JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Introduction of Heat Recovery Heat Pumps to a Chicken Slaughtering Plant in Thailand

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

This proposed JCM project aims to improve energy efficiency at a chicken slaughtering plant of CPF (Thailand) Public Company Limited in Nakhonratchasima province, Thailand by introducing a high-efficiency heat recovery heat pump system (HP). CO_2 heat pump is highly efficient and recovers heat from water body to generate hot water and chilled water simultaneously by using the trans-critical system of the natural refrigerant CO_2. The proposed project can reduce and save energy from electricity and fuel consumptions by introducing this high-efficiency HP system in this food manufacturing process.

A.3. Location of project, including coordinates

Country	Thailand
Region/State/Province etc.:	Chok Chai, Nakhonratchasima Province
City/Town/Community etc:	333,333/1-2 Moo 9, Sikhiu-Det Udom Road, Tha Yiem
Latitude, longitude	Latitude: N 14°44′34.10″ Longitude: E 102°12′50.82″

A.4. Name of project participants

The Kingdom of Thailand	CPF (Thailand) Public Company Limited
Japan	CPF Japan Co., Ltd.

A.5. Duration

Starting date of project operation	01/01/2018
Expected operational lifetime of project	10 years

A.6. Contribution from Japan

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 in order to acquire JCM credits. In addition, the technology is the state-of-the-art technology of high efficiency heat

recovery heat pump system using natural refrigerant developed by the Japanese manufacturing company. The Japanese manufacturing company transfers the technology to Thai project participants through trainings on the basics of HP.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	JCM_TH_AM008
Version number	Ver01.0

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	A project newly introduces (a) high efficiency HP(s) using natural refrigerants to a food manufacturing plant and it does not replace (an) existing HP(s). In case of HPs supplying chilled water, the water is fed into a refrigeration system of the plant which uses either screw or reciprocating compressors.	This project newly installs high efficiency HP called ECO-CUTE "UNIMO WW" using the natural refrigerant (CO_2) to the food manufacturing plant at CPF Korat. The newly installed HP supplies water to a refrigeration system of the plant which uses screw compressors.
Criterion 2	The cooling capacity of a HP unit is more than or equal to 50kW and less than 1600kW.	The project installs eight (8) units of HP. The cooling capacity of individual HP units generating 20 degree Celsius chilled water (4 units) is 62.5 kW, while the cooling capacity of individual HP units generating 25 degree Celsius chilled water (4 units) is 60.8 kW.

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
Electricity consumption by reference equipment for generating chilled water	CO_2
Fuel consumption by reference equipment for generating hot water	CO_2
Project emissions	
Emission sources	GHG type
Electricity consumption by HPs	CO_2

Electricity consumption by auxiliary electric equipment of HPs (e.g. pump)	CO_2

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

The layout of eight (8) heat recovery heat pumps and two (2) auxiliary systems and 10 monitoring points are illustrated in Figure 1, and the actual measuring spots and a control panel with 10 electricity meters of the proposed project are shown in Figure 2.

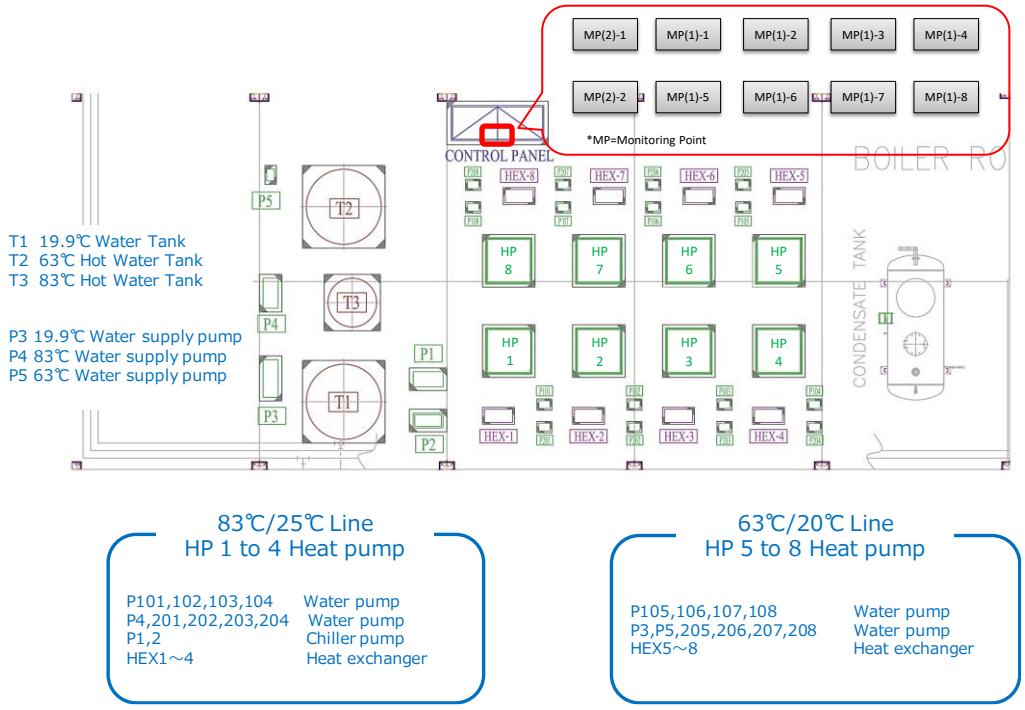

Figure 1: Layout of Heat Recovery Heat Pumps and Auxiliary Systems

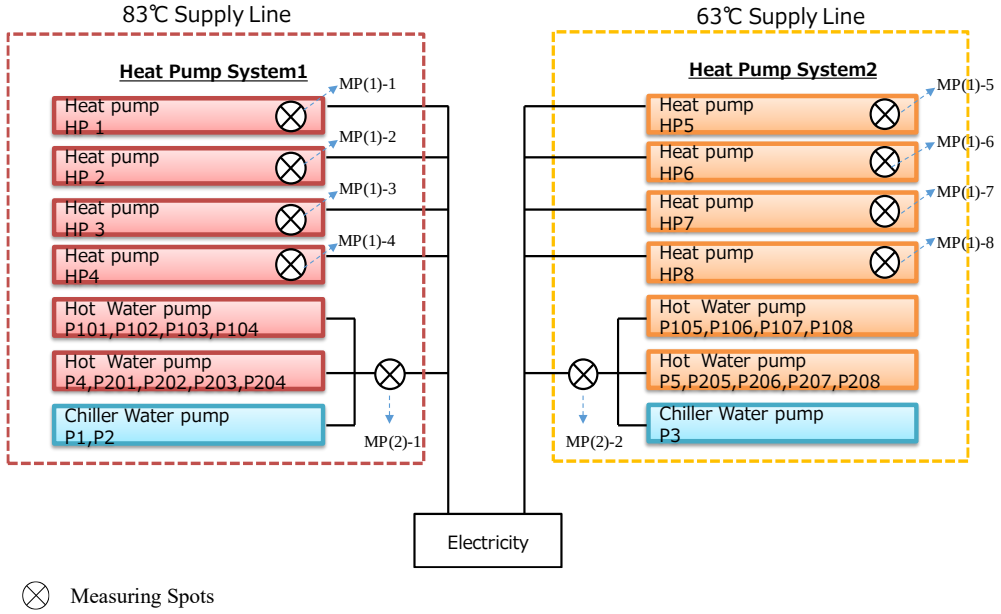

Figure2: 10 Monitoring Points of the Proposed Project

C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2018	1,702.1	759.7	942
2019	1,702.1	759.7	942
2020	1,702.1	759.7	942
2021	1,702.1	759.7	942
2022	1,702.1	759.7	942
2023	1,702.1	759.7	942
2024	1,702.1	759.7	942
2025	1,702.1	759.7	942
2026	1,702.1	759.7	942
2027	1,702.1	759.7	942
Total (tCO_2e)			9,420

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 participants invited relevant entities to join the local stakeholders' meeting at least two weeks prior to the meeting date. The meeting was held at 13:00-16:00 on 31/10/2017 at the Conference Room 1 of the CPF Korat Plant. The main stakeholders of the project were representatives from Thailand Greenhouse Gas Management Organization (TGO) and Ministry of Energy (MoE) of Thailand, professors from Suranaree University of Technology, Japanese counterparts from CPF Japan, engineers and CPF local staffs who work at the project site.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Representative from TGO	- What are the legal durable lifetime and what is the natural refrigerant applied for this technology? And, please explain more on the reference equipment. - Which Third Party Entity (TPE) is selected?	- The legal durable lifetime is for 10 years which is in line with the Japanese technology lifetime. With the good maintenance, lifetime of heat pumps can be used longer time. In addition, the technology uses carbon dioxide (CO_2) as a refrigerant. The reference equipment was conducted through the survey and it was based on screw and reciprocating types of compressor used in the food manufacturing plants in Thailand. - It is not selected the TPE yet. - No further action required.
Representative from Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy	- What is the verification period? And, what does it mean 7 years of meter electricity guarantee in the presentation?	- The verification period of this proposed JCM project is 10 years. The note in the presentation mentioning electricity meters' guarantee as 7 years. They may be replaced with new ones unless CPF Korat conducts the meter calibration on regular basis. - No further action required.
Engineer from CPF Korat	- On slide 7 of the Introduction of Heat-pumps presentation, heat-exchanger would have temperature different from 83 to 51.4 °C and another one from 63 to 55 °C. Could you please explain the reason why for this difference in temperature? - Does DEDE or MoE has any regulation/ guideline related to calibrating the equipment e.g. electricity meters?	- Yes, the information is correct. The difference in flow rates affects the difference in temperature. - DEDE replied that neither DEDE nor MOE has specific guidelines for equipment calibration. However, plant owners may follow specific requirements by standards for the calibration, e.g. ISO standards. - No further action required.

F. References
N/A

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

Annex

Revision history of PDD		
Version	Date	Contents revised
01.0	11/06/2019 20/09/2021	First edition Initial registration by the Joint Committee through electronic decision