JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Introduction of 0.8MW Solar Power System and High Efficiency Refrigerator to Food Factory

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

Thai Delmar Co., Ltd, the Thai corporation of Delmar Co., Ltd. which is a company of marine products and food, also being one of the group company of Nippon Suisan Kaisha, Ltd. built a new factory in the Asia Industrial Estate. In this new factory, solar power system and high efficiency refrigerators were installed to avoid reducing grid power consumption. For solar power system, it was constructed by Tosplant Engineering (Thailand) Co., Ltd. (an affiliate of Toshiba Plant System Co., Ltd., hereinafter referred to as Toshiba Thailand), which power generation scale is 899kW. The solar power generation is contributed by internal grid. For high efficiency refrigerator, it is manufactured by Mayekawa (Thailand) Co., Ltd. (an affiliated company of Maekawa Manufacturing Co., Ltd., hereinafter referred to as Maekawa Thailand), which has a refrigerating capacity of 367.9kW. The refrigerator introduced in this project is a high-efficiency non-CFC refrigerator that uses a natural refrigerant (NH3 and CO2) which was developed as a measure against global warming (global warming coefficient is 1 or less). Therefore its impact on the environment is small.

The refrigerator uses CO_2 as the refrigerant for the secondary refrigeration cycle which is controlled by an inverter.

A.3. Location of project, including coordinates

Country	The Kingdom of Thailand
Region/State/Province etc.:	Samut Prakarn Province
City/Town/Community etc.:	Bang Bo District
Latitude, longitude	N 13° 40' 2.32" and E 100° 54' 24.27"

A.4. Name of project participants

The Kingdom of Thailand	Thai Delmar Co., Ltd.
Japan	Kanematsu KGK Corp

A.5. Duration

Starting date of project operation	30/6/2020 (Solar Power System: 20/2/2021) (High Efficiency Refrigerator: 30/6/2020)
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. Throughout various stages of project implementation including project design, construction, scheduling, installation, Toshiba Thailand and Mayekawa Thailand have provided local operators with required training and know-how transfer and is also expected to do so continuously for operation and maintenance phases.

B. Application of an approved methodology(ies)

B.1. Selection of methodologies

Selected approved methodology No.	TH_AM001
Version number	Ver2.0
Selected approved methodology No.	TH_AM011
Version number	Ver1.0

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

Regarding solar power system (Based on the methodology of "JCM_TH_AM001_ver02.0")

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	The project installs solar PV system(s).	Solar power system is installed in the new factory in Asia Industrial Estate with power generation scale of 899kW.
Criterion 2	The solar PV system is connected to the internal power grid of the project site and/or to the grid for displacing grid electricity and/or captive electricity at the project site.	Solar power system is connected to the internal power grid of the factory to replace the grid power.

Criterion 3	The PV modules have obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	The PV modules of this project are qualified for design (crystal type: IEC61215) and safety (IEC61730-1, IEC61730-2).
Criterion 4	The equipment to monitor output power of the solar PV system and irradiance is installed at the project site.	Monitoring equipment is introduced to measure the amount of power generation and solar radiation intensity of the solar power system.

Regarding high efficiency refrigerator (Based on the methodology of "JCM_TH_AM011_ver01.0")

<table>
<tr><th>Eligibility criteria</th><th>Descriptions specified in the methodology</th><th>Project information</th></tr>
<tr><td>Criterion 1</td><td>Refrigerator(s) with a secondary loop cooling system using CO_2 as a refrigerant and equipped with inverter is installed at cold storage.</td><td>The refrigerator uses CO_2 as the refrigerant for the secondary refrigeration cycle which is controlled by an inverter.</td></tr>
<tr><td>Criterion 2</td><td>COP of project refrigerator(s) installed in the project cooling system is more than the threshold COP values set in the tables below. ("x" in the table represents cooling capacity per unit.)
<table>
<tr><th>Room Temperature condition</th><th>Cooling capacity (kW)</th><th>Threshold COP value</th></tr>
<tr><td>-25 deg. C</td><td>$42.4 \leq x \leq 340.0$</td><td>1.71</td></tr>
<tr><td>0 deg. C</td><td>$73.6 \leq x \leq 516.4$</td><td>2.79</td></tr>
<tr><td>5 deg. C</td><td>$86.2 \leq x \leq 612.6$</td><td>3.20</td></tr>
</table>
COP for the project refrigerator(s) are calculated with the following conditions:
● Room temperature condition: - 25 deg. C or 0 deg. C or 5 deg. C
● Cooling water fed to condenser: inlet 32 deg. C</td><td>Room temperature condition is -25 deg. C. Cooling capacity is between 42.4 kW and 340.0kW. And threshold COP value is 1.71.

The refrigerator installed in this project has a refrigeration capacity of 340kW or less. It has been clarified that the COP of the reference refrigerator in Thailand is 1.71, which can cool down to -25°C. While by adopting the NH_3/CO_2 cooling system, the COP of this project refrigerator increased to 2.1 and the energy efficiency being improved by 20% approximately.</td></tr>
<tr><td>Criterion 3</td><td>Periodical check is planned at least one (1) time</td><td>Periodical check is conducted at</td></tr>
</table>

	annually.	least once a year.
Criterion 4	In the case of replacing the existing refrigerator with the project refrigerator, a plan for prevention of releasing refrigerant used in the existing refrigerator 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.	Since this project is a new installation, it does not release the refrigerant from the existing refrigerator.

C. Calculation of emission reductions

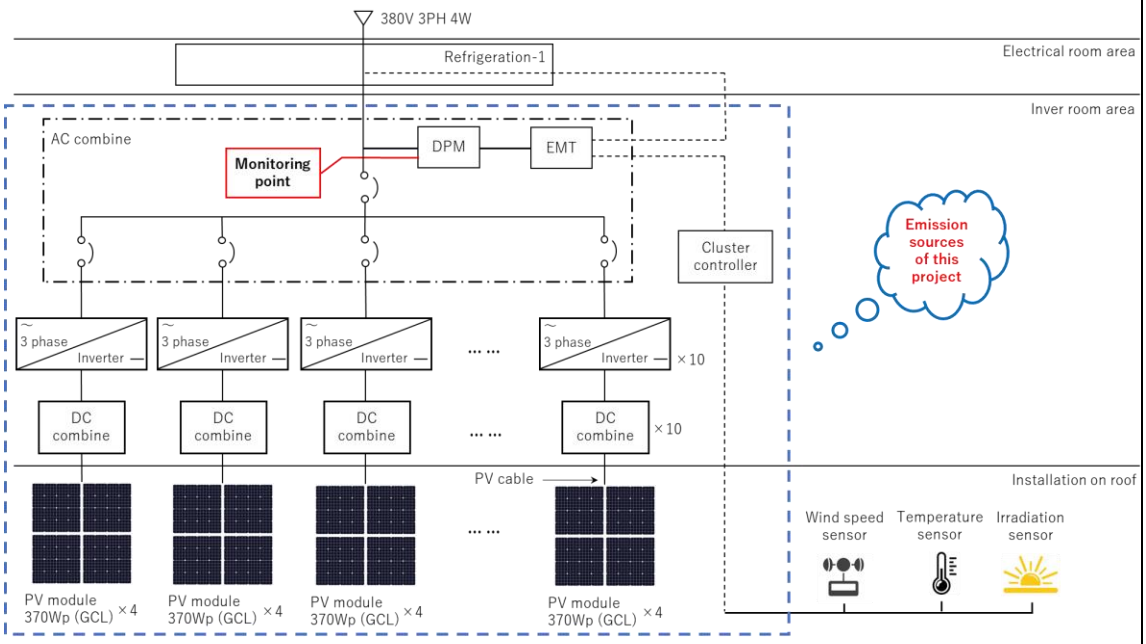
C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Consumption of grid and/or captive electricity	CO_2
Project emissions	
Emission sources	GHG type
Generation of electricity from solar PV system(s)	N/A

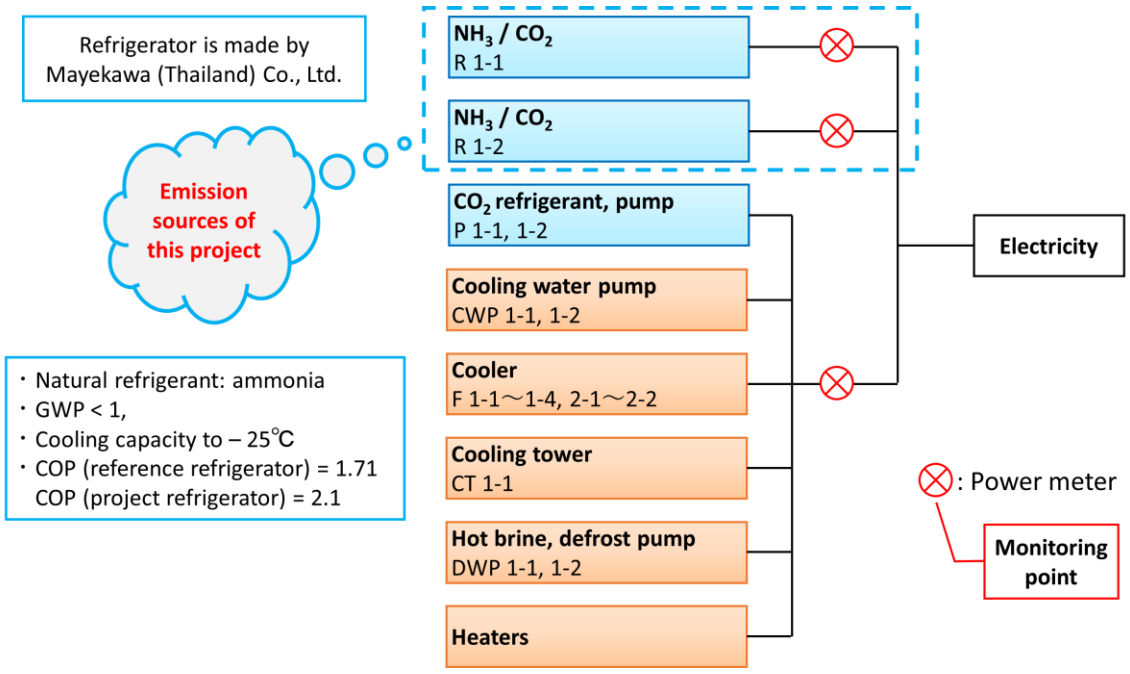
Reference emissions	
Emission sources	GHG type
Power consumption by the reference refrigerator	CO_2
Project emissions	
Emission sources	GHG type
Power consumption by the project refrigerator	CO_2

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

Solar Power System



High Efficiency Refrigerator



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2020	N/A	N/A	66
2021	N/A	N/A	448
2022	N/A	N/A	500
2023	N/A	N/A	500
2024	N/A	N/A	500
2025	N/A	N/A	500
2026	N/A	N/A	500
2027	N/A	N/A	500
2028	N/A	N/A	500
2029	N/A	N/A	500
2030	N/A	N/A	433
Total (tCO_2e)			4,947

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

To solicit comments from local stakeholders, a consultation meeting was planned by the project participants, and the project participants sent out invitation letters to the consultation meeting to various stakeholders. Details of the local stakeholders' consultation meeting is summarized as follows:

<Meeting outline>

- Date and Time: Oct. 27, 2020 13:30 – 14:30, Thai time
- Venue: Meeting room of Thai Delmar Co., Ltd
- Thailand Greenhouse Gas Management Organization (TGO) was participated by document review after the LSC.

<Meeting agenda>

#	*Time*	*Program*	*Remarks*
1	13:30 - 13:40	Introduction of participants	All participants
2	13:40 – 13:50	Overview of the project	Kanematsu KGK
3	13:50 – 14:00	Explanation of technology introduced	Kanematsu KGK and Mayekawa
4	14:00 – 14:20	Questions and answers	All participants
5	14:20 – 14:30	Company outline and Closing remarks	Thai Delmar

<Meeting summary>

In order to share the information of Joint Crediting Mechanism (JCM) model project in Thai Delmar factory and collect the comments/opinions from the persons concerned, the local stakeholder consultation (LSC) was conducted in accordance with above agenda.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
GEC	GEC asked that what is a benefit of the JCM application.	It is expected that JCM application contributes to saving initial cost of energy efficiency/renewable energy facilities installation. Also, through the JCM application, it is satisfied that Thai Delmar can reduce GHG emissions which their client take attention to.
TGO*	TGO asked about the project activities such as the power in refrigeration tons (RT).	No action is needed.

*Comment from TGO was received by e-mail.

F. References

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

Annex

Estimated emissions reductions in each year (TH_AM001)			
Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2020	0.0	0.0	0
2021	316.6	0.0	316
2022	368.0	0.0	368
2023	368.0	0.0	368
2024	368.0	0.0	368
2025	368.0	0.0	368
2026	368.0	0.0	368
2027	368.0	0.0	368
2028	368.0	0.0	368
2029	368.0	0.0	368
2030	368.0	0.0	368
Total (tCO_2e)			3,628

Estimated emissions reductions in each year (TH_AM011)			
Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2020	357.8	291.3	66
2021	711.7	579.5	132
2022	711.7	579.5	132
2023	711.7	579.5	132
2024	711.7	579.5	132
2025	711.7	579.5	132
2026	711.7	579.5	132
2027	711.7	579.5	132
2028	711.7	579.5	132
2029	711.7	579.5	132
2030	352.9	287.4	65
Total (tCO_2e)			1,319

Revision history of PDD		
Version	Date	Contents revised
01.0	XX/XX/2021	First edition