JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Introduction of High Efficiency Centrifugal Chiller and Electric Heat Pump Type Water Heater in Hotel

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

The proposed JCM project aims to reduce CO2 emissions by introducing the high efficiency chiller and water heater system to the hotel located in San Jose, Costa Rica. The high efficiency chiller equipped with an optimized control function, including inverter, enables to improve the energy efficiency while continuously regulating the room temperature. In addition, the high efficiency water heater can supply hot water by using waste heat of chiller and reduce the consumption of fossil fuel which was used for the conventional boilers for hot water supply. In the project, steam from auxiliary boiler is used not only to (ⅰ) heat the water, but also for (ⅱ) the laundry and kitchen. However, records of boiler fuel are not measured for those 2 uses respectively. This requires additional two steam meters to calculate boiler fuel used for heating water. They measure steam quantity used for (ⅰ) water heating and (ⅱ) kitchen and laundry respectively. Monitoring parameter "Fuel consumption of auxiliary boiler, $AC_{PJB,l,p}$" in approved methodology is obtained by apportioning calculation using measured steam quantity of the two uses mentioned above. Measuring are conducting by 2 orifice plate flowmeters, which are precise mechanical metering devices equipped with temperature and pressure sensors and a differential pressure cell to compensate for any variations on fluid density. These flowmeters directly measures steam flow rate, therefore boiler fuel used for heating water are obtained by multiplying total boiler fuel consumption and proportion of steam rate for heating water.

A.3. Location of project, including coordinates

Country	Costa Rica
Region/State/Province etc.:	Asuncion de Belen
City/Town/Community etc:	San Jose
Latitude, longitude	9.978972, -84.161277

A.4. Name of project participants

The Republic of Costa	MGM Sustainable Energy Limitada

Rica	Hotelera Bonanza S.A.
Japan	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, INC.

A.5. Duration

Starting date of project operation	01/11/2017
Expected operational lifetime of project	17 years

A.6. Contribution from developed countries

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 up to 50% of initial investment for the projects in order to acquire JCM credits.
The technology of advanced and efficient centrifugal chiller system is introduced in the proposed project by the Japanese project participant. The Japanese project participant transfers the technology through conducting the training on operation and maintenance of newly installed equipment through trial operation.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	CR_AM002 CR_AM003
Version number	ver1.0 ver1.0

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

<CR_AM002>

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Project chiller is an inverter type centrifugal chiller with a capacity ranging from 165USRt to 3500USRt. Note : 1 USRt = 3.52 kW	The capacities of the chillers introduced in the project are 390USRt.
Criterion 2	IPLV for project chiller *i* certified by AHRI is more than the threshold IPLV values set in the table below. (“x” in the table represents cooling capacity per unit.)	The IPLV for project chiller (IPLVpj,i) which are introduced to the proposed project are 10.67.

Cooling capacity per unit	**165≤x<2000**	**2000≤x<3500**

	[USRt]			
	Threshold IPLV value	8.04	9.60	
Criterion 3	Periodical check is planned more than one (1) time annually.			Periodical check is planned one times annually. Letter of consent on the conductance of periodical check one times annually for the project chiller was prepared by participants from both sides.
Criterion 4	Ozone Depletion Potential (ODP) of the refrigerant used for project chiller is zero.			As for the existing chiller, R123 of the HCFC is used for a refrigerant. Refrigerant for the project chiller is HFC R134a, whose ODP is zero.
Criterion 5	A plan for prevention of releasing refrigerant used for project chiller is prepared. In the case of replacing the existing chiller with the project chiller, a plan for prevention of releasing refrigerant used in the existing chiller to the air (e.g. re-use of the equipment) is prepared. Execution of this plan is checked at the time of verification, in order to confirm that refrigerant used for the existing one replaced by the project is prevented from being released to the air.			Letter of consent on not releasing refrigerant used for project chiller and existing chillers were prepared by participants from both sides.

< CR_AM003>

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	A project introduces (an) electric heat pump type water heater(s) to supply hot water utilized in a building. In case (an) project electric heat pump type water heater(s) replaces existing equipment, the existing one is not (an) heat pump type water heater(s).	The existing one is not (an) heat pump type water heater(s).
Criterion 2	Ozone Depletion Potential (ODP) of the refrigerant used in project electric heat pump is zero.	Refrigerant for the project electric heat pump is HFC R134a, whose ODP is zero.
Criterion 3	A plan for not releasing refrigerant used for the electric heat pump(s) is prepared.	A plan for not releasing refrigerant used for the electric heat pump(s) were prepared by participants.

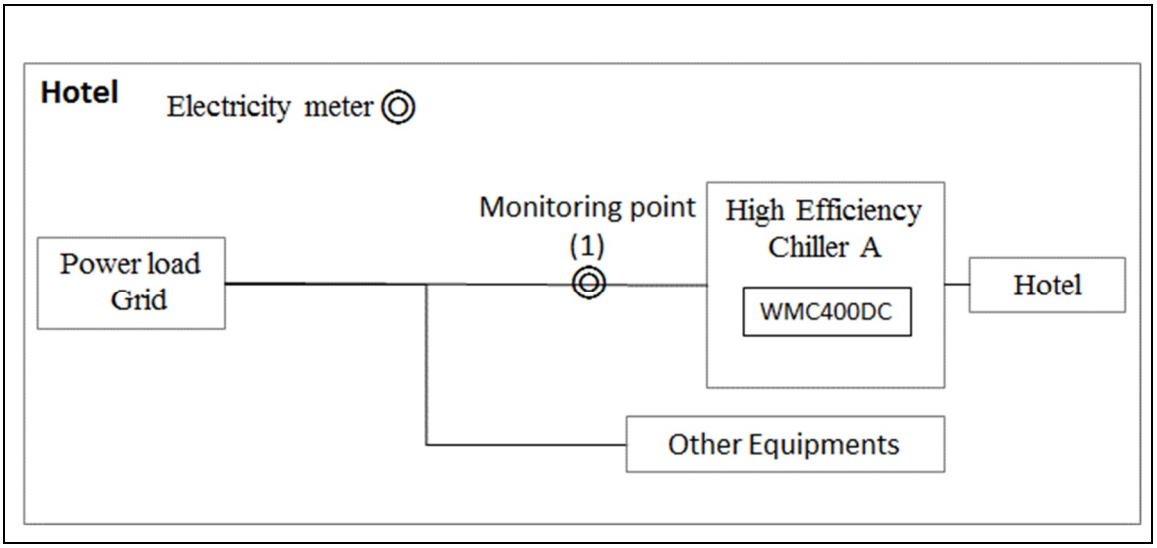
C. Calculation of emission reductions

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

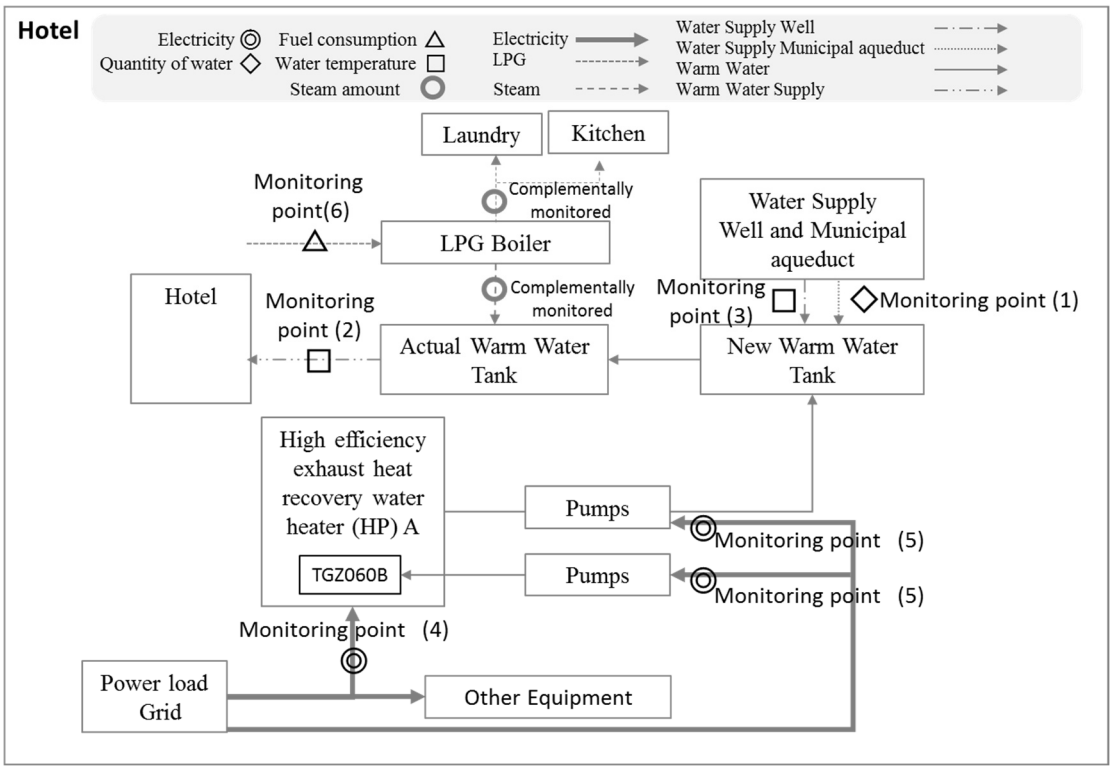
Reference emissions	
Emission sources	GHG type
Power consumption by reference chiller	CO_2
Fuel consumption by reference equipment (boiler)	CO_2
Project emissions	
Emission sources	GHG type
Power consumption by project chiller	CO_2
Electricity consumption by (an) electric heat pump type water heater(s) and fuel consumption by auxiliary boiler where applicable	CO_2

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

< CR_AM002>



< CR_AM003>



As written in A.2., Monitoring parameter "Fuel consumption of auxiliary boiler, $AC_{PJB,l,p}$" is calculated by multiplying total fuel consumption (measured in Monitoring point (6)) and proportion of steam quantity for heating water obtained by monitoring. ($AC_{PJB,l,p}$ is calculated in Appendix1)

Typical schematic of complementally monitoring is below.

(detail information to be added after receiving data from local company)

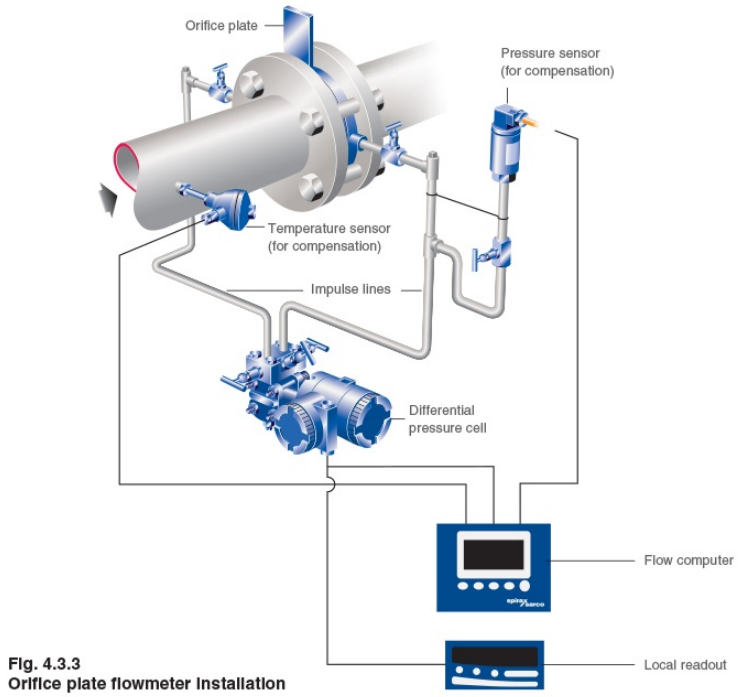


Fig. 4.3.3
Orifice plate flowmeter installation

C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO2e)	Estimated Project Emissions (tCO2e)	Estimated Emission Reductions (tCO2e)
2013	-	-	-
2014	-	-	-
2015	-	-	-
2016	-	-	-
2017	n/a	n/a	57
2018	n/a	n/a	347
2019	n/a	n/a	347
2020	n/a	n/a	347
Total (tCO2e)	n/a	n/a	1,098

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

The project participant identified the following stakeholders, accommodating the suggestions from Costa Rica JCM Secretariat.

[Direct stakeholders] Staff member of MGM Sustainable Energy Limitada and Wyndham Hotel

The project participant conducted a face-to-face interview with local stakeholder. Comments received from the participants are summarized in the following section E.2.. The project received no negative comments from the participants, and it was confirmed that none of the received comments required further mitigation action from the project side.

date	Venue	Attendance
October 2, 2017 9:00 ~ 13:00	Executive Conference Room, Wyndham Hotel, San Jose, Costa Rica	Hotel director MGM Sustainable Energy Limitada

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
MGM Sustainable Energy Limitada	What kind of organizations are TPEs?	TPEs are such organizations as JQA (Japan Quality Assurance Organization) who are designated by the Joint Committee under the JCM to validate JCM projects and verify greenhouse gas emission reductions. No further action necessary.
MGM Sustainable Energy Limitada	What is the MRV reporting period for the first year if we start collecting MRV data from October 1, 2017?	The reporting period for the first year would be from October 1 through December 31, 2017. NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, INC. will take care of developing monitoring report based on spread sheet and starting date provided by MGM. We also ask MGM to monthly check whether required data be properly collected. No further action necessary.

MGM Sustainable Energy Limitada	What is the timeline for validation, registration and verification?	Currently, validation is expected to take place by the end of fiscal year 2017. Registration will take some time after validation. Although verification will be implemented by the end of fiscal year 2018 for the Wyndham hotel project, the timing will be decided by Ministry of the Environment, Japan (MOEJ) according to government-to-government discussions. No further action necessary.
MGM Sustainable Energy Limitada	Which emission factors should be used for reporting emission reductions? Will the Japanese or Costa Rican government provide emission factors?	The emission factor published by the Costa Rican government or that announced in the latest CDM report is used. The last emission factor was made available in 2012. A latest emission factor will be used if it is officially published or instructed by the Joint Committee. No further action necessary.

F. References
N/A

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

Annex

<CR_AM002>

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

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013	-	-	-
2014	-	-	-
2015	-	-	-
2016	-	-	-
2017	4	3	1
2018	28	21	7
2019	28	21	7
2020	28	21	7
Total (tCO_{2e})	88	66	22

< CR_AM003>

Reference emissions	
Emission sources	GHG type
Fuel consumption by reference equipment (boiler)	CO_2
Project emissions	
Emission sources	GHG type
Electricity consumption by (an) electric heat pump type water heater(s) and fuel consumption by auxiliary boiler where applicable	CO_2

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013	-	-	-

2014	-	-	-
2015	-	-	-
2016	-	-	-
2017	56	53	3
2018	340	321	19
2019	340	321	19
2020	340	321	19
Total (tCO_{2e})	1,076	1,016	60

Revision history of PDD

Version	Date	Contents revised
01.0	13/02/2020	First edition