JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Energy Saving for Air-Conditioning at Textile Factory by Introducing High-efficiency Centrifugal Chiller in Karawang, West Java

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

The proposed JCM project aims to improve energy saving for air conditioning and cooling by introducing high-efficiency centrifugal chiller in a textile factory in Indonesia. The factory needs considerable energy, and chillers consume significant amount of energy compared with the other machines in the factory. The proposed project covers a textile factory of PT. Nikawa Textile Industry in Kawarang, West Java province in Indonesia. The factory has two units of absorption chillers, and the factory increased production capacity. To cope with heat load increase due to the capacity increase, additional chiller was installed, and was applied to JCM project. The chiller was installed in November 2014 and started its operation in December 2015.

A.3. Location of project, including coordinates

Country	Republic of Indonesia
Region/State/Province etc.:	West Java Province
City/Town/Community etc:	Karawang Regency
Latitude, longitude	S6.367404, E107.320875

A.4. Name of project participants

The Republic of Indonesia	PT. Nikawa Textile Industry
Japan	Nippon Koei Co., Ltd. (Focal Point) Ebara Refrigeration Equipment & Systems Co., Ltd.

A.5. Duration

Starting date of project operation	20/12/2015
Expected operational lifetime of project	7 years

A.6. Contribution from developed countries

The proposed project was financially supported by the Ministry of the Environment, Japan through the financing programme for JCM model project which seeks to acquire JCM credits.

As for technology transfer, Ebara Refrigeration Equipment & Systems Co., Ltd. (ERS) has provided the following supports to PT. Nikawa Textile Industry:

- Direct instruction on proper operation, and
- Efficient monitoring through remote monitoring system

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	ID_AM002
Version number	2.0

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	Project chiller is a centrifugal chiller with a capacity of less than 1,250 USRt. ** 1 USRt = 3.52 kW*	Project chiller (Ebara high efficiency centrifugal chiller : RTBF 050) is a centrifugal chiller with a capacity of 499 USRt. [Calculation] 1758 [kW] / 3.52 = 499.4 ≒ 499 [USRt]
Criterion 2	COP for project chiller *i* calculated under the standardizing temperature conditions* ($COP_{PJ,tc,i}$) is more than 6.0. $COP_{PJ,tc,i}$ is a recalculation of COP of project chiller i ($COP_{PJ,i}$) adjusting temperature conditions from the project specific condition to the standardizing conditions. $COP_{PJ,i}$ is derived in specifications prepared for the quotation or factory acceptance test data at the time of shipment by manufacturer. [Equation to calculate $COP_{PJ,tc,i}$] $\mathbf{COP_{PJ,tc,i} = COP_{PJ,i} \times [(T_{cooling-out,i} - T_{chilled-out,i} + TD_{chilled} + TD_{cooling}) \div (37 - 7 + TD_{chilled} + TD_{cooling})]}$	The COP for project chiller ($COP_{PJ,tc,i}$) which is introduced to the proposed project is 6.22. [Calculation result] 7.10 x (36.9 – 11 + 1.5 + 1.5) / (37.0 – 7 + 1.5 + 1.5) = 6.216 ≒ 6.22

	$COP_{PJ,tc,i}$: *COP of project chiller i calculated under the standardizing temperature conditions* [-]* $COP_{PJ,i}$: *COP of project chiller i under the project specific conditions [-]* $T_{cooling-out,i}$: *Output cooling water temperature of project chiller i set under the project specific condition [degree Celsius]* $T_{chilled-out,i}$: *Output chilled water temperature of project chiller i set under the project specific condition [degree Celsius]* $TD_{cooling}$: *Temperature difference between condensing temperature of refrigerant and output cooling water temperature 1.5 degree Celsius set as a default value [degree Celsius]* $TD_{chilled}$: *Temperature difference between evaporating temperature of refrigerant and output chilled water temperature, 1.5 degree Celsius set as a default value [degree Celsius]* *The standardizing temperature conditions to calculate* $COP_{PJ,tc,i}$ *Chilled water:* *output 7 degree Celsius* *input 12 degree Celsius* *Cooling water:* *output 37 degree Celsius* *input 32 degree Celsius*	
Criterion 3	Periodical check is planned more than four (4) times annually.	ERS and PT Ebara Indonesia (PTEI, subsidiary of the ERS which is a chiller manufacturer) agreed to conduct at least one direct periodical check per year by PTEI and remote periodical checks every month by the remote monitoring system by ERS. This remote monitoring system automatically detects the potential error every hour and reports any abnormal condition of chiller to ERS immediately. This periodical check procedure both by direct and remote method is more frequent, effective and better than five times of periodical checks stipulated in the methodology (ID_AM002).
Criterion 4	Ozone Depletion Potential (ODP) of the refrigerant used for project chiller is zero.	Refrigerant for the project chiller is HFC 245fa, whose ODP is zero.
Criterion 5	Plan for not releasing refrigerant used for project chiller is prepared. In the case of	Letter of consent on not releasing refrigerant used for the project chiller

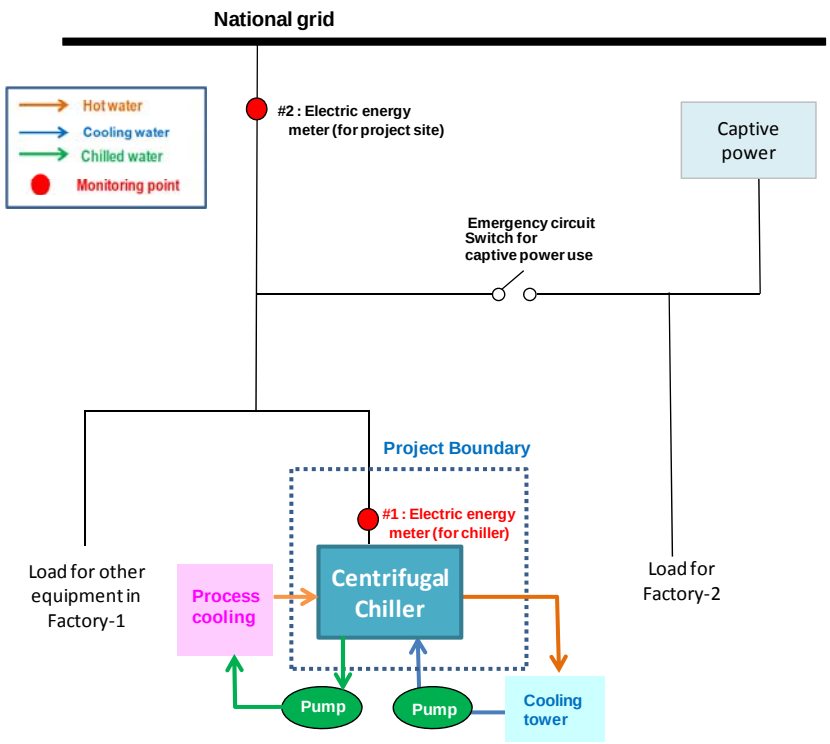
	replacing the existing chiller with the project chiller, refrigerant used for the existing chiller is not released to the air.	was prepared by PT Nikawa Textile Industry. This project aims at introduction of a new chiller, thus replacement of existing chiller is not considered.

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
Power consumption by reference chiller	CO_2
Project emissions	
Emission sources	GHG type
Power consumption by project chiller	CO_2

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



#1 : Electric energy meter for power consumption of project chiller

#2 : Electric energy meter for electricity imported from the grid to the project site

Note : The power for the project chiller is supplied from the Grid, and the Project Chiller will utilize grid power only. Meanwhile, the factory has independent coal and diesel generation system, i.e., captive power. When Grid power is cut, the Project Chiller is stopped immediately and automatically, and the factory uses no captive power for Project Chiller. Letter of Consent for Sole Supply of Grid Electricity to the Project Chiller is attached to this PDD.

C.3. Estimated emissions reductions in each year

Year	Estimated Reference Emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Annual Estimated Emission Reductions (tCO_{2e})
2014	61.33	55.16	6.00
2015	1,865.53	1,677.65	187.00
2016	1,865.53	1,677.65	187.00
2017	1,865.53	1,677.65	187.00
2018	1,865.53	1,677.65	187.00
2019	1,865.53	1,677.65	187.00
2020	1,865.53	1,677.65	187.00
2021	1,865.53	1,677.65	187.00
Total (tCO_{2e})	**13,120.05**	**11,798.73**	**1,315.00**

D. Environmental impact assessment

Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

PP identified following stakeholders accommodating the suggestions from Indonesian JCM Secretariat.

[Direct stakeholders] Factory staff related to chiller operations, namely the Factory Director, supervisors and chiller operators.

[Indirect stakeholders] Staff of local governments and related private sector organization such as textile association since they enjoy the benefit of the project (GHG reduction, energy saving, and capacity development) within their administrative

boundary.

The PP conducted a face-to-face interview and local stakeholder consultation with identified stakeholders (see table below).

#	Date	Venue	Method
1	March 11, 2015	Meeting room and factory of PT. Nikawa Textile Industry	Face-to-face interview and factory visit
2	August 6, 2015	Meeting room in West Java Governor's Office	Local Stakeholder Consultation
3	August 7, 2015	Meeting room of PT. Nikawa Textile Industry	Face-to-face interview
4	August 10, 2015	Meeting room and factory of PT. Nikawa Textile Industry	Face-to-face interview and factory visit

E.2. Summary of comments received and their consideration (as of 1st Application, need update)

Stakeholders	Comments received	Consideration of comments received
Factory Director	Nikawa is satisfied with the capacity and performance of the high-efficiency centrifugal chiller.	No action is necessary.
Supervisors	The centrifugal chiller has higher efficiency than the old units and has the effect of energy saving. The method for operation is simpler than that of the previous systems. Required time for starting is much shorter (2 min.) than the previous one (15 min.). For maintenance, the chiller is running without any trouble till August 2015, and trouble shooting of the project chiller seems easier than the other chillers in the factory..	No action is necessary.
Chiller Operators	The project chiller has no problem. If any trouble occurs, Ebara RS will take care, while we can also check with the error codes and countermeasures following the manual provided by Ebara RS.	No action is necessary.
Local	West Java government appreciates the	No action is necessary.

Stakeholders	Comments received	Consideration of comments received
governments (Provincial Government of West Java Province)	GHG reduction effect of the project and is ready to support the Project in case necessary. Further extension of this model project is required.	

F. References

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

Annex

Revision history of PDD

Version	Date	Contents revised
1.0	27/11/2015	First edition