

JCM Validation Report Form

A. Summary of validation

A.1. General Information

Title of the project	Introduction of 0.8MW Solar Power System and High Efficiency Refrigerator to Food Factory
Reference number	TH022
Third-party entity (TPE)	EPIC Sustainability Services Private Limited
Project participant contracting the TPE	Kanematsu KGK Corp.
Date of completion of this report	21/03/2025

A.2 Conclusion of validation

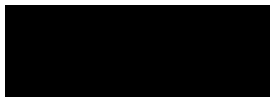
Overall validation opinion	☒ Positive ☐ Negative
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A.3. Overview of final validation conclusion

Only when all of the checkboxes are checked, overall validation opinion is positive.

Item	Validation requirements	No CAR or CL remaining
Project design document form	The TPE determines whether the PDD was completed using the latest version of the PDD forms appropriate to the type of project and drafted in line with the Guidelines for Developing the Joint Crediting Mechanism (JCM) Project Design Document, Monitoring Plan and Monitoring Report.	☒
Project description	The description of the proposed JCM project in the PDD is accurate, complete, and provides comprehension of the proposed JCM project.	☒
Application of approved JCM methodology (ies)	The project is eligible for applying applied methodology and that the applied version is valid at the time of submission of the proposed JCM project for validation.	☒
Emission sources and calculation of emission reductions	All relevant GHG emission sources covered in the methodology are addressed for the purpose of calculating project emissions and reference emissions for the proposed JCM project.	☒
	The values for project specific parameters to be fixed <i>ex ante</i> listed in the Monitoring Plan Sheet are appropriate, if applicable.	☒
Environmental impact assessment	The project participants conducted an environmental impact assessment, if required by the Kingdom of Thailand, in line with Thai procedures.	☒
Local stakeholder	The project participants have completed a local stakeholder consultation process and that due steps were taken to engage	☒

Item	Validation requirements	No CAR or CL remaining
consultation	stakeholders and solicit comments for the proposed project.	
Monitoring	The description of the Monitoring Plan (Monitoring Plan Sheet and Monitoring Structure Sheet) is based on the approved methodology and/or Guidelines for Developing the Joint Crediting Mechanism (JCM) Project Design Document, Monitoring Plan, and Monitoring Report. The monitoring points for measurement are appropriate, as well as whether the types of equipment to be installed are appropriate if necessary.	☒
Public comments	All comments on the PDD of the proposed JCM project submitted in line with the Project Cycle Procedure are taken into due account by the project participants.	☒
Modalities of communications	The corporate identity of all project participants and a focal point, as well as the personal identities, including specimen signatures and employment status, of their authorized signatories are included in the MoC.	☒
	The MoC has been correctly completed and duly authorized.	☒
Avoidance of double registration	The proposed JCM project is not registered under other GHG mitigation crediting mechanisms.	☒
Start of operation	The start of the operating date of the proposed JCM project does not predate January 1, 2013.	☒

Authorised signatory:	
Last name: R B	First name: Venkataramanaiah
Title: Director	
Specimen signature:	Date: 21/03/2025
	

B. Validation team and other experts

Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Ms. Priyanka M S	EPIC	Team Leader	☒	Yes	☒
Mr. Karthik Lakshman	EPIC	Technical Reviewer	☒	Yes	☐
			☐		☐
			☐		☐

Please specify the following for each item.

- * *Function:* Indicate the role of the personnel in the validation activity such as team leader, team member, technical expert, or internal reviewer.
- * *Scheme competence:* Check the boxes if the personnel have sufficient knowledge on the JCM.
- * *Technical competence:* Indicate if the personnel have sufficient technical competence related to the project under validation.

C. Means of validation, findings, and conclusion based on reporting requirements

C.1. Project design document form

<Means of validation>

The Validation team checked whether the project participant has used the latest version of the Project Design Document (PDD) form Available in the JCM website by reviewing the PDD.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

CAR 01

The latest version of Project Design Document Form available in the JCM website is version 3.0, however, the submitted PDD is prepared using the previous version 2.0. PP is required to update the PDD using the latest version of PDD form.

PP's Response:

Please find the attached PDD revised to version 3.0.

TPE's Response:

The validation team reviewed the revised PDD and confirmed that the PP has used the latest and valid version of PDD form available at the time of Validation. Hence, CAR 01 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team reviewed the revised PDD and confirmed that the PP has completed the PDD using the latest version of the PDD forms appropriate to the type of project and drafted

in line with the PDD and Monitoring Guidelines. The latest and valid version of PDD form available at the time of validation is version 3.0.

C.2. Project description

<Means of validation>

The project involves installation of 0.899 kW of rooftop solar power system and installation of two refrigerators of capacity 189.4 kW each. The project is established by 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 companies of Nippon Suisan Kaisha, Ltd. built a new factory in the Asia Industrial Estate. In this new factory, a solar power system and high efficiency refrigerators were installed to avoid reducing grid power consumption.

The primary objective of the project activity is to replace and reduce the electricity consumption from grid connected power plants which are mostly fossil fuel based. The operational lifetime of the project is 10 years as per the legal durable years of 10 years stipulated by Japanese law.

The crediting period for the project activity is fixed for 10 years, which is in line with the JCM guideline for crediting period.

Location:

The project activity is located in Bang Bo District, Samut Prakarn Province, The Kingdom of Thailand. The geo-coordinates of the project site are N 13° 40' 2.32" and E 100° 54' 24.27". The validation team confirmed the location of the project during the site visit and by reviewing construction permit and land titled deed. Also, cross checked the geocoordinates in the google earth.

Technology:

The technical specification of solar power plant is as below;

Model: GCL-M6/72

Efficiency: 19.1%

Cell type: 5BB Monocrystalline 156.75x156.75mm

Maximum power: 370 W

Maximum output operating voltage: 39.40

Maximum output operating current: 9.39

Normal operating temperature: 45+/-2 deg. C

Technical specification of inverters:

Model: Sunny Tripower 25000TL

Max. generator power: 45000 Wp

DC rated power: 25550 W

Max. input voltage: 1000 V

Rated power: 25000 W

Max. AC apparent power: 25000 VA

Efficiency: 98.3/98.1%

The technical specifications of the solar panels and inverters were confirmed by reviewing the technical specifications provided by the Manufacturer GCL and SMA respectively. The validation team crosschecked the same during the site visit and interviewing the site personnel.

Technical specification of refrigerator:

Model: NewTon R-6000

CO2 supply temperature: -32 Deg.C

Cooling capacity: 189.4 kW

COP: 2.10

Refrigerant: Primary- Ammonia (R717), secondary-CO2(R744)

Motor kW: 90kW (45kWx2)

The technical specification of the refrigerator is checked by reviewing the technical specification provided by the manufacturer NewTon and crosschecked the same by inspecting the nameplate details during the site visit.

Ownership:

The project activity is owned by Thai Delmar Co., Ltd. The validation team checked the MoC, Incorporation certificate, EPC agreement for Solar PV, EPC agreement for refrigerators, land titled deed, permit by industrial park, PV construction permit, and also interviewed the PP during the site visit to confirm the ownership.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

CAR 02

- 1) PP is requested to submit the supporting evidence for the expected operational lifetime of the project.
- 2) PP is requested to submit the annual records of electricity generation from solar power plant and electricity consumption from refrigerator to verify the estimated annual emission reductions from the project activity.

PP's response:

1) The operational lifetime of solar power and refrigerators is based on the legal durable years of 10 years stipulated by Japanese law. Please refer to the attachment “The list of legal durable years_0225.pdf”

2) Please refer to the excel attachment.

TPE's response:

1) The validation team reviewed the Ministerial Ordinance on the useful life of depreciable assets ‘The list of legal durable years_0225.pdf’ and confirmed that the all the durable year of equipment type used in the food manufacturing equipment is 10 years.

2) The validation team reviewed the data log of electricity generated from solar power plant and data-log of electricity consumed by the refrigerators.

Hence, CAR 02 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Based on the document review, site visit and interview with the site personnel, the validation team confirmed that the Project description provided by the PP is accurate, complete and appropriate and is in compliance with JCM guidelines.

C.3. Application of approved methodology(ies)**<Means of validation>**

The PP has applied JCM approved methodologies “Installation of Solar PV System” JCM_TH_AM001_ver02.0 for refrigerators installed and “Installation of Energy-efficient Refrigerators Using Natural Refrigerant at Cold Storage” JCM_TH_AM011_ver01.0 for the installed rooftop solar.

The assessment of the same is presented below;

“Installation of Solar PV System” JCM_TH_AM001_ver02.0**Criterion 1:**

The project installs solar PV system(s).

TPE's assessment:

The project activity is installation of 0.899 MW rooftop solar in Thai Delmar Food factory. The validation team reviewed the technical specification of the solar power system by GCL, technical specification of inverters by sunny tripower, construction permit by Industrial Estate

Authority of Thailand, EPC agreement, Letter of permission for land utilization and business operations in industrial estate by Industrial Estate Authority of Thailand, Land title deed and conducted site visit to confirm that the project activity is installation of Solar PV system. Hence, this criterion is met

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.

TPE's assessment:

The electricity generated by the solar power plant is connected to internal grid. The validation team checked the single line diagram of the solar power plant, also checked the same during the site inspection and interview with the site personnel. The project was confirmed to displace consumption of grid electricity. The electricity generated by the project solar PV systems is only consumed at the project sites. Hence, this criterion is met by the proposed project.

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).

TPE's assessment:

The solar PV modules installed at the project site are of GCL-M6/72 make. The manufacturers of PV modules, i.e., GCL has tested the PV modules with TUV Rheinland certification body. The validation team reviewed the TUV Rheinland test certificates and confirmed that the PV modules have obtained the IEC 61215:2005 EN 61215:2015 approval for Design qualification and IEC 61730-1:2004+A1+A2, IEC 61730-2:2004+A1, EN 61730-1:2007+A1+A2+A11, EN 61730-2:2007+A1 for safety qualifications. Hence, this criterion is met.

Criterion 4:

The equipment to monitor output power of the solar PV system and irradiance is installed at the project site.

TPE's assessment:

The solar PV modules are connected to SMA inverters and then to SMA Energy meters which are installed at the project site. The validation team checked the solar power system single line diagram and visually checked the same during the site visit and interviewed the site personnel to confirm that the electricity monitoring equipment is installed the project site. Hence, this criterion is met.

“Installation of Energy-efficient Refrigerators Using Natural Refrigerant at Cold Storage” JCM_TH_AM011_ver01.0

Criterion 1:

Refrigerator(s) with a secondary loop cooling system using CO₂ as a refrigerant and equipped with inverter is installed at cold storage.

TPE’s assessment:

The refrigerators installed at the project site are of NewTon make. The primary and secondary refrigerant are Ammonia and CO₂ respectively. The cooling system is CO₂ supply type and is equipped with inverters. The refrigerators are installed at cold storage. The validation team checked the technical specification of installed refrigerators provided by NewTon and confirmed that the project refrigerators have with secondary loop cooling system using CO₂ as a refrigerant and equipped with inverter is installed at cold storage. Hence, this criterion is met.

Criterion 2:

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.)

Room temperature condition	Cooling capacity (kW)	Threshold COP value
- 25 deg. C	$42.4 \leq x \leq 340.0$	1.71
0 deg. C	$73.6 \leq x \leq 516.4$	2.79
5 deg. C	$86.2 \leq x \leq 612.6$	3.20

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

TEP’s Assessment:

The refrigerators installed at the project site have a cooling system capacity of 189.4 kW, the COP is 2.10 which is greater than the threshold COP value 1.71 provided in the above table. The validation team checked the technical specification of refrigerators and confirmed that the same. Hence, this criterion is met.

Criterion 3:

Periodical check is planned at least one (1) time annually.

TPE’s Assessment:

The PP has been doing the periodical checks of the refrigerators on an annual basis. The validation team checked the Regular Inspection Report for the year 2022, 2023 and 2024 and confirmed that the regular inspection of refrigerator is done once in a year. Therefore, this criterion is met.

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.

TPE's Assessment:

The refrigerators installed at the project site are new. Hence, this is not applicable.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No findings are raised in this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Based on the document review, site visit and interview with the site personnel, the validation team confirmed that the project activity is complies with the eligibility criteria of the applied approved JCM methodology AM001 ver.01 and AM011 ver.02.

C.4. Emission sources and calculation of emission reductions

<Means of validation>

The project activity involves installation of roof top solar power system and high efficient refrigerators in Thai Delmar food factory, Thailand.

As discussed above, JCM methodology AM001 ver.02 is used for rooftop solar power plant. As per the applied methodology, the source for reference emission is due to consumption of grid/and or captive electricity and the type of gas emitted is CO₂.

Section F.1 of applied methodology states that, Most of the grid power is derived from natural gas in Thailand (around 70%). The generation efficiency of major natural gas-fired power plants in Thailand ranges from 41 to 61%. The default grid emission factor is set to be 0.319 tCO₂/MWh which corresponds to the most efficient natural gas-fired power plant in Thailand (generation efficiency: 61.2%).

The reference emissions are calculated based on the equation stated in section F.2 of the methodology,

$$RE_p = \sum EG_{i,p} \times EF_{RE}$$

Where,

RE_p : Reference emissions during the period p [tCO₂/p]

$EG_{i,p}$: Quantity of the electricity generated by the project solar PV system i during the period p [MWh/p]

EF_{RE} : Reference CO₂ emission factor of grid electricity and/or captive electricity [tCO₂/MWh]

The reference CO₂ emission factor of grid electricity and/or captive electricity (tCO₂/MWh) is a default from the applied methodology AM001 ver2.0. Therefore, the validation team confirmed that the value used for grid emission factor is valid and appropriate.

The annual quantity of electricity produced by the solar power plant is 1,154.77 MWh. Annual electricity generation value is estimated based on the solar module capacity, number of modules, cell capacity etc, Therefore,

$$RE_p = 1,154.77 \text{ MWh} \times 0.319 \text{ tCO}_2/\text{MWh} = 368 \text{ tCO}_2.$$

The validation team reviewed the Estimation of total power generation in the project, Thailand and Monitoring excel sheet confirmed that the electricity generation value is appropriately used to calculate the reference emissions from the solar power plant.

The project emissions are zero as per section G of the methodology.

$$PE_p = 0$$

Where,

PE_p : Project emissions during the period p [tCO₂/p]

The emission reductions are calculated as

$$ER_p = RE_p - PE_p$$

$$ER_p = RE_p$$

Where,

ER_p : Emission reductions during the period p [tCO₂/p]

RE_p : Reference emissions during the period p [tCO₂/p]

PE_p : Project emissions during the period p [tCO₂/p]

Therefore,

$$ER_p = 368 \text{ tCO}_2/\text{year}$$

The emission reductions for the project activity is calculated appropriately in line with the

applied methodology AM001.

The project activity has installed two refrigerators on the project site.

The reference emission sources by the project activity is due to power consumption by the reference refrigerator, the type of gas emitted is CO₂. And the project emission sources due to power consumption by the project refrigerator, the type of gas emitted is CO₂. This is as per section E. of the AM011 ver01.

Reference emissions are calculated by multiplying the power consumption of project refrigerator, ratio of COPs for reference/project refrigerators and CO₂ emission factor for consumed electricity.

$$RE_p = \sum (EC_{PJ,i,p} \times COP_{PJ,i} / COP_{RE,i} \times E_{elec})$$

Where,

RE_p = Reference emissions during the period p [tCO₂/p]

$EC_{PJ,i,p}$ = Power consumption of project refrigerator i during the period p [MWh/p]

$COP_{PJ,i}$ = COP of project refrigerator i [-]

$COP_{RE,i}$ = COP of reference refrigerator i [-]

E_{elec} = CO₂ emission factor for consumed electricity [tCO₂/MWh] i Identification number of refrigerators

$$RE_p = 1,023.11 \text{ MWh/year} \times 2.10/1.71 \times 0.5664 \text{ MWh/CO}_2 = 711.6 \text{ tCO}_2/\text{p}$$

The annual electricity consumption is calculated by dividing the annual refrigeration load by the project's refrigerators Coefficient of Performance (COP).

The below parameters are considered ex-ante and are valid for the entire crediting period.

Parameters	Validation Assessment
$COP_{PJ,i}$ = COP of project refrigerator i [-]. The room temperature conditions at which COPs are calculated in this methodology are shown below: • Room temperature condition: - 25 deg. C, 0 deg. C, 5 deg. C • Cooling water fed to condenser: inlet 32 deg. C	The COP of project refrigerator is 2.10. The parameter is sourced from technical specification of the refrigerators provided by the NewTon. The validation team reviewed the technical specification and confirmed that the value used is appropriate and accurate.
$COP_{RE,i}$ = COP of reference refrigerator i [-] The default values for $COP_{RE,i}$ is applied depending on the room temperature condition set for the project refrigerator i:	The COP of reference refrigerator is 1.71. The parameter is a default COP value derived from the maximum value of COP among the available data of the possible type

Room temperature condition	Cooling capacity (kW)	Threshold COP value	of refrigerators. The project refrigerators has cooling capacity of 189.4 kW which is with the provided range between 42.4 to 340.0kW. The cooling capacity of the refrigerators is confirmed by reviewing the technical specifications of refrigerators provided by the NewTon.
- 25 deg. C	$42.4 \leq x \leq 340.0$	1.71	
0 deg. C	$73.6 \leq x \leq 516.4$	2.79	
5 deg. C	$86.2 \leq x \leq 612.6$	3.20	
* “x” in the table represents cooling capacity per unit.			
EF_{elec} = CO2 emission factor for consumed electricity [tCO₂/MWh]. When the project refrigerator consumes only 1) grid electricity, 2) captive electricity or 3) electricity directly supplied from other sources (e.g. independent power producer (IPP), small power producer (SPP) and very small power producer (VSPP)) to the project site, the project participant applies the CO₂ emission factor respectively. When the project refrigerator may consume electricity supplied from more than 1 electric source, the project participant applies the CO₂ emission factor with the lowest value.			The electricity consumed by the refrigerators is from the grid, which was confirmed by review of the single line diagram and interview with the site personnel and by review of the electricity consumption records from the refrigerators. Therefore, the data is sourced from “Grid Emission Factor (GEF) of Thailand”, endorsed by Thailand Greenhouse Gas Management Organization (TGO). As per the source document the emission reduction is 0.5664 tCO₂/MWh. By review of the source document the validation team confirmed that the value used is the latest and most valid value available at the time of validation.
As per section G of the AM011 ver1.0, the project emissions are calculated as $PE_p = \sum (EC_{PJ,i,p} \times EF_{elec})$ Where, PE_p = Project emissions during the period p [tCO₂/p] $EC_{PJ,i,p}$ = Power consumption of project refrigerator i during the period p [MWh/p] EF_{elec} = CO₂ emission factor for consumed electricity [tCO₂/MWh] i Identification number of refrigerators. $PE_p = 1023.11 \text{ MWh} \times 0.5664 \text{ tCO}_2/\text{MWh} = 579.5 \text{ tCO}_2/\text{p}$			

As per section H of the AM011 ver1.0, the emission reductions by the project activity is calculated as

$$ER_p = RE_p - PE_p$$

Where,

ER_p = Emission reductions during the period p [tCO₂/p]

RE_p = Reference emissions during the period p [tCO₂/p]

PE_p = Project emissions during the period p [tCO₂/p]

$$ER_p = 711.7 \text{ tCO}_2/\text{p} - 579.5 \text{ tCO}_2/\text{p}$$

$$ER_p = 132 \text{ tCO}_2$$

The estimated annual emission reductions for both solar power plants and refrigerators are calculated in accordance with the applied methodology using valid input parameters. The validation team reviewed the Estimation of the amount of annual power consumption for refrigerators, Estimation of the amount of annual power consumption for solar power plant, Monitoring Plan sheet for both solar power plant and refrigerators to confirm the same.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

CAR 03

- 1) The project activity has installed two refrigerators on the project site, however, the Monitoring plan sheet (MPS (input_separate)) indicates only one refrigerator. PP to indicate details of 2 refrigerators separately.
- 2) The estimated reference emissions (in tCO₂) for each year of the project activity are not provided in section C.3 of the PDD.

PP's response:

- 1) Please check the modified MPS. Power consumption has been written separately.
- 2) Please check the modified C.3 in attached PDD version 3.0.

TPE's response;

- 1) The validation team reviewed the revised MPS sheet and confirmed that the PP has appropriately provided the details of the refrigerators.
- 2) The validation team reviewed the revised PDD and confirmed that the estimated emissions are correctly stated.

Hence, CAR 03 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the methodology was applied correctly to calculate PEs and REs and no other significant emission source was identified that would be affected and reasonably attributed by implementation of the proposed project but not addressed by the applied methodology. The choice of whether an emission source or gas is to be included where the applied methodology allows was reasonably justified by the PPs. The Monitoring Plan Sheet (MPS) was not altered, and the fields were filled in as required so that all estimates of the REs could be replicated using the data and parameter values provided in the PDD. The values for the project specific parameters fixed ex ante listed in the MPS were appropriate with all the data sources and assumptions and the calculations were correct to the proposed JCM project. All assumptions and data used by the PPs were listed in the PDD, including their references and sources; and All values used in the PDD were considered reasonable in the context of the proposed JCM project.

C.5. Environmental impact assessment

<Means of validation>

The project activity is installation of rooftop solar power plant and installation of two high efficiency refrigerators. The project activity does not harm the environment as no GHG is emitted by the project activity. In accordance with the Royal Gazette with code 224 dated 05th Oct 2016 issued by Ministry of Industry EIA is not required for the project activity with capacity less than 1,000 KW. The validation team reviewed the regulatory document and confirmed that the project does not require to perform EIA.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

CAR 04

As per section D of the PDD, the legal requirement of environmental impact assessment for the project activity is not required. PP to justify this statement by submitting the rule/regulation issued by the Government of Thailand.

PP's response:

Please find the attached "Announcement of the Ministry of Industry (Environmental Impact Assessment).pdf"

TPE's response:

As per the Royal Gazette with code 224 dated 05th Oct 2016 issued by Ministry of Industry EIA is not required for the project activity with capacity less than 1,000 KW. The validation team reviewed the regulation provided by the PP and confirmed that the project activity does not require to perform EIA.

Hence, CAR 04 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed by assessing the relevant documents that, the project does not need an environmental impacts assessment to be conducted to meet the legal requirement of the host country and the PDD satisfies the requirements of the JCM.

C.6. Local stakeholder consultation

<Means of validation>

The local stakeholders meeting was held by the PP on Oct 27, 2020 at meeting room of Thai Delmar Co. Ltd. The PP had invited all the relevant stakeholders for the project activity. During the meeting the PP has provided all the necessary information including the introduction of participants, Overview of the project, technology installed at the project site, outline of the company. The local stakeholders provided positive comments for the proposed project. No negative issues that require actions to be taken by the PPs were raised through consultation. It is confirmed through the review of the relevant documents and the interview with the PPs that the stakeholder consultation process was appropriately conducted to collect stakeholders' opinions on the project. The summary of the comments received in the consultation and due account of all comments taken by the PPs are fully described in the PDD. The validation team interviewed the stakeholders during the site visit and reviewed the invitation sent to stakeholders, photographic evidences of the meeting to confirm that the stakeholders consultations were conducted effectively in accordance with the JCM guidelines.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No findings are raised in this section

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the PPs have invited comments to the proposed project from the relevant local stakeholders, the summary of the comments received is provided in the PDD in a complete manner and the PPs have taken due account of all the comments received from the local stakeholders as the processes described in the PDD.

C.7. Monitoring

<Means of validation>

The project activity is installation of 0.899 MW solar power plant on the rooftop of the food factory and installation of two highly efficient refrigerators each with capacity 189.4 kW, total to 378.8 kW. The project activity is implemented by Thai Delmar Co., Ltd.

As per the applied methodology **TH_AM001** the parameter which are to be monitored during the verification for the Rooftop Solar power plant is as below;

Parameter	Validation opinion
EG _{i,p} = Quantity of the electricity generated by the project solar PV system i during the period p [MWh/p]	The parameter EG_{i,p} is sourced from the monthly data records from the electricity meters and remote monitoring interface Sunny Portal. The electricity generated in direct current by the project solar power plant flows into installed inverters. The inverter uses Maximum power point tracking to maximise the power extracted from the solar panels. This inverter converts the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity, which is compatible with the grid or on-site consumption. The inverter itself measures the DC input (from the solar panels) and the AC output. This provides data on the system's production. The project is equipped with SMA Energy Meter. This device provides precise measurement of energy flow at key points in the electrical system. It measures energy generated by the solar system, energy consumed. This allows for accurate monitoring of energy balance and consumption patterns. The SMA energy meter is essential for accurately monitoring the import and export

	of energy. The monitoring of the electricity is also done by SMA's Solar PV monitoring system called 'sunny portal'. It collects data from the inverters and energy meters, providing a comprehensive overview of the solar system's performance. Providing real-time data visualization, Performance analysis, error detection, remote monitoring, allowing users to access system data from anywhere with an internet connection. The calibration of the meters is done during its production and hence is not required. Where necessary the meters will be calibration as per the applicable host country regulations. The monitoring is done continuously. The validation team reviewed the reviewed the technical specification of the electricity meters, single line diagram of the solar PV, checked the system during the site visit and interviewed the site personnel to confirm the monitoring system.
The PP has clearly outlined the roles and responsibilities for maintaining and monitoring the solar power plant and electricity generated from the plant in the Monitoring Structure sheet. It states that the project manager (Kanematsu KGK Corp.) is responsible for preparing monitoring reports and keeping data monitored and required for verification and issuance for two years after the final issuance of credits, Deputy Project manager (Thai Delmar Co Ltd.,) has been appointed to be in charge of conforming the recorded data archived data. The QA/QC team(Thai Delmar Co Ltd) is responsible for checking the archived data and Tosplant Engineering (Thailand) Co., Ltd supports the QA/QC team. Further, the recording, monitoring, and collecting of data is the responsibility of the operator. Based on the interview the relevant site personnel and observations during the site visit, the validation team confirmed that the Monitoring of the electricity generated by the project activity is done in accordance with the Monitoring structure sheet. As per the applied methodology TH_AM011 the parameters which are to be monitored during	

the verification for the installed refrigerator is as below;

Parameter	Validation opinion
$EC_{PJ,i,p}$ = Power consumption of project refrigerator i during the period p [MWh/p]	The electricity consumed by the refrigerator is measured by electricity meters installed at the project site. Each refrigerator are installed with one meter each. The electricity consumption of the project refrigerator is directly and continuously measured by an electricity meter. Measured data is automatically collected and sent to a server and then recorded in a spreadsheet electronically. The recorded data is to be checked on a monthly basis by the responsible staff. The electricity meters are replaced or calibration in accordance with the applicable host country regulations and according to the manufacturer's recommendation, unless a type approval, manufacturer's specification, or certification issued by an entity accredited under international/national standards for the measuring equipment has been prepared by the time of installation. The validation team reviewed the reviewed the technical specification of the electricity meters, single line diagram of refrigerators system, electricity consumption data, and checked the system during the site visit and interviewed the site personnel to confirm the monitoring system.

The PP has clearly outlined the roles and responsibilities for maintaining and monitoring the electricity consumed by the two installed refrigerators in the Monitoring Structure sheet. It states that the project manager (Kanematsu KGK Corp.) is responsible for preparing monitoring reports and keeping data monitored and required for verification and issuance for two years after the final issuance of credits, Deputy Project manager (Thai Delmar Co Ltd.) has been appointed to be in charge of conforming the recorded data archived data. The QA/QC team (Thai Delmar Co Ltd) is responsible for checking the archived. Further, the recording,

monitoring, and collecting of data is the responsibility of the operator. Based on the interview the relevant site personnel and observations during the site visit, the validation team confirmed that the Monitoring of the electricity generated by the project activity is done in accordance with the Monitoring structure sheet.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No findings are raised in this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Based on the document review, interview with the site personnel and site inspection, the validation team confirmed that the monitoring plan provided in the Monitoring Structure Sheet is appropriate and in compliance with the applied methodology and/or PDD and Monitoring Guidelines. The project is commissioned and being operated and maintained in accordance with the Monitoring plan, hence confirmed that the plan is feasible.

C.8. Modalities of Communication

<Means of validation>

The MoC was submitted to EPIC in the form JCM_TH_F_MoC_ver02.0. The MoC nominates Kanematsu KGK Corp. as the focal point and was signed by the authorized representatives of all the PPs with the contact details. The form used is the latest one as of the time of validation. The validation team assessed the personal identities including specimen signatures and employment status of the authorized signatories through directly checking the evidence for corporate and personal identity of the PPs and their authorized signatories. The validation team also confirmed through reviewing the corporate information of the PPs and by meeting the persons representing the PPs that the information provided in the MoC is correct.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No findings are raised in this section

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the MoC was completed using the latest form after assessment conducted on relevance of the MoC in compliance with the requirements of the JCM Guidelines.

C.9. Avoidance of double registration

<Means of validation>

The validation team assessed and confirmed relevance of the written confirmation in the MoC from the PPs that the proposed JCM project was not registered under the other international climate mitigation mechanisms. The team in addition to the interviews with the PPs checked publicly accessible information of Clean Development Mechanism (CDM), Joint Implementation (JI), Verified Carbon Standard (VCS) and Gold Standard (GS) and found no identical project as the proposed JCM project in terms of the name of entities, applied technology, scale and the location. The result of researches confirmed that the proposed project was not registered under the other international climate mitigation mechanisms than JCM and it will not result in a double counting of GHG emission reductions. The details of the persons interviewed and the documents reviewed are shown in the Section E of this report.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No findings raised in this section

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Based on the interview with site personnel, review of the JCM website and other GHG program and non-GHG program sites, the validation team confirmed that the proposed JCM project was not registered under the other international climate mitigation mechanisms.

C.10. Start of operation

<Means of validation>

The Start date of the roof top solar power plant is indicated as 20th Feb 2021 in the PDD. The actual completion of solar power plant was on 15/05/2020 as per the Certificate of Completion provided by the KGK Engineering (Thai) Co., Ltd. As per the approval from MEA the start date of operation of the rooftop solar is considered as 20th Feb. 2021. Based on the document review, site inspection and interview with the site personnel, the validation team confirmed that the start of operation of the solar power plant which is used for internal consumption of the Thai Delmar Factory is on 20th Feb. 2021.

The Inspection Report and Trial Operation Data provided by Mayekawa (Thailand) Co., Ltd is on 22/06/2020. However, the actual operation of the refrigerators started on 30/06/2020. Therefore, the start date of the operation for refrigerators is considered as 30/06/2020. The validation team confirmed that same by reviewing the electricity consumption data-log records during the site visit. The validation team is of the opinion that the selected start date is conservative and appropriate, hence accepted.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

CL 01

The Project Design Document (PDD), section A.5, lists the project start dates as 20/02/2021, for the solar power system and 30/06/2020, for the high-efficiency refrigerator. However, the following inconsistency is identified:

Solar Power System: The "Certificate of completion for rooftop solar" is dated 15/05/2020, and the Sunny Portal (software data logger) recorded a commission date of 25/02/2020.

High-Efficiency Refrigerator: The "Refrigerator inspection report & trial operation" is dated 22/06/2020.

All these dates precede the project start dates listed in the PDD. The project participant (PP) is requested to clarify these discrepancies and provide supporting documentation to validate the actual start dates for both projects.

PP's response:

We, Kanematsu KGK would like to respond to these discrepancies as follows.

1. May 15, 2020, is the commission completion date for the entire solar system.
2. February 20, 2021, is the date when the officially installed solar self-consumption system was approved by MEA (Metropolitan Electricity Authority), and there was a comment from Thailand's TGO (Thailand Greenhouse Gas Management Organization) that this date should be the start date for solar monitoring.
3. June 30, 2020, is the commission completion date for the refrigerator and the start date for the monitoring.

Therefore, it has been decided February 20, 2021 (solar), and June 30, 2020 (Refrigerator), respectively for monitoring start date.

TPE's response;

Certificate of completion for rooftop solar dated as 15/05/2020, the Self consumption solar power system approved by MEA (Metropolitan Electricity Authority) states that the start date is 20th February 2021. Based on the insights from MEA the start date of the rooftop solar power is considered as 20th February 2021. The validation team reviewed both the documents and confirmed the same.

The start date of the Refrigerators is 30/06/2020 as per the start of operation of the refrigerators. Hence accepted. CL is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Based on the document review, interview with site personnel, and site inspection, the validation team confirmed that the start of the operation of the proposed JCM project is appropriately defined by PP in accordance with JCM project cycle procedures and other guidelines.

C.11. Other issues

<Means of validation>

No issue was identified as relevant element not covered above.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

Not Applicable

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Not Applicable

D. Information on public comments

D.1. Summary of public comments

In line with JCM project cycle procedure guidelines, the PDD and SDSAR were made publicly available for 30 days to invite public comments.

The project activity has undergone two public commenting period first was from 18th Feb. 2022 to 19th Mar.2022.

Due to change in TPE the project proponent submitted a revised MoC and project documents to Joint committee. Thus, the second commenting period was from 10th Feb. 2025 to 11th Mar. 2025. <https://www.jcm.go.jp/projects/106>

D.2. Summary of how comments received have been taken into account by the project participants

No comment was received during the commenting period. Thus, no action was required to be taken by the PPs to satisfy the JCM requirement.

E. List of interviewees and documents received

E.1. List of interviewees

- 1) Takeshi Aikawa – Senior Vice President, Thai Delmar
- 2) Teerawat Jitprapan – Consultant
- 3) Bandan Kaewkhontrong – Consultant
- 4) Hrit PamPngPoi – Manager, Thai Delmar
- 5) Weerachat Wonpent – Engineer, Thai Delmar
- 6) Seksan Arjjumpa – Engineer, Thai Delmar
- 7) Patnaree Wirunpcch – Interpreter
- 8) Aki Baba – Nippon Koei
- 9) Natsuki Rokui – Nippon Koei
- 10) Yada Jatjathamnukul – KGK
- 11) Umnarj Srieu – KGK
- 12) Kenta Takizawa – KGK

E.2. List of documents received

JCM Documents:

- 1) Joint Crediting Mechanism Glossary of Terms (JCM_TH_Glossary_ver01.0)
- 2) Common Specifications of the JCM Registry (JCM_TH_Spec_Registry_ver01.0)
- 3) Rules of Implementation for the Joint Crediting Mechanism (JCM) for Existing Projects (Attachment 2 JCM_TH_RoI)
- 4) Joint Crediting Mechanism Project Cycle Procedure for Existing Projects (JCM_TH_PCP_ver03.0)
- 5) Joint Crediting Mechanism Guidelines for Validation and Verification (JCM_TH_GL_VV_ver02.0)
- 6) Modalities of Communication Statement Form
- 7) Project Design Document
- 8) Monitoring Plan Sheets for TH_AM001 and TH_AM011
- 9) Joint Crediting Mechanism Approved Methodology TH_AM001 “Installation of Solar PV System” (JCM_TH_AM001_ver02.0)
- 10) Joint Crediting Mechanism Approved Methodology TH_AM011 “Installation of Energy-efficient Refrigerators Using Natural Refrigerant at Cold Storage” (JCM_TH_AM011_ver01.0)
- 11) Joint Crediting Mechanism Guidelines for Validation and Verification (JCM_TH_GL_VV_ver02.0)

Supporting documents;

- 1) Technical specification of solar panels
- 2) Technical specification of Inverters

- 3) Technical specification of refrigerators
- 4) PV module Design Certificate
- 5) Evidence of invitations sent to stakeholders and list of stakeholders invited
- 6) Attendance list of stakeholders who attended the meeting
- 7) Photographic evidence of the stakeholders meeting
- 8) Specification of electricity monitoring equipment for refrigerators
- 9) Report of power meter of refrigerators
- 10) Specification of electricity monitoring equipment for PV
- 11) Certificate of electricity monitoring equipment for PV (EU Declaration of Conformity)
- 12) Certificate of completion of Solar PV
- 13) Inspection report and trial operation data of refrigerators
- 14) Grid emission factor by GHG Thailand
- 15) Data log of energy consumed by the refrigerator
- 16) Data log of the electricity generated by the solar PV
- 17) Regulation on tariff meters and their calibration for PV
- 18) EPC agreement for installation of Solar PV
- 19) EPC agreement for installation of refrigerators
- 20) Land titled deed
- 21) Construction permit for the solar power plant
- 22) Project Participant's incorporation certificate
- 23) Corporate and personal identity of the PPs
- 24) Modalities of communication
- 25) Thai Delmar Co., Company brochure
- 26) Annual inspection records of refrigerators
- 27) EIA regulations by Ministry of Industry, Thailand
- 28) Monitoring system of the solar power plant and refrigerators
- 29) List of legal durables obtained by the solar power plant
- 30) Estimation of the amount of annual power consumption for refrigerator
- 31) Estimation of the amount of annual power consumption for Rooftop solar power plant
- 32) The list of legal durable years_0225.pdf

Attachment Certificates or curricula vitae of TPE's validation team members, technical experts and internal technical reviewers

Please attach certificates or curricula vitae of TPE's validation team members, technical experts and internal technical reviewers.

Ms. Priyanka M.S, holds a B.E in Environmental Engineering. She has around 3+ years of industry experience and is qualified as a lead auditor and technical reviewer for various project types with respect to various global GHG schemes, standards and protocols. She is based in India.

Mr. Karthik Lakshman, holds a B.E in Mechanical Engineering. He has around 3+ years of industry experience and is qualified as an lead auditor and technical reviewer for various project types with respect to various global GHG schemes, standards and protocols. He is based in India.