

# Appendix

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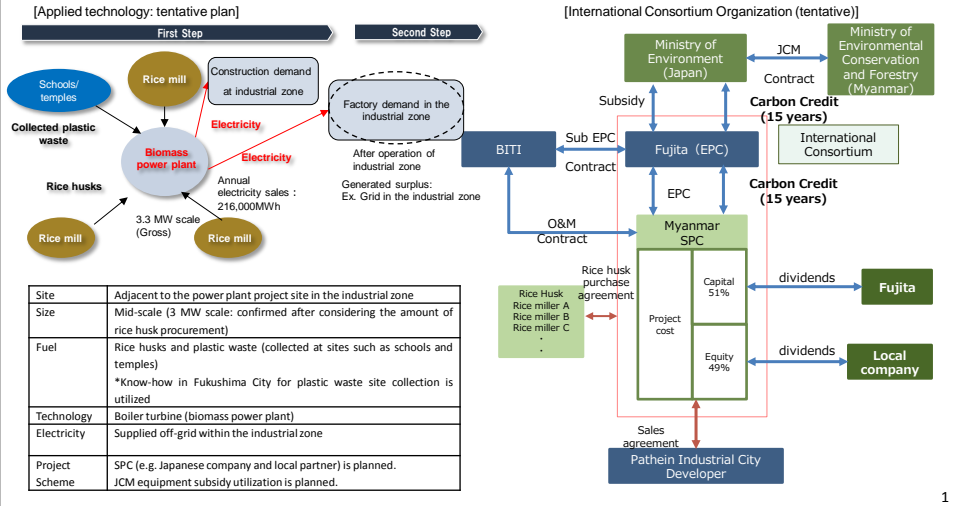
# **Appendix I**

## **Overview and Key Outcomes of the Project**

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

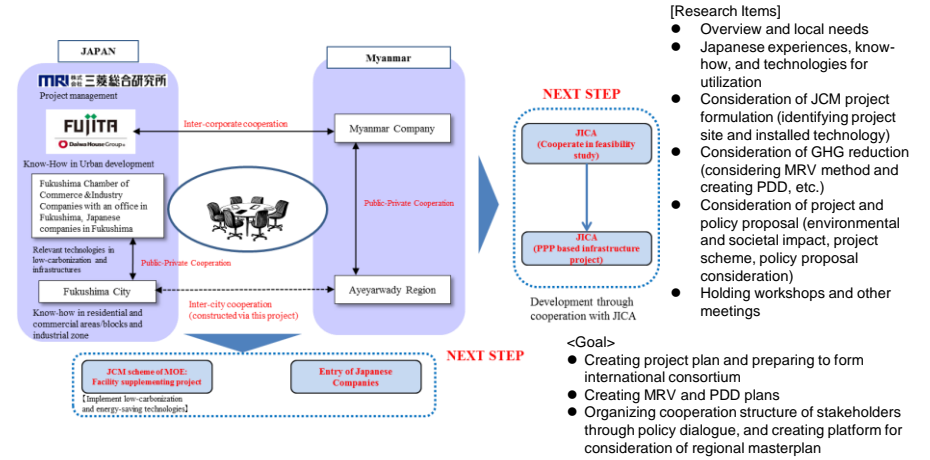
**Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region (Study of a low-carbon waste treatment system in Pathein Industrial City)** Project Overview

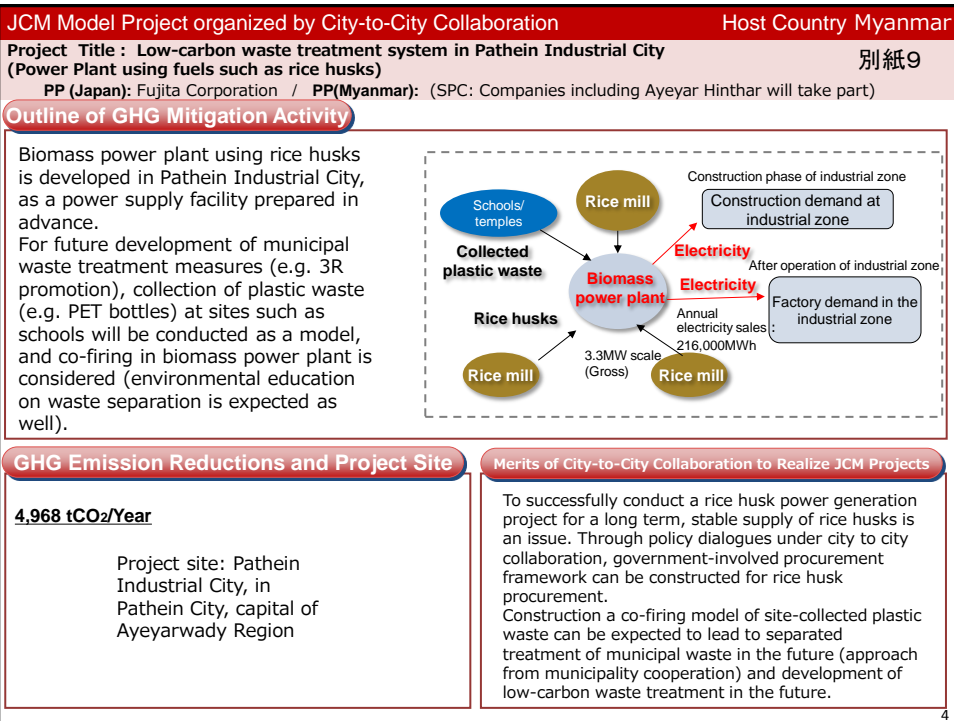
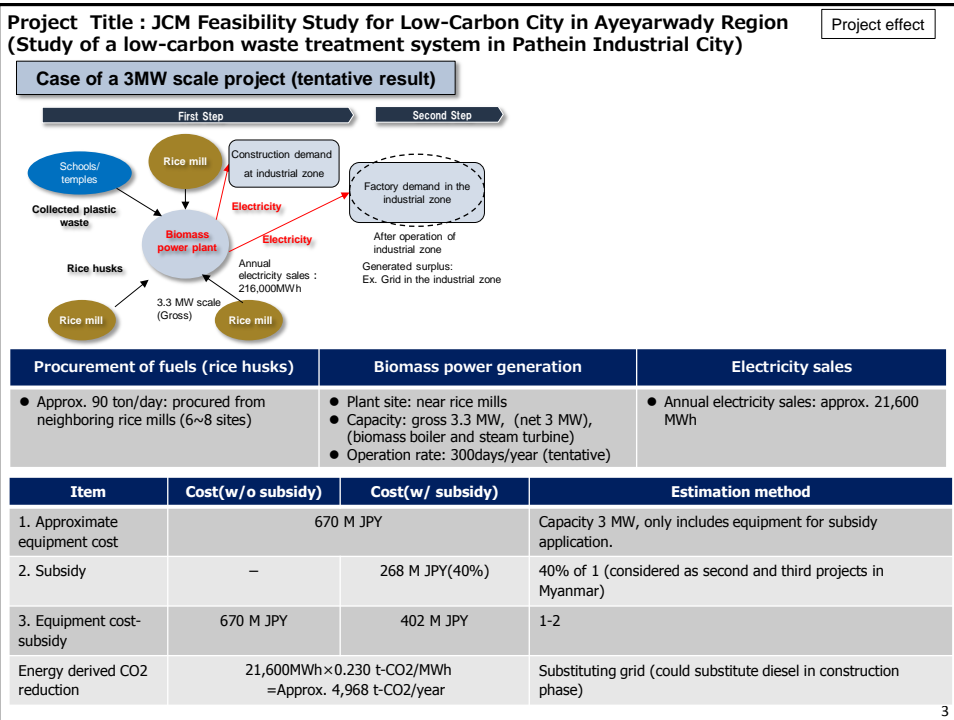
- "Biomass power plant using fuels such as rice husks (3 MW scale, aiming to start operation in FY 2019, 4 years from now)"**
- Biomass power plant using rice husks is developed in Pathein Industrial City, as a power supply facility prepared in advance.
  - For future development of municipal waste treatment measures (e.g. 3R promotion), collection of plastic waste (e.g. PET bottles) at sites such as schools will be conducted as a model, and co-firing in biomass power plant is considered (environmental education on waste separation is expected as well).



**Project Title : JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region (Study of a low-carbon waste 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. 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.





## 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



# **Appendix II**

## **Reference Data and Materials from the Study**

Appendix II includes the reference data from the study

## Reference material:

### Fukushima Renewable Energy Promotion Plan (Digest version)

<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.

### PART1: Overview of Workshops and Local Surveys

### PART2: Photos from Workshops and Surveys

### PART3: Distributed Materials from Workshops and Local Surveys

# **Appendix III**

## **Overview and Materials from Workshops and Local Surveys**

### **PART1: Overview of Workshops and Local Surveys**

**[Minutes 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.

#### **[Minutes 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 Patheingyi 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 Patheingyi City]

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

Date: September 20<sup>th</sup>, 2016 13:30-17:00

Venue: Patheingyi City, Ayeyarwady Region

Participants:

<Japan> Mitsubishi Research Institute, Fujita Corporation

<Myanmar> Ayeyarwady Regional Government, Patheingyi 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.



## Minutes of discussions for waste treatment (rice husk treatment) sector

### <Current Situation in Myanmar>

- There are several large-scale rice mills in Patheingyi City; some do gasification, and others sell their rice husks (for instance, to be used in brick factories). Selling price of rice husks vary depending on the season, so price for rice husks should be considered in comparison with such fluctuations.
- Rice husks can be supplied from rice mills in the neighboring regions of Patheingyi City; there is enough amount of rice husks generated in the area.

### <Proposals by the Japanese Delegates>

- The current rice husk power plant project planned in MyaungMya is of a scale that is adequate for rice husk supply amount from neighboring rice mills; therefore stable supply of rice husks is possible. However, the new rice husk power plant in the new industrial park is of a business model that utilizes rice husks generated from various rice mills in the neighboring region (with larger scale); to successfully operate the project, long-term stable supply of rice husks is inevitable. Therefore, we would like to carefully consider if supply of rice husks is adequate in this area.
- Gasification of rice husks is low in energy efficiency, and water quality issues such as tar can occur. It is crucial that gasification of rice husks is gradually regulated by environmental policies in the future. With such policies, stable supply of rice husks in the area is possible. In this sense, we would like to construct a business environment in cooperation with the government.

### <Local Needs>

- We recognize the environmental issues in gasification of rice husks. We would like to start considering necessary measures. (Environmental department)
- We would like to learn how waste treatment is regulated and incentivized on business owners in Japan.

**[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

Minutes:

- There was an opening note by development director for Patheingyi City, where he showed his appreciation towards those who had supported his visit to Japan. He introduced Patheingyi 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 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 waste treatment sector in Fukushima City]**

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

Venue: Fukushima City Hall

Agenda: Flow of waste and resources in Fukushima City

Overview:

Flow of waste and resources in Fukushima City (lectures and discussions)

- There was an explanation of the flow of waste and resources in Fukushima City, from their collection phase to recycling phase. It was emphasized that cooperation from the citizens is indispensable in waste treatment including recycling and separating/sorting.
- Myanmar would like to establish a successful model facility or scheme for waste treatment, and expand such model horizontally. The current situation in Myanmar is that there are some households who make their living by picking some waste from the waste accumulation site and selling it. We, as administration, feel that we must consider measures towards improving such situation.

**[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 Patheingyi 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 Patheingyi 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 Patheingyi City, Myanmar
- (4) Discussions
- (3) Closing Note

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

## [Overview of second workshop in Patheingyi City]

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

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

Venue: Patheingyi Industrial City

Participants:

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

<Myanmar> Ayeyarwady Regional Government, Patheingyi Industrial City

Minutes:

- 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.
- Ayeyarwady Region has a plan of “Patheingyi 2020” to become a green city. The plan was established with the support from JICA.
- There is power supply shortage in the region, and power plant project using rice husks which are waste is wonderful.
- We are very interested in environmental education at school. How did such program start? There are many related departments in Ayeyarwady Region, how are such programs conducted in Japan?
  - Environmental education has been conducted for a long time, but the educational material is being revised every year.
  - There are various departments and committees related to education in Japan as well.
- 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 waste treatment system in Patheingyi 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



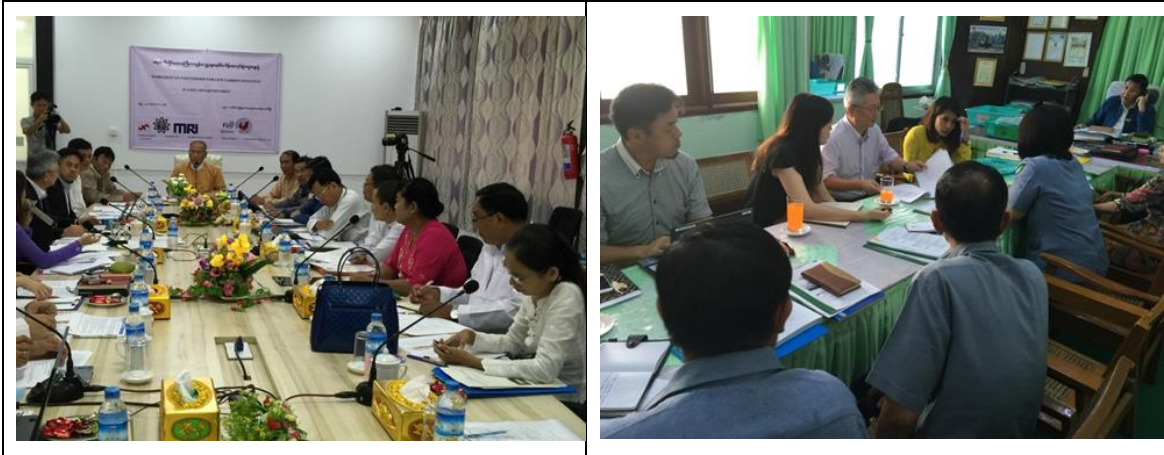
Presentation



Food from Myanmar

## 2. Workshop in September (Myanmar)

### Workshop



### Pathein Industrial City

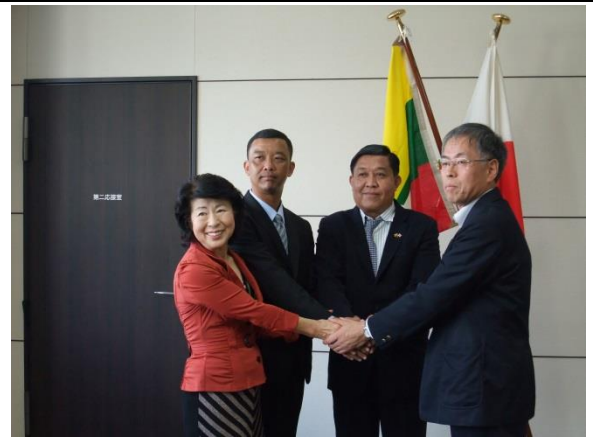


**Pathein Industrial City**



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

#### Courtesy Call with the Fukushima City Mayor



#### Workshop



## Networking Event



## 4. Workshop in January (Japan and Myanmar)

### Workshop



**Ayeyarwady Region**



Waste Treatment Site in Pathein City





Elementary School near Patheingyi Industrial City



**Elementary School Waste Treatment Site**



**Industrial Park near Pathein City**



**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 waste treatment  
system in Pathein Industrial City

## FIRST WORKSHOP IN PATHEIN CITY

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# 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.

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## **Presentations, Q&A, and Discussion**

### **<Session1: Waste field>**

- Background and Outline of Project (Japanese side)  
(including experience in Japan, concept proposal)
  - Waste management in Pathain (Myanmar side)
    - Current situation and prospective
    - Idea for cooperation
  - Idea for waste management(Japanese side)  
(mainly rice husk)
  - Q&A, Discussion
- 

## **Presentation (Japanese side)**

- Background and Outline of Project
  - Idea for waste management
-

# Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

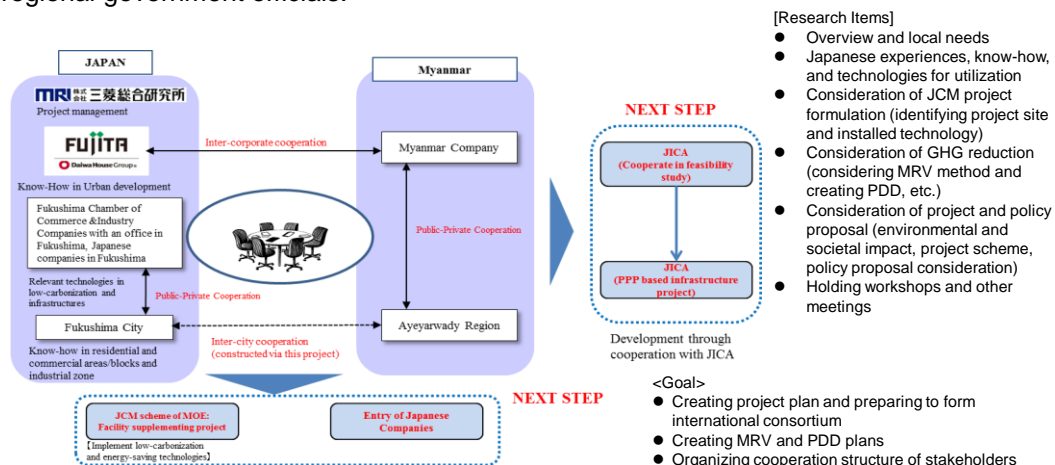
## Background and Outline of Project

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 Patheingyi Industrial City  
 2) Low-carbon water and sewerage treatment system in Patheingyi Industrial City

Research Overview

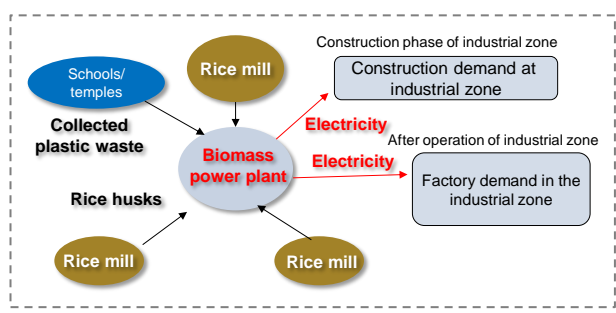
Mitsubishi Research Institute, as the representative proposer, will conduct the research in cooperation with Fujita, its partner, Fukushima City, and Fukushima Chamber of Commerce and Industry with the local stakeholders, and to obtain cooperation from the regional government officials.



**Project Title : Low-carbon waste treatment system in Patheingyi Industrial City  
(Power Plant using fuels such as rice husks)**

**Outline of GHG Mitigation Activity**

Biomass power plant using rice husks is developed in Patheingyi Industrial City, as a power supply facility prepared in advance. For future development of municipal waste treatment measures (e.g. 3R promotion), collection of plastic waste (e.g. PET bottles) at sites such as schools will be conducted as a model, and co-firing in biomass power plant is considered (environmental education on waste separation is expected as well).



**Project Site**

Project site: Patheingyi Industrial City, in Patheingyi City, capital of Ayeyarwady Region

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

To successfully conduct a rice husk power generation project for a long term, stable supply of rice husks is an issue. Through policy dialogues under city to city collaboration, government-involved procurement framework can be constructed for rice husk procurement. Construction a co-firing model of site-collected plastic waste can be expected to lead to separated treatment of municipal waste in the future (approach from municipality cooperation) and development of low-carbon waste treatment in the future.

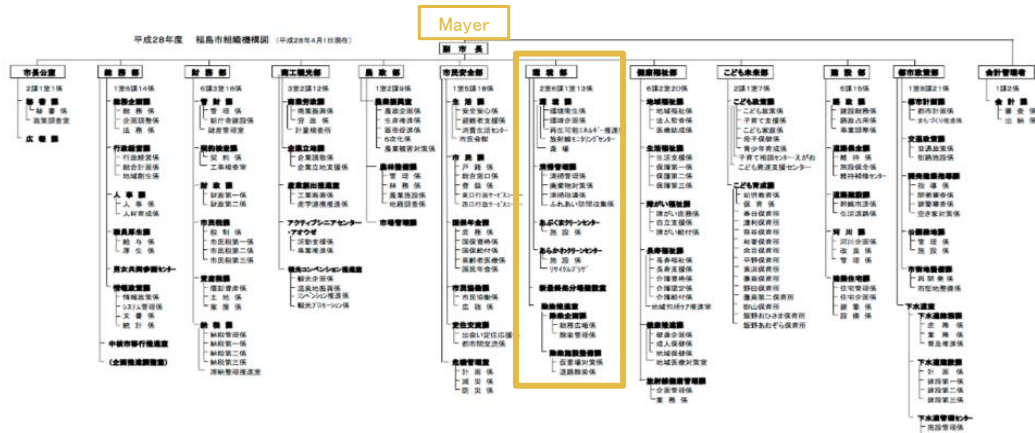
# Measures for promote the health of the city

~An example, in Fukushima city~

Fujita Corporation



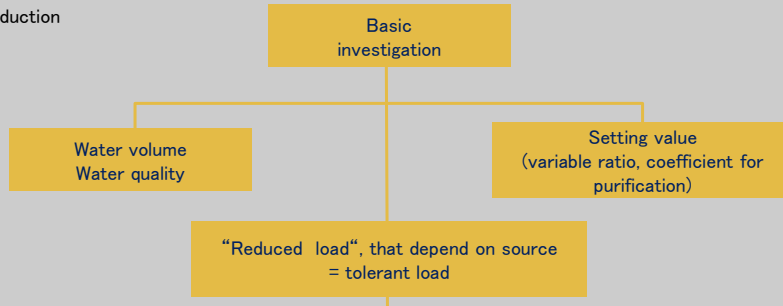
# A Chance to change the system for water treatment



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

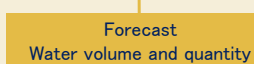
## 1. Target setting for the load reduction



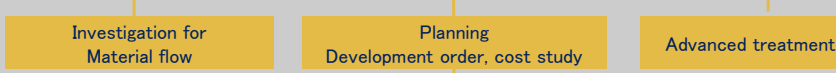
## 2. Countermeasure except for sewage treatment facility



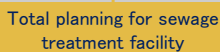
## 3. Pollution analysis



## 4. Investment for advanced analysis



## 5. Total planning



## 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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## Concept of Rice Husk Power Project in Pathein

**Project Site :** Pathein Industrial City, Pathein District

**Power generation capacity :** 3.0 MW (Net)

**Power generation method:** Boiler and Turbine Generator

**Operation:** 24 Hours/Day, 300 -330Days/Year

**Supply electricity:** 21,600 – 23,760 Mwh/year

**Supply voltage:** 11kV

**Suppliers of rice husk :** Rice mill in Pathein District

**The required amount of rice husk :**

4.1ton/hour, 98.4ton/day,

28,520ton/year (as 300 days)

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# MEETING FOR PARTNERSHIP FOR LOW CARBON INITIATIVE IN AYEYARWADY IN FUKUSHIMA CITY

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## **Partnership for Low Carbon Initiative in Ayeyarwady**

Discussion points



October 18, 2016

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# Background and Outline of Project

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## Ayeyarwady Division

### Location

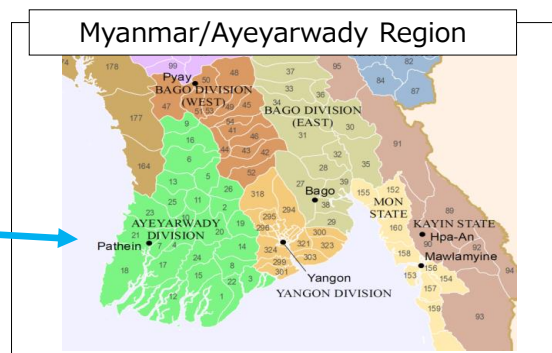
Southernmost region of Central Myanmar Delta region of Ayeyarwady river

### Patheingyi City

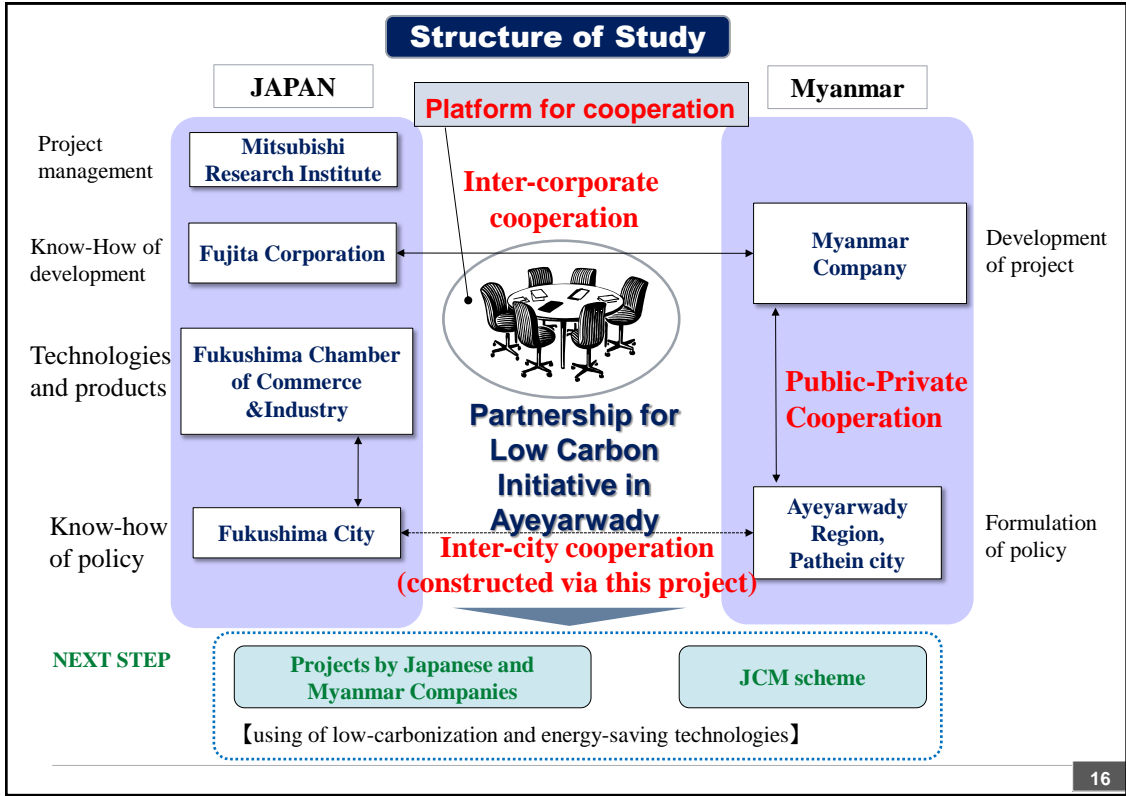
The capital city of Ayeyarwady Div.  
Population: about 300,000

### Patheingyi Industrial City

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



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## Background and Current Activities

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

Chief Minister Ayeyarwady Region visited Japan April 2015

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

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

### Letter of Intent (June 2015)

From Chief Minister 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 (Patheingyi, and Fukushima)
- Site visiting (Patheingyi, and Fukushima)

<FY2015>

- Local workshop (September 2015, Patheingyi)
- Workshop in Fukushima City (October 2015, Fukushima City)
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- Local workshop (February 2016, Patheingyi)

<FY2016>

- Local workshop (September 2016, Patheingyi)
- Workshop in Fukushima City (October 2016, Fukushima City)

18



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 Patheingyi



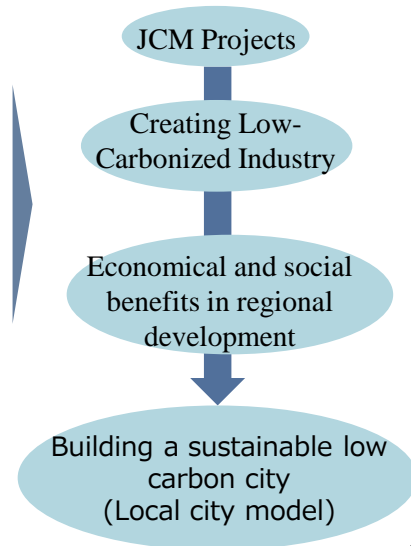
Discussion in Patheingyi

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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 Patheingyi 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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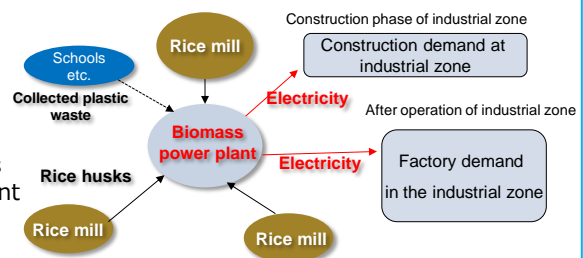
JCM Model Project organized by City-to-City Collaboration

Host Country: Myanmar

## Project Title : Low-carbon waste treatment system in Patheingyi Industrial City (Power Plant using fuels such as rice husks)

### Outline of GHG Mitigation Activity

- Biomass power plant using rice husks is developed in Patheingyi Industrial City, as a power supply facility prepared in advance.
- For future development of municipal waste treatment measures (e.g. 3R promotion), collection of plastic waste (e.g. PET bottles) at sites such as schools will be conducted as a model, and co-firing in biomass power plant is considered (environmental education on waste separation is expected as well).



### Project Site

Project site: Patheingyi Industrial City, in Patheingyi City, capital of Ayeyarwady Region

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

- To successfully conduct a rice husk power generation project for a long term, stable supply of rice husks is an issue. Through policy dialogues under city to city collaboration, government-involved procurement framework can be constructed for rice husk procurement.
- Construction a co-firing model of site-collected plastic waste can be expected to lead to separated treatment of municipal waste in the future (approach from municipality cooperation) and development of low-carbon waste treatment in the future.

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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 Patheingyi

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 Patheingyi

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.

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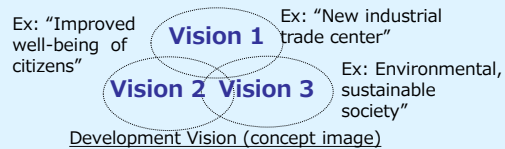


## What is a “master plan” for urban development?

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.



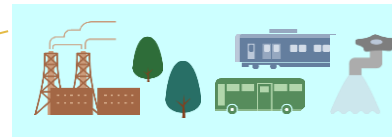
Other industrial zones in Myanmar also have master plans.

- Thilawa SEZ: Master plan by the Japanese government
- Dawei SEZ: Master plan support by Japan

Land Use Plan (image)

### 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.

### Expected outcome:

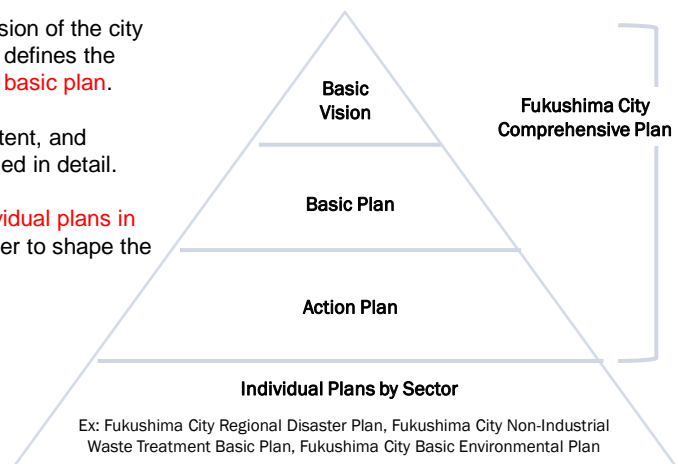
- Attraction of factories to the industrial zone and accelerated foreign investment
- Regional development and increased higher standard of living

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## 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).

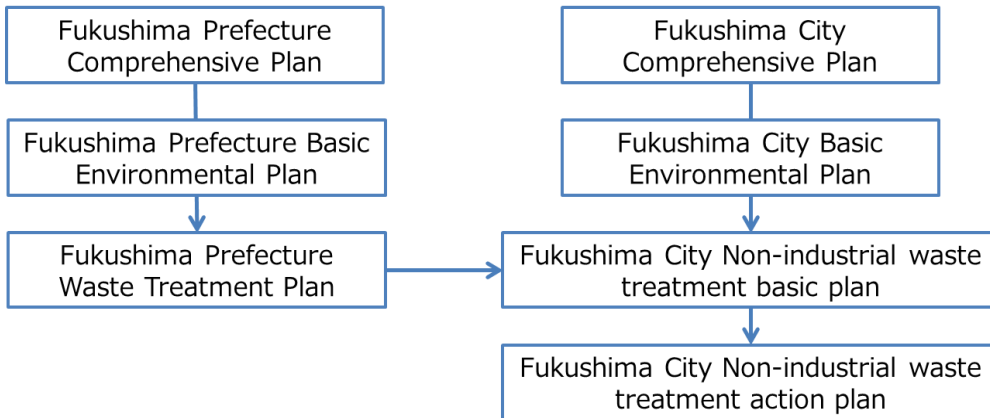


Source: Fukushima City Comprehensive Plan, edited by MRI

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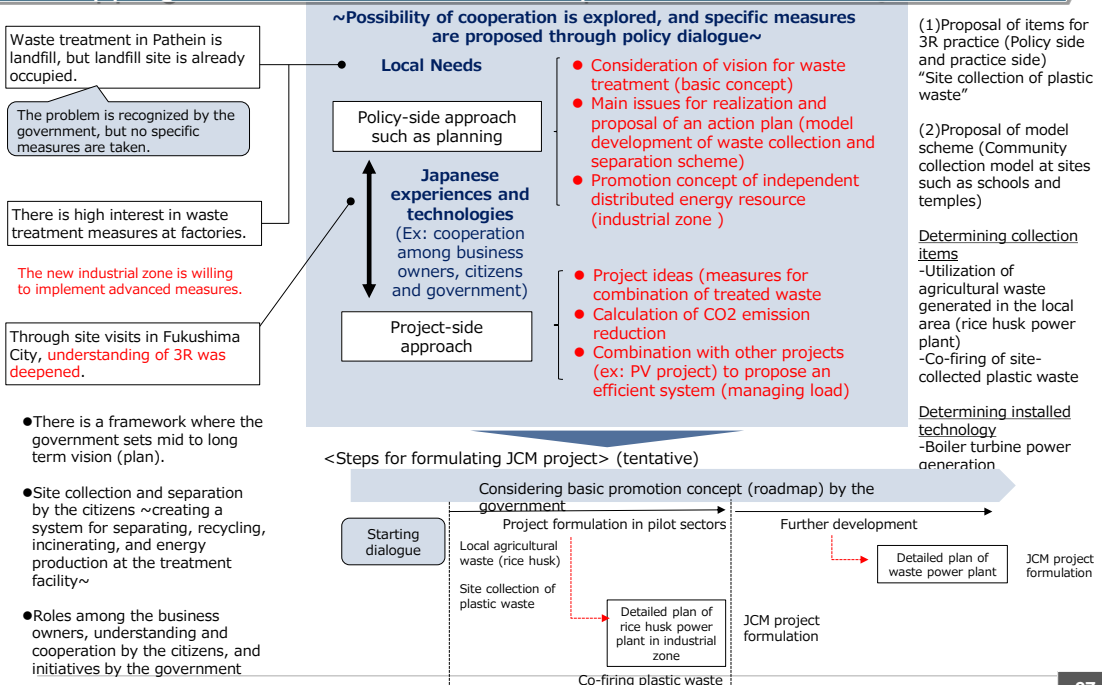
Source: Fukushima City Waste Treatment Basic Plan (2014~2020)

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## Discussion points in dialogue

(tentative version)

### – Mapping issues and idea of action plan in the waste management field



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## SECOND WORKSHOP IN PATHEIN CITY

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# 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: Waste 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)**

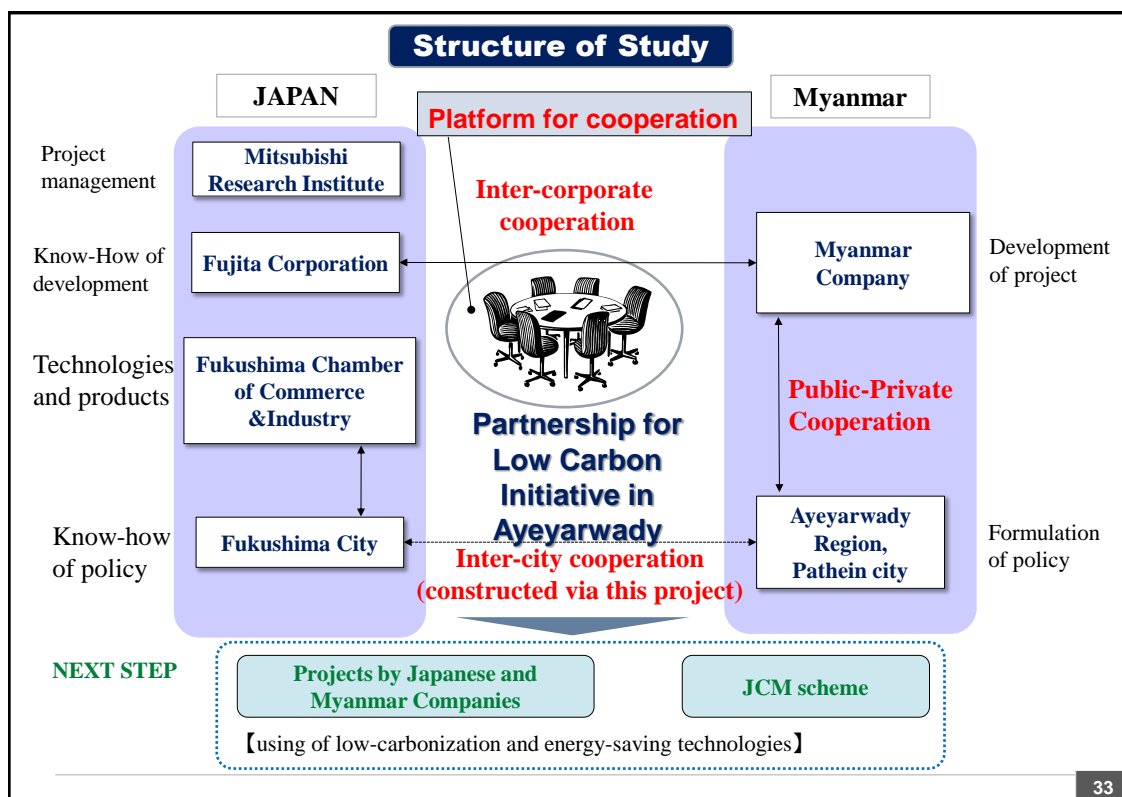
- Key outcomes and future direction
  - Proposal of project
  - Lessons in Fukushima and Implications of city to city cooperation
-

# Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

## Session1: Waste field

### Key outcomes and future direction

January 25, 2017



## Background and Current Activities

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## Snapshot of Inter-city cooperation

Workshop in Patheingyi City



Meeting in Fukushima City



Dialogue in Patheingyi City



Networking event with Fukushima Chamber of Commerce & Industry

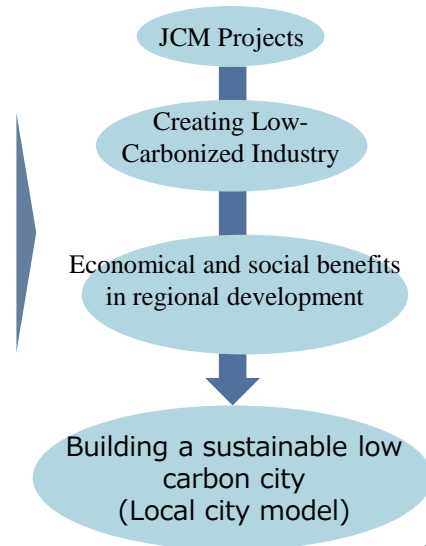


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## JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region, Myanmar

### Goal of the study

- **Finding candidate projects for Low Carbon Initiative in new industrial zone in Patheingyi 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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## Challenges of Low Carbon Initiative

(Tentative analysis)

### Approaches

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

catalytic

### 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

### Expectation of city-to-city cooperation, and JCM

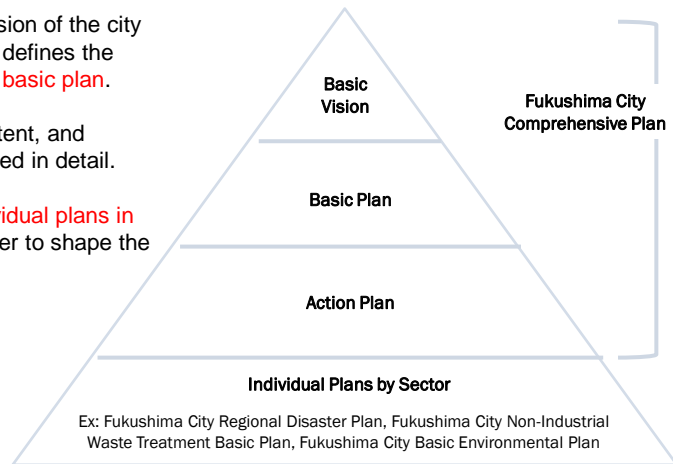
- Knowledge (i.e. policy) and Technology transfer
- Financial support
- Platform for cooperation in project base

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## 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**.
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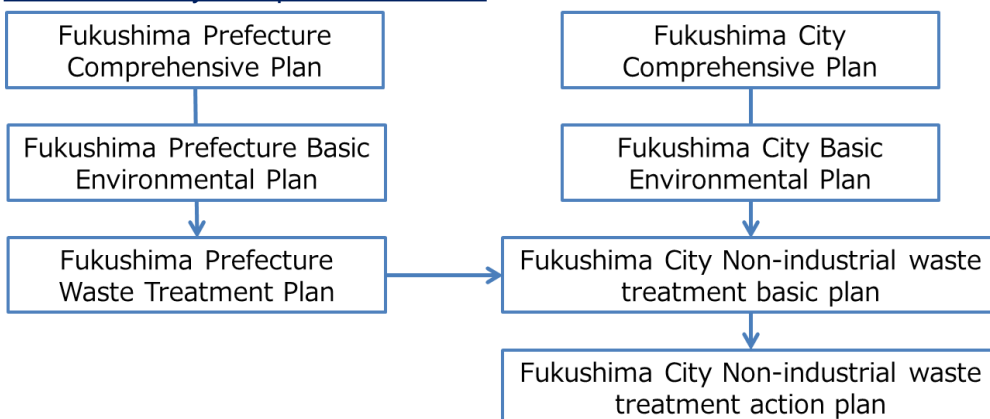


Source: Fukushima City Comprehensive Plan, edited by MRI

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## 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)

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## JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region

### Study of a low-carbon waste treatment system in Patheingyi Industrial City

To achieve a low-carbon, resilient and sustainable city through city to city collaboration under "Partnership for Low-Carbon Initiative in Ayeyarwady," feasibility a low-carbon waste treatment system (e.g. power plant projects using fuels such as rice husks) and measures for energy use of waste in the local area were studied.

## History of Waste Management in Japan

History of legal systems regarding the development of a sound material-cycle society (post-war period to the present)

Period	Major issues	Laws enacted
Post-war period to the 1950s	<ul style="list-style-type: none"> <li>Waste management for environmental sanitation</li> <li>Maintenance of a healthy and comfortable living environment</li> </ul>	<ul style="list-style-type: none"> <li>Public Cleansing Act (1954)</li> </ul>
1960s to 1970s	<ul style="list-style-type: none"> <li>Increase in the amount of industrial waste and emergence of pollution problems as a result of rapid economic growth</li> <li>Waste management for environmental protection</li> </ul>	<ul style="list-style-type: none"> <li>Act on Emergency Measures concerning the Development of Living Environment Facilities (1963)</li> <li>Waste Management Act (1970)</li> <li>Revision of the Waste Management Act (1976)</li> </ul>
1980s	<ul style="list-style-type: none"> <li>Promotion of the development of waste management facilities</li> <li>Environmental protection required for waste management</li> </ul>	<ul style="list-style-type: none"> <li>Wide-area Coastal Environment Development Center Act (1981)</li> <li>Private Sewerage System Act (Johkasoh Law) (1983)</li> </ul>
1990s	<ul style="list-style-type: none"> <li>Waste generation control and recycling</li> <li>Establishment of various recycling systems</li> <li>Management of hazardous substances (including dioxins)</li> <li>Introduction of a proper waste management system to cope with diversification in the type and nature of waste</li> </ul>	<ul style="list-style-type: none"> <li>Revision of the Waste Management Act (1991)</li> <li>Act to Promote the Development of Specified Facilities for the Disposal of Industrial Waste (1992)</li> <li>Japanese Basel Act (1992)</li> <li>Basic Environment Act (1993)</li> <li>Containers and Packaging Recycling Act (1995)</li> <li>Revision of the Waste Management Act (1997)</li> <li>Home Appliance Recycling Act (1996)</li> <li>Act on Special Measures against Dioxins (1999)</li> </ul>
2000-	<ul style="list-style-type: none"> <li>Promotion of 3R measures aimed at the establishment of a sound material-cycle society</li> <li>Enhancement of industrial waste management</li> <li>Enhancement of illegal dumping regulations</li> </ul>	<ul style="list-style-type: none"> <li>Basic Act for Establishing a Sound Material-Cycle Society (2000)</li> <li>Construction Recycling Act (2000)</li> <li>Food Recycling Act (2000)</li> <li>Revision of the Waste Management Act (2000)</li> <li>Act on Special Measures concerning Promotion of Proper Treatment of PCB Wastes (2001)</li> <li>Automobile Recycling Act (2002)</li> <li>Act on Special Measures concerning Removal of Environmental Problems Caused by Specified Industrial Wastes (2003)</li> <li>Revision of the Waste Management Act (2003 to 2006, 2010)</li> <li>Small Home Appliance Recycling Act (2013)</li> </ul>

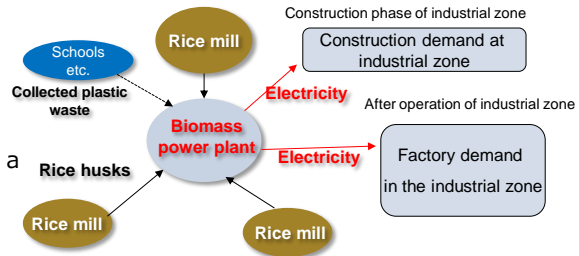
Public health improvement  
Pollution problems and living environment protection  
Establishment of a sound material-cycle society

Source) Ministry of the Environment(Japan), History and Current State of Waste Management in Japan

**Project Title : Low-carbon waste treatment system in Pathein Industrial City (Power Plant using fuels such as rice husks)**

**Outline of GHG Mitigation Activity**

- Biomass power plant using rice husks is developed in Pathein Industrial City, as a power supply facility prepared in advance.
- For future development of municipal waste treatment measures (e.g. 3R promotion), collection of plastic waste (e.g. PET bottles) at sites such as schools will be conducted as a model, and co-firing in biomass power plant is considered (environmental education on waste separation is expected as well).



**Project Site**

Project site: Pathein Industrial City, in Pathein City, capital of Ayeyarwady Region

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

- To successfully conduct a rice husk power generation project for a long term, stable supply of rice husks is an issue. Through policy dialogues under city to city collaboration, government-involved procurement framework can be constructed for rice husk procurement.
- Construction a co-firing model of site-collected plastic waste can be expected to lead to separated treatment of municipal waste in the future (approach from municipality cooperation) and development of low-carbon waste treatment in the future.

**Discussion points in dialogue – Mapping issues and idea of action plan in the waste management field (tentative version)**

Waste treatment in Pathein is landfill, but landfill site is already occupied.

The problem is recognized by the government.

There is high interest in waste treatment measures at factories.

The new industrial zone is willing to implement advanced measures.

Through site visits in Fukushima City, understanding of 3R was deepened.

- There is a framework where the government sets mid to long term vision (plan).
- Site collection and separation by the citizens ~creating a system for separating, recycling, incinerating, and energy production at the treatment facility~
- Roles among the business owners, understanding and cooperation by the citizens, and initiatives by the government

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

**Local Needs**

Policy-side approach such as planning

↕

Project-side approach

- vision for waste treatment (basic concept)
- Proposal of an action plan (model development of waste collection and separation scheme)
- Proposal of project scheme - rice husk power plant
- Effects of CO2 emission reduction

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

**Discussion points in the workshop**

- (1) Proposal of a model scheme (rice husk power plant)
- (2) Building regulatory enforcement
- (3) Awareness building for industry, education, and community
  - Energy utilization of waste
  - Separation, and challenge for 3R

**<Steps for formulating JCM project> (tentative)**

Starting dialogue → Considering basic promotion concept (roadmap) → Policy-side approach / Project-side approach

**Project formulation in industrial zone**

Local agricultural waste (rice husk) → Detailed plan of rice husk power plant

Site collection of plastic waste → Co-firing plastic waste

Formulation of model case of JCM project

Further development in Ayeyarwady Region → Project in other industrial zone (Various JCM project)

This year

Example of achievements of policy dialogue

## Waste disposal site in Pathein

### Segregating waste



Reduction of volume!

Key messages of dialogue

(tentative version)

Project Development Using JCM Scheme

Framework for Supporting Project Deployment

- Through Business Sector Collaboration -

- Through Policy Dialogues -

- **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.

- **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)

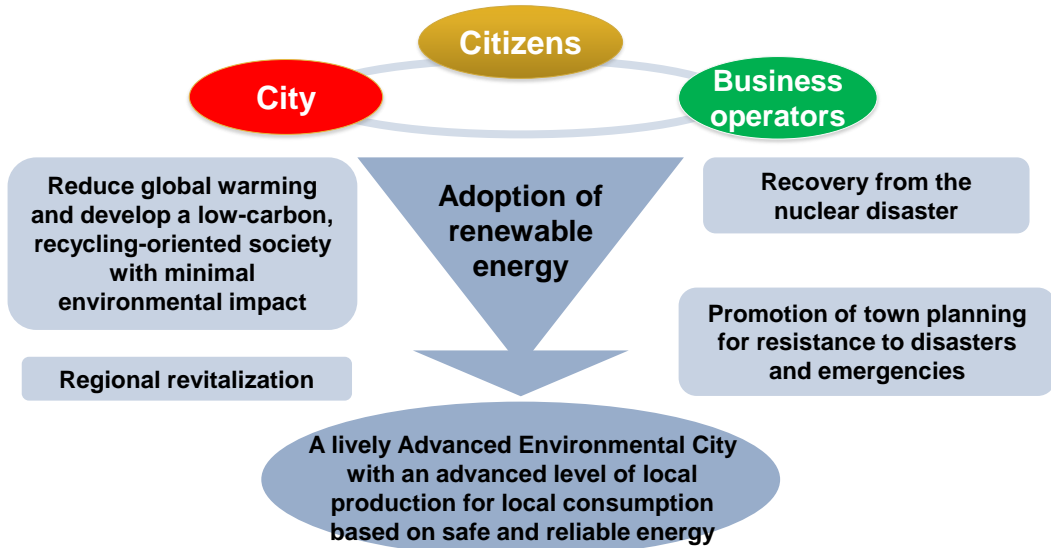
Building a sustainable low carbon city (Local city model)
- **Need for a Comprehensive Approach**
  - From Japanese experiences, a comprehensive framework for individual projects is necessary for developing renewable energy and waste management projects.

*<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)**

## Fukushima City's Future Vision

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

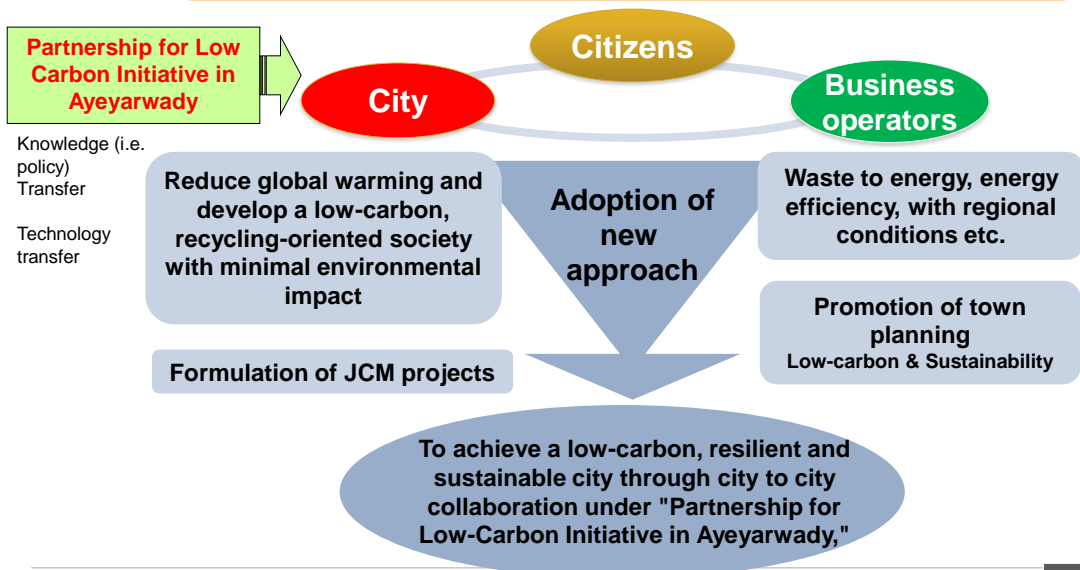


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(tentative version)

## 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)



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# Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

## Waste Treatment



January 25, 2017

### Why do we need to collect waste separately?

Very Important Key Word : **Biodegradability**

Substances that are decomposed by microorganisms or enzymes in the natural environment

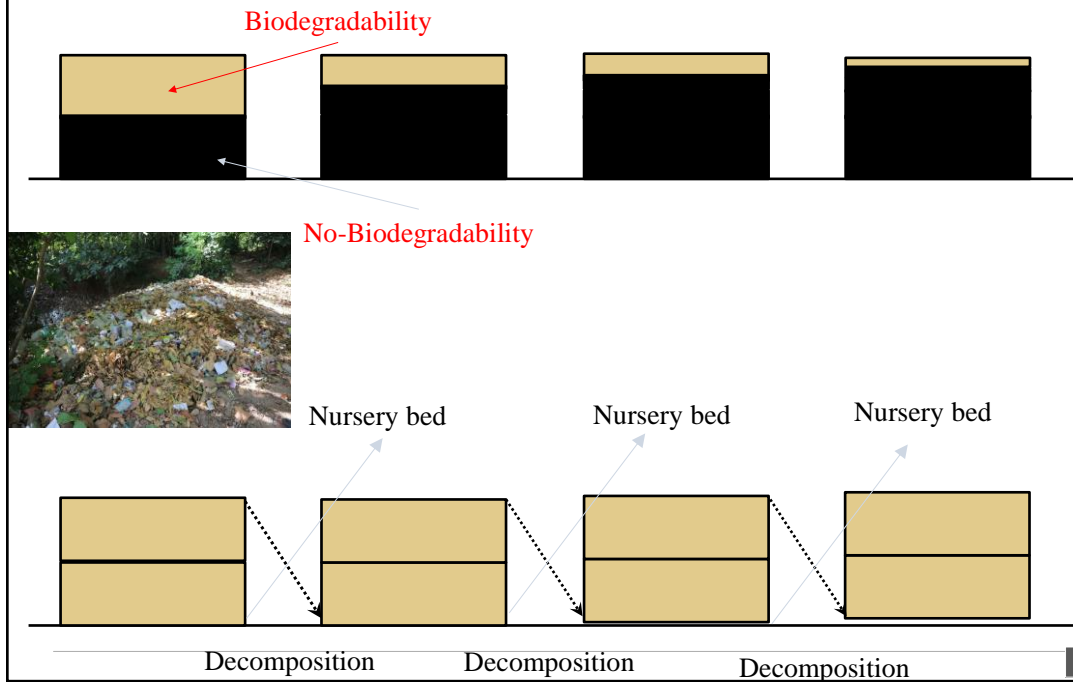
General plastics are not biodegradable

<b>Biodegradability</b>	<b>No-Biodegradability</b>
The raw material is naturally derived ➤ Food ➤ Rice Straw ➤ Rice Husk ➤ Wood	The raw material is not naturally derived ➤ Plastic ➤ Glass ➤ Steel

Separate collection is necessary.

## Life span of the waste disposal site?

The waste disposal site will be full either



## Landfill in Pathein (New Movement)



Landfill in Pathein (2015)

Landfill in Pathein (Dec. 2016)



# History of waste disposal

- Individual processing at home
- Field burn and illegal dumping  
Japan: ~1950  
Myanmar: Now almost City

- Landfill in waste disposal site  
Japan: 1950~  
Myanmar: Only Big City (Yangon & Patheingyi etc.)

- Waste incinerator  
Japan: 1960~  
Myanmar: 2016~

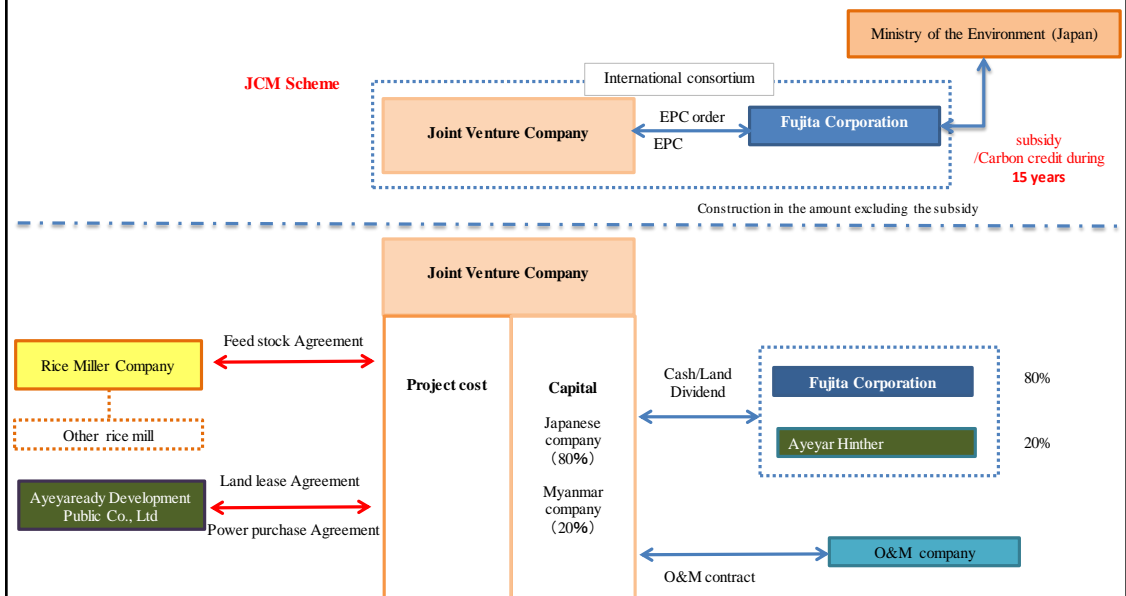
- Separate collection  
+
- Recycle+Waste incinerator  
Japan: Now  
Myanmar: ?



Now Yangon

Ayeyawady's unique waste treatment

# Business Scheme (Assumption)



## The Situation of RHPG Project in Patheingyi

The stable supplier of rice husk is not determined.



Can not determine the scale of power generation

Major means of transport can not be determined.



Can not decide the construction site.  
(River Side or not)

Investment amount is large.  
(≒ 5 – 6 M-USD)



No DICA of Regional government

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## Workshop of Partnership for Low Carbon Initiative in Ayeyarwady

### Session1: Waste field

### Lessons in Fukushima and Implications of city to city cooperation



January 25, 2017

Fukushima City



## Transition of Waste Treatment Policy in Fukushima City

### History of Public Cleansing Service

Year	Efforts by Fukushima City	Social Targets
1950~	<ul style="list-style-type: none"> <li>Started to build waste incineration sites</li> </ul>	Public health improvement
1970~	<ul style="list-style-type: none"> <li>Removed waste containers</li> <li>Installed plastic buckets and introduced a waste collection system on a fixed-day schedule</li> <li>Started a separate collection of combustible and non-combustible waste</li> </ul>	Pollution problems and living environment protection
1990~	<ul style="list-style-type: none"> <li>Introduced a reward system for group resource recovery</li> <li>Introduced a fee-based collection of general business waste</li> <li>Implemented a subsidy program for the purchase of composting containers</li> <li>Started resource recovery by separate collection</li> <li>Started to operate the Fukushima City Recycling Plaza</li> </ul>	Establishment of a sound material-cycle society
2000~	<ul style="list-style-type: none"> <li>Resource recovery by separate collection (currently 12 items and 9 categories)</li> <li>Promulgated the Act of Fukushima City Environmental Fund</li> <li>Implemented measures accompanied by the enactment of recycling-related laws.</li> </ul>	

(source: Cleansing service overview in Fukushima City, 2016 edition)

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## Waste Treatment Policy in Fukushima City

Fukushima City enacted “Basic Plan for General Waste Treatment in Fukushima City” to promote appropriate waste treatment and reduction of general waste.

### Basic Principles

- (1) Creation of a recycling-based society by **promoting the 3R Initiative** (Reduce, Reuse, Recycle of waste)
- (2) Securing a safe and better living environment by promoting appropriate waste management
- (3) Environment conservation through **cooperation among citizens, businesses and administration**

Source: Basic plan for general waste treatment in Fukushima City (summary)

3R is a key to create a recycling-based society which realizes the compatibility of environment and economy to effectively use finite resources on earth and preserve the global environment.

### Waste Treatment Target

Daily waste generated per capita (g/capita\*day)  
FY2010: 1,109 → FY2020: 890

Total waste generated (t)  
FY2010: 117,971 → FY2020: 91,600

Recycling rate (%)  
FY2010: 16.1 → FY2020: 26.0以上

Final treatment amount (t)  
FY2010: 12,983 → FY2020: 9,000

~Reduce waste in everyday life~

**R**educe  
**R**euse  
**R**ecycle

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## Enlightenment of Awareness

~Reforming the mindset of companies towards waste treatment~

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



Task force meeting in the Chamber of Commerce



Study group inviting a lecturer at the Chamber of Commerce

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## Waste Power Generation Local Production for Local Consumption Project

**Power generated from waste heat produced by garbage incineration is used by the incineration plant and recycling plant, and surplus power is supplied to 71 municipal elementary and junior high schools and other facilities as part of our efforts to promote the local production of renewable energy for local consumption.**

- 1) Construction completed in August 2008**
- 2) Maximum output: 5,100 kW**
- 3) Annual power generation: 28,599,000 kWh**
  - \* Hot water is also supplied to nearby welfare facilities.**

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## Biomass Power Generation at Food Factory

1) Business operator : Uchiike Brewing Ltd.

2) Content

- Treat drainage water in an oxygen-free condition while manufacturing soy sauce and miso and generate power by using the heat of methane gas generated in the process.
- The first certified facility of biomass power generation using methane gas in Tohoku Area since the introduction of the FIT scheme
- Operation : 26 September 2014
- Power generation output : 25kW
- Annual power generation :  
About 144,000kWh  
(January – December 2015)

(Source : Uchiike Brewing Ltd.)

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## Effective Waste Utilization in Fukushima City

Reward System for Group Resource Recovery

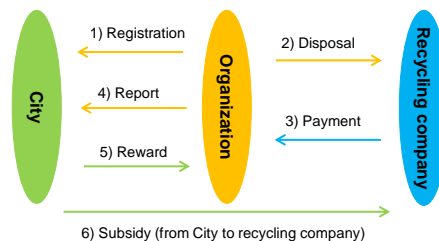


A large truck is filled with newspapers, books and aluminum cans

### Cooperation among administration – citizens – private companies

Reward is offered to PTAs and neighborhood associations which voluntarily collect resources such as waste papers, clothes and bins to promote resource recovery and achieve reuse of resources and reduction of waste.

(Number of registered organizations in 2015 : 315)



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## Effective Waste Utilization in Fukushima City

### Grant for the purchase of garbage treatment containers

Household garbage



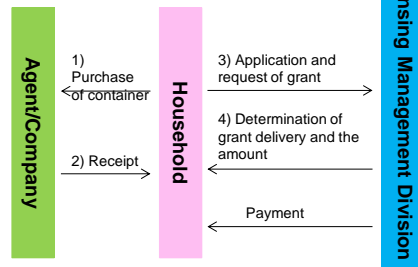
Garbage treatment container

Garbage treatment container

To be used as compost

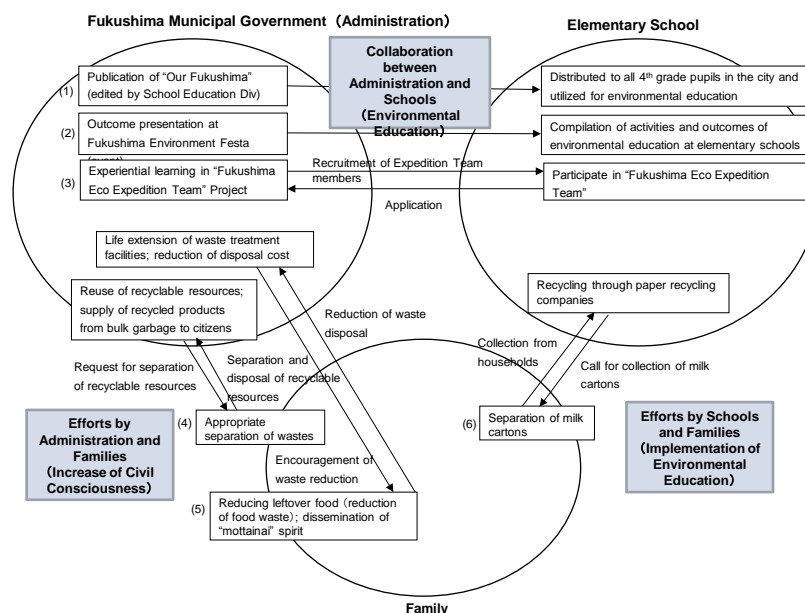
#### Cooperation among administration – citizens – private companies

Grant is offered to people who purchase and install a garbage treatment container to enhance awareness about reduction of garbage and reuse of resources. (9,564 units as of November 2016)



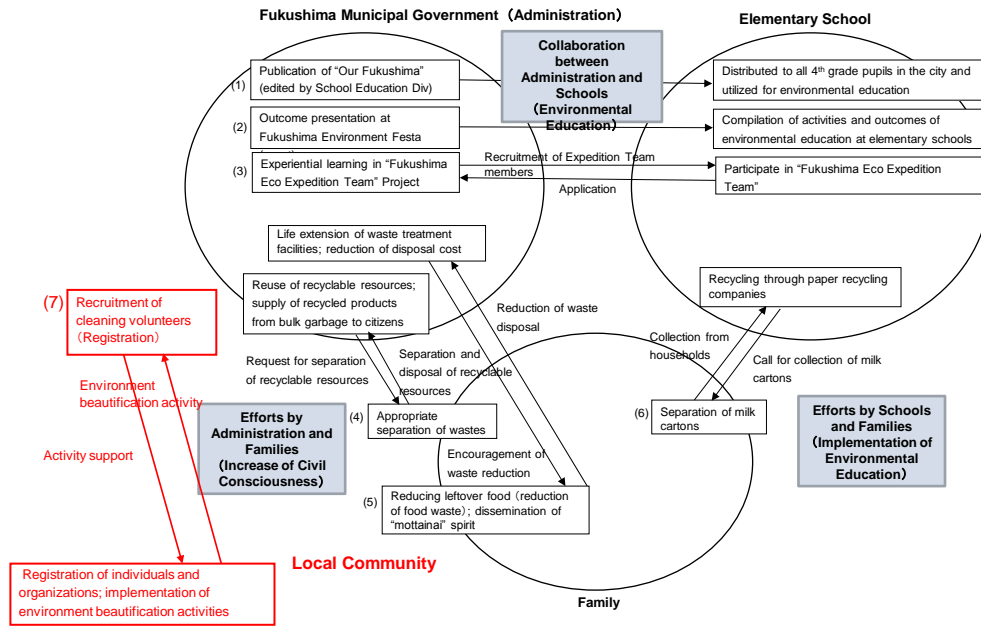
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## Collaboration among Administration, Schools and Families in Fukushima City



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## Collaboration among Administration, Schools and Families in Fukushima City



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## Enlightenment of Awareness ~Environmental Education at Elementary Schools~

Recycling of milk cartons



Learning about separate waste collection



(Elementary School in Fukushima)

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## Separate Collection ~Recycling~



Separate collection box at elementary school

【Torikawa Elementary School】

Collection box of used small house appliances



Recycled products from pet bottles



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## Presentation (Myanmar side)

- Current situation and policy perspectives of waste

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# **Appendix IV**

## **Materials on Patheingyi Industrial City**

Appendix IV includes the details of Patheingyi 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

<b>ZONE [A-1]</b>	<b>607.33 Acres</b>
Salable Area:	460.41 Acres
Utility & Green Space:	146.92 Acres

### Industrial Development

<b>ZONE [A-2]</b>	<b>553.48 Acres</b>
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

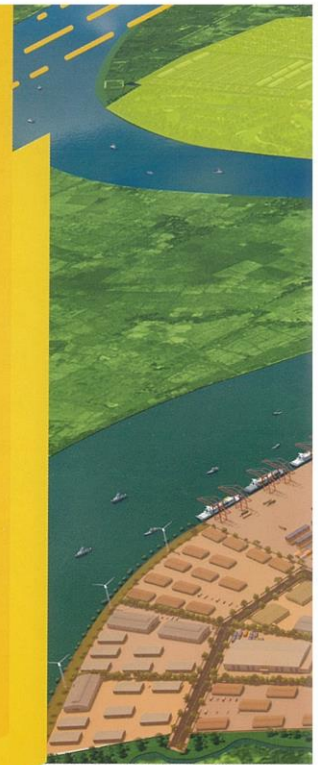
- Garment, textile and apparels

#### (C) Domestic Market-Based

- Rice Mill and downstream rice production
- Consumer products
- Fertilizer
- Agricultural Machinery
- Plastic Products
- Construction Materials
- Others

#### (D) Forestry Based

- Plywood / Veneer factory
- Teak conversion factory
- Furniture, pulp & paper manufacturing



RANK	INDUSTRIAL ZONE	TOTAL WEIGHTED SCORE
1	Pathein Industrial 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

# G

## Full support from the Ayeyarwaddy Regional GOVERNMENT

1988

- Military Government assumed state responsibility
- Industrialisation market has been partially opened to outside world

2011

- Semi Civilian Government took office in 2011
- Industrialisation market has only shown significant changes

2015

- Previous Government 5-year term, had established 7 new industrial zones with extension of existing 18 zones.
- 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 Government
- 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<sup>3</sup> per day



### CLEAN WATER SUPPLY

- Treatment capacity of 24,000 m<sup>3</sup> 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<sup>3</sup> 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 Industrial City : 102 km  
Port Capacity : (Up to LOA 100 m vessels / DWT 3,000)

FY2016 JCM Feasibility Study for Low-Carbon City in Ayeyarwady Region  
Study of a low-carbon waste treatment system in Patheingyi Industrial City

# **Appendix V**

## **MRV Methodology and PDD(Draft)**

Appendix V includes 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	Fujita Corporation
Sectoral scope(s) to which the Proposed Methodology applies	3. Energy Demand
Title of the proposed methodology, and version number	Rice husk based power and/or heat generation, Ver00.0
List of documents to be attached to this form (please check):	<input type="checkbox"/> The attached draft JCM-PDD: <input checked="" type="checkbox"/> Additional information
Date of completion	17/2/2016

History of the proposed methodology

Version	Date	Contents revised
00.1	17/2/2017	Zero Edition (Draft)

**A. Title of the methodology**

Rice husk based power and/or heat generation, Ver00.1

**B. Terms and definitions**

Terms	Definitions
Rice husk	Rice husk is the outermost layer of protection encasing a rice grain, typically used as fuel at the rice mill factory.

**C. Summary of the methodology**

Items	Summary
<i>GHG emission reduction measures</i>	This methodology applies to projects that supplies electricity and / or heat generated by combustion or rice husks, which substitute electricity and / or heat generated by fossil fuel.
<i>Calculation of reference emissions</i>	The reference emissions are GHG emissions from electricity and / or heat delivered to the electricity grid, and / or to captive users (both on and off-grid), which would have otherwise been generated partially or wholly by fossil fuel (grid electricity, captive electricity, boilers). Net emission reduction is ensured by not taking into account reduction in electricity loss in the case of supplying captive customers, and not taking into account possible reduction in methane through reduction of stockpiling.
<i>Calculation of project emissions</i>	Project emissions are GHG emissions associated with auxiliary fuel consumption and transport of biomass.
<i>Monitoring parameters</i>	<ul style="list-style-type: none"> <li>● The amount of electricity and / or heat supplied from the project plant to the electricity grid, and / or to captive users (both on and off-grid).</li> <li>● The amount of fuel consumed by the project.</li> <li>● The amount of rice husks transported, distance travelled, fuel consumed through transportation, as appropriate</li> </ul>

#### D. Eligibility criteria

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

Criterion 1	Cogeneration or electricity generation projects using rice husks.
-------------	---

#### E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity delivered to the electricity grid, and / or to captive users	CO <sub>2</sub>
Heat delivered to the electricity grid, and / or to captive users	CO <sub>2</sub>
Project emissions	
Emission sources	GHG types
Fuel consumed by the project plant	CO <sub>2</sub>
Transport of rice husk to the project plant	CO <sub>2</sub>

#### F. Establishment and calculation of reference emissions

##### F.1. Establishment of reference emissions

Reference emissions consist of two types of emission sources: electricity and/or heat delivered to the electricity grid, and/ or to captive users.

Emissions from electricity generated are calculated by multiplying the amount of electricity sent to the grid, and/or captive users by the project with the emission factor provided in the methodology. Heat generation substitute reference boiler at the user.

Project emissions are calculated on the basis of fossil fuel combustion and transport of biomass.

##### Net emission reduction:

In the case of supplying captive consumers, there is happened in electricity loss between the generation plants to them. However, this methodology doesn't taking into account it for ensuring net emission reductions. Furthermore, there is the possibility of reduction of methane emissions by arising from dispose of rice husk under anaerobic condition. However, disposes of rice husk are case by case, and most of rice husk are used in their miller and/or other factories such as brick factories. Therefore, reduction of methane emissions was not considered with conservative views.

## F.2. Calculation of reference emissions

Reference emissions are calculated on the basis of electricity generation and heat generation.

$$RE_p = RE_{elec,p} + RE_{heat,p}$$

$RE_p$	Reference emissions during the period $p$ [tCO <sub>2</sub> /p]
$RE_{elec,p}$	Reference emissions due to electricity generation during the period $p$ [tCO <sub>2</sub> /p]
$RE_{heat,p}$	Reference emissions due to heat generation during the period $p$ [tCO <sub>2</sub> /p]

Reference emissions due to electricity generation are calculated as follows.

$$RE_{elec,p} = ES_{grid,p} \times EF_{grid} + ES_{offgrid,p} \times EF_{offgrid}$$

$RE_{elec,p}$	Reference emissions due to electricity generation during the period $p$ [tCO <sub>2</sub> /p]
$ES_{grid,p}$	Electricity supplied to the grid or to industrial customers connected to the grid during the period $p$ [MWh/p]
$EF_{grid}$	CO <sub>2</sub> emission factor of the grid [tCO <sub>2</sub> /MWh]
$ES_{offgrid,p}$	Electricity supplied to industrial customers not connected to the grid during the period $p$ [MWh/p]
$EF_{offgrid}$	CO <sub>2</sub> emission factor of industrial customers not connected to the grid [tCO <sub>2</sub> /MWh]

Reference emissions due to heat generation are calculated as follows.

$$RE_{heat,p} = HS_{ic,p} \times \frac{1}{\eta_{BRE}} \times EF_{RE}$$

$RE_{heat,p}$	Reference emissions due to heat generation during the period $p$ [tCO <sub>2</sub> /p]
$HS_{ic,p}$	Heat supplied to industrial and commercial facilities during the period $p$ [GJ/p]
$\eta_{BRE}$	Efficiency of reference boilers
$EF_{RE}$	CO <sub>2</sub> emission factor of fossil fuel consumed for reference boiler [tCO <sub>2</sub> /GJ]

## G. Calculation of project emissions

Project emissions are calculated on the basis of fossil fuel combustion and transport of biomass.

$$PE_p = PE_{FF,p} + PE_{TR,p}$$

$PE_p$	Project emissions during the period $p$ [tCO <sub>2</sub> /p]
$PE_{FF,p}$	Project emissions due to fossil fuel combustion during the period $p$ [tCO <sub>2</sub> /p]
$PE_{TR,p}$	Project emissions due to transport of biomass during the period $p$ [tCO <sub>2</sub> /p]



Project emissions due to fossil fuel combustion are calculated as follows.

$$PE_{FF,p} = \sum_i FC_{i,p} \times NCV_{i,pj} \times EF_{i,pj}$$

$PE_{FF,p}$	Project emissions due to fossil fuel combustion during the period $p$ [tCO <sub>2</sub> /p]
$FC_{i,p}$	Fossil fuel $i$ consumed during the period $p$ by the equipment during the period $p$ [mass or volume unit].
$NCV_{i,pj}$	Net calorific value of fossil fuel $i$ [GJ/mass or volume unit]
$EF_{i,pj}$	CO <sub>2</sub> emission factor of fossil fuel $i$ [tCO <sub>2</sub> /GJ]
$I$	Type of fossil fuel

Project emissions due to transport of biomass are calculated as follows.

$$PE_{TR,p} = \sum_j RH_{j,p} \times D_j \times EF_{CO_2,f}$$

$PE_{TR,p}$	Project emissions due to transport of biomass during the period $p$ [tCO <sub>2</sub> /p]
$RH_{j,p}$	Quantity of rice husk procured from rice mill $j$ during the period $p$ [tonnes/p]
$D_j$	Distance from the biomass generation plant to rice mill $j$ [km]. If quantity of rice husk cannot be obtained for a particular rice mill, then the farthest rice mill from which rice husk is procured is taken as the value for $D_j$ .
$EF_{CO_2,f}$	CO <sub>2</sub> emission factor of transport
$J$	Rice mills from which rice husks are procured.

## H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p$$

$ER_p$	Emission reductions during the period $p$ [tCO <sub>2</sub> /p]
$RE_p$	Reference emissions during the period $p$ [tCO <sub>2</sub> /p]
$PE_p$	Project emissions during the period $p$ [tCO <sub>2</sub> /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
$EF_{grid}$	CO <sub>2</sub> emission factor of the grid	Emission factor is derived from the result of calculation by using IEA macro data. This value should

		<p>be revised every year until public value will be available.</p> <p>See the additional information in more detail.</p>
$EF_{offgrid}$	CO <sub>2</sub> emission factor of industrial customers not connected to the grid	<p>0.8tCO<sub>2</sub>/MWh</p> <p>From CDM methodology "AMS-I.A. Electricity generation by the user"</p>
$\eta_{BRE}$	Efficiency of reference boilers	<p>Selected from the default value set in the methodology. In the order to preference:</p> <p>a) Specification of reference boiler for heat supply.</p> <p>b) Default value from CDM Methodological tool "Tool to determine the baseline efficiency of thermal or electric energy generation systems"</p>
$NCVi$	Net calorific value of fossil fuel $i$	<p>Selected from the default values set in the methodology. In the order to preference:</p> <p>a) values provided by the fuel supplier; b) measurement by the project participants; c) regional or national default values; d) IPCC default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Lower value is applied.</p>
$EF_j$	CO <sub>2</sub> emission factor of fossil fuel $i$	<p>Selected from the default values set in the methodology. In the order to preference:</p> <p>a) values provided by the fuel supplier; b) measurement by the project participants; c) regional or national default values; d) IPCC</p>

		default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Lower value is applied.
$EF_{CO_2f}$	CO <sub>2</sub> emission factor of transport	Agency for Natural Resources and Energy: Logistics-Bunya Ni Okeru CO2 Haisyutu-Ryo Santei Hoho Kyodo guideline (Ver3.0), Domestic vessel

**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 CO<sub>2</sub> emission factor for Myanmar which is approved by UNFCCC so far. Under the circumstances, we consider the CO<sub>2</sub> 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 CO<sub>2</sub> emission factor of Myanmar. The grid average CO<sub>2</sub> emission factor can be calculated by using the fuel consumption data of Myanmar and fuel-specific CO<sub>2</sub> emission factor as defined in IPCC 2006GL. This results in fuel-specific and grid average CO<sub>2</sub> 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 CO<sub>2</sub> emission factor of the grid in Myanmar according to fuel [t-CO<sub>2</sub>/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 CO<sub>2</sub> emission factor of 0.230t-CO<sub>2</sub>/MWh, using methods

approved under CDM. This means that the grid average CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> emission factor under the JCM scheme.

## Joint Crediting Mechanism Project Design Document Form (Draft)

### A. Project description

#### A.1. Title of the JCM project

Rice husk based power generation in the Pathein Industrial City

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

Pathein Industrial City plans to provide an electricity supply from the national grid. However, as national electricity demand is increasing, it would be difficult to provide the whole electricity demand in industrial zone from the national grid. Therefore, some needs to be supplied elsewhere from generation resource that does not rely on the national grid; there is strong interest in renewable energy as a locally distributed energy resource.

To attract factories, it is essential to prepare a power supply system, and an independent power supply system within the industrial zone is needed. Partially building a power plant, prior to attracting factories, is needed and specific measures must be considered promptly.

“Power plant project using rice husks (estimate output of 3 MW, planned to start operating in 2019)” As a power plant facility to be prepared in advance in Pathein Industrial City, a biomass power plant project will be developed using rice husks as fuel. Local needs for effectively using rice husks generated from numerous rice mills in Pathein were expressed at the workshop. A power plant project using biomass fuels such as rice husks, meets local needs well from the aspect of appropriately treating and using rice husks and from the aspect of providing stable power supplies in the industrial zone. In addition, with the development of municipal waste measures (e.g. promoting 3R) in mind, plastic waste (e.g. PET bottles) will be collected at sites such as schools, as a model for municipal waste separation and collection. The collected plastic waste will be co-fired in the biomass power plant (impact from environmental education on waste separation is expected as well).

<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 in the industrial zone, off-grid.

#### 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, Longitude: 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

## &lt;Innovative measures that consider local characteristics&gt;

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).

## &lt;Importance of comprehensive (interdisciplinary) approach&gt;

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.	Rice husk based power and/or heat generation
Version number	(Methodology not Approved)

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

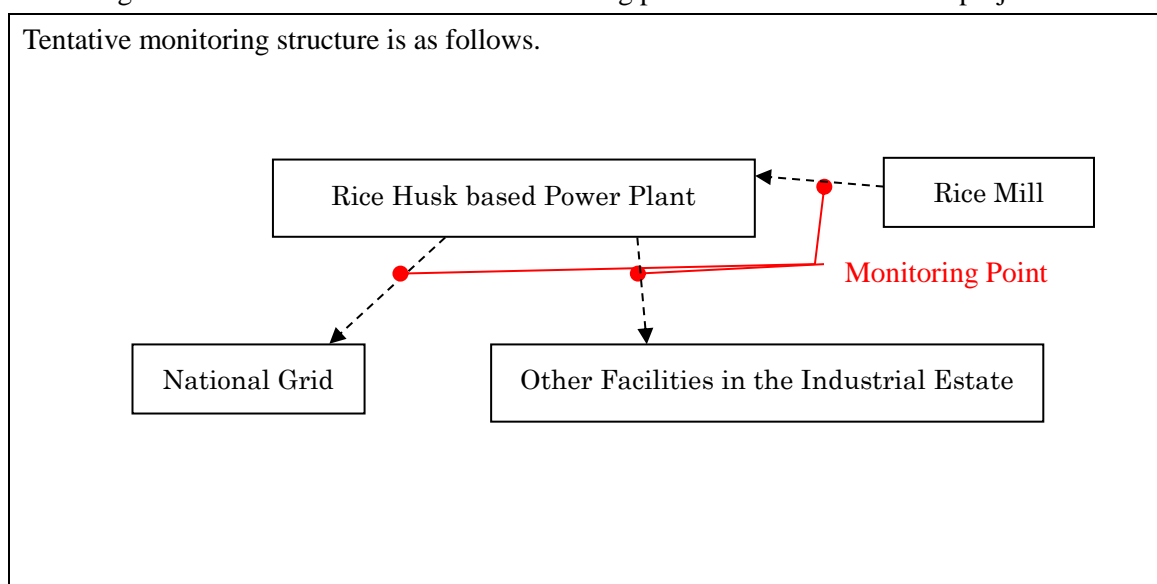
Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Cogeneration or electricity generation projects using rice husks.	Electricity generation projects using rice husks.

**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
Electricity delivered to the electricity grid, and / or to captive users	CO <sub>2</sub>
Heat delivered to the electricity grid, and / or to captive users	CO <sub>2</sub>
Project emissions	
Emission sources	GHG type
Fuel consumed by the project plant	CO <sub>2</sub>
Transport of rice husk to the project plant	CO <sub>2</sub>

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



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO <sub>2e</sub> )	Estimated Project Emissions (tCO <sub>2e</sub> )	Estimated Emission Reductions (tCO <sub>2e</sub> )
2017			
2018			



2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO <sub>2e</sub> )	N/A	N/A	N/A

**D. Environmental impact assessment**

Legal requirement of environmental impact assessment for the proposed project	N/A
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**E. Local stakeholder consultation**

E.1. Solicitation of comments from local stakeholders

N/A
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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 treatment system in Patheingyi Industrial City)) Report

February 2017

Mitsubishi Research Institute, Inc. & Fujita Corporation