JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Power generation by waste heat recovery in the PT Semen Indonesia (Persero) Tbk factory in Tuban

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

The proposed JCM Project aims to reduce consumption of electricity and consequently greenhouse gas (GHG) emissions by utilizing waste heat from the cement production facility by installation of 4 waste heat recovery (WHR) systems to generate electricity in the PT Semen Indonesia (Persero) Tbk factory in Tuban, the Republic of Indonesia. Waste heat recovery (WHR) system consists of preheater boilers and clinker coolers with a steam turbine generator. Electricity generated from the WHR system replaces grid electricity resulting in GHG emission reductions of the connected grid system. In line with the JCM approved methodology ID_AM001, reference emissions are calculated from net electricity generation by the project WHR systems which replace grid electricity imported to the cement factory where the project is implemented. Project emissions are not considered as the WHR system does not utilize any fossil fuel. .

A.3. Location of project, including coordinates

Country	The Republic of Indonesia
Region/State/Province etc.:	Ds. Sumberarum, Kec, Kerek
City/Town/Community etc:	Tuban
Latitude, longitude	6°51'56.1"S 111°54'40.3"E

A.4. Name of project participants

The Republic of Indonesia	PT Semen Indonesia (Persero) Tbk
Japan	JFE Engineering Corporation

A.5. Duration

Starting date of project operation	30/04/2018
Expected operational lifetime of project	9 years

A.6. Contribution from Japan

The proposed JCM Project was partially supported by the Ministry of Environment, Japan through the financing programme for JCM model projects, which provided financial support of less than half of the initial investment for the projects in order to facilitate GHG emission reduction project in Indonesia and to acquire JCM credits.

As for technology transfer, the proposed JCM Project implemented technical lectures and created opportunities for OJT training to local employees of PT Semen Indonesia (Persero) Tbk on operation and maintenance of the WHR system, which require special skills unique to the system.

The lectures had been introduced as follows;
Date: 11-12 January 2017
Participants: 35 technical engineers of PT Semen Indonesia (Persero) Tbk
Place: PT Semen Indonesia (Persero) Tbk. Gresik Office
Contents: WHR System O&M Lecture

[11 January 2017]

1. Process of WHR system
2. Control philosophy of WHR system
3. Generator operation and maintenance
4. Turbine operation and maintenance
5. Boiler operation and maintenance

[12 January 2017]

1. Start and stop of WHR system (with DCS graphics)

While the trial operation term, OJT programs will be provided by JFE Engineering Corporation engineers.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	ID_AM001
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	The project utilizes waste heat from the cement production facility by waste heat recovery (WHR) system to generate electricity.	Four WHR systems are planned to be installed by JFE Engineering Corporation at the facility of PT Semen Indonesia (Persero) Tbk in Tuban to utilize waste heat from the cement production facility and generate electricity.
Criterion 2	WHR system consists of a Suspension Preheater boiler (SP boiler) and/or Air Quenching Cooler boiler (AQC boiler), turbine generator and cooling tower.	The project WHR systems consist of four Suspension preheater boilers (SP boilers), four air quenching cooler boilers (AQC boilers), one turbine generator and one cooling tower originally designed by JFE Engineering Corporation.
Criterion 3	WHR system utilizes only waste heat and does not utilize fossil fuels as a heat source to generate steam for power generation.	The project WHR systems utilize only waste heat and do not utilize fossil fuels as a heat source to generate steam for power generation.
Criterion 4	WHR system has not been introduced to a corresponding cement kiln of the project prior to its implementation.	At the facility of PT Semen Indonesia (Persero) Tbk in Tuban, no WHR system has been introduced to a corresponding cement kiln of the project prior to its implementation.
Criterion 5	The cement factory where the project is implemented is connected to a grid system and the theoretical maximum electricity output of the WHR system, which is calculated by multiplying maximum electricity output of the WHR system by the maximum hours per year (24 * 365 = 8,760 hours), is not greater than the annual amount of the electricity	The cement factory of PT Semen Indonesia (Persero) Tbk is connected to an Indonesian grid system and its theoretical maximum electricity output is 268,056 MWh (rated generation capacity is 30.6 MW). It is not expected to be greater than the annual amount of the electricity imported to the cement factory from the grid system during the previous year before the validation,

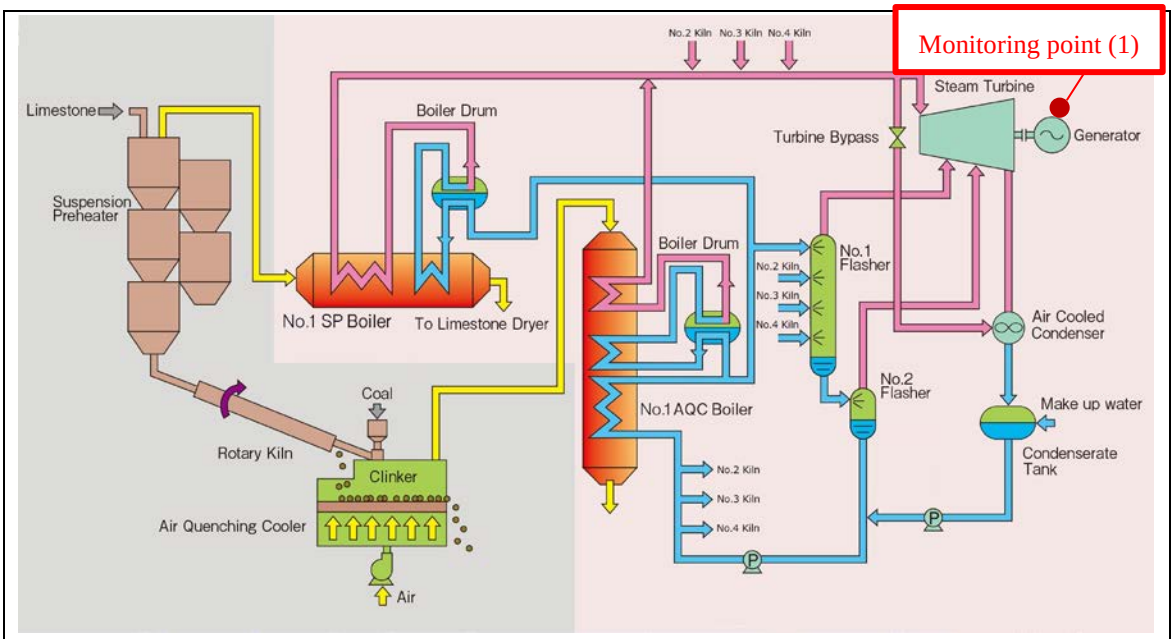
	imported to the cement factory from the grid system: ➢ During the previous year before the validation, if the validation of the project is conducted before the operation of the project, or ➢ During the previous year before the operation of the project, if the validation of the project is conducted after the operation of the project.	which is 1,217,155 MWh.
Criterion 6	The WHR system is designed to be connected only to an internal power grid of the cement factory.	This project WHR systems are connected only to the internal power grid of the cement factory of PT Semen Indonesia (Persero) Tbk.

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
Grid electricity generation	CO_2
Project emissions	
Emission sources	GHG type
N/A	N/A

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



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	99,375	0	99,375
2019	149,063	0	149,063
2020	149,063	0	149,063
Total (tCO_{2e})	397,501	0	397,501

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	YES No.188.45/158/KPTS/414.012/2015

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

In order to cover a diverse group of stakeholders, on 16 August, a local stakeholder consultation has been conducted with Indonesian ministries, Tuban regional agencies, Indonesian cement industry associations, universities and local regional PLN and employees of PT Semen Indonesia (Persero) Tbk.

The list of attendees to the meeting has been consulted to the JC secretariat of Indonesian side, and the local stakeholders to be invited have been fixed. The project participants sent invitation letters to those stakeholders except for those who work at the project site to notify of convening local stakeholder consultation meeting.

The schedule and participants of the meetings is provided below.

Date: 16 August 2017

Venue: Plant Site Dormitory Tuban of PT Semen Indonesia (Persero) Tbk

Time: 9:30-12:00 (Registration: 9:00-9:30)

Agenda:

1. Opening remarks
2. Overview of the project
3. Schema of JCM
4. Technology introduced
5. Questions and answers
6. Closing

Participants:

[Local stakeholders]

No.	Organization	Position
1	Coordinating Ministry for Economic Affairs	Assistant Deputy Minister for Multilateral Economic Cooperation and Financing
2	JCM Secretariat	Head of Indonesia JCM Secretariat
3	Environmental Agency of Tuban Regency	Head of Environment Agency of Tuban Regency
4	Tuban Region Government	Regional Secretary of Tuban Regency Government
5	Indonesia's Cement Industry Association	Chairman of the Indonesian Cement Association
6	The local regional PLN	Manager Rayon Tuban
7	Desa Sumberarum	Head of Sumberarum Tuban

8	Disperindag Jatim	Kepala Dinas Perindustrian dan Perdagangan
9	Swadaya Graha	Director of Operational Swadaya Graha

[Project participants]
Project participants: [Indonesia] PT semen Indonesia, [Japan] JFE Engineering Corporation

At each agenda item, a brief presentation was made by the project participants and JCM secretariat of Indonesia, and opinions of the stakeholders were solicited. A summary of the comments received and consideration of those comments are provided in Section E.2. below.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Chairman of the Indonesian Cement Association	Why is the estimate potential emission reduction calculated to be 120.000 ton-CO_{2e}/y? Based on my calculation it should be more than that and what is the calculation and the assumption that is used?	Assumption and algorithm to calculate emission reductions (RE_y [tCO_2/year]) are as follows; EG_y: The quantity of net electricity generation by the WHR systems which replace grid electricity imported (MWh, Quantity of expected electricity generation in total of dry season and rainy season). EF_{grid}: Emission factor of grid electricity (tCO_2/MWh) $RE_y = EG_y \times EF_{grid}$ $RE_y = 165{,}126 \times 0.741 = 122{,}358$ *Emission factor used for the presentation was the one previously published by the government of Indonesia. No further action is needed.
Chairman of the Indonesian Cement Association	What is the share of credits? How long is the period for this benefit share? Based on Padang Project, Japan seems to have all of the	Minimum xxx of the credit is for Indonesia government, and the rest is for Indonesian company, Japanese company (private sector) and

	benefits (credits).	Japanese government. In addition, the project period depends on the project lifetime which could be over 10 years. The xxx of the credits for Indonesia government is only its minimum percentage, and it is not included with the share benefit from Indonesia company (private sector). The project in Tuban is different from Padang because the investment in Padang is 100% from Japan. SMI (PT semen Indonesia) might need to renegotiate with Japan in case for Padang project. No further action is needed.
Head of Environment Agency, Tuban	The WHR system project contributes to the reduction of GHG emissions in Tuban, and it will be a benefit for Tuban environment.	Positive opinion was received. No further action is needed.
Manager Rayon Tuban (PLN)	PLN may have benefit loss almost 20% but this project has benefits for community environment and Tuban government. PLN supports this project because the technology and its benefits are good for many stakeholders.	Positive opinion was received. No further action is needed.
Head of Sumberarum Tuban	We support WHR system project and grateful because it is beneficial for the environment. We expect PT Semen Indonesia can have more attention in the environmental sector.	Positive opinion was received. No further action is needed.

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

Annex
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Revision history of PDD		
Version	Date	Contents revised
1.0	26/09/2017	First edition
2.0	30/11/2017	Revisions in section A.3, A.3, C.3, D and E.1 based on the findings by TPE at the validation process.