]
η_{PJ}	Power consumption efficiency of project wastewater treatment system [MWh/ m3-sewage]
η_{RE}	Power consumption efficiency of reference wastewater treatment system [MWh/ m3-sewage]
EF_{elec}	CO2 emission factor for consumed electricity [tCO2/MWh]

G. Calculation of project emissions

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

PE_p	Project emissions during the period p [tCO_2/p]
$EC_{PJ,p}$	Total power consumption of project wastewater treatment system during the period p [MWh/p]
EF_{elec}	CO2 emission factor for consumed electricity [tCO_2/MWh]

H. Calculation of emissions reductions

$$\boldsymbol{ER_p = RE_p - PE_p}$$

ER_p	Emission reductions during the period p [tCO_2/p]
RE_p	Reference emissions during the period p [tCO_2/p]
PE_p	Project emissions during the period p [tCO_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_{elec}	CO2 emission factor for consumed electricity. When project wastewater treatment system consumes only grid electricity or captive electricity, the project participant applies the CO2 emission factor respectively. When project wastewater treatment system may	**[Grid electricity]** Emission factor is derived from the result of calculation by using IEA macro data. This value should be revised every year until public value will be available.

	consume both grid electricity and captive electricity, the project participant applies the CO2 emission factor with lower value. **[CO2 emission factor]** For grid electricity: The most recent value available from the source stated in this table at the time of validation For captive electricity: 0.8* [tCO2/MWh] *The most recent value available from CDM approved small scale methodology AMS-I.A at the time of validation is applied.	See the additional information I in more detail. **[Captive electricity]** CDM approved small scale methodology AMS-I.A
η_{PJ}	Power consumption efficiency of project wastewater treatment system. The value prepared by manufacturer is applied.	Specifications of project wastewater treatment system prepared for the quotation or the owner acceptance test data by manufacturer.
η_{RE}	Power consumption efficiency of reference wastewater treatment system. Since wastewater treatment system is limited, reference emissions are determined under the assumption that commercially available wastewater treatment system, conventional activated sludge system is installed in industrial area.	Nominal value available on product catalogs, specification documents or websites. The default value might be derived from the result of survey from manufacturers. The default value should be revised if necessary from survey result which is conducted by JC or project participants every three years. The survey should prove the use of clear methodology. See the additional information II in more detail.

Additional Information I

"Grid Electricity Emission Factor in Myanmar"

There is only one CDM registered project in Myanmar, which is supposed to replace the power supply from China. Therefore, there is no official grid CO2 emission factor for Myanmar which is approved by UNFCCC so far. Under the circumstances, we consider the CO2 emission factor of grid of Myanmar as follows.

First step to develop a methodology for rice husk generation in Myanmar is to derive the grid CO2 emission factor of Myanmar. The grid average CO2 emission factor can be calculated by using the fuel consumption data of Myanmar and fuel-specific CO2 emission factor as defined in IPCC 2006GL. This results in fuel-specific and grid average CO2 emission factor as follows.

Table 1 Energy mix of the grid in Myanmar [GWh]

	Coal	Oil	Gas	Hydro	Total
2009	473	30	1,205	5,256	6,964
2010	671	33	1,734	5,105	7,543
2011	724	38	1,588	7,518	9,868
2012	771	51	2,144	7,766	10,712
2013	514	55	2,443	8,878	11,890
2014	286	65	4,977	8,829	14,157

Table 2 CO2 emission factor of the grid in Myanmar according to fuel [t-CO2/MWh]

	Coal	Oil	Gas	Grid average
2009	1.055	0.864	0.729	0.202
2010	1.057	0.786	0.729	0.265
2011	0.979	0.853	0.729	0.192
2012	0.961	0.826	0.729	0.219
2013	0.956	0.825	0.729	0.195
Average 2009-2013	-	-	-	0.215
Average 2010-2014	-	-	-	0.230

These results in a grid average CO2 emission factor of 0.230t-CO2/MWh, using methods

approved under CDM. This means that the grid average CO2 emission factor of Myanmar is smaller than most countries, the reason being the predominance of electricity generated by hydropower in Myanmar (over 70%).

Introduction of natural gas based generation is planned in Myanmar, and in 2016 it is expected that electricity from gas-fired power plants exceed that from hydropower plants. Therefore it is expected that grid CO2 emission factor will increase in the near future, suggesting that emission reduction from the project will increase as a result of ex post estimation (as opposed to ex ante estimation). The possible benefit of ex post estimation, however, must be taken into consideration with additional burden of annual calculation and uncertainty.

According to CDM rules, taking into account possible future installation of gas-fired plants necessitates obtaining detailed generation data.

In like manner, the impact of fossil fuel generation in the future will be considered in the calculation of a grid average CO2 emission factor under the JCM scheme.

Additional Information II

"Power consumption efficiency of reference wastewater treatment system"

Power consumption efficiency of reference wastewater treatment system can be estimated on based the correlation between removal BOD load and energy consumption. Parameter in the existing conventional activated sludge system will be estimated.

$$\eta_{RE} = \frac{EC_{RE}}{Q_m} = \sum \frac{(\mu + L_{BOD,r})}{(K + L_{BOD,r})} \times \frac{1}{Q_m}$$

$$L_{BOD,r} = Q_m \times (C_{BOD,m,in} - C_{BOD,m,st})$$

EC_{RE}	Electricity consumption of reference wastewater treatment system [MWh/month]
μ, K	Energy consumption estimation factor
$L_{BOD,r}$	Actual value of BOD removal load. (t-BOD/month)
Q_m	Actual value of treated wastewater (m^3/month)
$C_{BOD,m,in}$	Actual value of wastewater's BOD (mg /m^3)
$C_{BOD,m,st}$	Target quality of treated wastewater - BOD (mg/m^3)

Joint Crediting Mechanism Proposed Methodology Form (Draft)

Cover sheet of the Proposed Methodology Form	
Form for submitting the proposed methodology	
Host Country	Republic of the Union of Myanmar
Name of the methodology proponents submitting this form	
Sectoral scope(s) to which the Proposed Methodology applies	1. Energy industries (renewable sources)
Title of the proposed methodology, and version number	Installation of Solar PV System, Ver00.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☒Additional information i) Grid Electricity Emission Factor in Myanmar
Date of completion	17/2/2017

History of the proposed methodology

Version	Date	Contents revised
00.0	17/2/2017	Zero Edition (Draft)

J. Title of the methodology

Installation of Solar PV System, Ver00.0

K. 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 inverters required to change the electrical current from direct current (DC) to alternating current (AC).

L. Summary 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).

M. Eligibility criteria

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

Criterion 1	The project newly installs solar PV system(s).
Criterion 2	The PV modules obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).

Criterion 3	The equipment used to monitor output power of the solar PV system(s) and irradiance is installed at the project site.

N. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Consumption of grid electricity and/or captive electricity	CO_2
Project emissions	
Emission sources	GHG types
Generation of electricity from the solar PV system(s)	N/A

O. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

The default emission factors are set in a conservative manner based on the national grid and based on the most efficient heat efficiency of a diesel power generator.

In addition, the conservative emission factor based on a captive diesel power generator is calculated from CDM methodology "AMS-I.A. Electricity generation by the user", and set to 0.8tCO2/MWh.

F.2. Calculation of reference emissions

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

RE_p	Reference emissions during the period p [tCO_2/p]
$EG_{i,p}$	Quantity of the electricity generated by the project solar PV system i during the period p [MWh/p]
$EF_{RE,i}$	Reference CO2 emission factor for the project solar PV system i [tCO2/MWh]

P. Calculation of project emissions

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

$$\boldsymbol{PE_p = 0}$$

PE_p	Project emissions during the period p [tCO_2/p]

Q. Calculation of emissions reductions

$$\boldsymbol{ER_p = RE_p - PE_p}$$

ER_p	Emission reductions during the period p [tCO_2/p]
RE_p	Reference emissions during the period p [tCO_2/p]
PE_p	Project emissions during the period p [tCO_2/p]

R. 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
$EF_{RE,\,i}$	Reference CO2 emission factor for the project solar PV system i. The value for $EF_{RE,i}$ is selected from the emission factor based on the national grid ($EF_{RE,grid}$) or based on captive diesel power generator ($EF_{RE,cap}$) in the following manner: In case the PV system in a proposed project activity is connected to the national grid including internal grid which is not connected to a captive power generator, $EF_{RE,grid,}$ 0.230 tCO2/MWh is applied. In case the PV system in a proposed project activity is connected to internal grid which is connected to both the national grid and a captive	**[Grid electricity]** Emission factor is derived from the result of calculation by using IEA macro data. This value should be revised every year until public value will be available. See the additional information I in more detail. **[Captive electricity]** From CDM methodology "AMS-I.A. Electricity generation by the user"

	power generator, $EF_{RE,cap}$, 0.230 tCO2/MWh is applied. In case the PV system in a proposed project activity is connected to internal grid which is not connected to the national grid, $EF_{RE,cap}$, 0.8tCO2/MWh is applied.	

Additional Information I

"Grid Electricity Emission Factor in Myanmar"

There is only one CDM registered project in Myanmar, which is supposed to replace the power supply from China. Therefore, there is no official grid CO2 emission factor for Myanmar which is approved by UNFCCC so far. Under the circumstances, we consider the CO2 emission factor of grid of Myanmar as follows.

First step to develop a methodology for rice husk generation in Myanmar is to derive the grid CO2 emission factor of Myanmar. The grid average CO2 emission factor can be calculated by using the fuel consumption data of Myanmar and fuel-specific CO2 emission factor as defined in IPCC 2006GL. This results in fuel-specific and grid average CO2 emission factor as follows.

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According to CDM rules, taking into account possible future installation of gas-fired plants necessitates obtaining detailed generation data.

In like manner, the impact of fossil fuel generation in the future will be considered in the calculation of a grid average CO2 emission factor under the JCM scheme.

Joint Crediting Mechanism Project Design Document Form (Draft)

A. Project description

A.1. Title of the JCM project

Mega solar installed at a water treatment facilities in the Pathein Industrial City

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

Pathein Industrial City plans to supply industrial water and prepare an industrial wastewater treatment facility. As an independent distributed energy resource, a mega solar power plant will be installed at waste treatment facilities. This mega solar system installed at the wastewater treatment facility is expected to become a regional model for a low-carbon water treatment facility (to surrounding and other areas) Pathein Industrial City is located at the end of the national grid, and electricity for construction and operation of industrial zone will not be supplied adequately. Therefore, considering the necessary amount and quality of electricity supply, it is natural to assume that generators using fossil fuel (mainly diesel generators) are installed. Thus, the project is considered important to the society, as it promotes renewable energy by installing solar power plant, a non-fossil fueled energy, instead of installing fossil fueled generators. <For a certain period> Power will be supplied to meet electricity demand for construction in the industrial zone. The surplus will be sold to the grid. <In the future> Power will be supplied to the water treatment facility.

A.3. Location of project, including coordinates

Country	Myanmar
Region/State/Province etc.:	Ayeyarwaddy
City/Town/Community etc:	Pathein Industrial City
Latitude, longitude	Latitude: 16.73.86, Logitude: 94.76.01

A.4. Name of project participants

Mongolia	Pathein Industrial City
Japan	N/A

A.5. Duration

Starting date of project operation	N/A
Expected operational lifetime of project	N/A

A.6. Contribution from Japan

<Innovative measures that consider local characteristics>

It is important to aim for a low-carbon city model using advanced low-carbon technologies, placing the new industrial zone at the center (the area can be considered a new regional development model in Myanmar). Future vision and promotion plan for a Pathein version of a "low-carbon city (cutting-edge environmental city)" using Japanese technologies and knowledge must be considered (the area can be differentiated from other industrial zones, which will be important for attracting factories).

<Importance of comprehensive (interdisciplinary) approach>

From Japanese experiences, a comprehensive framework that covers all individual projects must be constructed to formulate projects in the renewable energy and waste treatment sectors, instead of considering individual projects.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	Installation of Non-Aeration Wastewater Treatment System
Version number	(Methodology not Approved)
Selected approved methodology No.	Installation of Solar PV System
Version number	(Methodology not Approved)

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

Eligibility criteria	Descriptions specified in the methodology	Project information
Installation of Non-Aeration Wastewater Treatment System		
Criterion 1	Non-Aeration Wastewater Treatment System is newly installed or installed to replace existing wastewater treatment system	Non-Aeration Wastewater Treatment System is newly installed in this project.
Installation of Solar PV System		
Criterion 1	The project newly installs solar PV system(s).	The project newly installs solar PV system.

Criterion 2	The PV modules obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	N/A
Criterion 3	The equipment used to monitor output power of the solar PV system(s) and irradiance is installed at the project site.	N/A

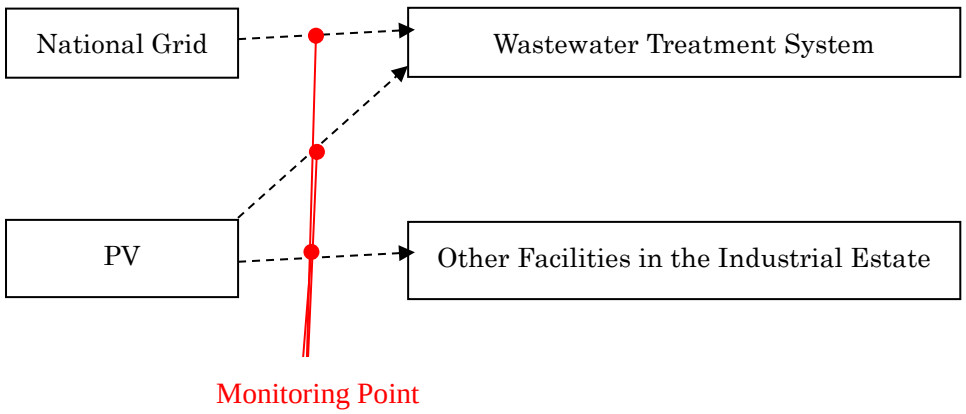
C. Calculation of emission reductions

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

Reference emissions	
Emission sources	GHG type
Installation of Non-Aeration Wastewater Treatment System	
Electricity consumption by reference wastewater treatment system	CO_2
Installation of Solar PV System	
Consumption of grid electricity and/or captive electricity	CO_2
Project emissions	
Emission sources	GHG type
Installation of Non-Aeration Wastewater Treatment System	
Electricity consumption by project wastewater treatment system	CO_2
Installation of Solar PV System	
Generation of electricity from the solar PV system(s)	N/A

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

Tentative monitoring structure is as follows.



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO_{2e})	N/A	N/A	N/A

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	N/A

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

N/A

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
N/A	N/A	N/A

F. References
N/A

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

Annex
N/A

Revision history of PDD		
Version	Date	Contents revised
00.0	17/2/2017	Zero Edition (Draft)

FY2016 Feasibility Study of Joint Crediting Mechanism Project by City to City Collaboration
(JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region (Study of a low-carbon waste and sewerage treatment system in Pathein Industrial City)) Report

February 2017

Mitsubishi Research Institute, Inc. & Fujita Corporation