Large scale JCM feasibility study in FY2015

(JCM Project Formulation Study through City-to-City Collaboration in Yangon)

Final Report

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Nippon Koei Co., Ltd
Kawasaki City
Large scale JCM feasibility study in FY2015
JCM Project Formulation Study through City-to-City Collaboration in Yangon

Final Report

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## ABBREVIATION

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<th>Abbreviation</th>
<th>Meanings</th>
</tr>
</thead>
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<td>1</td>
<td>CCFL</td>
<td>Cold Cathode Fluorescent Lamp</td>
</tr>
<tr>
<td>2</td>
<td>CPLA</td>
<td>City Planning and Land Administration Department</td>
</tr>
<tr>
<td>3</td>
<td>GHG</td>
<td>Greenhouse Gases</td>
</tr>
<tr>
<td>4</td>
<td>INDC</td>
<td>Intended Nationally Determined Contributions</td>
</tr>
<tr>
<td>5</td>
<td>JCM</td>
<td>Joint Crediting Mechanism</td>
</tr>
<tr>
<td>6</td>
<td>MIC</td>
<td>Myanmar Investment Committee</td>
</tr>
<tr>
<td>7</td>
<td>MOECAF</td>
<td>Ministry of Environment Conservation and Forestry</td>
</tr>
<tr>
<td>8</td>
<td>MOU</td>
<td>Minutes of Understanding</td>
</tr>
<tr>
<td>9</td>
<td>NAPA</td>
<td>National Adaptation Programmes of Action</td>
</tr>
<tr>
<td>10</td>
<td>PCCD</td>
<td>Pollution Control and Cleansing Department</td>
</tr>
<tr>
<td>11</td>
<td>UMFCCI</td>
<td>The Republic of the Union of Myanmar Federation of Chambers of Commerce and Industry</td>
</tr>
<tr>
<td>12</td>
<td>YCDC</td>
<td>Yangon City Development Committee</td>
</tr>
</tbody>
</table>
CHAPTER 1 BACKGROUND OF THE STUDY

1.1 BACKGROUND

Yangon City, the former capital of the Republic of the Union of Myanmar, is one of the largest commercial cities in the country which population is 5 million. In response to the democratization in recent years, rapid urbanization of Yangon city is on-going through the inflow of foreign capital and development by private companies. However, the city faces the difficulties such as deterioration of infrastructure due to the limited investment, technical assistance and social development from foreign countries against the military government. More specifically, there are some problems to be considered, for example, the demand far exceeds the supply of electricity power with the urban development and infrastructure development, traffic congestion is caused by the poor road condition or lack of facilities, including signal, and the lower capacity of water supply and sewerage facilities by their aging. In addition, energy saving of buildings by private investment would be a point to be considered for the increasing power demand in the future.

Japanese local government has been addressed and managed the issue of pollution and other related issues caused by economic development during the post-war economic recovery so that it is expected to contribute to mitigate such negative impacts in Yangon city which is currently facing the similar issues. To this situation, Kawasaki city in Kanagawa prefecture where function as the core city of the neighboring Keihin industrial area, has a variety of experiences and knowledge such as pollution measures or industrial development. And, in
recent years, the city has been actively involved in the activities toward low-carbon society inside and outside of the countries.

1.2 PURPOSE

This study is aimed to find and form the candidate projects of Joint Crediting Mechanism (JCM) in Yangon city, where rapidly developing, through city-to-city collaboration with Kawasaki city which has the useful knowledge for low-carbon emission society, and contributes to the Yangon city’s problem-solving.

1.3 PROJECT IMPLEMENTATION SCHEME

Nippon Koei Co., Ltd., implements the study as the proponent in this project in cooperation with Kawasaki city as co-proponent and Yangon City Development Committee (YCDC) as counterpart.

![Implementation Structure of the Project](image)

This project proposed four (4) low-carbon theme (JCM candidate projects) and the technology in each theme was introduced by the following companies as a co-proponent; Ebara Refrigeration Equipment & Systems Co., Ltd. (introduction of high-efficiency air conditioning systems), Ebara Corporation (introduction of high-efficiency pump), NANOFUEL Co., Ltd. (introduction of nano-emulsion fuel), Cool Japan Co., Ltd.
(introduction of the CCFL\textsuperscript{1}). Also Kawasaki green innovation clusters, association companies are approximately 100 companies, joined the project as cooperation corporate entity to examine the theme. The result of examination for JCM project formulation is described in chapter 5.

Also, Mingaladon industrial park, located in the northern part of Yangon City, showed their intentions to cooperate/participate in the proposed low-carbon industrial park, and cooperated with the study as a co-proponent of this proposed project. In addition, Myanmar Koei International Ltd., one of group companies of Nippon Koei and also local subsidiary in Myanmar, had the main responsibilities for information collection and the consultation coordination as contact place for the Yangon city and related ministries and agencies.

\textsuperscript{1} CCFL stands for Cold Cathode Fluorescent Lamp
CHAPTER 2 OVERVIEW OF YANGON CITY

2.1 OVERVIEW

2.1.1 Basic Information

Yangon city, formerly known as Rangoon, has been the capital of Republic of the Union of Myanmar until 2006. The current capital is Naypyidaw which lies to the North of Yangon. Yangon city belongs to Yangon region, an administrative area. The region has the north and east border with Bago region, west border with Ayeyarwady, and Mottama bay in the south. Yangon region including Yangon city is one of the most industrialized area in Myanmar, and most of the major industry is concentrated in this region.

The following table shows the basic information of Yangon city comparing to that of the Japanese counterpart of this Project, namely Kawasaki city.

<table>
<thead>
<tr>
<th>Item</th>
<th>Yangon city</th>
<th>Kawasaki city</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area [km²]</td>
<td>598.8</td>
<td>143.0</td>
</tr>
<tr>
<td>Average daily temperature [degree Celsius]</td>
<td>27.5</td>
<td>16.6</td>
</tr>
</tbody>
</table>

Source: Study Team based on the references

According to the recent rapid urbanization, the population had been increased about threefold from 1998 to 2014.

![Figure 2-1 Change of the Population of Yangon City](image-url)
The budget of Yangon City Development Committee (YCDC) is shown in the table below. The budget had been increased about 1.5 times for five (5) years from 2007 to 2012, and the expenditure also increased accordingly. The budget scale is expanding according to the economic growth of Myanmar.

### Table 2-2 Annual budget of YCDC

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General income</td>
<td>33,672.80</td>
<td>33,857.18</td>
<td>40,097.32</td>
<td>46,429.09</td>
<td>49,972.62</td>
</tr>
<tr>
<td>2</td>
<td>Income from investment</td>
<td>370.10</td>
<td>1,168.40</td>
<td>5,505.82</td>
<td>30,745.30</td>
<td>5,794.85</td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>34,042.90</td>
<td>35,025.58</td>
<td>45,603.14</td>
<td>77,174.39</td>
<td>55,767.47</td>
</tr>
<tr>
<td>3</td>
<td>General expenditure</td>
<td>20,585.61</td>
<td>26,450.70</td>
<td>27,048.18</td>
<td>49,533.65</td>
<td>37,225.23</td>
</tr>
<tr>
<td>4</td>
<td>Expenditure for investment</td>
<td>13,440.00</td>
<td>24,119.50</td>
<td>21,894.50</td>
<td>37,381.50</td>
<td>16,740.00</td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>34,025.61</td>
<td>50,570.20</td>
<td>48,942.68</td>
<td>86,915.15</td>
<td>53,965.23</td>
</tr>
</tbody>
</table>

Source: YCDC

### 2.1.2 Yangon City Development Committee (YCDC)

Myanmar has the seven (7) regions and seven (7) states composed of district/township, and each of region/state has a local administrative organization stipulated as the Constitution. However, YCDC, which is not stipulated in the Constitution, is in charge of administrative service in Yangon city according to the Law on Development of Yangon City. The administrative mandate of central and region/state is defined in the Constitution.

YCDC constituting with 27 departments, is responsible for administrative service to the 33 townships in Yangon city, such as operation and maintenance of public facility (road, market etc.), administrative control (issuance of construction permission, sanitary control of restaurant business etc.), and others (water supply operation etc.). Major task of YCDC is operation and maintenance of the existing facilities, and YCDC has little intervention in establishment of new projects and preparation of development plan.

The counterpart of this study is a joint team of two (2) departments of YCDC. One of them is the Department of City planning & Land Administration (CPLA), a newly established department under Secretary. The other is the Pollution control & Cleansing Department (PCCD), which is in charge of planning and implementation of waste management and cleansing. The organizational structure of YCDC and the roles of each sub-group are shown in the table below.

---

2 Although a document clearly defining the mandate of the central, local government and YCDC does not exist, their mandate is conventionally defined and understood mutually.
2.2 CURRENT SITUATION OF YANGON CITY

2.2.1 Major Industry

YCDC had contributed to develop Myanmar as the leading city, and currently YCDC is expected to lead Myanmar to convert its major industry from agriculture to commerce.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture</td>
<td>In industrial zone of Yangon city, more than 2,800 factories are under operation. The most of the factories are categorized into food/metal/timber process, rubber/plastic manufacture, fix/installation of equipments, and sewing. As the Ministry of Commerce of the central government leads to construct and manage the factories, YCDC has less intervention in them.</td>
</tr>
<tr>
<td>Commerce</td>
<td>Yangon city has various markets categorized into the followings: (i) Traditional market (ii) Modern commercial facilities (shopping center, super market, convenience store etc.) (iii) Private shop (iv) Street stall. Yangon city has more than 150 traditional markets, and more than 50 modern commercial facilities.</td>
</tr>
<tr>
<td>Service</td>
<td>In Yangon city, there are more than 200 of hotels and restaurants, and amusement facilities such as movie theater, and the number of those facilities is increasing.</td>
</tr>
</tbody>
</table>

Source: Study Team based on Report of JICA Preparatory Study for Urban Development Programme in the Greater Yangon (2011)
Note: Traditional market means public market where sells various products such as rice, oil, oil seeds, beans, other foods and snacks, plastic and plastic products, hemp sack, mat, waterproof sheet, etc.
Industry of Myanmar relies on agriculture likewise the neighbor Asian countries, while that of Yangon city depends on manufacture and commerce. Current industrial structure of Myanmar constitutes with 36% Agriculture/Livestock/Fishery/Forestry, 20% manufacture, 20% commerce, 18% service, while that of Yangon city is 37% manufacture, 25% commerce, 24% service. The table above shows the summary of the industry of Yangon city.

2.2.2 Business Expansion of Japanese Companies to Myanmar

1) In Yangon city, the number of construction of transportation infrastructure such as elevated bridge, hotel, shopping mall, buildings has been drastically increased.

2) It is not actively promoted to save energy of the existing facilities in Yangon city compared with the other Asian nations because the managers put priority to operate the existing infrastructure rather than renovation of private buildings, energy saving as it has not passed long time since economic closure.

3) In Myanmar, foreign companies started to expand their business in Myanmar after lifting the economic blockage. However, the foreign companies has limitations, such as (i) retail/service (ii) difficulty in obtaining a export license except companies which import all the materials, process in Myanmar, and export all the products. These limitations are revised frequently, and the companies are forced to follow the circulars and bylaws on investment issued by Myanmar Investment Committee (MIC).

4) Most of the equipment for daily life in Yangon were brought from the foreign countries as second-hand products or imported from China. Most of the private vehicles, and buses were used-ones brought from Japan, and many of the home electronics such as air conditioner and generator are imported from China.

2.2.3 Strategy against Climate Change in Myanmar

The study target, Yangon city, has not yet developed organizations and institutions against climate change. Therefore, the following sections show the collected information on the national strategy against climate change.

(1) Emission of Green House Gas (GHG) in Myanmar
Myanmar submitted the first national communication in 2000. According to it, the major source of GHG emission is land use and forest sector (36.5%), following agriculture (17.1%), and waste (4%). Land use and forest sector shares much in both absorption and reduction amount.
Table 2-4  GHG emission in Myanmar in 2000

<table>
<thead>
<tr>
<th>Sector</th>
<th>CO₂ [Gg CO₂-eq]</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absorption</td>
<td>Gross reduction</td>
</tr>
<tr>
<td>Energy</td>
<td>0</td>
<td>786</td>
</tr>
<tr>
<td>Industry</td>
<td>0</td>
<td>463</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0</td>
<td>22,843</td>
</tr>
<tr>
<td>Land Use and Forest</td>
<td>142,221</td>
<td>40,405</td>
</tr>
<tr>
<td>Waste</td>
<td>0</td>
<td>2,826</td>
</tr>
<tr>
<td>Total</td>
<td>142,221</td>
<td>67,323</td>
</tr>
</tbody>
</table>

Source: The 11th workshop on GHG inventories in Asia

Potential reduction amount of CO₂ emission was estimated by UNEP RISO CENTER based on its past data as shown in the table below.

Table 2-5  Potential reduction amount of CO₂ emission by sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Potential reduction amount of CO₂ emission [tCO₂/year]</th>
</tr>
</thead>
<tbody>
<tr>
<td>REDD+/Avoid deforestation</td>
<td>133,883,430</td>
</tr>
<tr>
<td>Afforestation/ plantation</td>
<td>419,363,560</td>
</tr>
<tr>
<td>Charcoal manufacture</td>
<td>127,920</td>
</tr>
<tr>
<td>Power generation from waste</td>
<td>589,400</td>
</tr>
<tr>
<td>Convert from fossil fuel</td>
<td>1,706,353</td>
</tr>
<tr>
<td>Water power generation</td>
<td>47,900</td>
</tr>
<tr>
<td>Wind power generation</td>
<td>655,750</td>
</tr>
<tr>
<td>Popularization of compact fluorescent lamp</td>
<td>150,000</td>
</tr>
<tr>
<td>Improvement of efficiency of equipments for heat generation</td>
<td>6,500,000</td>
</tr>
<tr>
<td>Improvement of process of brick manufacture</td>
<td>500,000</td>
</tr>
<tr>
<td>Utilization of biodiesel in transportation sector</td>
<td>500,000</td>
</tr>
<tr>
<td>Utilization of Ethanol fuel</td>
<td>100,000</td>
</tr>
<tr>
<td>Introduction of express bus transportation system</td>
<td>25,000</td>
</tr>
</tbody>
</table>

Source: EMISSIONS REDUCTION PROFILE Myanmar (UNEP RISO, June 2013)

(2) Organizational Structure and National Strategy against Climate Change

The organizational structure for climate control in Myanmar is composed of the Ministry of Environmental Conservation and Forestry (MOECAF\(^3\)), established in 2012, and the following six (6) divisions/ organizations: Department of survey, Department of forestry, Department of environment conservation, Department of afforestation of dry zone, and Forestry University. The agreement on JCM on 16\(^{th}\) September 2015 was signed by the Deputy Minister of MOECAF, Dr. Thet Thet Zin.

\(^3\) As of February 2016

<table>
<thead>
<tr>
<th>Policy</th>
<th>Year</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myanmar National Environment Policy</td>
<td>1994</td>
<td>Conservation and prevention from deterioration of environment, promotion of economic development, achievement of sustainable development which puts priority to environment protection, development in harmony with environment</td>
</tr>
<tr>
<td>Myanmar Agenda 21</td>
<td>1997</td>
<td>Sustainable natural resources utilization, social development, economic development, organization development</td>
</tr>
<tr>
<td>National Sustainable Development Strategy</td>
<td>2009</td>
<td>Strategy to achieve sustainable development in the three fields: Society/ Economy/ Environment</td>
</tr>
<tr>
<td>Law on Environment Protection</td>
<td>2012</td>
<td>Control/ prevention from loss/ sustainable utilization of natural resources, improvement of public awareness, and cooperation for environment program</td>
</tr>
<tr>
<td>National Adaptation Programmes of Action (NAPA)</td>
<td>2012</td>
<td>Implementation of the 32 prior activities from the eight (8) target sectors for adaptation</td>
</tr>
<tr>
<td>JCM</td>
<td>2015</td>
<td>Bi-lateral agreement on JCM</td>
</tr>
</tbody>
</table>

Source: Study Team based on Handbook of national market mechanism, IGES, January 2013, and 11th workshop on GHG inventories in Asia and the published information by the UN prepared by the JICA study team

Myanmar has developed NAPA in 2012, which shows the 32 prior activities from the eight (8) target sectors (agriculture, disaster prevention, forest, public sanitation, water resource, coast protection) for adaptation. Based on it, Myanmar has implemented the prior activities.
CHAPTER 3 OVERVIEW OF KAWASAKI CITY

3.1 BASIC INFORMATION

Kawasaki City is located in the North-eastern area of Kanagawa Prefecture. The city has the north boarder along Tamagawa River with Tokyo Prefecture, and the south boarder with Yokohama City. The city has Tama hill in the west and Tokyo bay in the south. The population is about 1.4 million, and the number of the households is 687,000. The city has the highest population growth rate among the big cities in Japan, and lower average age. The history of Kawasaki city is originated from “Kawasaki jyuku” which is an old guest house at EDO era in the Tokaido road. After starting the modern industrialization starting in the end of Meiji era, the city has been grown leading the technology improvement of Japan. The agricultural area has become an urban agricultural area which produces agricultural crops to be shipped to Edo and Tokyo, and the coastal area has become an industrial city with harbor facilities. However, the city has faced the pollution from industry and traffic sector, and social issue caused by the overdevelopment. Therefore the city had changed its policy from industry-first to environment-first, and became an environmentally-friendly city.

3.2 CURRENT SITUATION OF KAWASAKI CITY

3.2.1 History of Kawasaki City on Environment Problems

In the period of rapid economic growth (1960s-1970s), since Kawasaki city played a leading role for industrialization of Keihin Industrial area, the city faced various environmental problems such as air and water pollution etc. However, the efforts made by all of the relevant companies, local people and the city government contributed to recover the environment with clear sky and clean river. As a result, the city accumulated (i) the world-class environmental technology on air pollution control, waste disposal, and recycle and, (ii) know-how such as technology development by the companies, pollution control regulation, and public awareness improvement.

Kawasaki Oceanfront Industrial Area in 1960s
Current Overview of Kawasaki City

3.2.2 Actions against Environmental Problems

Kawasaki city has promoted the industrial growth with high environmental consideration such as pollution control and recycle, based on the environmental technology and know-how accumulated in the course of solving the environmental problems. Kawasaki Eco-town, the first eco-town approved in 1997, coordinates with the facilities in/around the town for circulation of the resources through the various recycling facilities. Kawasaki Eco-town, about 2,800 hectare of Kawasaki coast front, developed a system of waste resource circulation among the companies in the city, recycling the waste produced from the Eco-town and Kawasaki city. This Eco-town is highly appreciated not only from domestic area but also from foreign countries.

Figure 3-1 Framework of Kawasaki Eco-town

In the next pages, major low-carbon facilities in the city are introduced.
Mega Solar Power Plant in Kawasaki

Operation of about 100,000 of solar panels started in 2011 before the other areas.
✓ Output power: 2MW
  • Ougi island 1.3MW
  • Uki island 0.7kW
✓ Operating body: Tokyo Electric Power Company and Kawasaki city
✓ The plant is constructed in the post-final disposal site

Wind Power Plant in Ougi island

Large scale wind power plant, whose annual power-generating capacity is 300 MWh.
✓ Output power: 0.199MW
✓ Operating body: JX Nikko Nisseki Energy

Biomass Power Plant in Kawasaki

The largest plant generating power only from biomass fuel. The first biomass power plant for a city.
✓ Output power: 3.3MW
✓ Operating body: Kawasaki biomass power generation Co., Ltd. (Japan Bioenergy holding, Sumitomo Forestry Co., Ltd, Furuhashi EPO Co., Ltd, Sumitomo Joint Electric Power Co., Ltd)
✓ Power generation from wood biomass such as construction waste etc.

Natural Gas Power Plant in Kawasaki

Highest operation rate with a few operators. The characteristics of the plant is environmentally friendly, high efficient, and stable power supply.
✓ Output power: 84.7Mw
✓ Operating body: JX Nikko Nisseki Energy, Tokyo gas
✓ High efficient power generation by combined cycle of gas and steam turbine
Besides, Kawasaki city supports business matching of the companies in Kawasaki with superior environmental technology and the areas which has needs for those technologies. As shown in the figure below, Kawasaki city has assisted the companies in the city to extend their environmental technology in China, Saudi Arabia, Mozambique, Thailand, and Laos in order to support the countries to solve the environmental problems.

3.2.3 Kawasaki Green Innovation Cluster

Kawasaki Green Innovation Cluster is a network aiming at industrial development and international contribution through coordination among the three organizations: related companies, university and government. The cluster supports to create a business based on the accumulated environmental technology and know-how.

The member of the cluster is over 100 companies from and outside of Kawasaki city. The network has been working on the three major tasks coordinating with the cluster members and local governments: “inquiry counter for effective implementation of the policy of Kawasaki-city and the supporting organizations”, “public relations, information sharing”, and “Creation of business based on the accumulated environmental technology, experience of the local government and know-how”.

Figure 3-2 Environment technology extended from Kawasaki city to the world
**Function of the Cluster**

1. **Inquiry counter for effective implementation of the policy of Kawasaki-city and the supporting organizations**
   The secretary of the cluster opens an direct inquiry counter to have consultation with those who has interest on the assistance from Kawasaki city and other supporting organizations.

2. **Public relations, and information sharing**
   The cluster shares the information on the cluster to the public to support create a new business.
   - Public relations on the environmental technology and service accumulated in the Kawasaki city
   - Information sharing of the needs for environmental technology home/abroad
   - Information sharing related to the project by the supporting organizations (e.g. public invitation)
   - Information sharing on the public invitation/ seminars/ consultation organized by the related organizations

3. **Creation of new business opportunity based on the accumulated environmental technology, experience of the local government and know-how**
   The cluster supports the cluster members to expand their business in order to create new business through cooperation with Kawasaki city
   - Support research and development, and demonstration in Kawasaki city
• Support business expansion of the cluster members through the intercity cooperation

Packaging of the environmental technology, products, service accumulated in Kawasaki city, and business expansion to the domestic and international market

3.2.4 Chamber of Commerce in Kawasaki City

Chamber of Commerce in Kawasaki city, aiming at development of small and medium-sized business, local revitalization, promotion of the international activities, plays a role of promotion of economic exchange of the private sector in the other countries coordinating with the chambers of commerce in the world.

Chamber of Commerce in Kawasaki city has signed a memorandum with association of chambers of commerce in Myanmar on 29th June 2015 to strengthen the relation for the mutual economic development and promotion of small and medium-sized business. The background of the memorandum is that the small and medium-sized business in Kawasaki city tries to make connections with the chambers of the commerce in Myanmar so as to start business in the market in Mekong region, and Myanmar expects Kawasaki with manufacturing business to assist Myanmar to develop its industry. In 2014 before the memorandum was signed, Kawasaki city has dispatched a mission composed of the companies from/outside of the city, to Yangon, Naypyidaw, and Mandalay for business matching, and organized business seminar to the companies in the city to promote business expansion to Myanmar.
CHAPTER 4 PROMOTION OF LOW-CARBON CITY-TO-CITY COLLABORATION

4.1 OVERVIEW

In this project, the challenges which Yangon city faces currently or in the future are assumed (e.g. various environmental issues due to the rapid economic growth), and then Kawasaki city was selected as a Japanese local government which has knowledge and experiences in those fields.

Kawasaki city consists of the core of the Keihin industrial region and they are working on environmental problems such as pollution measures for many years. And recently, Kawasaki city becomes the one of the cities that owns a lot of environmental technologies and industries related to low-carbon/ resource recycling/ energy, etc. In addition, in Kawasaki city, citizens, companies, and government have cooperated together to address environmental issues from long time ago, and there are many companies with high environmental awareness.

From the above, it is clear that Kawasaki city has supported the economic development of Keihin industrial region and developed the broad network in the field of environmental technologies and the industry. Thus, participation of Kawasaki city in the city-to-city collaboration is expected to contribute to the sustainable development of Yangon city, and also JCM candidate projects were examined from the Kawasaki green innovation cluster companies.

This project investigated and examined the possibilities of “city-to-city collaboration” between Kawasaki city and Yangon city, and the JCM project formulation from the following four sectors to solve the problems Yangon city faces.

- Development of low-carbon industrial park
- Introduction of low-carbon building management system
- Introduction of low-carbon water supply and sewerage facilities
- Finding the candidate project of renewable energy/ new energy

The main participants of this project and their correlation charts are shown in the figure below.
4.2 DISCUSSION ON CITY TO CITY COLLABORATION

At the beginning of this project, as described above, it had been focused on the cooperation with International Economic Promotion Office of Economic Labor Bureau in Kawasaki city for the JCM projects formulation in Yangon city. However, some plans were modified compared with the original one through the discussion and exchange opinions with Yangon city regarding the city-to-city collaboration (mainly two departments in YCDC: City planning & Land Administration Department, and Pollution control & Cleansing Department).

Considering the above situations, the topics which currently the two cities have consultation regarding city-to-city collaboration are categorized into three points as followings; 1) Implementation Structure of Kawasaki city, 2) Implementation Structure of both Yangon and Kawasaki cities, and 3) Basic Policies.

4.2.1 Implementation Structure of Kawasaki City

In this project, International Economic Promotion Office of Economic Labor Bureau in Kawasaki city became the entity in charge of the low-carbon city-to-city collaboration and examined the possibilities of its collaboration with Yangon city. International Economic Promotion Office is responsible for the promotion of industrial exchanges with other countries, the promotion of environmental industry, etc. as their main tasks, and providing support to the members of Kawasaki green innovation cluster companies to support the expansion of their overseas businesses.

After the commencement of this project, the study team discussed with the Kawasaki Chamber of Commerce and Industry (KCCI), having the support from Kawasaki city, and had the consultation meeting for further business expansion of companies of Kawasaki city into Yangon city. This reason is that, “KCCI”, the representative of the business community of Kawasaki city, has signed MOU for economic cooperation agreement with the Myanmar Chamber of Commerce and Industry (MCCI) in June, 2015. Thus, the further cooperative
relationships were examined among the companies in both cities. The following figure below shows the image of collaboration with Kawasaki city and KCCI.

![Implementation Structure of Kawasaki City for City-to-City Collaboration](image)

**Figure 4-2 Implementation Structure of Kawasaki City for City-to-City Collaboration**

As the related above activities, “Kawasaki green innovation cluster overseas development seminar” was held on 13th November, 2015 within Kawasaki city. Information of JCM project formulation which contributes to city-to-city collaboration by both Kawasaki and Yangon cities was provided to the participation from not only the cluster member companies, but also the stakeholders of KCCI.

### 4.2.2 Draft Implementation Structure of both Yangon and Kawasaki cities

Initially, City Planning and Land Administration Dept (CPLA) of Yangon city was supposed to be the counter part of this project. However, according to Yangon city, the Pollution Control and Cleansing Dept (PCCD) is also appropriate counterpart as well as CPLA, which was in charge of JCM model project “Waste Power Generation Business in Yangon city” that has been already undertaken in the country. Based on the advice from Yangon city, the structure of the counterpart in Yangon city was revised as below.

On the other hand, International Economic Promotion Office of Economic Labor Bureau in Kawasaki city, which had the main responsibility of Kawasaki city for this project, became the coordinator within the city to promote the city-to-city collaboration and attempt the cooperation of the related departments to the city-to-city collaboration. Each department will work together by examination of the idea for concrete assistance menu of city-to-city collaboration, or technology exchanges with the Yangon city staff. In particular, for JCM project formulation, it is assumed to cooperate with Kawasaki green innovation cluster companies which consist of the companies mainly located in Kawasaki city.
In addition to KCCI signed the MOU with Myanmar Economic Federation in June 2015, the head and the officers of KCCI showed the positive attitudes for the cooperation with the project. Thus, KCCI was also included in the implementation structure.

4.2.3 Basic Policy for City-to-City Collaboration

At the initial stage of this project, it was focused to promote the JCM project formulation. However, there were requests of the Yangon city side and the project examined widener range of cooperation, which is not limited to project formation, into a variety of support and cooperation to the Yangon city through sharing the knowledge of Kawasaki city.

And, to sign by both cities mayors on the MOU for city-to-city collaboration was set as a goal, utilizing the consultation results of both cities for its foundation. At the beginning of the project, it was started from the understanding the issues faced by Yangon city and needs for the city-to-city collaboration with Kawasaki city, etc. And then, Kawasaki city has discussed, explored and examined with Yangon city about how to utilize the experiences, technologies and the network of Kawasaki city which have been piled up until now to meet the expectation of Yangon city.

Basic policy of city-to-city collaboration, considering the challenges faced by Yangon city and possible support can be offered by Kawasaki city are summarized below.
The main challenges and needs of the Yangon city were categorized into three; low-carbon development, waste disposal, and environmental monitoring. As responds to those sectors from Kawasaki city, technical support, support by personnel exchanges, support for preparation of plan, etc. have been proposed widely. Both parties confirmed their needs and possible sector to be supported and then, examined basic policy of the future city-to-city collaboration. Based on this basic policy, the draft of MOU is going to be prepared and signed by March 2016.

**Needs and issues of Yangon city**
- Low carbon city development
  - Needs for environmental friendly and low carbon city development
- Waste management
  - Issues on waste collection and waste management
- Environmental monitoring
  - Consideration on increase of traffic volume and air pollution by rapid development

**City to City collaboration menu supported by Kawasaki city**
- Low carbon city development
  - Sharing of experience of Kawasaki eco-town
  - Supporting Kawasaki private companies with low-carbon technologies to business at Yangon
- Environmental monitoring
  - Supporting development of monitoring system for car exhaust and air analysis
  - Supporting development of monitoring system for water and soil
- Waste management
  - Installation and management of waste disposal and treatment facility, and collection and separation of domestic waste
  - Supporting development of Master plan for domestic waste management

**Basic concept of city-to-city collaboration between Yangon city and Kawasaki city**
1) Excavating and supporting of low-carbon projects utilizing joint crediting mechanism (ICM) scheme
2) Technical cooperation and information exchange for realizing low-carbon society of Yangon
3) Supporting a certain of new business in a field of environment

**Conclusion of MOU between Yangon city and Kawasaki city**
(Planned to be made in March 2016)

**Figure 4-4 Basic Policy of City-to-City Collaboration of both Yangon and Kawasaki cities**

### 4.2.4 Implementation menu for City-to-City Collaboration

The following table summarizes the examined content of the implementation menu for city-to-city collaboration from next fiscal year.
<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Topics</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2015</strong></td>
<td>1) To grasp and share the current situation for city-to-city collaboration</td>
<td>It was focused to build the deeper understanding of each other through the understanding of the current situation and information sharing by having several consultation meetings in Myanmar and Japan.</td>
</tr>
<tr>
<td></td>
<td>2) To examine the menu for city-to-city collaboration</td>
<td>It was examined the menu for city-to-city collaboration by having the consultation of the issues and needs of Yangon city and possible supports to be offered from Kawasaki city.</td>
</tr>
<tr>
<td></td>
<td>3) To examine the draft MOU</td>
<td>It was examined and prepared the draft MOU based on the above discussion for future city-to-city collaboration</td>
</tr>
<tr>
<td><strong>2016</strong></td>
<td>1) To prepare the low-carbon development action plan</td>
<td>To prepare low-carbon development action plan from middle and long term point of view based on the low-carbon development vision stated in Master Plan of the development of Yangon metropolitan area prepared in 2013</td>
</tr>
<tr>
<td></td>
<td>2) To conduct regular WG meetings (including the meetings in Japan)</td>
<td>To implement regular WG meetings to promote the preparation of low-carbon action plan and implementation of the city-to-city collaboration. WG will be hold in Myanmar and Japan.</td>
</tr>
<tr>
<td></td>
<td>3) To prepare the draft menu for technical training</td>
<td>To prepare the technical training menu based on the possible support from Kawasaki city toward the technical assistance requested by Yangon city</td>
</tr>
<tr>
<td></td>
<td>4) To prepare the draft pilot project</td>
<td>To select the sites for pilot projects which are feasible in the short term and prepare implementation plans in lo-carbon development action plan.</td>
</tr>
<tr>
<td><strong>2017</strong></td>
<td>1) To implement the pilot project based on the low-carbon development action plan</td>
<td>To support pilot project implementation based on the pilot project implementation plan prepared in 2016 fiscal year.</td>
</tr>
<tr>
<td></td>
<td>2) To implement the technical training (including training in Japan)</td>
<td>To implement the technical training in Myanmar and Japan based on the technical training menu prepared in 2016 fiscal year.</td>
</tr>
<tr>
<td></td>
<td>3) To implement regular WG meeting (including meeting in Japan)</td>
<td>To attempt close cooperation through the implementation of regular WG meetings.</td>
</tr>
</tbody>
</table>
4.3 RESULTS OF ACTIVITIES REGARDING CITY-TO-CITY COLLABORATION

4.3.1 Overview

In this fiscal year, after reviewing the challenges and countermeasures (including the study of JCM project formulation) for low-carbon society in Yangon city (YCDC), building the relationship between Kawasaki city and Yangon city was conducted, together with providing the information of various activities of Kawasaki city from the experiences of pollution problems to low-carbon society and their movements established or operated by the city in recent years, which based on the environmental technologies/industries that Kawasaki city has developed as the core city of Keihin industrial zone.

City-to-city collaboration between Yangon city and Kawasaki City has not been addressed before. Thus, as first step, understanding of the current situations of the two cities was attempted, then, needs of Yangon city for city-to-city collaboration were shared, and proposal of supports by Kawasaki city was discussed in a phased manner and examined the framework of the future city-to-city collaboration. Activities regarding city-to-city collaboration in this project are summarized in the table below.

<table>
<thead>
<tr>
<th>Contents of the Study</th>
<th>Implementation period</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off meeting(Tokyo)</td>
<td>25th August, 2015</td>
<td>Kick-off meeting was held among Ministry of Environment, Kawasaki city, and Nippon Koei and the study policy, schedule of the study, contents of study are discussed</td>
</tr>
<tr>
<td>1st Field Study (Yangon)</td>
<td>8th-12th September, 2015</td>
<td>Summary of the study and its schedule was explained to YCDC and asked YCDC to participate the JCM workshop for city-to-city collaboration in Yokohama on 19th October. One person was assigned from City Planning &amp; Land Administration Dept and Pollution control &amp; Cleansing Dept respectively as the participants</td>
</tr>
<tr>
<td>2nd Field Study (Yangon)</td>
<td>11th-16th October, 2015</td>
<td>2nd field Study was conducted by Nippon Koei and the person in charge of Kawasaki city. The summary of the field Study was showed as below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Meeting with YCDC (City Planning &amp; Land Administration Dept and Pollution control &amp; Cleansing Dept) as the counterpart and discussion regarding the cooperation system with Kawasaki city, signatures on agreement documents of city-to-city collaboration was conducted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It was confirmed that mayor of Yangon city became the signer on the agreement documents regarding the cooperation, so that the cooperation of public relations Depts. were required to promote the city-to-city collaboration</td>
</tr>
<tr>
<td>JCM Workshop (Yokohama)</td>
<td>19th-22nd October, 2015</td>
<td>19th October: Participation of JCM workshop for city-to-city collaboration (hosted by Yokohama city and Ministry of Environment) Director of Mingaladon industrial park management company; Mr. Min Thu was invited.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20th – 22nd October: Field trip on low-carbon facilities in Yokohama city</td>
</tr>
</tbody>
</table>
### Contents of the Study

<table>
<thead>
<tr>
<th>Study</th>
<th>Implementation period</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kawasaki city</td>
<td></td>
<td>As applicable technology owned by companies or facilities in Kawasaki city into Mingaladon industrial park, recycling plant, biomass power generation facility, Environmental Research Institute, and the energy-saving-related facilities were guided and question-and-answer session was conducted about the low-carbon technologies in Kawasaki city. * See the attachment for the summary of the field trips of low-carbon related facilities in Kawasaki city</td>
</tr>
</tbody>
</table>
| 3rd Field Study (Yangon) | 15th–26th November, 2015 | - Meeting with YCDC (City Planning & Land Administration Dept and Pollution control & Cleansing Dept) and discussion about the invitation to Japan supposed to be help on January and its participants or programme were conducted. The workshop was going to be arranged, putting in mind the participation of the director of each dept.  
- Regarding MOU of city-to-city collaboration between Kawasaki city and Yangon city, its contents, procedures, and schedule up to signature were discussed and confirmed. The draft MOU was prepared by the study team, and then detail descriptions were decided based on the draft. The signing schedule was set by the end of February, as much as possible, considering the possibility of change of Yangon mayor due to the change of government since March |
| 4th Field Study (Yangon) | 27th–29th December, 2015 | 4th field Study was conducted by Nippon Koei and the person in charge of Kawasaki city. The summary of the study was described as below.  
- Meeting with YCDC (City Planning & Land Administration Dept and Pollution control & Cleansing Dept) and secretary of Public Relation, and discussion about signing on the MOU for city-to-city collaboration and invitation to Japan, scheduled to be implemented last month were discussed.  
- After the preparation of draft MOU, it was agreed that review was conducted within YCDC and proceed to the signature from the mayor via Public Relation Dept.  
- The contents of city-to-city collaboration were decided to be examined from three key-words: Air-pollution monitoring, Waste management, Low-carbon eco-town development |
| Invitation to Japan (Kawasaki) | 11th–16th January, 2016 | The following officers were invited to Kawasaki city and field trip to see environmental technologies of the companies in Kawasaki city and discussion regarding the draft MOU were conducted.  
1) Director of Pollution control & Cleansing Dept: Mr. Cho Tun Aung  
2) Director of City Planning & Land Administration Dept : Mr. Than Lwin Oo  
3) Secretariat Division: Mr. Thike Soe * See the attachment for the summary of the invitation to Japan |
| Workshop (Yangon) | 29th January, 2016 | A workshop on city-to-city collaboration was carried out in Yangon City Hall. The mayor of Yangon performed the opening and the deputy mayor of YCDC gave the closing remark, and 70 people from each department from YCDC, University officers in Yangon city, and companies in the city participated. From Japanese side, study team, Kawasaki city, and the Japanese companies in Yangon city attended. In the workshop, the study team announced regarding the city-to-city collaboration by YCDC and Kawasaki City, the activities and |
4.3.2 The third field study

At the third field study, the study team discussed with CPLA and PCCD on basic concept of city-to-city collaboration and MOU between Kawasaki city and Yangon city which is planned to conclude within this fiscal year. The MOU is finalized based on discussion both cities.

Discussion between Kawasaki city and YCDC

4.3.3 The forth field study

It was discussed having YCDC’s secretary on corporation of city-to-city collaboration between Kawasaki city and YCDC. Also the needs of YCDC on city-to-city collaboration and the menu which Kawasaki city can provide for the collaboration were shared at the meeting.
4.3.4 Inviting YCDC staff to Kawasaki city and discussion at Kawasaki

YCDC’s staff who are directors of CPLA and PCCDYCDC visited Kawasaki city and discussed with Kawasaki economic labor department on city-to-city collaboration and visited several low-carbon facilities in Kawasaki city in order to get images of future city-to-city collaboration.

![Visiting Kawasaki Chamber of Commerce](image1)

![Visiting Kawasaki Environment Research Center](image2)

4.3.5 City-to-city collaboration Workshop at Yangon

The workshop for city-to-city collaboration was held at Yangon city and more than 80 persons participated from Yangon city, Kawasaki city, universities, and private companies. At the workshop, Mayor of Yangon city gave a opening speech and both cities presented for introduction of the cities and basic concept of city-to-city collaboration.

![Opening speech was given by Mayor of Yangon city](image3)

![Workshop presentation](image4)
4.3.6 Kawasaki International Eco-Tech Fair

The Kawasaki International Eco-Tech Fair was held on 18\textsuperscript{th} and 19\textsuperscript{th} of February 2016 hosted by Kawasaki city. At the Eco-tech fair, the activities of city-to-city collaboration between Yangon city and Kawasaki city and Kawasaki innovation cluster were introduced. Also, it was promoted to join the business in Yangon city as JCM project to private companies which have low-carbon technologies.
CHAPTER 5 JCM PROJECT FORMULATION ACTIVITIES

5.1 OVERVIEW

In Yangon (YCDC), since the economic blockade released in 2011, the city has been rapidly urbanized, causing the chronic traffic congestion and energy shortages, or deterioration of sanitary environment. In this situation, the government of Myanmar agreed to build JCM on 16th September, 2015, and bilateral documents regarding its operational system with Japan. And this agreement is expected to be the first step to solve the various problems which the country faces.

The speed of the YCDC development is outstanding among rapidly developing Asian countries so that the interest of Japanese companies which would like to start their businesses into the new markets is high. Therefore, by carrying out this project, it is expected to promote Japanese companies into Yangon city by JCM scheme as a trigger, and especially to become a familiar presence of Yangon city for the Kawasaki companies through the project.

Also, it should be understood that the project needs to build the foundation to find and form the JCM project for medium and long-term stably, rather than to simply understand the project for JCM project formulation in a single year. In this regard, information dissemination to the Kawasaki green innovation cluster member companies was conducted, and building one function of sending the cluster-related information to Yangon city was attempted.

In this project, while respecting the implementation of the “city-to-city collaboration” by Kawasaki city and Yangon city, in order to solve the problem of Yangon city, JCM project formulation was examined from four sectors (“low-carbon industrial park”, “low-carbon building management system”, “low-carbon water supply and sewerage systems”, and “renewable energy/ new energy”), considering to meet the two main purposes of this project. The main participants of this project and its correlation are shown in the figure below.

[Diagram: Figure 5-1 Main Participants and Their Correlation in the Project]
In this project, JCM project formulation was conducted together with Japanese companies, having the interests of doing their businesses in Yangon city or JCM experiences. In addition to this, it is going to be invited to join “Kawasaki green innovation cluster” member companies managed by Kawasaki city. The cluster is a network of the cooperation among industry, academia and government related to Kawasaki city and aimed to improve the environment and achieve the industrial development and international contributions. Therefore, the support of business incubation is provided by utilizing accumulated environmental technology and know-how of Kawasaki city.

5.2 STUDY POLICY FOR PROJECT FORMULATION

JCM Project formulation study was implemented based on the following study policies.

Table 5-1 Study Policy regarding JCM Project Formulation

<table>
<thead>
<tr>
<th>Issues</th>
<th>Policy at the beginning of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Funding situation by companies, business plan, confirmation of financial health, etc.</td>
<td>The project implementation will be depended on the company (business owner). In particular, financing conditions or business plan of the company greatly affects the JCM projects implementation. In addition, since the financial condition of the company is considered as one of the indicator to measure the stable project implementation, it is required to make sure that point.</td>
</tr>
<tr>
<td>2. Study of strategies, utilizing existing policy, for the JCM candidate projects implementation, in particular energy saving measures, etc.</td>
<td>In order to implement the energy saving and new business, they are often affected by the related policies and institutions. Particularly, the existence of the funds support for energy saving project implementation boosts significantly its implementation. Considering the situation above, the points of JCM implementation were confirmed and examined.</td>
</tr>
<tr>
<td>3. Current situation of market share regarding targeted products or facility</td>
<td>Distributed situation of the target product or equipment will significantly affect the implementation of similar projects. Particularly, it is important to check the products from the countries other than Japan and their market share to set reference scenario, etc.</td>
</tr>
<tr>
<td>4. Situation of electricity price or price for fuel</td>
<td>To confirm whether electricity prices become a burden to makes users consider the necessary of energy-saving, and, whether the situation could be a reason to induce energy-saving.</td>
</tr>
<tr>
<td>5. Confirmation of Grid emission factor</td>
<td>For the calculation of GHG emission reductions related to energy-saving and renewable energy, the grid emission factor is essential. As Nippon Koei has collected sufficient information related to “grid emission factor”, which has not been made public in Myanmar, it becomes possible to do the deep examination with respect to the calculation.</td>
</tr>
<tr>
<td>6. Examination of BaU and reference scenario</td>
<td>Reference emissions has been assumed to be set lower level compared to Business-as-usual (BaU), and firstly, BaU is examined quantitatively, taking into account the status of the products and equipment, estimation of the actual situation, various statistical data, etc.</td>
</tr>
<tr>
<td>7. Situation of installation of the monitoring equipment, or feasibility of MRV</td>
<td>In the JCM project, it is necessary to conduct MRV without any delays along with the proper installation of the monitoring instrument. In particular, various confirmations are required when unfamiliar products and equipment to MRV are adopted.</td>
</tr>
<tr>
<td>8. Confirmation of equipment conditions surrounding the subject facility and frequency of use</td>
<td>As the environment surrounding the subject facilities, the Study recognizes that confirmation of equipment or systems, frequency of use and usage status is an important point in the development of MRV methodology. Thus, target facility’s environment, etc. is to make sure in detail.</td>
</tr>
</tbody>
</table>
The project suggested examining the JCM candidate project from four sectors. The following table summarizes the related stakeholder and their interests of the project at the moment, etc. by each sector.

<table>
<thead>
<tr>
<th>Suggested project</th>
<th>Stakeholder</th>
<th>Interests of the project, degree of interests, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Low-carbon industrial park</td>
<td>Mingaradon Industrial park</td>
<td>Mingaladon industrial park shows their willingness to low-carbonization (JCM project) of its equipment in the park. Already the needs for low-carbonization of the park have been confirmed, so that consultations were conducted with the technologies and companies to meet their needs, and attempt for the project formulation in the next fiscal year.</td>
</tr>
<tr>
<td>2) Building Management system</td>
<td>Private shopping center (existing)</td>
<td>In “Yangon urban area development program Study (JICA)” implemented by Nippon Koei, hearing to existing commercial facility was carried out and grasped the issues and needs of them. In a subsequent follow-up investigation in the country, the intention of the energy-saving has been confirmed, and meeting with several facilities will be conducted regarding the introduction of energy-saving technologies, towards the project formulation in the next fiscal year.</td>
</tr>
<tr>
<td>3) Low-carbon water and sewage facilities</td>
<td>Water and sewage facility (existing), Industrial park, commercial facility</td>
<td>Almost water and sewage facilities in Yangon city has been aging, and they has not been able to achieve safe and secure water supply. Also, non-revenue water rate is high as 67% so that there is an urgent need to review the system in general. In addition, adequate treatment has not been made in the sewage treatment plant, resulting in the low level of water quality compared with other countries in Asia.</td>
</tr>
<tr>
<td>4) Renewable energy/ new energy</td>
<td>Local company, etc.</td>
<td>Currently, Yangon city faces the chronic power shortage, the introduction of renewable energy and new energy, which does not rely on power from the grid, is expected by local companies. So far, Nippon Koei has confirmed from local companies about the potential of the introduction of renewable and new energy. Thus, based on the information, the needs of JCM project identification are confirmed.</td>
</tr>
</tbody>
</table>

For JCM project formulation, results of the consultation with variety of industry organizations, etc. are organized in the table below. In Kawasaki city, KCCI signed cooperation agreement (MOU) with Myanmar Industry Association in June, 2015 for the business development at the private level.
Table 5-3  Results of the Consultation with Variety of Industry Organizations for JCM Project Formulation

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Organization</th>
<th>Reason to be Selected</th>
</tr>
</thead>
</table>
| 1 | JETRO, Yangon Office     | -To grasp the situation of Japanese companies as for doing their businesses in Yangon, and to collect information on the business development in Yangon, etc.  
     |                          | -To confirm additional information after the meeting at JETRO Yangon office to the person who stayed in the Yangon office before, etc. |
| 2 | JETRO, Tokyo Office      | -To confirm additional information after the meeting at JETRO Yangon office to the person who stayed in the Yangon office before, etc. |
| 3 | KCCI                     | -To have the meeting to exchange opinions regarding the expansion to Yangon city from Kawasaki green innovation cluster companies, and the situation of the signed MOU with Yangon Industry Association in 2015 |
| 4 | Myanmar Japanese Chamber of Commerce and Industry (Former Yangon Japanese Chamber of Commerce and Industry) | -To have a consultation meeting to provide information for JCM project formulation |
| 5 | Others (Japanese organizations in Yangon city) | -To grasp the Japanese companies, doing their businesses in Yangon, etc. |

In addition, having the support of the International Economic Promotion Office, Economic Labor Bureau in Kawasaki city, the project has implemented with the assumption that the support for the overseas businesses expansion in the city is attempted and blueprint for active participation in the JCM is drawn, taking full advantage of the function of the “Kawasaki green innovation clusters”, established and operated by the city. Some companies in the cluster are indicated in the table below.

Table 5-4  List of Kawasaki Green Innovation Cluster Member Companies (excerpt)

<table>
<thead>
<tr>
<th>E-Square Inc.</th>
<th>Toshiba Co., Inc. (Community Solution Group, Business Development Center)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elly Power Co., Ltd.</td>
<td>NANOFUEL Co., Ltd.</td>
</tr>
<tr>
<td>Kawasaki Shinkin Bank</td>
<td>Nihon Genryo Co., Ltd.</td>
</tr>
<tr>
<td>JFE Kankyo Co., Ltd.</td>
<td>Nippon Basic Co., Ltd.</td>
</tr>
<tr>
<td>Sowshow Co., Ltd</td>
<td>Hokkai Spring MFG. Co., Ltd.</td>
</tr>
<tr>
<td>Softem Co., Ltd</td>
<td>Takasago Co., Ltd</td>
</tr>
<tr>
<td>Tokyo Rectifier Co., Ltd.</td>
<td></td>
</tr>
</tbody>
</table>

5-4
As indicated, it is expected to contribute to the present and future of the Yangon city by the various elements which Kawasaki city industrial sector has, technologies for the industrial complex formation, environmental friendly products/technology/services. Therefore, together with the “city-to-city collaboration” as mentioned above, the Study was conducted, considering the continuous discussions with the listed companies in the table above, and to support the companies in Kawasaki city for their businesses in Yangon city.
5.3 DEVELOPMENT OF LOW CARBON INDUSTRIAL PARK

5.3.1 Overview

Considering the possibility of introduction of Japanese technology and products for industrial park (existing industrial park: Mingaladon), where intensive energy consumption is expected in Myanmar, JCM project formulation was examined.

Mingaladon Industrial Park was established in 1998, and it is a medium-scale industrial park where many tenants have been occupied by the Japanese companies. It passed already 17 years since its establishment and the park faces the aging of infrastructure and the necessity to renovate. Also, similar to Yangon city, due to the unstable power supply, ensuring the power for backup power source becomes a major challenge. Based on these circumstances, the effort for low-carbon industrial park can be expected to achieve stable factory operation in terms of its operation or economic perspectives.

“Introduction of high-efficiency air conditioning” and “introduction of energy-saving fluorescent lamps” were raised as technologies that seem to be high feasibility for the introduction at the moment for low-carbonization of Mingaladon industrial park. Also, similar opinions were confirmed through the hearings to the industrial park management staff. In addition to this, the following technologies were examined their feasibilities, having the supports of Kawasaki green innovation cluster companies; “introduction of thermal barrier...
coatings and films”, “introduction of the heat-insulating glass”, “introduction of solar power generation facilities”, “introduction of high-efficiency distributed power”, etc.

5.3.2 Current Situation of Industrial Park Development

Yangon city (YCDC) has not prepared the clear policy, institutions or plans for low-carbon industrial park development yet. Therefore, Mingaladon industrial park or other parks established various criteria (for power, water supply and sewerage sectors, etc.), referring to the standard of industrial park in neighboring countries or regulations of YCDC. Therefore, in this project, the city has referred the outputs regarding the policy or planning, which the city will refer from “Program Formulation Preparatory Study for Development of Urban Area Yangon city in Myanmar” implemented by the Japan International Cooperation Agency (JICA). The followings summarizes the information related to low-carbon industrial development in YCDC.

1) Thilawa SEZ Development Projects
This is a project to develop the industrial park or commercial facilities, etc. in special economic zone which are located at 23 kilometer to south from Yangon city center. 400ha (zone A) out of total development area: The area of 2,400 is currently in progress for development. The development project, was agreed between the government of Myanmar and the government of Japan in December 2012, and Myanmar Japan Thilawa Development Ltd., comprised of Japanese trading companies, have been in charge of development. The development also includes the industrial park area, so that low-carbon industrial park development in the region is expected.

2) Current Situation of Industrial Park around Yangon City and Future Trend of Construction
In Yangon, industrial park (or a single factory) can be confirmed through the entire city. In current situation, although there is no particular constraint, new industrial park (or plants) have been constructed along the main road in suburbs. This trend would remain and be remarkable in the future, and industrial parks are likely to be transferred in a good suburban area (and along the main road) which has good access to distribution centers such as airports or ports, due to avoid problems of the traffic congestion by heavy vehicles and neighboring residents problems.

---
4 SEZ: Special Economic Zone
5.4 INTRODUCTION OF LOW-CARBON BUILDING MANAGEMENT SYSTEM

5.4.1 Overview

One of the challenges of the Yangon City (YCDC), ordinary blackout, planned power outage and unstable power supply can be raised. Therefore, spare power supply (generator, etc.) has been prepared as a measure for power failure in a normal commercial facilities, office buildings, etc., and the fuel costs become a major burden on the employer. On the other hand, urban development is proceeding rapidly in the city by private sectors such as shopping malls or hotels, and there is a tendency of further urban development in the future. Therefore, the introduction of low-carbon building management system is attempted through the introduction of low-carbon technologies, such as energy-saving or alternative energy to the existing private commercial facilities, or hotels.

In the future, in commercial facilities and offices in the YCDC, low-carbon technologies widely spread in Asia region, that show the effect (high-efficiency air conditioning or high-efficiency lighting, renewable energy and various types of energy-saving equipment) are expected to be introduced. In addition, having the support of Japanese companies, it was examined the following technologies during the project period: “the adoption of thermal barrier paint”, “introduction of the insulating glass”, “introduction of solar power generation facilities”, “introduction of high-efficiency distributed power”, etc. as well as the demand in the industrial park.

Figure 5-3  Image of JCM Project Formulation Regarding Low-Carbon Building Management System
5.4.2 Situation of Development of Commercial Building

Regarding low-carbon building management system, Yangon city (YCDC) has not prepared the clear policy, institutions or plans for low-carbon industrial park development yet. Also, the city has not showed any policies towards the achievement of low-carbon society. Therefore, this project referred the outcome of the “Program Formulation Preparatory Study for Development of Urban Area Yangon city in Myanmar” implemented by JICA because it can be considered the best plan at the moment and it is likely to be carried out the plans.

1) Urban Development Project in Yangon City

YCDC has addressed various urban development projects by the public and private sectors since economic blockade was released in 2011. Especially, the projects which YCDC has been involved are indicated as below.

<table>
<thead>
<tr>
<th>#</th>
<th>Project Name</th>
<th>Summary</th>
<th>Project Implementing Body</th>
<th>Implementati on Year (plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mindama Project</td>
<td>Movie theater, Multi-purpose commercial facilities, including hotels, Development area: 13.3 ha</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>2</td>
<td>Mayangon Junction Project</td>
<td>Movie theater, Multi-purpose commercial facilities, including hotels, Development area: 8.1 ha</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>3</td>
<td>Garnamar Project</td>
<td>Movie theater, Multi-purpose commercial facilities, including hotels, Development area: 13.3 ha</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>4</td>
<td>Kyaukyaetwin Project</td>
<td>Commercial facilities, Housing Development Area: 20.4 ha</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>5</td>
<td>Babahtoo Housing Development Project</td>
<td>---</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>6</td>
<td>Bo Min Yong Low Cost Housing Development Project</td>
<td>---</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>7</td>
<td>Duplex for South Dagon Project</td>
<td>Multi-purpose facilities, Development area: 7.6 ha</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
<tr>
<td>8</td>
<td>Middle Level Housing Development Project</td>
<td>---</td>
<td>YCDC</td>
<td>Pending</td>
</tr>
</tbody>
</table>

Source: Program Formulation Preparatory Study for Development of Urban Area of Yangon city in Myanmar (JICA)

2) Others

In YCDC, in recent years, multiple-dwelling houses has been built as high rise of housing, and many of them often was built since 2000. And with respect to commercial facilities, complex shopping center, supermarket, convenience stores, etc. which had not existed in the YCDC before has rapidly increased as well as the market of traditional commercial facility. Then, these facilities (buildings) is forced to provide power failure measures, stable air conditioning facilities, and water and sewage facilities in stably and safely as part of their good services and that makes additional burdens for the employers.
5.5 INTRODUCTION OF LOW-CARBON WATER AND SEWERAGE FACILITY

5.5.1 Overview

Water supply population of the Yangon City (YCDC) is 6.8 million, water supply diffusion rate is 38% (2011), and sewer diffusion rate is less than 5% so that 60% of the citizens can not enjoy the benefits of water supply and they take the water from groundwater, rivers, and lakes. In addition, non-revenue water rate is 67 and it indicates the issue of water leakage due to aging pipes, illegal connections to the water pipe.

In addition, the water quality provided from tap water cannot be said good, general bacteria have been detected from most of tap water. Thus, the low-carbon in the water supply field is promoted to introduce low-carbon water purification facility through the improvement of current situation and the supply of safe and secure water. From the fact that a number of water and sewerage facilities in the YCDC are aging, update of the system, renovation, and the construction of new infrastructure has become an urgent task. Therefore, the introduction of energy-saving equipment related to the water and sewerage has been widely required, and it is expected to reduce the GHG emission from water pump, etc. of which power consumption is high in the sector.
While water supply and sewerage project is considered as mainly public works due to its characteristic, it is already confirmed that some of private companies also intervene in some of projects.

On the other hand, as described above, it is a clear fact that the aging of water supply and sewerage facility becomes an urgent issue to be solved in YCDC. From the above, this project was implemented with the participation of Kawasaki green innovation cluster member companies, etc. for the contribution of low-carbon of the water and sewerage project, taking the approach indicated in the figure below.

In addition, application of JCM model project by MOJ to the project with high public characteristics could be raise some considerations points regarding the implementation of public bidding. In that case, since it was confirm the demand of Yangon city side, application of a related scheme of JCM; “Leapfrog Development” was examined.

5.5.2 Current Situation of Yangon City

Regarding low-carbon water and sewerage, Yangon city (YCDC) has not prepared clear policies, institutions or plans for the improvement of water and sewerage services, but because it is an urgent problem in the city, they have been actively promoting the acceptance of study funded by JICA.

Currently, a study, focusing on water and sewerage is being carried out by JICA, and in order to grasp the overall picture, the target (see table below) in water and sewerage sector, which was identified in “Program Formulation Preparatory Study for Development of Urban Area of Yangon city in Myanmar” (JICA) was referred as the Study results which should be a reference as of now.

1) Development Goal and Indicators of Water Facilities

[Vision] Realization of independent and sustainable water projects and the provision of drinkable water at the appropriate water amount, pressure and price to more citizens

<table>
<thead>
<tr>
<th>No.</th>
<th>Development Indicator</th>
<th>Impact Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water supplied population</td>
<td>Yangon city : 6,800,000人</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yangon urban area : 8,100,000人</td>
</tr>
<tr>
<td>2</td>
<td>Coverage rate of the water supply system</td>
<td>Yangon city : 80% (38%: as of 2011)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yangon urban area : 69% (35%: as of 2011)</td>
</tr>
<tr>
<td>3</td>
<td>Daily maximum water supply</td>
<td>Yangon city : 2,500,000 m3/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yangon urban area : 2,900,000 m3/day</td>
</tr>
<tr>
<td>4</td>
<td>Non-revenue water</td>
<td>To production water amount: 15% (67%: as of 2011)</td>
</tr>
<tr>
<td>5</td>
<td>Facility utilization rate</td>
<td>More than 80%</td>
</tr>
<tr>
<td>6</td>
<td>24-hour water supply rate</td>
<td>To water supplied population: 100%</td>
</tr>
<tr>
<td>7</td>
<td>Chlorine injection rate</td>
<td>To water supplied population: 100%</td>
</tr>
<tr>
<td>8</td>
<td>Water quality</td>
<td>All items show under the indicators in the guideline of</td>
</tr>
</tbody>
</table>
2) Development Goal and Indicators of Sewerage and Rainwater Drainage

[Vision] The creation of good water environment and safe city with no flood

<table>
<thead>
<tr>
<th>No.</th>
<th>Development Indicator</th>
<th>Impact Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sewer diffusion rate</td>
<td>Yangon city : 36% (---)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yangon urban area: 49% (4%: as of 2011)</td>
</tr>
<tr>
<td>2</td>
<td>Sewage treatment rate</td>
<td>Yangon urban area : 40%</td>
</tr>
<tr>
<td>3</td>
<td>Water regeneration rate</td>
<td>To sewage treatment amount: 6%</td>
</tr>
<tr>
<td>4</td>
<td>Water quality of sewage treatment</td>
<td>BOD : 20 mg/liter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SS : 30 mg/liter</td>
</tr>
<tr>
<td>5</td>
<td>Goal of Improvement for flood</td>
<td>Elimination of flood damage in the YCDC city center</td>
</tr>
<tr>
<td></td>
<td>(qualitative)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Program Formulation Preparatory Study for Development of Urban Area of Yangon city in Myanmar (JICA)

5.6 PROJECT FINDING ON RENEWABLE ENERGY AND NEW ENERGY

5.6.1 Overview

Electricity supply is not always stable in Yangon city due to damage of transmission lines by strong wind and planned outage in the last half of the dry season. Although the power demand in Yangon city is increasing with the recent rapid economic growth, stable power supply has not been realized yet. Therefore, the private sector shows its interest in renewable energy and new energy because they are rather easier to install than other power generation system.

In this connection, the Study team conducted two things in order to understand the basic information to formulate JCM projects of renewable energy and new energy as below: (i) a needs study in Yangon city (ii) Study on the Japanese technology which has potential to be applied in Yangon to satisfy the needs identified in study (i).
(i) Needs survey: In order to understand the needs of Yangon city, interview survey with the following organizations was conducted: various local companies, the government, and the chamber of the commerce.

(ii) Study on the Japanese technology: Interview survey for information collection from the companies, which are interested in business expansion to Yangon, was conducted. The potential companies’ list were made by hearing to Kawasaki Green Innovation Cluster, JETRO Yangon office, and Energy saving center etc.

5.6.2 Current Power Condition of Yangon City

Power shortage has become one of the most serious problems not only in Yangon city, but also in entire Myanmar.

1) Lack of Power Generation

In the end of dry season and drought period, output power from hydraulic power plant declines, and the existing plant and power distribution station are old enough to have maintenance or renewal. In many of the facilities, backup generators were installed to address this power shortage and the budget for this backup system has to be supplemented.

2) Loss in Power Transmission
The major technical causes of the loss in power transmission in Myanmar are (i) aging of the transmission lines, and (ii) little capacity of power distribution station. Non-technical cause is unofficial power use.

### 5.7 POTENTIAL PROJECTS OF JCM MODEL PROJECT

The result of the project finding is summarized in the following table.

<table>
<thead>
<tr>
<th>#</th>
<th>Study target</th>
<th>Summary of the Study result</th>
<th>Further action for project formulation</th>
</tr>
</thead>
</table>
| 1  | Interview Study with the Potential Companies to apply for JCM Model Project | - The company will open Yangon office in April 2016, and Japanese staff will be dispatched from October. The major service of the company is cleaning.  
   - The company has technology to improve cooling and heating system by heat shield paint. | - to examine needs for heat shield film in Yangon                                              |
| 2  | Nanofuel Co., Ltd.                  | - It is expected to improve efficiency of generator and boiler by 10 % with nano emulsion fuel. The boiler using heavy oil with high operation rate has high potential of GHG emission reduction.  
   - It is possible to propose application for JCM project if any factories or commercial facilities are interested in the technology. | - to study the needs for efficiency improvement of power plants and self power generation system of factories in Yangon.  
   - to study the feasibility of the proposed project. |
| 3  | Fuji Furukawa E&C Co., Ltd.         | The study team obtained the data to study the feasibility of the project of renewal of the sewerage system of Mingaladon industrial park.  
   The obtained data is operation hour of the pumps, list of the facilities, operation hour of the independent diesel generator, rate of operation of blower, the specifications of the facilities and system diagram of the industrial park.  
   The company plans to replace three sets of pump and blower. The approval for application for JCM project is planned in the management board on May. After the approval, the detail plan is to be developed and approved on August.  
   The information sharing on JCM is planed after the approval from the management board. | - to obtain a quotation of pump and blower for sewerage system and estimate cost of the project to study the feasibility.  
   - to confirm the possibility of application for the 2nd public invitation to the JCM model project on May after the approval from the management board of the company. |
| 4  | Nomura Trading Company              | This company has closed off its Yangon office in 1996 due to the economic blockage, but it re-opened a branch of its Thai local company in Yangon in 2012.  
   This company imports LED lamps and refueling tanker planes in Myanmar. The imported LED lamps are used as highway lightning. | - to study on potential and feasibility of introduction of LED lamp in Myanmar |
Table 5-9  The result of finding for JCM model project

<table>
<thead>
<tr>
<th>Name of company</th>
<th>Overviews</th>
<th>Further actions</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  I Company</td>
<td>· It was explained the JCM scheme to the company.</td>
<td>· To study the potential of JCM by introducing backup power generator, and follow up the company if the potential is high.</td>
<td>△</td>
</tr>
<tr>
<td></td>
<td>· The company shared its needs for backup power generator of its factory in Mingaladon industrial park.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Yangon Japanese school</td>
<td>The number of the students is expected to increase according to the Japanese business expansion to Myanmar. The study team confirmed the plan of facility expansion and potential of a JCM project.</td>
<td>· The scale is too small to apply for JCM model project.</td>
<td>×</td>
</tr>
<tr>
<td>3  Mingaladon industrial park</td>
<td>The study team obtained the data to study the feasibility of the project of renewal of the sewerage system of Mingaladon industrial park. The obtained data is operation hour of the pumps, list of the facilities, operation hour of the independent diesel generator, rate of operation of blower, the specifications of the facilities and system diagram of the industrial park.</td>
<td>· To obtain a quotation of pump and blower for sewerage system and estimate cost of the project to study the feasibility.</td>
<td>△</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· To confirm the possibility of application for the 2nd public invitation to the JCM model project on May after the approval from the management board of the company.</td>
<td></td>
</tr>
<tr>
<td>4  M company</td>
<td>The study team explained the JCM scheme to the company with qualification of IPP to discuss about the potential of JCM project for the plan of power plant with heavy fuel oil (HFO).</td>
<td>· To obtain the data on the planed amount of power generation, fuel consumption, fuel price, initial cost, cost for operation and maintenance, from a maker of fuel reformulating equipment.</td>
<td>△</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· To study on the feasibility of the project based on the obtained data</td>
<td></td>
</tr>
<tr>
<td>5  P company</td>
<td>It distributes electricity in Minagaladon township including Mingaladon industrial park, Yangon and Mandalay as requested by Yangon Electricity Supply Board (YESB). The study team had discussion about the potential of the application of the JCM scheme for the equipment</td>
<td>· To obtain a list of the equipments which need to be renewed or introduced.</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Based on the list, discuss with a maker about the possibility of introduction of high efficiency equipments.</td>
<td></td>
</tr>
<tr>
<td>Name of company</td>
<td>Overviews</td>
<td>Further actions</td>
<td>Feasibility</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| A company       | · A Company, which took over a local food company, plans to establish a new production line with high efficiency equipments such as steam recovery system, chillers, through flow boiler. This company shows its interest in JCM scheme to introduce those new equipments.                                                                                              | · To obtain information on the equipments from Mayekawa and Miura boiler which are to introduce the equipments.  
· To continue support for application for JCM model project.                                                                                              | ○           |
| B company       | · This company plans to introduce through flow boiler in its new factory, which plans to start its operation in April 2017.                                                                                                                                                                                                                                                                         | · It is planned to have approval from the management board in the end of January.  
· After the approval, start to support application from February.                                                                                               | △           |
| C company       | · C Company established a joint venture, called I&H, with the Ministry of Construction of Myanmar. It plans to introduce several energy saving equipments such as boiler in a cement factory.                                                                                                                                                                                                                              | · Support application after confirmation of the approval from the head quarter of C Company.                                                                                                                               | △           |

Source: Study Team  
Feasibility:  
○ High. Possible to apply for the 1st public invitation for JCM model project next year  
△ Medium. Though it seems to be difficult to apply for the 1st public invitation for JCM model project due to project schedule and scale, it has potential to apply in the following years.  
× Low. Not feasible for JCM model project.

The outlines of the potential projects for JCM model project formulated based on the study result are summarized in the following section.
5.8 FORMULATION OF PROJECT FOR DEVELOPMENT OF LOW-CARBON INDUSTRIAL PARK

The potential projects for development of low-carbon industrial park are summarized below.

1) Project for energy saving of Mingaladon Industrial Park by introduction of solar panels

<table>
<thead>
<tr>
<th>Proponent company</th>
<th>Locally incorporated company of I Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
<td>I Company has newly established a factory in Mingaladon Industrial Park in Yangon city. The new factory for manufacture of electronic parts will start its operation in the beginning of 2016. Since blackout happens frequently, the factory aims at operate even during blackout period with solar power generation system.</td>
</tr>
<tr>
<td>Technology to be introduced</td>
<td>Solar power generation system on roof (600 panels of 260W =171.6kWp, and 6 inverters of 25 kW, and 150 kW of AC output power) will enable to generate 238,763kWh per year. This is an independent power system without power sales. Storage battery is not included.</td>
</tr>
<tr>
<td>Business plan</td>
<td>Locally corporate company of I Company invests in 100% of initial cost.</td>
</tr>
<tr>
<td>Implementation scheme</td>
<td></td>
</tr>
<tr>
<td>Estimated reduction amount of emission</td>
<td>94 tCO2/year ※annual mean of total reduction for 17 years (legal life year)</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>JPY 10,093/tCO2</td>
</tr>
</tbody>
</table>
2) Project for energy saving of food factory by introduction of high efficiency chiller and boiler

<table>
<thead>
<tr>
<th>Prominent company</th>
<th>Locally incorporated company of A Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
<td>A Company took over the largest beer factory and plans to set up a new production line in its Yangon factory with high efficiency equipments such as steam recovery, chiller, through flow boiler. The company considers applying for JCM model project to receive financial support for the investment.</td>
</tr>
</tbody>
</table>
| Technology to be introduced | 1) High efficiency chiller  
2) Ejector system  
3) High efficiency through flow boiler |

<table>
<thead>
<tr>
<th>Implementation scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

| Estimated reduction amount of emission | 1) 668 tCO2/year  
2) 1,000 tCO2/year  
3) 1,086 tCO2/year Total 2,754 tCO2  
* Annual mean of total reduction for 10 years (legal life year) |
|----------------------------------------|
| Cost-effectiveness | 1) JPY 8,996/tCO2  
2) JPY 13,456/tCO2  
3) JPY 4,604/tCO2 Total JPY 8,347/tCO2 |
5.9 FORMULATION OF PROJECT FOR INTRODUCTION OF LOW-CARBON BUILDING MANAGEMENT

The study team studied the potential of the project for introduction of low-carbon building management in the Japanese school and commercial facility such as shopping mall. The studied energy saving technology/products which have potential to be introduced is solar panel, high efficiency chiller, and LED lamp. As the scheme of JCM model project does not match with the needs and business schedule of the study target, no potential project for next year was confirmed. However, one company which has a chain of shopping mall is still discussing with the study team to apply for JCM model project in the near future.

5.10 FORMULATION OF PROJECT FOR INTRODUCTION OF LOW-CARBON FACILITY FOR WATER SUPPLY AND SEWERAGE SYSTEM

The summary of the potential JCM model projects for introduction of the low-carbon facility for water supply/distribution and sewerage system is shown below.

1) Introduction of high efficiency pump blower in Mingaladon

<table>
<thead>
<tr>
<th>Proponent company</th>
<th>Operation company of the industrial park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
<td>Replacement of the existing pump and blower of the common sewerage system of the tenant factories of the industrial park with high efficiency pump and blower.</td>
</tr>
<tr>
<td>Technology to be introduced</td>
<td>1) High efficiency pump</td>
</tr>
<tr>
<td></td>
<td>2) High efficiency blower</td>
</tr>
<tr>
<td>Business plan</td>
<td>Project owner will invest at 100%</td>
</tr>
<tr>
<td>Estimated reduction amount of emission</td>
<td>To be calculated after selection of the equipments</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>To be calculated</td>
</tr>
<tr>
<td>Further work for project formulation</td>
<td>- Approval for renewal of the equipments from the management board of the prominent company</td>
</tr>
<tr>
<td></td>
<td>- Collection of quotation of pump and blower, and estimate the initial cost and cost-effectiveness</td>
</tr>
</tbody>
</table>
5.11 PROJECT FINDING OF RENEWABLE ENERGY AND NEW ENERGY

The summary of the potential JCM model projects on renewable energy and new energy is shown below.

1) Improvement of fuel quality for power generation with Heavy Fuel Oil (HFO)

<table>
<thead>
<tr>
<th>Proponent company</th>
<th>Private company with qualification of Myanmar IPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
<td>IPP company will establish four (4) HFO thermal power plants (total 12.5 MW) in Kyaukpyu. One of the plant will introduce emulsion fuel which has higher efficiency by 5-10% than the traditional HFO.</td>
</tr>
<tr>
<td>Technology to be introduced</td>
<td>Production of emulsion fuel by mixing water into liquid fuel and make nano-size water scattered in the liquid oil. This emulsion fuel improves combustion efficiency, and reduce emission of air pollutant such as PM and NOx.</td>
</tr>
<tr>
<td>Business plan</td>
<td>Myanmar IPP company invests and covers the full cost</td>
</tr>
<tr>
<td>Implementation scheme</td>
<td></td>
</tr>
<tr>
<td>Estimated reduction amount of emission</td>
<td>1,695 tCO2/year (Reduction efficiency: 5% under the condition of HFO emission factor 3.0 t-CO2/t)</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>To be calculated</td>
</tr>
</tbody>
</table>
| Further work | - Cost estimate  
- Confirmation of the implementation schedule  
- Data collection for calculation of the reduction efficiency  
- Selection of the representing company and formation of a Joint Venture for project implementation |
CHAPTER 6 FUTURE PLAN

6.1 CITY TO CITY COLLABORATION

6.1.1 Current situation and future plan

As for city to city collaboration between Yangon city and Kawasaki city, the draft MOU was prepared based on discussions by both cities. The draft MOU is under finalization and authorization by both cities and it is planned to conclude by the end of March this year. In the MOU, basic policies for city to city collaboration are mentioned and both cities agree with conducting city to city collaboration between Yangon city and Kawasaki city based on the MOU from the next fiscal year. The three basic policies for city to city collaboration which YCDC expects to Kawasaki city are 1) Excavating and supporting of low-carbon projects utilizing Joint crediting mechanism (JCM) scheme, 2) Technical cooperation and information exchange for realizing low-carbon society of Yangon, 3) Supporting a certain of new business in a field of environment. Based on those policies, it is planned to conduct city to city collaboration next year.

As for framework of implementation of the city to city collaboration, in the Kawasaki city, the economic labor department plans to take a leading role in order to cooperate with relevant departments in the city for preparing city to city collaboration menu, implementation of technical assistance, and assistance of preparation of low carbon action plan.

In the next fiscal year, it is planned to conduct regular working group meeting at Yangon and Kawasaki city and precede city to city collaboration between both cities. In the third year, it aims to implement pilot project which is selected from low carbon action plan prepared in the second year.

6.2 JCM MODEL PROJECT

6.2.1 Current situation and future plan

As for four theme for JCM project development which are “Project for low carbon industrial park”, ‘Project for low-carbon building management system’, ‘Project for low-carbon facility for water supply and sewerage system’, and ‘Project finding of renewable energy and new energy’, it was studied to formulate JCM model project at site and in Japan. Among projects found in Yangon city, two projects were selected as JCM model project which prepares for next JCM model project offering from the points of views such as implementation scheme, effect of GHG emission reduction, and cost benefit etc.

One of the candidate projects is selected from theme of low-carbon industrial park, and a saving energy project by introducing high efficiency chiller and boiler in existing food factory.
Another candidate is selected from the same theme and a project of introducing solar panels on top of the factory located in Mingaludon industrial park. Those two projects are under preparation to apply for next JCM model project.

Also, in the following table, the projects which are not prepared for next JCM model project in the viewpoint of project schedule and other unfixed matters are listed. Those projects are to follow aiming for application of JCM model projects within this year and in 2017.

<table>
<thead>
<tr>
<th>Project</th>
<th>Theme</th>
<th>Policies for follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project for introduction of high efficiency pump and flour in Mingaludon industrial park</td>
<td>Project for low-carbon facility for water supply and sewerage system</td>
<td>The board of meeting of project owner will be held in March and to be determined for project implementation. After it is authorized to implement the project in the board meeting, it is prepared for application of JCM model project.</td>
</tr>
<tr>
<td>Project for fuel reformulation by HFO</td>
<td>Project finding of renewable energy and new energy</td>
<td>The cost estimate of the project is submitted to the project owner and now under consideration to implement the project. After the project owner decides to apply for JCM model project, it is prepared for application of JCM model project.</td>
</tr>
</tbody>
</table>
Appendix

1) Presentation material for JCM seminar hosted by MOEJ
2) Presentation materials for Workshop in Yangon
3) Discussion materials with YCDC
4) Study tour in Kawasaki city
5) JCM model project related materials
Appendix: Presentation material for JCM seminar hosted by MOEJ
Yangon city is the largest city and the former capital of the Republic of the Union of Myanmar (Burma), and consists of 33 townships.

Area : 1,036 [km²]
Temperature : 32 degree Celsius (max)
22 degree Celsius (min)

Yangon city is not only a commercial heart but also an industrial center of the country.

Administrative body of Yangon city is the Yangon City Development Committee (YCDC). The committee's chairman therefore acts as the mayor of the city.
Background and Objective of the Project

[Background]
Yangon city is one of the rapid growth cities in the world, however, the city has faced several issues, such as energy supply, transportation, water supply/sewerage etc. Also, the private investment has been facilitated from not only domestic entities but also foreign entities, so the city has big commercial potential.

[Objectives]
To contribute to sustainable development and realize low carbon society in Yangon, the study aims to formulate prospective JCM projects collaborate with Kawasaki city and Japanese private entities, which have high-efficiency and low carbon technologies.

Outlines of City-to-City Collaboration between Yangon and Kawasaki

Current situation of potential sectors

[Power]
Unstable power supply, stand-by(back-up) power system in industrial park/commercial facilities etc.

[Transportation]
Heavy traffic jam, demand of mass rapid transit (MRT) system, insufficient parking lots, lack of consolidated logistics system etc.

[Water supply & sewerage]
Decrepit water supply/sewerage facilities, expansion of the facilities in the suburb etc.

Target sector
1) Low carbon industrial park
2) Low carbon building management system
3) Low carbon water supply/sewerage facilities
4) Project identification of Renewable energy/New energy

Technologies to be introduced
a) High efficiency air conditioning facilities, energy saving fluorescent light, etc.
b) High efficiency air conditioning facilities, energy saving fluorescent light, etc.
c) High efficiency pumping system, low carbon technologies in water sector etc.
d) Solar power, biogas, biomass, mini hydropower etc.

Support on environmental technology and industrial development collaborate with member of Kawasaki green innovation cluster etc.

Low CO2 Kawasaki brand entities, certified Nanofuel, Sowshow, JFE plastic resource corporation, Toshiba corp. etc.

Japanese private entities
Ebara corporation, Cool Japan, Ebara refrigeration equipment & system etc.

Nippon Koei
Study/support of JCM project formulation between Japanese and Myanmar companies
Objectives of the City-to-City Collaboration

- It aims to support establishment of Low Carbon Society in Yangon in order to mitigate GHG emissions.
- Also, it aims to scrutinize mid-and-long term city-to-city collaboration between Yangon and Kawasaki.
- Under the process of JCM project formulation, it aims not only "diffusion of advanced low carbon technologies" but also "share of knowledge and know-how " between Kawasaki city and YCDC in the JCM scheme.

Advanced low carbon products /technologies from Japanese entities

+ Shared Kawasaki city’s experience , knowledge and know-how
  - Overcome of pollution and establishment of low carbon society
  - Operation experiences of institutions and infrastructures

Establishment of low carbon societies in Yangon, in order to solve its current/urgent issues

Merits of the Project

**YCDC (Yangon city)’s Merits**

- Establish the low carbon society with utilization of Japanese advanced products/technologies and saving YCDC’s effort including administrative cost etc. by JCM scheme.
- Share the mid-and-long term support with Kawasaki city.
- Enjoy private support from not only domestic but also Japanese entities.
- Raise the quality of life by enjoying the co-benefits that the improvement of energy supply, air and water pollution, waste management etc.

**City to city collaboration with Kawasaki city**

**Myanmar local entity’s Merits**

- Available to acquire/install the advanced products/technologies with reasonable cost with JCM financial support programme.
- Can contribute to low energy consumption activities.
- Can save operating and maintenance costs.
- Feel the security for the introduction of new low carbon products /technologies by expectation of assistance and support.
Schedule of City-to-City Collaboration

1st step
- Kick off meeting between YCDC and Kawasaki cities
- Discussion of needs and potential for collaboration

Oct. 2015

2nd step
- Work shop for JCM city-to-city collaboration in Yangon
- Introducing Kawasaki city’s experience and knowhow on LCS

Nov. 2015

3rd step
- Discussion of approach for city-to-city collaboration

Dec. 2015

Final stage
- Agreement for future collaboration between YCDC and Kawasaki cities, such as MOU

Feb. 2016

Examples of focusing sector, Low carbon industrial park (1/2)

【Outlines of Mingaladon Industrial Park】

a) Official opening: February 1998
b) Construction: Mitsui Construction Co., Ltd.
c) Total area: approx. 90 ha
d) No. of tenants: 41 plots
e) Size of Plots: 1 ha ~ 4 ha
f) Lease Period: Up to February 7, 2048
g) Lease Period: 7 km from Yangon int’l airport
  23 km from city center
  24 km from Yangon port
h) Infrastructures: Electricity, Communication, Water supply, Waste Treatment Plant, Fire hydrants etc.
Examples of focusing sector, Low carbon industrial park (2/2)

In order to solve energy issues in Mingaladon IP, the following renewal/introducing activities are expected as JCM project not only in IP infrastructure but also tenant facilities.
- High efficiency air conditioning system
- High efficiency lighting system
- High efficiency water supply system
- Solid waste energy system
- Back-up power supply system
- Distribution line etc.

Examples of focusing sector, others

**Low carbon building management system**
- High efficiency air conditioning system
- High efficiency lighting system
- Solid waste energy system
- Back-up power supply system
- Heat shield film/panel
- Solar power system etc.

**Project identification of Renewable energy/New energy**
- Solar power system
- Biomass power generation system
- Biogas power generation system
- Back-up power supply system
- Application of natural gas etc.
Appendix : Presentation materials for Workshop in Yangon
Workshop on JCM Project Formulation Study through City-to-City Collaboration Between Yangon City Development Committee and Kawasaki City in Yangon

Coordinated by **NIPPON KOEI**

**Date** : 29th January 2016  
**Time** : 10:00 AM to 12:00 PM  
**Venue** : Meeting Room, City Hall, Yangon City Development Committee, Kyauktada Township, Yangon, Myanmar  
**Language** : Myanmar, Japanese

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Speaker</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Registration</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>Opening remarks</td>
<td>YCDC</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Presentation 2: <em>Outlines of JCM formulation study</em></td>
<td>Nippon Koei</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Tea break</td>
<td>---</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Presentation 3: <em>Expectation/Idea of city-to-city collaboration</em></td>
<td>YCDC</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Presentation 4: <em>Draft menu/idea of city-to-city collaboration</em></td>
<td>Kawasaki city</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Discussions</td>
<td>---</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Closing remarks</td>
<td>YCDC</td>
<td>5</td>
</tr>
</tbody>
</table>
Organizational Chart of Pollution Control and Cleansing Department

- Officer = 39
- Other Rank = 1040
- Labor = 3800

Head of Dept.

Deputy Head (East + South)
- Assistant head Pollution Control
  - 1 Divisional heads (Pollution Control)
  - 7 Township Cleansing Forces
  - Final Disposal Site (Dawei Chaung)

Deputy Head (North + West)
- Assistant head Pollution Control
  - 2 Divisional heads (Pollution Control)
  - 9 Township Cleansing Forces
  - Final Disposal Site (Htainbin)
Low Carbon Society Sector

- Yangon City Development Committee – Pollution Control and Cleansing Department (YCDC – PCCD) is trying to implement (CDM) including clean air, clean land and clean water.
- At present, there are 1690 tons/day of waste generated

- Carbon credit can be got and so 169 CERs from waste.
  • PCCD would like to know how to connect and implement, and how Kawasaki City can support to YCDC.
  • To obtain carbon credit, PCCD would like to ask to share knowledge to YCDC how to start the activities.
## Existing Used Main (2) Final Disposal Sites & (4) Temporary Small FDS

<table>
<thead>
<tr>
<th>No</th>
<th>Location of FDS site</th>
<th>Constructed Year</th>
<th>Planned Capacity</th>
<th>Site (Plant) Area</th>
<th>Dispose Ton Per Day (Current)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HtainBin</td>
<td>2002</td>
<td>-</td>
<td>150- Acre Used- 70 Ac</td>
<td>847</td>
<td>Open Dumping</td>
</tr>
<tr>
<td>2</td>
<td>Htwei Chaung</td>
<td>2001</td>
<td>-</td>
<td>104.7 – Acre Used-50 Ac</td>
<td>612</td>
<td>Open Dumping</td>
</tr>
<tr>
<td>3</td>
<td>Dala</td>
<td>2003</td>
<td>-</td>
<td>2.47- Acre</td>
<td>10</td>
<td>Low Landfill Temporary site</td>
</tr>
<tr>
<td>4</td>
<td>Seikkyi Khanaung To</td>
<td>2003</td>
<td>-</td>
<td>0.25 - Acre</td>
<td>5</td>
<td>Low Landfill Temporary site</td>
</tr>
<tr>
<td>5</td>
<td>Mingalardon</td>
<td>2003</td>
<td>-</td>
<td>0.91 - Acre</td>
<td>25</td>
<td>Low Landfill Temporary site</td>
</tr>
<tr>
<td>6</td>
<td>Shwe Pyi Thar</td>
<td>2005</td>
<td>-</td>
<td>9 - Acre</td>
<td>50</td>
<td>Low Landfill Temporary site</td>
</tr>
</tbody>
</table>

Proposed SSIP site in Tawkaungkalay for 60 tons per day of the waste in Shwe Pyi Thar Township

Note: (1) Total capital investment about (16) million US $,
      (2) YCDC allocated (8) which fixed (1.4) at 2015-2016, (6.6) at 2016-2017
      (3) Leap Frog program about (8) million, 2-year program from MoEJ.
      (4) Joint Crediting Mechanism about from MoFAJ,
Solid Waste Management Sector

- To establish waste to energy plant between 60 tons/day to 200 tons/day of solid waste according to JCM project.

-Further Requirements from Kawasaki

- To plan and implement advanced solid waste collection system.
- To get knowledge sharing of industrial waste management.
- To plan and implement waste separation program.
- To establish solid waste database.
- To plan and implement compost promotion program.

Fixed Possible AQM monitoring (67) sites.

Traffic
Urban
Industrial
Zones

YCDC Planned 67 places of Yangon A
AQM - Junction of Htaukyant (Northern part of Yangon)

**YCDC Planned**

- **67 places of Yangon Area**
- **3 Places fixed**
- **64 places mobile**

---

**Northern part of Yangon**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>WHO</th>
<th>PM10</th>
<th>SO2</th>
<th>NO2(24hr)</th>
<th>NO2(1hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>0</td>
<td>80</td>
<td>60</td>
<td>100</td>
<td>120</td>
</tr>
</tbody>
</table>

---

PM10, SO2, NO2(24hr), NO2(1hr)
Overall Discussion
- We are so interested in low carbon society sector.
- Our PCCD collects and disposes 1600 tons per day of, So I want to ask you to help us to get carbon credit from the waste.
- I also would like to collaborate with you if there are other activities of low carbon.
- HAZ-SCANNER Modern EPAs and chosen 67 places to monitor.
  - We have installed 3 sets of device as station
  - other device is used as mobile station

  - The 11 kinds of parameters we used for air quality monitoring are CO2, CO, CH4, NO2, SO2, PM2.5, PM10, Relative Humidity, Wind Speed, Wind Direction and Temperature.

Monitoring Sector
- At present, HAZ-SCANNER Modern EPAs, The 11 kinds of parameters,
- Further Requirements from Kawasaki City
  - We would like to get Mobile Station (Vehicle) to carry out more effective air quality monitoring activities.
  - Mobile Air Quality Monitoring Device and Portable Air Quality Monitoring Device
  - Sound Pollution Monitoring Device
Industrial Zones In Yangon City

- **Industrial Zones in City** = 24 No
- **Total Factories** = 3474

- Garments = 126
- Foodstuff = 334
- Chemical = 56
- Iron and Melting = 519
- Cold Storage and Fish Processing = 45
- Paper and Cardboard = 105
- Distillery = 9
- Forest Product = 148
- Public Use Goods = 661
- Others = 1511

(24) Industrial Zones Location In Yangon City
WASTE WATER ANALYSIS RESULT OF ALCOHOL DISTILLERIES - 2014
AFTER PHYSICAL TREATMENT (ppm)

<table>
<thead>
<tr>
<th>S R</th>
<th>ITEM</th>
<th>PMG</th>
<th>TAWIN</th>
<th>SMT</th>
<th>SHANHE</th>
<th>TOP ONE</th>
<th>YD</th>
<th>THEIN</th>
<th>Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>5.6</td>
<td>4.92</td>
<td>4.98</td>
<td>5.00</td>
<td>5.12</td>
<td>6</td>
<td>5.38</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>TOTAL SOLID</td>
<td>1595</td>
<td>2980</td>
<td>2181</td>
<td>2095</td>
<td>2983</td>
<td>6503</td>
<td>7750</td>
<td>1000</td>
</tr>
<tr>
<td>3</td>
<td>SS</td>
<td>238</td>
<td>600</td>
<td>391</td>
<td>515</td>
<td>658</td>
<td>1913</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>BOD</td>
<td>2023</td>
<td>2490</td>
<td>2023</td>
<td>562</td>
<td>2158</td>
<td>1494</td>
<td>2480</td>
<td>20-60</td>
</tr>
<tr>
<td>5</td>
<td>COD</td>
<td>648</td>
<td>3711</td>
<td>2089</td>
<td>396</td>
<td>694</td>
<td>2053</td>
<td>1229</td>
<td>200</td>
</tr>
</tbody>
</table>

At present, our PCCD has implemented inspection activities to the factories in the industrial zones in order to inspect waste water treatment yearly.

The 5 kinds of parameters we have used for waste water quality monitoring are pH, B.O.D, C.O.D, T.S (Total Solid) and S.S (Suspended Solid).

However, there is no mobile device, we need its.

We would like to get Mobile Device to monitor waste water quality and to carry out more effective waste water monitoring activities.
Monitoring Sector, supporting by Kawasaki

- To get the support on system development on air pollution.
  - Devices
  - JCM (50% Both of Kawasaki and YCDC)
- To get the support on system development on water quality.
  - Devices
  - JCM (50% Both of Kawasaki and YCDC)
- To get the support on system development on soil condition.
  - Devices
  - JCM (50% Both of Kawasaki and YCDC)
- To get the support on system development on car exhaust.
  - Devices
  - JCM (50% Both of Kawasaki and YCDC)

Joint Crediting Mechanism

The “Yangon Waste to Energy Plant Project” will be subsidized under the Joint Crediting Mechanism (JCM) Program. Approximately Up to 50% of total construction cost of the plant will be subsidized by the Japanese Government under the JCM Program. In order to reduce the generation of greenhouse gases such as methane from Open dumping Site, Yangon City Development Committee and JFE Engineering Corporation will establish an “International Consortium” which will aim to achieve a greenhouse gases emission reduction target. It is expected that the Republic of Myanmar and Japan will soon sign the bilateral document to start the JCM.
Carbon Reduction Reporting Program

- A prior program to Cap-and-Trade (2016 to up)
- **Mandatory Reporting Program**
  
  Require a report of 5 year plan for energy reduction with voluntary reduction target

- **Advise, Evaluate & Disclose**
  
  Level up the reduction efforts by
  - Advising,
  - Evaluating and
  - Public disclosure

*Easy to introduce*

*Good for collecting data needed for mandatory reduction program*
Towards low-carbon and environmentally sustainable Yangon cities,

Please, Yangon wishes to share experiences from Kawasaki City

Thank you
For your attention
Potential for City-to-City Collaboration

Utilizing Kawasaki's Experience
for better future of Yangon City
(part-1)

Economic and Labor Affairs Bureau
Kawasaki-city

General Information about Kawasaki
**Location**

- **Population:** APPROX 1.47 million population (2014)
- **Area:** 144.35 Km²
- **City budget:** APPROX 10 billion US$ (2015)
- **7 wards:** Kawasaki, Saiwai, Nakahara, Takatsu, Miyamae, Tama, Asao

**City Profile**

- **Population:** APPROX 1.47 million population (2014)
- **Area:** 144.35 Km²
- **City budget:** APPROX 10 billion US$ (2015)
- **7 wards:** Kawasaki, Saiwai, Nakahara, Takatsu, Miyamae, Tama, Asao
Major Corporations in Kawasaki

- Nippon ZEON
- Mitsubishi Fuso
- Kao
- YAKIN Kawasaki
- Truck & Bus
- Tenen General Sekiyu
- Showa Denko
- Nisshin Seifun
- Nippon Oil

Number of Research & Development institutes: Over 400 facilities

Overview of Kawasaki’s Experience
Background
~ History of Industrialization and Environmental Deterioration ~

Chronological viewpoint about environmental issue change in Kawasaki

<table>
<thead>
<tr>
<th>Period</th>
<th>Environmental Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>I 1940-1960</td>
<td>Development as “Industrial-city” Economic Development &gt; Environment</td>
</tr>
<tr>
<td>II 1960-1975</td>
<td>Environmental Deterioration caused by industries</td>
</tr>
<tr>
<td>III 1975-1990</td>
<td>Environmental Deterioration caused by household</td>
</tr>
<tr>
<td>IV 1990-</td>
<td>Issue of “Sustainability” (Earth Summit in Rio, Brazil): Search for the way to balance between economic and environment</td>
</tr>
</tbody>
</table>

Formation of Kawasaki Waterfront Area

Expansion of Reclaimed Land in Kawasaki Waterfront Area

Kawasaki Waterfront Area

Highest elevation 148.0m (above sea level)
Asao-Ward/Kawasaki area

Lowest elevation -0.365m (above sea level)
Kawasaki-ward/Okubo area
Major industries advanced to the waterfront area

- Cement
- Steel
- Fertilizer

1940s

1960s

Petrochemical complex

～1996

- Steel
- Logistics
Rapid Economic Growth and Serious Environmental Deterioration (1960s-70s)

Trend of Economic Growth Rate in Japan

(注) 年度ベース。93SNA連続方式推計。平均は各年度数値の単純平均。1980年度以前は「平成12年度国民経済計算基準」（93SNAベース）、1981〜94年度は年報（平成21年度経済）、それ以降は、2015年7〜9月期2次速報値（2015年7月公表）

(資料) 内閣府SNAサイト
“Sharing of roles” & “Cooperative action”

**Business**
- Investment for pollution control
- Development of pollution control technologies

**Citizen**
- Civil action against pollution
- Public awareness for environment

**Public Authority**
- Pollution control agreement with local industries
- Regulation for pollution control
- Pollution monitoring system

**Improvement of environmental situation**

**Accumulation of Pollution control technologies & Know-how**
Current Environmental Situation in Kawasaki (2010)

"1.96 million sweet fish coming back to Tama-river" (2010; Asahi newspaper)
• Thank you for your attention!
• We look forward to collaborate with you!

ARIGATOU GOZAI MASHITA!
aus;ZI;wifygw,f
Efforts for Environmental Improvement in Kawasaki ①

“Environmental Monitoring “
Environmental Monitoring System in Kawasaki

Monitoring Post for atmosphere

- Monitoring Post for effluent gas from automobile

Kawasaki Environmental Research Institute (Data Collection and Evaluation)

Environmental Monitoring Data Analysis

Air Sampler for PM2.5

PM2.5捕集フィルター

捕集前 捕集後

サンプラー GCMS
Environmental Monitoring Data in Kawasaki

Trend of SO\textsubscript{2} concentration in air from 1973 to 2014

- Major source of SO\textsubscript{2} is from fossil fuel combustion.
- SO\textsubscript{2} will cause respiratory disease.

Meet the environmental standard of SO\textsubscript{2}

Trend of NO\textsubscript{2} concentration in air from 1973 to 2014

- Major source of NO\textsubscript{2} is automobile.
- NO\textsubscript{2} will cause respiratory disease.

Meet the environmental standard of NO\textsubscript{2}
Efforts for Environmental Improvement in Kawasaki ②

“Solid Waste Management“
Basic Flow of Municipal Solid Waste Management

1. Source Separation
2. Waste Reduction at Source
3. Waste Collection
4. Intermediate Treatment (Incineration)
5. Intermediate Treatment (Recycle)
6. Final Disposal

Municipal Solid Waste Management
<Station for Waste Collection>

Signboard to Inform Waste Collection Rules to Residents
Municipal Solid Waste Management

<Waste Collection>

Tama Waste collection center

Miyamae Waste collection center

Kawasaki Waste collection center

Nakahara Waste collection center

Nanbu Waste collection center

Waste collection truck

Railway Transportation System for Solid Waste

Kajigaya Terminal Station

Suehirocho-Station

Ukishima Incineration plant

23km
Municipal Solid Waste Management

**<Waste Incineration Plant>**

- **Tachibana Incineration plant** (Under construction)
- **Ozenji Incineration plant**
- **Tsutsumine Incineration plant**

- **900t/day combustion capability**
- **450t/day combustion capability**
- **600t/day combustion capability**

**<Final Disposal>**

- **Ukishima Final Disposal Site**
After Incineration, Volume of Solid Waste would Reduce up to 1/50.

Trend of Solid Waste Generation in Kawasaki

Amount of Waste Generation

Population
Menu for Waste Separation at household

<table>
<thead>
<tr>
<th>menu</th>
<th>collection</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>General waste</td>
<td>2/week</td>
<td>Garbage, wood, ceramic plate etc</td>
</tr>
<tr>
<td>Recyclable</td>
<td>1/week</td>
<td>can, pet bottle, glass bottle, used battery</td>
</tr>
<tr>
<td>Mixed paper</td>
<td>1/week</td>
<td>Paper waste</td>
</tr>
<tr>
<td>Plastic container</td>
<td>1/week</td>
<td>Plastic container for food</td>
</tr>
<tr>
<td>Small size waste</td>
<td>1/week</td>
<td>Metal waste under 30cm</td>
</tr>
<tr>
<td>Oversized waste</td>
<td>2/month</td>
<td>Metal waste over 30cm or other waste over 50cm</td>
</tr>
</tbody>
</table>

Arousing Public Awareness for Proper Waste Separation

- Cooperation with “Waste Reduction Leader”
  Kawasaki city appoints “Waste Reduction Leader” from citizens who are expected to provide information for proper waste separation and reduction, and check stations for waste collection to be clean.

- Number of “Waste Reduction Leader”
  = 1,880 appointed in 2013
Public Meeting

Utilizing Various Media, PR tools

Trend of Solid Waste Disposal Cost in Kawasaki

Disposal Cost per weight

Total Disposal Cost
Efforts for Environmental Improvement in Kawasaki ③

“Kawasaki Eco-town”

Eco-Town Projects in Japan

- Start: 1997
- No. of approved sites: 26
- No. of subsidized facilities: 62

*Approved as Eco-town in the first year
Kawasaki Eco-town

- “Kawasaki Eco-town plan” was approved by MITI (METI) in 1997
- Appointed area: Kawasaki waterfront area

Recycling Facilities in Kawasaki Eco-town

- **SHOWA DENKO K.K.**
  - Material production for ammonia from waste plastics

- **DC CO., LTD.**
  - Recycling cement production

- **JFE group companies**
  - Reusing material for blast furnace from waste plastics
  - Concrete setting frame production from waste plastics
  - Used electric appliances recycling

- **PET REFINE TECHNOLOGY CO., LTD.**
  - Material production for new PET bottles (PET to PET)

- **SAN-EI REGULATOR CO., LTD.**
  - Toilet and tissue paper production from mix paper in used papers

The main facilities locate limited area (within 1.5km radius)
Material Flow in Kawasaki Eco-town

Non ferrous scrap → Non ferrous metal production furnace
Iron scrap → JFE group
Used electric appliances → Used electric appliances recycling equipments → Material production for blast furnace
Waste plastics → Construction board production
Used PET bottles → Material for ammonia production
construction sludge → PET REFINE TECHNOLOGY CO., LTD
Sewage sludge → DC CO., LTD
Used paper → SAN-EI REGULATOR CO., LTD

Energy related facilities in Kawasaki Waterfront Area

Mega-Solar Electric Plant
- 駐出力：2万kw
- 扇島1.3万kw
- 浮島0.7kw
- 事業主体：東京電力（株）川崎市
- 川崎市の廃棄物最終処分場跡地を活用

Large scale Wind Power Plant
- 出力：84.7万kw
- 事業主体：JX日鉱日石エネルギー、東京ガス
- 風力を活用した大型風力発電所

Biomass Power Plant
- 出力：3.3万kw
- 事業主体：川崎バイオマス発電（株）
- 建設廃棄物等の木質バイオマスを燃料として発電

LNG High Efficiency Power Plant
- 出力：0.199万kw
- 事業主体：JX日鉱日石エネルギー
- 風力を活用した大型発電所
4. Potential of City-to-City Collaboration between Yangon and Kawasaki

<table>
<thead>
<tr>
<th>Potential of City-to-City Collaboration (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low carbon society</strong></td>
</tr>
<tr>
<td>• Eco town planning and sharing experience</td>
</tr>
<tr>
<td>• Introduction of energy saving products/technologies from Japanese private entities</td>
</tr>
<tr>
<td>• Support on Private sector collaboration, such as chamber of commerce etc.</td>
</tr>
<tr>
<td>• Support on capacity development through JICA scheme etc.</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td>• Support on system development on car exhaust/air pollution/water quality / soil condition, including analysis know-how</td>
</tr>
<tr>
<td><strong>Solid waste</strong></td>
</tr>
<tr>
<td>• Planning/implementation of solid waste collection system</td>
</tr>
<tr>
<td>• Planning/implementation of garbage separation program</td>
</tr>
<tr>
<td>• Planning/implementation of compost promotion program</td>
</tr>
<tr>
<td>• Knowledge sharing of industrial waste management</td>
</tr>
<tr>
<td>• Establishment of solid water database etc.</td>
</tr>
</tbody>
</table>
### Potential of City-to-City Collaboration (2)

<table>
<thead>
<tr>
<th>Water supply / Sewerage</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sharing of management knowledge on water supply / sewerage system</td>
</tr>
<tr>
<td>• Sharing of water tariff collecting / water quality management knowledge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Planning / implementation of environmental education programs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other options</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Implementation of site tour on Kawasaki eco town etc.</td>
</tr>
<tr>
<td>• Establishment of Environmental Impact Assessment (EIA) system</td>
</tr>
</tbody>
</table>

- Introduction of Japanese advanced products / technologies from private entities, if necessary
Contents

Part 1: Outlines of the Study
Part 2: City-to-City Collaboration between YCDC and Kawasaki city
Part 3: JCM Project Formulation in YCDC
Part 1 : Outlines of the Study

Background and Objective of the Study

【Background】
Yangon city is one of the rapid growth cities in the world, however, the city has faced several issues, such as energy supply, transportation, water supply/sewerage etc. Also, the private investment has been facilitated from not only domestic entities but also foreign entities, so the city has big commercial potential.

【Objectives】
To contribute to sustainable development and realize low carbon society in Yangon, the study aims to formulate prospective JCM projects collaborate with Kawasaki city and Japanese private entities, which have high-efficiency and low carbon technologies.
What is Joint Crediting Mechanism (JCM) ?

1) Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.

2) Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan’s emission reduction target.

3) Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.

JCM Partner Countries

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

Three (3) JCM projects between Indonesia and Japan, one (1) JCM project between Palau and Japan, two (2) JCM projects between Mongolia and Japan and one (1) JCM project between Viet Nam and Japan have been registered respectively.
Outlines of the Study

Yangon city

Current situation of potential sectors

[Power]
Unstable power supply, stand-by (back-up) power system in industrial park/commercial facilities etc.

[Transportation]
Heavy traffic jam, demand of mass rapid transit (MRT) system, insufficient parking lots, lack of consolidated logistics system etc.

[Water supply & sewerage]
Decrepit water supply/sewage facilities, expansion of the facilities in the suburb etc.

Kawasaki city

Support on environmental technology and industrial development collaborate with member of Kawasaki green innovation cluster etc.

Low CO2 Kawasaki brand entities, certified
Nanofuel, Sowshow, JFE plastic resource corporation, Toshiba corp. etc.

Japanese private entities
Ebara corporation, Cool Japan, Ebara refrigeration equipment & system etc.

Nippon Koei
Study/support of JCM project formulation between Japanese and Myanmar companies

Target sector

1) Low carbon industrial park
2) Low carbon building management system
3) Low carbon water supply/sewage facilities
4) Project identification of Renewable energy/New energy

Technologies to be introduced

a) High efficiency air conditioning facilities, energy saving fluorescent light, etc.

b) High efficiency air conditioning facilities, energy saving fluorescent light, etc.

c) High efficiency pumping system, low carbon technologies in water sector etc.

d) Solar power, biogas, biomass, mini hydropower etc.

Overall Schedule of the Study

2015


City-to-City Collaboration

Kick off mtg @YCDC JCM WS @Yokohama Site visit by YCDC in Kawasaki JCM WS

Needs assessment in YCDC

Information collection & evaluation on JCM candidate activities

Coordination of JCM activities with private entities

Preparation of JCM application on candidate activities

Preparation of next fiscal years’ activities

Low carbon IPs

Low carbon buildings

Low carbon water/sewage

Renewable energy etc.

Consideration of city-to-city collaboration, using various fund and supporting scheme

Low carbon facilities

Consideration of JCM subsidy application with private entities

Consideration of private entity partnership

Consideration of JCM project formulation with private entities

Signing of MOU
Part 2: City-to-City Collaboration between YCDC and Kawasaki city

Objectives of the Collaboration

- It aims to support establishment of Low Carbon Society in Yangon in order to mitigate GHG emissions.
- Also, it aims to scrutinize mid-and-long term city-to-city collaboration between Yangon and Kawasaki.
- Under the process of JCM project formulation, it aims not only "diffusion of advanced low carbon technologies" but also "share of knowledge and know-how " between Kawasaki city and YCDC in the JCM scheme.

Advanced low carbon products /technologies from Japanese entities

Shared Kawasaki city’s experience, knowledge and know-how
- Overcome of pollution and establishment of low carbon society
- Operation experiences of institutions and infrastructures

Establishment of low carbon societies in Yangon, in order to solve its current/urgent issues
Merits of the Collaboration

**YCDC’s Merits**
- Establish the low carbon society with utilization of Japanese advanced products/technologies and saving YCDC’s effort including administrative cost etc. by JCM scheme.
- Share the mid-and-long term support with Kawasaki city.
- Enjoy private support from not only domestic but also Japanese entities.
- Raise the quality of life by enjoying the co-benefits that the improvement of energy supply, air and water pollution, waste management etc.

**City to city collaboration with Kawasaki city**

**Myanmar local entity’s Merits**
- Available to acquire/install the advanced products/technologies with reasonable cost with JCM financial support programme.
- Can contribute to low energy consumption activities.
- Can save operating and maintenance costs.
- Feel the security for the introduction of new low carbon products/technologies by expectation of assistance and support.

---

**Overall Schedule, City-to-city Collaboration**

<table>
<thead>
<tr>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
</table>

City-to-City Collaboration
- Kick off mtg @YCDC
- JCM WS @Yokohama
- Site visit by YCDC in Kawasaki
- JCM WS

| Needs assessment in YCDC |
| Information collection & evaluation on JCM candidate activities |
| Coordination of JCM activities with private entities |
| Preparation of JCM application on candidate activities |

JCM Project Formulation
- Low carbon IPs
- Low carbon buildings
- Low carbon water/sewe.
- Renewable energy etc.

- Preparation of next fiscal years’ activities
- Consideration of JCM subsidy application with private entities
- Consideration of city-to-city collaboration, using various fund and supporting scheme

- Signing of MOU
Part 3: JCM Project Formulation in YCDC

Incentives of the JCM

*The budget for FY 2015*
2.4 billion JPY (approx. **USD24 million**) per year by FY2017
(total 7.2 billion JPY)

- **Government of Japan**
  - Finance part of an investment cost (up to the half)
  - Conduct MRV and expected to deliver at least half of JCM credits issued

- **International consortiums** (which include Japanese entities)

- Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO2 from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- Eligible Projects: starting installation after the adoption of the financing and finishing installation within three years.
Overall Schedule, JCM Project Formulation

<table>
<thead>
<tr>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
</table>

City-to-City Collaboration
- Information/opinions exchange on city-to-city collaboration
- Discussion of contents of city-to-city collaboration
- Signing of MOU

Preparation of next fiscal years activities
- Low carbon IPs
- Low carbon buildings
- Low carbon water/sewe.
- Renewable energy etc.

JCM Project Formulation
- Needs assessment in YCDC
- Information collection & evaluation on JCM candidate activities
- Coordination of JCM activities with private entities
- Preparation of JCM application on candidate activities

Examples of the JCM projects (1/4)

**Energy Saving for Air-conditioning and Process Cooling at Textile Factory**

**Project Owner**
Japan: Ebara Refrigeration Equipment & Systems and Nippon Koel Co., Ltd.
Indonesia: PT. Primatexco and PT. Ebara Indonesia

In Indonesia, humidity control is indispensable for the textile industry to maintain product quality and massive energy output, which is required for the adjustment of factory air conditioning. The target factory replaces old-fashioned chillers (230USRt and 250USRt) with high-efficiency chillers (500USRt), in order to save energy and mitigate CO2 emissions. High-efficiency chillers adopt a high-performance economizer cycle and a super-cooling refrigerant cycle in order to save energy. Also, the chillers use low-pressure refrigerant (HFC-245fa) with zero ODP (Ozone Depletion Potential).

**Expected GHG Emission Reductions**
- Project 1: 117 tCO2/year
- Project 2: 117 tCO2/year

Batang, Central Java, Indonesia

Source: JCM Feasibility Studies, GEC
**Examples of the JCM projects (2/4)**

**FS2014-16**

**Introduction of Waste to Energy Plant in Yangon City** | Myanmar

- **Implementing Entity:** JFE Engineering Corporation
- **Expected GHG Emission Reductions:** 1,500 tCO₂/year
- **Waste to Energy Plant Diagram:**
  - Waste to Energy Plant
  - Gas Treatment
  - To Grid
  - Ash

**Yangon City, Myanmar**

Source: JCM Feasibility Studies, GEC

---

**Examples of the JCM projects (3/4)**

**MP2013-ID03**

**Energy Savings at Convenience Stores** | Indonesia

- **Project Owner:** Japan: Lawson, Inc., Indonesia: PT. Multi Utama Indonesia Tbk
- **Expected GHG Emission Reductions:** 28.5 tCO₂/store/year
- **Energy Efficiency Diagram:**
  - High Pressure
  - Low Pressure
  - Middle Pressure
  - Inter-cooler
  - High efficiency compressor

**Indonesia**

**Image:**
- Refrigerators
- Convenience Store Interior

Source: JCM Feasibility Studies, GEC
Examples of the JCM projects (4/4)

MP2014-MY01 PV Power Generation and Relevant Monitoring System for the Office Building

**Project Owner**
Japan : NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc
Malaysia : KEN TTDI SDN BHD

The PV panels installed on the top of building roof in Kuala Lumpur, Malaysia will generate electricity power and contribute to CO2 reduction. The solar cell is made of a thin monocrystalline silicon wafer surrounded by ultra-thin amorphous silicon layers. This product offers the industry’s leading performance and value; 19.4% conversion ratio. The electricity amount generated on solar panel will be monitored and managed in the data management server.

**Source : JCM Feasibility Studies, GEC**

Candidate project in YCDC, low carbon industrial park (1/2)

**Outlines of Mingaladon Industrial Park**

- a) Official opening : February 1998
- b) Construction : Mitsui Construction Co., Ltd.
- c) Total area : approx. 90 ha
- d) No. of tenants : 41 plots
- e) Size of Plots : 1 ha ~ 4 ha
- f) Lease Period : Up to February 7, 2048
- g) Lease Period : 7 km from Yangon int'l airport 23 km from city center 24 km from Yangon port
- h) Infrastructures : Electricity, Communication, Water supply, Waste Treatment Plant, Fire hydrants etc.

**Source : JCM Feasibility Studies, GEC**
In order to solve energy issues in Mingaladon IP, the following renewal/introducing activities are expected as JCM project not only in IP infrastructure but also tenant facilities.
- High efficiency air conditioning system
- High efficiency lighting system
- High efficiency water supply system
- Solid waste energy system
- Back-up power supply system
- Distribution line etc.

Low carbon building management system
- High efficiency air conditioning system
- High efficiency lighting system
- Solid waste energy system
- Back-up power supply system
- Heat shield film/panel
- Solar power system etc.

Low carbon water supply/sewerage system
- High efficiency water pump system
- High efficiency waste water pump system
- Solid waste energy system etc.

Project identification of renewable energy/new energy
- Solar power system
- Biomass power generation system
- Biogas power generation system
- Back-up power supply system
- Application of natural gas etc.
Thank you for your kind attention.

Masaru Ishikawa (Mr.)

NIPPON KOEI
Manager, Renewable Energy & Climate Change Group
Environmental Science & Engineering Dept.
EM : Ishikawa-ms@n-koei.jp
To make Kawasaki the fortunate city most on Earth!

Tackling pollution problems as an environmentally-visionary municipality, the City of Kawasaki is a world leader in achieving sustainability, Mayor Hirohiko Fukuda, who continues to passionately lead the way in advancing these initiatives ever further, talks below about his near-term vision for Kawasaki.

Measures to Combat Pollution

Through proactive efforts conducted variously by companies, city residents, and the government to overcome serious pollution issues, the City of Kawasaki has made remarkable progress. What are your thoughts on this?

The skills to solve pollution issues as the bedrock of Kawasaki innovation during Japan's era of high-speed economic growth (1960s and 1970s), Kawasaki has, as the center of the Keihin industrial area, a driving force of Japanese economics. The downside to this growth was harm done to the environment through air and water pollution, as well as waste disposal. However, many persistent efforts made by companies, city residents, and the government since then have restored the area's beauty and brought back the former beauty of its rivers and coast.

Companies have actively invested in developing technologies to solve pollution problems, while residents have become aware of these issues. Government has joined in this circle, contributing by signing agreements with companies over air pollution control and passing pollution control regulations.

This has led to a great wealth of new industries and dynamic business matching. A model for Japan, the city has become an "environmentally-advanced city" with the capacity for sustainable development.

The publication looks at Kawasaki's unifying innovation through a number of angles that include an interview with the mayor, comments from environment-related companies, and information about energy saving and creating sites in each region.

Measuring the Kawasaki eco-town concept

In 1997, the City of Kawasaki was officially recognized as the first eco-town region in Japan. Companies have made leading-edge recycling efforts.

Enhancing economic growth while also succeeding with environmental measures

The City of Kawasaki has built a base of technologies and knowhow through the process of overcoming pollution throughout the region, a region once plagued by pollution problems. It has used this base to reduce environmental impact, recycle resources, and otherwise stimulate industry centered on the environment. From this it framed the eco-town concept targeting Kawasaki's entire coastal region, receiving recognition in 1997 from the former Ministry of International Trade and Industry as the first eco-town region in Japan. The eco-town region covers the entire Kawasaki coast, an area of about 2,800 hectares.

Since being recognized as an eco-town, companies have shifted to production involving resource recycling and new recycling facilities have been built. The city is now home to a number of recycling facilities, which take advantage of the high concentration of companies on the coast and the large number of environmental technologies to recycle and make effective use of sustainable resources and waste products produced inside the city.

The eco-town has received high acclam for succeeding with environmental measures while demonstrating the ability to succeed economically, and attracts an endless number of overseas visitors looking to understand this success.
Advanced technology visualization, lifestyle

Showcasing environmental technologies

Since the Great East Japan Earthquake, power generation facilities on the coast and environmental technologies used within the city have garnered attention in Japan and abroad. Word is that the city is making progress in visualizing superlative environmental technologies.

Coastal power generation potential garnering attention in Japan and abroad

Global warming is now an urgent problem for mankind. In the interest of using alternative energy such as renewable energy and improving energy efficiency, further focus is being placed on generating clean power. Since the Great East Japan Earthquake, there has been a growing coastal concentration of renewable energy generating facilities such as high-efficiency thermal power stations, biomass power generation facilities, solar power generation facilities, and wind power generation facilities.

CC Kawasaki Energy Park: informing the world of Kawasaki’s environmental expertise

The CC Kawasaki Energy Park is home to many such state-of-the-art facilities, which work closely together to broadly share information about expertise on environmental matters. The CC Kawasaki Energy Park was designated a “Next-Generation Energy Park” by the Ministry of Economy, Trade and Industry in 2011. With shades of both an industrial tourism city and environmental city, it is a place where people can enjoy themselves while feeling an intimacy with the environment.

Kawasaki Eco Show Window Model Project

In addition, the Kawasaki Eco-Show Window Model Project is being carried out citywide to bring energy-saving and creating technologies into wider use. This involves using environmental products and a range of facilities within the city to save and create energy in an effort to make environmental technologies more visible in a way anyone can see. The dissemination of this publication is a part of this project.

Three 2014 certified model businesses paying a courtesy visit to the mayor

Tonomachi international strategic hub (King Skyfront)

Located on the shore opposite Haneda Airport, King Skyfront strives to develop pharmaceuticals and medical equipment while achieving innovation in industries connected with manufacturing and health.

CIEA’s Regenerative Medicine and New Drug Development Center
Began operations in July 2011

Kawasaki Life Science & Environment Research Center (LISE)
Began operations in July 2013

Daiwa House Industry Co., Ltd.
Land transfer deal signed in June 2014

Create Medic Co., Ltd.
Will begin operations in FY 2016

National Institute of Health Sciences
Construction to be completed in FY 2015

Manufacturing Nano Innovation Center (ICON) (tentative name)
Will begin operations in April 2015

Kanagawa Prefecture Life Innovation Center (tentative name)
Will begin operations in FY 2016

Johnson & Johnson’s Tokyo Science Center
Began operations in August 2014

Japan Radioisotope Association
Construction to be completed in FY 2016

CYBERDYNE
Land transfer deal signed in October 2014

FUJIFILM RI Pharma Co., Ltd.
Land transfer deal signed in August 2014
innovation, and smart cities.

King Skyfront’s aspirations

King Skyfront in the Tonomachi district appears to be working towards creating a new hub for life innovation, where people gather from around the world.

Kawasaki’s new mission for the 21st century

In the Japanese word Tonomachi, “tono” refers to the top member of a samurai organization. “King” comes from this idea, and is formed from the first letters of Kawasaki Innovation Gateway. King Skyfront represents a new mission for the City of Kawasaki: to build a new hub aimed at facilitating sustainable development around the world. King Skyfront is an area of about 40 hectares, located across the Tama River from Haneda Airport. Home to many world-class research institutes focused primarily on the life science and environmental fields, which are expected to see worldwide growth, it is an open innovation hub that creates new industries.

With Kawasaki’s involvement in resolving the problem of aging societies, environmental problems, and other issues faced by mankind, King Skyfront seeks to jumpstart innovation and generate global business in these fields while developing growth strategies for Japan.

Advancing the Smart City concept

It is said that the public and private sectors are working together towards achieving a sustainable smart city.

A new approach towards urban development, made possible through collaboration

One of Kawasaki’s strengths is its presence as an industrial center for environment-related technologies and its high concentration of state-of-the-art research facilities. Collaboration between the city and a range of companies located here allow their achievements to be shared among companies, residents, and the community at large.

One part of this is advancing specific initiatives aimed at building a sustainable smart city focused on goals such as reducing our carbon footprint through the judicious use of energy, improving city residents’ convenience and quality of life by leveraging ICT and other technologies, and ensuring safety and security in the event of a disaster. Model projects are already underway in the districts surrounding Kawasaki and Musashi-Kosugi stations. The former is the largest regional center in the city, and is making extensive efforts aimed at the efficient use of energy. The latter is working to optimize energy usage with city resident participation. We hope to offer these models to the world as a new approach to urban development from Japan.

Reducing carbon footprint and improving convenience and safety through sustainable smart communities

Toshiba Corporation Community Solutions Company
Community Solutions Division
Koshibe Hiroko, Synthesis Center Director

There are four points concerning the smart community we are developing in the City of Kawasaki. The first is “energy solutions”. With our integrated BEMS (Building Energy Management System) service, we are making energy usage visible at the community, building, floor, and tenant levels. This involves managing carbon footprint reduction and energy optimization while enhancing people’s comfort. Starting in 2013, our service has been deployed at multiple businesses in front of Kawasaki Station. We also foresee a 32% improvement in energy savings throughout our entire Smart Community Center building (Comparison by Toshiba to the total primary energy consumption in the reference year as per the Law Concerning the Rational Use of Energy).

The second point is “commercial revitalization solutions”. We conducted a proof of concept for the revitalization of areas around Kawasaki Station by connecting up shopping districts in the area using ICT and providing a smartphone-based shopping guide. The third point is “healthcare solutions”. We are working to develop and commercialize advanced healthcare solutions that achieve a widespread benefit for residents’ quality of life. The last point is “disaster prevention information sharing solutions”. This includes new plans for deploying emergency power supplies and providing electric buses that emit no exhaust gases and reduce the carbon footprint.

Going forward, we will be taking commercialization and convenience a step further while also focusing on both improving municipal sustainability and comfort for the individual as we implement “smart” solutions tailored to solving key issues in the community.

Using the City of Kawasaki as a venue for assisting with reconstruction support events
Staging an energy revolution, providing and achieving sustainability.

Towards building a hydrogen network

In addition to building a smart city, Kawasaki also appears to be ambitiously engaged in model businesses designed in line with community characteristics in the coastal region.

A long-awaited energy revolution begins in Kawasaki

Along with entering into agreements with Toshiba on collaboration and cooperation concerning a smart community, the City of Kawasaki has signed a comprehensive agreement on collaboration and cooperation with Chiyoda Corporation concerning the realization of a hydrogen society. This project will bring the hydrogen mass storage and transportation technologies of Chiyoda Corporation together with the diverse industrial resources in the areas of petrochemicals and energy in the Kawasaki coastal region to reduce the carbon footprint and diversify energy sources.

In order to establish the world’s first hydrogen network and develop commercial hydrogen stations, the City of Kawasaki is working to relax regulations and accelerate procedures through efforts that include making joint proposals to the Cabinet Office for a “national strategic special zone” plan and holding discussions with the national government and relevant organizations.

Strengthening the region’s competitive strength while expanding the use of hydrogen in transportation and city residents’ everyday life, we hope to bring about an energy revolution the likes of which only Kawasaki can achieve.

Kawasaki International Eco-Tech Fair 2014

Support for overseas development

The city seems to be providing support for business matching for companies with exemplary environment-related technologies, especially overseas companies.

Bringing environmental technologies to the world through business matching

The Kawasaki International Eco-Tech Fair is held every year. In 2014, some 200 people came to tour the city from 14 countries. This fair calls people to action to solve environmental problems around the world by utilizing the exemplary environmental technologies of companies based overseas and in the city, as well as the administrative expertise of the city itself. To improve the water environment around the world, the Kawasaki Water Business Network makes a difference by packaging together the products, skills, and expertise of companies with the city’s skills and expertise in business administration for waterworks and sewerage projects.

Contributing to sustainability around the world by supporting hydrogen companies born in Kawasaki

Chiyoda Corporation
Technology Development Unit and Hydrogen Chain Business Unit
Yoshimi Okada, Chief Engineer

Zoom Up

Making the most of the Kawasaki coastal region’s potential as a major consumer of hydrogen, we aim to work in step with hydrogen power stations’ operations to build a hydrogen supply chain that handles everything from procuring hydrogen to its transport and supply by the time of the Tokyo Olympics in 2020. Achieving this will be two revolutionary technologies from Chiyoda Corporation that will upturn conventional thinking concerning hydrogen.

One is a technology for transporting hydrogen at ambient temperature and pressure. Fixing hydrogen to In hues enables the production of methyicylcholane (MCH), a liquid easier to handle than hydrogen. With this technology, it is now possible to transport hydrogen across long distances and store it in large quantities safely at low cost without cryogenically freezing it or pressurizing it in hydrogen cylinders. The other technology is one for extracting hydrogen from MCH. Long considered impossible to achieve, Chiyoda Corporation’s nanotechnology has allowed it to be the first to succeed in producing a catalyst for such extraction. This allows only the necessary amount of hydrogen to be supplied whenever, wherever it is needed.

The result is green power from a renewable energy source. Hydrogen can be produced from water in a variety of places, and is an inexhaustible energy source that produces zero CO₂ emissions. By leading the way in commercializing this ideal energy source, hydrogen, we hope to help the world realize a sustainability that achieves harmony between energy procurement and the environment.
business matching,

I also thoroughly advertised these eco-technologies in Vietnam, Thailand, and Laos when visiting the ASEAN region.

**Advancing green innovation**

The City of Kawasaki appears to be undertaking "green innovation" initiatives to bring about next-generation vitality to the region. What are these initiatives?

**Further development and expansion of sustainable city Kawasaki**

These initiatives clarify a direction for our sustainable city to take by further developing and expanding the strengths and characteristics of the city, namely efforts made to date that have leveraged environmental technologies and industries.

We seek to take advantage of the knowledge and expertise we have accumulated through the process of our companies, residents, and government overcoming pollution to bring top-notch eco-technologies, products, and services from companies here to places both in Japan and abroad. The goal of this is to improve the awareness and awareness of the environment in other regions while also stimulating industry and enhancing quality of life in Kawasaki itself.

**Making Kawasaki the most fortunate city on Earth**

Finally, what are your hopes as expressed in the "Kawasaki, most fortunate city on Earth" slogan, and your outlook going forward?

Even as the national population declines, the City of Kawasaki's population continues to grow. There are few accidents or crimes. It is a nice place to live, where people are happy and safe. Looking at the national an international landscape, however, we do feel the desire to provide solutions to issues such as global warming and growing numbers of elderly and declining birth rates. Key to this is my myriad environment-related technologies developed, built up, and honed in Kawasaki. The creation of a sustainable city based on these technologies is the path that will lead to making "Kawasaki the most fortunate city on Earth", an idea its residents can be proud of. We will be devoting all energies to achieving this in as smooth and simple a way as possible, and we ask for everyone support in this endeavor.

![Recent photo of the coastal region](image)

**Kawasaki eco-technologies in use around the world**

Kawasaki is working to help resolve the world's environmental problems utilizing the top-notch eco-technologies of companies in the city and the city's administrative expertise.

- **Shenyang, China**
  - Exchange with Shenyang Water Group Co., Ltd.
  - Kawasaki City Waterworks Bureau

- **Shanghai, China**
  - High-pressure washing ofsuper high-rise condominiums
  - Fujiko Co., Ltd.

- **Dammam, Saudi Arabia and elsewhere**
  - Saudi Arabian environmental management project

- **Northern Mozambique**
  - Feasibility study for sustainable drinking water supply business using a filtration system that does not require filter replacement
  - Nihon Geogy Co., Ltd.

- **Thailand**
  - Signing of Memorandum for economic cooperation between Kawasaki City and Thailand's Ministry of Industry
  - Kawasaki City signed a memorandum with Laos' MPI to support business development in Laos

- **Penang, Malaysia**
  - Carbon footprint reduction project using waste-to-energy technologies
  - Kawasaki City Environment Bureau, et al.

- **Queensland, Australia**
  - Water-saving and wastewater recycling project
  - JFE Engineering Corporation, Kawasaki Waterworks Bureau, et al.
The fruits of implementing and promoting energy-saving

The Kawasaki Eco Show Window Model Project is an initiative that implements and promotes energy-saving and energy creating technologies, and involves soliciting from business operators in the city ideas themed on "making environment-related technologies visible" in a way that everyone can understand and that actually saves and creates energy. Here we introduce three model projects from among eight solicited during FY 2014.

Interview with 2014 certified model businesses

Nikken Ishibashi Co., Ltd.

Bringing energy-saving, efficient lighting into wider use
Hiro Ishibashi, President

A desire to convey the appeal of electrodeless lamps
Electrodeless lamps are extremely eco-friendly products that provide a soft light capable of illuminating an entire space. They consume 75% less power and last for a long 34 years if kept on every day for eight hours. Yet electrodeless lamps are little-known in Japan, and neither written nor spoken explanations convey the product's merits. So in order to give people a direct sense of what makes electrodeless lamps great, we made a call out for model projects.

Mu-fit Japan Corporation

Aiming to share information in a safe and eco-friendly way
Takayoshi Shimizu, President

Developing ecological materials
Adhesive sheets are used for indoor and outdoor advertising display sheets. As the adhesive ages, it can affect the surface it is attached to, becoming unable to be pulled off and leaving adhesive behind. As Mu-fit micro suction cups do not use glue, they can be easily pulled off and do not affect the surface they attach to. They also insulate against heat, block light, and prevent fogging, and consist of a micro suction cup filled with an acrylic emulsion agent that is good for both people and the environment. With conventional film marking, affixing and peeling off were complicated processes. With Mu-fit micro suction cup film, "difficult" becomes "easy".

Asurabbit Co., Ltd.

The keyword is intellectual property
Kimio Osanai, President

An idea born from dissatisfaction
The new type of disposable shopping bag proposed by this project uses a material that cuts down on CO₂ emissions when incinerated. The idea for this bag was something that came out of my dissatisfaction, and is the result of repeated trial and error. My problem with traditional bags is that they can get dirty inside when they tip over. This lowers the rate of reuse, and is just an unpleasant experience. When I had a chance to meet with Mayor Fukuda the other day, it made me happy when he said he "had been waiting for a product like this".

The keyword for business in the future is intellectual property. It seems to me that we are in an age where products born from individuals' flexible thinking can satisfy consumers' needs, regardless of the size of the company making the product.

Working to brighten up the entire region
Receiving model project certification increased the profile of electrodeless products, increased the number of inquiries made by companies and other local governments, and otherwise made big waves for the product. This model project involves installing electrodeless lamps in a shopping district, which will work to not only brighten up the city, but also prevent crime and stimulate the economy. They are also used in medical equipment, which indicates that they have almost no impact on precision machinery, a fact that has been scientifically proven.

I hope they will see broader adoption, just like LED lighting, as lighting that is good for both people and the environment.

A micro suction cup film with grand potential
Being certified as a model product improved people's awareness of and trust in our company and product, and orders from Japan as well as the USA and Europe increased. Overseas, the suction cup sheet is most often used for wallpaper/interior design and applications related to advertising display sheets, but it also has potential for use in reducing environmental impact and in disaster prevention. Using micro suction cups to replace the glue surface of wallpaper, for example, allows it to be more easily affixed and peeled off. They can also be attached to LED panels and easily peeled off and affixed elsewhere to display advertisements, or used as a special sign-two-way display that can be switched out as a sign directing people to an evacuation area during a disaster. In the future, through developing new functionality (micro suction cupping) by combining it with other products, I hope the product will take on new value not just as something used with printable media.

Model project as an opportunity to share many ideas
Although our product has taken shape, a lack of opportunities to advertise our product due to a small marketing team has made things a real struggle. Becoming certified as a model project has increased people's trust in and awareness of our product and granted more opportunities to advertise, and we are enjoying a good response.

Using things like 3D printers that can create prototypes of 3D models at low cost will hopefully allow us to develop products with added value in terms of eco-friendliness, even in niche areas.

In the City of Kawasaki, there are no doubt many small and medium-sized enterprises that start a business utilizing technological and developmental expertise but have a hard time finding success. I hope to see a continuation in Kawasaki of projects like these that shine a light on such companies.
saving and energy creation technologies

Kawasaki Eco Show Window Model Project 2014

Soft light from electrodeless lamps make for a safer, more secure city while lifting spirits.
Nikken Ishibashi Co., Ltd.

[Proposal points]
- Gentle light from electrodeless lamps makes for a safer, more secure city while lifting spirits.

Easily affixable and removable two-way graphic sheet made with a new light blocking, heat insulating material.
Mu-fit Japan Corporation

[Proposal points]
- Sheet can be affixed and peeled off on any number of times.
- Blocks light, provides heat insulation, and controls glass fogging.
- Can be printed on both sides, allowing window glass to become advertising space.

Lightweight disposable shopping bag that reduces CO2 emissions and does not tip over.
Asurahit Co., Ltd.

[Proposal points]
- Disposable shopping bag for ready-made meals, with dramatic improvements in ability to stay upright. No more首先 Nationwide tipping over, no more bags getting dirty on the inside.
- Uses less polyethylene (about 35%) and cuts CO2 emissions when incinerated (about 66%).

Kawasaki Eco Show Window Model Project 2013

A step towards a zero energy lighting system
Tokyo Rectifier Co., Ltd.

[Deployment location]
- Tsukishima, Tachikawa, Bus, Ltd.
- 1574 Chiba-ku, Tsurumi-ku

Demonstration test for 3-wheel electric vehicle and Kawasaki Smart City PR
EcoTrike Japan Co., Ltd.

[Deployment location]
- Kanazawa Co., Ltd.
- 3-26-1 Fushimi, Kawasaki-ku and 4 other locations

Bicycle sharing with self-operated rental cycle system
Pedal, Ltd.

[Deployment location]
- Tachibana Innovation, Kawasaki
- Kinosaki Building, 1-1 Minamikanazawa, Kawasaki-ku

Kawasaki Eco Show Window Model Project 2012

Generating electricity with the pool: a double eco-strategy
Steel Co., Ltd.

[Deployment location]
- Saitama Shimbashi Sports Club

Development of solid, lightweight solar power generation module
Tama Sashikyo Co., Ltd.

[Deployment location]
- Kashiwa City, Chiba Prefecture

Feed-type LED lighting system with direct current power and dimming function
Tokyo Rectifier Co., Ltd.

[Deployment location]
- Fujisawa, Kanagawa Prefecture

We brighten the futures of children with light gentle on the eyes and body.
Mitsubishi Electric Co., Ltd.

[Deployment location]
- Kawasaki City, Chiba Prefecture

Hybrid agricultural system based on clean energy
Kondo Kogyo Co., Ltd.

[Deployment location]
- Kanazawa Co., Ltd.

Shading and heat insulation panels for windows
Mu-hit Japan Corporation

[Deployment location]
- Kawasaki City, Chiba Prefecture

Kawasaki Eco Show Window Model Project 2011

Saving energy with bus stop signs that use solar panel and LED technologies
Alpha Co., Ltd.

[Deployment location]
- Kawasaki city, Kanagawa Prefecture

Creating, storing, and using energy at various location
Kondo Kogyo Co., Ltd.

[Deployment location]
- Saitama Shimbashi Sports Club

Natural energy generation from wind and solar — Providing safety and security through manual power generation
Tama Dencon Corporation

[Deployment location]
- Tama Dencon Corporation

Suspended lighting device using energy-saving LED balloon projector
Light Box Co., Ltd.

[Deployment location]
- Kawasaki City, Kanagawa Prefecture

Strategy for halving electric power consumption
Dayfield Co., Ltd.

[Deployment location]
- Kawasaki City, Kanagawa Prefecture

Deploying a solar power system to improve awareness of new energy sources
Città’ Entertainment

[Deployment location]
- Kawasaki City, Kanagawa Prefecture

More information available on the following website: http://www.kawasaki-showwindow.jp/
A range of Public-Private Collaborative Efforts

With the end goal of creating world-renowned brands originating in Kawasaki, the City of Kawasaki provides support for reducing the carbon footprint, manufacturing, and business matching for environment-related technologies, something it achieves through a variety of public-private initiatives. Examples of this are the Low-Carbon Kawasaki Brand, the Kawasaki Monodukuri Brand, and the Kawasaki International Eco-Tech Fair.

Low-Carbon Kawasaki Brand

Support for manufacturing and services leading the way in reducing the carbon footprint
A certification system that seeks to cut greenhouse gas emissions on a global scale, the Low-Carbon Kawasaki Brand Project began in FY 2009 and went through a three-year trial run before becoming a full-scale project in FY 2012. This project involves not only ascertaining and managing the amounts of CO₂ emitted directly from factories and business sites but also conducting comprehensive assessments of business activities through the entire lifecycle of a product, etc. and then carrying out suitable initiatives.

This program targets a product's, technology's, or service's contribution to curbing global warming throughout its entire lifecycle, and certifies a wide range of products, etc. without restrictions based on company size or business category. It also evaluates products, technologies, and services developed in Kawasaki, works to prevent global warming through broad-based information dissemination, and promotes the concept of evaluating CO₂ reduction throughout an entire lifecycle. Through these efforts, the program improves city residents' and companies' related skills and regard for the environment.

Kawasaki Monodukuri Brand

Certification of first-rate industrial products and technologies developed by small and medium-sized enterprises in the city
This program certifies first-rate industrial products and technologies developed by small and medium-sized enterprises in the City of Kawasaki and disseminates information about them in Japan and overseas in order to stimulate the local economy. It involves the Kawasaki Monodukuri Brand Promotion Council, which is comprised of organizations that include the Kawasaki City government and Kawasaki City Chamber of Commerce and Industry, conducting “Kawasaki Monodukuri Brand” projects.

The certification of products and technologies came about as a result of the progression of Japan's aging society and increased awareness concerning the environment and disaster prevention. As such, the program seeks to accurately identify a variety of latent needs and problems in society, apply dynamic solutions, and allow small and medium-sized businesses to demonstrate their manufacturing expertise in a variety of scenarios. The program also recognizes that there are many who contribute to the safety and security of residents' quality of life. With the expectation of helping more "only one, number one" companies set out into the world with expertise and skills developed in Kawasaki, the program continues to benefit from collaboration with related organizations as it works to stimulate regional industry and build a strong industrial city.

Kawasaki International Eco-Tech Fair

Contributing to the international community and conducting industrial exchange with eco-technologies
Kawasaki conducts the Kawasaki International Eco-Tech Fair with the goal of conducting industrial exchange in the environment field and contributing to the international community through the transfer of technologies. To accomplish this, it disseminates information about initiatives taken towards the environment, about first-rate environmental technologies that belong to companies in Japan and overseas, and about environmental technologies, etc. that are part of production processes. It also provides opportunities for companies with world-class environmental technologies, products, or services to link up with other companies and organizations in Japan and overseas.

Every year, some 150 companies and organizations—most of them based in the City of Kawasaki—set up 200 or more booths that are visited by more than 10,000 people during the fair's run. The fair assembled a wide range of environmentally-conscious technologies and expertise, brings first-class environmental technologies to Asia and other regions, and seeks to contribute to the international community. At the same time, it serves as an opportunity to show people the projects the city is conducting that involve environmental technologies and products.
Aimed at Enhancing Kawasaki's Value

Low-Carbon Kawasaki Brand Certified Businesses
Exa Corporation

Using IT to assist energy-saving efforts around the world
Enterprise Development Division
Maritime Environment & Engineering Solutions Department
Yukihiro Yamashita, Solutions Development Group

Working as an IT solutions professional
Exa is an IT engineering company that provides solutions for problems encountered by companies in various industries.
Ship operating control systems are something that has been around for a while, but they have all been either extremely expensive, or inexpensive but ineffective. Leveraging Exa's unique expertise, we developed the FCR Navi Eco+ ship energy-saving control support system, which allows operators to check operation status with a standard PC. It is an affordable system that provides necessary information in real time, and can be installed quickly. We have already received many inquiries from interested overseas parties. Through efforts such as developing systems for ocean-going vessel operation, we hope to continue taking advantage of our high level of technological expertise to support energy-saving initiatives around the world using IT solutions.

Brand awareness as a driving force behind future business
Perhaps because we have our own name despite our parent companies being IBM Japan and JFE Steel, people have said they do not know what kind of company we are. However, since being certified as a Low-Carbon Kawasaki Brand, awareness of and trust in our company has improved. This not only helped us talk business with our first customer, it has also led to an increase in inquiries from parties in both Japan and overseas. Another fortunate outcome has been an improved eco-consciousness among our employees. The Low-Carbon Kawasaki Brand, a status for which we applied due to the importance and sense of responsibility we feel towards eco-initiatives as an IT manufacturer, has been a driving force behind increased business opportunities for us.

Low-Carbon Kawasaki Brand 2013 Grand Prize
This system helps achieve optimal ship operation by incorporating ship operation information in real time, then analyzing data and making suggestions such as the recommended rotational frequency for the main engine. In addition to a low cost of deployment and quick installation, the system can cut fuel costs by an estimated ¥700 million or more over five years per ship (equivalent to coastal vessels with a weight class of several thousand tons). The system allows for considerable cost reduction by saving energy while at the same time mitigating global warming on a global scale.

Kawasaki Monodukuri Brand /
Low-Carbon Kawasaki Brand Certified Business
Nihon Genryo Co., Ltd.

Aiming for the world market with high-level technological expertise unique to specialized manufacturers
Yasuhiro Saito, President

Monozukuri DNA passed down through the generations
Our effort at Nihon Genryo Co., Ltd. is to provide people with delicious water that is safe for the world's people to drink. We are a specialized manufacturer with an over 80% share in the market for water treatment filters at water purification plants in Japan. Our Siphon Tank product, selected as a Kawasaki Monodukuri Brand, is a compact filtration system that does not require filter replacement. Remaining continually focused on our strengths as a manufacturer, we have been active as a pioneer in filter recycling. This has allowed us to develop the proprietary "siphon cleaning technique", which allows for the production of safe water. Since our founding, manufacturing DNA has been passed down through the generations. We develop products usable in times of emergency and in countries and regions without electricity, and our business extends overseas. By deploying water purification systems in places around the world, we hope to continue using water to contribute to society.

New technological development in collaboration with local governments
Becoming certified as a Kawasaki Monodukuri Brand has made it easier to work with local governments and has laid the groundwork for developing new technologies. For our company, which just celebrated its 75th year, this is an irrefutable testament to our technological expertise. Through continued refinement of our visionary nature and distinguished technologies, and through bold innovation, I hope we continue to remain a one-of-a-kind company.

FY 2004 (Year 1)
2010 Kawasaki Monodukuri Brand / Low-Carbon Kawasaki Brand Certified Business

Using primarily sand as a raw material, the "naphon cleaning technique" we developed allows for filters to be cleaned and repeatedly reused. Our Siphon Tanks are filtration systems that use this technique. These tanks reduce environmental impact and costs by keeping filters continually clean and thus eliminating the need to dispose of used filters as industrial waste. They are used in a range of applications from wastewater to sewage to wastewater treatment.
Kawasaki Coastal Area

A showcase of Kawasaki’s energy innovation, this area is home to many mega solar facilities, wind power generation plants, and other types of next-generation eco-power generation facilities and facilities with cutting-edge environmental energy technologies.

Pick Up A Kawasaki Eco Gurashi Mirai-kan

Learn about cutting-edge technologies of tomorrow through game-like activities

About the facility
The Kawasaki Eco Gurashi Mirai-kan focuses on three themes: global warming, which causes unusual weather and other phenomena, renewable energy such as solar power, and resource recycling, including the recycling of trash. As an environmental education facility, it provides visitors fun ways to learn as they experience specific ways to protect the environment. The facility provides regular tours that let visitors gaze at the spectacular mega solar plants as they watch planes taking off and landing from Haneda Airport.

Tour information
This is an interactive environmental education facility established with the concept of “learning by seeing, hearing, and touching”. In addition to showing videos that tell the environmental history of Kawasaki and its triumph over pollution, the facility teaches visitors about trash sorting through game-based activities. The power output of the mega solar facility can be viewed in real-time.

Tour time: 90 - 120 mins

http://eco-mirailkan.jp/

509-1 Ukishima-cho, Kawasaki-ku, Inside the Ukishima Treatment Center

044-329-8869 (Kawasaki Eco Gurashi Mirai-kan)

Free, open tours. Closed on Mondays.

Take the Kawa 03 bus bound for “Ukishima Bus Terminal” from the East Exit of JR Kawasaki Station. The Mirai-kan is a 10-minute walk from the “Ukishima Bus Terminal” (the last stop).
Kawasaki Mega Solar Power Generation Plant

This solar power plant is one of the largest in Japan, with a capacity of 100,000 solar panels, generating 29 MW. It can produce 3 million kWh annually.

Kawasaki City Ukishima Processing Center

Located in the center of Kawasaki, this facility processes waste into valuable resources. It is open to visitors by reservation.

Kawasaki Life Science & Environment Research Center (LISE)

This research center focuses on creating sustainable solutions for environmental challenges.

Kawasaki Natural Gas Power Plant

This plant has one of the world's highest levels of uptime and utilizes efficient eco-friendly methods to provide a stable supply of electricity.

Kawasaki Steam Net

This steam supply system provides steam to 10 companies in the surrounding area, contributing to energy-saving and CO₂ reductions.

Iriezaki Wastewater Treatment Center

This center incorporates eco-friendly wastewater treatment technologies to promote environmental sustainability.
Kawasaki City Southern Area — Kawasaki, Saiwai, and Nakahara (one section) Wards

This is a cutting-edge area where leading industries and companies have established bases. The entire region engages in eco-friendly activities that include working to establish shopping districts, places for people to relax, and a smart community that uses state-of-the-art technologies.

Pick Up

B Toshiba Science Museum

Come, look, touch, and experience science!!

About the facility

With a theme of “Interaction between people and science”, the Toshiba Science Museum helps educate the children who will be our future to kindle in them an interest in science. The facility is at once a place to preserve and display industrial heritage as well as a center for information about the Toshiba brand and a place for cultural exchange in collaboration with the community. In an intuitive way, the facility presents the past, present, and future sciences and technologies that have and will be at work around us.

Tour Information

From static electricity generators to the Smart Building Experience to the Nanorider exhibit, visitors will enjoy many interactive exhibits that let you use your own body to experience the latest technologies. Also not to be missed are the superconducting demonstrations and the science shows performed three times a day. There are also a number of science experiment classes and events available free of charge on the weekends.

Tour time: 60 - 90 mins

http://toshiba-mirai-kagakukan.jp/

Smart Community Center 2nd Floor (LAZONA Kawasaki TOSHIBA building),
72-34 Honkawacho, Saiwai-ku Kawasaki

544-543-2200

Tuesday – Friday 10:00 - 18:00 Saturday, Sunday & Holidays 10:00 - 19:00

Closed: Mondays and days designated by the museum (please see the museum’s website)

For free visits are generally self-guided. Reservations are required for the following:

- To visit in a group of 20 or more
- Guidance in a foreign language (English or Chinese)
- If an attendant is required for corporate visitors

A 1-minute walk from the West Exit of JR Kawasaki Station, or a 7-minute walk from Keikyu Kawasaki Station.
1. Kawasaki Station East Exit Station Square
A people- and eco-friendly station plaza
The East Exit Station Square was revamped based on the two design themes, being eco-friendly and barrier-free, while being conscious of giving the space an appearance suited to becoming the "Face of Kawasaki."
- 044-220-2303
- Bilingual leaflets are available.
- Adjacent to the East Exit of JR Kawasaki Station

2. Kawasaki Underground City Azalea
The third biggest underground city in Japan, at Kawasaki Station Square
Through means such as reducing CO2 by ray of its high-efficiency air conditioning system, this underground city actively contributes to improving the environment.
- http://www.azalea.jp
- 044-211-3871 (main line)
- Not available
- A 1-minute walk from JR Kawasaki Station, or a 1-minute walk from Keikyū Kawasaki Station

3. Kawasaki Chamber of Commerce and Industry
A cutting-edge office building friendly for both workers and the environment
Airflow windows that circulate air inside the building and special heat-insulating glass led to this building achieving CASBEE Kawasaki’s S rank, the highest rank.
- http://www.kawasaki-koki.or.jp
- Kawasaki Frontier Building 3F, 1-2 Ekimae kenn’on, Kawasaki-ku
- 044-211-4111
- Not available
- Adjacent to Keikyū Kawasaki Station, a 2-minute walk from JR Kawasaki Station

4. Egasaki Power Station
Micro hydroelectric power generation using natural energy
This station is the first in Japan to be jointly run by a local government and a private-sector company. It helps prevent global warming by using energy from the natural flow of water.
- 044-386-1333
- Available: reservation required.

5. Toshiba Smart Community Center
Cutting-edge environmentally-friendly office building
This center utilizes the cutting-edge technologies of Toshiba and balances comfort with high-level energy-saving performance. During disasters, it uses limited energy supplies effectively.
- http://www.toshiba.co.jp
- 044-320-4400
- Available
- 5-minute walk from JR Kawasaki Station

6. Yumemigasaki Zoo
Recreation area for citizens that utilizes natural energy
This zoo is home to some 400 animals representing 60 species. It utilizes automatic solar-tracking solar power equipment for the air-conditioning facilities inside its veterinary hospital and elsewhere.
- 044-584-4238
- Available
- A 15-minute walk from Shin-Kawasaki Station on the JR Rambu Line, or a 15-minute walk from Shin-Kawasaki Station on the JR Yokosuka Line

7. Shin-Kawasaki Forest of Creation NABOBIC
Global Nano/Micro Technology Business Incubation Center
This nanotechnology research facility contributes to technological innovations in the environment field, including solar power generation efficiency.
- http://www.kawasaki-nabobic.jp
- 044-547-1138
- Available: spaces occupied by enterprises, etc. are not for visiting; those may be possible upon consultation.
- A 10-minute walk from Shin-Kawasaki Station on the JR Yokosuka Line, or a 15-minute walk from Hashimoto Station on the JR Rambu Line

8. Shoei Co., Ltd.
Saving and creating energy with a building certified as an S-rank by CASBEE Kawasaki
This manufacturer of environment-related devices seeks to save energy as it creates it, giving back to society as a leading company in the area of environmental preservation.
- http://www.shoei-kogyo.co.jp
- 044-589-1991
- Available
- A 5-minute walk from Keikyū Kawasaki Station on the JR Yokosuka Line

9. Mitsubishi Fuso Truck and Bus Corporation
A plant that uses bio-kinds of natural energy
This environmentally-conscious plant saves energy by using geothermal heat pumps to cool the building, and creates energy with solar panels installed on the roof.
- http://www.mftbc.com
- 011-110-1111
- Available
- A 10-minute walk from Hashimoto Station on the JR Yokosuka Line
Kawasaki City Central Area — Nakahara and Takatsu Wards

An area where energy saving and creation has taken strong root in citizens' lives, evident in everything from solar cell-equipped hospitals and schools to facilities that use ICT to save energy.

Kawasaki Center for Climate Change Actions — CC Kawasaki Exchange Corner

Global warming prevention promotion sites in the city

About the facility
This facility has an information counter where visitors can ask questions and consult about everyday issues concerning things like energy saving in the home. The Information Corner provides information about initiatives being conducted by citizens and businesses. Visitors can also check out books about global warming. The facility also hosts exhibits on different themes each month related to global warming measures, in addition to conducting seminars and classes on different themes. These efforts help the facility promote awareness of global warming measures and build networks between city residents, business operators, and the government.

Tour information
The theme exhibits, which use the CC Kawasaki Exchange Corner, change every month. This gives something new to enjoy 12 times a year. Seminars and classes are also held once a month alongside the themed exhibits, providing visitors with information on a wide range of topics.

Tour time: Visits are self-guided
1 http://www.city.kawasaki.jp/kwcco/
2 1-4-1 Mizonokuchi, Takatsu-ku, inside Takatsu Civic Hall (Noozi Plaza 2, 11F)
3 044-813-1313
4 Available, Closed Mondays and days Civic Hall is closed. Application is required for participation in classes, etc. Visit website for more information about classes, etc.
5 A 5-minute walk from Musashi-Mizonokuchi Station on the JR Nambu Line, or a 5-minute walk from Mizonokuchi Station on the Tokyo Den-en-toshi or Oimachi Line
Tokyo Gas Nakahara Building
High-efficiency air conditioning system that utilizes solar heat for heating and cooling
The building has a vacuum tube type solar heat collector on its roof. It makes effective use of collected heat for heating as well as gas absorption water cooler and heater.
http://www.tokyo-gas.co.jp/industry/industry/ architecture/buildings/zenji02.html
021-259-7222
Available: reservation required
A 3-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line and Tokyo Toyojuku Line, or a 15-minute walk from Shin-Marunouchi Station on the Toei Toyojuku Line.

Kawasaki International Association (Kian) Center
An international exchange facility equipped with a solar power system
Kawasaki's first climate-initiated "Cleano" (Mister Sun) Solar Power Station was installed in August 2005 thanks to, donations from citizens and the Green Power Fund. This facility features space for events and accommodation.
http://www.kian.or.jp/
092-392-7900
Available: reservation is advised
A 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line and Tokyo Toyojuku Line.

NEC Tamagawa Solutions Center
An eco-office that has adopted advanced energy-saving measures
This office has reduced CO2 emissions by about 50% relative to conventional offices through cutting edge energy-saving equipment and ICT use. It is a true example of a "total eco-solution for the office."
http://www.nec.com/
173-3 Sibunomurabe, Nakahara-ku
044-435-1040
Available: reservation required
A 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line, a 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line, or a 15-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line.

Teketsu Ward Office
An eco-friendly and environmental showcase, through and through
This facility has introduced initiatives such as a solar power generation system and green roof, and provides Ecology City Hall Tours.
044-810-3927
Available: Please inquire in advance to receive information from facility staff.
A 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line, or a 5-minute walk from Mishima-Minamikowada Station on the Tokyo Toyojuku Line.

Nishimaruco Elementary School in Kawasaki City
Eco-conscious school facility
This school has a solar power system with a peak output of 100kW. The school’s indoor heating and lighting solutions are also environmentally friendly.
3-11-35 Higashinakatsuna, Nakahara-ku
044-739-4131
Available: upon consultation.
A 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line.

Kawasaki Municipal Ida Hospital
A green hospital living in harmony with the sun
This facility has solar panels on its roof and works to preserve the environment surrounding Mt. Ida.
http://www.city.kawasaki.jp/idahosyou/contents/0000007/ 3785456/1
044-277-1111, Nakahara-ku
044-760-2180
Available: reservation required
Take the bus from Hiyoshi Station on the Tokyo Toyojuku Line or Yodohama City Subway Line, and get off at "Ida Kashimaya-Sakurazaka." Free shuttle bus for Ida Hospital runs from the North Exit of Mutsuji-Kosugi Station.

Fujitsu Kawasaki Factory
Fujitsu Technology Hall — Touching Fujitsu’s technology and environment
At the Fujitsu Technology Hall, visitors can see everything from products of the latest ICT used around the world. The facility uses state-of-the-art ICT to save energy and reduce CO2 emissions.
http://www.fujitsu.com/hall/kawasakiexhibition/
4-1-1 Komikondai, Naka-ku
044-777-1111 (Fujitsu Technology Hall)
Available: reservation required. Tours are provided only to groups and organizations such as middle schools and high schools (requires a charter), as well as intermediate organizations for city halls, chambers of commerce and industry, and city halls, chambers of commerce and industry, and tourism bureaus. Please send requests to the following email address:
https://www.fujitsu.co.jp/foreign/kawasaki/futbiken.html
A 5-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line.

Tokyo Toyojuco Motosumiyoshi Station
Environmental-friendly station utilizing natural energy
This is an environmental model station engaging in solar power generation, rainwater reuse, and the greening of its premises. The station is equipped with a 140 kW solar energy system.
http://www.toury.co.jp/tokyo/tokyo/kenoutou/kangashutoku.html
3-1-1-10 Hidaka, Nakahara-ku
044-538-3062
Available: Tours are not provided on an individual basis.
Motosumiyoshi Station on the Toei Toyojuku Line and Meguro Line

Kawasaki Peace Museum
A municipal peace and exchange facility equipped with a solar power system
A project funded through the Green New Deal, this facility has been outfitted with equipment to make it eco-friendly, improving energy-saving effectiveness and cutting CO2.
http://www.city.kawasaki.jp/ichiba/category/31-21-0-0-0-0-0- 0-0-0-0.html
3-1-1, Kurekame, Shinshi, Nakahara-ku
044-435-8171
Available: Exhibits in the facility are available for viewing, but NO FOOD OR DRINKS ALLOWED.
Free admission: Closure: Mondays and every third Tuesday (the week day immediately following the event of a holiday), New Year’s Holiday (December 29-January 3)
A 10-minute walk from Mutsuji-Kosugi Station on the JR Nambu Line, Yodohama Line, or Meguro Line, or a 30-minute walk from Motosumiyoshi Station on the Toei Toyojuku Line.
Kawasaki City Northern Area — Miyamae, Tama, and Asao Wards

In addition to unique environmental facilities that make effective use of local natural resources, this area achieves harmony between urban development and environmental protection through research centers for plant factories, facilities for promoting culture, and initiatives to preserve the area's rich natural environment.

Pick Up

Recycle Park Asao Environment Education Promotion Facility (name tentative) (to open in April 2016)

A fun approach to studying environmental problems at a hands-on learning facility

About the facility

This facility aims to be a place where visitors can have fun learning about things like reducing and recycling trash (resource recycling), global warming and energy saving (reducing CO2 emissions), and preserving biodiversity (natural symbiosis) in game and quiz formats. Taking advantage of its adjacency to a trash incineration facility and recycling facility, the Recycle Park allows visitors to observe actual trash treatment and recycling processes, and uses the its “rooftop greening plaza” and “hearth communion plaza.”

Tour time: 60 - 90 mins (estimated)

http://www.city.kawasaki.jp/shitsutu/category/43-4-5-4-0-0-0-0-0-0-0-0.html (Recycling plant construction work website)

044-296-2591 (Facility Construction Section, Facilities Department, Environment Bureau, Kawasaki City)

More details will be provided when they are decided in time with the opening of the facility in April 2016.

Adjacent to the NagaSawa Iriyuki bus stop on the city bus line, or a 3-minute walk from “Den-en Chofu Gakuen Bai-gakka-mae.”
1. Kawasaki Frontale
   Solar water heater at the Asao Clubhouse
   In conjunction with the Chitose Project, Kawasaki
   Frontale has installed a solar hot water heater at its
   clubhouse as one of the efforts to cut CO2 emissions.
   - http://www.frontale.co.jp/
   - 1311-1 No. Akasaka-bata, Katsushika, Kawasaki
   - 03/79-000-965
   - Available
   - A 20-minute walk from Ichikawa Station on the Gotanda Line

2. Ozanji Municipal Solid Waste
   Disposal Center
   Making every effort possible to achieve harmony with
   and protect the environment.
   This highly-efficient power generation facility uses
   residual heat from waste incineration and conforms to
   strict self-imposed rules for pollution control.
   - 2366 Ozanji, Ozanji
   - 044-966-1428
   - Available for groups of elementary school students (reservation
     required)
   - Adjacent to the Ozanji Hospital bus stop on the Ito bus line, a
     3-minute walk from "Ozanji Chofu/Gakan Chofu Metro" bus stop
     via Ozanji or "Ito" bus.

3. Kawasaki City Tama Sports Center
   Using solar panels for natural energy
   This center supplies electricity to the buildings via a solar
   power system in its small greenhouses. The system is
   used to continuously light 500 communal areas.
   - http://kawasaki-tama.sports.com/
   - 4-10-5 Koshino, Tama, Kawasaki
   - 044-946-9300
   - Tours of the solar power equipment are available; reservation
     required. (Tours are not available for individuals) Days open are
     December 24 through January 3 (New Year’s holiday)
   - Take bus from Tama Sports Center on the JR Tama Line or Kan
     Line, or from the Yamanote Line on the Tama Line. The center
     is 1 minute walk from the "Tamanoyu" Sh自如 Shaipu" metro bus stop.

4. Kawasaki Municipal Tama Hospital
   A hospital equipped with a multi-panel solar power system
   installed at the southwest side of the premises, a
   multi-panel solar power system produces eco-friendly
   clean energy.
   - http://www.matsuzawa-koukai.com
   - 1-100-87 Shunbunen, Tama, Kawasaki
   - 044-950-3581 (Operational Planning Office, Kawasaki Municipal
     Hospital Management Office)
   - Not available
   - A 3-minute walk from the Tama Hospital Station on the JR Tama
     Line and Odakyu Line

5. Saginuma Power Plant
   Micro hydroelectric power generation using natural energy
   This station is the first in Japan to be jointly run by a
   local government and private-sector company. It helps
   prevent global warming by using energy from the
   natural flowing water.
   - 30189/business/micro.html
   - 3-11 Tashirokicho, Tama, Kawasaki
   - 044-950-0335
   - Available
   - Reservation required
   - A 4-minute walk from Saginuma Station on the Tokyo
     Den-encho Line

6. Advance Plant Factory Research
   Center of Meiji University
   Researching a new model for agriculture
   This facility conducts research into fully artificial
   light-type plant factories that grow vegetables not with
   sunlight but with artificial lighting. The facility is partially
   powered by natural energy.
   - http://www.meij.ac.jp/center/
   - 1-1-1 Hyogocho, Tama, Kawasaki
     (Meiji University’s Kyoji Campus
   - 044-954-1766 (E-mail: yukinori.mori@meij.ac.jp)
   - Available
   - Reservation required (please inquire by e-mail)
   - A 10-minute walk from the Exit of Sh自如 Shaipu Station on the Odakyu Line
   - A 15-minute walk from the Exit of Gotobashi Station on the Odakyu Line

7. Kawasaki City Fujioka F Fuji Museum
   Uses LED lighting special to exhibit to show works as
   their artists intended
   This art museum makes the most of its abundant natural
   surroundings and uses LED lighting, cool tubes, and
   natural ventilation to reduce its environmental load.
   - http://fujikomuseum.com
   - 2-1-1 Yagou, Tama, Kawasaki
   - 03/80-6368-245 (9:30-18:00)
   - Reservation required; must specify date and time. Tickets must
     be purchased in advance from the Lawson throughout Japan.
   - Separate purchasing options available to residents of Kawasaki
     City. Generally closed on Tuesdays and the New Year's holiday
   - Take the city bus from Ichikawa Station on the JR Tama Line
     and Odakyu Line. The museum is a 15-minute walk from
     sh自如 Shaipu Station on the Odakyu Line. Or a 15-minute
     walk from Sh自如 Shaipu Station on the JR Tama Line

8. Saint Marianna University School of
   Medicine
   Promoting energy-saving efforts at the Saint Marianna
   University School of Medicine
   Along with generating power using a large gas
   cogeneration system, this school achieves considerable
   energy savings by making effective use of exhaust gas.
   - http://www.marianne.uoo.go.jp/
   - 2-1-1 Sugita, Miyake, Kawasaki
   - 044-977-4111
   - Available
   - Reservation required. Courses on Saturdays, terms are
     available to both individually and corporations.
   - Take a bus bound for "Sa Motojuku Odaiba" from
     sh自如 Shaipu Station, Gotobashi Station, or Gotobashi
     Station on the Odakyu Line, or from the Gotobashi Station on the Tokyo
     Den-encho Line or Gotobashi Municipal Subway. The school is
     15 km away. Drive to the east from the Yamanoteshirakashi Interchange.

9. Asao Ward Office
   A solar power system on the roof of the Asao Ward
   Office
   The Asao Ward Board of Education Promotion Board conducts
   tours of this rooftop solar power system.
   - http://www.city.kawasaki.jp/ward/
   - 8-1-1 Maruyama, Asao, Kawasaki
   - 044-946-8119
   - Available; reservation required. Weekends only, except for events.
   - A 2-minute walk from the North Exit of Shin-Ikigaya Station on the
     Odakyu Line

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Being next door to Japan's main entrance, Tokyo International Airport (Haneda Airport), allows for easy access from anywhere overseas or in Japan.

KAWASAKI CITY
川崎市
Kawasaki City Economic and Labor Affairs Bureau,
International Economic Affairs Office
11-2 Ekimaehoncho, Kawasaki-ku, Kawasaki-shi 210-0007
Kawasaki Frontier Building 10th floor
Tel:044-200-2313  Fax:044-200-3920
28keiss@city.kawasaki.jp

Published January 2015
Appendix : Discussion materials with YCDC
Large Scale JCM Feasibility Study
Title: JCM Project Formulation Study through City-to-City Collaboration in Yangon

[Objectives]
To contribute to sustainable development and realize low carbon society in Yangon, the study aims to formulate prospective JCM projects collaborate with Kawasaki city and Japanese private entities, which have high-efficiency and low carbon technologies.

Current situation of potential sectors
[Power]
Unstable power supply, stand-by(back-up) power system in industrial park/commercial facilities etc.

[Transportation]
Heavy traffic jam, demand of mass rapid transit (MRT) system, insufficient parking lots, lack of consolidated logistics system etc.

[Water supply & sewerage]
Decrepit water supply/sewerage facilities, expansion of the facilities in the suburb etc.

Target sector
1) Low carbon industrial park
2) Low carbon building management system
3) Low carbon water supply/sewerage facilities
4) Project identification of Renewable energy/New energy

Technologies to be introduced
a) High efficiency air conditioning facilities, energy saving fluorescent light, etc.

Objectives of JCM Project Formulation Study through City-to-City Collaboration in Yangon

- It aims to support establishment of LOW CARBON SOCIETIES in Yangon in order to reduce GHG emission.
- Also, it aims to scrutinize mid-and long term city-to-city collaboration between Yangon and Kawasaki
- Under the process of JCM project formulation, it aims NOT ONLY diffusion of advanced low carbon technologies BUT ALSO share of knowledge and know-how between Kawasaki city and YCDC in the JCM scheme

Private Company’s Advanced carbon technologies +

Contribution of establishment of Low Carbon Societies in Yangon

Shared Kawasaki City’s Experience, knowledge and know-how
- Overcome of pollution and Establishment of Low carbon society
- Operation Experiences of institutions and infrastructures
Merits of JCM Project Formulation Study through City-to-City Collaboration in Yangon

Yangon city’s Merits

• Establishment of LCS with Lower Administrative Experiences and Cost by JCM model project scheme
• Raising the quality of life by enjoying the co-benefits that the improvement of air and water pollution, waste management, energy supply, not only GHG emission
• Enjoy mid-and-long term support from Kawasaki city
• Enjoy private support from both Myanmar and Kawasaki Chamber of Commerces.

City to city collaboration with Kawasaki city

Local company’s Merits

• Available to install the advanced but expensive low carbon technologies by JCM financial support programme
• Enjoy the lower life cycle cost which include not only CAPEX but also OPEX
• Feel the security for the introduction of new low carbon products/technologies by expectation of assistance and support

Targeted schedule of City to city collaboration in JCM scheme

1st step
- Kick off meeting between YCDC and Kawasaki city
- Discussion of needs and potential for collaboration

2nd step
- Work shop for JCM city to city collaboration in Yangon
- Introducing Kawasaki city’s experience and knowhow on LCS

3rd step
- Discussion of approach for city to city collaboration

Final stage
- Agreement for future collaboration between YCDC and Kawasaki city such as MOU

Oct. 2015

Nov. 2015

Dec. 2015

Feb. 2016
Needs of LCS in Yangon

Image of Achievement of LCS

In which sector does Yangon city need for support of LCS technology?

To develop the LCS in City-wise

How to support YCDC’s LCS development? Policy making, technology transfer, knowledge sharing?

Source: MOEJ JCM presentation material

Establishment of LCS by city-wise with Leapfrog

Source: MOEJ JCM presentation material
◆ Case of Yokohama city

Y-PORT = Yokohama Partnership of Resources and Technologies
An international technical cooperation project through a public-private partnership that harnesses Yokohama’s technology and know-hows to contribute to the emerging countries, since January 2011.

◆ Case of Yokohama city

Activities based on the City to City Cooperative Relationship

Supporting the BMA’s Low Carbon Society Efforts through Public-Private Partnerships
- Beginning dialogs through public-private partnerships in order to resolve urban issues-
### Reference of city to city collaboration in JCM scheme

**Steering Committee**
- To provide overall guidance, and review to the activities of drafting a Master Plan and capacity development in policy aspect, as a mechanism of PDCA (Cycle of the Project)
- To receive report on the progress of project activities periodically by the Working Group

**Working Group**
- To discuss technical matters related to drafting a Master Plan and capacity development activities, based on works by the 5 Task Forces
- To coordinate and ensure consistency and integration of work across the 5 Task Forces

**BMA Secretariat**
- Core of overall coordination. Coordinates inter-departmental work, including reporting process
- Propose activities on knowledge development of climate change
- Focal point for external communication

**Transport Task Force**
- Collect activity data / information related mitigation and adaptation
- Propose mitigation and adaptation actions
- Conduct outreach activities in respective sectors etc

**Energy Task Force**

**Waste & Wastewater Task Force**

**Urban Green Planning Task Force**

**Adaptation Task Force**

**Local consultants**
- Support for data collection and calculation etc

**JICA Expert Team**

**Domestic counterparts**
- Based on discussion by the Steering Committee, domestic counterparts are invited to collaborate with respective BMA department regarding data collection, outreach etc (working level officials are expected)
Kawasaki Eco-Town
~ The cooperative approach with municipal government and local enterprise ~

13th. Nov. 2014
Kawasaki Environment Research Institute
Takahiro Fukahori

Table of Contents

1. General information of Kawasaki-city

2. Kawasaki Eco-town

3. From “Eco-town” to “Eco-city”
1. General information of Kawasaki-city
City profile

- Population: 1,458,542 (2014)
- Area: 144.35 Km²
- Gross Product of the City: APPROX 50.1 billion US$ (2011)
- 7 wards: Kawasaki, Saiwai, Nakahara, Takatsu, Miyamae, Tama, Asao

Highest elevation: 148.0 m (above sea level)
Lowest elevation: -0.365 m (above sea level)
Asao-Ward Kurokawa area
Kawasaki-ward Oshima area

Major corporations in Kawasaki

- Nippon ZEON
- Mitsubishi Fuso
- Kao
- YAKIN Kawasaki Truck & Bus
- Tonen General Sekiyu
- Tokyo Electric Power
- JFE Steel
- Nippon Oil

Number of R & D institutions: 225
(201 privately owned, 22 universities or other research institutes)

※ Kawasaki Innovation status research (FY2007)
## 2. Kawasaki Eco-town

### Background

~ History of industrialization and environmental deterioration ~

Chronological viewpoint about environmental issue change in Kawasaki

<table>
<thead>
<tr>
<th>Period</th>
<th>Environmental Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I 1940-1960</td>
<td>Development as “Industrial-city” Economic development &gt; Environment</td>
</tr>
<tr>
<td>II 1960-1975</td>
<td>Deterioration of environment: mainly caused by industries</td>
</tr>
<tr>
<td>III 1975-1990</td>
<td>Deterioration of environment: mainly caused by household</td>
</tr>
<tr>
<td>IV 1990-</td>
<td>Issue of “Sustainability” (Earth Summit in Rio, Brazil): Search for the way to balance between economic and environment</td>
</tr>
</tbody>
</table>
Formation of Kawasaki waterfront area

Expansion of reclaimed land in Kawasaki waterfront area

- **Kawasaki waterfront area**

  
  
  - **Highest elevation:** 148.0m (above sea level)
  - **Lowest elevation:** -0.365m (above sea level)

- **Asao-Ward Kurokawa area**

- **Kawasaki-ward Oshima area**

**1940s**

- Cement
- Steel
- Fertilizer

**1960s**

- Petrochemical complex

Major industries advanced to the waterfront area
Kawasaki waterfront area (1950s-60s)
Rapid economic growth and environmental deterioration (1960s-70s)
Current environmental situation in Kawasaki (2010)
“How did Kawasaki accomplish an improvement of severe environmental situation?”

“Sharing of roles” and “Cooperative action”

- Regulation, Pollution control agreement
- Introduction of pollution control technologies, Monitoring
- Technology development

Point: *Innovativeness of municipal government in terms of anti-pollution control measures*
Eco-Town Projects in Japan

- **Start**: 1997
- **No. of approved sites**: 26
- **No. of subsidized facilities**: 62

- **Sapporo City**, **Hokkaido**
- **Aomori Pref.**
- **Iida City (Nagano)** *
- **Toyama City**
- **Okaya Pref.**
- **Hirosima Pref.**
- **Ehime Pref.**
- **Kitakyushu City***
- **Ohmura City (Fukuoka)**
- **Minomata City (Kumamoto)**
- **Yamaguchi Pref.**
- **Kochi City** *
- **Suzuka City (Mie)**
- **Yokkaichi City (Mie)**
- **Aichi Pref.**
- **Osaka Pref.**
- **Hyogo Pref.**
- **Kamaiishi City (Iwate)**
- **Kurihara City (Miyagi)**
- **Tokyo**
- **Chiba City & Pref.**

*Approved as Eco-town in the first year

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**Kawasaki Eco-town**

- “Kawasaki Eco-town plan” was approved by MITI (METI) in 1997
- Appointed area: Kawasaki waterfront area
Characteristic of Kawasaki Eco-town

- Leadership of municipal government
  (*Vision & Strategy*)

- Cooperative action with municipal government and local enterprise
  (*Implementation*)

- Self-contained 3R model of waste utilization
  (*Sound business model based on regional characteristics such as accumulation of various manufacturing industries*)

The characteristic has developed through experience of overcoming the severe environmental problems.

*Sharing of roles* and *Cooperative action*

---

Kawasaki Eco-Town Plan

**Step 1**: To promote environmental consciousness and action by company itself

**Step 2**: To promote environmental consciousness and action through collaboration among companies

**Step 3**: Research for sustainable development of Kawasaki waterfront area based on environmental technologies

**Step 4**: Dissemination of information about outcomes that have been achieved by companies or the area, and contribution to developing countries through the outcome
Recycling Facilities in Kawasaki Eco-town

SHOWA DENKO K.K.
Material production for ammonia from waste plastics

JFE group companies
Reusing material for blast furnace from waste plastics/Concrete setting frame production from waste plastics/Used electric appliances recycling

DC CO., LTD.
Recycling cement production

SAN-EI REGULATOR CO., LTD.
Toilet and tissue paper production from mix paper in used papers

PET REFINE TECHNOLOGY CO., LTD.
Material production for new PET bottles (PET to PET)

The main facilities locate limited area (within 1.5km radius)

Resources Recycling Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Capacity (plastics)</th>
<th>Year</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reuse of waste plastics for blast furnace</td>
<td>25,000t/ year</td>
<td>2000</td>
<td>JFE Plastic Resource Corp.</td>
</tr>
<tr>
<td>Recycling of used electric appliances</td>
<td>400,000~500,000 sets/ year</td>
<td>2001</td>
<td>JFE Urban Recycle Corp.</td>
</tr>
<tr>
<td>Concrete setting frame production from waste plastic</td>
<td>20,000t/ year</td>
<td>2002</td>
<td>JFE Plastic Resource Corp.</td>
</tr>
<tr>
<td>Material production for ammonia from waste plastics</td>
<td>65,000t/ year 65,000t/ year</td>
<td>2003</td>
<td>SHOWA DENKO K.K.</td>
</tr>
<tr>
<td>Used paper recycling</td>
<td>81,000t/ year 54,000t/ year</td>
<td>2002</td>
<td>SAN-EI Regulator CO., LTD</td>
</tr>
<tr>
<td>PET bottles material recycling - PET to PET -</td>
<td>27,500t/ year 22,300t/ year</td>
<td>2004</td>
<td>PET REFINE TECHNOLOGY CO., LTD</td>
</tr>
</tbody>
</table>

※ Others DC (Cement products) and YAKIN-Kawasaki (Non-ferrous products) implement recycling
Material flow in Kawasaki Eco-town

Non ferrous scrap
Iron scrap
Used electric Appliances
Used PET bottles
Construction sludge
Sewage sludge
Used paper

Non ferrous metal production furnace
JFE group
Ferrous metal
frame material
Ammonia
PET bottle
Cement
Toilet paper

Material production for blast furnace
Construction board production
Material for ammonia production

SHOWA DENKO K.K.

PET REFINE TECHNOLOGY CO., LTD

DC CO., LTD

SAN-EI REGULATOR CO., LTD

Sewage treatment center
Treated sewage water

From “Eco-town” to “Eco-city”

Other concept seeking for sustainable society
Resilient-city concept
Smart-city concept
Compact-city concept

Eco-town concept

Eco-town concept and other similar concepts
Recycle activities | Energy saving action | Provide Opportunities | Related various measures

Environmental Education | Green Procurement | Eco-friendly Lifestyle

- Industrial system related to 3R
- Main players are “local enterprises”
- “Sustainability” of energy and resource

Conclusion

Role of municipal government for transition to “Eco-city”

- Raising public awareness
- Promoting participation of various players
- Giving motivation
- Evoking action through these practice

Seeking for the “Eco-city” model in Kawasaki which would also contribute to solve global environmental problems.
Appendix : Study tour in Kawasaki city
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>Move from Yangon to BKK</td>
</tr>
<tr>
<td>10:00</td>
<td>9:00-11:40</td>
</tr>
<tr>
<td>11:00</td>
<td>11:00-13:40</td>
</tr>
<tr>
<td>12:00</td>
<td>13:00-15:00</td>
</tr>
<tr>
<td>13:00</td>
<td>Site visit for green park development area and redevelopment area of Kawasaki station</td>
</tr>
<tr>
<td>14:00</td>
<td>14:00-16:40</td>
</tr>
<tr>
<td>15:00</td>
<td>15:00-17:00</td>
</tr>
<tr>
<td>16:00</td>
<td>17:00-19:00</td>
</tr>
</tbody>
</table>

**Members:** Mr. Cho Tun Aung (Pollution Control & Cleansing Dept, YCDC), Mr. Than Lwin Oo (City Planning and Land Administration Dept, YCDC), and Mr. Thike Soe (City Planning and Land Administration Dept, YCDC)
Appendix: JCM model project related materials
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<th>Company</th>
<th>Sector</th>
<th>Technology</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ELIIY Power Co., Ltd.</td>
<td>renewable energy</td>
<td>Lithium-ion batteries, Electricity storage batteries for indoor use,</td>
<td>Awarded for Good Design and Creation of Landscape by Kawasaki City and others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Electricity storage system (2.5 kWh, 6.2kWh, ~270kWh), backup power supply</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>during power cut</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Kureha Ecology Management Co., Ltd. (KEM)</td>
<td>power generation</td>
<td>Waste treatment, Recycling, Exhaust heat use turbine generation (klin-stoker furnace, Fluidized Bed</td>
<td>Installation of WASTECH IWAKI (incineration facility) and WASTECH KANAGAWA (Thermal recycling generation by the waste heat use 4.8MW, crushing136t/day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Furnace)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>JFE Plastic Resource Corporation</td>
<td>recycling</td>
<td>Plastic recycling, Chemical recycling (CO2 emission reduction: 3t/t), Hot</td>
<td>Installation in many parks and factories. Awarded &quot;Environment Communication Award&quot; by</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cut-type pellet, Strand-type</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SOWSHOW CO., LTD.</td>
<td>energy saving</td>
<td>UV and heat cut film for construction and vehicle. 90% of heat is cut</td>
<td>Hundreds of installation records in ministries, municipal offices, banks, factories, convenience</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>while general mirror glass cuts 75%. Heat of sunlight is much reduced</td>
<td>stores, and airports.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>by cutting 87% infrared light. Air conditioner efficiency is increased</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(-6.4℃ compared to other product)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>TOSHIBA CORPORATION (Community Solutions</td>
<td>energy saving</td>
<td>Infrastructure solution (energy, water management) ; Integration BEMS,</td>
<td>Power peak mitigation (10%) in municipal building (2015), demonstration of high-end technology in</td>
</tr>
<tr>
<td></td>
<td>Group)</td>
<td></td>
<td>Energy saving air conditioning and lighting, LED lighting with sensor</td>
<td>sewer treatment center.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>control, BEMS interlocking control elevator, Energy-efficient heat pump</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>systems</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>NANOFUEL CO., LTD.</td>
<td>renewable energy, power</td>
<td>Fuel reuse, Nano-Emulsion fuel (water content 15%, uniformly dispersing</td>
<td>Nano-Emulsion fuel: demonstration of four-stroke engine 2700 kW and other in engine manufacturers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>generation</td>
<td>water particles in nano-level diameter in oil droplets, increases</td>
<td>and factories, Nano-bio fuel is demonstrated in NEDO project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>combustion efficiency) Nano-Emulsion Fuel System (1-3kL/h), Liquid</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>biomass power generation (removal of phosphorus, improved combustion, low</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>cost for biofuel processing (1-3YEN/L, 16-23YEN/kWh)</td>
<td></td>
</tr>
<tr>
<td>S#</td>
<td>Company</td>
<td>Sector</td>
<td>Technology</td>
<td>Achievements</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Nihon Genryo Co., Ltd.</td>
<td>energy saving</td>
<td>SIPHON WASHING (vortex flow produced by a gravity and screw lift force on filtering sand), Mobile Siphon Tank (3m³/h), and Non-Electric Source SIPHON filtering tank. Semi permanent filtering material (filter replacement is not necessary). Reverse washing is not needed. This reduces CO2 emission.</td>
<td>In Japanese grant aid programs, 6 mobile units were installed in Laos, and other units are installed in a university in Vietnam and typhoon affected area in Philippine, etc. Low Carbone brand certified by Kawasaki City. Awarded by MECSST.</td>
</tr>
<tr>
<td>8</td>
<td>JAPAN FUTURE ECO-SYSTEMS CORPORATION</td>
<td>recycling</td>
<td>Recycle (persistent plastic and food, bamboo) air environment improvement (hybrid photocatalyst). Chemical recycle (distillation recovery of hydrocarbon as kerosene or heavy oil, 40% CO2 reduction compared with simple waste plastic incineration), Recycle with biomass oil.</td>
<td>Waste tire, waste plastic, polyethylene for agriculture and fishing. 1.5 - 6 ton/day size installation experience.</td>
</tr>
<tr>
<td>9</td>
<td>Nippon Basic Co., Ltd.</td>
<td>water and sewerage</td>
<td>Five types of water-purifying equipment: Gasoline-type small water purifier (about 1500 ℓ/h), Cycloclean bicycle, a Portable series, Cycloclean RO75G and Desaliclean</td>
<td>Desaliclean 2501 is included in city buildings and Bangladesh water plant. Small scale water treatment plant for 1500 people. JICA Study adopted.</td>
</tr>
<tr>
<td>10</td>
<td>UNION.CO., LTD</td>
<td>-</td>
<td>Flammable plastic/UNI-PELE (compound resin mixed with bamboo powder) No emission of poisonous gas during combustion. CO2-reduction compared with the petroleum resins. Antibacterial. Tableware.</td>
<td>Certified Kawasaki Monodukuri (Craftsmanship) Brand</td>
</tr>
<tr>
<td>11</td>
<td>EBARA REFRIGERATION EQUIPMENT &amp; SYSTEMS CO., LTD</td>
<td>energy saving</td>
<td>High-efficiency energy-saving chiller for air conditioning of large buildings and factories (Centrifugal chiller, Screw chiller, Absorption Chiller/heaters, Cooling tower), district air conditioning system, including design, installation and after service.</td>
<td>from 1930', more than 2000 chillers have been installed. Including world 1st JCM project in Indonesia with 117 ton-CO2/yr reduction by 500 USRt chiller, three JCM projects in Indonesia and one in Bangladesh have been implemented. Tokyo Sky-Tree district-wise air conditioning system, Tokyo metro heat pump system (670 ton-CO2 reduction, -24% CO2 and -40% running cost and many other examples.</td>
</tr>
<tr>
<td>S#</td>
<td>Company</td>
<td>Sector</td>
<td>Technology</td>
<td>Achievements</td>
</tr>
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<td>-----------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Ebara Corporation</td>
<td>energy saving</td>
<td>Pump (standard, large size and high pressure, for municipal water supply and sewage, infrastructure, flood control, industrial water, petrochemical, etc., with custom-made high efficiency system), industrial compressor, hydropower, fan, and gas turbine co-generation.</td>
<td>Plan/Design/Built over 20,000 projects, &gt;90 yrs in Japan and &gt;50 yrs in overseas market. For example in Viet Nam, 0.3 mil m3/d Thu Duc BOO water works implemented and other sewage, drainage, irrigation for &gt;100 projects conducted. JCM F/S in Hanoi high efficiency pump plan estimated 152 ton CO2/yr reduction (saving 30~60 MWh/yr with 26 nos x 75 kW +8 nos x 90 kW units).</td>
</tr>
<tr>
<td>13</td>
<td>Cool Japan</td>
<td>energy saving</td>
<td>&quot;Ecofinee CCFL&quot; (old cathode fluorescent lamp) has aspects of 40~70% energy saving (40W type: 27W consumption, 20W type: 14W consumption), &gt;40,000hrs life (5-10 times longer than general CFL), low heat generation, wide light angle, good color rendering, small blue-light hazard, small Hg, recycle possible.</td>
<td>CCFL is applied in Tokyo metropolitan government building, Miyagi pref. road office, Tokyo metro, Kitakyusyu high speed railway, Matsuyama airport, and many food cort, hospital and elderly facilities, libraries, etc, by JCLA.</td>
</tr>
</tbody>
</table>

MoE: Ministry of Energy, Japan, NEDO: New Energy and Industrial Technology Development Organization, Japan
MECSST: Ministry of Education, Culture, Sports, Science and Technology, Japan
EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD

Summary of Technology

◆ Outlines : from 1930's, more than 2000 chillers have been installed. World 1st JCM project in Indonesia conducted with 117 ton-CO2/yr reduction by 500 USRt chiller. Tokyo Sky-Tree district-wise air conditioning system, Tokyo metro heat pump system (670 ton-CO2 reduction, -24% CO2 and -40% running cost) and many other examples have been implemented.

◆ Characteristics of technology
1) Environmental friendly refrigerant, HFC 245fa
2) COP more than 6.0
3) Low noise, low vibration by using latest technologies such as ball-bearing.
4) Reliable and durable.
5) Enhances operational/observing function by applying new micro-computer control panel.
A yearly overhaul contract is available, covering visiting inspections, as well as servicing and cooling/heating mode changeover before the start of cooling/heating season.

◆ Proposed target area
Air conditioning in factory, office building, commercial facilities such as shopping mall and hotel. High-efficiency energy-saving chiller for air conditioning of large buildings and district air conditioning system, including design, installation and after service.

Company Profile

◆ Company name : EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD
◆ Head office : 3-2-16 Ohmorikita, Ohta-ku, Tokyo, 143-0016 Japan
www.ers.ebara.com
◆ Establishment : September 2, 2002 (company split from Ebara corporation) with 675 employees, capital 450 mil. JPY

JCM City to City Collaboration bet. Kawasaki city & Yangon city

SOWSHOW CO., LTD.

Summary of Technology

◆ Outlines : Sowshow produces UV and heat cut film for buildings and vehicles. It as low heat absorption and possible to install most type of windows. It reflects infrared rays and mitigates temperature increase in summer. It transmits visible wave lights and no impact on lighting. It prevents disperse of broken glass when accidents and natural hazard occurs.

◆ Characteristics of technology
Film for Construction / Car Films / Car Wash operation
ECO X-3 heat and electronic wave cut film
UV and heat cut film for construction and vehicle. UV cut up to 99%. 90% of heat is cut while general mirror glass cuts 75%. Heat of sunlight is much reduced by cutting 87% infrared light. Air conditioner efficiency is increased (-6.4℃ compared to other product).

◆ Proposed target area
Buildings, commercial facilities, factories

Company Profile

◆ Company name : SOWSHOW CO., LTD.
◆ Head office : 3896 Nogawa, Takatsuka, Kawasaki Shi, Kanagawa, 213-0027, Japan
http://www.soushow.co.jp
◆ Establishment : November 1976 capital 1 mil JPY

Area of Business: Japan. Hundreds of installation records in ministries, municipal offices, banks, factories, convenience stores, and airports.
Experience in China, Vietnam, USA, Thailand, Australia, and Maldives.
Cool Japan Co., Ltd.

**Summary of Technology**

- **Outlines**: Cool Japan applies high efficiency and cost effective CCFL (cold cathode fluorescent lamp) and conducts energy saving and CO2 reduction with CCFL installation with a concept “Suitable lighting for suitable place”.

- **Characteristics of technology**
  - “Eco- Finee”
  - New generation CCFL
  - 40~70% energy saving (40W type:27W consumption, 20W type: 14W consumption), >40,000hrs life (5-10 times longer than general CFL), low heat generation, wide light angle, good color rendering, small blue-light hazard, small Hg, recycle possible.
  - Inverter build-in type and one-ballast type are available.

- **Proposed target area**
  - Installations in factories, storage, schools and classrooms, hospital, offices, commercial facilities, etc.

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NANOFUEL CO., LTD.

**Summary of Technology**

- **Outlines**: Emulsion fuel, is to add water to liquid fuel to disperse water in the oil. The emulsion fuel is achieving fuel saving by improved combustion efficiency, to reduce PM (Particulate Matter) by aiming complete combustion, further to reduce NOx.

- **Characteristics of technology**
  - By uniformly dispersing water particles in nano-level grain diameter, combustion efficiency is improved, which results in high fuel efficiency, CO2 and harmful matter emission reduction.
  - Nano-emulsion fuel : 15% water content in oil, thin oil film thickness and fine oil droplet results in improvement of flammability and high combustion efficiency
  - Nano-Bio Fuel : JPY1-3/L process cost while BDF cost is 15-JPY 30 /L, fuel cost JPY16-23/kWh, low phosphorus concentration and high degumming

- **Proposed target area**
  - Nano-emulsion fuel for high-efficient diesel generation
  - Nano-bio fuel for processing biofuel such as Jetropha

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**Company Profile**

- **Company name**: Cool Japan Co., Ltd.
- **Head office**: Tokyo Denki-kaikan 3F, 1-7-8 Akasaka Minato-ku Tokyo 107-0051 Japan
  - http://www.cooljapan-l.com/
- **Establishment**: October 2013, capital 10 mil. JPY

- **Area of Business**: Japan and world

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**Company Profile**

- **Company name**: NANOFUEL CO., LTD
- **Head office**: 1-19-4 Tonomachi, Kawasaki-ku, Kawasaki, Kanagawa, 2100821 JAPAN
  - www.nanofuel.co.jp/
- **Establishment**: Oct 2006, capital 101 mil JPY

- **Area of Business**: Japan and overseas (demonstration test is conducted 5 domestic engine companies and one overseas company)
ELIIY Power Co., Ltd.

**Summary of Technology**

- **Outlines**: ELIIY Power makes safety a top priority in the development of our products. All large-size lithium-ion electricity storage battery cells included in each of our electricity storage systems are manufactured at our plant in Japan. Olivine-type lithium iron phosphate, which offers superior safety, is used as a material for cathode. First in the world to have passed international certification organization TÜV Rheinland’s product safety test.

- **Characteristics of technology**: Extended lifespan: even if charged and recharged repeatedly for 10 years (DOD 100%, approx. 12,000 times)
  - The POWER YIILE PLUS large-size lithium-ion electricity storage system for indoor use (2.5 kWh)
  - Power Storager 10 general-purpose electricity storage system for industrial use (15, 30, 45, 60 kWh)
  - POWER IE 6 stationary electricity storage system for household use (6.2 kWh, receives a Good Design Award 2013)

**Company Profile**

- **Company name**: ELIIY Power Co., Ltd.
- **Head office**: 19th Floor, Shin-Osaki Kangyo Building, Osaki 1-6-4, Shinagawa-ku, Tokyo, 141-0032
  eliiypower.co.jp
- **Establishment**: September 2008, capital 31.5 mil JPY

Nippon Basic Co., Ltd.

**Summary of Technology**

- **Outlines**: To alleviate the suffering of people who lack clean drinking water due to adverse environmental causes, manufacturing and marketing state-of-the-art water purifying equipment that is both affordable and portable.

- **Characteristics of technology**: Water purification with activated carbon filter and microfiltration membrane filter
  - CycloClean: bicycle type water purification system, with solar PV, water purification for 1500 people
  - CycloClean Portable: a water cleaning capacity per hour of 100 or 200 liters
  - Desaliclean: So compact in size with the RO membranes loaded (about 5 ton/10 hours). Designed to carry it anywhere where it is urgently needed.

**Company Profile**

- **Company name**: Nippon Basic Co., Ltd.
- **Head office**: Ujihashi Building, 2-767 Shin-Maruko-cho, Nakahara-ku, Kanagawa, 211-0005 Japan
  www.nipponbasic.ecnet.jp/
- **Establishment**: May 2005, capital 35 mil JPY
Summary of Technology

◆ Outlines
Kureha Ecology Management Co., Ltd. (KEM) has been contributing to the global environment by providing industrial waste services, and expanded its services in environmental engineering. KEM is a Japanese government-certified service provider to handle and detoxify micro-level PCB wastes since February, 2013.

◆ Characteristics of technology
Westec Iwaki waste treatment plant: 400 t/day
Facility: Rotary kiln Waste type, treating including chemical wastes (PCBs, DXNs, Cl, F, Br, Pb, Cd, As, etc.) and medical wastes
Westec KAWASAKI: waste generation plant, 210 t/day, Power Generation: 4,800 kW
Facility: Rotary kiln + Stoker (Plastics, Wood, Paper, etc.) - Medical wastes and Construction/Demolition wastes

◆ Images
Westec Iwaki
Westec KANAGAWA

◆ Proposed target area
- Waste treatment plant, waste generation plant, heat recovery turbine generation,
- Water purification
- Recycling

Company Profile

◆ Company name:
Kureha Ecology Management Co., Ltd.
◆ Head office:
30 Shitanda, Nishiki-machi, Iwaki City, Fukushima 974-8232, Japan
http://www.kurekan.co.jp/en/contact/
◆ Establishment:
Dec.1971, capital 240 mil JPY

◆ Area of Business:
Japan (Kawasaki plant in Kanagawa pref., Iwaki plant in fukuoka pref., sales offices in Tokyo, Ibaragi, Sendai, Nagoya, Osaka) and world
“Kawasaki Water Business Network” (KaWaBiz NET) is a platform which consists of water-related companies and organizations, and City of Kawasaki. Under the cooperation between the companies and City of Kawasaki, KaWaBiz NET supports the overseas water-related business to enhance international water environment.

The “Business Introduction Catalog of Kawasaki Water Business Network” was produced in cooperation with interested members to introduce excellent and cutting-edge technologies, products and projects which is related to the business to domestic and foreign people.

It would be grateful if the brochure could serve in some small way to enhance the international water environment.

Kawasaki Water Business Network Management Office
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<th>Outline of Kawasaki Water Business Network</th>
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<td>ITOCHU Corporation</td>
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<td>Original Engineering Consultants Co., Ltd</td>
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<td>KAJIMA CORPORATION</td>
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<td>KURIMOTO, LTD.</td>
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<td>SANSHIN CORPORATION</td>
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<td>JFE ENGINEERING CORPORATION</td>
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<td>TOSHIBA CORPORATION</td>
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<td>Nihon Genryo Co., Ltd.</td>
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<td>Nippon Basic Co. Ltd</td>
<td>31</td>
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<tr>
<td>Hitachi, Ltd.</td>
<td>35</td>
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<tr>
<td>City of Kawasaki</td>
<td>39</td>
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</tbody>
</table>
A platform "Kawasaki Water Business Network" (KaWaBiz NET) was established in Aug. 2012 between companies with water-related technologies/products and City of Kawasaki with technologies and expertise of water/sewerage management.

The purpose of the establishment is to enhance the international water environment through water business cooperating with relevant ministries/organizations.

Activity models of KaWaBiz NET

Basic Pattern of Water Business

Determining Needs
- Field survey
- Determining Needs

Scheme Formulations, Feasibility Study
- Team Formation
- Development of Business Model
- Feasibility Study

Project Executions
- Acceptance of Order
- Construction Completion
- Operation Maintenance

Determining Needs in Target Regions
- Survey of needs
- Support for the survey of needs based on a G-to-G relationship
- Dispatch of mission

Support for Scheme Formulation, Feasibility Study and Project Execution
- Coordination to form team
- Provision of a project support environment based on a G-to-G relationship
- Provision of technologies and expertise of waterworks / sewerage management
- Coordination of policies and systems in cooperation with the relevant ministries and organizations

Information Service to Members

Supported by Relevant Ministries and Agencies, Affiliates
- Ministry of Health, Labour and Welfare/
- Ministry of Economy, Trade and Industry
- Ministry of Land, Infrastructure, Transport and Tourism/
- Japan International Cooperation Agency
- and others
# Kawasaki Water Business Network List

**Chairman:** Akira Koizumi, Dr. Eng. (Professor Emeritus, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University)

**Special Adviser:** Mayor of Kawasaki City / Chairman of the Kawasaki Chamber of Commerce & Industry

## Members List (56 members)

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQUA ZEST Corporation</td>
<td>DAI-ICHI HIGH FREQUENCY CO.,LTD.</td>
</tr>
<tr>
<td>Azbil Corporation</td>
<td>TABUCHI CORP.</td>
</tr>
<tr>
<td>ITOCHU Corporation</td>
<td>TSK Kikai Co., Ltd.</td>
</tr>
<tr>
<td>TEC International Co., Ltd.</td>
<td>TSUKISHIMA KIKAI CO., LTD.</td>
</tr>
<tr>
<td>NJS CONSULTANTS CO., LTD.</td>
<td>TEI Corporation</td>
</tr>
<tr>
<td>NTT Advanced Technology Corporation</td>
<td>DG TAKANO, Inc.</td>
</tr>
<tr>
<td>ELIY Power Co., Ltd.</td>
<td>TEIJIN LIMITED</td>
</tr>
<tr>
<td>Osumi Co., Ltd.</td>
<td>TESCO CO., LTD.</td>
</tr>
<tr>
<td>OSMO Co., Ltd.</td>
<td>Tohoku Chemical Industry Co., Ltd.</td>
</tr>
<tr>
<td>Original Engineering Consultants Co., Ltd.</td>
<td>TOSHIKA CORPORATION</td>
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<tr>
<td>KAJIMA CORPORATION</td>
<td>NEC Corporation</td>
</tr>
<tr>
<td>Kawasaki Constructors' Association</td>
<td>NIHON GENROCO, Ltd.</td>
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<tr>
<td>Kawasaki Plumbing Contractor's Association</td>
<td>Nippon Basic Co., Ltd.</td>
</tr>
<tr>
<td>The Kawasaki Chamber of Commerce &amp; Industry</td>
<td>Hamagin Research Institute, Ltd</td>
</tr>
<tr>
<td>Kano Kougaku Inc.</td>
<td>Hitachi, Ltd.</td>
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<tr>
<td>KIMURA TECHNICAL CO., LTD.</td>
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<td>KURIMOTO, LTD.</td>
<td>Hitachi Zosen Corporation</td>
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<tr>
<td>CTI Engineering International Co., Ltd.</td>
<td>FUJITSU LIMITED</td>
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<tr>
<td>COSMO KOKI Co. Ltd.</td>
<td>Fuji Electric Co., Ltd.</td>
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<tr>
<td>SANSHIN CORPORATION</td>
<td>Masezawa Industries, Inc.</td>
</tr>
<tr>
<td>SANYU REC CO., LTD.</td>
<td>Mizuho Bank, Ltd.</td>
</tr>
<tr>
<td>JFE Engineering Corporation</td>
<td>Sumitomo Mitsui Banking Corporation</td>
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<td>Geoplan Co., Ltd.</td>
<td>MITSUBISHI KAKOKI KAISHA, LTD.</td>
</tr>
<tr>
<td>Shouei Co., Ltd.</td>
<td>The Bank of Tokyo-Mitsubishi UFJ, Ltd.</td>
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<tr>
<td>SHOWA DENKO K.K.</td>
<td>YASKAWA ELECTRIC CORPORATION</td>
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<tr>
<td>Swing Corporation</td>
<td>YACHIYO ENGINEERING CO., LTD.</td>
</tr>
<tr>
<td>SUDOH KOGYO Co., Ltd.</td>
<td>Yokogawa Solution Service Corporation</td>
</tr>
<tr>
<td>Sumitomo Corporation</td>
<td>The Bank of Yokohama, Ltd</td>
</tr>
<tr>
<td>SEKISUI CHEMICAL CO., LTD.</td>
<td>City of Kawasaki</td>
</tr>
</tbody>
</table>

## Cooperators List (11 organizations)

<table>
<thead>
<tr>
<th>Ministries and Agencies</th>
<th>Japan International Cooperation Agency / JAPAN BANK FOR INTERNATIONAL COOPERATION / JAPAN WATER WORKS ASSOCIATION / JAPAN EXTERNAL TRADE ORGANIZATION JETRO YOKOHAMA / JAPAN SEWAGE WORKS ASSOCIATION / Kawasaki City Industrial Promotion Foundation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overseas Governments</td>
<td>Danang Representative Office in Japan / Queensland Government Trade and Investment Office- Japan</td>
</tr>
</tbody>
</table>

* As of Jan. 4, 2016
CORPORATE PROFILE
ナノテクによる新燃料で
新しい価値を創造します。

現在、再生可能エネルギーを活かす動きや、原子力発電所から脱しようという流れがあります。しかし、「次の主力エネルギーとは？」という問いへの明確な答えはまだ見つからていません。当社は、物質をナノメーターレベル（100万分の1ミリメートル）に微粒化するナノテクノロジー分野において、世界をリードする最先端の技術を有しています。そしてこの技術を環境・エネルギー分野に活用することで、次世代の新燃料の開発に成功しました。高い燃焼効率で省エネを達成し、有害排気ガスを大幅に削減し、人々の暮らしや社会の発展に貢献いたします。

Create new value by new fuel based on Nano-tech.

Currently, there is a flow movements to take advantage of renewable energy, and try to find a way out of nuclear power plant. However, we have not yet found clear answer to the question: "What would be next primo energy?" Our company owns most advanced and world leading technology in the technical field of micro-particulation of materials in nano-meter level (parts per million millimeter). And we have successfully developed new fuel for next generation by utilizing the technology to environmental and energy arena. To achieve energy saving with high combustion efficiency, and significantly reduce harmful emission, will contribute to the development of society and people's lives.

他の追従を許さない、30年にわたる研究開発。

当社等は主として海洋工学で研究されていたキャピテーションにいち早く着目し、これをナノテクに応用することを考案しました。キャピテーションは高速で流れる液体とその壁との間で生じるエネルギーで、流路等によりその発生量が大きく異なります。当社は様々な流路の形状とキャピテーションの関係を解明し、より高いエネルギーを発生させ、更に圧縮力、せん断力、衝撃力、摩擦力等の物理力も加えることで高い微粒化効果を達成しました。この技術を活用し、「ナノエマルジョン燃料事業」、「液体バイオマス発電事業」、「燃料改質事業」の3つの事業を推進しています。

Unrivalled, three-decade-long research and development.

Our company was quick to focus attention on cavitation effect which was mainly studied in marine technology arena, and worked out to apply the effect to Nano-technology. Cavitation is the energy generated in between high speed liquid flow and the pipe wall of the flow, of which amount of emergence differs substantially by flow channel and so forth. Our company has found out the relationship between cavitation impact and various shapes of flow path and has successfully attained very high atomizing effect by using the cavitation on addition to conventional physical forces such as compaction force, shearing force, impact power and frictional forth. Utilizing this technology, our company is promoting three businesses: "Nano-Emulsion Fuel Business", "Liquid Biomass Power Generation Business", and "Fuel Reutilization Business".
ナノエマルジョン燃料事業

いわゆる「エマルジョン燃料」は燃焼を抑制し、燃焼の向上スモーク等排出ガスの低減が期待され、50年ほど前から世界中の様々なエンジンメーカー、バイオエネルギー事業者が開発に取り組んできました。しかし、ディーゼル機関への悪影響、不充分な耐久性、高コストなどの課題を克服できず本来の実用化には至っていません。当社はナノテクノロジーを活用したナノエマルジョン化することでこれらの課題を克服することに成功。ナノエマルジョン燃料を製造する装置を開発し、これを使用する添加剤のソリューションを提供します。

Nano-Emulsion Fuel Business

So-called "Emulsion Fuel" has more than 50 years of history of development by world-wide various engine makers and boiler makers, under expectation for improvement of fuel consumption and reduction of emission such as smoke, due to combustion quality improvement. However, it has not yet been practically used as it was expected, because such issues like harmful effect to engine, insufficient efficiency and high cost are not yet solved. We have successfully solved those issues by Nano-emulsification based on our Nano-technology. We can provide System to generate Nano-emulsion fuel along with solutions like Surfactant for the system and so forth.

液体バイオマス発電事業

バイオマス原油はリノールの含有、並びに高粘度、高発熱、表面張力により燃焼性が悪いことから、ディーゼル機関内部に燃料が残存し、発熱し機関に過大な悪影響を与えるため直接燃料として使用することはできませんでした。当社は独自のナノテクノロジーでこれを解決することで、効率的なリノールの燃焼、大幅な燃焼性の改善を実現し、直接火中型ディーゼルエンジンの燃料として使用できる「ナノバイオ燃料」の開発に成功しました。そして、これを用い世界初の液体バイオマス発電、発電事業を展開しています。

Liquid Biomass Power Generation Business

The Biomass crude oil was not able to be used directly as a fuel to engines, since the engine is very badly influenced by the unburned residual remained and got stuck in the engine, which is caused by phosphorus contained in the crude oil and by the characteristics of biomass: high viscosity, high boiling point and low evaporation. By fully utilizing unique Nano-technology, our company has achieved sufficient elimination of phosphorus and significantly improved flammability. We've successfully developed "Nano-Bio Fuel" which can be directly supplied and used as a fuel for large and medium-sized diesel engines. We are developing world first "Liquid Biomass Power Generation" and electric power selling business.

燃料改質事業

石油、特に重油には石油精製時に使用した残存触媒等を含む水素状物質（スラッジ）が1%程度含有しています。このスラッジはディーゼル機関に悪影響を及ぼすため、使用される際を除き、廃棄として処理されています。すなわち、1%の燃料ロス、無駄なCOの排出、更には燃料改質コストの負担を強いることになってしまいます。当社はナノテクノロジーを用いて処理することで、燃料として再利用することを実現。スラッジをリサイクルするソリューションを提供します。

Fuel Reutilization Business

Petroleum, especially Heavy fuel oil, contains about 1%-large particles of Carbon Matter (sludge) including residual catalyst used in petroleum refining. The sludge has bad impact for diesel engine so it is to be removed at the time of use and is to be incinerated. That is to say 1% of fuel is lost, unnecessary CO2 is discharged and fuel treatment cost is burdened. By treatment with nano-technology, we've realized to reuse it as a fuel. We provide a solution to recycle sludge.

研究開発体制

当社は環境工学、電気工学、工芸化学等の研究者、技術者を配し、またこれらが有機的に結びついたことで、従来にはない新しい発想で研究開発をとらえています。また、化学試験設備、装置試験設備を有し、様々な新燃料を開発し製品化を進めてきました。更に協力するメーカー企業だけでなく、NEO（独立行政法人新エネルギー・産業技術総合開発機構）や大学との共同研究を行う等、官学連携を推進することで、常に最先端の技術開発を行っています。

Many researchers and engineers in the fields of mechanical engineering, electrical engineering, industrial chemistry are appointed in our R&D organization. We have been promoting R&D activities based on such organically-bonded formation with such non-conventional ideas. We have been evaluating and validating various types of new fuel developed at our chemical and system test facilities. Furthermore, we also have been always promoting most advanced technical development under collaboration not only with related manufacturing companies but with governmental and academic organizations such as NEDO (New Energy and Industrial Technology Development Organization) and universities,

Research and Development Structure

The research and development team includes researchers and engineers in various fields such as mechanical engineering, electrical engineering, and industrial chemistry. We have been actively promoting R&D activities based on unconventional ideas and collaborations with various organizations including NEDO (New Energy and Industrial Technology Development Organization) and universities.
ナノフュエル株式会社
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Tel: +81-44-270-1611 Fax: +81-44-270-1612
www.nanofuel.co.jp
Succeeded in fuelization of crude vegetable oil that can be used directly by power generators.
世界初となる
液体バイオマス発電の実用化を目指して

世界中でバイオマス発電が行われていますが、その原料のほとんどが稲わら、紙漿、木屑、もみ殻等の固体バイオマスであり、液体バイオマスを活用しているものはありません。

液体バイオマスである植物油はディーゼルエンジンを対象としますが、直接燃料として使用することは困難なため、複雑なプロセスによる精製・加工が必要です。

このためコスト高となり発電に使用することはできませんでした。

当社は、独自の「ナノテクノロジー」を駆使することで直接ディーゼルエンジンの燃料として使用できる液体バイオ燃料：ナノバイオ燃料の開発に成功しました。

この技術を用いることで世界初の液体バイオマス発電が可能となります。

To become the world’s first
Aiming at practical use of liquid biomass power generation

Biomass power generation has been made all over the world, but most of its stuff is solid biomass such as rice straw, cotton, wood, rice husk, etc., there’s no one using the liquid biomass. Crude vegetable oil is a liquid biomass which is intended for diesel engines, while it’s difficult to be used directly as a fuel therefore it requires refining and processing by a complex process. For this reason, it was not possible to use it for power generation by increased cost. We, succeeded in developing a Nano-Bio Fuel, a liquid bio-fuel which can be used directly as a fuel by power generators, making full use of original cutting-edge nano-technology. The world’s first Liquid biomass power generation becomes possible by using this technique.

大手エンジンメーカーとの共同研究により実現したナノバイオ燃料

大手エンジンメーカーがヨーロッパのユーザーから「植物油を直接燃料に使用したい」という要望を受け、当社にて技術開発を依頼、ここから共同開発が始まりました。さらにこの開発の必要性が認められ、NEDO（独立行政法人 新エネルギー・産業技術総合開発機構）事業として採択、これを受けまして基礎研究開発および実用化研究開発を成功裏に実現しました。

Nano-Bio Fuel was realized in collaboration with a major engine manufacturer

A Major engine manufacturer received the request from European users that “Want to use crude vegetable oil directly as a fuel”, subsequently they asked us for technical development. Joint development began from here. The need for this development is further authorized, adopted as a NEDO (New Energy and Industrial Technology Development Organization) project. In response to this, both fundamental and practical use’ research and development have been completed successfully.

植物原油での低コスト発電を実現

バイオ燃料の代表的なものとして、BDF（バイオディーゼル燃料）は、従来のガソリンと異なり、溶媒として使用されることが一般的です。BDFはディーゼル発電用エンジンへの適用も可能ですが、その製造工程が複雑なことから大量生産で発電用に使用することは現実的ではありません。また、バイオディーゼルは高コストであることからコスパが石破天驚ほど上昇しない、大きな出力が必要とする中・大型エンジンに使用することは困難です。一方で植物原油は燃料としてディーゼルエンジンに適用すると、未燃焼残渣がシリンダー内に蓄積し、燃焼に影響を及ぼす。未燃焼残渣は、高品質、高点、低蒸発性であることから燃焼性能が悪化すること、によります。当社はナノテクノロジーの駆使することでこれらの課題を克服し植物原油の燃料化に成功しました。これによりディーゼル発電での利用が可能となりました。

Realization of low-cost power generation with crude vegetable oil

Representative examples of biofuel include BDF and biodiesel, both are alternative fuel for dynamic body, such as automobiles. BDF is also applicable to diesel engines, while it is not realistic as for its high price due to its manufacturing process is complex. Bio-ethanol, in addition to being expensive, it only contains about half calories of petroleum, as a result it’s difficult to be used for large and medium-sized engines that require a large output. On the other hand, non-combustion residual substance adheres in cylinders and leads to a stop in a short time when applying crude vegetable oil directly to diesel engines. The reason is due to the fact that ①Phosphorus contained in crude vegetable oil forms a phosphate and solidified. ② Combustion of crude vegetable oil is poor because of the high viscosity. high boiling point, low evaporation characteristic. We solved these problems by making full use of nanotechnology, and succeeded in fuelization of crude vegetable oil. As a result, the use for diesel power generation becomes possible.

世界初となる
液体バイオマス発電の実用化を目指して
ナノバイオ燃料のメカニズム

脱ガム（リンの除油）は通常、植物原油中に水を分散し、水和させて水と共に分離、処理します。当社はその水をナノ化で分散させることによりその表面積を1,000倍程度にし、極めて効率よく脱ガムすることを可能にしました。更に脱ガムされた植物油に水添加剤を加えナノエマルジョン化させることでその燃焼性を大幅に改善。これによりジャストロファ油等の植物原油を極めて低コストでディーゼルエンジンに直接使用できる燃料にすることが可能となりました。

Mechanism of Nano-Bio Fuel

Usually, degumming is to distribute water to crude vegetable oil, along with the separation of water hydrated, and eliminated (elimination of phosphorus). We enabled degumming extremely efficient with the surface area as around 1,000 times by scattering the water at nano-size. Furthermore, the flammability is greatly improved by adding water and surfactant into degummed crude vegetable oil to make it nano-emulsified. By this way, it became able to make crude vegetable oil such as Jatropha oil directly usable fuel to diesel engines at extremely low cost.

実用可能な燃料「ナノバイオ燃料」の誕生

早瀬燃料に伴い大幅な燃焼性能の改善

燃料中の燃料により蒸着し易さが向上

実用可能な燃料「ナノバイオ燃料」の誕生

すぐれたコストパフォーマンスを発揮

軽油を代替する代表的なバイオ燃料であるBDFの製造コストのおよそ1/10まで抑えることができます。また、ナノエマルジョン燃料の燃焼率の改善による燃費削減効果も期待できます。

Manifest Superior Cost Performance

It is available to control its production cost to approx. 1/10 of BDF which is representative biofuel substituting with light oil. In addition, fuel saving effect can be expected from Nano-Emulsion fuel by the improvement of combustion efficiency.

地産地消型発電事業の実現

世界初の液体バイオマス発電所の技術を東南アジアへ輸出しすることで、現地の植物原油を使用したナノバイオ燃料による発電が可能となり、電力の地産地消を実現します。

Realization of local production for local consumption type power generation business

Power generation with Nano-Bio fuel using local crude vegetable oil is enabled by exporting the technology of the world's first liquid biomass power station to Southeast Asia and realizes local production for local consumption of electricity.
Nano-Bio Fuel Production System

Just incorporated into existing diesel power plant, convertible to liquid biomass power plant. Crude vegetable oil becomes Nano-Bio fuel after degumming process and Nano-emulsification process, which can be used directly by the power generators.

Comparison with main renewable energy (solar, wind)

Low cost supply is possible while being affected by the weather.

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Cost (yen/kWh)</th>
<th>Suitable Sites Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Biomass Power</td>
<td>16~23</td>
<td>Less constraints on suitable sites selection</td>
</tr>
<tr>
<td>Solar Energy</td>
<td>30~46</td>
<td>Consideration of conditions such as daynight hours Land destruction of green tract on installation</td>
</tr>
<tr>
<td>Wind Power</td>
<td>10~17</td>
<td>Wind conditions at the installation site Influence on living environment, etc.</td>
</tr>
</tbody>
</table>

※1 23yen/kWh is the current market price of palm oil 76yen/kg (October 2013). 16yen/kWh is the current market price of soybean oil 50yen/kg. 10yen/kWh is calculated from the future.

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Tel: +81-44-270-1616 Fax: +81-44-270-1612
www.nanofuel.co.jp
従来のエマルジョン燃料の常識をくつがえした
優れた燃焼効率と環境性能、
そしてコスト削減を実現する、画期的な新燃料

Overturned conventional wisdom of emulsion fuel
Revolutionary New Fuel to achieve excellent combustion efficiency, environmental responsiveness and cost reduction

ナノエマルジョン燃料
Nano-Emulsion Fuel

ナノフュエル株式会社
NANOFUEL CO., LTD.
新世代のエネルギー・ソリューション
ナノエマルジョン燃料

環境への負荷が少なくクリーンでしかも低コストを実現する
新エネルギーの登場が期待されています。
当社は、物質をナノレベル（100万分の1ミリメートル）に
微粒子化する独自の最先端ナノテクノロジーを発展させることで、
今までのエマルジョン燃料の課題点を克服した、
画期的な新燃料「ナノエマルジョン燃料」の開発に成功しました。
新世代のエネルギー・ソリューションの誕生です。

A new generation of energy solution
Nano-Emulsion Fuel

Appearance of new, clean energy with least adverse impact on environment and low cost is highly awaited. By utilizing our unique and most advanced technology to atomize materials at the "nano" level (parts per million millimeter), our company has successfully developed revolutionary new fuel - "Nano-Emulsion Fuel", which has solved the issues of conventional emulsion fuel. It is actually the birth of energy solution for new generation.

待望の画期的な新燃料の誕生

石油に水を添加したエマルジョン燃料は燃焼が改善されることから、燃費が向上し、スモーク等の有害な排ガスが低減するとされ、およそ50年前から様々な研究開発が行われてきました。しかしその有効性が十分に加え、燃焼性能を基本性能、コスト等に多くの課題があり実用化には至っていませんでした。そので当社は添加する水をナノレベルに微粒子化することで従来の課題を克服し、新燃料「ナノエマルジョン燃料」を開発しました。

Long-awaited birth of new and epoch-making fuel

Improvement of combustion efficiency due to the addition of water into oil results in improvement of fuel efficiency and in reduction of harmful emission. So, all kinds of research and development have been conducted since approximately 50 years ago. However, there have been issues in basic performance as fuel, cost and so forth, in addition to the lack of efficacy, which has hindered the practical use of emulsion fuel. Our company has developed "Nano-Emulsion Fuel" as a new fuel, overcoming the issues by atomizing water to be added at the "Nano" level.

従来のエマルジョン燃料
Conventional Emulsion Fuel

およそ50年前から研究開発が続けられてきたが期待されながらも実用化には至らなかった従来のエマルジョン燃料。

Conventional emulsion fuel, despite expectations, not yet practically used after more than 50 years of R&D.

ナノフュエルの先進ナノテクノロジーが課題を解決！
Nanofuel's most advanced Nano-technology has solved the issues！

ナノエマルジョン燃料
Nano-Emulsion Fuel

水粒子の粒径をナノレベルで均一に分散させることで、燃焼効率を更に改善し大幅な燃費削減、有害排ガスの削減が可能となりました。

by uniformly dispersing water particles in nano-level grain diameter, combustion efficiency has been much more improved that resulted in drastic fuel efficiency improvement and reduction of harmful emission.
ナノエマルジョン燃料の燃焼メカニズム

ディーゼル機関においては燃焼室内に喷霧された（液体）燃料が発熱に応じて急速に燃焼し、炉内圧を生じます。また、エンジンの熱司令器をできるだけ直接燃焼させることにより、燃焼フィールドを抑制し、燃焼効率を改善します。エンジン燃料はこの温度上昇の過程で油より先に内部を水が気化し、体験発生（大気圧下で約1700倍）し周囲の油を分散させることで燃焼を抑制します。これにより燃料の表面積が大きく広がることから燃焼効率が改善します。ナノエマルジョン燃料は従来のエンジン燃料よりも、燃料厚が32分の1に減少します。これにより燃料が更に細かくなり、その表面積が格段と大きくなることで燃焼効率が改善します。

Combustion mechanism of Nano Emulsion Fuel

In diesel engine, sprayed (liquid) fuel in combustion chamber rapidly rises in temperature, and oil droplets burning from surface toward center core, generate energy such as heat and pressure. In the process of temperature rising, water enveloped by oil comes to evaporate earlier than oil and to expand in volume (1,700 times larger under atmospheric pressure), and to decompose and atomize circumjacent oil droplets. By this, the surface area of oil droplets enlarges and burning efficiency is to be improved. The thickness of oil film of Nano-Emulsion Fuel is 1/32 part of that of conventional emulsion fuel, which make the oil droplets much fine and dramatically enlarge the surface area thus the effect can be much bigger.

従来のエマルジョン燃料をはるかに超える高性能

ナノエマルジョン燃料は従来のエマルジョン燃料とは異なり、燃料として期待される「燃費削減効果」、「有害排出削減効果」、「コスト削減」等すべてを高い次元で実現しています。

High performance far beyond conventional emulsion fuel

Contrary to conventional Emulsion Fuel, Nano-Emulsion Fuel achieves in higher dimension, all the effects expected for a fuel such as "Fuel Consumption Reduction", "Harmful Emission Reduction", and "Cost Reduction".

性能が実証されているナノエマルジョン燃料

ナノエマルジョン燃料は国内外大手エンジンメーカー5社、海外大手エンジンメーカー1社をはじめ、船舶、道路、食品、化学、アルミ等幅広い分野の大手企業で評価試験を実施し、そのすべてで燃費の削減と有害排出ガスの大幅な削減が実証されています。

Nano-Emulsion Fuel with validated performance

Evaluation tests for Nano-Emulsion Fuel have been conducted not only by 5 domestic and one overseas major engine manufacturers at major companies among various industries such as shipbuilding, road construction, foods, chemical, aluminum and so forth, all of which have proved improvement of fuel efficiency and drastic reduction of harmful emission.

性能を実証しているナノエマルジョン燃料

性能が実証されているナノエマルジョン燃料

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性能が実証されているナノエマルジョン燃料
製品 Product

■ナノエマルジョン燃料製造装置
ナノエマルジョン燃料製造装置（NEFS）は既存の燃料系に組み込むだけで、簡単に使用することができます。標準タイプは幅広い燃料組成に対応しています。遠隔地で燃料の製造量やメンテナンス時期等の情報を通信で得ることができます。

Nano-Emulsion Fuel System
Nano-Emulsion Fuel Manufacturing System (NEFS) can be used easily by installing in the existing combustion process. The standard type of NEFS can cope with wide-range of fuel composition, and has monitoring function of volume of produced fuel and to notice maintenance cycle at remote site.

- 標準タイプ: 広範囲の設置環境、燃料組成に対応
  - NEFS-S300: 300ℓ/hr
  - NEFS-S1000: 1000ℓ/hr
  - *標準タイプについてはレンタルもご利用しております。
  - *For standard type, "Rental" system is also available.

- 用途限定タイプ: 設置環境、燃料組成等を限定することで低価格化
  - NEFS-L300: 300ℓ/hr (受注生産) (Build to order)
  - NEFS-L1000: 1000ℓ/hr (受注生産) (Build to order)

- 中・大型陸用発電機用: エンジンの燃料消費に追従してナノエマルジョン燃料を製造
  - For medium/large land-based generator use: Nano-emulsion fuel production follows fuel consumption of engine
  - NEFS-E1000: 1000ℓ/hr (受注生産) (Build to order)
  - NEFS-E2000: 2000ℓ/hr (受注生産) (Build to order)
  - NEFS-E3000: 3000ℓ/hr (受注生産) (Build to order)

■ナノエマルジョン燃料専用添加剤
ナノエマルジョン燃料専用の添加剤です。用途によって使い分けします。

Surfactant dedicated for Nano-Emulsion Fuel
Surfactants exclusively used for Nano-Emulsion fuel with types depending on the intended use.

- インライン用添加剤
  - In-line use Surfactant
    - Nanoemuer GFA-101(A,B)
    - Nanoemuer GFA-102(A,B)

- タンク貯蔵用添加剤
  - Tank storage use Surfactant
    - Nanoemuer GFA-001(A,B)
    - Nanoemuer GFA-002(A,B)

*ナノエマーは当社とミヨシ油製品株式会社の共同開発商品です。
*ナノエマーは当社の登録商標です。
*Nanoemuer is co-developed product by Miyoshi Oil & Fat Co., Ltd. and Nanofuel.
*Nanoemuer is our registered trademark.

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