**JCM Project Design Document Form**

## A. Project description

A.1. Title of the JCM project

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| Introduction of High-efficiency Boiler System to Rubber Belt Plant |

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

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| The proposed JCM project aims to improve boiler efficiency by (1) the introduction of once-through boiler, (2) fuel switch of existing boiler from heavy oil to natural gas, and (3) the installation of economizer into existing boiler to the rubber belt plant in the Kingdom of Thailand. There were total four fire-tube boilers in the project site. One fire-tube boiler was replaced to once-through boiler. Other three fire-tube boilers were installed economizers at the same time as fuel switch of the boilers from heavy oil to natural gas. |

A.3. Location of project, including coordinates

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|---|---|
| Country | The Kingdom of Thailand |
| Region/State/Province etc.: | Samutsakorn Province |
| City/Town/Community etc: | Mueang Samut Sakhon |
| Latitude, longitude | N 13° 35’ 13’’, E 100° 14’ 60’’ |

A.4. Name of project participants

| | |
|---|---|
| The Kingdom of Thailand | Bando Manufacturing (Thailand) Ltd. |
| Japan | Bando Chemical Industries, Ltd. |

A.5. Duration

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| Starting date of project operation | 01/02/2018 |
| Expected operational lifetime of project | 9 years |

A.6. Contribution from Japan

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| The proposed project was partially supported by the Ministry of the Environment, Japan (MOEJ) through the Financing Programme for JCM Model projects, which provided financial support of less than half of the initial investment for the projects to acquire JCM credits. As for technology transfer, the installed once-through boiler and several economizers has been provided by Japanese manufactures. |

## B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

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| Selected approved methodology No. | TH_AM010 |
| Version number | 1.0 |

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

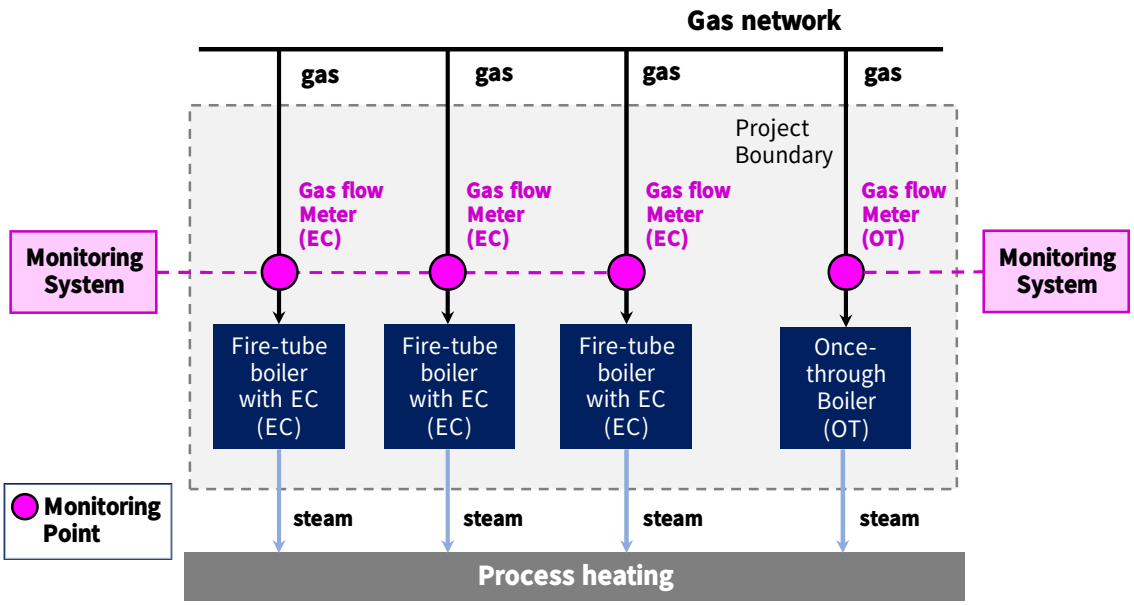
| Eligibility criteria | Descriptions specified in the methodology | Project information |
|---|---|---|
| Criterion 1 | Projects involve implementation of one or both of the following two energy efficiency improvement measures: the introduction of once-through boiler and the installation of economizer into existing boiler. | Both the introduction of once-through boiler and the installation of economizer into existing boiler are implemented in the project. |
| Criterion 2 | For projects that involve the introduction of once-through boiler, the project boiler (OT) is a once-through boiler with a rated capacity of 7 ton/hour per unit or less (equivalent evaporation). | One project boiler (OT) is a once-through boiler with a rated capacity of 4 ton/hour (equivalent evaporation). |
| Criterion 3 | For projects that involves the installation of economizer into existing boiler, the fuel for the project boiler (EC) shall not be heavy oil nor coal. | The fuel for three project boilers (EC) to which economizers are installed by the project, is natural gas, not heavy oil nor coal. |
| Criterion 4 | Periodical check and maintenance by the manufacturer of boiler or authorized agent is implemented in accordance with the manufacturer's requirement. | Bando Manufacturing (Thailand) Ltd. shall arrange necessary periodical check and maintenance by manufacturers (Miura Industries (Thailand) Co., Ltd., Thai Hirakawa Co., Ltd., and Getabec Public Company Limited). |

## C. Calculation of emission reductions

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

| Reference emissions | |
|---|---|
| Emission sources | GHG type |
| Fuel consumption by reference boiler (OT) | $CO_2$ |
| Fuel consumption by reference boiler (EC) | $CO_2$ |
| **Project emissions** | |
| Emission sources | GHG type |
| Fuel consumption by project boiler (OT) | $CO_2$ |
| Fuel consumption by project boiler (EC) | $CO_2$ |

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




Source: Provided by Nippon Koei Co., Ltd. based on date by Bando Chemical Industries Ltd.

C.3. Estimated emissions reductions in each year

| Year | Estimated Reference emissions ($tCO_2e$) | Estimated Project Emissions ($tCO_2e$) | Estimated Emission Reductions ($tCO_2e$) |
|---|---|---|---|
| 2018 | 20,368.6 | 12,925.2 | 5,426 |
| 2019 | 22,037.9 | 14,100.2 | 5,919 |
| 2020 | 22,037.9 | 14,100.2 | 5,919 |
| 2021 | 22,037.9 | 14,100.2 | 5,919 |
| 2022 | 22,037.9 | 14,100.2 | 5,919 |
| 2023 | 22,037.9 | 14,100.2 | 5,919 |
| 2024 | 22,037.9 | 14,100.2 | 5,919 |
| 2025 | 22,037.9 | 14,100.2 | 5,919 |
| 2026 | 22,037.9 | 14,100.2 | 5,919 |
| 2027 | 3,695.2 | 1,175.0 | 493 |
| Total ($tCO_2e$) | | | 53,271 |

## D. Environmental impact assessment

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| Legal requirement of environmental impact assessment for the proposed project | No |

## E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Local stakeholder consultation meeting was held during 10:00-11:30, 4 December 2018 at the meeting room of Bando Manufacturing (Thailand) Ltd (hereinafter called “BMT”).
The Government (Thailand Greenhouse Gas Management Organization (hereinafter called “TGO”)), Maintenance Manager and Maintenance Operator of BMT, Boiler Manufacture, Economizer Manufactures, the Gas supplier, and Focal Point (Bando Chemical Industries Ltd) attended and their comments were collected in LSC.

E.2. Summary of comments received and their consideration

| Stakeholders | Comments received | Consideration of comments received |
|---|---|---|
| TGO | I think that efficiency of boilers and economizers will decrease steadily during the project period. It will be a problem that the difference between actual values of efficiency and the values | No action is needed.<br>In the methodology, the decrease in efficiency is assumed to occur for both project and reference cases, while the decrease ratio will be much |

| | | |
|---|---|---|
| | of PDD may occur. So, it is better to calculate the amount of GHG emission reduction by using actual boiler or economizer's efficiency. | less in the project case since appropriate maintenance is secured in the eligibility criteria. Besides, the methodology applies conservative way to calculate the emission reduction to secure the net emission reduction. |
| Osaka Gas (Thailand) Co., Ltd. | CNG has not yet become popular in Thailand, so we would like to promote gas utilization more in this country by utilizing the experiences of this JCM project. | No action is needed. |
| Miura Industries (Thailand) Co., Ltd. | Once-through boilers are not yet familiar in Thailand. We would like to expand once-through boilers by using JCM scheme. | No action is needed. |
| Thai Hirakawa Co., Ltd. | To maintain the efficiency of economizers in the project, we will continue proper maintenance during the project period. | No action is needed. |
| Getabec Public Company Limited | It is first time for Getabec to join JCM project. We learned a lot about JCM scheme from this project and had a good experience for energy saving. | No action is needed. |
| Operator of maintenance of BMT | To follow the JCM requirements, several parameters such as each boiler's fuel consumption are needed to check properly during the project period. We will do our best to conduct monitoring for energy saving. | No action is needed. |
| Maintenance Manager of BMT | In accordance with the procedures required for JCM project, we would like to achieve energy saving in our factory. | No action is needed. |

| **F. References** |
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| N/A |

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

| **Annex** |
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| N/A |

| **Revision history of PDD** | | |
|---|---|---|
| Version | Date | Contents revised |
| 01.0 | 28/09/2020 | First edition |
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