

## JCM Verification Report Form

### A. Summary of verification

#### A.1. General Information

Title of the project	Installation of Energy Saving Equipment in Lens Factory
Reference number	VN011
Monitoring period	01/12/2017 – 31/07/2019
Date of completion of the monitoring report	08/10/2019
Third-party entity (TPE)	Lloyd's Register Quality Assurance Limited (LRQA)
Project participant contracting the TPE	HOYA CORPORATION
Date of completion of this report	06/11/2019

#### A.2 Conclusion of verification and level of assurance

Overall verification opinion	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative
<input checked="" type="checkbox"/> Unqualified opinion	<p>Based on the process and procedure conducted, <i>Lloyd's Register Quality Assurance Limited (LRQA)</i> (TPE's name) provides reasonable assurance that the emission reductions for <i>Installation of Energy Saving Equipment in Lens Factory</i> (project name)</p> <ul style="list-style-type: none"> <li>✓ Are free of material errors and are a fair representation of the GHG data and information, and</li> <li>✓ Are prepared in line with the related JCM rules, procedure, guidelines, forms and other relevant documents</li> </ul>
<p><i>(If overall verification opinion is negative, please check below and state its reasons.)</i></p> <input type="checkbox"/> Qualified Opinion <input type="checkbox"/> Adverse opinion <input type="checkbox"/> Disclaimer	<p>&lt;State the reasons&gt; Not applicable</p>

#### A.3. Overview of the verification results

Item	Verification requirements	No CAR or CL remaining
The project	The TPE determines the conformity of the actual	<input checked="" type="checkbox"/>

Item	Verification requirements	No CAR or CL remaining
implementation with the eligibility criteria of the applied methodology	project and its operation with the eligibility criteria of the applied methodology.	
The project implementation against the registered PDD or any approved revised PDD	The TPE assesses the status of the actual project and its operation with the registered/validated PDD or any approved revised PDD.	<input checked="" type="checkbox"/>
Calibration frequency and correction of measured values with related requirements	If monitoring Option C is selected, the TPE determines whether the measuring equipments have been properly calibrated in line with the monitoring plan and whether measured values are properly corrected, where necessary, to calculate emission reductions in line with the PDD and Monitoring Guidelines.	<input checked="" type="checkbox"/>
Data and calculation of GHG emission reductions	The TPE assesses the data and calculations of GHG emission reductions achieved by/resulting from the project by the application of the selected approved methodology.	<input checked="" type="checkbox"/>
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	<input checked="" type="checkbox"/>
Post registration changes	The TPE determines whether there are post registration changes from the registered PDD and/or methodology which prevent the use of the applied methodology.	<input checked="" type="checkbox"/>

Authorised signatory:	Mr. <input checked="" type="checkbox"/>	Ms. <input type="checkbox"/>
Last name: Chiba	First name: Michiaki	
Title: Climate Change Manager - Asia & Pacific		
Specimen signature:		Date: 06/11/2019

## B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Michiaki Chiba	LRQA Ltd.	Team leader	<input checked="" type="checkbox"/>	Technical competence authorised	<input checked="" type="checkbox"/>
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Nguyen Tri Thang	Expert	Host country expert	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Stewart Niu	LRQA China	Internal reviewer	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>
Mr. <input type="checkbox"/> Ms. <input type="checkbox"/>				<input type="checkbox"/>		<input type="checkbox"/>

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 verification, findings and conclusions based on reporting requirements

C.1. Compliance of the project implementation and operation with the eligibility criteria of the applied methodology

### <Means of verification>

LRQA has determined during the verification process that the actual implementation and operation of the project has been conducted in conformance with the eligibility criteria of the applied methodologies.

The project applied the approved methodologies: JCM\_VN\_AM011\_ver01.0 Energy Saving by Introduction of High Efficiency Inverter Type Centrifugal Chiller, Version 01.0 for application of the centrifugal chiller, and JCM\_VN\_AM012\_ver01.0 Energy Saving by Introduction of Heat Recovery Electric Heat Pump, Version 01.0 for application of Heat Recovery Electric Heat Pump (HREHP).

LRQA assessed by means of an on-site visit that the physical features of the project are in place and that the project participants (the PPs) have operated the project as per the eligibility criteria of the applied methodologies. The steps taken to verify each eligibility criterion and the conclusions about implementation of the project are summarised as below.

For VN\_AM011

Criterion 1: Project chiller is an inverter type centrifugal chiller with a capacity which is less than or equals to 1,500 USRt.

\*1 USRt = 12,000 BTU/hr = 3.52 kW

Justification in the PDD: An inverter type centrifugal chiller manufactured by Mitsubishi Heavy Industries (product model type “ETI-50”), whose cooling capacity is 460 USRt, is installed for this project.

Steps taken for assessment: The verification team assessed the project documentation, the technical specification, the commissioning report, and conducted on site assessment including interviews.

Conclusion: The verification team confirmed that the project chiller is an inverter type centrifugal chiller with a capacity of 460 USRt that is less than 1,500 USRt, and the criterion is met.

Criterion 2: COP for project chiller i calculated under the standardizing temperature conditions\* (COP\_PJ,tc,i) is more than the threshold COP values set in the tables below. (“x” in the table represents cooling capacity per unit.)

Cooling capacity per unit (USRt)	300≤x<450	450≤x<550	550≤x<825	825≤x≤1,500
Threshold COP value	5.59	5.69	5.85	6.06

COP\_PJ,tc,i is calculated by altering the temperature conditions of COP of project chiller i (COP\_PJ,i) from the project specific conditions to the standardizing conditions. COP\_PJ,i is derived from specifications prepared for the quotation or factory acceptance test data by manufacturer.

[equation to calculate COP\_PJ,tc,i]

$$COP_{PJ,tc,i} = COP_{PJ,i} \times [(T_{cooling-out,i} - T_{chilled-out,i} + TD_{chilled} + TD_{cooling}) \div (37 - 7 + TD_{chilled} + TD_{cooling})]$$

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 conditions [degree Celsius]

T\_chilled-out,i: Output chilled water temperature of project chiller i set under the project specific conditions [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<sub>PJ,tc,i</sub>

Chilled water:	output	7 degrees Celsius
	input	12 degrees Celsius
Cooling water:	output	37 degrees Celsius
	input	32 degrees Celsius

Justification in the PDD: COP for the project chillers (ETI-50) calculated under the standardizing temperature conditions is 6.22 with a cooling capacity of 460 USRt, which is more than the threshold COP value set in this criterion.

Steps taken for assessment: The verification team reviewed the technical specification of the project chiller, the commissioning report, and conducted on-site assessment including interviews.

Conclusion: The verification team confirmed that COP of the project chiller is determined as 6.22 based on the technical specification. The COP value is converted to the standardizing temperature conditions as 6.22 following the procedures stipulated in the approved methodology using output cooling water temperature at 37 °C and output chilled water temperature at 7.0 °C as per the specification. Thus, the criterion is met by the project.

Criterion 3: Periodical check is planned more than one (1) time annually.

Justification in the PDD: A contract of annual maintenance is signed between the project participant and an agent who is authorized by the chiller manufacturer, Mitsubishi Heavy Industries.

Steps taken for assessment: Document review was conducted on the contract with the company authorised by the manufacturer, the schedule, the reports of the periodical maintenance, and interviewed the PPs.

Conclusion: The verification team confirmed that the periodical maintenance of the project chiller is planned on quarterly basis and was conducted on 18/04/2019 and 06/07/2019 during the monitoring period, that satisfy requirement of the criterion.

Criterion 4: Ozone Depletion Potential (ODP) of the refrigerant used for project chiller is zero.

Justification in the PDD: The refrigerant used for project chiller is R134a whose ODP is zero.

Steps taken for assessment: The verification team reviewed technical specification of project chiller and the Safety Data Sheet of refrigerant used, and conducted the on site assessment.

Conclusion: The verification team confirmed that the project chiller uses the refrigerant R134a whose ODP is zero as confirmed in the supporting documents. Thus, the criterion was confirmed as satisfied by the project.

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.

Justification in the PDD: An existing chiller is replaced by the project chiller for this project. Measures to prevent releasing refrigerant used in the existing chiller to the air were taken when it was replaced. The replaced chiller is stored at the project site and monitored the storage status of refrigerant with a pressure gauge to make sure refrigerant is not released to the air. A "WORK INSTRUCTION FOR MONTHLY CHECKING THE GAS PRESSURE OF AIR CHILLER NO.2" is prepared to monitor and record the status of refrigerant in order to avoid releasing refrigerant to the air.

Steps taken for assessment: The verification team reviewed the plan inclusive of the detailed procedures to regularly check the pressure gauges installed to the existing chiller replaced by the project and stored at the project site, and interviewed the PPs during the on site assessment.

Conclusion: The verification team confirmed that the PPs established the plan to prevent releasing of refrigerant from the project chiller and the existing chiller replaced by the project including the detailed procedures to regularly monitor the pressure gauges installed to the existing chiller. The verification team reviewed the detailed procedures, records of regular monitoring implemented during the monitoring period, records of staff training, interviewed the PPs during the on site assessment and confirmed that the criterion was satisfied by the project during the monitoring period.

In the meantime, the PPs intend to re-utilise the old chiller replaced by the project chiller and kept as spare unit on site to meet additional cooling demand of the planned factory expansion that is under preparation and expected to start operation in the next monitoring period. The project chiller will be mainly operated as it is most efficient while the 2 other chillers will meet the excess demand. The PPs will monitor operation of the old chiller that partly backs-up operation of the project chiller and affects monitoring of refrigerant leak in the future monitoring periods.

For VN\_AM012

Criterion 1: A project introduces (an) heat recovery electric heat pump(s) (HREHP). In case (an) project HREHP(s) replaces existing equipment, the existing one is not (an) HREHP(s).

Justification in the PDD: HREHP manufactured by Toshiba Carrier Corporation (product model type "HWC-WH6702V") is newly installed for this project.

Steps taken for assessment: The verification team assessed the project documentation, the

technical specification, the commissioning report, and conducted on site assessment including interviews.

Conclusion: The verification team confirmed that the project introduces new HREHP at the lens factory. The project HREHP displace a part of cooling energy and heating energy that have been supplied by the existing air-cooled chillers and electric heater respectively. Therefore, the criterion is met.

Criterion 2: Periodical check is planned more than one (1) time annually.

Justification in the PDD: A contract of annual maintenance is signed between the project participant and an agent who is authorized by the HREHP manufacturer, Toshiba Carrier Corporation.

Steps taken for assessment: Document review was conducted on the contract with the company authorised by the manufacturer, the schedule, the reports of the periodical maintenance, and interviewed the PPs.

Conclusion: The verification team confirmed that the periodical maintenance of the project HREHP is planned on quarterly basis and was conducted on 26-28/03/2019 and 25-27/06/2019 during the monitoring period. The delay of periodical check was pointed out as CAR 1 of the validation and the PPs implemented the plan of the periodical check with the contract and the schedule of quarterly program preventing from any delay in the future. The criterion was confirmed as satisfied.

Criterion 3: Ozone Depletion Potential (ODP) of the refrigerant used for project HREHP(s) is zero.

Justification in the PDD: The refrigerant used for project HREHP is R134a whose ODP is zero.

Steps taken for assessment: The verification team reviewed technical specification of project HREHP and the Safety Data Sheet of refrigerant used, and conducted the on site assessment.

Conclusion: The verification team confirmed that the project HREHP uses the refrigerant R134a whose ODP is zero as confirmed in the supporting documents. Thus, the criterion was confirmed as satisfied by the project.

Criterion 4: A plan for prevention of releasing refrigerant used for project HREHP(s) is prepared.

In the case of replacing the existing chiller with the project HREHP(s), 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.

Justification in the PDD: Airtightness of the project HREHP is quite high, and all piping and

valves are closed, therefore releasing refrigerant to the air is not expected. There is no existing chiller replaced with the project implementation.

Steps taken for assessment: The verification team reviewed the plan and supporting documents provided by the PPs and conducted an on site assessment including interviews.

Conclusion: The verification team assessed the supporting documents received from the PPs and confirmed the plan prepared not to release refrigerant was implemented by the PPs during the monitoring period. Therefore, the criterion is satisfied.

The verification team confirmed that the eligibility conditions are satisfied by the project by reviewing the supporting documents and the on site assessment.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

**<Findings>**

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

No issue was raised to the requirements of this section.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project has been implemented in conformity with the eligibility criteria of the applied methodologies.

C.2. Assessment of the project implementation against the registered PDD or any approved revised PDD

**<Means of verification>**

The project installs inverter type centrifugal chiller and heat recovery electric heat pump (HREHP) at the lens factory of HOYA LENS VIETNAM LTD (HOLV) in Thu Dau Mot City, Binh Duong Province, Viet Nam.

One centrifugal chiller manufactured by Mitsubishi Heavy Industries model ETI-50 is installed for the project that improves energy efficiency of chiller and leads to GHG emissions reductions.

One set of HREHP manufactured by Toshiba Carrier Corporation consisting of three units of model HWC-WH6702V is installed for the project that leads to reduction of energy consumption by electric heater for heating energy generation and air-cooled chiller for cooling energy generation and leads to GHG emission reductions.

The project is implemented by HOLV from the Socialist Republic of Viet Nam and HOYA CORPORATION from Japan (the PPs). The start date of project operation is on 28/05/2018 for the centrifugal chiller and 01/12/2017 for HREHP and the expected operational lifetime of the project is for 9 years.

The project receives financial support for JCM model projects from the Ministry of the

Environment, Japan (MOE).

The verification team assessed the Monitoring Report (MR) that consists of Monitoring Report Sheet (MRS) parts of the Monitoring Spreadsheet and the supporting documents, conducted a physical site visit to assess the status of the actual project and its operation in accordance with the registered PDD.

The verification team determined through the verification process that the implementation and operation of the project has been in accordance with the description in the registered PDD. The verification team, by means of a desk review and an on-site visit, assessed that:

- all physical features of the JCM project described in the registered PDD are in place, and
- the PPs have operated the JCM project as per the registered PDD.

The MR follows the MP of the registered PDD that has been established based on the approved methodologies. The parameters to be monitored ex-post are (1) EC\_PJ,i,p Power consumption of project chiller i during the period p (in MWh/p) for the chiller component applied JCM\_VN\_AM011 and (1) EC\_PJ,i,p Power consumption of project HREHP i during the period p (in MWh/p) for the HREHP component applied JCM\_VN\_AM012. Electricity meters are installed to directly and continuously measure electricity consumption for each of the chiller and the HREHP.

The roles and responsibilities of the persons are described in the Monitoring Structure Sheet (MSS) in accordance with the requirements of the applied methodologies. There was no change in the organizational structure during the monitoring period.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

**<Findings>**

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

No issue was raised to the requirements of this section.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project was implemented and operated in accordance with the registered PDD.

C.3. Compliance of calibration frequency and correction of measured values with related requirements

**<Means of verification>**

The parameters No. (1) EC\_PJ,i,p for the respective chiller and HREHP components apply the monitoring Option C and the monitoring of the parameters uses electricity meters as the measuring equipment. The electricity meters measure electricity consumed by the project chiller and HREHP out of the total electricity imported by the factory from the public electricity

grid system, that are not for trade measurement and subject of regulations in the host country. Calibration of the electricity meters was conducted at the shipment from the factory and periodical calibration is not required by the host country regulations, the manufacturer or the approved methodologies. No correction was required to the measured values to calculate ERs in line with the PDD and Monitoring Guidelines during the monitoring period.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

**<Findings>**

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

No issue was raised to the requirements of this section.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the measuring equipment applied for the parameters satisfied the requirements of the MP concerning the regular calibration and no correction was required to the measured values during the monitoring period.

C.4. Assessment of data and calculation of GHG emission reductions

**<Means of verification>**

The MR is developed using the MRS applied to the registered JCM project that is confirmed fulfilment of the requirements of the MRS of the applied methodologies.

LRQA has determined that:

1. a complete set of data for the specified monitoring period is available,
2. information provided in the MR has been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis,
3. calculations of reference emissions (REs) and project emissions (PEs), as appropriate, have been carried out in accordance with the formulae and methods described in the MP and the applied methodologies,
4. any assumptions used in emission calculations have been justified, and
5. appropriate emission factors, default values and other reference values have been correctly applied.

The project provides the cooling and heating services by application of inverter type centrifugal chiller and HREHP. The sources of GHG emissions are power consumption by reference chiller and the project chiller for application of the centrifugal chiller, and power consumption by reference electric heater and air-cooled chillers and project HREHP for application of HREHP. CO<sub>2</sub> emissions in the reference and project scenarios are considered to determine the REs and the PEs in accordance with the applied methodologies.

The GHG emission reductions of the project component applying the centrifugal chiller are

calculated as:  $ER_p = RE_p - PE_p = EC_{PJ,i,p} \times (COP_{PJ,tc,i} / COP_{RE,i}) \times E_{Felec} - EC_{PJ,i,p} \times E_{Felec}$ . The CO<sub>2</sub> emission factor is 0.9185 t-CO<sub>2</sub>/MWh as fixed ex-ante at the validation. The COP of the reference chiller is 5.69 applying the default value of the methodology and the COP of the project chiller is 6.22 as calculated for the standardizing temperature conditions and fixed ex-ante at the validation.

The GHG emission reductions during the first monitoring period are calculated from the power consumption of project chiller monitored ex-post as:

Year 2018 (28/05/2018 – 31/12/2018)

$530.176 \text{ MWh} \times (6.22 / 5.69) \times 0.9185 - 530.176 \text{ MWh} \times 0.9185 = 532.33 - 486.97 = 45.4 \text{ t-CO}_2\text{e}$ .

Year 2019 (01/01/2019 – 31/07/2019)

$600.254 \text{ MWh} \times (6.22 / 5.69) \times 0.9185 - 600.254 \text{ MWh} \times 0.9185 = 602.69 - 551.33 = 51.4 \text{ t-CO}_2\text{e}$ .

The GHG emission reductions of the project component applying HREHP are calculated as:  $ER_p = RE_p - PE_p = (EC_{PJ,i,p} \times 3.6) / ECR_i \times H_{PJ,i} / \eta_{REh} \times EF_{REh} + (EC_{PJ,i,p} / ECR_i \times CH_{PJ,i} / COP_{RE,cool,i} \times EF_{elec}) - EC_{PJ,i,p} \times EF_{elec}$ . The CO<sub>2</sub> emission factor is 0.9185 t-CO<sub>2</sub>/MWh and CO<sub>2</sub> emission factor for the reference equipment for heating energy generation is 0.255 tCO<sub>2</sub>/GJ as fixed ex-ante at the validation. The COP of the reference air cooled chiller is determined as 3.08 applying the default value of the methodology. The rated electricity consumption (ECR<sub>i</sub>), rated heating capacity (H<sub>PJ,i</sub>), and rated cooling capacity (CH<sub>PJ,i</sub>) of the project HREHP are 53.1 kW, 180 kW and 126.9 kW respectively. Efficiency of reference equipment for heating energy generation (η<sub>REh</sub>) is 1 applying the conservative default value of the methodology.

The GHG emission reductions during the first monitoring period are calculated from the power consumption of project HREHP monitored ex-post as:

Year 2017 (01/12/2017 – 31/12/2017)

$21.471 \times 3.6 / 53.1 \times 180 / 1 \times 0.255139 + 21.471 / 53.1 \times 126.9 / 3.08 \times 0.9185 - 21.471 \times 0.9185 = 66.851 + 15.302 - 19.721 = 82.15 - 19.72 = 62.4 \text{ t-CO}_2\text{e}$ .

Year 2018 (01/01/2018 – 31/12/2018)

$287.231 \times 3.6 / 53.1 \times 180 / 1 \times 0.255139 + 287.231 / 53.1 \times 126.9 / 3.08 \times 0.9185 - 287.231 \times 0.9185 = 894.31 + 204.70 - 263.82 = 1,099.01 - 263.82 = 835.2 \text{ t-CO}_2\text{e}$ .

Year 2019 (01/01/2019 – 31/07/2019)

$172.070 \times 3.6 / 53.1 \times 180 / 1 \times 0.255139 + 172.070 / 53.1 \times 126.9 / 3.08 \times 0.9185 - 172.070 \times 0.9185 = 535.75 + 122.63 - 158.05 = 658.38 - 158.05 = 500.3 \text{ t-CO}_2\text{e}$ .

The project centrifugal chiller started the operation on 28/05/2018 and the total power

consumption in the first monitoring period of 430 days is 1,130.43 MWh that is 959.55 MWh in a year (1,130.43 MWh x 365/430 days = 959.55 MWh) and it is 78.9 % of ex-ante estimation in the registered PDD of 1,216 MWh.

The project HREHP started the operation on 01/12/2017 and the total power consumption in the first monitoring period of 608 days is 480.772 MWh that is 288.621 MWh in a year (480.772 MWh x 365/608 days =288.621 MWh) and it is 75.1 % of ex-ante estimation in the registered PDD of 384 MWh.

The verification team assessed the reported data with documented evidence and by means of on site visit. Through the processes taken, CAR 1, CL1 and CL2 were raised as the resolution detailed below.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

Parameters	Monitored values	Method to check values in the monitoring report with sources
AM011 EC_PJ,i,p (2018)	530.176 MWh/p	Assessment was conducted based on records of meter readings and on site assessment.
EC_PJ,i,p (2019)	600.254 MWh/p	
AM012 EC_PJ,i,p (2017)	21.471 MWh/p	Assessment was conducted based on records of meter readings and on site assessment.
EC_PJ,i,p (2018)	287.231 MWh/p	
EC_PJ,i,p (2019)	172.070 MWh/p	

#### <Findings>

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

Grade / Ref: CAR 1

Nature of the issue raised: Discrepancies were found with the monitored data of electricity consumption by the project HREHP in April 2018.

Nature of responses provided by the PPs: The PPs confirmed that a part of data was missed on 15/04/2018 for HREHP and corrected the data in the revised MR.

Assessment of the responses: The verification team reviewed the revised MR with supporting evidence and confirmed the data discrepancy was corrected for calculation in the revised MR.

The correction resulted in increase of ERs by less than 1 tCO<sub>2</sub>e.

The CAR was closed.

Grade / Ref: CL 1

Nature of the issue raised: The PPs were required to clarify why the monitored data of the project chiller in May 2018 and the monitored data of the project HREHP in December 2017 and from January to March 2018 was not included in the calculation of ERs.

Nature of responses provided by the PPs: The PPs confirmed that the monitored data of project chiller in May 2018 and that of project HREHP in December 2017, January to March 2018 was missed in the MR and the revised MR was provided including the data during the periods.

Assessment of the responses: The verification team reviewed the revised MR with supporting evidence and confirmed that the calculation is corrected inclusive of missed data in the revised MR. The correction resulted in increase of ERs by 1 tCO<sub>2</sub>e for the chiller in 2018, 62 tCO<sub>2</sub>e and 216 tCO<sub>2</sub>e for the HREHP in 2017 and 2018 respectively.

The CL was closed.

Grade / Ref: CL 2

Nature of the issue raised: The PPs were required to clarify implementation of the monitoring procedures to:

- 1) maintain records of technical troubles and the solution affected performance data of the project and the operation time,
- 2) retain evidence of the monitored data, and
- 3) check the monitored data and explain reasons of abnormal data.

Nature of responses provided by the PPs: The PPs provided revised version of Work Instruction for Collect Electric Consumption Data of Heat Pump & Turbo Chiller (JCM) and Monitoring & reporting procedure about the running status of heat pump machine and turbo chiller machine with relevant records of implementation for review by the verification team.

Assessment of the responses: The verification team reviewed the revised procedures with relevant records provided by the PPs to clarify implementation of the monitoring procedures and confirmed that the PPs demonstrated implementation of the monitoring procedures as appropriate to support credibility of monitored data during the monitoring period.

The CL was closed.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that appropriate methods and formulae for calculating REs and PEs have been followed. The verification team is of the opinion that all assumptions, emissions factors and default values that were applied in calculations have been justified.

#### C.5. Assessment of avoidance of double registration

##### **<Means of verification>**

The verification team assessed and confirmed relevance of the written confirmation from the PPs that the project is 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 F of this report.

##### **<Findings>**

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

No issue was raised to the requirements of this section.

##### **<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project is not registered under other international climate mitigation programs.

#### C.6. Post registration changes

##### **<Means of verification>**

The verification team assessed the project documentation and through the on site visit and confirmed that there was no post registration change from the registered PDD or the approved methodologies.

##### **<Findings>**

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

No issue was raised to the requirements of this section.

##### **<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification through the verification processes determined that there was no post registration change from the registered PDD or approved methodologies which prevent from use of the applied methodologies.

#### **D. Assessment of response to remaining issues**

An assessment of response to the remaining issues including FARs from the validation and/or previous verification period, if appropriate

No FAR was issued in the validation and this is the first verification of the project.

### E. Verified amount of emission reductions achieved

Year	Verified Emissions (tCO <sub>2</sub> e)	Reference Emissions (tCO <sub>2</sub> e)	Verified Project Emissions (tCO <sub>2</sub> e)	Verified Emission Reductions (tCO <sub>2</sub> e)
2013				
2014				
2015				
2016				
2017		82.2	19.7	62
2018		1,631.3	750.8	880
2019		1,261.1	709.3	551
2020				
Total (tCO <sub>2</sub> e)				1,493

### F. List of interviewees and documents received

#### F.1. List of interviewees

<p>HOYA LENS VIETNAM LTD  Hatsuyoshi Nakazawa, Expert  Nguyen Thanh Tu, Facility Manager  Tran Cuong, Facility Supervisor</p> <p>Mitsubishi UFJ Research and Consulting Co., Ltd.  Ryo Maeda, Consultant, Consulting Business Division, Optimum Solution Business Unit, Social Innovation Co-Creation Dept.  Hiroyuki Yamashita, Business Analyst, Consulting Business Division, Optimum Solution Business Unit, Social Innovation Co-Creation Dept.</p>
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#### F.2. List of documents received

<p>Category A documents (documents prepared by the PPs)</p> <ul style="list-style-type: none"> <li>- Monitoring Report submitted on 16/08/2019</li> <li>- Revised Monitoring Report dated 08/10/2019</li> <li>- Monitoring data sheet of project turbo chiller</li> <li>- Monitoring data sheet of heat pump</li> <li>- Company overview of HOYA LENS VIETNAM LTD</li> </ul>
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- Specifications of chiller units
  - Specification for heat recovery heat pump
  - As-built drawing
  - Chilled water schematic diagram
  - Plant lay out
  - Commissioning report for centrifugal chiller
  - Inspection report for heat pump units
  - Warranty certificates
  - Operator's manual for the chillers
  - Refrigerator test records
  - Report for introduction of high efficiency inverter turbo refrigerator
  - Electricity line diagram
  - Specification of measuring equipment
  - Inspection report for measuring equipment
  - Work instruction for collect electric consumption data of heat pump and turbo chiller
  - Work instruction for monthly checking the gas pressure of air chiller No.2
  - Annual shutdown report for project chiller
  - Gas pressure checklist for air chiller
  - Maintenance reports for HP
  - Training records
  - Confirmation letter from the project participants on avoidance of double registration
  - Maintenance service contract for chiller
  - Maintenance menu and schedule for Mitsubishi Centrifugal Chiller
  - Quarterly inspection report for chiller ETI-50
  - Service contract for heat pump
  - Maintenance menu and schedule for Toshiba Heat Pump
  - Quarterly maintenance reports for heat pump
  - Revised monitoring data and calculation sheets for project turbo chiller
  - Revised monitoring data and calculation sheets for project HREHP
  - Revised work instruction for collect electric consumption data of heat pump and turbo chiller
  - Daily reports for monitoring of project turbo chiller during the monitoring period
  - Daily reports for monitoring of project HREHP during the monitoring period
  - Record on operational status of the project chiller
  - Record on operational status of the project HREHP
- Category B documents (other documents referenced)
- PDD Version 2.0 dated 11/02/2019 including the annexes

- Modalities of Communication Statement Form dated 11/01/2019
- Validation Report dated 22/03/2019
- JCM\_VN\_AM011\_ver01.0 Energy Saving by Introduction of High Efficiency Inverter Type Centrifugal Chiller, Version 01.0, and
- JCM\_VN\_AM012\_ver01.0 Energy Saving by Introduction of Heat Recovery Electric Heat Pump, Version 01.0
- JCM Project Cycle Procedure JCM\_VN\_PCP\_ver04.0
- JCM Guidelines for Validation and Verification JCM\_VN\_GL\_VV\_ver01.0
- JCM Guidelines for Developing PDD and MR JCM\_VN\_GL\_PDD\_MR\_ver02.0
- JCM Glossary of Terms JCM\_VN\_Glossary\_ver01.0
- Approved Small Scale Methodology AMS II.C. Demand-side energy efficiency activities for specific technologies
- Documents on similar JCM projects issued emission reduction credits including project Ref. ID001, ID004, ID005, TH003 and TH004
- Approved Methodology AM0060 Power saving through replacement by energy efficient chillers
- Approved Methodology AM0070 Manufacturing of energy efficient domestic refrigerators
- Approved Methodology AM0071 Manufacturing and servicing of domestic and/or small commercial refrigeration appliances using a low GWP refrigerant
- AM\_REV\_0148 Response to request for modification of procedure for accounting of leakage of emissions from physical leakage of the initial charge of refrigerant in the new chiller
- SSC\_510 Clarification on the applicability of AMS-II.C to a project activity replacing multiple low efficiency equipment with a single high efficient equipment
- SSC\_539 Clarification on identification of baseline scenario and demonstration of additionality for chiller programme under AMS-II.C
- SSC\_540 Clarification on calculation of baseline emissions for chiller programme under AMS-II.C
- SSC\_580 Clarification on the requirement of AMS-II.C for project activity replacing inefficient refrigerators
- Chiller Energy Efficiency Project, Philippines, the World Bank
- The Chiller Energy Efficiency Project, Republic of India, the World Bank
- CDM-SSC-PoA-DD/CDM-SSC-CPA-DD Demand Side Management (DSM) for accelerating the diffusion of energy efficient chiller technology
- CDM-PoA-DD/CDM-CPA-DD Philippines – Chiller Energy Efficiency Programme (PCEEP)
- CDM-SSC-PoA-DD/CDM-SSC-CPA-DD Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants
- Proposed and registered projects under CDM, VCS, Gold Standard, and the other

international schemes

- IEC 62053-22:2003, Electricity metering equipment (ac) - Particular requirements. Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
- Safety Data Sheet for R-134a
- Ministry of Science and Technology Circular No. 23/2013/TT-BKHCH on Group 2 Measuring Instruments
- Electricity emission factor for Vietnamese Grid published by the Ministry of Natural Resource and Environment

**Annex Certificates or curricula vitae of TPE's verification 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.*

Certificate of Appointment is attached to this report.

## Joint Crediting Mechanism Certificate of Appointment

Title of Project:

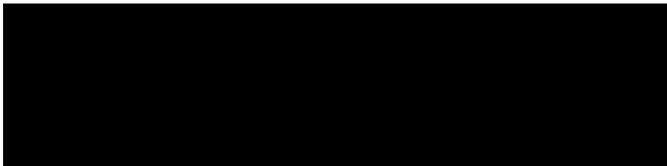
Verification for Installation of Energy Saving Equipment in Lens Factory  
(Ref No. VN011)

First monitoring period: 01/12/2017 – 31/07/2019

We hereby certify that the following personnel have engaged in the verification process that has fully satisfied the competence requirements of the verification of the JCM project.

<b>Name of Person</b>	<b>Assigned Roles</b>
Michiaki Chiba	Team Leader
Nguyen Tri Thang	Host Country Expert
Stewart Niu	Technical Reviewer

Signed by



Michiaki Chiba  
Climate Change Manager – Asia & Pacific  
19/08/2019