CPA VALIDATION REPORT
STANDARD BANK PLC

VALIDATION OF THE
ENERGY EFFICIENCY IN CHILLER PLANT AT THE CAPRICORN BUILDING LOCATED AT 1 SCIENCE PARK ROAD, THE CAPRICORN, SINGAPORE 117528 (CAPRICORN CPA)

BUREAU VERITAS CERTIFICATION

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62/71 Boulevard du Château
92571 Neuilly Sur Seine Cdx - France

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Client:	**Client ref.:**
Standard Bank Plc	Mr. Geoff Sinclair

Summary:

Bureau Veritas Certification has made the validation of the Energy Efficiency in Chiller Plant at CAPRICORN Building (CAPRICORN CPA) project of Standard Bank Plc located in 1 Science Park road, The Capricorn, Singapore Science Park II, Singapore 117528 on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study, monitoring plan and other relevant documents, and consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final validation report and opinion. The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

The first output of the validation process is a list of Clarification and Corrective Actions Requests (CL and CAR), presented in Appendix A. Taking into account this output, the project proponent revised its project design document.

In summary, it is Bureau Veritas Certification's opinion that the project correctly applies the baseline and monitoring methodology AMS II.C Version 13 and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria.

Report No.:	Subject Group:
Singapore-val/0003.1/2012	CDM

CPA title:
Energy Efficiency in Chiller Plant at Capricorn Building located at 1 Science park Road, The Capricorn, Singapore Science Park II, Singapore 117528 (CAPRICORN CPA)

Work carried out by:
Kusheru Wibowo (Lead Verifier)
So Shuk Ling (Verifier)
HB Muralidhar (Technical Specialist)
S. Thyagaraj (Internal Reviewers)

Internal Technical Review carried our by:
Name of Internal Technical Reviewer
S. Thyagaraj

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1 INTRODUCTION

Standard Bank Plc has commissioned Bureau Veritas Certification to validate its 1st CDM programme of Activity (CPA) "Energy Efficiency in Chiller Plant at CAPRICORN Building located at 1 Science Park Road, The Capricorn, Singapore Science Park II, Singapore 117528 (CAPRICORN CPA) (hereafter called "CPA") in 1 Science Park Road, The Capricorn, Singapore Science Park II, Singapore 117528.

This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

The validation serves as project design verification and is a requirement of all projects. The validation is an independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan (MP), and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design, as documented, is sound and reasonable, and meets the stated requirements and identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

The validation is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Validation team

The validation team consists of the following personnel:

FUNCTION	NAME	CODE HOLDER*	TASK PERFORMED
Lead Verifier	Kusheru Wibowo	☐Yes ☒ No	☒DR ☒SV ☒RI
Verifier	So Shuk Ling	☐Yes ☒ No	☒DR ☒SV ☒RI
Technical Specialist	HB Muralidhar	☒Yes ☐ No	☒DR ☒SV ☐RI
Financial Specialist	N.A.	☐Yes ☐ No	☐DR ☐SV ☐RI

Internal Technical Reviewer (ITR)	S.Thyagaraj	☒**Yes** ☐ **No**	☒**DR** ☐**SV** ☒**RI**
Specialist supporting ITR	N.A.	☐**Yes** ☐ **No**	☐**DR** ☐**SV** ☐**RI**

*DR = Document Review; SV = Site Visit; RI = Report issuance

2 METHODOLOGY

The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, a validation protocol was customized for the project, according to the version 01.2 of the Clean Development Mechanism Validation and Verification Manual, issued by the Executive Board at its 55th meeting on 30/07/2010. The protocol shows, in a transparent manner, criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM Programme of Activities is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The completed validation protocol is enclosed in Appendix A to this report.

2.1 Review of Documents

The real case Project Design Document (CPA-DD) (Capricorn CPA) submitted by Standard Bank Plc and additional background documents related to the project design and baseline, i.e. country Law, Guidelines for Completing the Project Design Document (CPA-DD), Approved methodology, Kyoto Protocol, Clarifications on Validation Requirements to be Checked by a Designated Operational Entity were reviewed.

To address Bureau Veritas Certification corrective action and clarification requests, Standard Bank Plc revised the CPA-DD and resubmitted it on 10/12/2011 for re-webhosting.

The validation findings presented in this report relate to the project as described in the CPA-DD version 2 dated on 18 /07/ 2011.

2.2 Follow-up Interviews

On 12/10/2011 Bureau Veritas Certification performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Ascendas Services Pte Ltd, Trane Air-

conditioning Pte Ltd, Climate Resources Exchange Pte Ltd and British High Commission Singapore were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
Ascendas Services Pte Ltd	➢ Project Background, PoA and CPA consideration ➢ Agreement sign with Climate Resources Exchange Pte Ltd ➢ Management Board Meeting on consideration benefits of CDM for retrofit chiller plant project ➢ Cost barrier ➢ Environmental legal law and Environmental analysis for CPA ➢ Scrap equipment monitoring ➢ Sources and gases included in the CPA boundary ➢ Additionality demonstration ➢ Environmental legal law and environmental analysis ➢ Site visit chiller plant
Trane Airconditioning Pte Ltd	➢ Contract of replacing chiller plant ➢ Project Technology ➢ Technology barrier and common practice ➢ Installation and commissioning of chiller plant ➢ Energy coefficient and energy saving data before and after retrofit ➢ Baseline study ➢ Energy coefficient performance guarantee ➢ Emission reduction calculation ➢ Project handover to Ascendas Services ➢ Maintenance plan for chiller plant ➢ Equipment monitoring and EMS data monitoring emission reduction ➢ Training of technicians ➢ Scrap equipment monitoring ➢ Site visit chiller plant
LOCAL Stakeholder- British High Commission Singapore	➢ Feedback of the information of survey participant done during the stakeholders consultation Meeting on 03 Feb 2010
Climate Resources Exchange Pte Ltd-	➢ Agreement with Standard Bank on the PoA for Energy Efficiency in Chiller Plants in Industrial / Commercial Buildings across Singapore ➢ Project background and PoA consideration ➢ Agreement with Ascendas of CPA ➢ CPAs inclusion in PoA ➢ Meeting with DNA Singapore (NEA) on letter of approval ➢ Communication with Standard Bank letter of approval from UK ➢ Environmental legal law and environmental analysis ➢ Stake holder consultation processes ➢ Additionality demonstration

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to raise the requests for corrective actions and clarification and any other outstanding issues that needed to be clarified for Bureau Veritas Certification positive conclusion on the project design.

Corrective Action Requests (CAR) is issued, where:

(a) The Coordinating and Management Entity (CME) have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
(b) The CDM Programme of Activities requirements have not been met;
(c) There is a risk that emission reductions cannot be monitored or calculated.

The validation team may also use the term Clarification Request (CL), if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.

2.4 Internal Technical Review

The validation report underwent a Internal Technical Review (ITR) before requesting registration of the project activity.

The ITR is an independent process performed to examine thoroughly that the process of validation has been carried out in conformance with the requirements of the validation scheme as well as internal Bureau Veritas Certification procedures.

The Lead Verifier provides a copy of the validation report to the reviewer, including any necessary validation documentation. The reviewer reviews the submitted documentation for conformance with the validation scheme. This will be a comprehensive review of all documentation generated during the validation process.

When performing an Internal Technical Review, the reviewer ensures that:

- The validation activity has been performed by the team by exercising utmost diligence and complete adherence to the CDM rules and requirements.

- The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the stakeholder comments and responses, closure of CARs, CLs and FARs during the validation exercise, review of sample documents.

The reviewer compiles clarification questions for the Lead Verifier and Validation Team and discusses these matters with Lead Verifier.

After the agreement of the responses on the ‘Clarification Request’ from the Lead Verifier as well as the PP(s) the finalized validation report is accepted for further processing such as uploading on the UNFCCC webpage.

3 VALIDATION CONCLUSIONS

In the following sections, the conclusions of the validation are stated.

The findings from the desk review of the original project design documents and the findings from interviews during the follow up visit are described in the Validation Protocol in Appendix A.

The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol in Appendix A. The validation of the Project resulted in 02 Corrective Action Requests (CARs) and 03 Clarification Requests (CLs).

The CARs and CLs were closed based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

The number between brackets at the end of each section correspond to the VVM paragraph

3.1 Approval (49-50)

A letter of approval at PoA level has been received (Category 1 Ref 11 & 10) and the following support documentation was received from Singapore DNA and UK DNA respectively:

1. Singapore DNA is National Environmental Agency which has issued the Letter of approval for Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants in Singapore by Climate Resources Exchange dated 20 September 2010 (Category 1 Ref 11).

2. UK DNA is from Department of Energy & Climate change has issued the Letter of Approval for Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants (Reference number: SB/03/2010) dated on 14 Oct 2010 (Category 1 Ref 10).

Bureau Veritas Certification received this letter from the project participants and does not doubt its authenticity.

Bureau Veritas Certification considers the letters are in accordance with paragraphs 45 - 48 of the VVM.

3.2 Participation (54)

The participation for each project participant has been approved by a Party of the Kyoto Protocol.

The validation team concluded this by verified the web http://maindb.unfcc.int/public/country.pl?country=SG the host party is non Annex 1 party Republic of Singapore and verified the web http: //maindb.unfccc.int/public/country/pl?country=GB that Annex 1 party including United Kingdom of Great Britain.

3.3 Project design document (57)

The validation team confirms that the revised CPA -DD Ver.03/Ref: 03/ complies with the latest forms of the guidance documents for completion of CPA-DD i.e. EB55 Annex 38 using latest version of the template form CDM-CPA-DD, and thus complying with Para 57 of VVM, version 1.2.

3.4 Changes in the Project Activity

The validation team has observed during site visit that the project activity has been implemented in accordance with the description provided in the web hosted CPA-DD. Thus, no changes were observed during site visit with comparison to the webhosted CPA-DD as compared to details mentioned in web hosted CPA-PDD /Ref: 02/.

However, the final PDD Ver-03, dated 05/03/2012 has following changes as compared to PDD Ver. 02 that was web hosted.

There are few specific changes were made to the Capricorn CPA-DD, based on the outcome of Validation process

1. The most significant change is the change of Approved methodology to develop this proposed PoA.Initially CME has utilized AMS II.E Version 10, which is now replaced by AMS IIC Version 13.
2. Section B.3 of CPA –DD is now revised with the criteria for selection of technology at the time of implementation of the CPA.
3. Section B.5.1 of Capricorn CPA-DD is revised to incorporate monitoring parameters prescribed by the algorithm of approved methodology to determine Baseline and project emissions due to implementation of Capricorn CPA

These changes were validated by the validation team and found appropriately addressed in CPA –DD version 03 Dated 05/03/2012.

CPA –DD is revised to Version 04 Dtd. 27/08/2012 in response to the completeness check points, mainly to make it align with the requirements of latest PoA Standard i.e. EB 65 Annex 03.

3.5 Project description (64)

The process undertaken to validate the accuracy and completeness of the project description:
The CPA is under the PoA project title: Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants.

This CPA aims to achieve energy efficiency and reduce consumption of electricity in Capricorn Building, located in Singapore which will result into the reduction of GHG emissions due to burning of fossil fuel during power generation activity.

The Capricorn CPA involves the replacement of the inefficient air cooled chiller having specific energy consumption rating of 1.391 kW/TR with energy efficient water cooled chiller having specific energy consumption rating of 0.59 kW/TR (Which is better than 0.65 kW/TR, PoA criteria for inclusion) in Capricorn building which belongs to the HSBC Institutional Trust Services Singapore Limited as Trustee of Ascendas Real Estate Investment Trust. They will be the implementer of this Capricorn CPA**.**

Existing / baseline air conditioning system consists of 6 units of 300TR air cooled chillers located at the roof top of Capricorn Building and this CPA project is implemented to replace these inefficient chillers with following new equipments:

1. 3 units of 400TR with R123 refrigerant water-cooled chillers
2. Cooling towers with total 1512 TR (9 cells x 168 TR per cell)
3. 3 units of new chilled water pumps and 3 units of new condenser water pumps
4. Electrical Control system for variable speed drive on motor for all new pumps and cooling towers
5. New 18" condenser water pipes for cooling towers and
6. Energy management and Monitoring System to monitor the data

The CPA start date is on 16/11/2010 the date of contract (Category 1 reference 12) awarded from project implementer to the designer Trane and the length of CPA operation lifetime expected to be 10 years at the same efficiency level (0.59 kWh/TR) provided by Trane under their maintenance plan (Category 1 reference 14).

The CPA has chosen 10 years fixed crediting period and start date of the crediting period will be the date of PoA registration date.

There are no mandatory policies or regulations for adoption of the program to use energy efficient chiller with 0.65kW/TR or better in Singapore buildings. However Singapore government promotes energy efficiency and has provided incentive grants for implementation of energy efficient designs in buildings. The proposed CPA is a voluntary action by coordinating and managing entity.

The CPA does not receive any public funding although they have applied for government incentive scheme "Greet funding".

Total Annual CER estimated through implementation of this Small scale CDM programme of Activities (CPA) is 1,021 tCO2e.

Under the PoA there are totally 14 eligibility criteria are defined for the inclusion of CPA to the POA.

Validation team has verified Capricorn CPA against established eligibility criteria and the validation opinion about the inclusion of "Energy Efficiency in Chiller Plant at CAPRICORN Building located at 1 Science Park Road, The Capricorn, Singapore Science Park II, Singapore 117528 (CAPRICORN CPA) is as given below.

Eligibility Criteria	***Validation Opinion***
a) The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA. - The CPA must be within the geographical location of The Republic of Singapore as stated in section A.4.1.2 of the PoA-DD	The CPA Named "Capricorn" is located at 1 Science Park Road, the Capricorn, Singapore Science Park II, and Singapore 117528. From postal address and by means of physical site visit it is confirmed that the geographical boundary of CPA is within the Republic of Singapore, and hence validation team concluded that this eligibility condition is fulfilled by the CPA
b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. Programme logo - As per the conditions set out in in the operation and management plan of the PoA – as defined under section A.4.4.1 (Operational and management plan of the PoA-DD). Each CPA shall have a unique identification number (UIN) based on its precise geo-coordinates (GPS) and assigned under the building owner's name. The CME will have this recorded in the database of the operating and management software/hardware system. In addition, a CARE PoA Logo printed sticker with the UIN number shall be issued and must be displayed on the control infrastructure of the chiller plant system of each CPA	During validation visit Validation team has verified the the Geocordinates of the Capricorn Building and conformed that the geo coordinates provided in the CPA-DD are correct. Also it was cross-checked with the CDM Data base and confirmed that there is no registered project by same name / geo coordinates and PP and methodology as well as technology observed. From above assessment Validation team confirms that the eligibility condition is fulfilled and there is no double accounting of emission reduction evidenced
c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications; - Each CPA must implement water-cooled chiller technology and shall comply with ASHRAE 14 guidelines and AHRI 550 calibration standards and shall implement a building automation software technology that is able to measure and monitor the performance of the chiller plant system in order to achieve a minimum energy efficiency coefficient of 0.65kW/TR at 1-minute intervals and be able to store such data that the DOE can verify on an annual basis during the crediting period of the CPA. - Any building whether industrial, commercial	Project activity involves replacement of 06 air cooled chiller in baseline by installing 03 new water cooled chiller . Validation team has verified installation contract with Trane Singapore and technical Specification of Trane Chillers, Capacity 400 RT /Ref-14/. The installation of new TRANE make chillers is found in accordance with the ASHRAE 14 guideline. It was also observed that CPA implementer has made a provision for monitoring Chiller plant performance at one minute Interval to achieve 0.65 Kw/TR energy efficiency Coefficient

or residential must be operating a chiller plant to cool the building with an installed cooling load capacity of more than 100TR and have a total chiller plant system efficiency of not better than 0.65kW/TR (i.e.0.66kW/TR and higher). - Each CPA must have completed an energy audit on the chiller plant system and conducted by a registered Energy Service Company (ESCO) accredited by the National Environment Agency (NEA) and prove through a comprehensive report that the measurements and computation that the chiller plant system efficiency was not better than 0.65kW/TR in the baseline scenario.	Calibration of all monitoring devices is planned as per AHRI 550 calibration standard. Validation team has verified the results of energy audit performed by CPA implementer using accredited ESCO, TRANE Singapore Pte. Ltd. during 10/12/2010 to 21/01/2011 Validation team verified the status of Accreditation with NEA and found that it was valid at the time of Energy Audit. From the Energy audit records submitted by CME for validation it was observed that the efficiency of the baseline chiller plant system was 1.395 kW/TR.
d) Conditions to check the start date of the CPA through documentary evidence; - Each CPA to be considered for inclusion under the PoA must prove that the start date is after the start date of the PoA, i.e. the date that the PoA was first published for Global Stakeholder Consultation – April 6 2010. The documentary evidence must show and prove that any Purchase or Works Order made out to the technology provider or main contractor must be after this date.	The start date of real case CPA i.e. Capricorn CPA was verified using the Purchase order / Contract document issued by CPA implementer Ascendas Services Pte Ltd on behalf of Singapore Science Park Ltd awarded to Trane Singapore (ref: AS/36/10-11/090) Dtd. 16th November 2010. CME has considered awarding purchase order / Contract to Trane Singapore Pte. Ltd. as the real action for implementing the 1st Real case CPA, and hence provided as the start dae of CPA. This is found in accordance with the definition of start date and the Start date of CPA is observed to be after 06th April 2010. From above it is concluded that the eligibility condition pertaining to start date established in the PoA-DD is fulfilled.
e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;	During Validation of the CPA, validation Team has verified all the applicability conditions prescribed by the Approved Baseline and monitoring methodology AMS II.C, Version 13 “Demand-side efficiency activities for specific technologies” and found that the CPA is meeting all applicable methodological conditions. This has been demonstrated by CME and CPA implementer transparently using various supporting documents i.e. Technical Specifications, Design configurations, Electricity consumption, Baseline monitoring, energy audit results etc. Detailed validation conclusion on the applicability conditions of AMS II.C is provided in this validation report Section 3.6.1.
(f) Conditions that ensure that CPAs meets the requirements pertaining to the demonstration of additionality as per Attachment A of Appendix	CME has demonstrated at PoA level that the implementation of PoA pertaining to Energy efficiency in chiller plant by achieving energy

B of Simplified modalities and procedures for small-scale CDM project activities. The additionality is demonstrated at the PoA level using Attachment A of Appendix B of simplified modalities and procedure for small-scale CDM project Activities. The most appropriate barrier selected is the Prevailing practice barrier and detailed justification of additionality due to prevailing practice in the host country Singapore is provided in the PoA-DD section A.4.3 and it is extended to all CPA's. Based on the description of the Prevailing practice barrier, the following key criteria are identified to demonstrate CPA additionality: - Each CPA must demonstrate that in the absence of the guidance of the PoA it would not have been able to achieve a chiller plant system efficiency of 0.65kW/TR measured at 1-minuteIntervals based on the integrated design-approach for the retrofit of the old Chiller plant systems. - Each CPA implements the proposed voluntary measure of the PoA and is not a result of any other policy or measure applied within the boundary of the PoA hence, it would not exist in the absence of the PoA - Each CPA increases enforcement of the mandatory policy/regulation that would systematically not be enforced, or increases compliance with those requirements for which non-compliance is widespread in the country/region, hence, it results in an increased level of enforcement or compliance that would not be reached in the absence of the PoA; - Each CPA increases enforcement of the existing mandatory policy/regulation to a level that would not be reached in the absence of the PoA.	efficiency coefficient of 0.65 Kw/TR, is not a prevailing practice in host country Singapore, and hence faces barrier due to prevailing practice. This was validated by validation team in PoA validation report. In accordance with the Para 4 of EB 60 Annex 26, full additionality assessment is not required at CPA level, and hence the assessment of additionality of CPA was done through the eligibility conditions established by PoA. Four conditions CME has identified to prove additionality of the CPA are found valid in accordance with Prevailing practice Barrier, where CPA is considered additional if - Design / implementation of CPA meets energy efficiency criteria of 0.65 kW/TR and has in build system for monitoring operational parameters at 1 Minute interval CPA is additional. In case of Capricorn CPA, retrofit of Chiller plant system is in accordance with this additionality requirement. Validation team Verified project design documents and system configurations to conclude that Capricorn building is capable of achieving of desired Energy efficiency using 1minute internal monitoring system. - The implementation of CPA is a voluntary decision of the CPA implementer as there is no regulatory requirement is prevailing in host county at the time of implementation of this CPA for achieving desired Energy Efficiency. - Consistent achievement of energy efficiency in chiller plant system by implementing such integrated design approach will help in setting bench mark for enforcement of mandatory policy / regulation in host Country Singapore. Hence Validation team herewith concludes that the proposed Real Case CPA "Capricorn" meets the additionality conditions prescribed in the PoA – DD.
(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis; - Each CPA must meet the EIA requirements as stated in the EIA Section C – below. Each CPA must also demonstrate and present records that equipment replaced have been scrapped and independently verified. The local stakeholder consultation has already been done at the PoA level and so each CPA does	- CME has decided to conduct Stake holders consultation at PoA level and it is clearly mentioned in the PoA-DD sections D.1, D.2 and D.3 as well as in CPA-DD section D.1. Stake holders consultation validation is done at PoA level and it is reported in the PoA Validation Report Section 3.10. - There is no mandatory requirement to perform EIA for such kind of activities as per the local Environmental Regulations,

not need to undergo such a separate stakeholder consultation.	however CPA implementer has performed an EIA Voluntarily to verify the effects of waste generation due to retrofit activity and to establish relevant controls on waste disposal, purely for the internal reference purpose CPA implementer dated in July 2011, and the documented report was presented by the CME for validation purpose. - Old chillers have scrapped by independent party and the scraped records are kept and retained. Validation team has verified the scrap records of old chillers disposed by Sun 88 Engineering on 30/04/2011 for old chiller unit 2 & 5, on 21/05/2011 for unit 4 & 6 and on 04/06/2011 for unit 1 & 3 (Category 1 reference 16).
(h) Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance; - Each CPA shall provide documentary evidence for their source of funding for developing their respective retrofit project.	There is no ODA available for the implementation of this CPA. It was observed that the implementation of Chiller plant system at the 1st CPA location was funded internally by Ascendas Real Estate Investment Trust (A-REIT).
(i) Where applicable, the requirements for the de-bundling check, in case CPAs belong to small-scale (SSC) or micro-scale project categories. - Each CPA shall undergo a de-bundling check as prescribed under section A.4.4.1 (Operational and management plan of the PoA-DD) and verified by the DOE prior to inclusion	CME has performed the assessment of debundling criteria for the small scale CPA " Capricorn" by following Operational management plan. Validation team confirmed that the small scale proposed CPA is not a debundled CDM project of any large scale or micro scale CDM project. Validation team used UNFCCC website and CD4 CDM database, VCS data base to confirm that this CPA is not a registered project.
(j) Condition in determining the difference in the loading capacity of the chiller plant system in the baseline scenario as compared to the project activity. - CPAs where cooling load capacity changes significantly between the baseline and the project activity, i.e. less than 10% or more than 50% as compared to the baseline shall be excluded from this PoA in accordance with the applied methodology AMS IIC Version 13.	Cooling requirement of Capricorn building in the baseline was 600-700TR and during the baseline scenario, there are 6 chillers (3 working + 3 standbys) of 300RT capacity were installed to achieve baseline cooling load. In project scenario CME has installed 3 chillers (2 working + 1 standby) of 400RT capacity to achieve same cooling load as baseline. Hence, it is concluded that there is no change in cooling load from the baseline to the project scenario, however, only configuration of chiller has been modified to suit the operational requirement.
(k) Condition to determine if the CPA falls within the requirement of an SSC-CPA. - Each CPA shall not generate an electrical energy savings of more than 60GWh per annum post retrofit.	Capricorn CPA will be resulting in an electrical energy saving of 1,568,040 KWH, which is equivalent ot 1.568 GWh. This is confirmed by the Validation Team using baseline monitoring report, emission reduction spread sheet and technical specifications of Project equipment's
(l) Condition to determine if the CPA is eligible to be included in the PoA if parts of the system	From the design details and equipment configuration it was observed that the

are shut down and/or if there is no actual retrofit but only optimization or calibration works performed to improve chiller plant system efficiency. - Such CPAs will not be included.	Capricorn CPA implementation involves complete retrofit of the chiller plant system. While carrying out retrofit of the chiller plant system at Capricorn building CPA implementer has replace 06 Air cooled chillers of 300 TR capacity each with 03 Water cooled new chillers of 400 TR capacity each. Configuration includes fully automated operating system with no manual intervention. Hence it is confirmed that the this CPA is eligible to include as a real case CPA to the PoA.
(m) Conditions to determine if a CPA is eligible to be included in the PoA based on Refrigerant Usage - CPAs switching from use of older refrigerants R11/R12/R22 to a non-CFC refrigerant such as R134a or R123 are allowed. - CPAs switching from any of R134a or R123 refrigerants to a new refrigerant that is commercially available that is CFC-free and which refrigerant has a lower GWP than any of R134a or R123 refrigerants in the future is allowed.	Baseline chiller plant system at Capricorn Building was using R134a as a refrigerant gas, which is considered as CFC gas with GWP value of 1300. During retrofit CPA implementer has installed water cooled chillers using non CFC refrigerant gas i.e. R123 having lower GWP, and hence this CPA is eligible for inclusion to the PoA. This was confirmed by the validation team using Technical specifications of baseline chillers and project chillers.

In conclusion, the validation team confirm that the Capricorn CP complies with the eligibility criteria requirements of the PoA.

3.6 Baseline and monitoring methodology

3.6.1 General requirement (76-77)

The steps taken to assess the relevant information contained in the CPA-DD against each applicability condition are described below.

The CPA is using approved methodology AMS II.C version 13- Demand-side efficiency activities for specific technologies.

Applicability condition (1): This methodology comprises activities that encourage the adoption of energy-efficient equipment / appliance e.g., lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems) at many sites. These technologies may replace existing equipment or be installed at new sites. In the case of new facilities, the determination of baseline scenario shall be as per the procedures described in the general guidance to SSC methodologies under the section "Type II and III Greenfield projects (new facilities)". The aggregate energy savings by a single project may not exceed the equivalent of 60 GWh per year for electrical end use energy efficiency technologies. For fossil fuel end use energy efficient technologies, the limit is 180 GWh thermal per year in fuel input.

This CPA involves retrofit / installation of energy-efficient water cooled chiller with a specific energy consumption of 0.59kW/TR by replacing existing energy inefficient air

cooled chiller with 1.391kW/TR in Capricorn Building in Singapore and the CPA did not exceed energy saving of 60 GWh per year for electrical end use energy efficiency technologies. (Note: in this CPA, the energy saving is 1.62 GWh per annum)

Applicability condition (2): For each replaced appliance / equipment / system the rated capacity or output or level of service (e.g light output, water output, room temperature and comfort, the rated output capacity of air-conditioners etc.) is not significantly smaller (maximum – 10%) than the baseline or significantly larger (maximum + 50%) than the baseline.

The cooling load requirement of the Capricorn building in the baseline was 600-700TR and during the baseline scenario, there are 6 chillers (3 working + 3 standbys) of 300RT capacity were installed to achieve baseline cooling load. In the project scenario CME has installed 3 chillers (2 working + 1 standby) of 400RT capacity to achieve same cooling load as baseline. Hence, it is concluded that there is no change in cooling load from the baseline to the project scenario; however, only configuration of chiller has been modified to suit the operational requirement.

CME has performed baseline study to arrive at baseline emission prior to retrofit. During this baseline study daily data at 1 minute interval for period of one month was captured utilizing EMS Software and presented to validation team during validation. Validation team has validated the data of baseline study where cooling load is determined as average 400 – 600 TR which is found transparent. Based on this data the project equipment rated capacity was verified and found that it is arrived on the basis of the same cooling load.

Applicability condition (3): If the energy efficient equipment contains refrigerants, then the refrigerant used in the project case shall be CFC free. Project emissions from the baseline refrigerant and / or project refrigerants shall be considered in accordance with the guidance of the Board (EB 34, paragraph 17). This methodology credits emission reductions only due to the reduction in electricity consumption from use of more efficient equipment / appliance.

As per the Paragraph 3 of AMS II.C, Version 13, if the energy efficient equipment contains refrigerants, then the refrigerant used in the project case shall be CFC free. In accordance with this requirement CME has established an eligibility condition (m) at PoA level for inclusion of CPA, which clearly specifies that

- CPAs switching from use of older refrigerants R11/R12/R22 to a non-CFC refrigerant such as R134a or R123 are allowed.
- CPAs switching from any of R134a or R123 refrigerants to a new refrigerant that is commercially available that is CFC-free and which refrigerant has a lower GWP than any of R134a or R123 refrigerants in the future is allowed.

Paragraph 3 of AMS II.C, Version 13, further states that, project emissions from the baseline refrigerant and/or project refrigerants shall be considered in accordance with the guidance of the Board (EB 34, paragraph 17), Validation Team verified the

requirement of EB 34, Paragraph 17, and found that gases mentioned in the eligibility condition (m) are in accordance with the list of gases in EB34, paragraph 17. This methodology credits emission reductions only due to the reduction in electricity consumption from use of more efficient equipment/appliances, this indicates that the methodology is not applicable for the CPA's that only replace chillers to credit emission reductions from refrigerant gases due to differences in GWP of the said refrigerants without replacing the entire chiller plant system to reduce overall electrical energy (kWh) consumption will NOT be allowed in accordance with the methodology AMS IIC Version 13. The proposed PoA project and 1st CPA, involves reduction in electricity consumption from use of more efficient Chiller Plant Systems, hence it is concluded that the Approved methodology is applicable to the proposed PoA and 1st CPA..

The validation team hereby confirms that the selected baseline and monitoring methodology AMS II C(Version 13), is previously approved by the CDM Executive Board, and is applicable to the project activity, which, complies with all the applicability conditions therein.

The DOE hereby confirms that, as a result of the implementation of the proposed CDM project activity, there are no greenhouse gas emissions occurring within the proposed CDM project activity boundary, which are expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology.

3.6.2 Project boundary (80)

As per the PoA definition of project boundary, the geographical boundary of each CPA will be determined by the location of the buildings where chiller systems are installed. Hence, the project boundary for the real case CPA – Capricorn is the chiller plant located at 1 Science Park Road, Science park II, Singapore117528.

The main source of GHG from this project will be CO2 from the electricity energy consumption drawn from Singapore national grid.

The validation team validated the project boundary by:

a) Site visit on 11-12 Oct 2011 to assess the physical installation of chillers was done at the Capricorn Building located at 1 Science Park Road, Science park II in Singapore where air cooled chiller has been replaced by water cooled chiller and found that it is complied to the PoA-DD project boundary description.

The CPA boundary includes the water cooled chillers, cooling towers, pumps, electrical control system, header pipes, Energy Monitoring and Control System installed in the project.

b) Following documentation related to the CPA have been verified to confirm the boundary:

1. Contract from Ascendas Services Pte Ltd on behalf of Singapore Science Park Ltd awarded to Trane Singapore (ref: AS/36/10-11/090) for the upgrading of existing air cooled chiller plant in Capricorn Building dated on 16 Nov 2010. (Category 1 reference 12)

2. Certificate of completion and hand over of project for upgrading of existing air-cooled chiller system to water cooled chiller system at Science park road, The Capricorn from Trane Singapore to Ascendas in July 2011. (Category 1 reference 13)

3. Contract agreement between CME and CPA implementer to include Capricorn CPA into proposed PoA project dated 31 Dec 2009. (Category 1 reference 8)

Based on the above assessment, the validation team hereby confirms that the identified boundary and the selected sources and gases are justified for the project activity.

3.6.3 Baseline identification (87-88)

The steps taken to assess the requirement given in paragraph 81 and 82 of the VVM are described below:

The CME has defined the baseline as according to the methodology AMS II.C in the PoA-DD and detail assessment of baseline identification has been described in PoA Validation report section 3.6.3.

Based on the PoA description of baseline identification, CME has identified 3 alternatives and the most plausible and relevant alternatives amongst them is continuation of current situation i.e running inefficient chiller plant with efficiency of 1.39kWh/TR.Hence, the baseline scenario identified found in line with the requirement of approved methodology and the PoA requirements.

Since the baseline is energy displaced electricity, CME has demonstrated the calculation of baseline cooling load electricity consumption by multiplying average annual cooling load (TRh) and efficiency (kWh/TRh) of chiller running in baseline scenario which is further multiplied by the gird emission factor to arrive at baseline emissions.

Baseline study was conducted by CME for the Capricorn Building from 18 Dec 2010 to 21 Jan 2011 with variable cooling load (Average ranging 400-600TR). Detailed documents on baseline with specific analysis on cooling load, temperature changes, electricity consumption and running hours are made available for the validation purpose. Based on these documents the validation team confirms that cooling load, Dry bulb temperature, humidity, chilled water temperatures (Return & Supply) are transparently calculated and presented by CME at 1minute interval during baseline scenario.

Based on the ASHRAE guideline 14 Section5.2.2 the selection of Baseline period is found justified and validation team further verified weather data for Singapore to cross

check the variation in the atmospheric condition particularly ambient temperature and humidity. Data seen on www.weatherunderground.com reveals that there are no significant variations in the temperature and humidity (High and Low). The Range of both parameters found reasonably steady throughout the year and the range for temperature observed was 24-33 degree Celsius (Average).

Based on the above assessment, the validation team hereby confirms that:
(a) All the assumptions and data used by the project participants are listed in the CPA-DD, including their references and sources;
(b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the CPA-DD;
(c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
(d) Relevant national and/or sectoral policies and circumstances are considered and listed in the CPA-DD;
(e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

3.6.4 Algorithms and/or formulae used to determine emission reductions (92-93)

The steps taken to assess the requirement outlined in paragraph 89 the VVM are described below:
PP has used the algorithm and formulae in line with the AMS II.C Version 13 and corresponding tools to calculate emission factor stated in AMS I.D. (EB63 Annex 19 methodological Tool “Tool to calculate the emission factor for an electricity system” version 02.2.1.

The CPA under the PoA will gather data from:

1. Temperature for chilled water supply and return in baseline and project activity
2. Rate of flow of chilled water
3. Electrical energy demand in baseline and project activity

Data will then computed in the Energy Management Software to get the value
1) chiller plant loading in TR(tons of refrigeration) over one month period to get TR-H,
2) Electrical energy consumption in kW over time one month period to get kW-H.
3) Calculate two values kW-H and TR-H to get the energy efficiency in kW/TR.

Calculated the different in electrical energy consumption between the baseline scenario and the project activity under the same loading (TR) to get the energy saving in kWh.

Since the baseline is energy displaced electricity, CME has calculated baseline cooling load electricity consumption by multiplying average annual cooling load (TRh) and efficiency (kWh/TRh) of chiller running in baseline scenario which is further multiplied by the gird emission factor to arrive at baseline emissions. As the values use to calculate

the baseline emission are real time values obtained during baseline monitoring campaign done by CME for the period 18 Dec 2010 to 21 Jan 2011, which were presented by CME in transparent electronic data form (output of monitoring EMS system), hence, the baseline emission calculated by CME was found satisfactory.

$BE_y = E_{BL,y} * EF_{CO2,ELEC,y} + Q_{ref,BL} X GWP_{ref,BL}$

Baseline cooling load electricity consumption was calculated using Equation and validation of calculation is provided in the below mentioned table

$$E_{BL,y} = \sum_i (n_i \times \rho_i \times o_i / (1 - l_y)$$

Parameter	Unit	Value	Validation Opinion
Baseline cooling load electricity consumption	$E_{BL\,y}$	3,729,773 kWh / year	Baseline electricity consumption is calculated using baseline value of electricity consumption per hour i.e. 413 kW during the baseline monitoring period of 35 days. And extrapolated to 8760 hrs per year of operations. This approach is found conservative
Average annual quantity of refrigerant used in the baseline	$Q_{ref\,BL}$	0.24 Ton	Capricorn utilizes Actual Data provided for by the CPA owner through chiller manufacturer Each Chiller has a refrigerant charge of 263kg. Therefore 6 chillers would have a total charge of 263kg x 6 = 1578kg *15% = 236.7kg This value is found in accordance with the guidance from Chapter 7: Emissions of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories. As per table 7.9. As well as "Energy and Global Warming Impacts of HFC Refrigerants published by US EPA and DOE together with the Alternative Fluorocarbons Environmental Acceptability Study (AFEAS)
Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations	l_y	0.03	It is a published value by the Singapore Power for the transmission and distribution losses of Singapore electricity grid. This is available on the web site of Singapore Power. The value applied is found correct.
Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption	$EF_{CO2,y}$	0.4512 Kg CO_2/kWh	Emission factor is the calculated value using published Simple operating margin and build margin values published by Singapore DNA, National Environmental Agency.
Global Warming Potential of the baseline refrigerant	$GWP_{ref\,BL}$	1,300 tCO2e/t refrigerant	IPCC Default value for R134a refrigerant. (http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=144)
Baseline emission	BE_y	1,995 tCO_2e / year	Calculated value using prescribed formulae to calculate baseline emissions.

Project Emission :

As per approved methodology project emission calculation is using following formula

$$PE_y = EP_{PJ,y} * EF_{CO2,y}$$

Where:

PE_y Project emissions in year *y* (tCO2e)

$E_{PJ,y}$ Energy consumption in project activity in year *y*. This shall be determined *ex post* based on monitored values

$EF_{CO2,y}$ Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption should be calculated in accordance with the procedures of AMS-I.D. For fossil fuel displaced reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project specific data are not available or difficult to obtain

Parameter	Unit	Value	Validation Opinion
Energy consumption in project activity	$E_{PJ,y}$	2,113,237 kWh / year	Project electricity consumption is calculated using post retrofit monitoring of the project activity using 1 Minute interval monitoring system for the period of 92 days. The monitored average KW load of chiller plant during project scenario is observed to be 234 kW. The project activity energy consumption is calculated using formula KW Load x Operating hours / (1 – Ly). CME has considered 8760 hrs per year of operations and Ly = 0.03. This approach is found conservative and hence accepted.
Average annual quantity of refrigerant used in the baseline	$Q_{ref\ PJ,y}$	0.23 Ton	CME has used 499 Kg value per chiller for the refrigerant charge, and considerd 15% leakage per year . This is found in accordance with As per guidance from Chapter 7: Emissions of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories. This range may be from 10kg to 2,000kg per chiller and a maximum leakage of 15% per annum is determined for developing countries and the technical specification of project chiller.
Global Warming Potential of the baseline refrigerant	$GWP_{ref\ PJ,y}$	90 tCO2e/t refrigerant	IPCC default value obtained from (http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html)
Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption	$EF_{CO2,y}$	0.4512 Kg CO_2/kWh	Emission factor is the calculated value using published Simple operating margin and build margin values published by Singapore DNA, National Environmental Agency.
Project Emission	BE_y	974.19 tCO_2e / year	Calculated value using prescribed formulae from Approved Methodology.

Energy consumption in project activity in Year y ($EP_{PJ,y}$) is a calculated value presented ex ante based on the output of baseline study. CME has utilized Annual Baseline

cooling load, chiller efficiency in baseline and chiller efficiency in project scenario to calculate the **(** $EP_{PJ,y}$ **).** The transparent description on calculation of these values is provided in the CPA-DD Section B.5.2 and emission calculation spread sheet. Validation team found this calculation transparent and in line with the algorithm recommended by the approved methodology.

Emission Reductions:
As per approved methodology emission reduction calculation is done using following formula

$$ER_y = (BE_y - PE_y) - LE_y \quad \textbf{(1)}$$

Where:

ER_y Emission reductions in year *y* (tCO2e)

LE_y Leakage emissions in year *y* (tCO2e)

CME has demonstrated the emission reduction calculation in excel spread sheet as well as in CPA-DD.

As per the demonstration leakage emission in the project is not applicable because there is no transfer of the equipment, the old chiller equipment were scrapped, hence, no leakage emissions are accounted in the calculation.

Values obtained through this calculation are reproduced as give below:

Baseline emission	**BE**	1,995.00	tCO_{2e}	Baseline emissions calculated using Eq. $E_{BL,y} = \sum_i (n_i \times \rho_i \times o_i / (1 - l_y)$
Project Emission in year y	***PE$_y$***	974.19	tCO_{2e}	Project Emission in year y
Emission Reduction in year y	***ERy***	1,021.00	tCO_{2e}	Emission Reduction in year y is calculated using equation $ER_y = (BE_y - PE_y) - LE_y$. In this CPA Leakage emissions are not applicable as the baseline chiller was scrapped and disposed off by the CPA owner and records of disposals were verified by the validation team, hence only Baseline emission and Project emissions are considered for calculation of emission reductions and this is found correct.

Grid Emission factor:
Grid emission factor is published by Singapore DNA which is National Environmental Agency on 25 Feb 2011 based on 3 years data 2007, 2008 and 2009.

PME decided to use the Ex ante option which complies with the EB 50 Annex 14 rules.

A 3-year generation weighted average has been derived for the years, 2007, 2008 and 2009.
The build and operating margins of the grid are considered as a product of the weighted average for each margin and summed to give the final value of the emission factor ($EF_{grid,CM,y}$) and expressed in kilogramsCO2 per kWh as follows:
$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (kgCO2/kWh)

$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in yearly y (kgCO2/kWh)

W_{OM} = Weighting of operating margin emission factor (%)

W_{BM} = Weighting of build margin emission factor (%)

Validation team has validated the emission factor published by NEA on 25 Feb 2011 and it is accordance to the tool to calculate the emission factor for an electricity system. The validation of the emission factor has described clearly in the PoA validation report reference Singapore val/0003/2012.

Based on the above assessment, the validation team hereby confirms that:
(a) All assumptions and data used by the project participants are listed in the CPA-DD, including their references and sources;

(b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the CPA-DD;

(c) All values used in the CPA-DD are considered reasonable in the context of the proposed CDM project activity;

(d) The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;

(e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the CPA-DD.

3.7 Additionality of Typical CPA (97)

The steps taken and sources of information used, to cross-check the information contained in the PDD on this matter are described below:

The additonality is demonstrated at PoA level using barrier due to prevailing practice which is found in accordance SSC Guidance Annex A to appendix B, hence full additionality assessment is not required. Any CPA that meets the eligibility criteria for its inclusion in the PoA bears the same characteristics of the programme and face the same barriers. As this CPA meets the eligibility criteria for inclusion into the PoA, hence it is additional due to barrier of prevailing practice.

Further it was observed that CME has established specific requirements, which each CPA should meet to demonstrate its additionality. Validation team has verified these specific requirements and found that the Capricorn CPA is meeting all established requirements under Section E.5.1 of PoA –DD, Version 05. Validation details are given as below.

- ✓ The baseline efficiency of the chiller plant system was higher than 0.65kW/TR and/or an accurate monitoring system taking readings at 1-minute intervals was not in place. A baseline energy audit was conducted by an accredited ESCO. – Yes Capricorn CPA was having Air cooled Chillers system in the Baseline with Specific energy efficiency norm of 0.139 KW/Tr and there was no monitoring system at 1 minute interval available.

  Baseline audit was conducted by accredited ESCO Trane Singapore Pte. Ltd. and the energy audit report was made available to Validation team during for validation purpose. Hence this requirement is fulfilled by the Capricorn CPA.

- ✓ The new Chiller Plant System Efficiency must achieve 0.65kW/TR – From the Project design and equipment specification it is confirmed that newly installed Chiller plant system will achieve desired Specific Energy consumption of 0.65 Kw/Tr or better. This has been confirmed by the Acredited Esco and the supplier of the shilled plant system i.e. TRANE Singapore Pte. Ltd. Hence this requirement is fulfilled by the Capricorn CPA.

- ✓ The typical CPA-DD must meet all the eligibility criteria set out in section A.4.2.2 of the Registered PoA-DD – Please refer validation opinion Section 3.5 of this report above, Capricorn CPA is meeting all eligibility criteria are established by the PoA, hence this requirement is also fulfilled by the Capricorn CPA.

- ✓ All data measured and monitored at 1-minute intervals: - CPA implemented has made a provision of 1minute interval monitoring system for monitoring and measuring Chiller plant system operational data and parameters, hence it is conclude that this requirement is fulfilled by the Capricorn CPA.

- ✓ Design-approach must be consistent with ASHRAE Guidelines 14 – From the Project design and specification documents its validated that the new Chiller plant system installed at Capricorn Building in Singapore is meeting the ASHRAE Guideline 14 and hence it is concluded that Capricorn CPA is meeting this requirement.

- ✓ Calibration & Measurement Accuracy must be consistent with AHRI 550 Guidelines – CPA implementer has made provision for carrying out calibration of all relevant instruments as per AHRI 550 guidelines. This was verified using calibration certificates for the project equipment's which are meant for monitoring important chiller system parameters ie. Temperature sensors.

- ✓ Cooling load capacity in the CPA must not deviate by less than 10% or more than 50% from the baseline cooling load and in accordance with methodology AMSIIC Version 13 – Please refer validation comments in section 3.5 and section 3.6.1 of this validation report. From the Validation Opinion in these section it is concluded that Capricorn CPA is meeting this requirement.

3.7.1 Prior consideration of the clean development mechanism (104)

As per the present EB rules, Prior Consideration of PoA is not a requirement. PME only has to ensure the CPA start date under the PoA shall not before the start date of the PoA where in this Capricorn CPA start date was on 16/11/2010. The start date of PoA is 06/04/2010.

3.7.1.1 Historical information on project timeline

The PoA start date is on 06/04/2010 as the webhosted date for global stakeholder consultation and as per EB49 Annex 22, it falls under the category of new project activities. Hence, Historical information on project timeline with respect to any real action prior to start ate of project activity is not applicable.

3.7.2 Identification of alternatives (107)

The approved methodology AMS II.C version 13 does not require identification f alternatives. Hence it is not applicable to this CPA.

3.7.3 Investment analysis (114)

CME did not select the investment analysis to claim for additionality, hence, it is not applicable to this CPA.

3.7.4 Barrier analysis (118)

The steps taken to assess the relevant information contained in the CPA-DD against each barrier are described below.

CME has demonstrated the additionality on barrier due to prevailing practice which has described above in section 3.7.
The validation team hereby confirms that the barrier analysis performed is credible.

3.7.5 Common practice analysis (121)

CME did not select the common practice analysis to claim for additionality, hence, it is not applicable to this CPA.

3.8 Monitoring plan (124)

The validation team hereby confirms that the monitoring plan complies with the requirements of the methodology.

The steps taken to assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design are described below.

CME has described the monitored plan will monitor the following data:

1. Temperature for chilled water supply and return
2. Rate of flow of chilled water
3. Electrical energy demand for each and every equipment within the chiller plant.
4. *pi* - Power consumption of one chiller system baseline, which is the weighted Average of baseline chiller system. This is monitored using Baseline monitoring records for one month, which is a ex ante value adequate metering facility is available and found it is hooked to the EMS for data capturing purpose.
5. *oi* - Average annual operating hours of the Chiller plant in Baseline as well as project scenario which is fixed value using 365x 24 = 8760 calculation, which is Ex ante value
6. *ly* - Average annual technical grid losses – Technical grid loss in Singapore is derived by using publically available data published by Government of Singapore through EMA (Energy Market Authority), which shows that the Technical Grid loss for Singapore is defined as 3%, which is a ex ante value./Ref 22/
7. $Q_{ref\ PJ,y}$. Average annual quantity of refrigerant used in the baseline – This will be monitored by the CPA implementer.

The measurement of data will be at 1 minute's interval and data will be stored in Energy Management Software (EMS).

These data will be computed to account for

1. Chiller plant loading (TR-tons of refrigeration) over a times series to obtain TR-H and
2. Electrical Energy Consumption in kW over a time series to obtain kW-H.

These two values (TR-H and kW-H) are computed independently to determine the energy efficiency coefficient in kW/TR.

CME has defined flowing data and parameters in the monitoring plan:

1. Power transducer to monitor the total power demand including all chiller plant equipment to determine the electrical power demand-baseline and power demand during project activity in kW.

2. Magnetic or ultrasonic flow meter to monitor the chilled water flow produced by the chiller plant in litres / second use in baseline and project activity

3. Thermistor probe to monitor the chilled water supply and return temperature in baseline in degree C.

4. Scrapped record from independent agency for old chillers and its equipment. The serial number of the scrapped chiller indicated in the scrap record.

CME then further defined each equipment flow meter, power transducer and thermistor probe accuracy requirement base on manufacturing specification and also will be accuracy requirement set for calibration.

EMS software installed by the CME for monitoring operating performance of the Chiller system has proven track record which provides CME with the ability to centrally monitor, analyze, and control chiller system to achieve desired energy-efficiency in the chiller operations. Fundamentally, an EMS is an information and control system used to optimize operations of end-use equipment using a computer with application software, a custom-programmed database, a communications network, and a series of control devices and data sensors.

An EMS operates chiller system equipment through a control loop, which is comprised of controllers, sensors, switches, relays, and end devices. Monitoring parameters included for monitoring purpose are supply and return air temperature, chilled water temperature, ambient temperature and humidity levels, energy consumption etc. EMS designed to function effectively to keep track of following operations with high reliability at 1 minute interval

- Facility environmental conditioning
- Environmental system monitoring and control
- Supervisory monitoring and control
- Supervisory control strategies
- Optimum start/stop
- Duty cycling
- Load shedding
- Load shifting
- Data analysis tools for energy accounting

EMS also permits the evaluation of system performance, historic data trends, and chiller system operation to make effective decisions on methods that further optimize the system. Based on the sectoral knowledge validation team confirms that the reliability of EMS software established by CME to monitor Chiller plant performance at one minute interval is good.

Validation team has verified the calibration report (Category 1 reference 18) for the main equipment and scrap record (Category 1 reference 16) from third party Sun 88 Engineer to dispose off the old chiller units. Also during site visit at Capricorn building verified the EMS system to capture the data of power and operating hours in order to calculate the energy consumption.

The validation team hereby confirms that the project participants are able to implement the monitoring plan.

3.9 Sustainable development (127)

The host Party's DNA confirmed the contribution of the project to the sustainable development of the host Party. Refer to item 3.1 of this report.

3.10 Local stakeholder consultation (130)

The steps taken to assess the adequacy of the local stakeholder consultation are described below.

Local stakeholder consultation is done at PoA level. Hence, local stakeholder consultation at CPA level is not applicable.

3.11 Environmental impacts (133)

There is no regulatory requirement from host party Singapore government to do an environmental impact assessment for this replacement of high efficiency chiller plant.

CPA implementer however did carry out the environment assessment on waste can be generated from the replacement activities and defined all waste will be disposed off according to NEA waste disposal regulation.

Waste has been identified will be metal scrap, refrigerant gas and oil and grease. Validation team has verified all these wastes are disposed off as per National Environment Agency regulation by licensed collector.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The CPA-DD using methodology AMS II.C version 13 was webhosted on the UNFCCC for global stakeholders comments as per CDM requirements. The project was webhosted from 15 Dec 2011 to 13 Jan 2012.

No comments were received during the webhosting period.

5 VALIDATION OPINION

Bureau Veritas Certification has performed a validation of the CPA- Energy Efficiency in Chiller Plant at the CAPRICORN Building located at 1 Science Park Road, The Capricorn, Singapore Science park II, Singapore 117528 (CAPRICORN CPA) Project in Singapore. The validation was performed on the basis of UNFCCC criteria and host country criteria and also on the criteria given to provide for consistent project operations, monitoring and reporting.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

Project participant/s used the latest tool for demonstration of the additionality. In line with this tool, the CPA-DD provides analysis of barriers due to prevailing practice to determine that the project activity itself is not the baseline scenario.

By synthetic description of the project, the project is likely to result in reductions of GHG emissions partially. An analysis of the barriers due to prevailing practice demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions

attributable to the project are hence additional to any that would occur in the absence of the project activity. Given that the project is implemented and maintained as designed, the project is likely to achieve the estimated amount of 1,021 tCO_2e emission reductions per annum

The review of the project design documentation (version 3) and the subsequent follow-up interviews have provided Bureau Veritas Certification with sufficient evidence to determine the fulfilment of stated criteria. In our opinion, the project correctly applies and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria. Bureau Veritas Certification thus requests registration of 'CPA- Energy Efficiency in Chiller Plant at the CAPRICORN Building located at 1 Science Park Road, The Capricorn, Singapore Science park II, Singapore 117528 (CAPRICORN CPA) ' as CDM Programme of Activities.

6 REFERENCES

Category 1 Documents:
Documents provided by Type the name of the company that relates directly to the GHG components of the project.

/1/ PoA-DD (Version 1) dated on 21 March 2010 Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plant

/2/ PoA-DD (Version 2) dated on 18 July 2011– Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plant

/3/ PoA-DD (Version 3)- 25 Nov 2011 Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plant

/4/ Typical CDM-SSC-CPA-DD

/5/ CPA-DD (Version 1) on 21 March 2010 Energy Efficiency in Chiller Plant at the Galen Building in Singapore Science Park II (The Galen CPA)

/6/ CPA-DD (Version 2) on 18 July 2011– Energy efficiency in chiller plant at the Capricorn Building located at 1 Science Park Road, the Capricorn, Singapore 117528 ((Capricorn CPA)

/7/ CPA-DD (Version 3) on 25 Nov 2011- Energy efficiency in chiller plant at the Capricorn Building located at 1 Science Park Road, the Capricorn, Singapore 117528 ((Capricorn CPA)

/8/ Mandate and Request for inclusion into POA-Care for Energy Efficiency in Chiller Plants dated from 31 Dec 2009 from Climate Resource Exchange Pte Ltd with Singapore Science Park Limited

/9/ Letter from Climate Resources Exchange and Standard Bank dated on April 20, 2010 to The Designated national Authority of Singapore National Environmental Agency for the subject on Request for Host Country Approval on the CARE (Climate Action Response Enterprise) CDM Program of Activities (PoA) for Energy Efficiency in Chiller Plants.

/10/ Letter of Approval from UK DNA Department of Energy & Climate Change DNA ref: SB/03/2010 dated on 14 Oct 2010 to Standard Bank Plc for project title: Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants

/11/ Letter of Approval from Singapore DNA- National Environmental Agency dated 20 September 2010 to Climate Resource Exchange Pte Ltd for project title: Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants

/12/ Contract from Ascendas Services Pte Ltd on behalf of Singapore Science Park ltd awarded to Trane Singapore (ref: AS/36/10-11/090) for the upgrading of existing air cooled chiller plant in Capricorn Building dated on 16 Nov 2010.

/13/ Certificate of completion and hand over of project for upgrading of existing air-

cooled chiller system to water cooled chiller system at Science park road, The Capricorn from Trane Singapore to Ascendas in July 2011.

/14/ Contract for upgrading of existing air cooled chiiller plant in Capricorn Building- Letter of undertaking for performance guarantee from Trane Singapore to Singapore Science Park Ltd.

/15/ Stakeholders Meeting Questionnaire completed by attendants on 02 Feb 2010

/16/ Scrap records of old chiller units together with the pumps no. 2 & no. 5 dated on 30/04/2011, no. 4 & no. 6 on 21/05/2011, no. 3 and no. 1 on 04/06/2011 from Sun 88 Engineering.

/17/ Trane baseline data tracking from 17/12/2010 to 21/01/2011 of Capricorn Building

/18/ Calibration reports of Power meters, flow meters, transducers and thermostats.

/19/ Capricorn Building M&V plan dated on 15/12/2011.

/20/ NEA letter (reference NEA/EP/RCD/10-00068-1) dated on 13 July 2010 to CRX to support using 0.65kWh energy efficiency or better and 1 mintue interval data monitoring and measurement is non-common practice in Singapore

/21/ Green Mark Assessment criteria for non residential existing Building (Version 2.1) http://bca.gov.sg/GreenMark/others/GM_NREB_V2.1.pdf

/22/ Emission reduction calculation spread sheet

/23/ Capricorn Building Baseline Summary 18 Dec 2010- 21 Jan 2011- PowerPoint presentation.

/24/ Refrigerant Handling for gas recovery from dismantled chiller at Capricorn Building – Service report of Trane (Report no. 09152/2011 dated 26/07/2011)

/25/ Capricorn Baseline Chiller Plant data- An excel sheet for monitoring baseline parameters during 18 Dec 2010- 21 Jan 2011

/26/ EMS software technical data sheet and configuration documents

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents.

/1/ EB 55 Annex 1 (Version 01.2) Clean Development Mechanism Validation and Verification Manual

/2/ AMS II.E (Version 10): Energy efficiency and fuel switching measures for buildings.

/3/ AMS II. C (Version 13): Demand-side energy efficiency activities for specific technologies

/4/ EB 63 Annex 19 AMSI.D Methodology Tool " Tool to calculate the emission factor for an electricity system' Version 02.2.1

/5/ EB49 Annex 22 (Version 03)- Guidelines on the demonstration and assessment of prior consideration of the CDM

/6/ EB 35 Annex 34- Non-binding best practice examples to demonstrate additionality for SSC project activities
/7/ EB 41 Annex 45 - "Guidance on the Assessment of investment Analysis.
/8/ ARI 550- Implication for Chilled – Water Plant Design
/9/ Ashrae Guidelines 14- 2002 Measurement of Energy and Demand Savings
/10/ Ashrae Guideline 22-2008 Instrumentation for Monitoring Central Chilled-Water Plant Efficiency
/11/ How to buy an energy Efficient Water-Cooled Electric chiller. Source from Energy Efficiency and renewable Energy Federal Energy Management Program
/12/ Singapore National Environment Agency website : http://app2.nea.gov.sg/legislation.apx
/13/ Singapore National Environment Agency website: http://app2.nea.gov.sg/topics.climatechange.apx
/14/ Energy Sustainability Unit website: www.esu.com.sg
/15/ Singapore National Environment Agency Website: http://app2.nea.gov.sg/index.aspx
/16/ Singapore National Environment Agency Websites: http://app.mewr.gov.sg/web/Contents/contents.aspx?contId=683
/17/ Singapore National Environment Agency Websites: http://app2.nea.gov.sg/funds_home.aspx
/18/ Building Construction Authority website: http://www.bac.gov.sg
/19/ Building Construction Authority website: http://www.bac.gov.sg/Publications/publications.html
/20/ Building Construction Authority website: http://www.bac.gov.sg/Professionals/GovAsst/govasst.html
/21/ SS 530: 2006 Code Of Practice For Energy efficiency standard for building services and equipment
/22/ e-mail dated 20 Feb 2012 from MR. Bhaskar RAM of NEA for explanation on timeline for the baseline chiller efficiency selection
/23/ Energy Efficiency Improvement Assistance Scheme (EASe)- APEC Workshop on Sustainable Energy Development in the Built Environment dated on 14 April 2009 by NEA- Powerpoint presentation (publicly available document at http: // www.egeec.apec.org/www/UploadFile/2.iii_EE_%20improvement_asstnce_scheme_EASe_Singapore.pdf

Persons interviewed:
List persons interviewed during the validation or persons that contributed with other information that are not included in the documents listed above.

/1/ Mr. Vinod Kesava- MD / CEO of Climate Resources Exchange- CME Representative
/2/ Mr. Kes Shotam- Senior Managing Director of Climate Resources Exchange- CME Representative
/3/ Mr. Jason Lim Kin Siong- M&E Section Property Management Manger of Ascendas Services Pte Ltd- Implementer of CPA
/4/ Mr. Leo Teo Siak Hian- Senior Project Manager- Asia Energy Solutions of Trane Air-conditioning Pte Ltd- Service Provider for installation of Chiller Systems.
/5/ Mr. Steven Kang-Sales & Business Development Director- Asia Energy Services of Trane Air-conditioning Pte Ltd- Service Provider for installation of Chiller Systems.
/6/ Ms.Shobana Kesara from British High Commission Singapore- Stakeholder
/7/ Mr. Ng Pei Chen- Senior Executive Climate Change programme Department of National Environmental Agency- DNA Representative
/8/ Personnel from Energy Market Authority
/9/ Mr. Lee E. Lock – Senior Consultant from Trane Air-Conditioning Pte Ltd- Service Provider for installation of Chiller Systems.
/10/ Ms. Ma Zhan- Standard Bank- CME
/11/ Mr. William Pazos- Standard Bank-CME

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7 CURRICULA VITAE OF THE DOE'S VALIDATION TEAM MEMBERS

Include cv of Team Leader, Team Members, Experts, Internal technical Reviewer

Kusheru Wibowo (Team Leader) : A Chemical Engineer with over all 18 years of experience. He has worked with Standards in Bureau Verification Certification as Lead auditor for Quality Management system ISO 9001, Environmental Management System ISO 14001 for nine years. He has undergone intensive training on Clean Development Mechanism and has been involved in 8 CDM project validation/verification activities

So Shuk Ling (Team Member) : She is Bachelor degree in Chemistry and statistic and Master degree in Manufacturing and Polymer Science. He has been working in auditing for quality and Environmental management system more than 9 years and in Electronics Manufacturing company more than 8 years. She has undergone intensive training on Clean Development Mechanism.

HB Muralidhar: (Technical specialist): Lead auditor in Bureau Veritas Certification for Environmental Management System, Quality Management System and Occupation Health and Safety Management System. Graduate in Electrical Engineering with 25 years of experience power generation and distribution related fields as well as in management system auditing. He has undergone intensive training on Clean Development Mechanism. He is the technical expert & conducted validation and verification for more than 50 CDM projects.

S. Thyagaraj (Internal Technical Reviewer): He has a Bachelors of Technology degree in Chemical Engineering and over 7 years of experience in Technical services covering various functions like Production management, Energy conservation and Environment protection measures in the manufacturing industry including ISO 14001 based quality management systems. He is a certified Energy Manager from Bureau of Energy Efficiency. Working for the last 2.5 years in Bureau Veritas Certification (India) Pvt. Ltd. as Verifier-Climate change. Has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM project activities.

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APPENDIX A: COMPANY CDM PROJECT VALIDATION PROTOCOL

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
1. Approval			*COUNTRY A (Singapore-Climate Resources Exchanged Pte Ltd)*	*COUNTRY B (Standard Bank Plc)*		
a. Have all Parties involved approved the project activity?	VVM	44	Yes Climate Resource Exchange Pte Ltd	Yes Standard Bank Plc	OK	OK
b. Has the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PoA-DD provided a written letter of approval? (If yes, provide the reference of the letter of approval, any supporting documentation, and specify if the letter was received from the project participant or directly from the DNA)	VVM	45	LOA from National Environmental Agency Singapore on 20 Sept 2010	LOA from Department of Energy & Climate Change, London UK DNA ref: SB/03/2010 dated on 14 Oct 2010	OK	OK
c. Does the letter of approval from DNA of each Party involved:	VVM	45				
i. confirm that the Party is a Party of the Kyoto Protocol?	VVM	45.a	Singapore country has ratified Kyoto Protocol on 12 April 2006	The United Kingdom ratified the Kyoto Protocol on 31st May 2002	OK	OK
ii. confirm that participation is voluntary?	VVM	45.b	Yes	Yes	OK	OK
iii. confirm that, in the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country?	VVM	45.c	Yes	Yes		
iv. Refers to the precise proposed CDM project activity title in the PoA-DD being submitted for registration?	VVM	45.d	Yes	Yes	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
d. Is(are) the letter(s) of approval unconditional with respect to (i) to (iv) above?	VVM	46	Yes	Yes	OK	OK
e. Has(ve) the letter(s) of approval been issued by the respective Party's designated national authority (DNA) and is valid for the CDM project activity under validation?	VVM	47	Yes National Environmental Agency, Singapore	Yes Energy & Climate Change Department, London	OK	OK
f. If there is doubt with respect to authenticity of the letter of approval?	VVM	48	No	No	OK	OK
g. If yes, was verified with the DNA that the letter of approval is authentic?	VVM	48	NA	NA	NA	NA
2. Participation			*PP1 (Climate Resources Exchange Pte Ltd)*	*PP2 (Standard Bank Plc)*		
a. Have all project participants been listed in a consistent manner in the project documentation?	VVM	51	Yes Climate Resources Exchange Pte Ltd (CRX)	Yes Standard Bank Plc (SBP)	OK	OK
b. Has the participation of the project participants in the project activity been approved by a Party to the Kyoto Protocol?	VVM	51	Yes Refer to http://maindb.unfccc.int/public/country.pl?country=SG	Yes Refer http://maindb.unfccc.int/public/country.pl?country=GB	OK	OK
c. Are the project participants listed in tabular form in section A.3 of the CPA-DD?	VVM	52	Yes	Yes	OK	OK
d. Is the information in section A.3 consistent with the contact details provided in annex 1 of the CPA-DD?	VVM	52	Yes	Yes	OK	OK
e. Has the participation of each of the project	VVM	52	Yes	Yes	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
participants been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation? (Provide reference of the approval document for each of the project participants)			refer to 1b above	Refer to 1b above		
f. Are any entities other than those approved as project participants included in these sections of the CPA-DD?	VVM	52	NO	NO	OK	OK
g. Has the approval of participation issued from the relevant DNA?	VVM	53	Yes Refer to 1b above	Yes Refer to 1b above	OK	OK
h. Is there doubt with respect to (g) above?	VVM	53	NO	NO	OK	OK
i. If yes, was verified with the DNA that the approval of participation is valid for the proposed project participant?	VVM	53	NA	NA	NA	NA
3A - Project Design Document-CPA						
a. Is the CPA-DD section A, are following provided?	EB 33	Ann 34				
i. Section A.1:Title of the project and version / dated provided?	EB 33	Ann 34	Yes Energy Efficiency in Chiller Plant at the CAPRICORN Building at 1 Science Park Road, The Capricorn, Singapore Science Park II, Singapore 117528 (CAPRICORN CPA), Version 2 dated: November 25, 2011		OK	OK
ii. Section A.2: Description of the small scale CPA provided?	EB 33	Ann 34	Yes The CPA aims to achieve an energy efficiency coefficient of at least 0.65kW/TR or better in the chiller plants in Capricorn Building. The chiller plant was 8 years old with currently energy efficient coefficient of 1.391kW/TR.		OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
iii. Section A.3 information on the entity / individual responsible of the CPA included? CPA implementers can be project participants of the PoA, under which the CPA is submitted, provided their name is included in the registered PoA.?	EB 33	Ann 34	Yes CPA implementer is HSBC Institutional Trust Services (Singapore) Limited as Trustee of Ascendas Real Estate Investment Trust. They are not project participant of the PoA.	OK	OK
iv. Section A.4 Technical description of the small-scale CPA provided as follows:	EB 33	Ann 34			
i. In Section A.4.1 Identification of the small scale CPA provided?	EB 33	Ann 34	Yes	OK	OK
ii. Section A4.1.1 host Party information provided?	EB 33	Ann 34	Yes Republic of Singapore	OK	OK
iii. Section A.4.1.2 information of geographic reference or other means of identification allowing the unique identification of the small scale-CPA (maxim one page) provided? Geographic reference or other means of identification, name / contact details of the entity/individual responsible for the CPA, e.g in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.	EB 33	Ann 34	Yes Capricorn is at latitude N1^{0}17.402' and longitude E103^{0}46.7331'. Capricorn building is at 1 Science Park Road, Science park II, Singapore 117528	OK	OK
v. Section A.4.2 Duration of the small scale CPA provided as follows:	EB 33	Ann 34			
i. Section A. 4.2.1 Starting date of the small scale CPA provided?	EB 33	Ann 34	Yes Stage date of CPA on 16 Nov 2010 (date of award of contract to Trane-the designer) Verified the contract ref: AS/36/10-11/090 dated on	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			16 Nov 2010 from Ascendas Services Pte Ltd for and on behalf of HSBC Institutional Trust Services (Singapore) Ltd as Trustee of Ascends Real Estate Investment Trust to award TAC Distribution Pte Ltd to upgrade the existing air-cooled chiller plant system to water cooled chiller plant system at Capricorn building located at 1 Science park Road, Singapore 117528.		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
ii. Section A4.2.2 Expected operational lifetime of the small scale CPA provided?	EB 33	Ann 34	Yes 10 years	OK	OK
vi. Section A.4.3 Choice of the crediting period and related information provided? Choice either renewable crediting period or fixed crediting period.	EB 33	Ann 34	Yes Fixed Crediting period- 10 years	OK	OK
i. Section A.4.3.1 Starting date of the crediting period provided?	EB 33	Ann 34	Yes The date of registration of the CPA whichever is later.	OK	OK
ii. Section A.4.3.2 Length of crediting period, first crediting period if the choice is renewable CP provided? Note: The duration of crediting period of any CPA shall be limited to the end date of the PoA regardless of when the CPA was added.	EB 33	Ann 34	Yes 10 years for CPA PoA will be 28 years	OK	OK
vii. Section A.4.4 Estimated amount of emission reductions over the chosen crediting period provided?	EB 33	Ann 34	Excel sheet on CER estimation has not been provided- CL 3. Estimation of overall emission reductions is 10210 (tCO2e) Provided the excel sheet for the emission reduction calculation. CL 3 closed.	CL 3	OK
viii. Section A.4.5 information of public funding of the CPA provided?	EB 33	Ann 34	Yes No public funding but CPA implementer has applied the incentive grant from Greet incentive schemes provided by the national Environment Agency (NEA) for this CPA project.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
viiii. Section A.4.6 information to confirm that the proposed small scale CPA is not a de-bundled component provided?	EB 33	Ann 34	Yes PME will follow the tool prescribed in the PoA-DD to ensure CPA is not a de-bundled component	OK	OK
x. Section A4.7 Confirmation that small scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA provided?	EB 33	Ann 34	Yes CRX and CPA Implementer confirm that there is no other proposed large scale PoA under it s management.	OK	OK
b. Section B information of eligibility of small scale CPA and estimation of emissions reduction provided as follows:	EB 33	Ann 34			
i. Section B.1 Title and reference of the Registered PoA to which small scale CPA is added provided??	EB 33	Ann 34	Yes PoA Title: Climate Action Response Enterprise (CARE) for Energy Efficiency in Chiller Plants	OK	OK
ii. Section B.2 Justification of the why the small scale CPA is eligible to be included in the Registered PoA provided?	EB 33	Ann 34	Yes PoA has lay down 14 eligible criteria, where this CPA has meeting all the 14 eligible criteria.	OK	OK
iii. Section B.3 Assessment and demonstration of additionality of the small scale CPA, as per eligibility criteria listed in the Registered PoA provided?	EB 33	Ann 34	Refer to CL 2 in PoA. CL2-closed Following the Approach 2 defined in CDM-SSC-PoA-DD section E.5.1 Barrier due to prevailing practice	CL 2	OK
iv. Section B.4 Description of the sources and gases included in the project boundary and proof that the	EB 33	Ann 34	Yes Mainly CO2 sources from the CPA project.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
small scale CPA is located within the geographical boundary of the registered PoA provided?			This CPA project is at the 1 Science Park Road which is located within the Singapore.		
v. Section B.5 Emission reductions provided as follows:	EB 33	Ann 34			
i. Section B.5.1 Data and parameters that are available at validation provided?	EB 33	Ann 34	Yes Total 18 parameters	OK	OK
ii. Section B.5.2 Ex-ante calculation emission reductions provided?	EB 33	Ann 34	Yes Ex-ante calculation emission reduction is provided. Emission factor is based on NEA published data on 25 Feb 2011 for past three years (2007,2008 and 2009) NEA is Singapore DNA. The emission factor is calculated by EMA (energy Market Authority). EMA is Singapore government sector who regulate the electricity generation in Singapore.	OK	OK
iii. Section B.5.3 Summary of the ex-ante estimation of emission reductions provided in the tabular form stated in the section B.5.3?	EB 33	Ann 34	Refer to CL 3 CL 3 closed Estimation of overall emission reduction is 10210 (tCO2e) in 10 years Base on calculation estimation of project activity emission is 9740 tCO2eq in 10 years and estimation of baseline emission is 19950 tCO2eq in 10 years, hence, estimation of overall emissions reduction is 10210 tCO2eq in 10 years.	CL 3	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
vi. Section B.6 Application of the monitoring methodology and description of the monitoring plan provided as follows?	EB 33	Ann 34			
i. Section B.6.1 Description of the monitoring plan provided?.	EB 33	Ann 34	Yes Monitor energy data and equipment scrap record	OK	OK
c. Section C.1 Level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken indicated? Justify the choice of level at which the environmental analysis is undertaken provided?	EB 33	Ann 34	Yes Environmental analysis done at CPA level: Scrapping metal, disposal of refrigeration gas and oil & greases from dismantle of chiller	OK	OK
d. Section C.2 Documentation on the analysis of the environmental impacts, including transboundary impacts provided?	EB 33	Ann 34	Yes There is no law / regulation in Singapore to require environmental impacts analysis to be done for replacing chiller There is no transboundary movement involved in this project. Replaced equipment will be scrapped.	OK	OK
e. Section C.3 Statement on whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws / regulations provided?	EB 33	Ann 34	Yes There is no law / regulation in Singapore to require environmental impacts analysis to be done for cooling system installation or replacement activity"	OK	OK
f. Section D Stakeholders' comments provided as follows:	EB 33	Ann 34			
i. Section D.1 the level at which local stakeholder comments are invited indicated? Justify the choice provided?	EB 33	Ann 34	Yes Stakeholder comments done at PoA level	OK	OK
ii. Section D.2 Brief description how comments by local stakeholders have been	EB 33	Ann 34	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
invited and compiled provided?					
iii. Section D.3 Summary of the comments received provided?	EB 33	Ann 34	NA	NA	NA
iv. Section D.4 Report on how due account was taken of any comments received provided?	EB 33	Ann 34	NA	NA	NA
g. Annex 1 Contact information on Entity / Individual Responsible for the Small Scale CPA provided as in the Annex 1 tubular form?	EB 33	Ann 34	Yes HSBC Institutional Trust Services (Singapore) Ltd as Trustee of Ascendas Real Estate Investment Trust HSBC Institutional Trust Services (Singapore) Ltd as Trustee of Ascendas Real Estate Investment Trust	OK	OK
3B. Programme of activities	**VVM**	**165**			
a. Operational and management arrangements for the PoA	VVM	166			
i. is the operational and management arrangements which have been established by the coordinating / managing entity are suitable for the CPA being validated?	VVM	166	Yes	OK	OK
ii. do the coordinating / managing entity have control of all records and information related to the implementation of individual CPAs?	VVM	166	Yes Serial number will be given to each CPA	OK	OK
iii. is the coordinating / managing entity in a position to ensure each CPA is being operated in accordance with the specific requirements of the programme?	VVM	166	Yes CPA will sign a agreement letter with CRX	OK	OK
4. Project description					
a. Does the CPA-DD contain a clear description of the project activity that provides the reader with a	VVM	58	Yes The CPA is to replace inefficient chiller plant in	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
clear understanding of the precise nature of the project activity and the technical aspects of its implementation?			Capricorn Building (air cooled chiller) with new chiller has the efficiency of at least 0.65kW/TR (water cooled chiller) or better to reduce the energy savings from this project which lead to CO2 emission reduction. Currently the Capricorn building was operating at energy efficiency coefficient of 1.391kW/TR.		
b. Is the description of the proposed CDM project activity as contained in the CPA-DD:	VVM	59	Yes		
i. sufficiently covering all relevant elements?	VVM	59	Yes	OK	OK
ii. accurate?	VVM	59	Yes	OK	OK
iii. providing the reader with a clear understanding of the nature of the proposed CDM project activity?	VVM	59	Yes	OK	OK
iv. Are there any changes / modification compared to the webhosted CPA-DD	VVM	59	Yes Refer CL 1 CL 1 closed The change due to using different methodology. CPA-DD version 1 and version 2 using AMS IIE Version 10 and CPA-DD version 3 using AMS IIC Version 13.	CL-1	OK
c. Is the proposed CDM project activity in existing facilities or utilizing existing equipments?	VVM	60	Yes In existing facilities to replace or retrofit the chiller system	OK	OK
d. Is the CDM project activity one of the following types:	VVM	60			
i. Large scale?	VVM	60	No It is a small scale project	NA	NA
ii. Non-bundled small scale projects	VVM	60	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
with emission reductions exceeding 15,000 tonnes per year?					
iii. Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes?	VVM	60	NA	NA	NA
e. If yes to (c) and (d) above, was a physical site inspection conducted to confirm that the description in the PoA-DD reflects the proposed CDM project activity, unless other means are specified in the methodology?	VVM	60	Yes Site visit on 12 Oct 2011 at CPA project level at Capricorn@ 1 Science Park Road, Science park II, Singapore 117528	OK	OK
f. If yes to (d.iii) above, was the number of physical site visits base on sampling?	VVM	60	No sampling	OK	OK
g. If yes is the sampling size appropriately justified through statistical analysis?	VVM	60	NA	NA	NA
h. For other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, was a physical site inspection conducted?	VVM	61	Refer to above section 4e	OK	OK
i. For all other proposed CDM project activities not referred to in paragraphs 59 – 61, and for other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, was a physical site inspection conducted?	VVM	62	NA	NA	NA
j. If no, was it appropriately justified?	VVM	62	NA	NA	NA
k. Does the proposed CDM project activity involve the alteration of an existing installation or process?	VVM	63	Yes. It is a replacement of air cooled chiller to water cooled chiller	OK	OK
l. If yes, does the project description clearly state	VVM	63	Yes	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
the differences resulting from the project activity compared to the pre-project situation?					
5.Baseline and monitoring methodology					
a. General requirement					
a. Do the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board?	VVM	65	Yes According to AMS II C Version 13	OK	OK
b. Is the selected methodology applicable to the project activity?	VVM	66	Refer to (5.b.a) below	-	-
c. Had the PP correctly applied the selected methodology?	VVM	66	Refer to (5.b.d) below	-	-
d. Had the selected methodology been correctly applied with respect to project boundary?	VVM	67	Refer to (5.c) below	-	-
e. Had the selected methodology been correctly applied with respect to baseline identification?	VVM	67	Refer to (5.d) below	-	-
f. Had the selected methodology been correctly applied with respect to Algorithms and/or formulae used to determine emission reductions?	VVM	67	Refer to (5.e) below	-	-
g. Had the selected methodology been correctly applied with respect to additionality?	VVM	67	Refer to (6) below	-	-
i. Specific questions per methodology regarding application of the methodology with respect to additionality			There is no specific additionality mentioned in the AMS II C / Version 13. They are following Appendix B of the simplified modalities and procedures for small-scale CDM project activities	OK	OK
h. Had the selected methodology been correctly applied with respect to monitoring methodology?	VVM	67	Refer to (7) below	-	-
i. Specific questions per methodology regarding application of the methodology with respect to monitoring			Refer to (7) below		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
methodology.					
b. Applicability of the selected methodology to the project activity					
a. Is the selected baseline and monitoring methodology, previously approved by the CDM Executive Board, applicable to the project activity including that the used version is valid?	VVM	68	Yes According to AMS II.C Version 13	OK	OK
i. are all the technology / measure mentioned in the methodology regarding applicability have been followed?			Yes 3 applicability are mentioned in the AMS II.C version 13	OK	OK
b. Has the DOE applied specific guidance provided by the CDM Executive Board in respect to the applicable approved methodology?	VVM	69	As per the AMS II.C Version 13 and CDM rules	OK	OK
c. Is the methodology correctly quoted?	VVM	70	The revised CPA version 3 dated on 25 Nov 2011 is using AMS IIC Version 13 Demand-side energy efficiency activities for specific technologies. However, its PoA using AMS II.E is related to energy efficiency & fuel savings initiatives implemented together. In this project, there is only improvement in energy efficiency, please clarify- CL1 CL 1 closed Revised the PoA using AMS II.C Version 13.	CL 1	OK
d. Are the applicability conditions of the methodology met?	VVM	71			

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
i. Does the Project Activity encourage the adoption of energy-efficient equipment, lamps, ballasts, refrigerators, motor, fans, air conditioners, appliance, etc at many sites?	AMS	II.C	It is energy efficiency chiller implemented in the in Capricorn Building in Singapore.	OK	OK
ii. Will the technology / technologies replace existing equipment or be installed at new sites	AMS	II.C	It is energy efficiency water cooled chiller (ie. 0.65kWh/TR) replacement on inefficient chiller (>1.2-1.8 kWh/TR) air cooled chiller in Capricorn Building.	OK	OK
iii. In the case of new facilities, was the baseline scenario determined as per the procedures described in the general guidance to SSC methodologies under the section Type II and III Greenfield projects (new facilities)	AMS	II.C	Yes CPA baseline scenario is determined by according to the AMS II.C Baseline option 1.	OK	OK
iv. Does the project activity involve electrical end us energy efficiency technology?	AMS	II.C	Yes Using energy efficiency equipment (chillers, cooling towers, pumps, size of pipes, routing, monitoring system / bas, etc) and inter-linking these components optimally to deliver the required cooling load at lower electricity consumptions	OK	OK
v. If yes, is the aggregate energy savings by a single project exceed the equivalent of 60GWh per year? Note: the aggregate energy savings by a single project may not exceed the equivalent of 60GWh per year.	AMS	II.C	No It does not exceed to 60GWh per year.	OK	OK
vi. Does the project activity involve fossil fuel end use energy efficient technologies	AMS	II.C	No It used electrical end use technology- water cooled chiller	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
vii. If yes, is the aggregate energy savings by a single project exceed 180 GWh thermal per year in fuel input? Note: The aggregate energy savings by a single project may not exceed 180 GWh thermal per year in fuel input.	AMS	II.C	NA	NA	NA
viii. For each replaced appliance/equipment, is the capacity or output or level of service (e.g light output, room temperature and comfort, the rated output capacity of air-conditioners etc) not significantly smaller (maximum-10%) than the baseline or significantly larger (maximum+ 50%) than the baseline	AMS	IIC	There are metering solution to monitor each replaced appliance / equipment that their rated output is not significantly smaller 10% also not significantly larger than 50% than the baseline.	OK	OK
ix. If the energy efficient equipment contains refrigerants, then are the refrigerants used in the project case CFC free?	AMS	IIC	CFC free refrigerants i.e R134a or R123 to be used in the CPA	OK	OK
x. Are project emissions from the baseline refrigerant and/or project refrigerants considered in accordance with the guidance of the Board (EB34, paragraph 17)?	AMS	IIC	Yes CPA using either equal or lower than the baseline refrigerant type. This CPA is using R123. Hence the refrigerant leakage emission can be neglected.	OK	OK
xi. Is the claim for credits of emission reductions only due to the reduction in electricity consumption from use of more efficient equipment / appliances?	AMS	IIC	Yes Using energy efficiency equipment (chillers, cooling towers, pumps, size of pipes, routing, monitoring system / bas, etc) and inter-linking these components optimally to deliver the required cooling load at lower electricity consumptions	OK	OK
xii. Does the project activity involves the replacement of equipment?	AMS	IIC	Yes Retrofit the air cooled chiller to water cooled chiller.	OK	OK

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			New equipment in places are 3 units of 400TR (R123) Trane water-cooled chiller, cooling towers, 3 units of chilled water pumps and 3 units of new condenser water pumps, Electrical control System to control variable speed drive on motor for all new pumps and cooling towers, New 18' condenser water pipes for cooling towers and Energy monitoring and control system.		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
xiii. Is the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped?	AMS	IIC	Yes Replaced equipment is scrap, hence, the leakage effect is neglected in the CPA. Scrapped air cooler chiller units by third party Sun 88 Engineering.	OK	OK
e. Is the project activity expected to result in emissions other than those allowed by the methodology?	VVM	71	No	OK	OK
f. Is the choice of the methodology justified?	VVM	71	Refer to CL 1 Closed Explained in CDM-SSC-PoA-DD section E6.1	CL 1	OK
g. Have the project participants shown that the project activity meets each of the applicability conditions or the approved methodology?	VVM	71	Refer to (5.b.d) above	CL 1	OK
h. Have the project participants shown that the project activity meets each of the applicability conditions of any tool or other methodology component referred to the methodology?	VVM	71	DOE has validate the emission factor calculated based on the EB63 Annex 19 Tool to calculate the emission factor for an electricity system is correctly using the formulation done by EMA (Energy Market Authority).	OK	OK
i. Did the project activity fall under category Type II and III Greenfield Projects (new facilities)?	AMS	II.C	Type II	OK	OK
ii. In such case did the project participant use a Type II and Type III small-scale methodology?	AMS	II.C	Yes Using type II small scale methodology	OK	OK
iii. If yes, is it demonstrated that the most plausible baseline scenario for this project activity is the baseline provided in the respective Type II and III small scale methodology?	AMS	II.C	Yes It follows the AMS II C that emission baseline is based on the Option 1 of baseline.	OK	OK
iv. Did the demonstration include the assessment of the alternatives of the project activity?	AMS	II.C	NA Not a requirement from AMS II.C	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
v. For the purpose of the demonstration, did the project participants apply the steps 1 to 3 of the latest version of "Combined tool to identify the baseline scenario and demonstrate additionality" to identify the baseline scenario?	AMS	II.C	NA Using Attachment A to Appendix B of the " Simplified Modalities & Procedures for small-scale CDM Project Activities" to demonstration of additionality to this small scale CPA.	NA	NA
vi. Is the identified baseline scenario the same as the baseline of the methodology?	AMS	II.C	Yes It is following the Option 1 of the baseline stated in the methodology as the product of the baseline energy consumption of equipment / appliances and the emission factor for the electricity displaced.	OK	OK
vii. If so, is it demonstrated that the implementation of the project as "the proposed project activity undertaken without begin registered as CDM' is not the common practice in the region?	AMS	II.C	Yes Demonstrated barrier due to prevailing practice	OK	OK
i. Is the DOE, based on local and sectoral knowledge, aware that comparable information is available from sources other than that used in the PoA-DD?	VVM	71	Yes, other similar CDM projects	OK	OK
j. If yes, was the PoA-DD cross checked against the other sources to confirm that the project activity meets the applicability conditions of the methodology? (provide the reference to these choices)	VVM	71	Compared to another data we have got during previous validation process	OK	OK
k. Can a determination regarding the applicability of the selected methodology to the proposed CDM project activity be made?	VVM	72	Refer to CL 1 Closed	CL 1	OK
l. If no, clarification of the methodology was requested, in accordance with the guidance	VVM	72	NA	NA	NA

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provided by the CDM Executive Board?					
m. If answer to (5.b.d) above is "no", revision or deviation from the methodology was requested, in accordance with the guidance provided by the CDM Executive Board?	VVM	73	NA	NA	NA
n. If yes to (5.b.l) and (5.b.m) above, a request for registration was submitted before the CDM Executive Board has approved the proposed deviation or revision?	VVM	74	NA	NA	NA
c. Project boundary					
a. Does the CPA-DD correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity?	VVM	78	Yes CPA project boundary is the chiller systems within the Capricorn building located at 1 Science park Road, Science park II, Singapore 117528.	OK	OK
i. Does the project boundary cover the physical, geographical location of each measure (each piece of equipment) installed?	AMS	II.C	Yes Entire water cooled chiller system in Capricorn building.	OK	OK
b. Is the delineation in the CPA-DD of the project boundary correct and include identification of all locations, processes and equipment including secondary equipment and associated processes such as logistics etc?	VVM	79	Yes Between latitude $1^0$17.402'North, $1^0$29' North and longitudes $103^0$46.7331' East.	OK	OK
c. Does the delineation in the CPA-DD of the project boundary meet the requirements of the selected baseline?	VVM	79	Yes Within entire water cooled system.	OK	OK
d. Have changes been made to the project	VVM	79	There is no changes in the boundary in comparison	OK	OK

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boundary in comparison to the webhosted CPA-DD. If yes, please comment on the reason for the changes.			to the webhosted CPA-DD.		
e. Have all sources and GHGs required by the methodology been included within the project boundary?	VVM	79	Yes. Mainly CO2.	OK	OK
f. Does the methodology allow project participant to choose whether a source or gas is to be included within the project boundary?	VVM	79	NO	OK	OK
g. If yes, have the project participants justified that choice?	VVM	79	NA	NA	NA
h. If yes, is the justification provided reasonable? (provide reference to the supporting documented evidence provided by the project participants)	VVM	79	NA	NA	NA
d. Baseline identification					
a. Does the CPA-DD identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity?	VVM	81	Yes	OK	OK
b. Has any procedure contained in the methodology to identify the most reasonable baseline scenario, been correctly applied?	VVM	82	Yes As according to AMS II.C Version 13	OK	OK
i. Is the energy displaced by the project activity fossil fuel based?	AMS	II.C	No Energy displaced by electricity used in the project activity	OK	OK
1. ii If yes, is the energy baseline calculated at the existing level of fuel consumption or the	AMS	II.C	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
amount of fuel that would be used by the technology that would have been implemented otherwise?					
iii. Is the emission baseline calculated as the energy baseline multiplied by an emission factor for the fossil fuel displaced?	AMS	II.C	NA	OK	OK
iv. Are there reliable local / national data available for emission factor?	AMS	II.C	Yes It is published by Singapore government National Environmental Agency (NEA). NEA is also the DNA of Singapore.	OK	OK
v. If yes, are these data used for the emission factor?	AMS	II.C	Yes	OK	OK
vi. Are country or project specific data not available or difficult to obtain?	AMS	II.C	NO	OK	OK
vii. If yes, are IPCC default values of emission factor used?	AMS	II.C	NA	OK	OK
viii. Is the energy displaced by the project activity electricity?	AMS	II.C	Yes It is energy displaced project activity.	OK	OK
ix. If yes, is the emission baseline determined as the product of the baseline energy consumption of equipment/ appliances and the emission factor for the electricity displaced?	AMS	II.C	Yes The emission baseline follow the option 1 of baseline stated in the AMS II.C.	OK	OK
x. Does this project activity seek to retrofit or modify an existing unit or equipment resulting in an increase in capacity?	AMS	II.C	Yes This is retrofit the inefficient air cooled chiller to energy efficiency water cooled chiller.	OK	OK
xi. If yes, is the determination of the baseline scenario for the incremental capacity based on the procedures described in the general	AMS	II.C	Yes	NA	NA

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guidance to SSC methodologies under the sections " retrofit" and " capacity increase?					
c. Does the selected methodology require use of tools (such as the "Tool for the demonstration and assessment of additionality" and the "Combined tool to identify the baseline scenario and demonstrate additionality") to establish the baseline scenario?	VVM	82	No	NA	NA
d. If yes, was the methodology consulted on the application of these tools? (In such cases, the guidance in the methodology shall supersede the tool.)	VVM	82	NA	NA	NA
i. is the project activity the one that seek to retrofit or modify an existing unit or equipment?	AMS	II.C	Retrofit existing energy inefficient air cooled clilller.	OK	OK
ii. If yes, is there any increase capacity or output or level of service?	AMS	II.C	Yes	OK	OK
iii. If yes, is it within the range of -10% than the baseline and + 50% than the baseline? Note: For any increase of capacity or output or level of service beyond this range, which is due to the project activity, a different baseline shall apply.	AMS	II.C	Yes The increase capacity of cooling load will be within -10% of baseline and + 50% of baseline.	OK	OK
iv. If the project activities involved capacity increase, is it demonstrated that the most plausible baseline scenario for the additional (incremental) capacity is the baseline provided in the methodology AMS II.C?	AMS	II.C	Yes. It is following the option 1 of baseline stated in AMS II.C.	OK	OK
v. Did the demonstration include the assessment of the alternatives of the project activity by applying the Steps 1 to 3 of the latest version of "	AMS	II.C	NA Using Attachment A to Appendix B of the " Simplified Modalities & Procedures for small-scale	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
combined tool to identify the baseline scenario and demonstrate additionality" to identify the baseline scenario?			CDM project activities"		
vi. Is the identified baseline scenario for the additional (incremental) capacity the same as the baseline of the methodology?	AMS	II.C	Yes	OK	OK
vii. If yes, is it demonstrated that the implementation of the project as the "the proposed project activity undertaken without being registered as CDM', is not the common practice in the region?	AMS	II.C	Yes Demonstrated the CPA is due to barrier of prevailing practice.	OK	OK
viii. If the most plausible scenario for the additional capacity is the project activity, are the baseline emissions considered only to the extent of the capacity of the facility, which is being replaced?	AMS	II.C	Yes	OK	OK
ix. Are the calculations for emission factor for grid electricity done as per the procedures of AMS ID?	AMS	II.C	Yes. NEA has published the grid emission factor for past 3-year (2007, 2008, 2009) and declare that it is calculated as per AMD ID tool.	OK	OK
x. If yes, is the latest version of AMS ID referred?	AMS	II.C	Yes	OK	OK
xi. Is the latest version of the " Tool to calculate the emission factor fro an Electricity System" used in the project activity?	AMS	II.C	Yes The tool is from EB63 Annex 19 Tool to calculate the emission factor for an electricity system (version 02.2.1)		
xii. Is the baseline determined by using the 6 steps outlined in the tool?	AMS	II.C	NA	NA	NA
xiii. Are the calculations of the Operating Margin,	AMS	II.C	Yes	OK	OK

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Build Margin and the Combined margin transparently described in the PoA-DD and CPA-DD?			Data is transparently presented in the PoA-DD and CPA-DD. DOE has validated with EMA that the operating margin is calculated base on simple operating margin, build margin is based on 2 conditions: 1. 5 most recent new power plant addition to grid since 2004 and 20% fo system generation in Mwh. Combined margin is calculated based on the average of the sum of build margin and simple operating margin.		
xiv. Is the version of the CEA data used in the calculations relevant at the time of webhosting of PoA-DD and CPA-DD in the calculations?	AMS	II.C	Yes Latest data from NEA published the emission factor on 25 Feb 2011 were used for the calculation for the webhosted PoA-DD and CPA-DD.	OK	OK
xv. Are the emission factor calculations using any other data apart from the CEA data? If yes, provide details therof.	AMS	II.C	No	OK	OK
e. Does the methodology require several alternative scenarios to be considered in the identification of the most reasonable baseline scenario?	VVM	83	No	NA	NA
f. If yes, are all scenarios that are considered by the project participants and are supplementary to those required by the methodology reasonable in the context of the proposed CDM project activity?	VVM	83	NA	NA	NA
g. Has any reasonable alternative scenario been excluded?	VVM	83	NA	NA	NA
h. Is the baseline scenario identified reasonably supported by:	VVM	84			
a. Assumptions?	VVM	84	Base on the guildline ASHRAE 14 and 22.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Follow according to option 1 of baseline sated in AMS II.C.		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
b. Calculations?	VVM	84	Yes	OK	OK
c. Rationales?	VVM	84	Yes	OK	OK
i. Are the documents and sources referred to in the CPA-DD correctly quoted and interpreted?	VVM	84	Follow the ASHRAE Guide 14 & 22	OK	OK
j. Was the information provided in the CPA-DD cross checked with other verifiable and credible sources, such as local expert opinion, if available? (identify the sources)	VVM	84	During site visit meeting with Engineering team from Trane.	OK	OK
k. Have all applicable CDM requirements been taken into account in the identification of the baseline scenario for the proposed CDM project activity?	VVM	85	Yes	OK	OK
l. Have all relevant policies and circumstances been identified and correctly considered in the CPA-DD, in accordance with the guidance by the CDM Executive Board?	VVM	85	Yes	OK	OK
m. Does the CPA-DD provide a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	VVM	86	Yes The baseline is determined as according to option 1 of baseline indicated in the AMS II.C. Baseline caluculation period base on the Ashrae guildline 14 & 22.	OK	OK
e. Algorithms and/or formulae used to determine emission reductions					
a. Do the steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions comply with the requirements of the selected baseline and monitoring?	VVM	89	According to the AMS II.C version 13	OK	OK

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b. Have the equations and parameters in the CPA-DD been correctly applied with respect those in the select approved methodology?	VVM	90	Refer to CL 3 Closed.	OK	OK
i. are baseline emission calculated using the formula $BE_y = E_{BL,y} * EF_{CO2,ELEC,y} + Q_{ref,BL}$ X GWP $_{ref,BL}$, where $E_{BL,Y} = \sum_l (n_i * p_i * o_i) / (1-l_y)$?	AMS	II.C	Qref,BL X GWP ref,BL is not consider because refrigerant used in the PoA will be lower than baseline. Ly is not consider because Singapore gird is small where the gird loss is very small can consider insignificant. Baseline emission using (TR-H) baseline/month x (KW/TR) baseline efficiency CAR 02	OK Closed	OK Closed
ii. In the case of retrofit activity is the "power" calculated as the weighted average of the devices replaced?	AMS	II.C	Monthly energy consumption data is available and average monthly energy consumption is considered for deriving the baseline emissions. Calculated the cooling load TR-H baseline and Baseline efficiency KW/TR	OK	OK
iii. In the case of new installations is the " power" calculated as the weighted average of devices on the market?	AMS	II.C	NA	NA	NA
iv. Has the ly value included non-technical losses such as commercial losses (e.g theft / pilferage? ? Note: This value shall not include non-technical losses such as commercial losses (e.g theft / pilerage).	AMS	II.C	NA CME consider ly is not consider because Singapore Grid is small the grid loss is insignificant	NA	NA
v. Are the average annual technical grid losses	AMS	II.C	NA	NA	NA

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determined using recent, accurate and reliable data available for the host country, ie from recent data published either by national utility or an governmental body?			CME consider ly is not consider because Singapore Grid is small the grid loss is insignificant. Verified with local government body EMA (Energy Market Authority) who regulate the electricity generation companies in Singapore confirm that the technical gird loss is considered in Singapore very small.		
vi. Is the reliability of the data used (e.g appropriateness, accuracy / uncertainty, especially exclusion of non technical grid losses) established and documented by the project participant in the CPA-DD?	AMS	II.C	Yes Validate the data calculation using by the EMA (Energy Market Authority) – government body who regulate the electricity generation companies in Singapore. Data is calculated as per the tool (EB63 Annex 19)	OK	OK
vii. if no recent data are available or the data cannot be regarded accurate and reliable, is the default value of 0.1 as specified by the methodology used for average annual technical gird losses?	AMS	II C	NA	OK	OK
viii. Is the value of $Q_{ref, BL}$ used as per values from Chapter 7: Emission of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories?	AMS	II.C	$Q_{ref, BL}$ is not consider in the calculation because the CPA dose not make provision for the computation of emission from refrigerants in either the baseline or the project activity as the emission from refrigerants in the CPA must be equal to or lower than that of the baseline refrigerant type.	OK	OK
ix. Are the project emissions consisting of electricity and / or fossil fuel used in the project equipment, determined as follows: $PE_y = EP_{PJ,y} * EF_{CO2,y}$	AMS	II.C	**1.** Refer CAR 2	Closed	Closed

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
x. Is the energy consumption in the project activity in year y ($EP_{pj,y}$) determined ex post based on monitored values (Note: this shall be determined ex post based on monitored values)	AMS	II.C	Yes The EPpj,y is determined ex post based on monitored values	OK	OK
xi. Are the emission associated with gird electricity consumption, EF_{CO2y} calculated in accordance with the procedures of AMS I.D? (Note: this shall be determined based on AMS I.D)	AMS	II.C	Yes It is calucated as per AMS I.D where the emission factor published by NEA.	OK	OK
xii. If yes, is the calculation of the Operating Margin (OM) emission factor EFgridOMy based on one of the 4 methods described?	AMS	II.C	Yes EMA is calculated based on the Simple Operating margin.	OK	OK
xiii. If the simple OM method is used, is it shown that the low-cost / must-run resources constitute less than 50% of total grid generation in:	AMS	II.C			
a. average of the five most recent years, or?	AMS	II.C	Recent 3 years data (2007, 2008 and 2009)	OK	OK
b. based on long-term averages for hydroelectricity production.	AMS	II. C	NA	NA	NA
xiv. For the simple OM, are the emissions factor calculated using either of the two following data vintages:	AMS	II.C			
a. Ex-ante option?	AMS	II.C	EX-ante	OK	OK
b. Ex-post option?	AMS	II.C	NA	OK	OK
xv. Is the data vintage chosen as indicated above documented in CPA-DD?	AMS	II.C	Yes	OK	OK
xvi. If the dispatch data analysis OM is chosen, is the year in which the project activity displaces grid electricity used?	AMS	II.C	NA Grid emission factor is calculated based on the simple operating margin by the regulatory authority in Singapore, which was validated by visiting their office to verify the calculation method.	NA	NA

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xvii. For dispatch data analysis OM, is it indicated that the emission factor would be updated annually during monitoring?	AMS	II.C	NA.	NA	NA
xviii. Is the operating margin emission factor, according to the selected method, calculated as per Step 3 of the latest version of the " Tool to calculate the emission for an electricity system?	AMS	II.C	Yes EMA calculated the emission factor based on the Tool to calculate the emission for an electricity system.	OK	OK
xix. Is the Build Margin (BM) emission factor calculated as EFgrid, BM, y = ∑ EGm,y X FEEL, m, y) / (∑ EGm, y) ?	AMS	II.C	Yes. DOE has confirmed the build margin is calculated based on two condition set by EMA. Condition 1: 5 most recent new power plant addition to grid since 2004 and condition 2; 20% of the system generation in Mwh. Both conditions were fulfil.	OK	OK
xx. Is the combined margin emission factor calculated as $EF_{gird,CM,y}$ + $EF_{grid,OM,y}$ X W_{OM} + $EF_{grid,BM,Y}$ X W_{BM}	AMS	II.C	Yes EMA calculated the combined margin based on the average of build margin + simple operating margin.	OK	OK
xxi. Are the percent weightages of OM and BM emission factors used as per the tool?	AMS	II.C	50%	OK	OK
xxii. For fossil fuel displaced, are reliable local or national data for the emission factor used? Note: IPCC default values should be used only when country or project specific data are not available or difficult to obtain.	AMS	II. C	NA	NA	NA
xxiii. Does the project activity displace gird electricity?	AMS	II.C	Yes	OK	OK
xxiv. If yes, is the project energy consumption determined as follows using the data of the project equipment? EPpj,y = ∑I (ni*pi*oi) / (1-ly)	AMS	II.C	Project energy consumption calculated using (TR-H)baseline cooling load x post-retrofit efficiency KW/TR)	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			CAR02: There is no evidence to suggest that CME has demonstrated calculation of Baseline Emission, Project emissions and Emission reductions using prescribed algorithm of AMS IIC.	Closed	Closed

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
xxv. Are the project emissions from physical leakage of refrigerants accounted for in calculations?	AMS	II.C	No CPA did not make provision for the computation of emission from refrigerants in either the baseline or the project activity as the emission from refrigerants in the CPA must be equal or lower than that of the baseline refrigerant type.	OK	OK
xxvi. Are all GHGs are defined per Article 1, paragraph 5 of the Convention considered as per the guidance by the Executive Board in para 17, report of EB 34?	AMS	II.C	CPA is using CFC-free and those refrigerant that has a higher GWP as per IPCC guildines than that of refrigerant of the baseline will not be included in the CPA.	OK	OK
xxix. Are the values of average annual quantity of refrigerant used in year y to replace refrigerant that has leaked in year y tonnes / year) (ie. Qref,Pjy) taken from Chapter 7. Emissions of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories?	AMS	II. C	NA	NA	NA
xxx. Does the energy efficiency technology involve any equipment transfer from or to the project activity	AMS	II.C	NO. Replaced equipment all will scrap.	OK	OK
xxxi. If yes, are the leakages for equipment transfer considered in the calculations?	AMS	II.C	NA	NA	NA
xxxii. Is the emission reduction achieved by the project activity determined as the difference between the baseline emissions and the project emission and leakage? ERy= (BEy-PEy)- LEy	AMS	II.C	Emission reduction calculated by Energy saved per month = (TR-H) baseline x [(KW/TR)baseline – (KW/TR) post-retrofit] + savings in KWH Savings in KWH x Grid Emission factor = tons of CO2 emission reductions	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Refer CAR02	Closed	Closed

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
xxxiii. Does the project activity involved replacing incandescent lamp with CFL?	AMS	II.C	NO	OK	OK
xxxiv. If yes, is the value of BP calculated from the formula, BP=1 – (# of pieces of screw-in or lock-in efficient lighting equipment / total # of pieces of screw-in or lock-in lighting equipment), based on ex ante representative sample survey?	AMS	II.C	NA	OK	OK
xxxv. If the answer to question above is no, is the value of BP sect as “1.0? Note BP is only applicable to “ Project Activity under Programme of Activities (CPA of PoA)” and in other cases set BP to 1.0.	AMS	II.C	NA	OK	OK
xxxvi. If it is not demonstrated that any one of the above condition is met, are the leakages accounted in calculations?	AMS	II.C	NA	OK	OK
c. Does the methodology provide for selection between different options for equations or parameters?	VVM	90	Yes Follow Option 1 of baseline	OK	OK
d. If yes, has adequate justification been provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided)?	VVM	90	Base on the choice of baseline	OK	OK
e. If yes, have correct equations and parameters been used, in accordance with the methodology selected?	VVM	90	Refer to (5.e.b) above	-	-
f. Will data and parameters be monitored throughout the crediting period of the proposed CDM project activity?	VVM	91	Yes	OK	OK
g. If no, and these data and parameters will remain	VVM	91	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
fixed throughout the crediting period, are all data sources and assumptions:					
i. Appropriate and correct?	VVM	91	NA	NA	NA
ii. Applicable to the proposed CDM project activity?	VVM	91	NA	NA	NA
iii. Resulting in a conservative estimate of the emission reductions?	VVM	91	NA	NA	NA
h. Will data and parameters be monitored on implementation and hence become available only after validation of the project activity?	VVM	91	Yes	OK	OK
i. If yes, are the estimates provided in the PoA-DD for these data and parameters reasonable?	VVM	91	Yes	OK	OK
6.Additionality of a project activity					
a. Does the CPA-DD describe how a proposed CDM project activity is additional?	VVM	94	Yes Following Attachment A to Appendix B of the Simplified Modalities & Procedures for small scale CDM project Activities.	OK	OK
b. Were the following steps of the tool to assess additionality used:	EB 39	Ann 10			
i. Identification of alternatives to the project activity?	EB 39	Ann 10	NA	NA	NA
ii. Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible?	EB 39	Ann 10	NA	NA	NA
iii. Barriers analysis?	EB 39	Ann 10	Yes Barrier due to prevailing practice.	OK	OK
iv. Common practice analysis?	EB 39	Ann 10	NA	NA	NA

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c. In step 1 (i) have all the sub-steps as below been followed?	EB 39	Ann 10	NA	NA	NA
i. Sub-step 1a: Define alternatives to the project activity	EB 39	Ann 10	NA	NA	NA
ii. Sub-step 1b: Consistency with mandatory laws and regulations	EB 39	Ann 10	NA	NA	NA
d. Have the following alternatives been included while defining alternatives as per sub-step 1a?	EB 39	Ann 10	NA	NA	NA
i. (a) The proposed project activity undertaken without being registered as a CDM project activity;	EB 39	Ann 10	NA	NA	NA
ii. (b) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services or services with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;	EB 39	Ann 10	NA	NA	NA
iii. (c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).	EB 39	Ann 10	NA	NA	NA
e. Has the project participant included the technologies or practices that provide outputs or services with comparable quality, properties and application areas as the proposed CDM project activity and that have been implemented previously or are currently being introduced in the relevant country/region?	EB 39	Ann 10	NA	NA	NA
f. Has the outcome of Step 1a: Identified realistic	EB	Ann	NA	NA	NA

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	and credible alternative scenario(s) to the project activity done correctly? Please briefly mention the outcome.	39	10			
g.	Is the alternative(s) in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution.?	EB 39	Ann 10	NA	NA	NA
h.	If an alternative does not comply with all mandatory applicable legislation and regulations, has it been shown that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that noncompliance with those requirements is widespread in the country?	EB 39	Ann 10	NA	NA	NA
i.	Has the outcome of Step 1b: Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations done correctly? Please state the outcome.	EB 39	Ann 10	NA	NA	NA
j.	Has PP selected Step 2 (Investment analysis) or Step 3 (Barrier analysis) or both Steps 2 and 3?	EB 39	Ann 10	NA	NA	NA
k.	In step 2, have all the sub-steps as below been followed?	EB 39	Ann 10			

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i. Sub-step 2a: Determine appropriate analysis method;	EB 39	Ann 10	NA	NA	NA
ii. Sub-step 2b: Option I. Apply simple cost analysis;	EB 39	Ann 10	NA	NA	NA
iii. Sub-step 2b: Option II. Apply investment comparison analysis;	EB 39	Ann 10	NA	NA	NA
iv. Sub-step 2b: Option III. Apply benchmark analysis;	EB 39	Ann 10	NA	NA	NA
v. Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III);	EB 39	Ann 10	NA	NA	NA
vi. Sub-step 2d: Sensitivity analysis (only applicable to Options II and III).	EB 39	Ann 10	NA	NA	NA
l. In sub-step 2a has the determination of appropriate method of analysis done as per the guidance as below?	EB 39	Ann 10	NA	NA	NA
i. Simple cost analysis if the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income (Option I).	EB 39	Ann 10	NA	NA	NA
ii. Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Specify option used with justification.	EB 39	Ann 10	NA	NA	NA
m. Has the below guideline followed for sub-step 2b Option I. Apply simple cost analysis? Document the costs associated with the CDM project activity and the alternatives identified in Step1 and demonstrate that there is at least one alternative	EB 39	Ann 10	NA	NA	NA

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which is less costly than the project activity.					
n. Has the below guideline followed for sub-step 2b Option II. Apply investment comparison analysis? Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service most suitable for the project type and decision-making context. Please specify	EB 39	Ann 10	NA	NA	NA
o. Has the below guideline followed for Sub-step 2b: Option III. Apply benchmark analysis?	EB 39	Ann 10	NA	NA	NA
i. Identify the financial/economic indicator, such as IRR, most suitable for the project type and decision context.	EB 39	Ann 10	NA	NA	NA
ii. When applying Option II or Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. Only in the particular case where the project activity can be implemented by the project participant, the specific financial/economic situation of the company undertaking the project activity can be considered.	EB 39	Ann 10	NA	NA	NA
iii. Discount rates and benchmarks shall be derived from: (a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial)	EB 39	Ann 10	NA	NA	NA

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expert or documented by official publicly available financial data; (b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects; (c) A company internal benchmark (weighted average capital cost of the company), only in the particular case referred to above in 2. The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark; (d) Government/official approved benchmark where such benchmarks are used for investment decisions; (e) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified. Please specify benchmark and justify.					
p. Has the below guideline followed for Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III)?	EB 39	Ann 10	NA	NA	NA
i. Calculate the suitable financial indicator for the proposed CDM project activity and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for	EB 39	Ann 10	NA	NA	NA

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example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but possibly including inter alia subsidies/fiscal incentives, ODA, etc, where applicable), and, as appropriate, non-market cost and benefits in the case of public investors if this is standard practice for the selection of public investments in the host country.					
ii. Present the investment analysis in a transparent manner and provide all the relevant assumptions, preferably in the CPA-DD, or in separate annexes to the CPA-DD.	EB 39	Ann 10	NA	NA	NA
iii. Justify and/or cite assumptions.	EB 39	Ann 10	NA	NA	NA
iv. In calculating the financial/economic indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions.	EB 39	Ann 10	NA	NA	NA
v. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.	EB 39	Ann 10	NA	NA	NA
vi. Present in the CPA-DD a clear comparison of the financial indicator for the proposed CDM activity. Please specify details for above.	EB 39	Ann 10	NA	NA	NA
q. Has the below guideline followed for Sub-step 2d: Sensitivity analysis (only applicable to Options II and III)? Include a sensitivity analysis that shows	EB 39	Ann 10	NA	NA	NA

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whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.					
r. Has the outcome of Step 2 clearly mentioned with justification?	EB 39	Ann 10	NA	NA	NA
s. In step 3: Barrier analysis have all the sub-steps as below been followed?	EB 39	Ann 10			
i. Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity;	EB 39	Ann 10	Barrier due to prevalent practice.	OK	OK
ii. Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity).	EB 39	Ann 10	NA	NA	NA
t. Has the below guideline followed for Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project?	EB 39	Ann 10	NA	NA	NA
i. (a) Investment barriers: For alternatives undertaken and operated by private entities: Similar activities have only been implemented with grants or other non-commercial finance terms. No private capital is available from domestic or international capital markets due to real or perceived risks associated with investment in the country where the proposed CDM project activity is to be implemented, as demonstrated by the credit rating of the country or other country investments reports of reputed origin.	EB 39	Ann 10	NA	NA	NA

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ii. (b) Technological barriers: Skilled and/or properly trained labour to operate and maintain the technology is not available in the relevant country/region, which leads to an unacceptably high risk of equipment disrepair and malfunctioning or other underperformance; Lack of infrastructure for implementation and logistics for maintenance of the technology, Risk of technological failure: the process/technology failure risk in the local circumstances is significantly greater than for other technologies that provide services or outputs comparable to those of the proposed CDM project activity, as demonstrated by relevant scientific literature or technology manufacturer information, The particular technology used in the proposed project activity is not available in the relevant region.	EB 39	Ann 10	NA	NA	NA
iii. (c) Barriers due to prevailing practice: The project activity is the "first of its kind".	EB 39	Ann 10	Barrier due to prevailing practice: Prevailing practice or existing regulatory or policy requirement would have led to implementation of technology with higher emission.	OK	OK
iv. (d) Other barriers, preferably specified in the underlying methodology as examples.	EB 39	Ann 10	NA	NA	NA
u. Has the outcome from Step 3a clearly mentioned in CPA-DD?	EB 39	Ann 10	Yes Barrier due to prevailing practice.	OK	OK
v. Has the below guideline followed for Sub-step 3 b: Show that the identified barriers would not	EB 39	Ann 10	NA	NA	NA

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prevent the implementation of at least one of the alternatives (except the proposed project activity)?					
i. If the identified barriers also affect other alternatives, explain how they are affected less strongly than they affect the proposed CDM project activity. In other words, demonstrate that the identified barriers do not prevent the implementation of at least one of the alternatives. Any alternative that would be prevented by the barriers identified in Sub-step 3a is not a viable alternative, and shall be eliminated from consideration.	EB 39	Ann 10	NA	NA	NA
ii. Provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to how it demonstrates the existence and significance of the identified barriers and whether alternatives are prevented by these barriers.	EB 39	Ann 10	NA	NA	NA
iii. The type of evidence to be provided should include at least one of the following: (a) Relevant legislation, regulatory information or industry norms; (b) Relevant (sectoral) studies or surveys (e.g. market surveys, technology studies, etc) undertaken by universities, research institutions, industry associations, companies, bilateral/multilateral institutions, etc; (c) Relevant statistical data from national or international statistics; (d) Documentation of	EB 39	Ann 10	NA	NA	NA

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relevant market data (e.g. market prices, tariffs, rules); (e) Written documentation of independent expert judgments from industry, educational institutions (e.g. universities, technical schools, training centres), industry associations and others. Please specify.					
w. Has the outcome from Step 3 clearly mentioned in PoA-DD?	EB 39	Ann 10			
x. In step 4: Common practise analysis has all the sub-steps as below followed?	EB 39	Ann 10	NA	NA	NA
i. Sub-step 4a: Analyze other activities similar to the proposed project activity;	EB 39	Ann 10	NA	NA	NA
ii. Sub-step 4b: Discuss any similar Options that are occurring.	EB 39	Ann 10	NA	NA	NA
y. Has the below guideline followed for Sub-step 4a: Analyze other activities similar to the proposed project activity? Provide an analysis of any other activities that are operational and that are similar to the proposed project activity. Other CDM project activities are not to be included in this analysis. Provide documented evidence and, where relevant, quantitative information. On the basis of that analysis, describe whether and to which extent similar activities have already diffused in the relevant region.	EB 39	Ann 10	NA	NA	NA
z. Has the below guideline followed for Sub-step 4b: Discuss any similar Options that are occurring? If similar activities are identified, then it is necessary to demonstrate why the existence of	EB 39	Ann 10	NA	NA	NA

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these activities does not contradict the claim that the proposed project activity is financially/economically unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially/economically attractive (e.g., subsidies or other financial flows) and which the proposed project activity cannot use or did not face the barriers to which the proposed project activity is subject. In case similar projects are not accessible, the CPA-DD should include justification about non-accessibility of data/information.					
aa. Has the outcome from Step 4 clearly mentioned in CPA-DD?	EB 39	Ann 10	NA	NA	NA
bb. Has it been proved that the project is additional?	EB 39	Ann 10	Yes Additional proved by barrier due to prevailing practice.	OK	OK
cc. Has the PP demonstrated additionality by explaining Investment barrier, Access-to-finance barrier, Technological barrier, Barrier due to prevailing practice or other barriers?	EB 35	Ann 34	NA	NA	NA
dd. If Investment barrier has been explained, is it demonstrated that financially more viable alternative to the project activity would have led to higher emissions? Please explain.	EB 35	Ann 34	NA	NA	NA

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ee. If Access-to-finance has been explained, is it demonstrated that the project activity could not access appropriate capital without consideration of the CDM revenues? Please explain.	EB 35	Ann 34	NA	NA	NA
ff. If Technological barrier has been explained, is it demonstrated that a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions? Please explain.	EB 35	Ann 34	NA	NA	NA
gg. If prevailing practise barrier has been explained, is it demonstrated that the prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions? Please explain.	EB 35	Ann 34	Yes 1. There is no existing regulatory or policy requirements that request building owner to replace the chiller with efficient 0.65KW/TR or better. 2. NEA letter dated on 13 July 2010 reference no. NEA/EP/RCD/10-00068-1 support not many buildings have the energy efficient 0.65KW/TR or better. 3. Only few buildings in Singapore which build before 2006 have electricity efficient <=0.65kW/TR.	OK	OK
hh. If other barrier has been explained, is it demonstrated that other barriers such as institutional barriers or limited information, managerial resources, organizational capacity, or capacity to absorb new technologies would prevent the project activity any way?	EB 35	Ann 34	NA	NA	NA
ii. Have the project participants identified the most	EB	Ann	Yes	OK	OK

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	relevant barrier?	35	34	Barrier due to prevailing practice.		
jj.	Have the project participants provided transparent and documented third party evidence such as national/international statistics, national/provincial policy and legislation, studies/surveys by independent agencies etc. to demonstrate the most relevant barrier? Please explain.	EB 35	Ann 34	Yes NEA letter dated on 13 July 2010 reference no. NEA/EP/RCD/10-00068-1 support not many buildings have the energy efficient 0.65KW/TR or better. Data from (EASe) Energy Efficiency Improvement Assistance scheme that 4 buildings have achieved 0.65KW/TR prior to 2006.	OK	OK

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a. Prior consideration of the clean development mechanism					
a. Is the project activity start date prior to the date of publication of the CPA-DD for stakeholder comments?	VVM	98	NA for CPA under PoA.	NA	NA
b. If yes, were the CDM benefits considered necessary in the decision to undertake the project as a proposed CDM project activity?	VVM	98	NA	NA	NA
c. Is the start date of the project activity, reported in the CPA-DD, in accordance with the "Glossary of CDM terms", which states that "The starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins."?	VVM	99	NA	NA	NA
d. Does the project activity require construction, retrofit or other modifications?	VVM	99	NA	NA	NA
e. If yes, is it ensured that the date of commissioning cannot be considered as the project activity start date?	VVM	99	NA	NA	NA
f. Is it a new project activity (project activities with staring date on or after 02 August 2008) or an existing project activity (project activities with a start date before 02 August 2008)?	VVM	100	NA	NA	NA
g. For a new project, for which CPA-DD has not been published for global stakeholder consultation or a new methodology proposed to the Executive Board before the project activity start date, had the PP informed the Host Party DNA and/or the UNFCCC secretariat in writing of	VVM	101	NA	NA	NA

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the commencement of the project activity and of their intention to seek CDM status? (Provide reference to such confirmation from Host Party DNA and/or UNFCCC secretariat).					
h. For an existing project activity, for which the start date is prior to the date of publication of the CPA-DD for global stakeholder consultation, are the following evidences provided:	VVM	102	NA	NA	NA
i. evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project, including, inter alia:	VVM	102	NA	NA	NA
a. minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a proposed CDM project activity?	VVM	102	NA	NA	NA
ii. reliable evidence from project participants that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation, including, inter alia:	VVM	102	NA	NA	NA
a. contract with consultants for CDM/CPA-DD/methodology services?	VVM	102	NA	NA	NA
b. Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with	VVM	102	NA	NA	NA

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multilateral financial institutions or carbon funds)?					
c. evidence of agreements or negotiations with a DOE for validation services?	VVM	102	NA	NA	NA
d. submission of a new methodology to the CDM Executive Board?	VVM	102	NA	NA	NA
e. publication in newspaper?	VVM	102	NA	NA	NA
f. interviews with DNA?	VVM	102	NA	NA	NA
g. earlier correspondence on the project with the DNA or the UNFCCC secretariat?	VVM	102	NA	NA	NA
h. Has the chronology of events including time lines been appropriately captured and explained / detailed in the CPA-DD?	VVM	102	NA	NA	NA
b. Identification of alternatives					
a. Does the approved methodology that is selected by the proposed CDM project activity prescribe the baseline scenario and hence no further analysis is required?	VVM	105	Yes	OK	OK
b. If no, does the CPA-DD identify credible alternatives to the project activity in order to determine the most realistic baseline scenario?	VVM	105	NA	NA	NA
c. Does the list of alternatives given in the CPA-DD ensure that:	VVM	106			
i. the list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity?	VVM	106	NA	NA	NA
ii. the list contains all plausible alternatives that the DOE, on the basis of its local and	VVM	106	NA	NA	NA

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sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity?					
iii. the alternatives comply with all applicable and enforced legislation?	VVM	106	NA	NA	NA
2. c. Investment analysis					
a. Has investment analysis been used to demonstrate the additionality of the proposed CDM project activity?	VVM	108	NA	NA	NA
b. If yes, does the CPA-DD provide evidence that the proposed CDM project activity would not be:	VVM	108	NA	NA	NA
i. the most economically or financially attractive alternative?	VVM	108	NA	NA	NA
ii. economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs)?	VVM	108	NA	NA	NA
c. Was this shown by one of the following approaches?	VVM	109	NA	NA	NA
i. The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income. Document the costs associated with the proposed CDM project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity.	VVM	109	NA	NA	NA
ii. The proposed CDM project activity is less economically or financially attractive than at	VVM	109	NA	NA	NA

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least one other credible and realistic alternative.					
iii. The financial returns of the proposed CDM project activity would be insufficient to justify the required investment.	VVM	109	NA	NA	NA
d. Is the period of assessment limited to the proposed crediting period of the CDM project activity?	EB 51	Ann 58	NA	NA	NA
e. Does the project IRR and equity IRR calculations reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period?	EB 51	Ann 58	NA	NA	NA
f. Does the IRR calculation include the cost of major maintenance and/or rehabilitation if these are expected to be incurred during the period of assessment?	EB 51	Ann 58	NA	NA	NA
g. Do the project participants justify the appropriateness of the period of assessment in the context of the underlying project activity, without reference to the proposed CDM crediting period?	EB 51	Ann 58	NA	NA	NA
h. Does the cash flow in the final year include a fair value of the project activity assets at the end of the assessment period?	EB 51	Ann 58	NA	NA	NA
i. Has the fair value been calculated in accordance with local accounting regulations where available, or international best practice?	EB 51	Ann 58	NA	NA	NA

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j. Does the fair value calculations include both the book value of the asset and the reasonable expectation of the potential profit or loss on the realization of the assets?	EB 51	Ann 58	NA	NA	NA
k. Was depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, added back to net profits for the purpose of calculating the financial indicator (e.g. IRR, NPV)?	EB 51	Ann 58	NA	NA	NA
l. Has taxation been included as an expense in the IRR/NPV calculation in cases where the benchmark or other comparator is intended for post-tax comparisons?	EB 51	Ann 58	NA	NA	NA
m. Are the input values used in all investment analysis valid and applicable at the time of the investment decision taken by the project participant?	EB 51	Ann 58	NA	NA	NA
n. Is the timing of the investment decision consistent and appropriate with the input values?	EB 51	Ann 58	NA	NA	NA
o. Are all the listed input values been consistently applied in all calculations?	EB 51	Ann 58	NA	NA	NA
p. Does the investment analysis reflect the economic decision making context at point of the decision to recommence the project in the case of project activities for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM?	EB 51	Ann 58	NA	NA	NA

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q. Have project participants supplied the spreadsheet versions of all investment analysis?	EB 51	Ann 58	NA	NA	NA
r. Are all formulas used in this analysis readable and all relevant cells be viewable and unprotected?	EB 51	Ann 58	NA	NA	NA
s. In cases where the project participant does not wish to make such a spreadsheet available to the public has the PP provided an exact read-only or PDF copy for general publication?	EB 51	Ann 58	NA	NA	NA
t. In case the PP wishes to black-out certain elements of the publicly available version, is it justifiable?	EB 51	Ann 58	NA	NA	NA
u. Was the cost of financing expenditures (i.e. loan repayments and interest) included in the calculation of project IRR?	EB 51	Ann 58	NA	NA	NA
v. In the calculation of equity IRR, has only the portion of investment costs which is financed by equity been considered as the net cash outflow?	EB 51	Ann 58	NA	NA	NA
w. Has the portion of the investment costs which is financed by debt been considered a cash outflow in the calculation of equity IRR? (this is not allowed)	EB 51	Ann 58	NA	NA	NA
x. Was a pre-tax benchmark being applied?	EB 51	Ann 58	NA	NA	NA
y. In cases where a post-tax benchmark is applied, is actual interest payable taken into account in the calculation of income tax?	EB 51	Ann 58	NA	NA	NA
z. In such situations, was interest calculated according to the prevailing commercial interest	EB 51	Ann 58	NA	NA	NA

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rates in the region, preferably by assessing the cost of other debt recently acquired by the project developer and by applying a debt-equity ratio used by the project developer for investments taken in the previous three years?					
aa. In cases where a benchmark approach is used is the applied benchmark appropriate to the type of IRR calculated?	EB 51	Ann 58	NA	NA	NA
bb. Has local commercial lending rates or weighted average costs of capital (WACC) selected as appropriate benchmarks for a project IRR?	EB 51	Ann 58	NA	NA	NA
cc. Has required/expected returns on equity selected as appropriate benchmark for equity IRR?	EB 51	Ann 58	NA	NA	NA
dd. In case benchmarks supplied by relevant national authorities selected is it applicable to the project activity and the type of IRR calculation presented?	EB 51	Ann 58	NA	NA	NA
ee. In the cases of projects which could be developed by an entity other than the project participant is the benchmark applied based on publicly available data sources which can be clearly validated?	EB 51	Ann 58	NA	NA	NA
ff. Have internal company benchmarks/expected returns (including those used as the expected return on equity in the calculation of a weighted average cost of capital - WACC) been applied in cases where there is only one possible project developer?	EB 51	Ann 58	NA	NA	NA
gg. In such cases, have these values been used for	EB	Ann	NA	NA	NA

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similar projects with similar risks, developed by the same company or, if the company is brand new, would have been used for similar projects in the same sector in the country/region?	51	58			
hh. Has a minimum clear evidence of the resolution by the company's Board and/or shareholders been provided to the effect as above?	EB 51	Ann 58	NA	NA	NA
ii. Has a thorough assessment of the financial statements of the project developer - including the proposed WACC - to assess the past financial behaviour of the entity during at least the last 3 years in relation to similar projects been conducted?	EB 51	Ann 58	NA	NA	NA
jj. Does the risk premiums applied in the determination of required returns on equity reflect the risk profile of the project activity being assessed, established according to national/international accounting principles? (It is not considered reasonable to apply the rate general stock market returns as a risk premium for project activities that face a different risk profile than an investment in such indices.)	EB 51	Ann 58	NA	NA	NA
kk. Has an investment comparison analysis and not a benchmark analysis used when the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services?	EB 51	Ann 58	NA	NA	NA
ll. Have variables, including the initial investment	EB	Ann	NA	NA	NA

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cost, that constitute more than 20% of either total project costs or total project revenues been subjected to reasonable variation (positive and negative) and the results of this variation been presented in the CPA-DD and be reproducible in the associated spreadsheets?	51	58			
mm. Have a corrective action been raised for a variable to be included in the sensitivity analysis which constitute less than 20% and have a material impact on the analysis ?	EB 51	Ann 58	NA	NA	NA
nn. Is the range of variations selected is reasonable in the project context?	EB 51	Ann 58	NA	NA	NA
oo. Dos the variations in the sensitivity analysis at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances?	EB 51	Ann 58	NA	NA	NA
pp. In cases where a scenario will result in the project activity passing the benchmark or becoming the most financially attractive alternative, is an assessment done of the probability of the occurrence of this scenario in comparison to the likelihood of the assumptions in the presented investment analysis, taking into consideration correlations between the variables as well as the specific socio-economic and policy context of the project activity?	EB 51	Ann 58	NA	NA	NA
qq. Was the plant load factor defined ex-ante in the CDM-CPA-DD according to one of the following options:	EB 51	Ann 58	NA	NA	NA

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i. The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval?	EB 51	Ann 58	NA	NA	NA
ii. The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)?	EB 51	Ann 58	NA	NA	NA
rr. Was a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determine the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices conducted?	VVM	111	NA	NA	NA
ss. Were the parameters cross-checked against third-party or publicly available sources, such as invoices or price indices?	VVM	111	NA	NA	NA
tt. Were feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants reviewed?	VVM	111	NA	NA	NA
uu. Was the correctness of computations carried out and documented by the project participants assessed?	VVM	111	NA	NA	NA
vv. Was the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions assessed?	VVM	111	NA	NA	NA
ww. Is the type of benchmark applied is	VVM	112	NA	NA	NA

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	suitable for the type of financial indicator presented?					
	xx. Do any risk premiums applied determining the benchmark reflect the risks associated with the project type or activity?	VVM	112	NA	NA	NA
	yy. To determine this, was it assessed whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark by:	VVM	112	NA	NA	NA
3.	i. assessing previous investment decisions by the project participants involved?	VVM	112	NA	NA	NA
4.	ii. determining whether the same benchmark has been applied?	VVM	112	NA	NA	NA
	iii. determining if there are verifiable circumstances that have led to a change in the benchmark?	VVM	112	NA	NA	NA
	zz. Did the project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activities?	VVM	113	NA	NA	NA
5.	xx. If yes:	VVM	113	NA	NA	NA
	i. has the FSR been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially	VVM	113	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
changed?					
ii. Are the values used in the CPA-DD and associated annexes fully consistent with the FSR?	VVM	113	NA	NA	NA
iii. If not, was the appropriateness of the values validated?	VVM	113	NA	NA	NA
iv. On the basis of its specific local and sectoral expertise, is confirmation provided, by cross-checking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision?	VVM	113	NA	NA	NA
d Barrier analysis					
a. Has barrier analysis been used to demonstrate the additionality of the proposed CDM project activity?	VVM	115	Yes barriers due to prevailing practices CL2 closed.	CL 2	OK
b. If yes, does the CPA-DD demonstrate that the proposed CDM project activity faces barriers that:	VVM	115	Barrier due to prevailing practices	CL 2	OK
i. prevent the implementation of this type of proposed CMD project activity?	VVM	115	Refer to CL 2 Closed	CL 2	OK
ii. do not prevent the implementation of at least one of the alternatives?	VVM	115	Refer to CL 2 closed	CL 2	OK
c. Are there any issues that have a clear direct impact on the financial returns of the project activity, other than: risk related barriers, for example risk of technical failure, that could have negative effects on the financial performance; or	VVM	116	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
barriers related to the unavailability of sources of finance for the project activity? {If yes, these issues cannot be considered barriers and shall be assessed by investment analysis. [Refer to (6.c) above]}					
d. Were the barriers determined as real by:	VVM	117			
i. assessing the available evidence and/or undertaking interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the CPA-DD exist?	VVM	117	Refer to CL 2-closed Discussion with Trane engineering teams from Trane Singapore. Trane Singapore is a manufacturer and services providers of energy efficient heating, ventilation and air conditioning (HVAC) systems in commercial, industrial and institutional buildings.	CL 2	OK
ii. ensuring that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics?	VVM	117	Refer to CL 2-closed Prevailing practice supported by NEA (National Environmental Agency) letter ref: NEA/EP/RCD/10-00068-1 dated on 13 July 2010 on the subject of " System energy efficiencies of chiller plants and the practice of computing data at 1 minute interval in Singapore" that confirmed the system energy efficiency of 0.65 kW/TR or better are not common in Singapore and the practice of sampling data and monitoring system energy efficiency at 1 minute intervals is also rare.	CL 2	OK
iii. Is existence of a barrier substantiated only by the opinions of the project participants? (If yes, this barrier cannot be considered as adequately substantiated)	VVM	117	NO	CL 2	OK
e. Were the barriers determined as preventing the	VVM	117	Refer to CL 2-closed	CL 2	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
implementation of the project activity but not the implementation of at least one of the possible alternatives by applying local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of *at least one of* the possible alternatives, in particular the identified baseline scenario?					
e. Common practice analysis					
a. Is this a proposed large-scale or first-of-its kind small-scale project activity?	VVM	119	NA	NA	NA
b. If yes, was common practice analysis carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality?	VVM	119	NA	NA	NA
c. Was it assessed whether the geographical scope (e.g. defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type? (For certain technologies the relevant region for assessment will be local and for others it may be transnational/global.	VVM	120	NA	NA	NA
d. Was a region other than the entire host country chosen?	VVM	120	NA	NA	NA
e. If yes, was the explanation why this region is more appropriate assessed?	VVM	120	NA	NA	NA
f. Using official sources and local and industry	VVM	120	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
expertise, was it determined to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, have been undertaken in the defined region?					
g. Are similar and operational projects, other than CDM project activities, already "widely observed and commonly carried out" in the defined region?	VVM	120	NA	NA	NA
h. If yes, was it assessed whether there are essential distinctions between the proposed CDM project activity and the other similar activities?	VVM	120	NA	NA	NA
7. Monotoring plan					
a. Does the CPA-DD include a monitoring plan?	VVM	122	Yes Defined at section A.4.4.2	OK	OK
b. Is this monitoring plan based on the approved monitoring methodology applied to the proposed CDM project activity?	VVM	122	Yes Based on AMS-II.C version 13	OK	OK
c. Was the list of parameters required by the selected methodology identified?	VVM	123	Yes	OK	OK
d. Does the monitoring plan contain all necessary parameters?	VVM	123	Yes	OK	OK
e. Are the parameters clearly described?	VVM	123	Yes 1 . Monitor the scrapped equipment 2 electrical power demand for project activity 3. electrical energy consumption for project activity 4. chilled water flow demand for project activity 5. Chilled water supply temp for project activity 6. chilled water return temp. for project activity 7. Chilled water cooling load for project activity	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			8. chilled water cooling load energy for project activity		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
f. Do the means of monitoring described in the plan comply with the requirements of the methodology?	VVM	123	Yes According to AMS-II.C version 13	OK	OK
g. Do the devices installed replace existing devices?	AMS	II.C	Yes	OK	OK
h. if yes, are the number and " power" of a representative sample of the replaced devices recorded in a way to allow for a physical verification by DOE?	AMS	II.C	Yes Data stored in EMS which can be physical verify data by DOE.	OK	OK
i. Is this monitored while replacement is underway to avoid (e.g that 40W lamps are recorded as 100W lamps), greatly inflating the baseline	AMS	II.C	Yes Verified the list of components and their respective Data will monitor the energy use of the building and energy saving	OK	OK
j. Do the devices installed have a constant current (ampere) characteristics?	AMS	II.C	Yes	OK	OK
k. If yes, does the monitoring consist of monitoring either the " power" and "Operating hours" or the "energy use" of the devices installed using an appropriate method as defined in para 13 of the methodology?	AMS	II.C	Metering the energy use of the equipment.	OK	OK
l. Has the project participant opted for recording the " power" of the device installed (e.g lamp or refrigerator) using nameplate data or bench tests of a sample of the units installed and metering a sample of the units installed for their operating hours using run time meters.	AMS	II.C	NA	NA	NA
m. If no, has the project participant opted for meter the " energy use" of an appropriate sample of the devices installed?	AMS	II.C	Metering the energy use of the equipment		
n. In either case above, did the monitoring include	AMS	II.C	NA	NA	NA

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
annual checks of a sample of non-metered systems to ensure that they are still operating?			No non metering system. There is metering system which can be monitor and measured the data on line by EMS.		
o. Do the devices installed have a variable current (ampere) characteristics?	AMS	II.C	NA	NA	NA
p. If yes, did the monitoring consist of metering the " energy use" of an appropriate sample of the devices installed?	AMS	II.C	NA	NA	NA
q. If yes, did the monitoring also include annual check of a sample of non-metered systems to ensure that they are still operating?	AMS	II.C	NA	NA	NA
r. In case of project activities under programme of activities, if the replaced equipment is scrapped, is an independent monitoring of scrapping of replaced equipment implemented as required under the methodology?	AMS	II.C	Replaced equipment is scrapped and third party scrap records will be monitored. Verified the old chillers scrapped by Sun 88 Engineering.	OK	OK
s. Did the monitoring include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other?	AMS	II.C	chiller number indicated on the scrapped equipment.	OK	OK
t. Are provisions made in the monitoring plan to store the scrapped equipment until such correspondence have been checked?	AMS	II.C	Yes Old chillers from the baseline scenario is scrapped and tracked by third party is included in the monitoring plan.	OK	OK
u. Is the scrapping of replaced equipment clearly documented and independently verified?	AMS	II.C	Yes It is documented by the third independent party to scrapped and provided with scrapped record.	OK	OK
v. Are the monitoring arrangements described in the monitoring plan feasible within the project design?	VVM	123	Yes	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
w. Does the monitoring plan provide details regarding calibration of monitoring equipment / instruments or does it include zero check as a substitute for calibration)	EB 24	37	Yes Trane maintenance plan	OK	OK
x. Are the following means of implementation of the monitoring plan sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified:	VVM	123	Yes	OK	OK
i. data management procedures?	VVM	123	Yes. By EMS monitoring system	OK	OK
ii. quality assurance procedures?	VVM	123	Yes. By EMS monitoring system	OK	Ok
iii. quality control procedures?	VVM	123	Yes. By EMS monitoring system	OK	OK
8. Sustainable development					
a. Does the CDM project activity assists Parties not included in Annex I to the Convention in achieving sustainable development?	VVM	125	Yes Refer to Letter of Approval from DNA Singapore and UK London	OK	OK
b. Does the letter of approval by the DNA of the host Party confirm the contribution of the proposed CDM project activity to the sustainable development of the host Party?	VVM	126	Yes	OK	OK
9. Local stakeholder consultation					
a. Were local stakeholders (public, including individuals, groups or communities affected, of likely to be affected, by the proposed CDM project activity or actions leading to the implementation of such an activity) invited by the PPs to comment on the proposed CDM project	VVM	128	Yes Stakeholder meeting conducted on 3 Feb 2010 and the PoA-DD and CPA-DD webhosted on the UNFCCC website for public comments on 20 Aug 2011 to 18 Sept 2011	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
activity prior to the publication of the CPA-DD on the UNFCCC website?					
b. Have comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity been invited?	VVM	129	Yes	OK	OK
c. Is the summary of the comments received as provided in the CPA-DD complete?	VVM	129	NA Summary stated in PoA-DD because the choice of stakeholder's comments done at PoA level.	NA	NA
d. Have the project participants taken due account of any comments received and described this process in the CPA-DD?	VVM	129	NA Summary stated in PoA-DD because the choice of stakeholder's comments done at PoA level.	NA	NA
10. Environmental impacts					
a. Have the project participants submitted documentation on the analysis of the environmental impacts of the project activity?	VVM	131	Environmental analysis done at CPA level	OK	OK
b. Have the project participants undertaken an analysis of environmental impacts?	VVM	132	NO No regulation required.	OK	OK
c. Does the host Party require an environmental impact assessment?	VVM	132	NO No host party regulation on environmental impact assessment need to be done for a cooling system installation or replacement activity	OK	OK
d. If yes, have the project participants undertaken an environmental impact assessment?	VVM	132	NA	NA	NA

Table 2 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1 and 2	Summary of project owner response	Validation team conclusion
CL 1: AMS II.E is related to energy efficiency & fuel savings initiatives implemented together. In this project, there is only improvement in energy efficiency through the replacement of chillers at multiple sites(Please clarify). (Also please see the footnote below).	4b-iv 5b-c,f,g,k 5ea	We, CRX the PME have duly changed the methodology to AMSIIC-Version 13 and have also amended the relevant parts of the SSC PoA-DD that reflect this change including the eligibility criteria for CPAs to join this SSC-PoA known as CARE. We also wish to state that the calculation for emission reductions from refrigerant gases (as provided for by AMSIIC) have not been included as allowed by EB34 paragraph 17(b) as this PoA only considers CPAs that use refrigerant gases that have a lower GWP from the baseline. It therefore does not allow CPAs that make a changeover to a refrigerant gas that has a higher GWP than that of the baseline. The PoA also disallows the use of refrigerant gases that have been disallowed under the Montreal Protocol.	Verified that the PoA-DD version 3 dated on 25 Nov 2011 and CPA-DD version 2 dated on 25 Nov 2011 have been changed to methodology AMS II.C version 13. Validation is according to the methodology AMS II.C version 13. CL1 closed.
CL 2. There is no detailed information provided on the energy efficiency means	3A-b-iii 6d	We, CRX, the PME have duly addressed the additionality issue by producing evidence of non-common practice in the	Verified the addtionality has rewrite to provide more detail description such as design/know-how, ESCO competitively, etc to support the barrier due

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1 and 2	Summary of project owner response	Validation team conclusion
implemented in the 5-6 buildings, which have also changed over to water cooled / high efficiency chillers. Despite the claim of several barriers (such as design and know how, ESCO competitivity etc)It is not clear ,how these 5-6 buildings have already implemented such projects without CDM. .If so , then how is it that the project activity claims this as a barrier?.		SSC-PoA-DD and also duly described projects that have improved efficiency of their chiller plants by methods of only optimization or partial shut down which are not allowed under this PoA. In addition, these buildings could not be considered under any CDM incentive as they were implemented before July 2006 when Singapore acceded to the Kyoto Protocol. The other points (such as design/know-how, ESCO competitivity, etc) are support indications of how the objective of our PoA is still non-prevailing practice. Finally the letter we have produced from the Singapore DNA – dated July 13 2010 and duly provided to the DOE - clearly states that the objectives of our PoA (such as 0.65kw/RT and measurement and monitoring at 1-min intervals) is not prevailing practice.	to prevailing practice for buildings to achieve < 0.65 kWh/TR efficiency and monitoring at 1-min intervals. CL2 closed.
CL 3: Excel sheet on CER estimation has not been provided.	3A-vii 3A-b-v-iii 5eb	We, CRX, the PME have duly provided the excel sheet on the precise estimation of CERs for the first CPA-DD Capricorn. All raw data has also been previously provided	CER calculation in excel sheet has been submitted to DOE to validate the CER calculation. CL 3 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1 and 2	Summary of project owner response	Validation team conclusion
		to the DOE during site visit of Oct 12, 2011	
CAR1: CME has utilized Average energy consumption of 413 kW for baseline, however the same is not found in line with the baseline monitoring data presented in the spread sheet.		On detailed verification of the baseline data is was observed that there is an error occured on Jan 22 2011 at 3.51pm. The monitoring software introduces a ridiculously large or small number is introduced into the reading to warn the operator / facilities manager if there is a sudden anomaly in the system for whatever reason. In any case – for purposes of the CPA we should only take the readings from 0000hrs of Dec 18 2010 to 2359 hrs of Jan 21 2011. All the baseline load graphs that you have been provided account for that period only. If we want to use all the data – then the large integer needs to be changed to FALSE so that excel will not use that data in the computation of "AVERAGE". Now these erroneous readings were removed from the baseline data and the average value of 413 is derived. This data is extracted directly from the EMS	*CME has resubmitted the Baseline data in spread sheet, which was validated by the validation team and found transparent and correct. The Value obtained 413 kW is correct and reasonable based on the readings shown in the Spread sheet, hence the CAR is closed.*
CAR 2: There is no evidence to	e.	CPA – DD Section B.5.2 is now revised for demonstrating the calculation of Baseline	*Section B.5.2 and Emission reduction spread sheets were verified and found in line with the*

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1 and 2	Summary of project owner response	Validation team conclusion
suggest that CME has demonstrated the calculation of Baseline emissions, Project emissions and Emission reductions using Algorithms prescribed in the approved methodology AMS IIC.		emission, project emission and emission reduction using prescribed algorithm from approve methodology. Earlier presented calculations baseline emission, project emissions were based on the cooling load and efficiencies in Baseline and project scenarios were derived from ASHRAE guidelines and now these calculation will be utilized for cross checking purpose.	*requirement of approved methodology and hence the CAR 02 was closed.*

AMS IIE : **Technology/measure**

This category comprises any energy efficiency and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university.

AMS IIC: **Technology/measure**

This methodology comprises activities that encourage the adoption of energy-efficient equipment/appliance (e.g., lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems) at many sites. These technologies may replace existing equipment or be installed at new sites.