

JCM Verification Report Form

A. Summary of verification

A.1. General Information


Title of the project	Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor
Reference number	TH004
Monitoring period	01/04/2017 – 31/12/2017
Date of completion of the monitoring report	20/02/2018
Third-party entity (TPE)	Japan Quality Assurance Organization (JQA) (TPE-TH-003)
Project participant contracting the TPE	Sony Semiconductor Manufacturing Corporation
Date of completion of this report	14/05/2018

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, JQA provides reasonable assurance that the emission reductions for Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor</p> <ul style="list-style-type: none"> ✓ Are free of material errors and are a fair representation of the GHG data and information, and ✓ Are prepared in line with the related JCM rules, procedure, guidelines, forms and other relevant documents
<i>(If overall verification opinion is negative, please check below and state its reasons.)</i> <input type="checkbox"/> Qualified Opinion <input type="checkbox"/> Adverse opinion <input type="checkbox"/> Disclaimer	<State the reasons>

A.3. Overview of the verification results

Item	Verification requirements	No CAR or CL remaining
The project implementation with the eligibility criteria of the applied methodology	The TPE determines the conformity of the actual project and its operation with the eligibility criteria of the applied methodology.	<input checked="" type="checkbox"/>
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: Asada	First name: Sumio	
Title: Senior Executive		
Specimen signature:	Date: 14/05/2018	
		

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. <input checked="" type="checkbox"/>	Tadashi	External	Team leader	<input checked="" type="checkbox"/>	Authorized	<input checked="" type="checkbox"/>
Ms. <input type="checkbox"/>	Yoshida	Individual				
Mr. <input checked="" type="checkbox"/>	Koichiro	JQA	Internal reviewer	<input checked="" type="checkbox"/>	Authorized	<input type="checkbox"/>
Ms. <input type="checkbox"/>	Tanabe					

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>

The project was registered as a JCM project on 20/04/2018, which applied JCM approved methodologies TH_AM002_ver02.0 "Energy Saving by Introduction of Multi-stage Oil-Free Air Compressor" and TH_AM003_ver01.0 "Energy Saving by Introduction of High Efficiency Inverter Type Centrifugal Chiller" under the scheme of Joint Crediting Mechanism between Kingdom of Thailand and Japan.

The project participants (PPs) are Sony Device Technology (Thailand) Co., Ltd. from Kingdom of Thailand and Sony Semiconductor Manufacturing Corporation from Japan.

The purpose of the project is to reduce CO₂ emissions from electricity consumption in the new clean room of semiconductor plant by newly installing high-efficiency centrifugal chillers and air compressors. The project chiller is equipped with an inverter, which contributes to energy saving through the control of rotation speed of compressor motor of the chiller to continuously regulate temperature and humidity of the clean room. Furthermore, the installation of project non-inverter type multi-stage oil-free air compressor, which supplies large volume of pressurized air required for the running of semiconductor manufacturing equipment in the clean room, also contributes to energy saving.

The JCM website indicates that the starting date of the project operation is 01/04/2017 and this monitoring period is from 01/04/2017 to 31/12/2017. It is confirmed through the review of relevant documents, on-site visit and the interview with the PPs that the monitoring

started on 01/04/2017 after the commissioning of the project facilities on 29/03/2017. Sony Semiconductor Manufacturing Corporation has conducted OJT training about the operation and maintenance of the project facilities during the installation. Maintenance support by the manufacturers will be also available upon request.

JQA has assessed whether the project implementation and operation after the starting date of project operation complies with the eligibility criteria of the applied methodologies during the monitoring period. After the desk review, an on-site assessment was conducted on 01/02/2018. JQA conducted a physical inspection and interviewed with the PPs listed in Section F of this verification report.

The assessment results regarding the eligibility criteria are summarized as below:

[JCM_TH_AM002]

Criterion 1

Project air compressor is a non-inverter type multi-stage oil-free air compressor with an electric motor power of 55kW, 75kW, 110kW, 132kW, 145kW, 160kW, or 200kW installed in manufacturing process of semiconductors.

Through the review of supporting documents and check of the nameplate of the compressor during on-site inspection, the project information of Criterion 1 in the PDD is confirmed as follows:

- The installed compressor is the model “ALE75W” made by KOBELCO,
- The project compressor is a two-stage oil-free type with non-inverter, which has an output capacity of 75 kW for main motor.

Hence, it is concluded that the project meets the criterion 1 with a satisfactory result.

Criterion 2

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

Through the review of supporting documents and the interview with the PPs during on-site inspection, the project information of Criterion 2 in the PDD is confirmed as follows:

- Annual maintenance service report demonstrates that the check and maintenance of compressor has been conducted annually,
- Preventive Maintenance Control Plan shows that the compressor will be checked

annually and further overhauled every 40,000 hours.

Hence, it is concluded that the project meets the criterion 2 with a satisfactory result.

[JCM_TH_AM003]

Criterion 1

*Project chiller is an inverter type centrifugal chiller with a capacity which is less than or equal to 1,500 USRt. * 1 USRt = 3.52 kW*

Through the review of supporting documents and check of the nameplate of the chiller during on-site inspection, the project information of Criterion 1 in the PDD is confirmed as follows:

- The installed chiller is the model “ETI-50” made by Mitsubishi Heavy Industries, Ltd.
- The project chiller is an inverter type centrifugal one with a capacity of 500 USRt.

Hence, it is concluded that the project meets the criterion 1 with a satisfactory result.

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 table below. (“ x ” in the table represents cooling capacity per unit.)*

Cooling capacity per unit (USRt)	$300 \leq x \leq 450$	$450 < x \leq 550$	$550 < x \leq 825$	$825 < x \leq 1,500$
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_{PJ,tc,i}*

Chilled water : Output 7 degree Celsius, Input 12 degree Celsius

Cooling water : Output 37 degree Celsius, Input 32 degree Celsius

Through the review of supporting documents and the interview with the PPs during on-site inspection, the project information of Criterion 2 in the PDD is confirmed as follows:

- The COP of project chiller ETI-50 (COP_{PJ,tc,i}) under the standardizing temperature conditions is calculated to be 6.15 using COP_{PJ,i} (= 6.15) given by the manufacturer's test data, by the following equation:

$$\begin{aligned} \text{COP}_{\text{PJ,tc,i}} &= 6.15 \times [(37 - 7 + 1.5 + 1.5) \div (37 - 7 + 1.5 + 1.5)] \\ &= 6.15 \end{aligned}$$

- The COP of ETI-50 (6.15) is higher than the threshold COP of 5.69 for 500 USRt cooling capacity class, according to the methodology TH_AM003.

Hence, it is concluded that the project meets the criterion 2 with a satisfactory result.

Criterion 3

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

Through the review of supporting documents and the interview with the PPs during on-site inspection, the project information of Criterion 3 in the PDD is confirmed as follows:

- Annual maintenance service report demonstrates that the check and maintenance of chiller has been carried out annually by the manufacturer,
- Preventive Maintenance Control Plan shows that the chillers are to be checked and maintained annually.

Hence, it is concluded that the project meets the criterion 3 with a satisfactory result.

Criterion 4

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

Through the review of supporting documents and the interview with the PPs during on-site inspection, the project information of Criterion 4 in the PDD is confirmed as follows:

- The refrigerant type used for the project chiller is "ASAHIKLIN AK-134a (HFC-134)"

produced by Asahi Glass Co., Ltd.,

- Safety Data Sheet shows that the ODP of ASAHIKLIN AK-134a (HFC-134) is zero.

Hence, it is concluded that the project meets the criterion 4 with a satisfactory result.

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.

Through the review of supporting documents and the interview with the PPs during on-site inspection, the project information of Criterion 5 in the PDD is confirmed as follows:

- Letter of consent signed between Sony Device Technology (Thailand) Co., Ltd. And Sony Semiconductor Manufacturing Corporation dated 18/12/2017 was prepared to avoid the release of refrigerant into the atmosphere.
- The letter states that the maintenance for chiller is carried out in accordance with the directions given by the manufacturer “Mitsubishi Heavy Industries, Ltd.” and further the collection of refrigerant from project chillers at the time of removal will be appropriately processed by the manufacturer according to “Freon Collection Guideline (2008)” of the Industrial Network for Fluorocarbon Recovery Promotion (INFREP).

Hence, it is concluded that the project meets the criterion 5 with a satisfactory result.

In conclusion, JQA confirms that the project implementation and operation comply with all eligibility criteria stipulated in TH_AM002 and TH_AM003.

<Findings>

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

No issue was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the actual project and its operation are in compliance with the eligibility

criteria of the applied methodologies TH_AM002 and TH_AM003 during this monitoring period.

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

<Means of verification>

JQA has assessed the status of the actual project and its operation with the registered PDD through the desk review, on-site visit and interviews with the PPs. The assessment results are summarized as follows;

[Physical features of the project]

Through the desk review, on-site visit and interview with the PPs, it is confirmed that the project compressors and chillers were installed in the new clean room of semiconductor factory to reduce CO₂ emissions from electricity consumption and the commissioning of these equipment was completed on 29/03/2017. The installation of these equipment complies with the description of the PDD.

[Monitoring points]

Two monitoring parameters, i.e., power consumption of project air compressor ($EC_{PJ,i,p}$) and power consumption of project chiller ($EC_{PJ,i,p}$), are measured by electricity meter.

1. $EC_{PJ,i,p}$: Power consumption of project air compressor i during the period p [MWh/p]
2. $EC_{PJ,i,p}$: Power consumption of project chiller i during the period p [MWh/p]

It is confirmed through the on-site inspection that the electricity meter has been installed for each of air compressors and chillers, and has been monitoring the electricity consumption of them.

The monitoring points of power consumption for air compressor and chiller are located at the right position, respectively. These monitoring data are continuously monitored by electricity meter and are automatically transmitted to the server at Sony Device Technology (Thailand) Co., Ltd. for recording. Detailed information on the monitoring data of these power consumptions is described in Section C.4.

[Monitoring structure]

The monitoring structure has been established and the roles and responsibilities of the

personnel are consistent with the description in Monitoring Structure Sheet. It is confirmed through the on-site visit and the interview with the PPs that the monitoring activity has been appropriately implemented during the monitoring period, in line with the monitoring plan of the registered PDD.

JQA confirms through the on-site visit for the first verification that the physical features of the project in the registered PDD are in place and the PPs have operated the project as per the registered PDD.

<Findings>

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

No issue was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the project has been operated in accordance with the registered PDD during the monitoring period, and no changes are found from the description of the registered PDD.

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

<Means of verification>

The power consumption of project air compressors and chillers during the monitoring period is measured by electricity meters which are installed and managed by the PPs. As per the applied methodologies TH_AM002 and TH_AM003, the electricity meter is required to be calibrated in case a calibration certificate issued by an entity accredited under national/international standards is not provided. The electricity meters used in the project activity, which is Model ME96SSR-MB (Class 1.0) manufactured by Mitsubishi Electric Corporation, are calibrated by the manufacturer at the time of factory shipment, and performance of the meter is guaranteed by the manufacturer for ten years without a calibration. It is confirmed through the review of the test report issued by the manufacturer that the electricity meter was calibrated at the time of factory shipment and performance of the meter is guaranteed for ten years without a calibration.

<Findings>

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

No issue was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the electricity meter was appropriately calibrated by the manufacturer at the time of factory shipment and its calibration frequency is in compliance with the manufacturer's requirements. Therefore, no correction of the measured value is required.

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

<Means of verification>

JQA has assessed the data and calculation of GHG emission reductions achieved by the project activity as follows:

(a) The corresponding Monitoring Report Sheet of the applied methodology has been used;

Through the review of the monitoring report for the project which is titled as AM002 (Compressor)_20180220v2.xlsx and AM003 (Chiller)_20180220v2.xlsx, it is confirmed that the Monitoring Report Sheets (MRS(input), MRS(input_separate) and MRS(calc_process)) of applied methodologies TH_AM002 and TH_AM003 are appropriately used.

(b) A complete set of data for the monitoring period for all parameters monitored ex post was provided to the verification team in the form of several kinds of files.

Monitoring Report Sheet (MRS) provided by the PPs contains a complete set of the monitored data on power consumption of air compressors (2 units) and chillers (3 units) during the monitoring period of 01/04/2017 – 31/12/2017. The monitored data of air compressors and chillers are separately provided by use of Monitoring Spreadsheet JCM_TH_AM002_ver02.0 and JCM_TH_AM003_ver01.0, respectively. It is confirmed through the review of these monitored data that the monitored power consumption data are fully provided for the monitoring period of 01/04/2017–31/12/2017.

(c) Information provided in the monitoring report has been checked with sources such as plant logbooks, inventories, purchase records, laboratory analysis;

JQA has reviewed the correctness of monitored data given in the MRSs for air compressor and chiller through cross-checking them with the monthly power consumption data provided by the PPs.

Parameters	Monitored values	Method to check values in the monitoring report with sources
EC _{PJ,i,P} for air compressor (TH_AM002)	903.0 MWh/p	The value of power consumption for air compressors in the monitoring report (MRS sheet) is cross-checked with its monthly power consumption data which aggregate the daily data downloaded from the server.
EC _{PJ,i,P} for chiller (TH_AM003)	1,687.6 MWh/p	The value of power consumption for chillers in the monitoring report (MRS sheet) is cross-checked with its monthly power consumption data which aggregate the daily data downloaded from the server.

It is confirmed through the cross-check of the monitored data in the MRS sheet with the monthly power consumption data that the values of power consumption by air compressors and chillers in the MRS sheets are fully consistent with those of monthly power consumption data and further reference emissions, project emissions and emission reductions in the MPS sheets are correctly calculated.

(d) Any assumptions used in emission calculations have been justified;

Through the review of the MRS and the interview with the PPs, it is confirmed that no assumption has been used in emission calculations and hence no justification is required.

(e) Appropriate emission factors, default values, and other reference values have been correctly applied.

Through the review of the MRS and the interview with the PPs, it is confirmed that emission factors, default values, and other reference values have been correctly applied.

<Findings>

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

No issue was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the monitored data and the calculation of GHG emission reductions achieved by the project activity, in accordance with the applied methodologies TH_AM002 and

TH_AM003, are appropriate and correct.

C.5. Assessment of avoidance of double registration

<Means of verification>

It is confirmed that a written confirmation from the PPs regarding no registration under other international climate mitigation mechanisms was provided at the time of validation and the declaration letter signed by the PP's representative in the MoC was submitted to the Joint Committee. In addition, it is re-confirmed through the check of the relevant website and the interview with PPs that the project has not been registered under any other mechanisms.

<Findings>

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

No issues was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the project has not been registered under other international climate mitigation mechanisms.

C.6. Post registration changes

<Means of verification>

It is confirmed through the review of documents and the on-site assessment that the project has not been changed from the registered PDD and/or methodology.

<Findings>

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

No issue was identified.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

JQA concludes that the project has not been changed from the registered PDD and/or methodology.

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 issues including FAR from the validation are remained. As this is the first verification, no issues from the previous verification are also remained.

E. Verified amount of emission reductions achieved

Year	Verified Emissions (tCO ₂ e)	Reference	Verified Project Emissions (tCO ₂ e)	Verified Emission Reductions (tCO ₂ e)
2017		1,583.3	1467.4	115
2018		n/a	n/a	n/a
2019		n/a	n/a	n/a
2020		n/a	n/a	n/a
2021		n/a	n/a	n/a
2022		n/a	n/a	n/a
2023		n/a	n/a	n/a
2024		n/a	n/a	n/a
2025		n/a	n/a	n/a
Total (tCO ₂ e)				115

F. List of interviewees and documents received

F.1. List of interviewees

- Hironori Sakamoto, Managing Director, Sony Device Technology (Thailand) Co., Ltd.
- Yoshiro Fujiyama, Executive Director, Sony Device Technology (Thailand) Co., Ltd.
- Chiaki Nomura, Executive Director, Sony Device Technology (Thailand) Co., Ltd.
- Rapin Pensook, Executive Director, Sony Device Technology (Thailand) Co., Ltd.
- Apirome Puangchareanpor, Assistant General Manager, Sony Device Technology (Thailand) Co., Ltd.
- Somya Nathomtong, Assistant General Manager, Sony Device Technology (Thailand) Co., Ltd.
- Manattida Temiyakul, Sony Device Technology (Thailand) Co., Ltd.
- Chihiro Kudo, General Manager, Sony Technology (Thailand) Co, Ltd.
- Hirotochi Kikuchi, Assistant Manager, Sony Technology (Thailand) Co, Ltd.
- Nobutaka Kawashita, Senior General Manager, Sony Semiconductor Manufacturing Corporation
- Takeshi Yamada, Manager, Sony Semiconductor Manufacturing Corporation
- Kazuyuki Amano, Sony Semiconductor Manufacturing Corporation
- Yasuhiro Takemura, Senior Manager, E-Square Inc.
- Kenichi Uchida, Manager, E-Square Inc.

F.2. List of documents received

1. Monitoring Report Sheet (Draft), AM002(Compressor)_20180220v2.xlsx and AM003(Chiller)_ 20180220v2.xlsx
2. Project Design Document, ver. 2.0, 20/02/2018
3. Validation Report, 22/03/2018 (JCM_TH004_Val_Rep.pdf)
4. JCM Modalities of Communication Statement Form (MoC) dated 22/11/2017
5. Approved Methodology JCM_TH_AM002_ver02.0, 21/08/2017, JC3, Annex 10
6. Monitoring Spreadsheet JCM_TH_AM002_ver02.0.xlsx
7. Approved Methodology JCM_TH_AM003_ver01.0, 21/08/2017, JC3, Annex 6
8. Monitoring Spreadsheet JCM_TH_AM003_ver01.0.xlsx
9. JCM Glossary of Terms (JCM_TH_Glossary_ver01.0)
10. JCM Project Cycle Procedure (JCM_TH_PCP_ver02.0)
11. JCM Modalities of Communication Statement Form (JCM_TH_F_MoC_ver01.0)
12. JCM Guidelines for Developing Project Design Document and Monitoring Report (JCM_TH_GL_PDD_MR_ver02.0)
13. JCM Guidelines for Validation and Verification (JCM_TH_GL_VV_ver01.0)
14. JCM Verification Report Form (JCM_TH_F_Vrf_Rep_ver02.0)
15. Layout of compressor and chiller in the clean room of semiconductor plant
- 16-1. Specification of compressor “ALE75W” manufactured by KOBELCO
- 16-2. Specification of compressor “ALE75W”
17. Operation manual of compressor “ALE75W” manufactured by KOBELCO
- 18-1. Specification of chiller “ETI-50” manufactured by Mitsubishi Heavy Industries, Ltd.
- 18-2. Specification of chiller “ETI-50”
19. Operation manual of chiller “ETI-50” manufactured by Mitsubishi Heavy Industries, Ltd.
- 20-1. Specification of electricity meter ME96SSR-MB (Class 1.0) manufactured by Mitsubishi Electric Corporation
- 20-2. Calibration test report of electricity meter issued by Mitsubishi Electric Corporation Fukuyama Works, dated 25/07/2016
- 20-3. Calibration frequency recommended by the manufacturer
21. Safety data sheet (SDS) of the refrigerant Asahiklin AK-134a manufactured by AGC
22. Letter of Consent between Sony Device Technology (Thailand) Co., Ltd. and Sony Semiconductor Manufacturing Corporation dated 18/12/2017 for the collection of refrigerant
23. Freon Collection Guideline (2008) by the Industrial Network for Fluorocarbon Recovery Promotion (INFREP)
24. Preventive maintenance control plan prepared by Sony Device Technology (Thailand) Co., Ltd.
25. Maintenance record of air compressor issued by Meiwa Enterprise (Thailand) Co., Ltd.

26. Annual Maintenance Servicing Report of chiller issued by Mitsubishi Heavy Industries – Mahajak Air Conditioners Co., Ltd.
27. Training record conducted 16/12/2015
28. Monitoring points of power consumption for air compressor and chiller
29. Schematic diagram of monitoring structure
30. Display of power consumption on the monitoring screen
31. Daily data of power consumption for air compressors and chillers in April 2017
32. Monthly power consumption data during 01/04/2017 – 31/12/2017
33. Operation logbook data of equipment including air compressor and chiller

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

Statement of competence			Statement of competence		
Name: <u>Dr. Tadashi Yoshida</u>			Name: <u>Mr. Koichiro Tanabe</u>		
Qualified and authorized by Japan Quality Assurance Organization.			Qualified and authorized by Japan Quality Assurance Organization.		
Function		Function		Function	
	Date of qualification		Date of qualification		Date of qualification
Validator	2014/12/22	Validator	-	Validator	-
Verifier	2014/12/22	Verifier	2014/12/22	Verifier	2014/12/22
Team leader	2014/12/22	Team leader	2014/12/22	Team leader	2014/12/22
Technical area within sectoral scopes		Technical area within sectoral scopes		Technical area within sectoral scopes	
	Date of qualification		Date of qualification		Date of qualification
TA 1.1. Thermal energy generation	2014/12/22	TA 1.1. Thermal energy generation	2014/12/22	TA 1.1. Thermal energy generation	2014/12/22
TA 1.2. Renewables	2014/12/22	TA 1.2. Renewables	2014/12/22	TA 1.2. Renewables	2014/12/22
TA 3.1. Energy demand	2014/12/22	TA 3.1. Energy demand	2014/12/22	TA 3.1. Energy demand	2014/12/22
TA 4.1. Cement and lime production	2015/11/12	TA 4.1. Cement and lime production	-	TA 4.1. Cement and lime production	-
TA 4.6. Other manufacturing industries	2014/12/22	TA 4.6. Other manufacturing industries	2014/12/22	TA 4.6. Other manufacturing industries	2014/12/22
TA 5.1. Chemical industry	2014/12/22	TA 5.1. Chemical industry	2014/12/22	TA 5.1. Chemical industry	2014/12/22
TA 10.1. Fugitive emissions from oil and gas	2014/12/22	TA 10.1. Fugitive emissions from oil and gas	2014/12/22	TA 10.1. Fugitive emissions from oil and gas	2014/12/22
TA 13.1. Solid waste and wastewater	2014/12/22	TA 13.1. Solid waste and wastewater	2014/12/22	TA 13.1. Solid waste and wastewater	2014/12/22
TA 14.1. Afforestation and reforestation	-	TA 14.1. Afforestation and reforestation	-	TA 14.1. Afforestation and reforestation	-