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# VERIFICATION AND CERTIFICATION REPORT

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**International Bank for Reconstruction and  
Development (“IBRD”) acting as trustee of the  
Spanish Carbon Fund (SCF)**

**PoA: SGCC In-advance Distribution Transformer  
Replacement CDM Programme**

(UNFCCC Reference No.: 2896)

**CPA: SGCC In-advance Distribution Transformer  
Replacement CDM Programme CPA-001**

(UNFCCC Reference No.: 2896-0001)

First Monitoring period: 01/01/2011 to 30/11/2011 (both days inclusive)

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**SGS Climate Change Programme**

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<b>Date of Issue:</b>	<b>Project Number:</b>
11-10-2012	CDM.VER1300 PoA MP1
<b>PoA Title:</b>	<b>UNFCCC Reference Number</b>
SGCC In-advance Distribution Transformer Replacement CDM Programme	2896
<b>CPAs included:</b>	<b>UNFCCC Reference Number</b>
SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001	2896-0001
<b>Organisation:</b>	<b>Client:</b>
SGS United Kingdom Limited	International Bank for Reconstruction and Development ("IBRD") acting as trustee of the Spanish Carbon Fund (SCF)
<b>Publication of Monitoring Report:</b>	
<b>Monitoring Period:</b>	01/01/2011 to 30/11/2011
First Monitoring Report Version and Date:	Version 01, dated 25/12/2011
Final Monitoring Report Version and Date:	Version 02.1, dated 07/05/2012
<b>Summary:</b>	
<p>SGS United Kingdom Ltd has performed the first periodic verification of Program of Activity (PoA) SGCC In-advance Distribution Transformer Replacement CDM Programme (UNFCCC. Ref. No.: 2896) along with the CDM Programme Activity (CPA) SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001(UNFCCC. Ref. No.: 2896-0001) included in the PoA. The verification includes confirming the implementation of the PoA and the CPA included in the PoA and the monitoring plan in the CPA-DD and the application of the monitoring methodology as per the approved methodology for small-scale CDM project AMS.II.A.: Supply Side Energy Efficiency Improvements – Transmission and Distribution Version 10. A site visit was conducted to verify the data submitted in the monitoring report. SGS confirms the following has been reviewed:</p> <ul style="list-style-type: none"> <li>(a) The registered PoA-DD and CPA-DD, including the monitoring plan and the corresponding validation report;</li> <li>(b) Monitoring report and corresponding ER calculation spreadsheet;</li> <li>(c) The applied monitoring methodology;</li> <li>(d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;</li> <li>(e) All information and references relevant to the project activity's resulting in emission reductions</li> </ul> <p>SGCC In-advance Distribution Transformer Replacement CDM Programme is an efficiency programme of activities that is implemented by State Grid Corporation of China (SGCC) in the electricity transmission and distribution systems of 25 provinces in China controlled by SGCC. The goal of the PoA is to replace low efficiency in-service transformers which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers whose no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers to reduce the electricity losses caused by no-load losses of transformers during power supply by the grids, in order to reduce CO<sub>2</sub> emissions.</p> <p>SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 is implemented in the electricity transmission and distribution system of Liaoning Province, China and involves the replacement of 1,100 low efficiency in service distribution transformers with the high efficiency transformers.</p> <p>SGS confirms that the project is implemented in accordance with the validated and registered PoA DD and CPA DD. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the PoA has resulted in 1,018 tCO<sub>2</sub>e emission reductions during period 01/01/2011 up to 30/11/2011.</p>	

<b>Subject:</b>		
CDM Verification		
<b>Verification Team:</b>		
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<b>Technical Review:</b>		
Date: 12-10-2012 Name: Joe Sun		<input type="checkbox"/> Limited Distribution
<b>Authorised Signatory:</b>		
Name: Siddharth Yadav Date: 18/10/2012		<input type="checkbox"/> Unrestricted Distribution
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## Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CL	Clarification Request
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
COP/MOP	Conference of the Parties/Meeting of the Parties
CPA	Component Project Activity
CPA-DD	Component Project Activity Design Document
EF	Emission Factor
ERs	Emission Reductions
GHG	Green House Gas(es)
FAR	Forward Action Request
IBRD	International Bank for Reconstruction and Development
LL	Load Losses
MIS	Management Information System
MP	Monitoring Plan
MR	Monitoring Report
NLL	No-Load Losses
PoA	Programme of Activities
PoA-DD	Programme of Activities Design Document
SCF	Spanish Carbon Fund
SGCC	State Grid Corporation of China
SGS	SGS United Kingdom Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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## 1. Introduction

### 1.1 Objective

SGS United Kingdom Ltd has been contracted by IBRD to perform an independent verification of its PoA SGCC In-advance Distribution Transformer Replacement CDM Programme along with the CPA SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 included in the PoA. CDM projects must undergo periodic audits and verification of emission reductions as the basis for issuance of Certified Emission Reductions (CERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The emissions report conforms with the requirements of the monitoring plan in the registered PDD and the approved methodology; and
- The data reported are complete and transparent.

### 1.2 Scope

The scope of the verification is the independent and objective review and ex post determination of the monitored reductions in GHG emission by the PoA. The verification is based on the validated and registered PoA-DD, CPA-DD and the monitoring report. The project is assessed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

SGS has, based on the recommendations in the Validation and Verification Manual, employed a risk-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

The verification 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 Project Activity and Period Covered

This engagement covers emissions and emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the following project and period.

Title of PoA	SGCC In-advance Distribution Transformer Replacement CDM Programme
UNFCCC Registration Number:	2896
CPAs included:	SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001
UNFCCC Registration Number:	2896-0001
Monitoring Period Covered in this Report	01/01/2011 - 30/11/2011
Project Participant (Host Country)	State Grid Corporation of China
Location of the CPA:	Liaoning Province, China

SGCC In-advance Distribution Transformer Replacement CDM Programme is an efficiency programme of activities that is implemented by State Grid Corporation of China (SGCC) in the electricity transmission and distribution systems of 25 provinces in China controlled by SGCC. The goal of SGCC DT PoA is to replace low efficiency in-service transformers (baseline transformers) which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers (project transformers) whose no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers to reduce the electricity losses caused by no-load losses of transformers during power supply by the grids, in order to reduce CO<sub>2</sub> emissions.

SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 is implemented in the electricity transmission and distribution system of Liaoning Province, China and involves the replacement of 1,100 low efficiency in service distribution transformers with the high efficiency transformers.

## 2. Methodology

### 2.1 General Approach

SGS' approach to the verification is a two-stage process.

In the first stage, SGS completed a strategic review and risk assessment of the PoA and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

At the end of this stage, SGS produced a Periodic Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the verification approach and the sampling plan.

Using the Periodic Verification Checklist, SGS verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question. This involved a site visit and a desk review of the monitoring report. This verification report describes the findings of this assessment.

### 2.2 Verification Team for this Assessment

Assessment Team	
Name	Role
Michael WU Shimin	Lead Assessor
Linda HU Mudan	Assessor
Shute LI Shude	Local Assessor
Vikas Bankar	Sectoral Scope Expert (TA2.1)

Technical Review Team	
Name	Role
Joe SUN Guozhong	Technical Reviewer
Shivaji Chakraborty	Sectoral Scope Expert (TA2.1)

### 2.3 Means of Verification

#### 2.3.1 Review of Documentation

The validated PoA-DD, CPA-DD, the monitoring report submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is attached in section 8 of this report.

### 2.3.2 Site Visits

As part of the verification, the following on-site inspections have been performed by members of the assessment team. By desk review of the CPA-DD, the MR and the ER calculation spreadsheet for the first monitoring period, the assessment team decided to conduct the site visit in Shenyang City because the data for all the transformers included in the PoA stored in the centralized MIS system can be checked in the headquarter of Liaoning Electric Power Company Ltd. in Shenyang City. The original records including the manufacturer test report and the operation forms of the 107 sample transformers from the Shenyang City, Anshan City and Dandong City were all delivered to the headquarter of Liaoning Electric Power Company Ltd. in Shenyang City where the assessment team conducted the onsite verification for assessment team's verification.

<b>Location:</b> Shenyang City, Liaoning Province, China	
<b>Date:</b> 07-08/02/2012	
<b>Coverage:</b>	<b>Source of Information / Persons Interviewed</b>
1. Assessment of the implementation and operation of the project activity as per the registered PoA DD and CPA DD;	Du Weichen, Liaoning Electric Power Company Ltd.
2. Review of information flows for generating, aggregating and reporting the monitoring parameters;	Jiang Wanchao, Liaoning Electric Power Company Ltd. Zhao Qi, Liaoning Electric Power Company Ltd.
3. Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan.	Zeng Guang, Liaoning Electric Power Company Ltd. Cui Guangfu, Liaoning Electric Power Company Ltd.
4. A cross-check between information provided in the monitoring report and data from other sources such as manufacturer test report, operation form and MIS system ;	Nie Yu, Liaoning Electric Power Company Ltd. Han Jianjun, Liaoning Electric Power Company Ltd.
5. Systematically verify and certify the correct implementation and operation of the record-keeping system.	Lv Qiaozhen, State Grid Corporation of China. Li Zijun, the World Bank;
6. A random check of the project transformers including name plates and observations of monitoring practices against the requirements of the CPA DD and the selected methodology;	Jiang Shan, Additional Consulting and Engineering; Tan Shishi, Additional Consulting and Engineering;
7. Review of calculations and assumptions made in determining the GHG data and emission reductions;	
8. Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.	

### 2.4 Reporting of Findings

As an outcome of the verification process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the team shall raise a Clarification Request (CL) specifying what additional information is required.



Where a non-conformance arises the team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- I. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- II. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- III. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

The verification process may be halted until this information has been made available to comply with the requirements of the CDM Executive Board. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

A clarification request (CL) will be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

Corrective Action Requests and Clarification requests are raised in the Periodic Verification Checklist. The Project Developer is given the opportunity to “close” outstanding CARs and respond to CLs and FARs.

Forward Action Requests (FARs) may be raised during verification for actions where the monitoring and reporting require attention and/or adjustment for the next verification period. FARs may be raised which are for the benefit of future projects and future verification actors. These have no impact upon the completion of the verification activity.

All CARs, CLs and FARs for this verification period are included in this report.

## **2.5 Internal Quality Control**

Following the completion of the assessment process and a recommendation by the Assessment Team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team.

### 3. Verification Findings

#### 3.1 Project Implementation - General

Based on the information available on UNFCCC website [http://cdm.unfccc.int/ProgrammeOfActivities/poa\\_db/5DEPL4CVSQZAU23JR9H6F8KOYGMW70/view](http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/5DEPL4CVSQZAU23JR9H6F8KOYGMW70/view), the PoA (UNFCCC Ref. No. 2896) was registered on 12/02/2011 with the crediting period from 01/01/2011 to 31/12/2017 (renewable) (/1/). SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 (CPA 2896-0001) was included on 12/02/2011 with the crediting period from 01/01/2011 to 31/12/2020 (Fixed, (/2/)).

This is the first periodic verification of the PoA covering the period from 01/01/2011 to 30/11/2011. The starting date of the monitoring period is consistent with the starting date of the crediting period. The end date of this monitoring period is within the crediting period. However, the starting date of the crediting period was quoted as 12/02/2011 in the ER calculation spreadsheet version 01, which leads to the wrong calculation of emission reduction for this monitoring period. CAR #3 was raised in this regard. The starting date in the revised ER calculation sheet (/4/) was corrected to be 01/01/2011. CAR #3 was closed.

Following para 35 of EB55 Annex 38 (/25/), the assessment team conducted the verification of the PoA and confirmed that:

(a): As there is only one CPA (CPA 2896-0001) included in the PoA for this monitoring period, CPA2896-0001 is identified by the assessment team for verification in accordance with the method/procedure to be used for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPA under the PoA and determined in the CDM-PoA-DD. After checking information in the CPA-DD, it was confirmed that the CPA is in accordance with the PoA-DD and Generic CPA-DD (/7/).

(b): There is just one version of the PoA during this monitoring period, therefore, this version of the PoA is taken into account in the sampling approach.

(c): The monitoring report was published on the UNFCCC CDM website and available through following link: [http://cdm.unfccc.int/ProgrammeOfActivities/FS\\_POA/2896/poa\\_Monitoring\\_rep\\_2896.pdf](http://cdm.unfccc.int/ProgrammeOfActivities/FS_POA/2896/poa_Monitoring_rep_2896.pdf)

(d): The correct implementation and operation of the record keeping system was systematically verified and certified.

As per the description in the PoA-DD, the PoA is implemented by SGCC in the electricity transmission and distribution systems of 25 provinces in China controlled by SGCC. The goal of PoA is to replace low efficiency in-service transformers which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers whose no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers to reduce the electricity losses caused by no-load losses of transformers during power supply by the grids, in order to reduce CO<sub>2</sub> emissions.

According to the description on page 4 section A.2 in the CPA-DD (/5/), CPA-001 is implemented in the electricity transmission and distribution system of Liaoning Province, China and involves the replacement of 1,100 low efficiency in-service distribution transformers (Type S7 Transformers, as the baseline transformers) with the high efficiency transformers (Type SH15, as the project transformers). After checking the operation forms of the replacement, it was confirmed that the first replacement was performed on 06/03/2010 and the CPA-001 commissioned on 07/03/2010. The starting date of each project transformer was reported in the ER calculation sheet. The operation form for the first replacement and the information in the MIS system were checked to confirm the information of the operation in the MR. During the onsite visit, after checking the information in the management information system (MIS), it was found that 894 (789 in the final MR due to response to CL #2 as detailed in section 3.4.2 below) out of the 1,100 baseline transformers S7 have been replaced with SH15 and S13 transformers. The rest of the transformers (311) were identified as "abnormal" and excluded in the calculation of emission reduction. It was found that Type S13 transformers besides the SH15 transformers described in the CPA-DD were also used to replace the Type S7 transformers in the project activity. CL #1 was raised for PP to clarify how the project was implemented in

accordance with the registered CPA DD. It was clarified that it is a typo in the description of CPA-DD because Type S13 and SH15 transformers are considered in ex-ante emission reduction estimates of CPA-001. After checking the ex-ante ER calculation sheet uploaded to the UNFCCC for registration (/10/), it was found that Type S13 transformers have been included in the calculation of emission reduction as project transformers. Therefore, it was believed that this was a typographical mistake when compiling the registered CPA-DD. Moreover, as per the registered PoA-DD, the goal of SGCC DT PoA is defined as to “*replace low efficiency in-service transformers (baseline transformers) which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers (project transformers) whose no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers*”. Therefore, transformers with lower no-load loss than that of Type 11 transformers are eligible within the project scope. After checking related national standards (/13/), it was found that the no-load loss of Type SH15 and S13 transformers are lower than that of type 11, thus are in compliance with the description in the PoA DD. Therefore, CL #1 was closed. The assessment team considers the typo is minor in nature and can be addressed through the verification stage by the DOE without submitting a notification or a request for approval of changes from project description in the CPA-DD. In addition, the assessment team also checked the scrapping records and witness reports of all the 894 transformers. The information in both the scrapping records and witness reports were found to be in consistency with the MIS system and also the ER calculation spreadsheet.

Therefore, by means of checking the MIS system, the scrapping records and witness reports, it is concluded by the assessment team that the project has been implemented in accordance with the PoA-DD and CPA-DD.

According to the registered PoA-DD and CPA-DD, the MIS System will work as a record keeping system for each CPA under PoA. Electronic documents relevant to CPAs of PoA will be kept in the MIS System. SGCC is responsible to develop and manage the MIS System. An independent server has been bought by SGCC for the MIS System for weekly backup of data and information to avoid data loss in case of emergency. Other documents relevant to CPAs of PoA such as manufacturer test reports of transformers, scrapping agreement etc. will be kept by Subsidiaries' CDM Working Teams. All monitoring data and information, including original photographs, will be kept at least for two years after the end of the last crediting period or two years after the last issuance of CERs, whichever occurs later. SGCC will open accounts of different levels in the MIS System according to the requirements of monitoring data management. By managing accounts, the MIS System can track every operation on a piece of data.

Through onsite visit and detailed checking the MIS system, it was confirmed that the record keeping system for this operation and monitoring of the PoA was well established. The MIS System can keep track of detailed information on each in-advance replacement in CPA-001 including the information of baseline transformers before replacement and project transformers after replacement. The data recorded in the MIS system include the location, type, capacity, serial number, capacity, manufacturer, no-load loss, load loss, photos of the nameplate of the baseline transformers, the capacity, replacement date, the manufacture date, the manufacturer, the serial number, the no-load loss, load loss and photos of the nameplates of the project transformers. The dates of scrapping and the witness entity are also included in the system. The original records such as the manufacturer test report of the transformers and the operation forms are kept in the respective cities where the transformers are installed.

SGCC opened accounts of different levels in the MIS System according to the requirements of monitoring data management. By managing the accounts, the MIS System can track every operation on a piece of data. The data archived in the MIS system can be reviewed over the internet using corresponding accounts. The accounts of different levels in the MIS system have also been checked by the assessment team. Liaoning Electric Power Company Ltd. has the overall access to the information of each transformer included in the CPA while the subsidiaries only have access to the transformers under their maintenance. As discussed in the sampling section below, the assessment team has checked the consistency of the original data of the 107 sample transformers with the data kept in the MIS system. The result was to the assessment team's satisfaction. Therefore, it was confirmed by the assessment team that the record keeping system have been correctly implemented and operated.

During this monitoring period, the project has been operated as per the registered PoA-DD and CPA-DD. No special event or situation, which may impact the applicability of the methodology, occurred in this monitoring

period, which was confirmed by interviewing the host country PP and reviewing the information in the MIS system.

According to the “Guidelines on completeness check of requests for issuance” (EB 48 Annex 68, /14/), the Monitoring Report contains the comparison of the actual emission reduction claimed for the monitoring period with the estimate in the registered CPA-DD. The actual emission reduction is 1,018 tCO<sub>2</sub>e during monitoring period from 01/01/2011 to 30/11/2011 and corresponding emission reduction estimated in the registered PDD is 3,732 tCO<sub>2</sub>e ( $3,732 \text{ tCO}_2\text{e} = 334 \text{ days} / 365 \text{ days} \times 4,079 \text{ tCO}_2\text{e}$ ) for the same period. The actual emission reduction is within the estimate in the registered CPA-DD.

CAR #5(e) was raised regarding the difference of the lifetime of the baseline transformer and the operational lifetime. It was clarified that the operational life time of CPA was determined as 20 years in the CPA DD because the remaining lifetime of the baseline transformers was less than 20 years. This has been confirmed by checking the ER sheet. The lifetime of the transformers (30 years) was determined in accordance with the Tool to Determine the Remaining Lifetime of Equipment. CAR #5(e) was closed.

CAR #5(f) was raised regarding the compliance of the environmental requirements specified in the CPA-DD during the procurement, installation, exchange and scrapping of transformers. It was clarified that the project activity complied with these requirements and relevant evidences were provided. As per the Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme (/27/), environmental impact assessment is not required for this project activity. The SGCC and the World Bank have taken measures to ensure SGCC DT PoA meets all the environmental regulations. These environmental management plans (/28/) prepared by the World Bank and the witness report of scrapping of the baseline transformers have been reviewed by the assessment team. It was believed that the implementation of the project complied with the relevant requirements. CAR #5(f) was closed.

### **3.2 Remaining Issues, CAR's, FAR's from Previous Validation or Verification**

This is the first verification of the PoA. There is no remaining issue from the validation of the project (/8/).

### **3.3 Compliance of the monitoring plan with the monitoring methodology.**

The PoA was registered against the approved methodology for small-scale CDM project AMS.II.A.: Supply Side Energy Efficiency Improvements - Transmission and Distribution Version 10 (/15/). As per the requirement in the registered monitoring methodology AMS-II.A version 10, the Technical energy losses of the project equipment shall be measured at least hourly to establish an annual average value, unless such losses cannot be metered. If the technical energy losses cannot be determined from metered data, they shall be calculated using the test results when the installed equipment is commissioned, and if these are not available use the procedures described under paragraphs 4 or 5 of the methodology AMS.II.A.Version 10 to estimate project technical energy losses as appropriate. According to the monitoring plan in the registered CPA-DD, the non-load loss value and load loss value of the project transformer will be the measured value in the manufacturer test report of the project transformer. CL #2 was raised requesting PP to clarify how the monitoring plan for the No-Load Loss value and Load Loss value of the project transformer is in compliance with the requirement in the methodology. It was clarified that the No-Load Losses (NLL) and Load Losses (LL) cannot be metered hourly. Therefore, it is calculated using the test results provided on the manufacturer test reports of the project transformers, as defined in the registered PoA-DD as the second option provided in the methodology AMS-II.A version 10. Based on the opinion of the sectoral scope expert in the team, the No-Load Losses (NLL) and Load Losses (LL) cannot be measured hourly. And as per the national standards (Power Transformers\_Part I General (Document No.GB 1094.1-1996, /13/), tests for rated NLL and LL for individual transformer must be conducted in the laboratory environment within manufacture base. Thus, the manufacturer test report was considered to be test result of the installed transformers. CL #2 was closed.

Following VVM para 203 of VVM version 02.1 (/16/), the assessment team confirmed that the monitoring plan in the registered PoA DD and CPA DD is verified to be in accordance with the applied methodology.

### **3.4 Completeness of Monitoring**

Monitoring of reductions in GHG emissions to result from the registered project have been implemented in accordance with the monitoring plan contained in the registered PoA-DD and CPA-DD. The monitoring mechanism is effective and reliable.

### 3.4.1 Sampling Plan:

#### 1. Objectives and Reliability Requirements

The PoA only claims ERs from no-load losses. No-load losses occur whenever a transformer is energized and remain constant regardless of the amount of electricity flowing through it. These losses are related to the features, the thickness and the lamination method of core materials and the manufacturing technique are not related to the load.

Since no-load losses are related with the feature of the transformer itself and have impact on the ERs directly, the parameter of interest is chosen as the no-load loss value of the baseline/project transformer in No. z *in-advance replacement* in year y ( $NLL_{z,y}$ ).

According to the PoA PDD, PPs monitored and recorded all parameter values for each transformer instead of applying a sampling approach. Thus, following paragraph 22 of EB65 Annex 2, Standard for sampling and surveys for CDM project activities and Programme of Activities (Version 02.0, /23/), the assessment team applied a sample approach for the verification of this project and used the professional judgement to conclude the accuracy of the monitored parameters. The sampling plan is prepared for verifying the monitoring parameter values and 95/10 precision is used for sample size selection.

#### 2. Target Population

The parameter of interest is the no-load loss value of the baseline/project transformer in No. z *in-advance replacement* in year y ( $NLL_{z,y}$ ). Thus, the target population is the no-load loss value of the baseline/project transformer in No. z *in-advance replacement* in year y ( $NLL_{z,y}$ ) of all the 1,110 transformers in CPA-001.

#### 3. Sampling Method

Stratified Random Sample is adopted to select the representative samples as per EB65 Annex 2. 95% confidence interval and 10% of precision is used for the total sample size selection. The no-load losses of transformer are related with the Rated Capacity (kVA) of transformers. Since different Rated Capacity are included in the CPA, the population is divided into several sub-populations according to different Rated Capacity of transformers. In each sub-population, the sample size for each sub-population is selected based on the proportion of Rated Capacity of transformers.

According to the PoA-DD and CPA-DD, no-load losses are related to the features, the thickness and the lamination method of core materials and the manufacturing technique are not related to the load. And the actual no-load loss value of the project transformer in No. z *in-advance replacement* in year y ( $NLL_{PJ,z,y}$ ) are derived from the manufacturer test report of the project transformer. Thus, the actual no-load loss may be different for different capacity. The sub-populations are categorized based on the capacity. The sample also covered all capacity and the sample size for each sub-population was based on the proportion of the capacity.

According to the PoA PDD, Type 7 transformers and Type SH15 and Type S13 transformers were adopted in CPA-001 in the baseline and project scenario was covered in the samples.

#### 4. Level of Assurance

The level of assurance of the sampling plan is set as 1%, in compliance with para 24 of the EB65 Annex 2. The result is indicated in section 3.6 below.

#### 5. Sample Size

95% confidence interval and 10% of precision is used for sample size selection. Thus, the sample size is

$$\text{calculated as: } n = \frac{t^2 \sigma^2}{\Delta^2 + \frac{t^2 \sigma^2}{N}}$$

Where,

n is the size of the sample

$\sigma^2$  is the standard deviation of the population



N is the size of the population

t is the 95% quantile of the normal distribution ( $t=1.96$ )

$\Delta$  is the allowable precision ( $\Delta=10\%$ )

Due to the standard deviation of the population ( $\sigma^2$ ) is not available at present, the  $\sigma^2 = p(1-p)$  and the most conservative p of 0.5 is adopted, which allows the maximum sample size (/24/).

Based on the requirement of 95% confidence interval and 10% of precision, the sample size is calculated as 87 samples. When the sample is apportioned to each sub-population based on the proportion of the capacity, 20 more transformers are added. The sample size finally adopted is listed in table 1 below: .

Table 1 The sample size for each capacity of baseline transformers

Capacity (kVA)	Number of baseline transformers	Number of transformers initially reported to be in normal operation	Sample Size
30	3	0	0
50	19	14	2
80	2	0	0
100	97	68	7
160	31	24	3
200	152	131	15
250	56	51	6
315	463	413	46
400	56	44	6
500	41	30	4
630	179	119	18
800	1	0	0
Total	1,100	894	107

The transformers marked as “abnormal” are not included in the calculation of emission reduction and also not included in the samples. The sample size for capacity of 30kVA, 80kVA, and 800kVA are zero because they are abnormal during the monitoring period and not included in the ER calculation.

Following EB67 Annex 6, the assessment team recalculated the sample size following the Example 2 – Stratified Random Sampling.

Table 2 The proportion of transformer in operation in this monitoring period for each capacity of baseline transformers

Capacity (kVA)	Number of baseline transformers	Number of transformers initially reported to be in normal operation	Proportion of transformer in operation in this monitoring period
30	3	0	0.00%
50	19	14	73.68%
80	2	0	0.00%
100	97	68	70.10%
160	31	24	77.42%
200	152	131	86.18%
250	56	51	91.07%
315	463	413	89.20%
400	56	44	78.57%
500	41	30	73.17%
630	179	119	66.48%
800	1	0	0.00%
Total	1,100	894	81.27%

$$SD^2 = \frac{(g_a \times p_a(1 - p_a)) + (g_b \times p_b(1 - p_b)) + (g_c \times p_c(1 - p_c)) + \dots + (g_k \times p_k(1 - p_k))}{N}$$

$$= 0.14$$

$$\bar{p} = \frac{(g_a \times p_a) + (g_b \times p_b) + (g_c \times p_c) + \dots + (g_k \times p_k)}{N}$$

$$= 0.81$$

$$V = \frac{SD^2}{\bar{p}^2}$$

$$= 0.21$$

Therefore,

$$N \geq 1.96^2 \times 1100 \times 0.21 / [(1100-1) \times 0.01 + 1.96^2 \times 0.21] = 76$$

The sample sizes do not take into account non-response because all the data are available for checking by the assessment team. When the sample is apportioned to each sub-population based on the proportion of the capacity, 6 transformers are added due to round up to integer.

The recalculated sample size is listed in table 3 below:

Table 3 Recalculated sample size following EB67 Annex 6

Capacity (kVA)	Number of baseline transformers	Number of transformers initially reported to be in normal operation	Sample Size
30	3	0	0
50	19	14	2
80	2	0	0
100	97	68	6
160	31	24	3
200	152	131	12
250	56	51	5
315	463	413	36
400	56	44	4
500	41	30	3
630	179	119	11
800	1	0	0
Total	1,100	894	82

Based on the above comparison, it was observed that the original sample size was larger than the recalculated sample size and has covered the required samples following EB67 Annex 6. Therefore, the original sample size was considered in compliance with the best practice as per EB67 Annex 6.

## 6. Sampling Frame

The performance of the transformers is related to the capacities and not related to the locations where the transformers were installed. The sampling frame includes all capacities of the valid transformers adopted in CPA-001. The samples (total 107 transformers) covering all capacities of the valid transformers were randomly picked by the assessment team from three cities with the most transformers in the CPA, Shenyang City, Anshan City and Dandong City (613 out of 1100). Therefore, the samples were considered to be randomly selected and representative (covering all valid capacities of the entire population).

The data in the MIS system of the 107 transformers had been 100% checked by the assessment team. Moreover, as a means of cross checking, the original records of the 107 transformers including the manufacturer test report and the operation forms were delivered to the headquarter for the assessment team's review. The result of the verification of the MIS system and the samples are to the assessment team's

satisfaction. The proportion of discrepancies between the PPs record and DOE record is within the level of assurance of the sampling plan (1%) and thus considered to be acceptable by the assessment team.

It is worthy specifying that the assessment team did not physically check all the 107 project transformers included in the sampling plan during the site visit because DOE based on professional judgement and physical checking of 23 number of transformers (20% of the total samples as the acceptance sampling) and record checking of all randomly picked transformers concluded that the system in place is robust and reliable enough to check the compliance of the monitoring plan by all transformers and cities involved. Also physical checking is not meant to check any of the parameters required to calculate the emission reductions but to confirm the physical presence of transformers. The data that were used directly in the emission reductions in the 107 project transformers sampled by the assessment team have been 100% checked by the assessment team by checking the MIS system and related evidences including the Operation Forms and manufacturer test report. The evidences were all delivered to the headquarter of Liaoning Electric Power Company Ltd. where the assessment team conducted the onsite verification for assessment team's verification. The results of the verification for each parameter are discussed under each parameter below.

The approach adopted by the assessment team is in compliance with paragraph 22 of Annex 2 of EB 65 meeting report (/23/).

### **3.4.2 $NLL_{PJ,Z,Y}$ : The no-load loss value of the project transformer in No. z in-advance replacement**

As per the monitoring plan in the CPA-DD, the actual data of no-load loss value of the project transformers will be the measured no-load loss value in the manufacturer test report of the project transformer.

Through onsite visit, it was confirmed that the values in the manufacturer test reports of the project transformers (/11/) was adopted as the value of NLL, which is in compliance with the monitoring plan in the CPA-DD.

The NLL of each project transformer was tested by the manufacturer and provided to PP in the form of manufacturer test report. After the replacement of the transformer, the on-site engineer reported the value in the test report in the MIS system and kept the original test report in the specific bureau in charge of the project transformers. The values inputted into the MIS system are subjected to be checked by the supervisors.

Following the sampling plan, the NLL values of the 107 project transformers have been checked by the assessment team. The values of the 107 project transformers in the MIS system and the manufacturer test reports were checked by the assessment team. It was confirmed that the values in the MIS system are in consistency with the manufacturer test reports and the values reported in the ER calculation sheet of the samples are consistent with the data sources.

Moreover, following para 186(c) of VVM version 02.1, the assessment team cross checked values of the NLL against the other sources to confirm that the stated figures are correct. It was found that the NLL varied significantly for the same capacity of project transformers. The PP was further requested to clarify the variation in CL #2. It was clarified that the NLL values of type S13 and SH15 are different for the same capacity. For the variation of NLL values for the same type and capacity, considering it's defined in the national standards that the test value of NLL or LL of a transformer is within 115% of the reference value, 105 project transformers with the test value exceeding 115% of the reference value of NLL or LL in CPA-001 are excluded labelling as "abnormal" in the ER calculation spreadsheet, for the purpose of conservativeness although all of the transformers included in CPA-001 are eligible as per the eligibility criteria set in the registered PoA-DD. The test value of NLL of project transformer No. 226 was corrected as 141 W instead of 650W following the clarification and the related correction evidence has been provided to the assessment team. According to section 10 of the national standard GB/T1094.1-5~1996, the test of the transformer shall be conducted by the manufacturer and the test system shall be in line with the requirement of para 4.11 of GB/T 19001 to ensure the accuracy level. After checking the manufacturer test reports and the statement from the manufacturers regarding the test of the transformers (/26/), it was found that the test was conducted by the respective manufacturers following the national standard GB/T1094.1-5~1996. Therefore, it was confirmed that the values reported in the manufacturer test report are determined in accordance with the industrial standards. Following the correction and clarification, the variation of NLL for type S13 and SH15



are reasonable and the NLL of project transformers included in the revised ER calculation sheet were found to be within the 115% of the reference values in the national standards (/13/) as per the Industry Standard - Naming Rules of Transformer Models (Document No. JB/T 3837-1996), therefore CL #2 was closed.

In conclusion, the NLLs are monitored in compliance with the monitoring plan and the reported values of NLL in the revised ER sheet are consistent with the data sources for the samples and within reasonable range. The no-load losses of the baseline transformers are higher than the measured values of the project transformers.

### **3.4.3 $LL_{PJ,Z,y}$ : The load loss value of the project transformer in No. z in-advance replacement in year y.**

As per the monitoring plan, the actual data will be the measured load loss value in the manufacturer test report of the project transformer. The parameter is only used for the eligibility criteria analysis.

Through onsite visit, it was confirmed that the values in the manufacturer test reports of the project transformers was adopted as the value of LL, which is in compliance with the monitoring plan in the CPA-DD.

The LL of each project transformer was tested by the manufacturer and provided to PP in the form of manufacturer test report. After the replacement of the transformer, the on-site engineer reported the value in the test report in the MIS system and kept the original test report in the specific bureau in charge of the project transformers. The values inputted into the MIS system are subjected to be checked by the supervisors.

Following the sampling plan, the LL values of the 107 project transformers have been checked by the assessment team. The values of the 107 project transformers in the MIS system and the manufacturer test reports were checked by the assessment team. It was confirmed that the values in the MIS system are in consistency with the manufacturer test reports and the values reported in the ER calculation sheet of the samples are consistent with the data sources.

Moreover, following para 186(c) of VVM version 02.1, the assessment team cross checked values of the LL against the other sources to confirm that the stated figures are correct. It was found that the reported value of LL in the ER calculation sheet version 02.1 is within the range specified in the Industry Standard - Naming Rules of Transformer Models (Document No. JB/T 3837-1996).

Therefore, it was confirmed that the LLs are monitored in compliance with the monitoring plan and the reported values of LL in the revised ER sheet are consistent with the data sources for the samples and within reasonable range. The load losses of the baseline transformers are higher than the measured values of the project transformers.

### **3.4.4 $D_{new,z}$ : The date when No. z in-advance replacement happens**

As per the monitoring plan in the CPA-DD, the replacement date on Operation Forms will be adopted and relevant documents will be archived in the MIS System in electronic format for verification.

Through onsite visit, it was confirmed that the values of the date when the transformer replacement happened was sourced from the replacement date on the Operation Forms (/9/), and the values of replacement dates have been archived in the MIS system, which is in conformance with the monitoring plan.

As per the CDM manual (/17/) defined by the PP, an operation form is required for each replacement. The detailed information of the replacement including the operation number of the distribution transformer, the location, information of the original and new transformer, the date of replacement, the date of completion and the staff members in charge of the replacement are clearly indicated in the operation forms. After the replacement of the transformer, the on-site engineer recorded the replacement date in the operation form and reported the replacement date in the test report in the MIS system and kept the original test report in the specific bureau in charge of the project transformers. The values inputted into the MIS system are subjected to be checked by the supervisors.

Following the sampling plan, the replacement dates of the 107 project transformers have been checked by the assessment team. The replacement dates of the 107 project transformers in the MIS system and the operation forms were checked by the assessment team. It was confirmed that the replacement dates in the MIS system are in consistency with the operation forms and the values reported in the ER calculation sheet of the samples are consistent with the data sources.

Therefore, it was confirmed that the replacement dates are monitored in compliance with the monitoring plan and the reported values of replacement date in the ER sheet are consistent with the data sources for the samples.

**3.4.5  $PSL_{z,y}$ : The power supply reliability rate of the provincial grid that covers the project transformer in No. z in-advance replacement in year y.**

As per the monitoring plan in the registered CPA-DD, the publicly available data from Electric Power Reliability Management Center of State Electricity Regulatory Commission are adopted and updated using the latest version before the implementation of monitoring.

After checking the data in the monitoring report against the latest publication from the Electric Power Reliability Management Center of State Electricity Regulatory Commission (/18/) at the time of completing the MR, it was confirmed that the reported value of the power supply reliability rate of the provincial grid is monitored in compliance with the monitoring plan and the value is consistent with the publication from Electric Power Reliability Management Center of State Electricity Regulatory Commission.

**3.4.6  $n_{new}$ : The total number of in-advance replacements that are actually implemented in CPA-001.**

As per the monitoring plan, it is the count according to data in the MIS System and can be cross checked with other data archived in the MIS System, such as the replaced transformers.

Through the onsite visit, it was confirmed that the total number of the in-advance replacements that are actually implemented in CPA-001 is counted according to the data in the MIS system and can be cross checked with the other data archived in the MIS system, such as the replaced transformers, therefore, it is monitored in line with the monitoring plan.

As per the CDM manual defined by the PP, after the replacement of the transformer, the on-site engineer reported detailed information of the installed and replaced transformers in the MIS system including the replacement date, capacity, NLL and LL, manufacturers. Therefore, the total number of in-advance replacements that are actually implemented in CPA-001 can be determined by the MIS system.

Following the sampling plan, the information of 107 project transformers recorded by the MIS system has been checked by the assessment team. Based on the checking results, the assessment team was convinced that the MIS system has been running smoothly and with the ability to record the data transparently. Moreover, the number of the replacements can be cross checked with the scrapping records (/19/) and witness reports (/20/) from the "Northeast Electric Power Research Institute Co., Ltd" which is entrusted to witness the scrapping process of each transformer.

**3.4.7  $N_{old}$ : The total number of the scrapped transformers in in-advance replacements that are actually implemented in CPA-001.**

As per the monitoring plan, it is determined according to the scrapping agreement. As per the methodology, in case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

As per the CDM manual defined by the PP, the transformers replaced are scrapped by the designated scrapping entity "Huludao Electric Power Equipment Factory" and a scrapping agreement has been signed. Moreover, an independent entity "Northeast Electric Power Research Institute Co., Ltd" is entrusted to witness the scrapping process of each baseline transformer and witness reports are provided to the PP including the numbers of the baseline transformers scrapped including the identification numbers. The information of scrapped transformers was also reported in the MIS system including the identification numbers, the capacity, NLL, LL and photo which can be used to check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other.

After checking the scrapping agreement, the witness reports and MIS system, it was confirmed that the total number of the scrapped transformers in in-advance replacements that are actually implemented in CPA-001

was determined according to the scrapped agreement and independent monitoring of scrapping of replaced equipment was implemented. A check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other has been conducted and consistency was found by the assessment team. Therefore, it was confirmed that the parameter has been monitored in accordance with the requirement of the monitoring plan and methodology.

### **3.5 Accuracy of Equipment**

No monitoring equipment is required for the implementation of the monitoring plan. After checking the values of the monitoring parameters reported in the MR and ER sheet against the records kept by PP, it was confirmed that the monitoring results are consistently recorded as per approved frequency and the quality assurance and quality control procedures have been implemented as per the monitoring plan.

### **3.6 Accuracy of Emission Reduction Calculations**

100% of the data in the samples have been checked by the assessment team. Out of the 107 samples, only one discrepancy (the no-load loss value from the standard for the baseline transformer with the sequential number 53, please refer to CAR #4 below) was observed. Therefore, the proportion of discrepancies between the PPs record and DOE record ( $0.935\% = 1/107$ ) is within the level of assurance of the sampling plan (1%) and thus considered to be acceptable by the assessment team.

The calculation of revised emission reductions is found to be correct. CL #2, CAR #3, CAR #4 and CAR #5 were raised, the response to CLs and CARs was satisfactory and these were closed. The details of the reported and the verified values for all parameters are listed in section 4, 'Calculation of Emission Reductions'. The emission reduction in this monitoring period is verified to be 1,018 tCO<sub>2</sub>e. Therefore, with the grid emission factor 0.92675 tCO<sub>2</sub>/MWh, the electricity saving by the project in this monitoring period is calculated as 1,098.46 MWh which is lower than the 60GWh per year specified in the methodology.

CAR #5(a) was raised requesting the PP to define the "abnormal" of the replacement status in the ER sheet. A note was added to the ER sheet "All the in-advance replacements that are not implemented in line with the project design are excluded from CPA-001 and labelled as "abnormal" in the ER calculation spreadsheet." The same have been verified by the assessment team. CAR #5(a) was closed.

CAR #5(b) was raised regarding the rated capacity of the project transformers. The PP responded by providing the data of the rated capacity of the project transformers (/29/) and clarified that they are not listed in the ER sheet as they are not monitoring parameters or related to the emission reductions calculations. The rated capacity of the project transformers have been checked by the assessment team and consistency was found in the sampling group. CAR #5(b) was closed.

CAR #5(c) was raised regarding the inconsistency of the notation used for the monitoring parameter in the ER sheet with CPA-DD e.g. NLL pj and was closed after the notation was corrected to be consistent.

CAR #5(d) was raised regarding the typographical errors were found in column K (NLL<sub>BL,z,act,y</sub>) of the ER sheet and closed after the format of data have been corrected.

According to section B.2 of the PoA –DD, the emission reductions from the replacement of transformers can only be claimed for the days that

- (1) are after the date when No. z in-advance replacement is implemented, and
- (2) are not earlier than the starting date of the crediting period of the CPA that includes No. z in-advance replacement, and
- (3) are not later than the ending date of the crediting period of the CPA that includes No. z in-advance replacement, and
- (4) are not later than the date when the baseline transformer in No. z in-advance replacement is replaced in the absence of the CPA of SGCC DT PoA.

After checking the data in the ER calculation spreadsheet, it was confirmed that the emission reductions from the PoA in this monitoring period was calculated for the period since the date of replacement and the date of the starting date of the crediting period of the CPA (01/01/2011) and before the ending date of the crediting period and the date when the baseline transformers would be replaced in the absence of the CPA in the PoA.

The assessment team confirms that:

- a) A complete set of data is available for this monitoring period. The data monitored have been properly recorded in the MIS system and 100% of the data in the sampling plan have been checked by the assessment team.
- b) The reported data have been checked against the manufacturer test report, national standards, scrapping agreement, operation forms, scrapping reports and witness reports.
- c) Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed;
- d) The emission factors and default values that were applied in the calculations have been justified.

### **3.7 Quality of Evidence to Determine Emission Reductions**

Critical parameters used for the determination of the Emission Reductions are discussed in section 3.4 above. All the data recorded is in compliance with the monitoring report.

### **3.8 Management System and Quality Assurance**

In order to verify data quality, the company involved in the project works in accordance with SGCC DT PoA Management Measures (/21/) and Management Information System Manual (/22/), which establishes the operational and management structure implemented. Both documents have been provided to the assessment team for review. It was confirmed that PP has established a complete management system for the implementation and operation of the PoA and CPA with QA/QC measures clearly defined.

### **3.9 Data from External Sources**

1. The manufacturing time of the baseline transformer in No. z in-advance replacement ( $DATE_{BL,z,produce}$ ):

According to the registered CPA-DD, the data is determined from the information on the nameplate of the baseline transformers. Through the onsite visit, it was found that the manufacturing time of the baseline transformers were recorded in the MIS system and photos of the nameplates of the baseline transformers have been taken and uploaded to the MIS system. Following the sampling plan, the manufacturing time of the 107 baseline transformers in the MIS system and the nameplates were checked by the assessment team. It was confirmed that the values in the MIS system are in consistency with the nameplates and the values reported in the ER calculation sheet of the samples are consistent with the data sources.

2. The baseline no-load loss value in No. z in-advance replacement in year y ( $NLL_{BL,z,y}$ ):

According to the registered CPA DD, the data is determined as the lower value of the no-load loss value, which is sourced from standards, of the baseline transformer and ( $NLL_{BL,Z,reg,y}$ ) and the measured no-load loss value on the manufacturer test report of the baseline transformer ( $NLL_{BL,Z,act,y}$ ) or 95% of  $NLL_{BL,Z,reg,y}$  will be adopted.  $NLL_{BL,Z,reg,y}$  is sourced from the national standards of the baseline transformers and  $NLL_{BL,Z,act,y}$  is sourced from the manufacturer test report for the baseline transformer (/12/). After each replacement, the on-site engineer reported the value of the baseline no-load loss value in the manufacturer test report into the MIS system and kept the original report at the local bureau. If the test report was not available, the values of the same type of transformers (Type 7) in the transformer standards whose effective date is earlier and most close to the manufacturing date of the baseline transformer were adopted with a 95% factor. The assessment team has checked the consistency of the national values in the MIS system with the relevant national standards, and consistency was found.

The no-load loss value from the standard for the baseline transformer with the sequential number 53 reported in the ER calculation sheet (1.0 kW) was found to be different from the value (1.06 kW) from the applicable standard JB1300-1973. CAR #4 was raised requesting PP to clarify the difference and submit the revised document to address this issue. It was clarified to be a typo during data input. The revised ER calculation sheet was provided and it was confirmed that the value of  $NLL_{BL,Z,reg,y}$  for baseline transformer 53 was corrected. CAR #4 was thus closed.

The value of  $NLL_{BL,Z,act,y}$  of the baseline transformers in the MIS system and the manufacturer test report were checked by the assessment team. It was confirmed that the values in the MIS system are consistent

with the manufacturer test report and the values reported in the ER calculation sheet of the samples are consistent with the data sources.

3. The baseline load loss value in No. z in-advance replacement in year y ( $LL_{BL,z,y}$ ):

As per the CPA-DD, the allowable load loss value of the same type of transformers defined in transformer standards whose effective date is earlier and most close to the manufacturing date of the baseline transformer is adopted. The baseline load loss value of each baseline transformer was kept in the MIS system. The data of baseline load loss value in the MIS system was checked against the relevant national transformer standards and consistency was found. Moreover, the values reported in the ER sheet of the baseline load loss value are found to be the same with the value in the MIS system.

4. The grid emission factor corresponding to No. z in-advance replacement ( $EF_{grid,z,y}$ ):

As per the CPA-DD, the grid emission factor equals to the  $EF_{grid,CM,y}$  of the regional power grid where the No. z in-advance replacement takes place. The  $EF_{grid,z,y}$  is thus the same as  $EF_{grid,CM,y}$  of Northeast China Power Grid which was ex-ante calculated to be 0.92675 tCO<sub>2</sub>e/MWh and fixed throughout the crediting period. The value of  $EF_{grid,z,y}$  used in the MR and ER calculation sheet in consistency with the value in the registered CPA-DD.

5. The average replacing rate during 2006~2009 of the provinces covered by CPA-001 (ARR):

As per the CPA-DD, the annual average replacing rate of Type 7 or Type 8 transformers is 0.3% during 2006~2009 in Liaoning Province. The value of ARR used in the MR is in conformance with the CPA-DD.

#### 4. Calculation of Emission Reductions

Parameter	Reported Value in the MR version 01 and ER version 1.0	Verified Value in MR version 02.1 and ER version 03
$NLL_{PJ,z,y}$	Refer to ER sheet	Refer to ER sheet
$LL_{PJ,z,y}$	Refer to ER sheet	Refer to ER sheet
$D_{new,z}$	Refer to ER sheet	Refer to ER sheet
$PSL_{z,y}$	99.932%	99.932%
$n_{new}$	894	789
$N_{old}$	894	789
$n$	1,100	1,100
$DATE_{BL,z,produce}$	Refer to ER sheet	Refer to ER sheet
$NLL_{BL,z,y}$	Refer to ER sheet	Refer to ER sheet
$LL_{BL,z,y}$	Refer to ER sheet	Refer to ER sheet
$EF_{grid,z,y}$	0.92675	0.92675
$EF_{grid,CM,y}$	0.92675	0.92675
ARP	0.3	0.3

The baseline emission is calculated using the following formulas:

$$BE_y = \sum_{z=1}^n BE_{z,y} = 1,282 \text{ tCO}_2\text{e}$$

$$BE_{z,y} = EL_{BL,z,y} \times EF_{grid,z,y} \times (1 - ARR)$$

$$EL_{BL,z,y} = NLL_{BL,z,y} \times H_{z,y} / 10^6$$

$$H_{z,y} = 8760 \times PSL_{z,y}$$

The project emission is calculated using the following formulas:

$$PE_y = \sum_{z=1}^n PE_{z,y} = 264 \text{ tCO}_2\text{e}$$

$$PE_{z,y} = NLL_{PJ,z,y} \times H_{z,y} \times EF_{grid,z,y} / 10^6$$

$$H_{z,y} = 8760 \times PSL_{z,y}$$

Leakage in CPA-001 is not considered as per the CPA-DD.

$$L_y = 0 \text{ tCO}_2\text{e}$$

The emission reductions is calculated using the following formula:

$$ER_y = BE_y - PE_y - L_y$$

$$= 1,282 \text{ tCO}_2\text{e} - 264 \text{ tCO}_2\text{e} - 0 \text{ tCO}_2\text{e}$$

$$= 1,018 \text{ tCO}_2\text{e}$$



## **5. Recommendations for Changes in the Monitoring Plan**

No recommendation for changes in the monitoring plan was made during this (1<sup>st</sup>) monitoring period.



## 6. Overview of Results

### Assessment Against the Provisions of Decision 17/CP.7:

Is the project documentation in accordance with the requirements of the registered PDD and relevant provision of decision 17/CP.7, EB decisions and guidance and the COP/MOP?

*Yes. The results of the compliance assessment are recorded in the verification checklist which is used as an internal report only.*

Have on-site inspections been performed that may comprise, inter alia, a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observations of established practices and testing of the accuracy of monitoring equipment?

*Yes. Members of the assessment team visited the sites and undertook interviews, collected data, audited the implementation of procedures, checked calibration certificates and checked data, inter alia.*

*The results of the site visits are recorded in the verification checklist which is used as an internal report only.*

*The evidences have been checked and collected. The revised monitoring report is attached with this verification report.*

Has data from additional sources been used? If yes, please detail the source and significance.

Data	Values	Sources	Significance
PSL <sub>z,y</sub>	99.932%	Electric Power Reliability Management Center of State Electricity Regulatory Commission	High
DATE <sub>BL,z,produce</sub>	Refer to ER sheet	The nameplate of the baseline transformers	Low
EF <sub>grid,CM,y</sub>	0.92675 tCO <sub>2</sub> e/MWh	Registered CPA-DD	High
ARR	0.3	Registered CPA-DD	High
LL <sub>BL,z,y</sub>	Refer to ER sheet	National transformer standards	Low
NLL <sub>BL,z,y</sub>	Refer to ER sheet	National transformer standards Manufacturer Test Report	High

Please review the monitoring results and verify that the monitoring methodologies for the estimation of reductions in anthropogenic emissions by sources have been applied correctly and their documentation is complete and transparent.

*Yes. The monitoring methodology has been correctly applied and the monitoring report and supporting references are complete and transparent.*

Have any recommendations for changes to the monitoring methodology for any future crediting period been issued to the project participant?

*No.*

Determine the reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CDM project activity, based on the data and information using calculation procedures consistent with those contained in the registered project design document and the monitoring plan.



*The data used in anthropogenic emission reduction calculation is consistent with those contained in the registered PDD and monitoring plan. The emission reduction was 3,732 tCO<sub>2</sub> for the period 01/01/2011 to 30/11/2011 as per the estimation made in the registered CPA DD. The actual emission reduction has been verified as 1,018 tCO<sub>2</sub> for the same period.*

Identify and inform the project participants of any concerns related to the conformity of the actual project activity and its operation with the registered project design document. Project participants shall address the concerns and supply relevant additional information.

*No such non conformity of the actual project activity and its operation with the registered project design document has been observed.*

Post monitoring report on UNFCCC website

*Yes, the monitoring report is available at ref. PoA 2896 on UNFCCC website*

[http://cdm.unfccc.int/ProgrammeOfActivities/FS\\_POA/2896/poa\\_Monitoring\\_rep\\_2896.pdf](http://cdm.unfccc.int/ProgrammeOfActivities/FS_POA/2896/poa_Monitoring_rep_2896.pdf)

## 7. Verification and Certification Statement

SGS United Kingdom Ltd has been contracted by IBRD to perform the verification of the Program of Activity (PoA) SGCC In-advance Distribution Transformer Replacement CDM Programme (UNFCCC. Ref. No.: 2896) along with the CDM Programme Activity (CPA) SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 (UNFCCC. Ref. No.: 2896-0001) included in the PoA covering the period from 01/01/2011 to 30/11/2011.

The verification is based on the validated and registered PoA DD, CPA DD and the monitoring report for this project. Verification is performed in accordance with section I of Decision 3/CMP.1, and relevant decisions of the CDM EB and CoP/MoP. The scope of this engagement covers the verification and certification of greenhouse gas emission reductions generated by the above project during the above mentioned period, as reported in monitoring report version 02.1 dated 07/05/2012.

The management of the State Grid Corporation of China is responsible for the preparation, calculation and determination of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring Report version 02.1 dated 07/05/2012. The development and maintenance of records and reporting procedures are in accordance with the monitoring report.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the period from 01/01/2011 to 30/11/2011 based on the reported emission reductions in the Monitoring Report version 02.1 dated 07/05/2012 for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, SGS planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

SGS confirms that the project is implemented as described in the validated and registered project design documents. Based on the information we have seen and evaluated, we confirm the following:

PoA Title:	SGCC In-advance Distribution Transformer Replacement CDM Programme
UNFCCC Reference Number:	2896
Registered PoA-DD Used for Verification:	CDM SSC-PoA-DD version 05 dated 25/11/2010
CPAs included:	SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001
UNFCCC Reference Number:	2896-0001
Registered CPA-DD Used for Verification:	CDM SSC-CPA-DD version 04 dated 25/11/2010
Methodology Used for Verification:	AMS.II.A. Version 10
Applicable Period:	01/01/2011 - 30/11/2011 (both days inclusive)
Total GHG Emission Reductions Verified:	1,018 tCO <sub>2</sub> e

**Signed on behalf of the Verification Body by Authorized Signatory**

A handwritten signature in blue ink, appearing to read 'Siddharth', is written over a horizontal line.

Signature:

Name: Siddharth Yadav

Date: 18/10/2012

## 8. Document References

- /1/ UNFCCC webpage of the PoA  
[http://cdm.unfccc.int/ProgrammeOfActivities/poa\\_db/5DEPL4CVSQZAU23JR9H6F8KOYGMW70/view](http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/5DEPL4CVSQZAU23JR9H6F8KOYGMW70/view)
- /2/ UNFCCC webpage of the CPA  
[http://cdm.unfccc.int/ProgrammeOfActivities/cpa\\_db/IFY40C2XJ3OUBMWPRDV8NE16GLZQ9S/view](http://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/IFY40C2XJ3OUBMWPRDV8NE16GLZQ9S/view)
- /3/ Monitoring report Version 01 dated 25/12/2011, version 02 dated 13/04/2012 and version 02.1 dated 07/05/2012
- | Version | Date       | Nature of revision  |
|---------|------------|---|
| 01      | 25/12/2011 | Original version for publishing on the UNFCCC website;  |
| 02      | 13/04/2012 | 1. Change of monitoring parameters including $NLL_{PJ,Z,y}$ , $LL_{PJ,Z,y}$ , $n_{new}$ and $n_{old}$ following the findings raised by the assessment team in section D of the MR. The $BE_y$ , $PE_y$ and $ER_y$ was revised accordingly in section E of the MR.<br>2. Minor editorial changes |
| 02.1    | 07/05/2012 | Minor editorial change  |
- /4/ ER calculation sheet for this monitoring period version 1.0 dated 25/12/2011, version 2.0 dated 13/04/2012 and version 02.1 dated 07/05/2012 and version 03 dated 13/06/2012
- /5/ CDM SSC-PoA-DD version 05 dated 25/11/2010
- /6/ CDM-SSC-CPA-DD version 04 dated 25/11/2010
- /7/ Generic CPA-DD version 04 dated 25/11/2010
- /8/ SSC POA VALIDATION REPORT for the PoA Revision 1 dated 26/11/2010 issued by TUV Nord (Report No: 8000377132 – 09/485)
- /9/ Operation forms for the replacement
- /10/ Ex-ante ER calculation spreadsheet.  
<http://cdm.unfccc.int/UserManagement/FileStorage/GOHTFENI0JKZ9M673WXC BVYR24QLD5>
- /11/ Manufacturer test reports for the project transformers
- /12/ Manufacturer test reports for the baseline transformers
- /13/ National Standards for transformers related to the project  
GB6451.1-86; GB/T6451-1995; JB1300-1997; GB/T 6451-1999 ; GB/T 25446-2010 ; JB/T3837 – 1996 ; JB/T 3837-2010 ; GB 1094.1-1996
- /14/ Guidelines on completeness check of requests for issuance (EB 48 Annex 68)
- /15/ AMS.II.A.: Supply Side Energy Efficiency Improvements - Transmission and Distribution Version 10
- /16/ Validation and Verification Manual version 01.2 dated 30/07/2010
- /17/ CDM Manual for the PoA DD

- /18/ Report of PSL in 2010 from the Electric Power Reliability Management Center of State Electricity Regulatory Commission  
<http://www.chinaer.org/info.aspx?n=20110526083528670658>
- /19/ Scrapping agreement and scrapping reports
- /20/ Witness reports of the scrapping
- /21/ SGCC DT PoA Management Measures
- /22/ Management Information System Manual
- /23/ EB65 Annex 2, Standard for sampling and surveys for CDM project activities and Programme of Activities (Version 02.0)
- /24/ How to determine the sample size scientifically, written by Zhang Yong. published on China Statistics in May 2008  
<http://www.cnki.net/kcms/detail/detail.aspx?dbname=CJFD2008&filename=ZGTJ200805027>
- /25/ EB55 Annex 38 Procedures for registration of a Programme of Activities as a single CDM Project Activity and issuance of certified emission reductions for a Programme of Activities (version 04.1)
- /26/ The statement from the manufactures regarding the test of the transformers
- /27/ Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme
- /28/ Environmental Management Plan of SGCC DT PoA
- /29/ Summary of the rated capacity of project transformers

## 9. Findings Overview

	CARs	CLs	FARs
Total Number raised	3	2	0

Date:	13/02/2012	Raised by:	Assessment team		
Type:	CL	Number:	CL #1	Reference:	Section 2.1.1 of checklist
Lead Assessor Comment:			Date: 13/02/2012		
According to the description of the CPA in A.2 of the CPA-DD, the baseline transformers in CPA-001 are all Type S7 transformers and the project transformers are Type SH15 transformers. However, it was found that Type S13 transformers were used to replace the Type S7 transformers in the project activity. CL #1 was raised for PP to clarify how the project was implemented in accordance with the registered CPA DD.					
Project Participant Response:			Date: 16/02/2012		
It is a typo in the description of CPA-DD. As per the registered PoA-DD, the goal of SGCC DT PoA is defined as to “replace low efficiency in-service transformers (baseline transformers) which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers (project transformers) whose no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers”. Therefore, transformers with lower no-load loss than that of Type 11 transformers are eligible within the project scope, including Type S13 transformers. Furthermore, Type S13 and SH15 transformers are considered in ex-ante emission reduction estimates of CPA-001.					
Documentation Provided as Evidence by Project Participant:					
ER calculation spreadsheet of CPA-001 (registered version) PoA-DD of SGCC DT PoA (registered version)					
Information Verified by Lead Assessor:					
ER calculation spreadsheet of CPA-001 (registered version) PoA-DD of SGCC DT PoA (registered version)					
Reasoning for not Acceptance or Acceptance and Close Out:					
After checking the ex-ante ER calculation sheet of CPA-001 downloaded from UNFCCC project page, it was confirmed that 278 sets of Type S13 and 822 sets of SH15 project transformers had been included in the calculation of emission reductions. Therefore, the description in the CPA-DD “the project transformers are Type SH15 transformers” was considered to be a typo. Moreover, type S13 project transformer was in compliance with the eligibility criteria of the PoA “The project transformer’s no-load losses are compliant with or lower than that of the same rated capacity Type 11 transformers”. Therefore, it was confirmed that the project was implemented in accordance with the CPA DD and PoA DD. CL #1 was closed.					
Acceptance and Close out by Lead Assessor:			Date: 02/03/2012		
Michael Wu					

Date:	13/02/2012		Raised by:	Assessment team		
Type:	CL	Number:	CL #2	Reference:	Section 2.3.2 of checklist	
<b>Lead Assessor Comment:</b>				<b>Date:</b> 13/02/2012		
As per the requirement in the registered monitoring methodology AMS-II.A version 10, the Technical energy losses of the project equipment shall be measured at least hourly to establish an annual average value, unless such losses cannot be metered. If the technical energy losses cannot be determined from metered data, they shall be calculated using the test results when the installed equipment is commissioned, and if these are not available use the procedures described under paragraphs 4 or 5 to estimate project technical energy losses as appropriate. According to the monitoring plan in the registered CPA-DD, the non-load loss value and load loss value of the project transformer will be the measured value in the manufacturer test report of the project transformer. CL #2 was raised requesting PP to clarify how the monitoring plan for the non-load loss value and load loss value of the project transformer is in compliance with the requirement in the methodology.						
<b>Project Participant Response:</b>				<b>Date:</b> 16/02/2012		

Clarification is provided below :

Technical energy losses of transformers refer to No-Load Losses (NLL) and Load Losses (LL) cannot be metered hourly. Therefore, it is calculated using the test results provided on the manufacturer test reports of the project transformers, as defined in the registered PoA-DD as the second option provided in the methodology AMS-II.A version 10.

As regulated in the national standards (*Power Transformers Part I General* (Document No.GB 1094.1-1996), tests for rated NLL and LL for individual transformer must be conducted in the laboratory environment within manufacture base. And the test results must be recorded in the manufacturer test report of a certain transformer and be provided to the consumer along with the transformer.

With test results of each of the project transformers, the monitoring of technical energy losses of project transformers in the PoA follows the second option of abovementioned procedure in AMS-II.A version 10 thus is in compliance with the requirement in the methodology.

**Documentation Provided as Evidence by Project Participant:**

*Power Transformers Part I General* (Document No.GB 1094.1-1996)

PoA-DD of SGCC DT PoA (registered version)

**Information Verified by Lead Assessor:**

*Power Transformers Part I General* (Document No.GB 1094.1-1996)

PoA-DD of SGCC DT PoA (registered version)

**Reasoning for not Acceptance or Acceptance and Close Out: [02/03/2012]**

After reviewing the evidences provided and clarification made, the following issues still need to be addressed:

1. For the same capacity of project transformers, the non-load loss varied significantly from the test report, i.e, for 100 kVA, from 57 w (No. 187) to 150w (No. 35, 36, 38); for 315 kVA from 116.4w (No. 255) to 650 w (No. 226). Please clarify why the non-load loss varied significantly for these transformers.

**Project Participant Response:**

**Date: 13/04/2012**

The comparison in the above question is not appropriate. Variation of test values of No-Load Losses (NLL) among transformers with same capacity level is allowed, since NLL also corresponds to respective types. This is also demonstrated in the national standards for transformers. For transformers with the same capacity, the reference value of NLL of one type of transformer may be several times of that of the other type. (for instance, the reference value of NLL of **Type 7 315 kVA** transformer is 760 W as per national standard GB6451-1986, and the reference value of NLL of **Type 15 315 kVA** transformer is 170 W as per national standard GB25446-2010-T). Furthermore, a reasonable variation range of test values compared with reference values is allowed in national standards considering the differences in raw materials and manufacturing techniques. Among these mentioned transformers:

Project transformer	No.187	No.226	No.255	No.36	No.35	No.38
Type	15	15	15	15	13	13
Capacity	100 kVA	315 kVA	315 kVA	100 kVA	100 kVA	100 kVA
Test value	57 W	141 W	116.4 W	150 W	150 W	150 W
Reference value	75 W	170 W	170 W	75 W	150 W	150 W
	National standard GB25446-2010-T				National standard JB/T3837-2010	
Comparison	More efficient	More efficient	More efficient	Less efficient	Compliant	Compliant

The test value of NLL of project transformer No. 226 is 141 W instead of 650W, which is a typing mistake by CDM staff during data recording process. Project transformer No.226 is Type 15 315 KVA transformer with corrected NLL of 141 W. The NLL of project transformer No.36 is 150W which exceeds the reference level of 75W for Type 15 100KVA in the national standard. However, it's not considered as quality failure in transformers and is not banned in application as per industrial practice. Manufacturer test reports of these transformers are provided as supporting documents.

As analyzed above, the test values of NLL of the six transformers are reasonable.

NLL and Load Losses (LL) of all project transformers in the MIS system were cross-checked against the manufacturer test reports to ensure consistency. Typing mistakes were identified for LL of project transformer No.204 and No.1034, and the ER calculation spreadsheet was corrected with the test values. Manufacturer test reports of these transformers are provided as supporting documents.

Considering it's defined in the national standards that the test value of NLL or LL of a transformer is within



115% of the reference value. Although all of the transformers included in CPA-001 are eligible as per the eligibility criteria set in the registered PoA-DD, 105 project transformers with the test value exceeding 115% of the reference value of NLL or LL in CPA-001 are excluded labelling as “abnormal” in the ER calculation spreadsheet, for the purpose of conservativeness. The ER calculation spreadsheet is updated and provided.	
<b>Documentation Provided as Evidence by Project Participant:</b>	
National standard GB25446-2010-T National standard JB/T3837-2010 Manufacturer test reports of project transformer No.204, No.226 and No.1034 Evidence of corrected NLL/LL_No.204, No.226 and No.1034 ER calculation spreadsheet	
<b>Information Verified by Lead Assessor:</b>	
National standard GB25446-2010-T National standard JB/T3837-2010 PoA-DD page 41 National standard GB 1094.1-1996 Manufacturer test reports of project transformer No.204, No.226 and No.1034 Evidence of corrected NLL/LL_No.204, No.226 and No.1034 ER calculation spreadsheet	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	
Based on the opinion of the sectoral scope expert in the team, the No-Load Losses (NLL) and Load Losses (LL) can not be measured hourly. And as per the national standards ( <i>Power Transformers Part I General</i> (Document No.GB 1094.1-1996), tests for rated NLL and LL for individual transformer must be conducted in the laboratory environment within manufacture base. Thus, the manufacturer test report was considered to be the test result of the installed transformers.	
Following the correction and clarification, 105 project transformers with the test value higher than 115% of the reference value of NLL or LL in CPA-001 are labelled as “abnormal” and excluded in the calculation of emission reductions in their revised ER calculation sheet. It was confirmed that the variation of NLL for type S13 and SH15 are reasonable and the NLL of project transformers included in the revised ER calculation sheet were found to be within the 115% of the reference value in the Industry Standard - Naming Rules of Transformer Models (Document No. JB/T 3837-1996).	
Following VVM para 203 of VVM version 02.1, the assessment team confirmed that the monitoring plan of registered project is verified to be in accordance with the applied methodology.	
<b>Acceptance and Close out by Lead Assessor:</b> <b>Michael Wu</b>	<b>Date: 20/04/2012</b>

Date:	13/02/2012		Raised by:	Assessment team		
Type:	CAR	Number:	CAR #3	Reference:	Section 2.4.1 of checklist	
<b>Lead Assessor Comment:</b>				<b>Date:</b> 13/02/2012		
According to the information in the UNFCCC website, the crediting period of the CPA (CPA 2896-0001) is from 01/01/2011 to 31/12/2020 (Fixed). However, the starting date of the crediting period was quoted as 12/02/2011 in the ER calculation spreadsheet, which leads to the wrong calculation of emission reduction for this monitoring period. CAR #3 was raised in this regard.						
<b>Project Participant Response:</b>				<b>Date:</b> 16/02/2012		
It has been revised.						
<b>Documentation Provided as Evidence by Project Participant:</b>						
Revised ER calculation spreadsheet and MR.						
<b>Information Verified by Lead Assessor:</b>						
Revised ER calculation spreadsheet and MR.						
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>						
The starting date in the revised ER calculation sheet was corrected to be 01/01/2011. CAR #3 was closed.						
<b>Acceptance and Close out by Lead Assessor:</b> Michael Wu				<b>Date:</b> 20/04/2012		



Date:	13/02/2012		Raised by:	Assessment team		
Type:	CAR	Number:	CAR #4	Reference:	Section 4.1.3 of checklist	
<b>Lead Assessor Comment:</b>				<b>Date:</b> 13/02/2012		
According to the registered CPA-DD, the no-load loss value, which is sourced from standards, of the baseline transformer adopted the allowable no-load loss value of the same type of transformers (Type 7) in the transformer standards whose effective date is earlier and most close to the manufacturing date of the baseline transformer. The no-load loss value from the standard for the baseline transformer with the sequential number 53 reported in the ER calculation sheet (1.0 kW) was found to be different from the value (1.06 kW) from the applicable standard JB1300-1973. CAR #4 was raised requesting PP to clarify the difference and submit the revised document to address this issue.						
<b>Project Participant Response:</b>				<b>Date:</b> 16/02/2012		
It is a typo due to large amount of data input and it has been revised. The application form submitted to the manager of MIS System, requesting value correction and updated corresponding webpage of MIS System are provided as evidence. After it's corrected, the no-load loss values of baseline transformers are fixed throughout the whole crediting period.						
<b>Documentation Provided as Evidence by Project Participant:</b>						
Revised ER calculation spreadsheet and MR.						
<b>Information Verified by Lead Assessor:</b>						
Revised ER calculation spreadsheet and MR.						
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>						
The no-load loss value from the standard for the baseline transformer with the sequential number 53 was corrected to be 1.06 kW which is in compliance with the applicable standard JB1300-1973. CAR #4 was closed.						
<b>Acceptance and Close out by Lead Assessor:</b> <b>Michael Wu</b>				<b>Date:</b> 20/04/2012		

Date:	13/06/2012	Raised by:	Assessment team		
Type:	CAR	Number:	CAR #5	Reference:	Section 4.1.3 of checklist
Lead Assessor Comment:			Date: 13/06/2012		
<p>The following issues were identified, please clarify and provide the revised documents.</p> <p>a) In 'column P' of the ER sheet it is not clearly defined how the replacement status of Transformer is concluded as 'abnormal'.</p> <p>b) The rate capacities of the project transformer were not clearly presented in the ER sheet.</p> <p>c) Notation used for the monitoring parameter is not consistent with CPA-DD e.g. NLL pj</p> <p>d) The typographical errors were found in column K of the ER sheet.</p> <p>e) Please clarify why the lifetime of baseline transformer is defined as 30 years while the project transformer lifetime is 20 years. Please clarify.</p> <p>f) As mentioned in the CPA-DD the implementation of SGCC DT PoA to be implemented in an environment-friendly way, procurement, installation, exchange and scrapping of transformers should satisfy the following requirements:</p> <ul style="list-style-type: none"><li>- the noise requirements of new transformers, established by Power Transformers Part 10 Determination of Sound Levels (Document No.GB1094.10-2003) and the Guide for Choice Power Transformers (Document No.GB/T17468-1998);</li><li>- the noise requirements of urban area, established by Standard of Environmental Noise of Urban Area (Document No.GB3096-1993);</li><li>- the noise requirements of industrial enterprises, established by Emission Standard for Industrial Enterprises Noise at Boundary (Document No.GB12348-2008); - the solid waste requirements of disposal, established by Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste (Order No.31 of the President of the People's Republic of China).</li></ul> <p>Please clarify how the above mentioned requirements have been met.</p>					
Project Participant Response:			Date: 14/06/2012		

<p>a) All the in-advance replacements that are not implemented in line with the project design are excluded from CPA-001 and labeled as “abnormal” in the ER calculation spreadsheet, such as those 105 project transformers with the test value exceeding 115% of the reference value of NLL or LL. This definition is added in the revised ER calculation spreadsheet.</p> <p>b) They are provided for reference but it is neither one of the parameters required to be monitored nor one of the necessary parameters used for ER calculation.</p> <p>c) They are corrected to be consistent.</p> <p>d) They are corrected.</p> <p>e) It is described in the CPA-DD that the “expected operational lifetime of the small-scale CPA” is 20 years, not the lifetime of project transformers. Since the remaining lifetime of baseline transformers is not more than 20 years, the expected operational lifetime of CPAs is set to 20 years. The lifetime of transformers refers to Tool to Determine the Remaining Lifetime of Equipment issued by EB 50.</p> <p>f) These standards are only some of relevant standards to the PoA and its CPAs. The government, the World Bank and SGCC itself all take measures to ensure SGCC DT PoA meets all the environmental regulations, including but not limited to these listed standards. First of all, SGCC DT PoA is exempt from environmental impact assessment according to Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme (Document No.HBH[2010]63) issued by the Ministry of Environmental Protection of P.R. China on January 22, 2010. In this letter, it is confirmed that SGCC DT PoA will have little impact on local environment. This demonstrates that it is very easy for SGCC to meet relevant environmental protection regulations/standards during project implementation. Second, in the CPA-DD it mentioned that Environmental Management Plan of SGCC DT PoA is complied to ensure the implementation of SGCC DT PoA to be implemented in an environment-friendly way. This environmental management plan is drafted by the World Bank, a reliable entity, mainly to give a mitigation plan and a monitoring plan, i.e. the World Bank has been assisting SGCC in environmental compliance and monitoring the results. Third, SGCC internally addresses environmental issues during transformer replacement, especially scrapping process in form of formal documents. SGCC specially requires a third party to witness the scrapping process with one of the intentions to monitor any violation of environmental regulations.</p>
<p><b>Documentation Provided as Evidence by Project Participant:</b></p> <p>Revised ER calculation spreadsheet Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme Environmental Management Plan of SGCC DT PoA SGCC DT PoA Management Measures Scrapping agreement Witness report of scraping</p>
<p><b>Information Verified by Lead Assessor:</b></p> <p>Revised ER calculation spreadsheet Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme Environmental Management Plan of SGCC DT PoA SGCC DT PoA Management Measures Scrapping agreement Witness report of scraping</p>
<p><b>Reasoning for not Acceptance or Acceptance and Close Out:</b></p> <p>a) A note was added to the ER sheet “All the in-advance replacements that are not implemented in line with the project design are excluded from CPA-001 and labelled as “abnormal” in the ER calculation spreadsheet.” The same have been verified by the assessment team.</p> <p>b) The rate capacities of the project transformer have been provided to the assessment team for review. The same has been checked during the onsite visit.</p> <p>c) The notation used for the monitoring parameters is revised to be consistent with the CPA-DD.</p> <p>d) The typographical errors were corrected in the revised ER sheet.</p> <p>e) It was clarified that the operational life time of the CPA was determined as 20 years because all the remaining life time of the baseline transformers were less than 20 years. This has been confirmed by checking the ER sheet. The lifetime of transformers (30 years) in the CPA-DD was determined in</p>

accordance with the Tool to Determine the Remaining Lifetime of Equipment issued by EB 50.

- f) As per the Reply Letter on Relevant Issues of SGCC In-advance Distribution Transformer Replacement CDM Programme, environmental impact assessment is not required for this project activity. The SGCC and the World Bank have taken measures to ensure SGCC DT PoA meets all the environmental regulations. These environmental management plans prepared by the World Bank and the witness report of scrapping of the baseline transformers have been reviewed by the assessment team. It was believed that the implementation of the project compiled with the relevant requirements.

**Acceptance and Close out by Lead Assessor:**

Date: 14/06/2012 [Michael Wu]

## 10. Statement of Competence

### Statement of Competence

Name: Michael Wu

#### Status

- Lead Assessor	x	- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	China	- Technical Reviewer	x

#### Scopes of Expertise

<b>1. Energy Industries (renewable / non-renewable)</b>	<b>x</b>
Technical Area(s): TA 1.2 Energy generation from renewable energy sources.	
<b>2. Energy Distribution</b>	
Technical Area(s):	
<b>3. Energy Demand</b>	
Technical Area(s):	
<b>4. Manufacturing</b>	
Technical Area(s):	
<b>5. Chemical Industry</b>	
Technical Area(s):	
<b>6. Construction</b>	
Technical Area(s):	
<b>7. Transport</b>	
Technical Area(s):	
<b>8. Mining/Mineral Production</b>	
Technical Area(s):	
<b>9. Metal Production</b>	
Technical Area(s):	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	
Technical Area(s):	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	
Technical Area(s):	
<b>12. Solvent Use</b>	
Technical Area(s):	
<b>13. Waste Handling and Disposal</b>	
Technical Area(s):	
<b>14. Afforestation and Reforestation</b>	
Technical Area(s):	
<b>15. Agriculture</b>	
Technical Area(s):	

Technical Area(s):

Approved Member of Staff by:

Siddharth Yadav

Date:

06/02/2012

## Statement of Competence

Name: Linda Hu

### Status

- Lead Assessor	x	- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	China	- Technical Reviewer	x

### Scopes of Expertise

<b>1. Energy Industries (renewable / non-renewable)</b>	<b>x</b>
<i>Technical Area(s): 1.2 Energy generation from renewable energy sources</i>	
<b>2. Energy Distribution</b>	
<i>Technical Area(s):</i>	
<b>3. Energy Demand</b>	
<i>Technical Area(s):</i>	
<b>4. Manufacturing</b>	
<i>Technical Area(s):</i>	
<b>5. Chemical Industry</b>	
<i>Technical Area(s):</i>	
<b>6. Construction</b>	
<i>Technical Area(s):</i>	
<b>7. Transport</b>	
<i>Technical Area(s):</i>	
<b>8. Mining/Mineral Production</b>	
<i>Technical Area(s):</i>	
<b>9. Metal Production</b>	
<i>Technical Area(s):</i>	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	
<i>Technical Area(s):</i>	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	<b>x</b>
<i>Technical Area(s): TA 11.2 GHG capture and destruction</i>	
<b>12. Solvent Use</b>	
<i>Technical Area(s):</i>	
<b>13. Waste Handling and Disposal</b>	
<i>Technical Area(s):</i>	
<b>14. Afforestation and Reforestation</b>	
<i>Technical Area(s):</i>	
<b>15. Agriculture</b>	
<i>Technical Area(s):</i>	

Approved Member of Staff by:

Siddharth Yadav

Date:

10/09/2012

## Statement of Competence

Name: Shute Li

### Status

- Lead Assessor	x	- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	China	- Technical Reviewer	x

### Scopes of Expertise

<b>1. Energy Industries (renewable / non-renewable)</b>	<b>x</b>
Technical Area(s): TA 1.2 Energy generation from renewable energy sources	
<b>2. Energy Distribution</b>	
Technical Area(s):	
<b>3. Energy Demand</b>	
Technical Area(s):	
<b>4. Manufacturing</b>	
Technical Area(s):	
<b>5. Chemical Industry</b>	
Technical Area(s):	
<b>6. Construction</b>	
Technical Area(s):	
<b>7. Transport</b>	
Technical Area(s):	
<b>8. Mining/Mineral Production</b>	
Technical Area(s):	
<b>9. Metal Production</b>	
Technical Area(s):	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	
Technical Area(s):	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	<b>x</b>
Technical Area(s): TA 11.2 GHG capture and destruction	
<b>12. Solvent Use</b>	
Technical Area(s):	
<b>13. Waste Handling and Disposal</b>	<b>x</b>
Technical Area(s): TA 13.1: Waste handling and disposal	
<b>14. Afforestation and Reforestation</b>	
Technical Area(s):	
<b>15. Agriculture</b>	
Technical Area(s):	

Approved Member of Staff by: Siddharth Yadav Date: 01/08/2012

## Statement of Competence

Name: **Vikas Bankar**

### Status

- Lead Assessor	<b>x</b>	- Expert	<b>x</b>
- Assessor	<b>x</b>	- Financial Expert	
- Local Assessor	<b>India</b>	- Technical Reviewer	<b>x</b>

### Scopes of Expertise

<b>5. Energy Industries (renewable / non-renewable)</b>	<b>x</b>
Technical Area(s): <i>TA 1.2 Energy generation from renewable energy sources</i>	
<b>6. Energy Distribution</b>	<b>x</b>
Technical Area(s): <i>TA 2.1 Electricity distribution TA 2.2 Heat distribution</i>	
<b>7. Energy Demand</b>	<b>x</b>
Technical Area(s): <i>TA 3.1 Energy Demand</i>	
<b>8. Manufacturing</b>	
Technical Area(s):	
<b>16. Chemical Industry</b>	
Technical Area(s):	
<b>17. Construction</b>	
Technical Area(s):	
<b>18. Transport</b>	
Technical Area(s):	
<b>19. Mining/Mineral Production</b>	
Technical Area(s):	
<b>20. Metal Production</b>	
Technical Area(s):	
<b>21. Fugitive Emissions from Fuels (solid, oil and gas)</b>	
Technical Area(s):	
<b>22. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	
Technical Area(s):	
<b>23. Solvent Use</b>	
Technical Area(s):	
<b>24. Waste Handling and Disposal</b>	
Technical Area(s):	
<b>25. Afforestation and Reforestation</b>	
Technical Area(s):	
<b>26. Agriculture</b>	
Technical Area(s):	

Approved Member of Staff by: **Siddharth Yadav** Date: **17/07/2012**



## Statement of Competence

Name: **Joe Sun**

### Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input type="checkbox"/>
- Assessor	<input type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input type="checkbox"/>	- Technical Reviewer	<input checked="" type="checkbox"/>

### Scopes of Expertise

<b>1. Energy Industries (renewable / non-renewable)</b>	<input type="checkbox"/>
Technical Area(s):	
<b>2. Energy Distribution</b>	<input type="checkbox"/>
Technical Area(s):	
<b>3. Energy Demand</b>	<input type="checkbox"/>
Technical Area(s):	
<b>4. Manufacturing</b>	<input type="checkbox"/>
Technical Area(s):	
<b>5. Chemical Industry</b>	<input type="checkbox"/>
Technical Area(s):	
<b>6. Construction</b>	<input type="checkbox"/>
Technical Area(s):	
<b>7. Transport</b>	<input type="checkbox"/>
Technical Area(s):	
<b>8. Mining/Mineral Production</b>	<input type="checkbox"/>
Technical Area(s):	
<b>9. Metal Production</b>	<input type="checkbox"/>
Technical Area(s):	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	<input type="checkbox"/>
Technical Area(s):	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	<input type="checkbox"/>
Technical Area(s):	
<b>12. Solvent Use</b>	<input type="checkbox"/>
Technical Area(s):	
<b>13. Waste Handling and Disposal</b>	<input type="checkbox"/>
Technical Area(s):	
<b>14. Afforestation and Reforestation</b>	<input type="checkbox"/>
Technical Area(s):	
<b>15. Agriculture</b>	<input type="checkbox"/>
Technical Area(s):	

Approved Member of Staff by: **Siddharth Yadav** Date: **11/09/2012**

## Statement of Competence

Name: Shivaji  
Chakraborty

### Status

- Lead Assessor	x	- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	India	- Technical Reviewer	x

### Scopes of Expertise

#### 1. Energy Industries (renewable / non-renewable)

x

Technical Area(s):

TA 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar

TA 1.2 Energy generation from renewable energy sources

#### 2. Energy Distribution

x

Technical Area(s): TA 2.1 Electricity distribution

TA 2.2 Heat distribution

#### 3. Energy Demand

x

Technical Area(s): TA 3.1 Energy Demand

#### 4. Manufacturing

Technical Area(s):

#### 5. Chemical Industry

Technical Area(s):

#### 6. Construction

Technical Area(s):

#### 7. Transport

Technical Area(s):

#### 8. Mining/Mineral Production

Technical Area(s):

#### 9. Metal Production

Technical Area(s):

#### 10. Fugitive Emissions from Fuels (solid, oil and gas)

Technical Area(s):

#### 11. Fugitive Emissions from Production and

Consumption of Halocarbons and Sulphur Hexafluoride

Technical Area(s):

#### 12. Solvent Use

Technical Area(s):

#### 13. Waste Handling and Disposal

Technical Area(s):

#### 14. Afforestation and Reforestation

Technical Area(s):

#### 15. Agriculture

Technical Area(s):

Approved Member of Staff by:

Siddharth Yadav

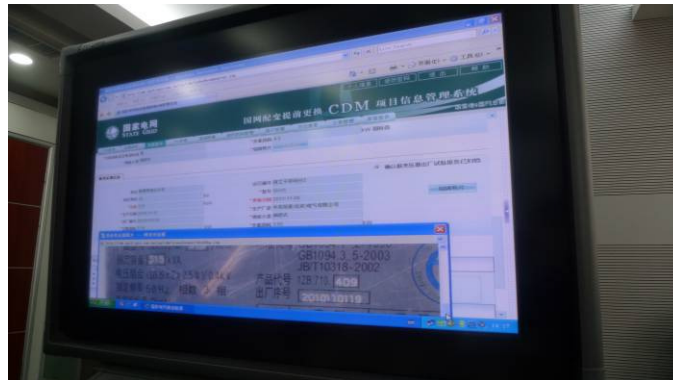
Date:

19/09/2012

## 11. Photographic Evidence

Name of equipment: MIS system

Date: 07/02/2012



Name of equipment: Project transformer

Date: 07/02/2012



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