JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Installation of High Efficiency Centrifugal Chiller for Air Conditioning System in Clothing Tag Factory in Bangladesh

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

This project aims to saving energy and reducing CO_2 emissions by introducing high efficiency centrifugal chillers for an air-conditioning system in the clothing tag factory in Bangladesh. In order to expand its production capacity, the clothing tag factory requires energy saving since the more allocation of energy for industrial sector is not always available in Bangladesh. Thus the factory decided to introduce high efficiency centrifugal chillers. The proposed project covers three buildings of Next Accessories Ltd. in Shawghat, Vulta, Rupganj, Narayanganj District, Dhaka Division in Bangladesh. The factory introduces three units of 299.8 USRt high efficiency centrifugal chillers. The first unit of the project chiller was installed in February 2017 and started its operation in 1st March 2017. Other two chillers will be installed in May 2017. The factory has existing 290 USRt chiller, which will be operated with project chillers as back-up after second and third project chillers are installed.

A.3. Location of project, including coordinates

Country	Bangladesh
Region/State/Province etc.:	Dhaka Division
City/Town/Community etc:	Narayanganj District
Latitude, longitude	N 23°47'28", E 90°34'21"

A.4. Name of project participants

The People's Republic of Bangladesh	Next Accessories Ltd.
Japan	Nippon Koei Co., Ltd. (Focal Point) Ebara Refrigeration Equipment & Systems Co., Ltd.

A.5. Duration

Starting date of project operation	01/03/2017
Expected operational lifetime of project	7 years

A.6. Contribution from Japan

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

As for technology transfer, Ebara Refrigeration Equipment & Systems Co., Ltd. (ERS) has provided the following supports to Next Accessories Ltd. by its agent in Bangladesh, Green Energy Engineering BD Limited.

- Direct instruction on proper operation
- Efficient periodical checks to maintain efficiency of the chiller through remote monitoring system

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	BD_AM001
Version number	Ver1.0

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 1,150 USRt. * 1 USRt = 3.52 kW	Three units of project chiller are centrifugal chillers with a capacity of 299.8 USRt each.
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 $COP_{PJ,tc,i}$]	COP's of project chillers are as follows: Chiller unit #1 : 6.16 Chiller unit #2 : 6.18 Chiller unit #3 : 6.16

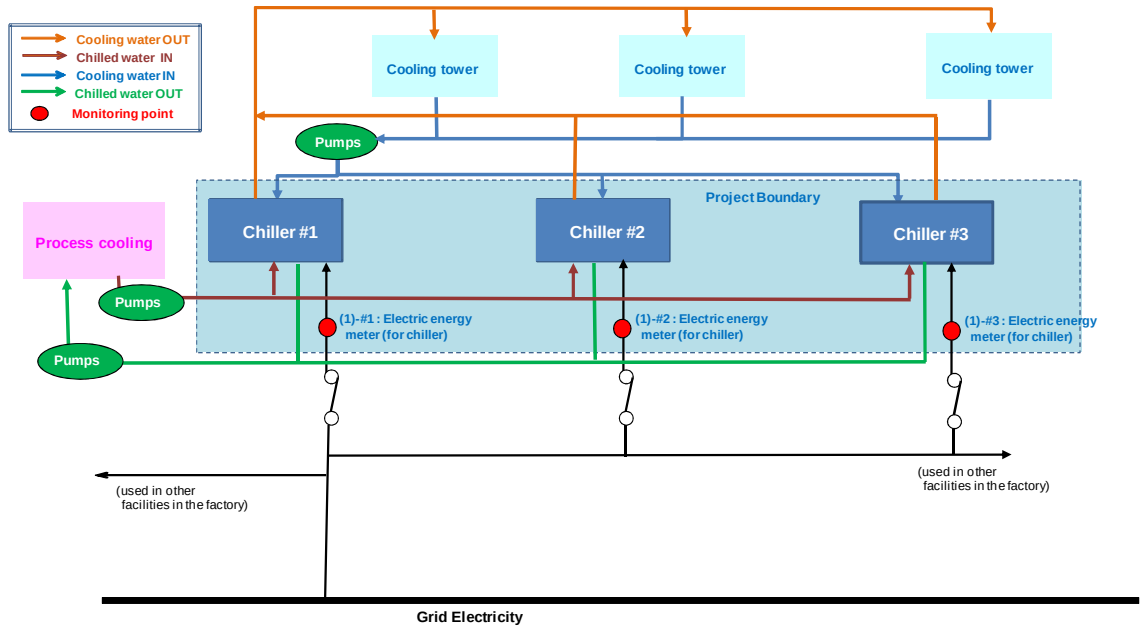
	$\mathbf{COP_{PJ,tc,i}} = \mathbf{COP_{PJ,i}} \times [(\mathbf{T_{cooling-out,i}} - \mathbf{T_{chilled-out,i}} + \mathbf{TD_{chilled}} + \mathbf{TD_{cooling}}) \div (\mathbf{37 - 7} + \mathbf{TD_{chilled}} + \mathbf{TD_{cooling}})]$ $COP_{PJ,tc,i}$: COP of project chiller *i* calculated under the standardizing 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 Celsiu, input 32 degree Celsius	
Criterion 3	Periodical check is conducted at least twice a year.	ERS will conduct periodical check twice a year.
Criterion 4	Ozone Depletion Potential (ODP) of the refrigerant used for project chiller is zero.	ODP of HFC-245fa used in the project chiller is zero.
Criterion 5	A plan for not releasing refrigerant used for project chiller is prepared. In the case of replacing the existing chiller with the project chiller, a plan is prepared in which refrigerant used in the existing chiller is not released to the air e.g. re-use of the refrigerant. Execution of the prevention plan is checked at the time of verification, in order to confirm that refrigerant used for the existing one replaced by the project is not released to the air.	Next Accessories Ltd. agreed to prepare Letter of Consent not to release refrigerant of existing equipment and project chiller.

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)-#1, (1)-#2, (1)-#3 : Electric energy meter for power consumption of project chiller #1, #2, #3
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 diesel generator, i.e., captive power. In the case of power shutdown due to power grid failure, 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 Chillers is attached to this PDD.
The data of energy consumption of the project chiller to calculate the emission reduction amount applies the manual recorded data of meter #1, #2, #3. The automatic data collection for energy consumption by the remote monitoring system is also conducted and checked in case of manual recorded data is not available.

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			
2014			
2015			
2016			
2017	1,242.3	1,034.1	208
2018	3,442.3	2,863.7	578
2019	3,442.3	2,863.7	578
2020	3,442.3	2,863.7	578
Total (tCO_{2e})	11,569.2	9,625.2	1942

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

Project participant identified following stakeholders accommodating the suggestions from Bangladesh JCM Secretariat.

[Direct stakeholders] Factory staff related to chiller operations, namely the Assistant Managing Director - Sustainability, Assistant Manager - Utility, and Chiller Operator.

[Indirect stakeholders] Staff of Department of Environment (DOE) of Bangladesh

The project participant conducted a local stakeholder consultation in Bangladesh (see table below).

#	Date	Venue	Method
1	5 March 2017	DOE office, Dhaka	Local Stakeholder Consultation

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Department of	Demand of chiller is increasing in Bangladesh,	No action is necessary.

Environment	and more and more equipment will be installed in industrial zone in near future. Accordingly, high efficiency chiller will highly contribute the energy saving in industrial sector in Bangladesh. JCM scheme is effective for this.	
Assistant General Manager-Sustainability, Next Accessories Ltd.	The efficiency of project chiller is good and it is continuously achieving best result compared with old chiller. The project chiller satisfied the factory's expectation.	No action is necessary.
Assistant Manager - Utility, Next Accessories Ltd.	The impression for project chiller is quite good and operators are satisfied with the performance of the project chiller.	No action is necessary.
Chiller Operator , Next Accessories Ltd.	Same impression as Assistant Manager-Utility	No action is necessary.

F. References

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

Annex

Revision history of PDD		
Version	Date	Contents revised
1.0	30/03/2017	
1.1	10/04/2017	Description about existing chiller was modified. The value in 1st year of the table in C.3. Estimated emissions reductions was revised according to commissioning delay of unit #2 and unit #3.
1.2	19/06/2017	Figure and description of monitoring points in Section C.2. was modified: (i) The numbering of electric energy meter for chiller was modified from "#1, #2, and #3" to "#(1)-1, #(1)-2, and #(1)-3" to make consistency with MPS. (ii) Monitoring point "#4" was deleted since electric energy from grid was not

		included in MPS. (iii) Description for captive power was deleted since captive power will be supplied only for small power consumption to maintain factory operation and captive power will not be used to supply energy to project chiller.