Appendix I
Overview of Project Results
Understanding the local needs

- Sagaing Region and Ayeyarwady Region, which are the major rice cultivation sites, have difficulty in dealing with a large amount of rice husk produced. (In the areas with large rice cultivation, their waste is mainly rice husk.)

- With the economic development, the problem of power supply is becoming more serious. The promotion of energy access and waste management are the top priority in Myanmar.

The Central Government (Myanmar President Office, Ministry of Energy, etc.) and the Sagaing Regional Government have strong interest in the ICM Project between the two countries (rice husk power generation project) in the Myanmar Township in Ayeyarwady Region as a new solution which they can expect to prevail and expand in many areas in Myanmar. We are asked for future policy dialogue and cooperation, including the assistance in planning and capacity building in collaboration between Sagaing Region and Ayeyarwady Region.

* Promoting waste management measures (including the local rice husk power generation project)
* Promoting the local microgrid system using renewable energy

<Background>
- While the Central Government was discussing the geographically-distributed power system, the Vice President requested MAPCO, which is a local partner, to consider the expansion beyond the Ayeyarwady Region regarding the first ICM rice husk power generation project in Myanmar (Mying Mya Pt, Fujita/MAPCO). (As a specific candidate site, Shwebo Township in Sagaing Region was named.)
- Accordingly, MAPCO conducted an on-site survey independently, and people of Fujita conducted preliminary research in June.
- Under such circumstances, they requested developmental cooperation in the collaboration between Sagaing Region and Ayeyarwady Region. (An official document was issued from the responsible minister of the region addressed to Mayor of Fukuoka City)

1) Promoting waste management measures (including the local rice husk power generation project)
2) Promoting the local microgrid system using renewable energy

- In the local workshop in Sagaing Region in September, we gained understanding of the significance of this project and its implementation policy in presence of the chief executive of the region and other relevant parties.

Subjects where intercity cooperation is seen

Promoting shared understanding of the direction of cooperation

- Basic policy of project expansion through intercity cooperation
  - By utilizing intercity cooperation among Fukuoka City, Ayeyarwady Region, and Sagaing Region, it is possible to understand the status of municipal waste and industrial waste including rice husk in provincial areas. At the same time, based on the experiences in taking measures against waste in Japan, it can be possible to specify the problems that will come to surface in the future and countermeasures against them (basic policy, etc) through the policy dialogue.
  - In the rice husk power generation project, it is essential for the regions to procure rice husk over a long term in a stable manner. Also, it is important that the government side should promote the appropriate treatment of rice husk produced in rice mills. Through discussing concrete measures for tightening regulations, the project expansion in terms of policy can be expected, such as tightening of regulations over purification of rice husk, which has a large environmental impact.

- Expected effects
  - Effective use of rice husk waste and its economic benefit
  - There is a high demand for effective use of rice husk around the industrial complex where this project is located. Therefore, its effective use will bring rice milling businesses an economic benefit.
  - Electricity supply in the industrial complex
    - In the industrial complex, electricity can be supplied for the power demand during construction from the grid. This will allow stable production in the industrial complex.
  - Supplying green energy to the industrial complex and securing autonomous distributed power sources which are strong against disasters
    - Advanced regions in Myanmar should take disaster prevention measures because they have severe floods in wet seasons. Autonomous distributed power sources will allow power supply at the time of disaster and contribute to the resiliency of the regions.
  - Expansion to new business opportunities
    - While industrial development in the region is becoming an important issue with the economic development, fostering new industries (processed goods of rice, processing of agricultural products, distribution of fishery products, etc.) is becoming more important. The rice husk power generation facilities of this project can provide not only electricity but also heat to the industrial complex. As for heat utilization, rice husk can be used as various heat sources; for example, improving quality by using it for drying rice husk, using it for processing beans and fishery products. It is expected to lead to the creation of new businesses.
  - Improvement of power access in the local community
    - Various problems with the promotion of energy access and waste management are a top priority in Myanmar. The rice husk power generation project is expected to be a new solution, which is expected to be widely used in many areas in Myanmar. The central government of Myanmar is changing its policy to actively use a distributed power system (renewable energy, microgrid, etc.) in order to drastically improve electricity supply. This project can be expected to be a business model which embodies a governmental policy like this.

Significance and benefits of the existing Industrial complex with many rice mills, which is considered as a promising project site.

(The first project in Ayeyarwady Region is a new Industrial complex, while this project is an applied model in the existing Industrial complex.)
Subjects where intercity cooperation is seen

We took up experiences in policy making, achievements, and promising techniques regarding planning of waste management, geographically-distributed autonomous power systems (waste power generation, local production for local consumption, and examined measures to use them. In this regard, through the intercity cooperation between Ayeyarwady Region, Sagaing Region, which share the same issues, we examined measures to create the model of advanced regions in Myanmar based on the results of examination in the last fiscal year.

<table>
<thead>
<tr>
<th>Tasks to be considered</th>
<th>Experiences in Fukushima City, etc.</th>
<th>Application of the results of examination in Ayeyarwady Region</th>
<th>Expansion in Sagaing Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of appropriate management of rice husk waste</td>
<td>Training and awareness-raising through the Chamber of Commerce</td>
<td>Dialogue with rice milling businesses</td>
<td>Learning from experiences in Fukushima City and the preceding experiences in Ayeyarwady</td>
</tr>
<tr>
<td>Awareness of the problem of rapidly increasing municipal waste</td>
<td>3R movement, cleaning activities by local companies and groups, resource recovery activities, etc.</td>
<td>Re-classification of waste in landfills (to start waste reduction)</td>
<td>Otto (Introducing the expansion of environmental education in elementary schools in Pathelin City and Fukushima City, introducing waste management in Fukushima City)</td>
</tr>
<tr>
<td>Planning, system building, and capacity building</td>
<td>Basic plan of waste management (waste management system, points to remember, low-carbon approach. Particularly, examples of recycling and waste power generation.)</td>
<td>Share the Expansion Policy formulated based on the last year’s discussion</td>
<td>Deepening the understanding of the importance of Basic Plan (sharing the results of the policy dialogue with Ayeyarwady in the local workshop in February)</td>
</tr>
</tbody>
</table>

The workshop in the region in February was jointly held so that both parties from Ayeyarwady Region and Sagaing Region could participate, which helped establish cooperation and share experiences between the Regions.

<table>
<thead>
<tr>
<th>No</th>
<th>Task to be implemented</th>
<th>Targets</th>
<th>Content of survey</th>
<th>Results of examination</th>
<th>Future implementation policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>Examination of feasibility of project</td>
<td>Determine the system to be introduced (until Dec.)</td>
<td>Make a trial calculation of cost effectiveness (until Jan., screening in Feb.)</td>
<td>Determine the system introduced and make a trial calculation of cost effectiveness (cooperation with Japanese companies, examine the source of equipment, O&amp;M methods, measure for local human resource development, etc.)</td>
<td>Discussion on equipment procurement, O&amp;M, etc. with three Japanese companies (Dec.) - Determination of the scope of power generation facilities (the first phase is assumed to be a size of 1MW in the industrial complex in Shwebo Township) - Among the relevant parties, MIFF and MAPO agree on the implementation of rice husk power generation with 1MW or more. It will be further discussed to concretize the plan in the future.</td>
</tr>
<tr>
<td>Task 2</td>
<td>Coordination with regional development</td>
<td>Confirm the current status and future plan (until Dec.)</td>
<td>Make the project expansion model through draft until Dec., examination until Feb.</td>
<td>Understand the local needs (until Dec.)</td>
<td>Confirm the feasibility of political promotion measures (until Feb.)</td>
</tr>
<tr>
<td>Task 3</td>
<td>Coordination with power purchaser</td>
<td>Group the power selling price standard (workshop in Sep., until Feb.)</td>
<td>Formulates the power utilization plan (short-term, medium-term, long-term) and conceptualize the supply plan (until Feb.)</td>
<td>Discuss the conditions of power selling price, in particular in consultation with local companies, examination of consultation with Ministry of Electricity and regional government</td>
<td>Shared recognition in the Ministry of Energy of the region - Discussions with MIFF (Ayeyarwady Foundation Rice Power) and MAPO - Discussions at the working-level offices with relevant ministries and agencies - For the development of rice milling businesses, an effective approach to the utilization of renewable energy, CO2 emission control, and protection of the environment, utilization of which are also important</td>
</tr>
</tbody>
</table>

Regarding the power supply policy (including and connection and management), it is necessary to coordinate with the central government. Therefore, its advancement is a prerequisite (the clarification for more concrete discussion on policy and technology).
### Differences from the first project in Myaungmya

**[Similarities]**
- As there are no large rivers nearby, pumping up underground water may affect rice cultivation. Therefore, steam cooling should be changed into air cooling.
- The initial cost will increase. However, its reduction should be considered by reviewing the facilities of the first project.
- Because the ground is assumed to be better than that in the first project, the construction cost will not be higher.
- Purchasers of extra power should be examined.

**[Candidate site 1: Shwebo Township]**
- In order to secure the required amount of rice husk, it is necessary to organize small- and medium-sized rice milling businesses into a public rice husk supplying corporation.
- Advantages of the participation in the project should be clarified.

**[Candidate site 2: Wallet Township]**
- There are rice mills operating which already produce almost the required amount of rice husk.
### Contract method when the project is implemented

**Project structure:** SPC by Japanese companies and Myanmarese companies is formed and operated

<table>
<thead>
<tr>
<th>Introduction site</th>
<th>Phwebo Township in Sagaing Region (There are two candidate sites.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology introduced</td>
<td>Rice husk power generation</td>
</tr>
<tr>
<td>Power purchaser</td>
<td>Power is supplied to facilities of factories and neighboring areas</td>
</tr>
<tr>
<td>Project scheme</td>
<td>SPC (example: Japanese company + local partner) is assumed. EPC: Fujita, etc. (plan)</td>
</tr>
</tbody>
</table>

- The project will be implemented in the site that can ensure rice husk (planned to be Phwebo Township).
- There are 100 rice mills in Phwebo, so it is possible to collect enough rice husk. Particularly in the Phwebo industrial zone, there are as many as 100 rice mills. If the average output is 10 t, the total amount is 2,000 t and the amount of rice husk is 600 t. 100 t is required for 5 MW and 200 t for 60 MW. It is readily possible to procure the required amount of rice husk.
- For a long-term, stable rice husk power generation project, long-term stable procurement of rice husk is essential. Therefore, the governments, businesses, and industrial groups should cooperate with each other to build a mechanism for securing rice husk which is produced in the mills (build a system to support the smooth implementation of the JCM project).

### Approach by cooperation between Regions

- Meeting the needs of the local government by embodying the idea of power supply in the region through microgrid:
  - The first project in Ayeyarwady Region is a simple business model that uses all amount of power in rice mills. However, in this and other projects, we will consider a system where extra power will be supplied to neighboring communities and industries through microgrid.
  - We will use experiences and techniques about regional electricity projects and microgrid in Japan. (Cooperation with several electric power companies and electrical engineering companies is planned.) Utilization of Japanese techniques and experiences.

<table>
<thead>
<tr>
<th>Introduction site</th>
<th>Wally Township in Sagaing Region</th>
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</thead>
<tbody>
<tr>
<td>Technology introduced</td>
<td>Rice husk power generation</td>
</tr>
<tr>
<td>Power purchaser</td>
<td>Power is supplied to local partners and neighboring areas</td>
</tr>
<tr>
<td>Project scheme</td>
<td>SPC (example: Japanese company + local partner) is assumed. EPC: Fujita, etc. (plan)</td>
</tr>
</tbody>
</table>

- The project will be implemented in the site that can ensure rice husk (planned to be Wally Township).
- Large rice mills (planned to be 24kW level): One of the largest rice mills in Wally Village (rice milling capacity of 250 t/day). Rice husk 250 t/240 kW/day. The required amount for 24t 55 t. There are 11 small to large scale rice mills. 5 t can be collected from the neighboring rice mills.
- Regarding the facilities and the business scheme, those of the first project in Myanmar can be applied.

### Subject | Response and future implementation policy
---|---
Coordination with local relevant parties | • Create a basic plan of 3MW and 5MW rice husk power generation and suggest it to the relevant parties.
• Among the relevant parties, MRF and MAPCO agree on the implementation of rice husk power generation with 3MW or more.
**<Future implementation policy>**
• The actual organization of small and medium-sized rice milling businesses inside the Industrial Complex is scheduled to be discussed in March again.

Expansion of grid connection and microgrid | • In the local workshop in February, we obtained common understanding of the importance of utilization of renewable energy in the region when power supply is becoming a serious problem. (We obtained recognition not only from relevant parties and relevant businesses in the region, but from people from the Yangon government who attended the workshop. Also, we had an opportunity to explain this to the Minister of Agriculture, Livestock and Irrigation of the Union of Myanmar to whom we paid a courtesy visit.)
**<Future implementation policy>**
• Regarding the power supply policy including grid connection and microgrid, it is necessary to coordinate with the central government. Therefore, we will specify its advantages and disadvantages (for more concrete discussion on policy and technology).
<table>
<thead>
<tr>
<th>No</th>
<th>Task to be implemented</th>
<th>Targets</th>
<th>Context of survey</th>
<th>Results of examination</th>
<th>Future implementation policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Embarking on supporting measures by intercity cooperation</td>
<td>- Discuss the relevant parties of the region in the local workshop in February 2018.</td>
<td>Discussion on the relevant parties of the region in the local workshop and Fukutomi workshop.</td>
<td>In the local workshop in Sagaing Region in September, we gained the understanding of the significance of the project and the implementation policy in the region and its environment.</td>
<td>Building a relationship with the relevant authorities is a task to be tackled. (Building a technical relationship is essential for the implementation of CDM director level, investment screening, environmental regulations, etc.)</td>
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<td>- Provide policy guidance, etc. (workshop in Sagaing Region).</td>
<td>- Introduce the activities of the main activities in Sagaing Region.</td>
<td>Coordination was accomplished by taking the responsibility of the City Council workshop, an exchange with the Chamber of Commerce and Industry, etc.</td>
<td>Establishing a low-carbon model in the existing industrial complex with a cluster of rice mills which is considered a particularly promising project site (The first project in Asia)</td>
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<tr>
<td></td>
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<td>- Embody supporting measures until the local workshop in January.</td>
<td>- Support environmental education in school and awareness raising activities in Industrial groups.</td>
<td>Regarding the local workshop in February, it was jointly held, with a joint statement from the Ministry of Environment and the Sagaing Region. The workshop could participate in establishing a framework and sharing experiences between the Regions.</td>
<td>Establishing a low-carbon model in the existing industrial complex with a cluster of rice mills which is considered a particularly promising project site (The first project in Asia)</td>
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Local Situation

**Sagaing Region**

**Monywa City where its regional government is located**

Opinions were exchanged in the presence of the chief executive of the region (September 2017)

A support system was established on the region side under the leadership of the chief executive of the region.
Local Situation

Sagaing Region

Waste is scattered
(January 2018)

As in Ayeyarwady Region, it is confirmed that the waste problem is becoming more obvious along with the development of the economy.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Key activities</th>
<th>Outcome and future tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCM project is planned</td>
<td>Formulate a basic plan of 3MW and 5MW rice husk power generation and suggest it to the relevant parties. NRE and MACCO agreed on the implementation of rice husk power generation which produces 3MW or more of power.</td>
<td>Share the expansion policy for project creation with the relevant parties (NRF, MACCO) and agree on the direction. The actual organization of small and medium-sized rice milling businesses inside the industrial complex is scheduled to be discussed in March again.</td>
</tr>
<tr>
<td>Policy dialogue, etc.</td>
<td>Under the leadership of the chief executive of Sagaing Region, establish systems to examine projects on their side. Establish relationships with the responsible minister of energy. Through the local workshop, share the preceding experiences in Ayeyarwady (Share the master plan regarding waste in Ayeyarwady Region and the project expansion through rice husk power generation.)</td>
<td>Share recognition on expansion with not only the chief executive and the responsible minister of the region but other relevant parties including Minister of Agriculture, Livestock and Irrigation of the Union of Myanmar. (Securing electricity by renewable energy is an effective approach to the development of rice milling business; and controlling CO2 emissions and preventing environmental pollution caused by waste are important.) Building a relationship with working-level officials is a task to be tackled. (Building a trustful relationship is essential for the implementation of JCM.) Further policy dialogue is required to implement the introduction of the microgrid system and the collaboration in the development of surrounding communities. (the chief executive of Sagaing Region has the same recognition of the issue.)</td>
</tr>
<tr>
<td>Business exchange and capacity building</td>
<td>Through the local workshop, Activities of companies in Fukushima City (renewable energy, environment, etc.) were introduced to relevant business parties there. Opinions were exchanged on the possibility of cooperation between companies in Myanmar and Fukushima City. Importance of dialogue to embody businesses was confirmed and recognition was shared.</td>
<td>It should be understood that not only policy formation but project creation in the business sector has an important role in realizing a low-carbon society. Companies should understand that this is a business opportunity (which is learned through the examples of companies in Fukushima City). Dialogue with Chamber of Commerce and companies in Myanmar was a new attempt. Because of this, we share the recognition that continued exchange is important. (From business dialogue triggered by policy dialogue to the utilization of functions of the Chamber of Commerce, and further to business that will...</td>
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Condition of the sites

Candidate site 1: The Shwebo Area (large industrial complex)
- 80% of the 357 lots have already been occupied by factories, and 50% of them are rice mills. (It is a cluster district of rice mills).
- It seems there is a large amount of unused rice husk produced.
- The power is supplied by the grid, but diesel power generation is used when there is a shortage. Securing of stable electricity is a priority.

Candidate site 2: the Wallet Township (large rice mill)
- Size: Currently it has a rice milling facility which handles 150 tons of rice per day, which produces 30 tons of rice husk per day.
- In this fiscal year, another rice milling facility, which handles 100 tons of rice per day, will be added. Thus, this mill will produce 50 tons of rice husk per day.
- At present, although the power demand is almost satisfied, there is a little uncertainty because of the economic development around the area. Because there is no usage of rice husk, it is being burned in a large vacant lot.

Building a cooperative relationship with key persons in the region (building a bond)
- Ministry of Agriculture, Livestock and Irrigation of the Union of Myanmar
- Government officials in both Ayeyawady and Sagaing Regions
- Government officials in Yangon
- Members of the Chamber of Commerce (President, vice-president, etc.)
- People of MAPOC (President, etc.)

We were able to draw out the charm of Fukushima and their interest in agricultural products.

Policy dialogue with Myanmar, promoted by the Ministry of the Environment
- Linked with the export of the environment infrastructure
- We introduced activities in the workshop in Yangon, which was hosted by the Japanese Ministry of the Environment (in the presence of Vice Minister of the Environment)
- Myanmar showed much interest in the activities (The report of this fiscal year will be also provided.)

The initiative of Fukushima was showcased, which raised high expectations.

- Clarifying local needs
- Sagaing Region: Improve electric power in the existing industries (Embody the idea of introducing the microgrid system and the linkage to the development of surrounding communities. As a model of an advanced region, it gains high expectations from the top of the central government.)

From business dialogue triggered by policy dialogue to utilisation of network functions of the Chamber of Commerce, and further to business that will contribute to building a low-carbon community

Sagaing Region
- Policy dialogue and business dialogue for establishing a business model of local power supply including rice husk power generation and microgrid in the industrial complex with a cluster district of rice mills
- Provision of experiences and knowhow about the introduction of renewable energy to the region and knowhow about electricity work, installation and maintenance of electric facilities. (Business knowhow that is very common in Japan may be a treasure for Myanmar)
Appendix II
Workshop Agenda, Minutes, and Photos
Appendix II Contents

1. Sagaing Region Workshop (September 2017)
   Agenda and Minutes
2. Yangon Workshop (February 2018) Agenda
   and Minutes
3. Reporting of City-to-City Collaboration
   Activities in Naypyidaw (March 2018)
4. Photos from the Workshops
Workshop in Sagaing Region
-September 2017-

<A agenda and Minutes>
Workshop Agenda

Workshop of Partnership for Low Carbon Initiative in Sagaing

Date: 25th September 2017
Place: Monywa, Sagaing region

Objective
Under inter-regional collaboration in Sagaing region and Areaway region, JCM (Joint Crediting Mechanism Project) feasibility of a low-carbon waste treatment system (e.g. power plant projects using fuels such as rice husks) and micro grid system are studied. The workshop facilitates efforts on creation of regional waste treatment system and local distributed self-reliance power system (e.g. capacity building, and planning support for facilitating the implementation of waste treatment project) in the regions.

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

Presentations from Japanese side
Background, Project Outline
Concept proposal of Rice husk power generation and micro grid system
(including introduction of Myaung Mya rice husk power generation project)

Discussion and Closing
Closing Remark
Workshop in Yangon
-February 2018-

<Agenda and Minutes>
Background and Objective

Partnership for Low Carbon Initiative between Fukushima city (Japan) and Myanmar regional governments (with Ayeyarwady region: starting from in 2015, and with Sagaing Region: starting from 2017) aims to following;

- Accelerating action for low-carbonization of cities, by formulating the Joint Crediting Mechanism (JCM) projects (feasibility study).
- Facilitating policy formulation by dialogue under city to city cooperation with Fukushima city, Ayeyarwady region and Sagaing region (having workshop).

Under the Partnership for Low Carbon Initiative between Fukushima city and Ayeyarwady region, many workshops were implemented in both of Fukushima city, and Pathein city, sharing the experiences of policy planning and activities in Fukushima city and, discussing the candidate JCM Projects and recognized issues, future perspectives and idea of action plan.

One of key outcomes of our partnership is development of Rice Husk Power Generation project in Myaung Mya Township (now under construction). The project is the new problem-solving approach for solving energy access and waste management. This approach is expected to spread in many rural communities in Myanmar. Hence, further policy dialogues and cooperation, such as supports of developing plans and capacity building in following fields under inter-regional collaboration in Ayeyarwady regional government and Sagaing regional government are highly expected.

- Promotion of waste treatment measures (including rice husk power generation system in local communities)
- Promotion of renewable energy based micro-grid system in local communities
- Solar power generation system and solar powered low-carbon water treatment system

The workshop will facilitate city to city cooperation for improvement of energy access, and sustainable waste treatment system e.g. rice husks.

- Sharing experiences of policy planning in Fukushima city and achievement of policy dialogue between Ayeyarwady region and Fukushima city.
• Discussion on candidate projects, and approach for regional waste treatment system and local distributed self-reliance power system (e.g. capacity building, and planning support for facilitating the implementation of waste treatment project) in the regions.
## Agenda of Workshop

<table>
<thead>
<tr>
<th>Date and Venue</th>
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<tbody>
<tr>
<td><strong>Date</strong></td>
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<td><strong>Venue</strong></td>
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<table>
<thead>
<tr>
<th>Program</th>
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<tbody>
<tr>
<td><strong>Opening remark</strong></td>
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<table>
<thead>
<tr>
<th>from Japanese side</th>
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<tbody>
<tr>
<td>• Introduction of Partnership for Low Carbon Initiative, and Sharing the activities of policy dialogue between Ayeyawady region and Fukushima city</td>
</tr>
<tr>
<td>• Introduction of Fukushima City and Policy in Fukushima City</td>
</tr>
<tr>
<td>• Business Case of Companies in Fukushima</td>
</tr>
<tr>
<td>• Idea of new solution model (i.e. Rice husk power generation, PV system and microgrid system)</td>
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<tr>
<th>Coffee brake</th>
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<tbody>
<tr>
<td><strong>from Myanmar side</strong></td>
</tr>
<tr>
<td>- Current situation and prospective in the region on the topics of electrification (including micro-grid), and waste management (solid waste and waste water)</td>
</tr>
<tr>
<td>- Expectation to our partnership</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Discussion</th>
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<tbody>
<tr>
<td>Q&amp;A, ideas and comments for further cooperation</td>
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<tr>
<th>Closing</th>
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<tbody>
<tr>
<td>Closing Remarks (Myanmar side &amp; Japanese side)</td>
</tr>
</tbody>
</table>
Network Meeting

between Fukushima Chamber of Commerce & Industry, and Chambers of Commerce and Industry in Myanmar

Background and Objective

Fukushima City Government, Fujita Corporation, Mitsubishi Research Institute, Fukushima Chamber of Commerce & Industry and Myanmar regional governments (Ayeyarwady Region: starting from in 2015, and with Sagaing Region: joining from 2017) has built a cooperative relationship under the Partnership for Low Carbon Initiative in Myanmar.

Policy dialogue and business dialogue were implemented in various workshops at Fukushima city, and Pathein city. We are sharing the experiences of policy and discussing the candidate cooperative projects in mainly renewable energy and environmental sectors.

**Key Activities in FY2016:** Workshop in Pathein City (September 2016), Workshop in Fukushima City (October 2016), Discussions with visitors to Japan, site visits (January 2017, Tokyo), Workshop in Pathein City (January 2017)

**Key Activities in FY2017:** Workshop in Fukushima City (July 2017), Sagaing Region joins the city to city partnership for Low-Carbon City (from September 2017), Workshop in Pathein City (September 2017), Workshop in Fukushima City (January 2018), Workshop in Yangon (February 2018)

Myanmar various business opportunities in an emerging economy. In the experience in Japan, companies diversified their business activities during the period of high economic growth. Japanese experiences and technologies are highly expected for Myanmar business sectors. Especially, small and medium-sized enterprises in local city play key roles of developments of the local economy and solving local issues such as energy supply, environment
protection, recycling, agriculture & food production, logistics, local infrastructure fields.

This meeting will facilitate business networking between Fukushima Chamber of Commerce & Industry and Chambers of Commerce and Industry in Myanmar with sharing both of organization activities and business activities.
# Agenda of Network Meeting

between Fukushima Chamber of Commerce & Industry, and Chambers of Commerce and Industry in Myanmar

<table>
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<th>Date and Venue</th>
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<td><strong>Date</strong></td>
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<tbody>
<tr>
<td><strong>Opening remark</strong></td>
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<tr>
<td><strong>Greeting</strong> (Japanese side)</td>
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<tr>
<td>Fukushima Chamber of Commerce &amp; Industry</td>
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<tr>
<td>Fukushima City</td>
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<tr>
<td><strong>Greeting</strong> (Myanmar side)</td>
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<tr>
<td><strong>Introduction of our activates: Partnership for Low Carbon Initiative between Japan and Myanmar</strong></td>
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2018/2/6 Partnership for Low Carbon Initiative in Ayeyarwady Region & Sagaing Region

Workshop Minutes of Meeting

Opening Speech from Japan

Mingalarpar! I am Kazuhiro from the Department of Environment. I am so glad to meet the government officials, responsible persons from Ayeyarwady and Sagaing Regions, distinguished guests from MAPCO. This project has been implemented under participation of Fukushima city for three years. Fukushima City introduced the activities of waste management and renewable energy production. In last July, the responsible officers from Ayeyarwady Region came to Fukushima and studied Mega Solar Project and Waste Management operation. I would like to introduce about Fukushima’s policy later. As a conclusion, we believe that it will be benefited to Ayeyarwady Region, Sagaing Region, Fukushima city and for Japan-Myanmar both countries as initiating from this workshop.

Opening Speech from Japan
Opening Speech from Fukushima Chamber of Commerce and Industry

My name is Ayako Wago, Vice-Chairman of Fukushima Chamber of Commerce and Industry. It has been three years working together with Pathein City and I am so glad on the potential to work together with Sagaing Region. It has also described our Fukushima Chamber of Commerce and Industry in such performances. As you all know, Fukushima had to face the natural disaster in 2011. There were many international helps and it was decided to start using Renewable Energy that time. Well now, Fukushima is implementing to be the modernized state in Renewable Energy Sector in Japan. We are very proud to be able to utilize the technologies of Fukushima in Ayeyarwady and Sagaing Regions. I am wishing to sustain and last long the friendship initiating from this workshop. Thank you.
Cooperatives

Japan-Myanmar Cooperation is implementing the structural project as shown in figure, in Ayeyarwady Region in 2015 and in Sagaing Region in 2017, especially analysis of producing electricity using rice husks and solar system. Similarly, the delegates from Myanmar were sent to Japan and we also came to Myanmar. In last year July, a delegate from Myanmar went to Japan and studied the Fukushima Solar Power Plant, biomass project of food beverage factory and its waste water management. In studying the environmental education of Fukushima, the primary students in Fukushima sent the motivational video to Myanmar students and Myanmar students also delivered back responsibly. By this, the environmental works and renewable energy projects which are going to be conducted by Myanmar and Fukushima State are broader economic opportunities for all.

Introduction about Fukushima City
Introduction about Fukushima Chamber of Commerce and Industry

The objective of Fukushima Chamber of Commerce and Industry is to be briefed as Ms Wago had shared before. Firstly, I would like to introduce Daizen Logistic Company, the head quarter is located in Fukushima and the country office in Myanmar is located in Thilawa Special Economic Zone. We are now developing the storage system which can store the imported raw materials before tax consumption. We believe that this will be supportive to Myanmar country development by introducing new system like this. Konno Recycle Company is doing reproduction of tissues and papers by recycling the after used newspapers and paper boxes. Uchiike Jozo Company is producing electricity by biomass. It produces electricity by using Methane gas gain from the production of Japan Miso soy paste and soy sauce. Moreover, Mega Solar Projects are also running in large fields in Fukushima. Kato Iron Company produces Kato-method automated running water dust remover and Cubicle (electricity equipment). The Khinsuishou alcohol in the figure is the golden awards winner for eight years continuously and there are also rice breads. Rice bread is more diligent than wheat bread and delicious. Fukushima jams are also famous and the one which Ms. Wago advertised before was Anpo Kaki tart jam. That is all from Japan side.

Mr. Ye's comment
14

...
I would like to explain the objective of today event and ongoing tasks to the officials from government departments especially. Now MAPCO established by the Rice Producer Association is trying to produce rice based value added products. Once, there was Power Generation Unit (PGU) to produce electricity from rice husks and it was almost vanished without progress because of several reasons. In this regard, the production of electricity from rice brans and biomass accompanying with rice husker was prioritized and is now reached to the state of producible to 2.2 MW in Kyauklat. The 2.2 MW amount of electricity is not much though but the electricity consumption of entire Kyauklat is only above 1MW. So, this is not just fulfilling the need of electricity in villages but also distributing to the off grid-area away from Mahar power line. Moreover, the waste management of rice husks is complicated. Some farmer wastes rice husks to the river banks and it causes water pollution which has impact to the marine animals. Some does open burning of rice husks in open grounds which has also large negative impact to the natural environment. So, this systematic close burning is not just for producing electricity but also eliminating the problems of unsystematic rice husks waste management. Apart from that, the ash gain from burning wasted rice husks is rich in Silica and it is good for reusing implemented in Kyauklat. Again, it is implementing 1.6 MW power plant in cooperation with Fujita in Myaungmya in Ayeyarwady Region. The tasks are finished in Kyauklat and the construction works are started in Myaungmya. Two projects are implemented in Ayeyarwady Region and there are also plans to continue implementation in Shwebo in Sagaing Region with the aids of Japan. It is estimating to produce 3-3.2 MW in Sagaing Region Project. Feasibility Study will be continued. The ambition of Myanmar Rice Federation is the production of electricity from rice husks to 50 MW. The important thing is the amount of rice husks required to produce electricity can be gain from combination of 3-4 large rice millers. In Thailand, up to 1.6 MW of electricity is produced regularly from 500 tons per day rice miller and about 3 MW is produced in 1,000 tons per day rice miller. There are also electricity productions to 5-10 MW by combining two of 1,000 tons per day rice huskers. There are plans to implement the system of electricity production from rice husks by boiler turbines in cooperating managements with technical, financial aids from Japan. Myanmar Rice Federation has also plans to reestablish the PGU existed once which are almost disappeared because of several reasons from the private sector role. Our country is even on the situation of cutting out from engineer generation and it is also aimed to reconnect it. Moreover, the relative Silica rich ash can be used in construction materials and cement. In conclusion, the capacity of
producing electricity by rice husks is to 50-100 MW. On second thought, the electricity production Myanmar is depending on hydropower and natural gas mostly. We are very weak in using renewable energy. Renewable energy is used for conserving the natural environment and to substitute the hydropower in summer times. The peak husking of rice is accelerated in the months of November, December, January, February and in other words which is the time when hydropower production is reducing. The accelerated operation of rice millers in these months is highest and which is the times of exporting rice before the drops of rains. Again, it is discussing with the government on how to deliver the produced electricity to Mahar power line. The discussion is on how to cooperate with ELC with the commission chairman Thura U Shwe Man in Nay Pyi Taw together with Dr Tun Naing and Daw Mi Mi Khaing.

On the other hand, there are the productions of value added products from rice like bran oil. This technology was also good once in Myanmar but was weaker without improving. The sector role of public and private was not mild. If this transition is mild, it will be benefits for the people who should deserve. Therefore, our Myanmar Rice Federation is prioritizing rice and going to redevelop electricity production by rice husks and rehabilitate the rice bran oil factory. The production of electricity from rice husks was done in two projects and is now to continue implementation in Shwebo. Bran oil machine will be established in Kyaiklat and Tonta as fast as possible and so thanking to the condition favoring the practical implementation of building capacity to Myanmar national ethnic engineers including the rural development and industrial development based on agriculture by the public and private sectors in meeting with the Ministry of Agriculture, Livestock and Irrigation and Ministry of Electricity and Energy while the Japanese experts are in Myanmar. I would like to conclude by requesting the officials to judge and support the requirements in our continuation.

Renewable Energy Policy of Fukushina
Comment

In the recent years, the demand for electricity has increased significantly in Sagaing Region. In order to meet this demand, we are conducting two projects in Sagaing Region and studying the production of electricity from rice husks. For the Myangmya Project, Business Scheme which can be cooperatively performed by Fujita Company and domestic companies has been established. It is also planned to conduct next large project in Shwebo Industrial Zone. The major challenge is how to combine the spreading rice huskers. The next challenge is how to deliver the electricity produced to the national grid or by off grid. The plan to produce 3 MW of electricity by rice husks in Sagaing Region is confirmed and ensured. The large blank block of land is needed for installing large machineries and turbines. The attended gentlemen from Sagaing Region are requested to give suggestion for land place for 3-5 MW power plant. The appearance will be similar to the one in Myangmya Township. It will be very important on how to combine rice huskers and how to utilize the Silica and ash outcome as Mr U Ye comment.

Comment from Japan side

As I mentioned before, we are conducting two projects in Sagaing Region and studied about the rice husks and rice huskers needed for production 2MW of electricity for Wetlet Township. For Myangmya Project, Business Scheme which can be cooperatively performed by Fujita Company and domestic companies has been established. It is also planned to conduct next large project in Shwebo Industrial Zone. The major challenge is how to combine the spreading rice huskers. The next challenge is how to deliver the electricity produced to the national grid or by off grid. The plan to produce 3 MW of electricity by rice husks in Sagaing Region is confirmed and ensured. The large blank block of land is needed for installing large machineries and turbines. The attended gentlemen from Sagaing Region are requested to give suggestion for land place for 3-5 MW power plant. The appearance will be similar to the one in Myangmya Township. It will be very important on how to combine rice huskers and how to utilize the Silica and ash outcome as Mr U Ye comment.
In the project to be implemented by combining the mini rice millers in Shwe Bo, does it mean to combine the rice husks gain from millers or does it mean transformation of those small rice millers to one large rice miller? If it is going to transform to large rice miller, the small rice millers can be in the difficulty and there would be conflicts in joint cooperation.
Solution Answer

The Engineering technology is valued by Myanmar Rice Federation in order to say by policy. The role of producing barn oil and the electricity the rice husk are weaker in engineering technology than before according to the President U Chit Khair’s speech. If we think basically according to the requirement in the project, we have to think to be able to make the paddy price the higher because there are the political actions on the paddy price. If we want to make paddy price higher and the rice price cheaper, all the byproducts from rice milling have to be priced. It is not possible to make both the paddy and rice prices highest. Therefore, we should make the paddy price highest and keep the rice price a moderate fair in line with international standard for the consumers. We have to think to keep Carbon Credit after all and even needed to consider to enter the international the carbon market. Again, to be able to produce the glucose and sugar from the broken rice, the refilling plant should be consider in small rice millers case rather than to build large scale rice millers because it is remaining to buy the low quality rice also. However, we still have to warn that the small rice millers can be disappeared at some time just like typewriter were disappeared. Whatever kind of changes is made, it needs to be the gradual and gentle transformation than sudden change. Therefore, we must be generous to changes and we must think widely these transformations to be able to be gentle or perhaps it would be just like the former example that bran oil factory were disappeared and having to consume saturated fat 1 billion a year even the country is agricultural country. For the gentle transformation, The Myanmar Rice Federation and Rice Miller Association should be upgrading the small rice miller as much as possible, to modernize and change to commercial scale, to establish 500-1000 tons rice millers, to make collective action by team cooperative system if it could not be one’s property. Therefore, the transformation can be gentle by establishing Refilling Plants to be able to buy low quality rice, to homogenize, to be value added, and to be uniformity in quality and so it will be convenience in
long term. When establishing the barn oil machines in Myaunghnya, we implement by cooperating with four local peoples including U Ko Naing in Myaunghnya. We will establish with a de-stoner when establishing the rice miller machines. We will collect the rice husks from rice millers of locals and carry out near the port and we should look on how can we cooperate to be synergy. There was the Department of Rice Miller Engineer for small rice miller management but now it is not known that which ministry or department is taking into account for this. There is no accuracy in how the Ministry of Commerce and the Ministry of Agriculture, Livestock and Irrigation are participated. As Myanmar government is making changes as always, they are trying to enact the law of rice. It would be difficult to fully let the private do this industry and the private institution itself is weak to tackle this. Therefore, it is a hoping condition of these gentle transformations. We made the suggestion not to choose Nay Pyi Taw but to execute in Ayeyarwady to implement private owned MAFCO rice miller machine. Although, we can buy the paddy from Nay Pyi Taw where there is no buyer competition. We have to rethink if these protections are helping the nation although the large powerful entrepreneurs waived the small weaker ones. If the large powerful entrepreneurs and the small weaker ones compete with each other, FDA is opened at one side. It is also a consideration that whether the domestic entrepreneurs can compete the foreign entrepreneurs when they came in. On the other hand, AEC will begin at the end of the year. Thus, we had to compete from the side which we can effort or cooperate when couldn’t compete. If we don’t do so, we will fail. Therefore, we are especially saying small miller entrepreneurs about this case. We want to discuss with the responsible departments if we need to. The higher level officers are just policy makers and the opinions can be exchanged only when they meet the actual implementing people. Only so, we can make mutual cooperation between.
Throwing the rice husk on the side of the road is too many. We can solve this problem by using Silica purification which is going to be provided with the aid of Japan. Once we found on facebook, is cement machines which produce cement from ash powder and Silica in Putao Township, Kachin State.

Mr. Ye’s Comment

Boiler turbine which ran by gas is almost 2 million USD price and so it cannot not able to afford as the rice millers. The costs of research in JCM Program were taken by themselves by Japan Government. So by requesting the JCM Project for help, Japan Government will be partially share
the cost of the project. Japan can be well helping to Myanmar because it has the distinct Kyoto Protocol and Carbon Reduction. MAPCO also have experience in cooperating with Japan, Korea, and India in the past. If we look at the machine installed in Nay Pyi Taw, we can see the installation of machinery devices from different countries. By using like this, we can know which nations' machines are good for us. Normally, Japan process is slow and we had to take three years for operating in Myaungmya Project. The beginning of the project was very fast when joining up with India in Kyauklaht Project and the appliances came on quickly also but later problems emerged one by one and delayed operation. Even the Minister himself had to ask again and again if the electricity can be produced or not. The project began opening in the last year May can be produced stably the electricity in November and December. The cost is nearly the same in Japan because it cost 2.5 billion USD. The implementation was delayed as the Japanese use time for budget calculation. The boiler turbine needed again requires large investment. We would like you to inspect the machine accessed in Nay Pyi Taw while you are here.
From Japan

By looking this requirement, we can see Myanmar’s Economic Opportunity. We should prepare the economic and policy carefully because the rice husk is a good produce. Higher production is more implemented if we combine with the policy. The electricity sector in Japan had changed a lot. According to the experience in Japan Electricity sector, it is needed to follow the market mechanism in time. As there are many electricity companies in each and every State of Japan, it conducts all the production to distribution to houses. The electricity produced from Waste Incineration in Fukushima is delivered to the schools. As it is difficult to change the wire cables according to the logistic, we transport the electricity with the original power line. The very important point in this place is using the Renewable Energy in Japan. It is a good chance to extend the economic for the private companies. Another important point is the development of human resources. The employees who work in Japan Electric Sector need to get the License and it is divided into two levels such as Level-1 and Level-2 depending on the qualifications. By doing with the level determination, it is very supportive to the human resource development and country development. As I mentioned before, economic is needed to be adaptable with the policy.

Mr. Ye's Comment

The power using in Japan is many and coal, hydropower, wind power and nuclear are used. Biomass is used for Renewable Energy. The most using power in Japan is from Nuclear Energy.
Hydropower and wind power are the major power source in Myanmar. Coal cannot get the agreements by the public. It is producing the electricity from the rice husk in Sagaing now and this project is starting in other townships too. It can produce from 1.5 to 2 MW and it is possible to produce the electricity in Bokale, Bago and Letpadan. It is also requiring the aid of Japan because of unaffordable Budget by Myanmar Government. If it is possible, we can be executed 1,000 ton millers like in Thailand and Cambodia. At present, there are 18 machines produced the Brown oil.

Closing Remark from Myanmar

Thank you very much for attending this event as representative from the Ministry of Commerce. I could well understand the project of Fukushima. It will be very supportive to Myanmar economy by producing electricity from this project. Thank you also for the waste management and environmental conservation. As for me, I will present the gain knowledge to the officials and I would like to wish successful cooperation between private own business, government institutions and MAPCO. Thank you.
Overview of the message from President of MAPCO/Vice President of UMFCCI during meeting with Minister of Agriculture, Livestock, and Irrigation

<Vice President of UMFCCI>
- Currently, rice husk project in Myaung Mya is in progress with the support from Fujita Corporation. Additionally, similar project is planned in Sagaing Region.
- It is important to meet electricity demand, but prevention measures for environmental contamination are equally important, and this project is effective from such perspective.
- We would like to proceed with such activities with support from the Japanese government in terms of funding, technology and know-how.
- Myaung Mya area which belongs under the Ministry of Agriculture, Livestock and irrigation; therefore, we would like to ask for understanding and support for this project.
- Fukushima City is a city rich with tourism resources and agricultural products; we have received various support through our past city-to-city interactions. The city has advanced processing technology for food using rice (e.g. alcohol, bread); we would like to continue our meaningful relationship in the future.

<Minister of Agriculture, Livestock and Irrigation>
- I would like to show my appreciation for Fukushima City’s continuous support.
- The proposed project is meaningful for the country and should be proceeded.
Reporting of City-to-City Collaboration Activities in Naypyidaw
-March 2018-

<Agenda and Minutes>
Overview of Reporting on City-to-City Collaboration Activities in Naypyidaw

Activities of city-to-city collaboration were presented at the Myanmar Rice Federation (MRF) national level stakeholder forum (presentation and explanations at the panel booth). The activities were introduced to numerous stakeholders of MRF and rice millers from all over the country.

<Date>
March 6th, 2018 9:00~17:00

<Venue>
Myanmar International Convention Center, Naypyidaw

<Presenter>
Fujita Corporation and Fukushima Chamber of Commerce and Industry

<Presentation>
- Message from the Fukushima City Mayor and Head of Fukushima Chamber of Commerce (presented on the panel and also explained in the center)
- Overview of city-to-city collaboration activities between Fukushima City and Myanmar (distribution of materials and also explained in the center)

<Background of the event>
The head of Myanmar Rice Federation and vice president of UMFCCI (Union of Myanmar Federation of Chambers of Commerce and Industry), who is the current president at MAPCO, proposed the event as an opportunity to introduce rice husk power plant project under city-to-city collaboration in an event with many rice millers from all over the country, to increase possibilities for future roll out of the project in other regions of Myanmar.
Photos from the Workshops

<Photos>
Workshops in Myanmar (September 2017)

<Local workshop held in Myanmar (September 2017)>

**Workshop and discussions with local government officers**
The chief minister of the region participated in the beginning, and workshop was conducted with participants from the Sagaing Region.

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**Current situation of Monywa**
The capital of the region
Industrial Zone
An industrial zone with many rice mills
Local workshop in Myanmar (February 2018, Yangon)

** Courtesy Visit **

** Workshop **

![Image of workshop participants]

![Image of people at a meeting]

![Image of individuals in a meeting]

![Image of group photo during workshop]
Networking Event

Reporting of city-to-city collaboration activities (March 2018, Naypyidaw)
Appendix III
Materials from the Workshops
Appendix III Contents

1. Sagaing Region Workshop (September 2017) Materials
2. Yangon Workshop (February 2018) Materials
3. Reporting of City-to-City Collaboration Activities in Naypyidaw (March 2018) Materials
Sagaing Region Workshop
-September 2017-

<Materials>
Study on feasibility of a low-carbon waste treatment system and micro-grid system and promotion of activities under inter-regional collaboration in Ayeyarwady region and Sagaing region.

Finding best solution for low-carbon city
- Developing biomass power project using rice husks generated at rice mills in Shwebo (Feasibility study)
- Facilitating policy formulation by dialogue with Fukushima city (Japan), Sagaing region, and Ayeyarwady region

Expected effect
- Improvement of energy access
- Sustainable waste treatment system

Policy dialogue and Workshop
(September 2017 and January 2018)
- Introducing experiences of policy planning in Fukushima city such as “Regional comprehensive plan”, “Waste disposal plan” and “Strategy for local energy production and consumption”
- Introducing achievement of policy dialogue between Ayeyarwady region and Fukushima city.

Structure of the project

- Feasibility study of biomass power project using rice husks generated at rice mills in Shwebo (as Joint Crediting Mechanism (JCM) Project)
- Policy dialogue and workshop for facilitating policy formulation under inter-city cooperation with Fukushima city (Japan), Sagaing region, and Ayeyarwady region
Policy dialogue between Ayeyarwady region and Fukushima city

Chief Minister Ayeyarwady Region visited Japan April 2015

Letter of Intent (June 2015)

From Chief Minister Ayeyarwady Region
To Mayor of Fukushima City

- Dialogue in workshop (Pathein, and Fukushima)
- Site visiting (Pathein, and Fukushima)
- Finding candidate JCM (Joint Crediting Mechanism) projects

Starting “Partnership for Low Carbon Initiative in Ayeyarwady”

source: FUKUSHIMA City Renewable Energy Introduction Promotion Plan
Workshop in Sagaing (Sep. 2021)
experience in Fukushima

Renewable Energy in 2015, experience in Fukushima.

Energy self-sufficiency
FY2020: 30%
FY2030: 40%
FY2040: 50%

Energy self-consumption type facilities
(public facilities)
FY2020: 20%
FY2030: 60%
FY2040: 100%

(เฉพาะจุดจำหน่าย)
FY2020: 13%
FY2030: 25%
FY2040: 40%

Renewable Energy in 2015, experience in Fukushima.

(1) งบประมาณการดำเนินการในงานEnergy self-sufficiency
(2) Energy self-consumption type facilities
(3) งานวิจัยชุมชนการจัดการริมทางชุมชน

Source: FUKUSHIMA City Wastes processing basic plan (Summary version)

Reduce
Reuse
Recycle
Yangon Workshop
-February 2018-

(Materials>
Partnership for Low Carbon Initiative in Ayeyarwady Region & Sagain Region

Introduction of the activities in Ayeyarwady Region & Sagain Region, and Challenges for low carbon society through city to city collaboration

Structure of the project

- JAPAN
  - Mitsubishi Research Institute
  - Fujita Corporation
  - Fukushima Chamber of Commerce & Industry
  - Fukushima City

- Platform for cooperation
  - Inter-corporate cooperation
    - Myanmar Company
      - Public-Private Cooperation
    - Ayeyarwady Region & Sagain Region

- Myanmar

- Inter-city cooperation

- Know-how of development
- Technologies and products

- Policy dialogue and workshop for facilitating policy formulation under inter-city cooperation with Fukushima city, Ayeyarwady region and Sagaing region

- Feasibility study (JCM Project)
- Example of Achievement
  - Rice Husk Power Generation PJ in Myaung Mya Township (Under construction)
Key activities of the project

Feasibility study (JCM projects)

- Solar power generation system and solar powered low-carbon water treatment system in new industrial parks in Ayeyarwady region
- Biomass power project using rice husks generated at rice mills in Sagaing region

Feasibility study (JCM Project)

Example of Achievement
Rice Husk Power Generation PJ in Myaung Mya Township (Under construction)

Policy dialogue and Workshop

- Introducing experiences of policy planning and activities in Fukushima city
- Facilitating policy formulation by dialogue
Challenges and Opportunities for Environmental Infrastructure Projects

Biomass power plant using rice husks
Solar power generation system

Rice mill

Electricity

Industrial Zone

Surrounding Community

Small and distributed water treatment system

Electricity at microgrid

Electric power supply system at microgrid

Solar powered low-carbon water treatment system

Building distributed energy system
Building waste management system

Formulation of a new solution model for local cities
Study on feasibility of a low-carbon waste treatment system and micro-grid system and promotion of activities under inter-regional collaboration in Ayeyarwady region and Sagaing region.

OBJECTIVES

Finding best solution for low-carbon city

- Developing biomass power project using rice husks generated at rice mills in Shwebo, PV system (Feasibility study)
- Facilitating policy formulation by dialogue with Fukushima city (Japan), Sagaing region, and Ayeyarwady region

Expected effects

- Improvement of energy access
- Sustainable waste treatment system e.g. rice husks

ACTIVITIES

1. Feasibility study of biomass power project using rice husks generated at rice mills in Shwebo (as Joint Crediting Mechanism (JCM) Project), PV system

2. Policy dialogue and workshop for facilitating policy formulation under inter-city cooperation with Fukushima city (Japan), Sagaing region and Ayeyarwady region

Key topics of Policy dialogue and Workshop

- Introducing experiences of policy planning in Fukushima city
- Introducing achievement of policy dialogue between Ayeyarwady region and Fukushima city
- Discussion on biomass power project using rice husks generated at rice mills in Shwebo

From FY2015

From FY2017

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

Partnership for Low Carbon Initiative

Ayeayarwady Region
Sagaing Region

Fukushima City

Low-carbon waste treatment system (Biomass power plant using rice husks)

Electric power supply system at microgrid.

Building region-independent renewable energy system by waste biomass

Awareness building for appropriate waste management

Initiative for recycling and separate collection

Formulation of a new solution model for common challenges facing by local cities
Introduction of policy in Fukushima City

1. Role of Fukushima City Renewable Energy Promotion Plan
2. Fukushima City’s Future Vision
3. Power Generation via Waste Incineration (Arakawa Clean Center Local Production for Local Consumption Project)
4. Installation of Renewable Energy
5. Subsidies for Solar Systems

Role of Fukushima City Renewable Energy Promotion Plan

Fukushima City Renewable Energy Promotion Plan is a specific plan to promote measures for deploying renewable energy, as explained in the Fukushima City Basic Environmental Plan and Fukushima City Action Plans for Global Warming.

Fukushima City

Fukushima City Comprehensive Plan

Fukushima City Basic Environmental Plan

Fukushima City Renewable Energy Promotion Plan

Fukushima City Action Plans for Global Warming

[Reference]

National Level

Basic Act on Energy Policy

Basic Energy Plan

Fukushima Prefecture

Fukushima Prefecture Comprehensive Plan

Fukushima Renewable Energy Promotion Vision

Action plan for renewable energy pioneering land
Fukushima City’s Future Vision

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

- Reduce global warming and develop a low-carbon, recycling-oriented society with minimal environmental impact
- Regional revitalization
- Adoption of renewable energy
- Recovery from the nuclear disaster
- Promotion of town planning for resistance to disasters and emergencies

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

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: about 28,599 MWh(Average)

* Hot water is also supplied to nearby welfare facilities.
Local Production and Consumption Business: Waste Generation Plant at Arakawa Clean Center

Electricity is generated from surplus heat generated from waste incineration, which is utilized in the incineration plant and recycling facility.

The surplus electricity is supplied to the local elementary and middle schools (71 schools in total), promoting local generation and consumption model of renewable energy.

Installation of Renewable Energy

Solar systems equipped with batteries are installed strategically at evacuation sites, to enhance their functionality as disaster prevention centers, and to promote deployment of renewables.

Installed systems as of March 2017:
16/145 Facilities (11%)

Long term target for 2040:
145/145 Facilities (100%)
Subsidies for Solar Systems

Subsidies are provided for residential solar systems to promote their deployment.

(1) Subsidy: 30,000 JPY/kW
   *Max. 4kW/120,000 JPY

(2) Applications:
   approx. 600/year

1 JPY= 0.121 Kyat
(Based of Central Bank of Myanmar, as of 2nd Feb, 2018)

Loan Interest Incentives for Renewable Energy Projects

To promote the installation of renewable energy by SMEs, interest from loan for renewable energy facility is subsidized.

(1) Loan size: max. 20 million JPY

(2) Subsidy: smaller amount of the following: 1/2 of the interest to be paid, or interest rate of 1.2%

(3) Interest available for subsidy: Interest paid within 5 years of loan contract

1 JPY= 0.121 Kyat
(Based of Central Bank of Myanmar, as of 2nd Feb, 2018)
Introduction of Fukushima City, Japan

Business Case of Companies in Fukushima

Mascot of Fukushima City, Momorin

- In the season of snow thaws (spring approaches), the lingering snow on Azuma Mountains takes on the shape of a rabbit (called the “snow rabbit”).
- Momorin, the mascot of Fukushima City, was created based on the snow rabbit in 1998. The world of Momorin comes from Momo (peach), and Ringo (apple) in Japanese words.
- Momorin introduce charm of Fukushima city in tourism promotion events

Profile of Fukushima City

- Our beautiful city is also blessed with many hot springs. It is home to a harmonious blend of nature, culture, and industry.
- Fukushima City is the capital city of Fukushima Prefecture.
- It is located about 270 kilometers from Tokyo, which takes about 80 minutes by Shinkansen, and has been developed as the gateway to Tohoku.
- Population: 281,632; Households: 122,376 (as of November 30, 2017)
- Area: 768 km²
About Fukushima Chamber of Commerce and Industry

“Supporter of industries and the community”: we are an economic organization established with people’s will to revitalize the industry and the community.

Our Mission:

- Policy proposals for the community and the industry
- Support for SMEs (strategy consultations, financial consultations, business exchanges, global development support, mutual aids, business establishment support)
- Revitalization of the local economy (regional development, urban planning, encouraging consumer spending)

Fundamental Vision

Towards “Energetic and lively capital Fukushima”

~Initiation towards Fukushima Reconstruction~

Approximately 4,000 member companies

Daizen Thilawa Logistics Centre

Mission
- Our mission in Thilawa SEZ is to support the smooth and efficient flow of goods from procurement of raw materials to distribution of products in the consumers covering the whole supply chain.
- In a fast-developing country like Myanmar where rules & regulations change frequently, infrastructure instability, we will continue to provide reliable information on logistics and we will be a reliable partner for business activities.
- We hope that you will give us the opportunity to assist your business in Myanmar. We would be pleased to discuss the services and procedures you require at your earliest convenience.

Company Profile
- Company: Daizen-Munmar Co., Ltd.
- Headquarters: C-13, Thilawa SEZ Zone A
- Managing Director: Tomonori Yabe
- Established: May 2013
- Capital: USD 1,300,000
- Parent Company: Daizen Co., Ltd.
- Services: 
  - Warehouse
  - Freight Forwarding & Transportation
  - Processing in Consignment Bank
  - Customs Clearance
  - Contract Logistics & Consulting

Location
- For P&O businesses, the centre is located near the ports for efficient and speedy import and export procedures.
- For P&O businesses, the centre is conveniently located near the larger import and export shipments according to demand.

Advantages of SEZ

Architectural Rendering

Specifications
- Area: 10,000 m²
- Free Zone: TBD (adjustable)
- Protected Zone: TBD (adjustable)
- Storage Capacity: 3,000 t
- Security: 24-hour guard, security cameras
- No. of Truck Berths: 10 with dock levelers
- Equipment & System: Forklift, KMS, MUCSS

Design of Warehouse

Logistics Services Overview

Procurement of Raw Materials

Production

Fabrication

Warehousing

Palletizing

Packaging

Warehouse

Standard Warehouse

“Distribution Hub”

Optimization of distribution and end to end transport

Processing for Customer Industry

Over 10 years of experience in stainless and downstream

Customs Clearance

Up to date information on SEZ trade procedures

Reliable IT Function

Proven, user-friendly logistics solutions.

Key Members of Daizen Team

Takashi Yabe, Managing Director
- After graduating Tokyo University, he joined management consulting firm where he was involved in an electronic parts logistics system design project. He went on to work on various logistics projects and established Daizen in 1998. He currently manages Daizen’s operations in Myanmar.

Nobuo Yabe, Deputy Managing Director
- After graduating Waseda University, he joined several foreign companies and has over 15 years of experience in business and marketing. He leads Daizen’s operations in Myanmar and also manages the company’s office in Tokyo.

Hiroshi Hase, Logistics Manager
- After graduating Kyushu University, he joined several foreign companies. He has over 15 years of experience in business and management. He is in charge of logistics management with over 10 years of experience in the industry.

For any enquiries, please contact Tomonori Yabe.

E-mail: t.yabe@dzm.jp
Mobile: 09-970912317

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Copyright (C)
Waste Paper Recycling

Business Activities

Konno Co., Ltd.

waste paper recycling, industrial waste management

Sorting at plant

Paper-manufacturing company
Biomass Power Generation at a Food Processing Plant

1. **Operator:** Uchiike Jozo Co., Ltd.

2. **Summary of operations:**
   - Wastewater resulting from production of food products such as soy sauce and miso is processed in an oxygen-free environment and the resulting methane gas is combusted directly to run an engine generator (for electric power generation).
   - Represents the first example in the Tohoku region of a biomass power generation facility using methane gas and based on a Feed-in Tariff system.
   - Start of operations: Sep. 26, 2014
   - Electric power output: 25 kW
   - Annual electric power output: approx. 144,000 kWh (Jan.–Dec. 2015)

(Source: Uchiike Jozo Co., Ltd.)

Product development with aims to both environmental conservation and industrial development

1. **Company:** Kato Iron Co., Ltd.

2. **Product:**
   - Manufacturer of finished industrial machines with “material efficiency” and “energy efficiency”; dealing with the whole process from development, planning and sales.
   - Kato-method automated running water dust remover, which is its patented product, has long experiences in the water treatment field, such as public sewerage and industrial effluent treatment.
   - New division for electric machine business was established for distribution boards and control panels.

[Photo credit: Kato Iron Co., Ltd.]
First Project in Ayeyarwady Region

**Rice Husk Power Generation Business**

In **Myaung Mya**, Ayeyarwady Region, Myanmar

- **Power Generation Scale**: 1.8 MW (Gross) 1.6 MW (Net)
- **Power Generation Method**: Boiler and Turbine Generator
- **Rice Husk Purchase**: 55.2tons/day
- **Investment amount**: Approximately USD 4 million

**Financial Programme for JCM Model Project**

- **Rice Husk**
- **Boiler**
- **Turbine Generator**
3D DRAWINGS FOR POWER PLANT

PLAN FOR ELECTRICITY USAGE

- Gross Capacity : 1,816 kW
- Parasitic Load : 201 kW
- Net Capacity : 1,615 kW (1,816 kW - 201 kW)
- Operation Hours : 24 hours
- Operation Days : 300 days

- Gross Generation = 1,816 x 24 x 300 = 13,075,200 kWh
- Parasitic Load = 201 x 24 x 300 = 1,447,200 kWh
- Net Generation = 1,615 x 24 x 300 = 11,628,000 kWh

Note : Parasitic load is electricity usage in our factory to do operation activity.
Significance of This Project

1. This project can supply power to the Ayeyarwady Region.

2. This project can help to promote construction of new rice mill through securing electric power steadily.

3. This project can help to preserve the environment through effective use of rice husk which is normally accounted as waste.

4. This project will be a new management model of rice industry and will contribute to the economic development of the Ayeyarwady Region.

5. This project can contribute to solving poverty in rural areas through economic development of rice industry.

6. This project can disseminate the technology of developed countries through construction and operation of highly efficient rice husk power generation system.
Rice Husk Power Generation Project in Shwebo District

6 February 2018

Fujita Corporation
Myanmar Agribusiness Public Corporation Ltd

Wetlet Township Project

Shwebo District, Wallet Township
Wetlet Township Project

**Merit**
- There is some big rice mill.
- There is rice husk capable of generating 2 MW at a single rice mill.
- There is a land that makes a power plant in a rice mill.

**Demerit**
- Demand for electricity alone is small in the rice mill alone.
- It need to sell electricity someone.

**Common issues**
- There are no large rivers nearby.
- Water resources are managed for agriculture.
- There is a danger of exhaustion when using groundwater.

Although it will adopt the air cooling type, the project cost will be slightly increased.

---

**Business Scheme**

**Point**
- There are two types of business: rice husk power generation and silica production.
- These projects are planned to be carried out at the SPC to be newly created at the three companies.
- The rice husk power generation project is planning to obtain subsidies from the Japanese government.
Shwebo Township Project

Shwebo District, Shwebo Township

Substation

Construction Site (Plan)

Shwebo Township Project

Merit
Shwebo industrial zone are trying to add power substations (5MVA-10MVA).
It is necessary to investigate the scale of detailed rice mills, but it may be possible to generate electricity of around 20 MW.
The land that can make the power plant near the sub power station.

Demerit
There are many rice mill in the industrial zone. (Over 100 rice mill, 357 zone × 80% × 50%)
Individual rice mills are small.
It is necessary to match ideas of more than 100 rice mill.
It need to make them a new single company (for rice husk supplier).
Connect to the National Grid, but we need to have the electricity fee made special.
A considerable amount of construction cost is required.

Common issues
- There are no large rivers nearby.
- Water resources are managed for agriculture.
- There is a danger of exhaustion when using groundwater.

Although it will adopt the air cooling type, the project cost will be slightly increased

Industrial Zone

sub power station
Idea According Shwebo District

- Wetlet Project is a project for rice milling for individuals and is not very meaningful for both Fujita and MAPCO.
- Shwebo Project has great social significance.
- A large amount of construction cost is required.
- I think the way the Japanese government and the Myanmar government cooperate to acquire budgets other than JCM (Ministry of Environment, Japan) is better.

JICA (Japan International Cooperation Agency) has a different JCM program from the Ministry of the Environment

How to proceed Project

1. Determination of Power Generation Scale
   - 2MW (Rice Husk 55 tons/day)
   - 3MW (Rice Husk 104 tons/day)
   - 5MW (Rice Husk 172 tons/day)

2. Determination of Power Selling Method
   - National Grid: Low power selling price
     Negotiation with the Ministry of Electric Power
   - Off Grid: Who buys electricity
   - Micro Grid: How to structure
     Need to make power transmission company
     (Foreign capital company can not send power)

3. Determination of Investor
   - Japan: Fujita, other
   - Myanmar: MAPCO, New company
Business income and expenditure estimates (3MW)

<table>
<thead>
<tr>
<th>Total project cost</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Cost</td>
<td>663,760 USD</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>5,871,900 USD</td>
</tr>
<tr>
<td>Opening Cost</td>
<td>264,115 USD</td>
</tr>
<tr>
<td>Total project cost</td>
<td>6,201,495 USD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business balance (Reasonable)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (Power sales)</td>
<td>2,055,982 USD</td>
</tr>
<tr>
<td>Expenditure (Feedstock)</td>
<td>-155,732 USD</td>
</tr>
<tr>
<td>Expenditure (Land Lease Fee)</td>
<td>0 USD</td>
</tr>
<tr>
<td>Expenditure (O &amp; M out-sourcing)</td>
<td>-575,483 USD</td>
</tr>
<tr>
<td>Expenditure (General and administrative expenses)</td>
<td>-95,182 USD</td>
</tr>
<tr>
<td>Expenditure (Measurement/Reporting/Verification)</td>
<td>-15,000 USD</td>
</tr>
<tr>
<td>Expenditure (Accounting)</td>
<td>-12,000 USD</td>
</tr>
<tr>
<td>NOI</td>
<td>1,204,565 USD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance prospects</th>
<th>Conservative</th>
<th>Reasonable</th>
<th>Aggressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation days</td>
<td>270</td>
<td>330</td>
<td>330</td>
</tr>
<tr>
<td>Net yield Cap Rate (4 years)</td>
<td>13.85%</td>
<td>19.42%</td>
<td>19.42%</td>
</tr>
<tr>
<td>PIRR</td>
<td>10.92%</td>
<td>17.75%</td>
<td>17.75%</td>
</tr>
<tr>
<td>EIRR (after tax)</td>
<td>9.51%</td>
<td>16.15%</td>
<td>16.15%</td>
</tr>
<tr>
<td>Investment recovery year</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Subsidy: 40%
Because it is the second case in Myanmar.
Business income and expenditure estimates (5MW)

<table>
<thead>
<tr>
<th>Total project cost</th>
<th>Amount of investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Cost</td>
<td>Fujita</td>
</tr>
<tr>
<td>110,620USD</td>
<td>5,987,228USD</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>MAPCO</td>
</tr>
<tr>
<td>8,193,000USD</td>
<td>1,285,120USD</td>
</tr>
<tr>
<td>Opening Cost</td>
<td>New Company</td>
</tr>
<tr>
<td>263,842USD</td>
<td>1,285,120USD</td>
</tr>
<tr>
<td>Total project cost</td>
<td>Total</td>
</tr>
<tr>
<td>8,567,468USD</td>
<td>7,282,348USD</td>
</tr>
</tbody>
</table>

Business balance (Reasonable)

| Income (Power sales) | 2,979,688USD | 110 Kyats/kwh |
| Expenditure (Feedstock) | -234,414USD | 5 Kyats/kg |
| Expenditure (Land Lease Fee) | 0USD | 3.34USD/m²/year |
| Expenditure (O & M out-sourcing) | -959,139USD | BII/II |
| Expenditure (General and administrative expenses) | -300USD |
| Expenditure (Measurement/Reporting/Verification) | -15,000USD | Fujita |
| Expenditure (Accounting) | -12,000USD | Fujita |
| NOI | 1,759,204USD | 59.0% |

Balance prospects

<table>
<thead>
<tr>
<th>Conservative</th>
<th>Reasonable</th>
<th>Aggressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation days</td>
<td>270</td>
<td>300</td>
</tr>
<tr>
<td>Net yield Cap rate (4 years)</td>
<td>17.33%</td>
<td>20.53%</td>
</tr>
<tr>
<td>PIRR</td>
<td>15.27%</td>
<td>19.63%</td>
</tr>
<tr>
<td>EIRR (after tax)</td>
<td>13.75%</td>
<td>17.43%</td>
</tr>
<tr>
<td>Investment recovery year</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Subsidy: 40%
Because it is the second case in Myanmar

Rice Husk Power Generation Project in Shwebo (Idea)

RH supplier (110 tons/day x 330 days = 36,300 tons/year)

1 month: Maintenance period
RH Price = ○ kyats/kg (including transportation cost)
Power Price = ○ Kyats/kwh
Monsoon Paddy (6 months) = 100
Summer Paddy (6 months) = 50
Yearly (11 months) = (100 × 6 + 50 × 6) + 11 × 81.8

Electric grid: Not National Grid Micro Grid

Paddy → Rice Husk → Rice Husk Ash

Power
Silica

Purified Silica = 80 - 100 USD/ton
Introduction of Fukushima City, Japan

“Fukushima,” ဖျင်သာလောက်ပြောပြပါသည်။

Fukushima တွင် ရွေးချယ်ထားသော မြေပေါ်သော လူမျိုးစိမ်းများနှင့် ပတ်သက်သော စီးပွားရေးအခြေခံများကို ထောက်ပံ့ထားသည်။

- Fukushima ဖြစ်သူ အလုပ်လုပ်ပြီးသော လူမျိုးစိမ်းများနှင့် ပတ်သက်သော စီးပွားရေးအခြေခံများကို ထောက်ပံ့ထားသည်။

Ikeya-ko-sono “Fukushima”

- Itacho Ichikawa i takahsi ကိုယ်စိပ်များနှင့် ပတ်သက်သော စီးပွားရေးအခြေခံများကို ထောက်ပံ့ထားသည်။

"စိတ်ကြက်ပြန်ကောင်ခြင်း - Fruit of the Jewelry Box" ကိုစိတ်ကြက်ပြန်ကောင်ခြင်းနှင့် ပတ်သက်သော စီးပွားရေးအခြေခံများကို ထောက်ပံ့ထားသည်။

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Fukushima ဖျင်သာလောက်ပြောပြပါသည်။
Introduction of Fukushima City, Business Case of Companies in Fukushima
Feb. 2018, Yangon

Business Case of Companies in Fukushima

"Fukushima ကိုယောက်လိုက်ရှိနေသောနေရာတွင်များစွာ လိုက်နက်ကိုင်းများ
သတ်မှတ်ရရှိနေပါသည်"

Fukushima ကောင်းမွန်းသောလောက်ကြက်အားဖြင့်လည်ပြီးစီရင်ခဲ့ပါသည် "ရှိနေပြီးစီရင်ခဲ့ပါသည်
သတ်မှတ်ရရှိနေပါသည်" အတွက် ရှိနေပြီးစီရင်ခဲ့ပါသည် သတ်မှတ်ရရှိနေပါသည်
သတ်မှတ်ရရှိနေပါသည်

- အခြေခံ ရှိနေပြီးစီရင်ခဲ့ပါသည် အခြေခံ များစွာ
- အခြေခံ ရှိနေပြီးစီရင်ခဲ့ပါသည် များစွာ

(စိုးရိုက်ချုပ်နိုင်သောကြောင့် ရှိနေပြီးစီရင်ခဲ့ပါသည်
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ရှိနေပြီးစီရင်ခဲ့ပါသည်)

- အခြေခံ ရှိနေပြီးစီရင်ခဲ့ပါသည် များစွာ အခြေခံ
(စိုးရိုက်ချုပ်နိုင်သောကြောင့် ရှိနေပြီးစီရင်ခဲ့ပါသည်
ရှိနေပြီးစီရင်ခဲ့ပါသည် စိုးရိုက်ချုပ်နိုင်သောကြောင့်
ရှိနေပြီးစီရင်ခဲ့ပါသည်)

"Fukushima ကိုယောက်လိုက်ရှိနေသောနေရာတွင်များစွာ လိုက်နက်ကိုင်းများ
သတ်မှတ်ရရှိနေပါသည်"

~ Fukushima ကိုယောက်လိုက်ရှိနေသောနေရာတွင်များစွာ လိုက်နက်ကိုင်းများ
သတ်မှတ်ရရှိနေပါသည်~

စိုးရိုက်ချုပ်နိုင်သောကြောင့် ရှိနေပြီးစီရင်ခဲ့ပါသည်
Introduction of Fukushima City, Business Case of Companies in Fukushima
Feb. 2018, Yangon

Fukushima မြို့ကို ပြန့်မှန်းပေးနိုင်သော အခြေခံစိတ်ကြိုးစားချက်များနှင့် ဖော်ပြသည်။

Daizen Co., Ltd. သည် ကာကွယ်ရေးအထိမ်းအမှတ်ပြုလျက် ဝင်ရောက်ဖော်ပေးသည်။

Thilawa Logistics Center ကိုဖော်ပြထားသည် Daizen Co., Ltd. ကို မြေပိုင်ရှင်အဖြူစွဲဖော်ပေးသည် Daizen

Konnio Co., Ltd. သည် Waste Paper Recycling အချက်အလက်များကို ဖော်ပေးသည်။

Uchike Jozo Co., Ltd. သည် Biomass အချက်အလက်များကို ဖော်ပေးသည်။

Mega Solar
Fukushima မှ သိရှိနိုင်သည့် အခြေခံဆောင်ရွက်မှုစနစ်များဖြင့် ဖော်ပြသည် Mega Solarမှတ်စုပေါ် လူသိများနိုင်သည်။

Kato Tekko Co., Ltd. က ဦးစွဲချက်များအဖြစ် ကိုယ်စားလှယ်ကြိုက်မှုစနစ်များဖြင့် အောက်ပါအစီအစဉ်များဖြင့် ဖော်ပြသည်။

- "စိုက်ရိုက်သောအခြေခံဆောင်ရွက်မှုစနစ်" ဖြင့် ဖော်ပြသည်။ ကိုယ်စားလှယ်ကြိုက်မှုစနစ်ရှိ အခြေခံဆောင်ရွက်မှုစနစ်များကို ဖော်ပြသည်။
- Kato-Method Automated Running Water Dust Remover ဖော်ပြသည်။ ကိုယ်စားလှယ်ကြိုက်မှုစနစ်ကို ဖော်ပြသည်။
- Distribution Board နှင့် Control Panel ဖော်ပြသည်။

Fukushima မှ သိရှိနိုင်သည် "Kinsuisha" ၏ အရေးပါသော High quality Sake Contestမှ နေထိုင်မှုဖြစ်သည်။

- ဘာသာရပ်အတွက် တိုးတက်စေရန် ဖော်ပြသည်။
- တစ်ရပ်မျှတည်း ကိုယ်စားလှယ်ကြိုက်မှုစနစ်ကို ဖော်ပြသည်။
- Ginnay Co., Ltd ၏ ဝန်ထမ်းများများအဖြစ် ဖော်ပြသည်။

Fukushima မှ အရေးပါသော အခြေခံဆောင်ရွက်မှုစနစ်များဖြင့် "Anpo-kaki Tart" ဖော်ပြသည်။

- Fukushima မှ အရေးပါသော အခြေခံဆောင်ရွက်မှုစနစ်များဖြင့် "Anpo-kaki /အိုင်းငါး" ဖော်ပြသည်။
- "Anpo-kaki Tart" ဖော်ပြသည်။
- Anpo-kaki /အိုင်းငါးသော အခြေခံဆောင်ရွက်မှုစနစ်ကို ဖော်ပြသည်။
- Anpo-kaki /အိုင်းငါးသော အခြေခံဆောင်ရွက်မှုစနစ်ကို ဖော်ပြသည်။
Introduction of Policy in Fukushima City

Fukushima ပေါ်တွင် ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်

- Fukushima ၊ Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်
- "Arakawa Clean Center" ၊ Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်
- ဗိုလ်ချုပ်တွေ့ရစဉ် Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်
- ဗိုလ်ချုပ်တွေ့ရစဉ် Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်

Fukushima ပေါ်တွင် ဖော်မူသော Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်

Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ် Renewable Energy ဖော်မူသော ဗိုလ်ချုပ်တွေ့ရစဉ်
Introduction of Policy in Fukushima City
Feb. 2018, Yangon

弗氏島 新エネルギーの政策

福島県
- Fukushima
- Renewable Energy

福島県の新エネルギー政策

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Introduction of Policy in Fukushima City
Feb. 2018, Yangon

Fukushima (Recycle) & Renewable Energy

(Arakawa Clean Center)

- 4,400 kw (5,100 kW)
- 5,100 kw (Aug. 2008)
- 28,599 MWh (average for 5 years)

Renewable Energy operation: 100%

(as of March 2017: 16/145 facilities, 11.0%)
(2040: 145/145 facilities, 100%)
ရေးသားထားသောစာတမ်းတင်ဆက်စပ်ကိုရက်စီးခြင်းအပေါ်တင်ဆက်စပ်ရာမှာ Renewable Energy အားလုံးအထွက်ဖော်ပြထားသည်။

အဆိုပေါင်းစိုက်ခြင်းများအတွက် (2000 JPY/kW) (max. 4kW: 8000 JPY)

(4) လော့လွင်ကော်ပိုင်းကျယ်ပြန်ခြင်း (ဗျာ) ကော်ပိုင်များအတွက် 9% သို့မဟုတ် 9.5% ကော်ပိုင်များအတွက် 11% ကော်ပိုင်များအတွက် 13% ကော်ပိုင်းဖော်ပြထားသည်။(1/2 of the interest to be paid, or interest rate of 1.2%)

(5) လော့လွင်ကော်ပိုင်းကျယ်ပြန်ခြင်းအတွက် 9% သို့မဟုတ် 9.5% ကော်ပိုင်များအတွက် 11% ကော်ပိုင်များအတွက် 13% ကော်ပိုင်းဖော်ပြထားသည်။
Reporting of City-to-City Collaboration Activities in Naypyidaw
-March 2018-

<Materials>
Partnership for Low Carbon Initiative City to City Cooperation with Ayeyarwady Region, Sagaing Region, and Fukushima City

Message

We would like to express deep gratitude to the support and encouragement by overseas people regarding the Great East Japan Earthquake.

Fukushima City and Fukushima Chamber of Commerce & Industry have begun a policy dialogue and business exchange to promote Myanmar's environment preservation and development of renewable energy in an intercity cooperation with Ayeyarwady Region and Sagaing Region.

Fukushima City is one of the foremost rice-producing districts.

There are many attractive things including some fruits which are the most famous in Japan. Capitalizing on them, we are invigorating the region in Fukushima's unique way.

Message

Hiroshi Kohata
Mayor of Fukushima City

Hiromi Watanabe
Chairman of The Fukushima Chamber of Commerce & Industry
**Concept of Rice Complex as Low carbon Industry by using Green Power from Rice Husk**

**New rice value chains**

- Paddy Field
  - Rice
  - Rice Bran
  - Rice Husk

**Power Generation**
- Renewable Energy

**Waste can create business opportunities**

**Case in Japan: Rice Flour is recognized a hot business opportunity**

- Rice flour food is widely used in Japan for various dishes such as sushi, tempura, and confectionery.
- In recent years, the demand for rice flour has increased due to its nutritional benefits and lower carbon footprint compared to other flours.

**How Delicious Rice Flour Food Is!**

Now is the time to pay attention to rice flour!

From old days, rice flour has been used mainly for Japanese confectionery such as rice crackers or rice dumpling. In recent years, with the development of flour milling technology, we can use finer-grained rice flour. The rice flour is used for a wider range of foods, such as bread, noodles, pizza, dumplings, konjac, cake, and tayaki (fish-shaped cake filled with bean paste).

Rice flour has many advantages:
- **Rice flour is rich in high-quality proteins!**
  The rice flour contains about 1.5 times more amino acids in protein than the wheat. It is easy to take nutrition and best snacks for children.
- **Rice flour is good for a diet!**
  Rice flour is good for a diet and measures against a metabolic syndrome, because sugar absorption of the rice flour is slower than that of wheat and the feeling of satiety lasts long. If you use it for karaage, or Japanese fried chicken, it does not absorb so much oil so that you can control lipids.
- **Rice flour is very useful for those who have wheat allergy!**
  Rice has a very lower possibility of causing allergies than wheat. Those who have wheat allergy can try bread or cake made from 100% rice flour.
- **Rice flour is easy to cook!**
  Rice flour does not tend to get lumpy so that you do not need to sift it. To thicken stew, you can use it as it is.

(Source: translation Brochure of rice flour, Fukushima Prefecture.)
Appendix IV
Details and References
Appendix IV Contents

1. Map of Shwebo District
2. Details of Minigrids in Myanmar
3. Electricity Prices in Myanmar
Shwebo District Map
出所）Myanmar Information Management Unit（最終アクセス：2018年3月3日）
Details of Minigrids in Myanmar
ADB has supported installment of 12 minigrids in the rural area of Myanmar. It has published a report “Developing Renewable Energy Mini-Grids in Myanmar: A Guidebook” (2017) to summarize its activities. Minigrid sites are shown below.

Minigrids were installed in areas where power would not be supplied from the national grid for another 5 years. Additionally, villages and townships with 150~200 households were chosen as optimal size for installing minigrids. ADB supported 80% of the project cost, and the rest of the project cost had to be paid by the residents; villages and townships where residents agreed for such burden were chosen as well. Some of the villages had already installed diesel systems, so renewable energy facilities were added to reduce fuel cost. PV minigrid system, and hybrid system are shown below.
Figure PV minigrid system

Electricity consumption data for an average household is analyzed for installing minigrids (refer to figure below). Most of electricity consumption in an average household in a village or a township consists of lightings, television, and charging for mobile phones. Consumption is concentrated during the night from 6 pm to 8 am in the morning. The consumption pattern does not match PV generation pattern, so battery systems are indispensable for minigrid systems.
Several ownership models of minigrid systems are considered. An option is for the community itself to become the owner and operator of the minigrid system; in which case subsidy for initial investment and capacity building for maintenance works would be necessary. Another option is for the private sector (particular individual, utility, or third party company) to own and operate; in which case, minigrid system would need to be above certain size and preliminary negotiations with regulators for national grid rollout would be necessary. However, no such regulations exist in Myanmar currently, increasing the risks of private-sector ownership model. The third option is a collaborative project between the community and the private sector. Initial investment and maintenance works can be carried out by the private company, and investment for distribution assets and bill collection works can be carried out by the community. In this case, contract which clarifies the roles for each stakeholder, would be important.

A cost composition of a PV minigrid system for 200 households is shown in the report. A total of approximately 75,000 USD is assumed for project cost.

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Unit Costs ($)</th>
<th>Total Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– PV modules</td>
<td>24</td>
<td>245.00</td>
<td>5,880.00</td>
</tr>
<tr>
<td>– PV array rack</td>
<td>4</td>
<td>350.00</td>
<td>1,400.00</td>
</tr>
<tr>
<td>– Charge controller</td>
<td>4</td>
<td>480.00</td>
<td>1,920.00</td>
</tr>
<tr>
<td>– System housing</td>
<td>1</td>
<td>1,735.00</td>
<td>1,735.00</td>
</tr>
<tr>
<td>– Inverters</td>
<td>4</td>
<td>1,490.00</td>
<td>5,960.00</td>
</tr>
<tr>
<td>– Batteries</td>
<td>96</td>
<td>228.00</td>
<td>21,600.00</td>
</tr>
<tr>
<td>– Data logging system</td>
<td>1</td>
<td>375.00</td>
<td>375.00</td>
</tr>
<tr>
<td>– Earth ground system</td>
<td>1</td>
<td>210.00</td>
<td>210.00</td>
</tr>
<tr>
<td>– DC wires</td>
<td>200</td>
<td>1.50</td>
<td>300.00</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>39,960.00</strong></td>
</tr>
<tr>
<td>Balance of System Components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Lamps</td>
<td>400</td>
<td>3.00</td>
<td>1200.00</td>
</tr>
<tr>
<td>– Power sockets</td>
<td>200</td>
<td>3.50</td>
<td>700.00</td>
</tr>
<tr>
<td>– Pre-payment meters</td>
<td>200</td>
<td>48.00</td>
<td>9,600.00</td>
</tr>
<tr>
<td>– Power limiters</td>
<td>200</td>
<td>12.00</td>
<td>2,400.00</td>
</tr>
<tr>
<td>– 2.5 mm² single wire</td>
<td>6,000</td>
<td>0.35</td>
<td>2,100.00</td>
</tr>
<tr>
<td>– 1.5 mm² twin wire</td>
<td>4,000</td>
<td>0.45</td>
<td>1,800.00</td>
</tr>
<tr>
<td>– Lamp post</td>
<td>200</td>
<td>10.00</td>
<td>2,000.00</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>19,800.00</strong></td>
</tr>
<tr>
<td>Street Lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Stand-alone streetlights</td>
<td>20</td>
<td>790.00</td>
<td>15,800.00</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>15,800.00</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>55,560.00</strong></td>
</tr>
</tbody>
</table>

Figure Cost composition for a 200 household PV minigrid system

Electricity Prices in Myanmar
**Article of electricity price**

**Government needs K300 billion for electricity supply**  
(Source: 31 JUL 2017, Myanmar Times)

The Government needs an estimated K300 billion to supply electricity throughout the country for financial year 2017-2018, U Myint Oo, deputy director general of the Electricity and Energy Ministry’s Department of Electric Power told The Myanmar Times.

But U Myint Oo said that the government will be losing K23 per unit as it is going to supply power at a loss.

The Ministry of Electricity and Energy said the country needs 3100 megawatts of power for fiscal year 2017 – 2018.

In current fiscal year, the government expects a total income of K1.164 trillion from power distribution, while expenditure is expected to reach K1.541 trillion, so that the ministry will have a loss of K376.64 billion.

U Tun Naing, , deputy minister of the Ministry of Electricity and Energy, told Pyithu Hluttaw last month the government lost about K337 billion in electricity transmission in the previous fiscal year.

The ministry has to invest in transmission and distribution costs in addition to production cost, so that the state’s budget which has been planned for expansion of power plant projects, electricity grids and substation projects has been deducted to offset costs, officials said.

Currently, electricity prices for households ranged from K35 to K50 per unit and for industrial users, prices ranged from K75 per to K150 per unit.

State-owned and private power plants generate electricity at a cost of about K91.92 per unit but income from collecting electricity charges averaged K69.26 per unit, therefore

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(Access: 3rd March 2018)
about K22.66 has been used from the state's budget for every unit and a total of about K337 billion were lost in 2016-17 financial year, U Tun Naing said.

The World Bank is helping the government draw up a tariff policy that would develop the country’s electricity sector, reduce losses and set an appropriate rate of electricity prices, he said.

The Ministry of Electricity and Energy has invited suggestions from representatives of Pyithu Hluttaw, regional or state governments and concerned ministries on how to amend electricity prices.
## Joint Crediting Mechanism Proposed Methodology Form (Draft)

### Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

<table>
<thead>
<tr>
<th>Host Country</th>
<th>Republic of the Union of Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the methodology proponents submitting this form</td>
<td>Fujita Corporation</td>
</tr>
<tr>
<td>Sectoral scope(s) to which the Proposed Methodology applies</td>
<td>3. Energy Demand</td>
</tr>
<tr>
<td>Title of the proposed methodology, and version number</td>
<td>Rice husk based power and/or heat generation, Ver0.0</td>
</tr>
<tr>
<td>List of documents to be attached to this form (please check):</td>
<td>□The attached draft JCM-PDD: ❑Additional information</td>
</tr>
<tr>
<td>Date of completion</td>
<td>9/3/2018</td>
</tr>
</tbody>
</table>

### History of the proposed methodology

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Contents revised</th>
</tr>
</thead>
<tbody>
<tr>
<td>00.1</td>
<td>9/3/2018</td>
<td>Zero Edition (Draft)</td>
</tr>
</tbody>
</table>
A. Title of the methodology

Rice husk based power and/or heat generation, Ver 00.1

B. Terms and definitions

<table>
<thead>
<tr>
<th>Terms</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice husk</td>
<td>Rice husk is the outermost layer of protection encasing a rice grain, typically used as fuel at the rice mill factory.</td>
</tr>
</tbody>
</table>

C. Summary of the methodology

<table>
<thead>
<tr>
<th>Items</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG emission reduction measures</td>
<td>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.</td>
</tr>
<tr>
<td>Calculation of reference emissions</td>
<td>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.</td>
</tr>
<tr>
<td>Calculation of project emissions</td>
<td>Project emissions are GHG emissions associated with auxiliary fuel consumption and transport of biomass.</td>
</tr>
<tr>
<td>Monitoring parameters</td>
<td>▪ 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).</td>
</tr>
<tr>
<td></td>
<td>▪ The amount of fuel consumed by the project.</td>
</tr>
<tr>
<td></td>
<td>▪ The amount of rice husks transported, distance travelled, fuel consumed through transportation, as appropriate</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Reference emissions</th>
<th>Emission sources</th>
<th>GHG types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity delivered to the electricity grid, and/or to captive users</td>
<td>CO₂</td>
<td></td>
</tr>
<tr>
<td>Heat delivered to the electricity grid, and/or to captive users</td>
<td>CO₂</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project emissions</th>
<th>Emission sources</th>
<th>GHG types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel consumed by the project plant</td>
<td>CO₂</td>
<td></td>
</tr>
<tr>
<td>Transport of rice husk to the project plant</td>
<td>CO₂</td>
<td></td>
</tr>
</tbody>
</table>

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 take 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, disposites 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.

\[ R_E_p = R_E_{elec,p} + R_E_{heat,p} \]

- \( R_E_p \): Reference emissions during the period \( p \) [tCO\(_2\)/p]
- \( R_E_{elec,p} \): Reference emissions due to electricity generation during the period \( p \) [tCO\(_2\)/p]
- \( R_E_{heat,p} \): Reference emissions due to heat generation during the period \( p \) [tCO\(_2\)/p]

Reference emissions due to electricity generation are calculated as follows.

\[ R_E_{elec,p} = E_{grid,p} \times E_{grid} + E_{offgrid,p} \times E_{offgrid} \]

- \( R_E_{elec,p} \): Reference emissions due to electricity generation during the period \( p \) [tCO\(_2\)/p]
- \( E_{grid,p} \): Electricity supplied to the grid or to industrial customers connected to the grid during the period \( p \) [MWh/p]
- \( E_{grid} \): CO\(_2\) emission factor of the grid [tCO\(_2\)/MWh]
- \( E_{offgrid,p} \): Electricity supplied to industrial customers not connected to the grid during the period \( p \) [MWh/p]
- \( E_{offgrid} \): CO\(_2\) emission factor of industrial customers not connected to the grid [tCO\(_2\)/MWh]

Reference emissions due to heat generation are calculated as follows.

\[ R_E_{heat,p} = H_{ic,p} \times \frac{1}{\eta_{BRE}} \times E_{FF} \]

- \( R_E_{heat,p} \): Reference emissions due to heat generation during the period \( p \) [tCO\(_2\)/p]
- \( H_{ic,p} \): Heat supplied to industrial and commercial facilities during the period \( p \) [GJ/p]
- \( \eta_{BRE} \): Efficiency of reference boilers
- \( E_{FF} \): CO\(_2\) emission factor of fossil fuel consumed for reference boiler [tCO\(_2\)/GJ]

G. Calculation of project emissions

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

\[ P_E_p = P_{FF,p} + P_{TR,p} \]

- \( P_E_p \): Project emissions during the period \( p \) [tCO\(_2\)/p]
- \( P_{FF,p} \): Project emissions due to fossil fuel combustion during the period \( p \) [tCO\(_2\)/p]
- \( P_{TR,p} \): Project emissions due to transport of biomass during the period \( p \) [tCO\(_2\)/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\(_2\)/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\(_2\) emission factor of fossil fuel \( i \) [tCO2/GJ]
- \( I \): Type of fossil fuel

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

\[ PE_{TR,p} = \sum_j RH_{j,p} \times D_j \times EF_{CO2,f} \]

- \( PE_{TR,p} \): Project emissions due to transport of biomass during the period \( p \) [tCO\(_2\)/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 \( D_j \).
- \( EF_{CO2,f} \): CO\(_2\) 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\(_2\)/p]
- \( RE_p \): Reference emissions during the period \( p \) [tCO\(_2\)/p]
- \( PE_p \): Project emissions during the period \( p \) [tCO\(_2\)/p]

**I. Data and parameters fixed *ex ante***

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description of data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>( EF_{grid} )</td>
<td>CO(_2) emission factor of the grid</td>
<td>Emission factor is derived from the result of calculation by using IEA macro data. This value should</td>
</tr>
</tbody>
</table>
be revised every year until public value will be available. See the additional information in more detail.

| \( EF_{\text{offgrid}} \) | CO\(_2\) emission factor of industrial customers not connected to the grid | 0.8tCO\(_2\)/MWh From CDM methodology "AMS-I.A. Electricity generation by the user"

\( \eta_{\text{BRE}} \) | Efficiency of reference boilers | Selected from the default value set in the methodology. In the order to preference:
- b) Default value from CDM Methodological tool “Tool to determine the baseline efficiency of thermal or electric energy generation systems”

\( NCV_i \) | Net calorific value of fossil fuel \( i \) | Selected from the default values set in the methodology. In the order to preference:
- 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.

\( EF_j \) | CO\(_2\) emission factor of fossil fuel \( i \) | Selected from the default values set in the methodology. In the order to preference:
- a) values provided by the fuel supplier;
- b) measurement by the project participants;
- c) regional or national default values;
- d) IPCC
<table>
<thead>
<tr>
<th>$\text{EF}_{\text{CO}_2 f}$</th>
<th>$\text{CO}_2$ emission factor of transport</th>
<th>Agency for Natural Resources and Energy: Logistics-Bunya Ni Okeru CO2 Haisyutu-Ryo Santei Hoho Kyodo guideline (Ver3.0), Domestic vessel</th>
</tr>
</thead>
</table>

default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Lower value is applied.
Additional Information I

“Grid Electricity Emission Factor in Myanmar”

There is only a few CDM registered project in Myanmar, which emission factor calculated by old data from 2006 to 2008. Therefore, there is no official grid CO2 emission factor in the current situation of Myanmar, which is approved by UNFCCC so far. Under the circumstances, we consider the CO2 emission factor of grid of Myanmar as follows.

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

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Oil</th>
<th>Gas</th>
<th>Hydro</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>473</td>
<td>30</td>
<td>1,205</td>
<td>5,256</td>
<td>6,964</td>
</tr>
<tr>
<td>2010</td>
<td>671</td>
<td>33</td>
<td>1,734</td>
<td>5,105</td>
<td>7,543</td>
</tr>
<tr>
<td>2011</td>
<td>724</td>
<td>38</td>
<td>1,588</td>
<td>7,518</td>
<td>9,868</td>
</tr>
<tr>
<td>2012</td>
<td>771</td>
<td>51</td>
<td>2,144</td>
<td>7,766</td>
<td>10,732</td>
</tr>
<tr>
<td>2013</td>
<td>514</td>
<td>55</td>
<td>2,443</td>
<td>8,878</td>
<td>11,890</td>
</tr>
<tr>
<td>2014</td>
<td>286</td>
<td>65</td>
<td>4,977</td>
<td>8,829</td>
<td>14,157</td>
</tr>
<tr>
<td>2015</td>
<td>285</td>
<td>55</td>
<td>6,231</td>
<td>9,399</td>
<td>15,970</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Oil</th>
<th>Gas</th>
<th>Grid average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1.055</td>
<td>0.864</td>
<td>0.729</td>
<td>0.202</td>
</tr>
<tr>
<td>2010</td>
<td>1.057</td>
<td>0.786</td>
<td>0.729</td>
<td>0.265</td>
</tr>
<tr>
<td>2011</td>
<td>0.979</td>
<td>0.853</td>
<td>0.729</td>
<td>0.192</td>
</tr>
<tr>
<td>2012</td>
<td>0.961</td>
<td>0.826</td>
<td>0.729</td>
<td>0.218</td>
</tr>
<tr>
<td>2013</td>
<td>0.956</td>
<td>0.825</td>
<td>0.729</td>
<td>0.195</td>
</tr>
<tr>
<td>2014</td>
<td>0.969</td>
<td>0.848</td>
<td>0.729</td>
<td>0.280</td>
</tr>
<tr>
<td>2015</td>
<td>0.973</td>
<td>0.825</td>
<td>0.729</td>
<td>0.304</td>
</tr>
</tbody>
</table>

Average Emission Factor 2009-2013: 0.214
Average Emission Factor 2010-2014: 0.230
Average Emission Factor 2011-2015: 0.238
These results in a grid average CO2 emission factor of 0.238t-CO2/MWh, using methods approved under CDM. This means that the grid average CO2 emission factor of Myanmar is smaller than most countries, the reason being the predominance of electricity generated by hydropower in Myanmar (over 70%).

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

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

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