



## Monitoring report form (Version 03.2)

### Monitoring report

|                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Title of the project activity</b>                                                                                                                     | PoA: SGCC In-advance Distribution Transformer Replacement CDM Programme<br>CPAs: SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001; SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-002; SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-003; SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-004 |
| <b>Reference number of the project activity</b>                                                                                                          | PoA 2896, including the following CPAs:<br>CPA-001: 2896-0001; CPA-002: 2896-0002; CPA-003: 2896-0003; CPA-004: 2896-0004                                                                                                                                                                                                                                                                       |
| <b>Version number of the monitoring report</b>                                                                                                           | 05                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Completion date of the monitoring report</b>                                                                                                          | 02/07/2014                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Registration date of the project activity</b>                                                                                                         | PoA: 12/02/2011<br>CPA-001: 12/02/2011; CPA-002: 28/05/2012;<br>CPA-003: 28/05/2012; CPA-004: 28/05/2012                                                                                                                                                                                                                                                                                        |
| <b>Monitoring period number and duration of this monitoring period</b>                                                                                   | 02 from 01/12/2011 to 31/12/2013 (both days included), including:<br>CPA-001: 01/12/2011-31/12/2013<br>CPA-002: 01/06/2012-31/12/2013<br>CPA-003: 01/06/2012-31/12/2013<br>CPA-004: 01/06/2012-31/12/2013                                                                                                                                                                                       |
| <b>Project participant(s)</b>                                                                                                                            | State Grid Corporation of China; International Bank for Reconstruction and Development ( "IBRD" ) acting as trustee of the Spanish Carbon Fund (SCF) ; Kingdom of Spain- Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness                                                                                                                              |
| <b>Host Party(ies)</b>                                                                                                                                   | P. R. China                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Sectoral scope(s) and applied methodology(ies)</b>                                                                                                    | Scope 2 : Energy distribution;<br>AMS.II.A. (Version 10)                                                                                                                                                                                                                                                                                                                                        |
| <b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>           | Total: 159,719 tCO <sub>2</sub> e, including:<br>CPA-001: 8,515 tCO <sub>2</sub> e<br>CPA-002: 47,175 tCO <sub>2</sub> e<br>CPA-003: 48,604 tCO <sub>2</sub> e<br>CPA-004: 55,425 tCO <sub>2</sub> e                                                                                                                                                                                            |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>                                      | Total: 74,894 tCO <sub>2</sub> e, including:<br>CPA-001: 8,295 tCO <sub>2</sub> e<br>CPA-002: 20,397 tCO <sub>2</sub> e<br>CPA-003: 35,593 tCO <sub>2</sub> e<br>CPA-004: 10,609 tCO <sub>2</sub> e                                                                                                                                                                                             |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)</b>        | Total: 21,313 tCO <sub>2</sub> e, including:<br>CPA-001: 4,321 tCO <sub>2</sub> e; CPA-002: 4,974 tCO <sub>2</sub> e;<br>CPA-003: 9,045 tCO <sub>2</sub> e; CPA-004: 2,973 tCO <sub>2</sub> e                                                                                                                                                                                                   |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).</b> | Total: 53,581 tCO <sub>2</sub> e, including:<br>CPA-001: 3,974 tCO <sub>2</sub> e; CPA-002: 15,423 tCO <sub>2</sub> e;<br>CPA-003: 26,548 tCO <sub>2</sub> e; CPA-004: 7,636 tCO <sub>2</sub> e                                                                                                                                                                                                 |

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

&gt;&gt;

SGCC In-advance Distribution Transformer Replacement CDM Programme (hereinafter referred to as SGCC DT PoA) is an efficiency programme of activities that is implemented by State Grid Corporation of China (hereinafter referred to as SGCC) in the electricity transmission and distribution systems of 25 provinces in China (hereinafter referred to as the grids) controlled by SGCC. The goal of SGCC DT PoA is to replace low efficiency in-service transformers (hereinafter referred to as baseline transformers) which are Type 7 or Type 8 transformers with high efficiency newly purchased transformers (hereinafter referred to as 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 Green House Gases emissions.

SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-001 (hereinafter referred to CPA-001), SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-002 (hereinafter referred to CPA-002), SGCC In-advance Distribution Transformer Replacement CDM Programme CPA-003 (hereinafter referred to CPA-003) and SGCC In-advance Distribution Transformer Repla(hereinafter referred to CPA-004) cement CDM Programme CPA-004 are the four CPAs of SGCC DT PoA, which have been approved and included in this monitoring period. SGCC is responsible for planning, financing arrangement and the detailed implementation of CPA-001, CPA-002, CPA-003 and CPA-004. An in-advance replacement refers to replacement of a baseline transformer before reaching the end of its lifetime with a project transformer.

CPA-001, CPA-002, CPA-003 and CPA-004 comprise in-advance replacement of 1,100, 8,662, 9,289 and 9,570 baseline transformers respectively. CPA-001 was commissioned on 07/03/2010 since the first in-advance replacement was completed on 06/03/2010. CPA-002 was commissioned on 17/03/2010, considering the first in-advance replacement was completed on 16/03/2010. CPA-003 was commissioned on 07/04/2010 considering the first in-advance replacement was completed on 06/04/2010. CPA-004 was commissioned 23/01/2011 considering the first in-advance replacement was completed on 22/01/2011. The starting date of operation of each project transformer has been listed in the emission reduction calculation spreadsheet.

Total emission reductions achieved in this monitoring period from 01/12/2011 to 31/12/2013 (both days included) are 74,894 tCO<sub>2</sub>e.

**A.2. Location of project activity**

&gt;&gt;

The physical boundary of CPA-001 is the grids that are controlled by SGCC in Liaoning Province, China and therefore, the geographical boundary of CPA-001 is Liaoning Province. The geographical boundary of CPA-002, CPA-003 and CPA-004 cover the same boundary of Heilongjiang Province, Jilin Province, Liaoning Province, Hebei Province, Shanxi Province, Beijing Municipality, Shanghai Municipality, Henan Province, Hubei Province, Hunan Province, Chongqing Municipality, Sichuan Province, Ningxia Hui Autonomous Region, Qinghai Province and Gansu Province.

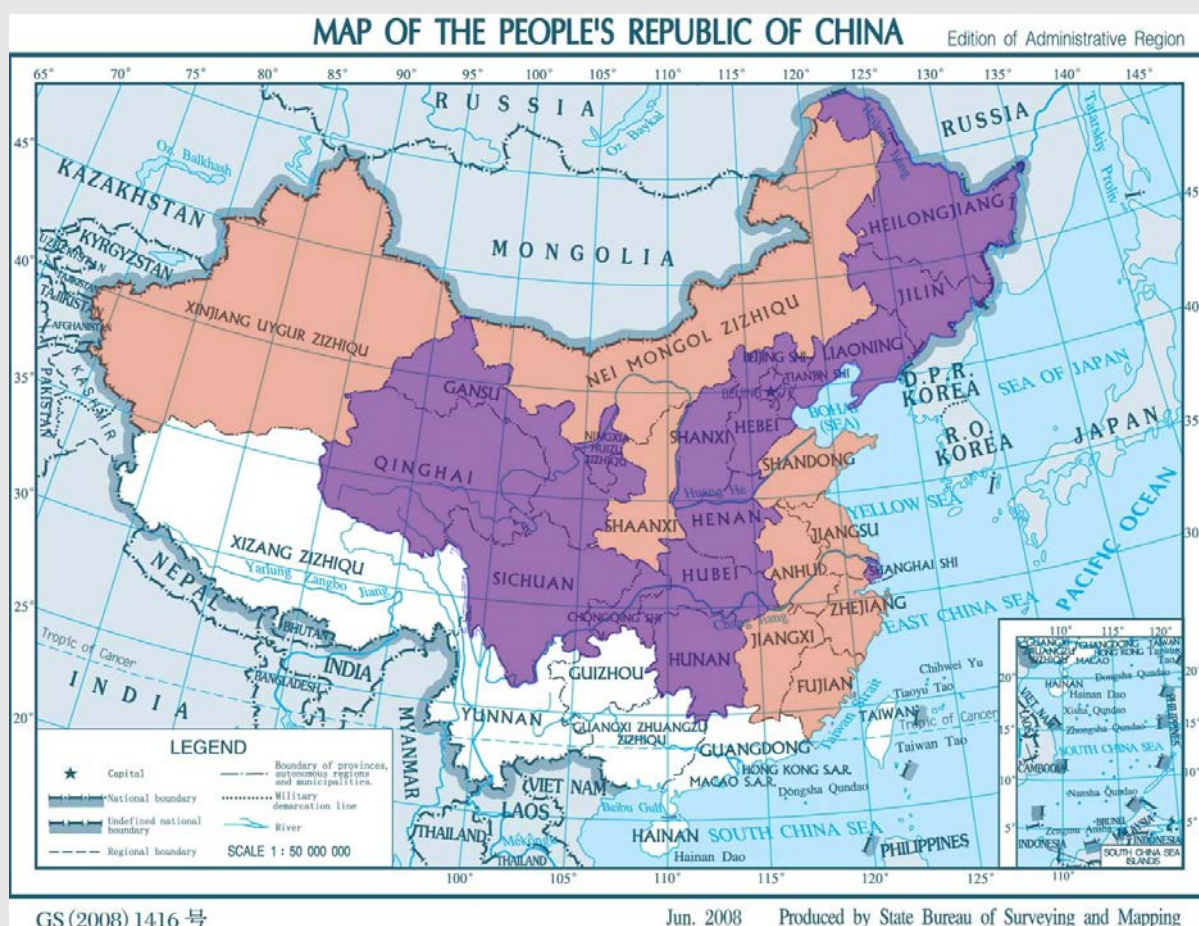


Figure 1. Geographical boundary of CPA-001, CPA-002, CPA-003 and CPA-004 within SGCC DT PoA

### A.3. Parties and project participant(s)

| Party involved<br>((host) indicates<br>a host Party) | Private and/or public<br>entity(ies) project<br>participants<br>(as applicable)                                               | Indicate if the Party involved<br>wishes to be considered as<br>project participant<br>(Yes/No) |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| P. R. China<br>(host)                                | State Grid Corporation of<br>China                                                                                            | No                                                                                              |
| Spain                                                | International Bank for<br>Reconstruction and<br>Development ("IBRD") acting<br>as trustee of the Spanish<br>Carbon Fund (SCF) | Yes                                                                                             |
| Spain                                                | Kingdom of Spain- Ministry<br>of Agriculture, Food and<br>Environment and Ministry of<br>Economy and<br>Competitiveness       | Yes                                                                                             |

### A.4. Reference of applied methodology

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Approved methodology for small-scale CDM project AMS.II.A.: Supply Side Energy Efficiency Improvements - Transmission and Distribution is applied in CPA-001 to CPA-004 of SGCC DT PoA. EB has already

approved to apply the methodology AMS.II.A. (Version 10) to PCDM projects.

As per the methodology AMS.II.A (Version 10), CPA-001 to CPA-004 also applies the approved methodology for small-scale CDM project AMS.I.D.: Grid Connected Renewable Electricity Generation (Version 16), Tool to Determine the Remaining Lifetime of Equipment (Version 01) and Tool to Calculate the Emission Factor for an Electricity System (Version 02).

For more information regarding the methodology please refer to

<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>, and

<http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>.

#### A.5. Crediting period of project activity

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The 7\*3 renewable crediting periods of PoA is shown as following:

12/02/2011-11/02/2018

The 10-year fixed crediting periods of CPAs are shown as following:

|         |                       |
|---------|-----------------------|
| CPA-001 | 12/02/2011-11/02/2021 |
| CPA-002 | 01/06/2012-31/05/2022 |
| CPA-003 | 01/06/2012-31/05/2022 |
| CPA-004 | 01/06/2012-31/05/2022 |

### SECTION B. Implementation of project activity

#### B.1. Description of implemented registered project activity

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Within currently four CPAs included in this PoA, a total number of 17,399 baseline transformers have been replaced and 12,250 units are in normal implemented (the details for each CPA are listed in the following table)<sup>1</sup>. CPA-001 was commissioned on 07/03/2010 since the first in-advance replacement was completed on 06/03/2010. CPA-002 was commissioned on 17/03/2010, considering the first in-advance replacement was completed on 16/03/2010. CPA-003 was commissioned on 07/04/2010 considering the first in-advance replacement was completed on 06/04/2010. CPA-004 was commissioned 23/01/2011 considering the first in-advance replacement was completed on 22/01/2011.

| CPA     | Number of replaced baseline transformers | Number of normal implemented units |
|---------|------------------------------------------|------------------------------------|
| CPA-001 | 1,100                                    | 769                                |
| CPA-002 | 5,530                                    | 3,209                              |
| CPA-003 | 7,955                                    | 6,378                              |
| CPA-004 | 2,814                                    | 1,894                              |
| Total   | 17,399                                   | 12,250                             |

Based on the table above, 5,149 units for the four CPAs (331 units for CPA-001, 2,321 units for CPA-002, 1,577 units for CPA-003 and 920 units for CPA-004) are abnormal replacement and are excluded from the emission reductions calculation, which have been labeled as Abnormal in the emission reduction calculation

<sup>1</sup> Monitoring data shows that 10,053 transformers have been replaced in the year of 2013. However, monitoring data of the 10,053 transformers was not entered into MIS system at the time that the monitoring report was published on the UNFCCC website. This is mainly due to the delayed replacement schedule in the year of 2013 (most transformers were replaced in 4<sup>th</sup> quarter of 2013). For the purpose of conservativeness, it is decided to exclude the 10,053 transformers replaced in year 2013 from second monitoring period from 01/12/2011 to 31/12/2013.

sheet. These units are not implemented in line with the project design, such as some transformers with the test value exceeding 115% of the reference value of NLL or LL, some transformers' installation locations are permanently removed or changed due to the urban construction.

During this monitoring period, all normally operating project transformers have followed the requirements defined in the registered PoA and included CPA-001, CPA-002, CPA-003 and CPA-004 approved by CDM EB. Meanwhile, no overhaul and downtime or exchange of equipment was undertaken. There was no special event or situation, which may impact the applicability of the methodology in this monitoring period either.

## **B.2. Post registration changes**

### **B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

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There was no temporary deviations from registered monitoring plan or applied methodology

### **B.2.2. Corrections**

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There was no correction from the registered PoA-DD.

### **B.2.3. Permanent changes from registered monitoring plan or applied methodology**

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There was no permanent change from registered monitoring plan or applied methodology.

### **B.2.4. Changes to project design of registered project activity**

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There was no change to project design of registered project activity.

### **B.2.5. Changes to start date of crediting period**

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The start date of crediting period for the PoA was changed from 01/01/2011 to 12/02/2011.

The start date of crediting period for CPA-001 was changed from 01/01/2011 to 12/02/2011.

There was no change to start date of crediting period for CPA-002, CPA-003 and CPA-004.

### **B.2.6. Types of changes specific to afforestation or reforestation project activity**

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Not applicable.

## **SECTION C. Description of monitoring system**

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### **1. Monitoring points**

There are two main monitoring points in the CPAs of SGCC DT PoA. One point is SGCC's headquarters which is located in Beijing and the other is located at SGCC's subsidiaries across SGCC controlled provinces.

SGCC's headquarters:

For  $PSL_{z,y}$ , the power supply reliability rate of the provincial grid that covers the project transformers, SGCC's headquarters is responsible for collecting relevant information issued by Electric Power Reliability

Management Center of State Electricity Regulatory Commission to update it into the MIS System annually.

For  $n_{new}$  and  $n_{old}$ , the total number of in-advance replacements that were actually implemented and the total number of the scrapped transformers in in-advance replacements that were actually implemented, SGCC's headquarters monitors them respectively through the MIS System and the scrapping agreements.

SGCC's subsidiaries:

For  $NLL_{PJ,Z,Y}$ ,  $LL_{PJ,Z,Y}$  and  $D_{new,Z}$  no-load loss value and the load loss value of project transformers and the date when replacement happens, SGCC's subsidiaries will collect their information when they replace transformers.

## 2. Data management procedures

SGCC Grid CDM Distribution Transformer Programme Management Information System (hereinafter referred to as the MIS System) is specially designed, developed and managed for SGCC DT PoA by SGCC. One of the key functions of the MIS System is to keep track of detailed information on each in-advance replacement in CPAs, through integrating the whole monitoring process from data generation, aggregation, recording, to calculation and reporting into one system.

Before replacement took place, information of baseline transformers had been submitted into the MIS System, which is ex-ante fixed and will not change throughout the crediting period of CPAs. After the replacement activities were completed, SGCC's subsidiary as the CPA implementer was responsible to complete and submit the detailed information on each in-advance replacement, including the Serial Number of the project transformer, the Operation Number corresponding to the Operation Number of the baseline transformer in the plan, the date of replacement, and the measured values of no-load losses and load losses on the manufacturer test report of the project transformer. Meanwhile, power supply reliability rates were updated in the MIS System as per the most recent publicly available figure sourced from Electric Power Reliability Management Center of State Electricity Regulatory Commission as of the date. If scrapping agreements were signed for baseline transformers, relevant information would be input into the MIS System.

Based on the above data input into the MIS System before and after replacement, the result of emission reductions can be calculated out and reported in the MIS System.

## 3. Organizational structure and roles and responsibilities

As indicated in Figure 2, SGCC's headquarters is mainly responsible for organizing the implementation of CPAs and SGCC's subsidiaries are the main implementers of the replacement and monitoring activities.

Additionally, SGCC's headquarters is responsible for CDM relevant communication.

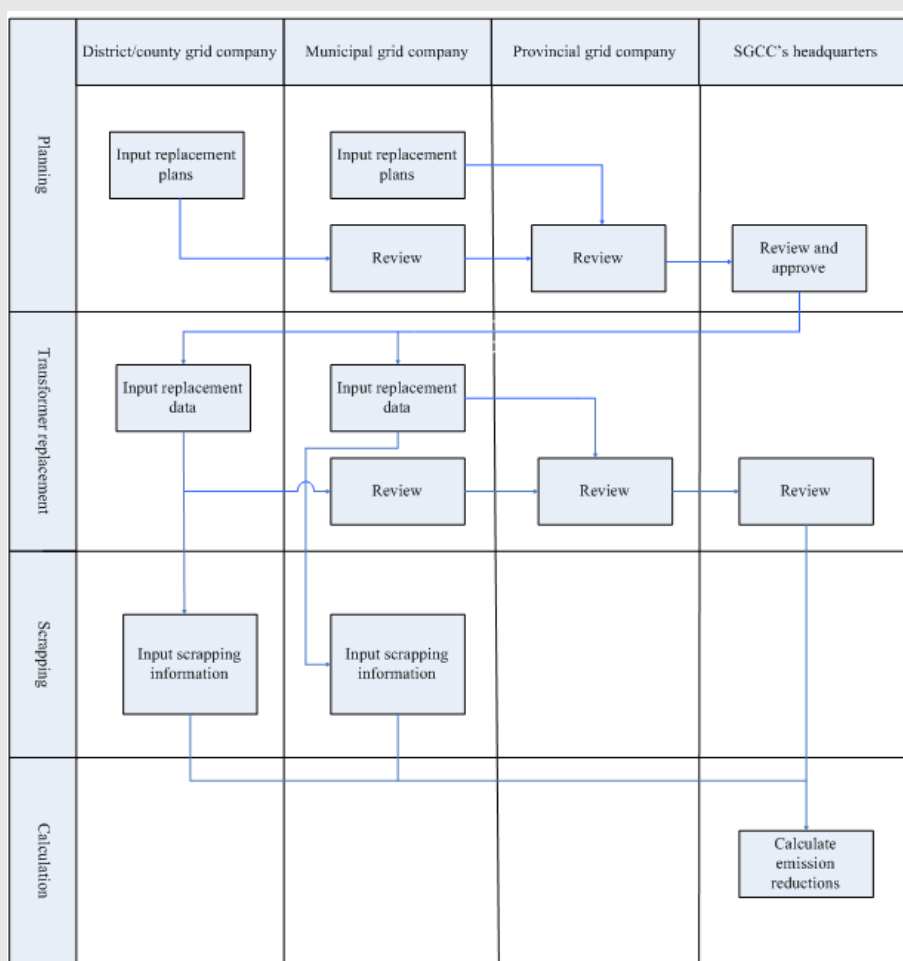


Figure 2. Organizational structure

#### 4. QA/QC procedures

Quality assurance/quality control procedures have been established by SGCC and are enforced along with the implementation of the CPAs involved in SGCC DT PoA.

All transformers to be procured should comply with national/local standards and be provided along with manufacturer test reports. The transformer manufacturers are responsible to provide transformers and the manufacturer test report corresponding to each transformer. The nameplate of each transformer must clearly indicate the information of the type, the Serial Number, the manufacturing time and the capacity. The measured values of no-load losses and load losses should be clearly listed in the manufacturer test report of each transformer.

Implementation of monitoring activities is guaranteed by SGCC DT PoA Management Measures and Operation Manual for Management Information System issued by SGCC. Detailed QA/QC procedures are established in these documents including: (a) the senior staff in the operation team are responsible for data cross-check in the MIS System regarding parameters  $D_{new,z}$  and  $PSL_{z,y}$ ; (b) photographs of nameplates and the key information on manufacturer test reports of transformers are stored in the MIS System for the purpose of cross checking  $NLL_{PJ,z,y}$  and  $LL_{PJ,z,y}$ . Moreover, an independent check on the correspondence of number of baseline transformers to be scrapped ( $n_{old}$ ) and the number of project transformers ( $n_{new}$ ) is conducted before scrapping and independent entities are introduced to monitor the scrapping of the replaced transformers. The scrapping dates of the replaced transformers are documented and independently verified.

Multiple rounds of training have been organized by SGCC to ensure CPA implementation. The training was conducted at different levels, including introduction of the program mandate and implementation procedure to management teams in subsidiary provincial companies, and instruction of detailed implementation requirements and monitoring steps for operational staff working on the ground, such as submission of replacement plan, storing scrapping records of baseline transformers, and operating of MIS system, etc.

MIS System functions as a record keeping system. Relevant electronic data are kept in the MIS System and regularly backed up. Other documents such as manufacturer test reports of transformers and scrapping agreements are kept by SGCC's subsidiaries. All monitoring data and documents 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.

#### 5. Emergency procedures

MIS System is the core of the monitoring activities. Data in the MIS System are periodically backed up in the form of excel sheets for the purpose of operational emergency, such as server breakdown or power outage. Necessary corrective actions and appropriate steps will be taken immediately if problems are found so that the MIS System can be resumed as soon as possible. The whole process from the emergency to the treatment will be recorded in the internal management forms including the time of emergency, the nature of emergency and corrective actions taken.

Moreover, if the emergency is caused by the maintenance team of the MIS System, training courses shall be re-arranged for relevant persons to prevent future mistakes error in the above mentioned procedures. If emergency is caused by hardware failure, a thorough check on relevant hardware will be arranged to prevent potential hardware failure.

### SECTION D. Data and parameters

#### D.1. Data and parameters fixed ex ante or at renewal of crediting period

|                          |                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>n</b>                                                                                                     |
| Unit:                    | -                                                                                                            |
| Description:             | The total number of in-advance replacements included in CPA-001 to CPA-004                                   |
| Source of data:          | The MIS System of SGCC DT PoA                                                                                |
| Value(s) applied:        | CPA-001            1,100<br>CPA-002            8,662<br>CPA-003            9,289<br>CPA-004            9,570 |
| Purpose of data:         | Baseline emission calculations                                                                               |
| Additional comment:      | -                                                                                                            |

|                          |                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>DATE<sub>BL,z,produce</sub></b>                                                                                                                                           |
| Unit:                    | -                                                                                                                                                                            |
| Description:             | The manufacturing time (the year; and if more detailed information is available, the month or the date) of the baseline transformer in No. <i>z in-advance replacement</i> . |
| Source of data:          | Information on the nameplate of the baseline transformer                                                                                                                     |
| Value(s) applied:        | Refer to the emission reduction calculation spreadsheet                                                                                                                      |
| Purpose of data:         | Baseline emission calculation                                                                                                                                                |
| Additional comment:      | -                                                                                                                                                                            |

|                          |                                                                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>NLL<sub>BL,z,reg,y</sub></b>                                                                                                              |
| Unit:                    | W                                                                                                                                            |
| Description:             | The no-load loss value, which is sourced from standards, of the baseline transformer in No. <i>z in-advance replacement</i> in year <i>y</i> |



|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source of data:     | The allowable no-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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Value(s) applied:   | Refer to the emission reduction calculation spreadsheet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Purpose of data:    | Baseline emission calculation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Additional comment: | <p>If the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> is available, then</p> $NLL_{BL,z,y} = \min \{ NLL_{BL,z,reg,y}, NLL_{BL,z,act,y} \}$ <p>Where:<br/> <math>NLL_{BL,z,y}</math> is the baseline no-load loss value in No. z <i>in-advance replacement</i> in year y (W);<br/> <math>NLL_{BL,z,reg,y}</math> is the no-load loss value, which is sourced from standards, of the baseline transformer in No. z <i>in-advance replacement</i> in year y (W);<br/> <math>NLL_{BL,z,act,y}</math> is the measured no-load loss value on the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> in year y (W).<br/> If the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> is not available, then<br/> <math>NLL_{BL,z,y} = NLL_{BL,z,reg,y} \times 95\%</math><br/> Where, 95% is a conservative coefficient.</p> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b><math>NLL_{BL,z,act,y}</math></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Unit:                    | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Description:             | The measured no-load loss value in the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> in year y.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Source of data:          | The measured no-load loss value in the manufacturer test report of the baseline transformer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Value(s) applied:        | Refer to the emission reduction calculation spreadsheet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Purpose of data:         | Baseline emission calculation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Additional comment:      | <p>If the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> is available, then</p> $NLL_{BL,z,y} = \min \{ NLL_{BL,z,reg,y}, NLL_{BL,z,act,y} \}$ <p>Where:<br/> <math>NLL_{BL,z,y}</math> is the baseline no-load loss value in No. z <i>in-advance replacement</i> in year y (W);<br/> <math>NLL_{BL,z,reg,y}</math> is the no-load loss value, which is sourced from standards, of the baseline transformer in No. z <i>in-advance replacement</i> in year y (W);<br/> <math>NLL_{BL,z,act,y}</math> is the measured no-load loss value on the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> in year y (W).<br/> If the manufacturer test report of the baseline transformer in No. z <i>in-advance replacement</i> is not available, then<br/> <math>NLL_{BL,z,y} = NLL_{BL,z,reg,y} \times 95\%</math></p> |

|  |                                           |
|--|-------------------------------------------|
|  | Where, 95% is a conservative coefficient. |
|--|-------------------------------------------|

|                          |                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>LL<sub>BL,z,y</sub></b>                                                                                                                                                                                       |
| Unit:                    | W                                                                                                                                                                                                                |
| Description:             | The baseline load loss value of No. z <i>in-advance replacement</i> in year y.                                                                                                                                   |
| Source of data:          | 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. |
| Value(s) applied:        | Refer to the emission reduction calculation spreadsheet                                                                                                                                                          |
| Purpose of data:         | Baseline emission calculation                                                                                                                                                                                    |
| Additional comment:      | -                                                                                                                                                                                                                |

| <b>Data / Parameter:</b> | <b>EF<sub>grid,CM,y</sub></b>                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------|----------------------|---------|------------------|---------|-----------------|---------|--------------------|---------|----------------------|---------|
| Unit:                    | tCO <sub>2</sub> e/MWh                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Description:             | The combined margin CO <sub>2</sub> emission factor for the project electricity system in year y.                                                                                                                                                                                                                                                                                                                                       |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Source of data:          | <i>Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China</i>                                                                                                                                                                                                                                                                                                                                         |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Value(s) applied:        | <table border="1"> <thead> <tr> <th>Regional power grid</th><th>EF<sub>grid,CM,y</sub> (tCO<sub>2</sub>e/MWh)</th></tr> </thead> <tbody> <tr> <td>Northeast China Grid</td><td>0.92675</td></tr> <tr> <td>North China Grid</td><td>0.89355</td></tr> <tr> <td>East China Grid</td><td>0.78255</td></tr> <tr> <td>Central China Grid</td><td>0.85285</td></tr> <tr> <td>Northwest China Grid</td><td>0.83395</td></tr> </tbody> </table> | Regional power grid | EF <sub>grid,CM,y</sub> (tCO <sub>2</sub> e/MWh) | Northeast China Grid | 0.92675 | North China Grid | 0.89355 | East China Grid | 0.78255 | Central China Grid | 0.85285 | Northwest China Grid | 0.83395 |
| Regional power grid      | EF <sub>grid,CM,y</sub> (tCO <sub>2</sub> e/MWh)                                                                                                                                                                                                                                                                                                                                                                                        |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Northeast China Grid     | 0.92675                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| North China Grid         | 0.89355                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| East China Grid          | 0.78255                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Central China Grid       | 0.85285                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Northwest China Grid     | 0.83395                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Purpose of data:         | Baseline and Project emission calculation                                                                                                                                                                                                                                                                                                                                                                                               |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |
| Additional comment:      | -                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                                                  |                      |         |                  |         |                 |         |                    |         |                      |         |

| <b>Data / Parameter:</b> | <b>EF<sub>grid,z,y</sub></b>                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------|----------------------|---------|------------------|---------|-----------------|---------|--------------------|---------|----------------------|---------|
| Unit:                    | tCO <sub>2</sub> e/MWh                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Description:             | The grid emission factor corresponding to No. z <i>in-advance replacement</i> (tCO <sub>2</sub> e/MWh), which is equal to the EF <sub>grid,CM,y</sub> of the regional power grid where the No. z <i>in-advance replacement</i> takes place                                                                                                                                                                                             |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Source of data:          | <i>Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China</i>                                                                                                                                                                                                                                                                                                                                        |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Value(s) applied:        | <table border="1"> <thead> <tr> <th>Regional power grid</th><th>EF<sub>grid,z,y</sub> (tCO<sub>2</sub>e/MWh)</th></tr> </thead> <tbody> <tr> <td>Northeast China Grid</td><td>0.92675</td></tr> <tr> <td>North China Grid</td><td>0.89355</td></tr> <tr> <td>East China Grid</td><td>0.78255</td></tr> <tr> <td>Central China Grid</td><td>0.85285</td></tr> <tr> <td>Northwest China Grid</td><td>0.83395</td></tr> </tbody> </table> | Regional power grid | EF <sub>grid,z,y</sub> (tCO <sub>2</sub> e/MWh) | Northeast China Grid | 0.92675 | North China Grid | 0.89355 | East China Grid | 0.78255 | Central China Grid | 0.85285 | Northwest China Grid | 0.83395 |
| Regional power grid      | EF <sub>grid,z,y</sub> (tCO <sub>2</sub> e/MWh)                                                                                                                                                                                                                                                                                                                                                                                        |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Northeast China Grid     | 0.92675                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| North China Grid         | 0.89355                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| East China Grid          | 0.78255                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Central China Grid       | 0.85285                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |
| Northwest China Grid     | 0.83395                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                                                 |                      |         |                  |         |                 |         |                    |         |                      |         |

|                     |                                           |
|---------------------|-------------------------------------------|
| Purpose of data:    | Baseline and Project emission calculation |
| Additional comment: | -                                         |

|                          |                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>ARR</b>                                                                                                                              |
| Unit:                    | %                                                                                                                                       |
| Description:             | The average replacing rate of the provinces covered by CPA-001 to CPA-004.                                                              |
| Source of data:          | The data are determined based on the survey carried out by SGCC following <i>Proposed Survey Method for Historical Replacing Rate</i> . |
| Value(s) applied:        | Refer to the emission reduction calculation spreadsheet                                                                                 |
| Purpose of data:         | Baseline emission calculation                                                                                                           |
| Additional comment:      | -                                                                                                                                       |

## D.2. Data and parameters monitored

|                                                   |                                                                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                          | <b>NLL<sub>PJ,z,y</sub></b>                                                                                                            |
| Unit:                                             | W                                                                                                                                      |
| Description:                                      | The no-load loss value of the project transformer in No. z <i>in-advance replacement</i> in year y                                     |
| Measured/<br>Calculated /<br>Default:             | Measured by the manufacturers of transformers                                                                                          |
| Source of data:                                   | The manufacturer test report of the project transformer                                                                                |
| Value(s) of<br>monitored<br>parameter:            | Refer to the emission reduction calculation spreadsheet                                                                                |
| Monitoring<br>equipment:                          | -                                                                                                                                      |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Once for the whole project lifetime                                                                                                    |
| Calculation method<br>(if applicable):            | -                                                                                                                                      |
| QA/QC procedures:                                 | The data obtained from manufacturer test reports of transformers are reliable. Relevant documents have been archived for verification. |
| Purpose of data:                                  | Project emission calculation                                                                                                           |
| Additional comment:                               | -                                                                                                                                      |

|                          |                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>LL<sub>PJ,z,y</sub></b>                                                                |
| Unit:                    | W                                                                                         |
| Description:             | The load loss value of the project transformer in No. z in-advance replacement in year y. |

|                                                   |                                                                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Measured/<br>Calculated /<br>Default:             | Measured by the manufacturers of transformers                                                                                          |
| Source of data:                                   | The manufacturer test report of the project transformer                                                                                |
| Value(s) of<br>monitored<br>parameter:            | Refer to the emission reduction calculation spreadsheet                                                                                |
| Monitoring<br>equipment:                          | -                                                                                                                                      |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Once for the whole project lifetime                                                                                                    |
| Calculation method<br>(if applicable):            | -                                                                                                                                      |
| QA/QC procedures:                                 | The data obtained from manufacturer test reports of transformers are reliable. Relevant documents have been archived for verification. |
| Purpose of data:                                  | The parameter is only used for the eligibility criteria analysis.                                                                      |
| Additional comment:                               | -                                                                                                                                      |

|                                                   |                                                         |
|---------------------------------------------------|---------------------------------------------------------|
| <b>Data / Parameter:</b>                          | <b>D<sub>new,z</sub></b>                                |
| Unit:                                             | -                                                       |
| Description:                                      | The date when No.z in-advance replacement happens       |
| Measured/<br>Calculated /<br>Default:             | Measured                                                |
| Source of data:                                   | Operation forms                                         |
| Value(s) of<br>monitored<br>parameter:            | Refer to the emission reduction calculation spreadsheet |
| Monitoring<br>equipment:                          | -                                                       |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Once for the whole project lifetime                     |
| Calculation method<br>(if applicable):            | -                                                       |
| QA/QC procedures:                                 | Operation Forms have been archived for verification.    |
| Purpose of data:                                  | Baseline and Project emission calculation               |
| Additional comment:                               | -                                                       |

|                          |                                                                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>PSL<sub>z,y</sub></b>                                                                                                                       |
| Unit:                    | -                                                                                                                                              |
| Description:             | The power supply reliability rate of the provincial grid that covers the project transformer in No. z <i>in-advance replacement</i> in year y. |

|                                                   |                                                                                                                                                       |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measured/<br>Calculated /<br>Default:             | Default                                                                                                                                               |
| Source of data:                                   | The latest data of the grids in provinces publicly issued by Electric Power Reliability Management Center of State Electricity Regulatory Commission. |
| Value(s) of<br>monitored<br>parameter:            | Refer to the emission reduction calculation spreadsheet                                                                                               |
| Monitoring<br>equipment:                          | -                                                                                                                                                     |
| Measuring/<br>Reading/<br>Recording<br>frequency: | -                                                                                                                                                     |
| Calculation method<br>(if applicable):            | -                                                                                                                                                     |
| QA/QC procedures:                                 | Relevant documents have been archived in the MIS System in electronic format for verification.                                                        |
| Purpose of data:                                  | Project emission calculation                                                                                                                          |
| Additional comment:                               | -                                                                                                                                                     |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                  |         |     |         |       |         |       |         |       |       |        |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|---------|-------|---------|-------|---------|-------|-------|--------|
| <b>Data / Parameter:</b>                          | <b>n<sub>news</sub></b>                                                                                                                                                                                                                                                                                                                                                                                          |         |     |         |       |         |       |         |       |       |        |
| Unit:                                             | -                                                                                                                                                                                                                                                                                                                                                                                                                |         |     |         |       |         |       |         |       |       |        |
| Description:                                      | The total number of <i>in-advance replacements</i> that are actually implemented under CPA-001, CPA-002, CPA-003, CPA-004 respectively                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Measured/<br>Calculated /<br>Default:             | Calculated                                                                                                                                                                                                                                                                                                                                                                                                       |         |     |         |       |         |       |         |       |       |        |
| Source of data:                                   | The MIS System                                                                                                                                                                                                                                                                                                                                                                                                   |         |     |         |       |         |       |         |       |       |        |
| Value(s) of<br>monitored<br>parameter:            | <p>The total number (normal replaced transformers used to calculate emission reductions) is 12,250 for the four CPAs, the details for each CPA are listed in the following table:</p> <table> <tr> <td>CPA-001</td><td>769</td></tr> <tr> <td>CPA-002</td><td>3,209</td></tr> <tr> <td>CPA-003</td><td>6,378</td></tr> <tr> <td>CPA-004</td><td>1,894</td></tr> <tr> <td>Total</td><td>12,250</td></tr> </table> | CPA-001 | 769 | CPA-002 | 3,209 | CPA-003 | 6,378 | CPA-004 | 1,894 | Total | 12,250 |
| CPA-001                                           | 769                                                                                                                                                                                                                                                                                                                                                                                                              |         |     |         |       |         |       |         |       |       |        |
| CPA-002                                           | 3,209                                                                                                                                                                                                                                                                                                                                                                                                            |         |     |         |       |         |       |         |       |       |        |
| CPA-003                                           | 6,378                                                                                                                                                                                                                                                                                                                                                                                                            |         |     |         |       |         |       |         |       |       |        |
| CPA-004                                           | 1,894                                                                                                                                                                                                                                                                                                                                                                                                            |         |     |         |       |         |       |         |       |       |        |
| Total                                             | 12,250                                                                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Monitoring<br>equipment:                          | -                                                                                                                                                                                                                                                                                                                                                                                                                |         |     |         |       |         |       |         |       |       |        |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Determined according to the MIS System of SGCC DT PoA.                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Calculation method<br>(if applicable):            | Count according to data in the MIS System.                                                                                                                                                                                                                                                                                                                                                                       |         |     |         |       |         |       |         |       |       |        |

|                     |                                                        |
|---------------------|--------------------------------------------------------|
| QA/QC procedures:   | Data are cross-checked when input into the MIS system. |
| Purpose of data:    | -                                                      |
| Additional comment: | -                                                      |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                             |         |     |         |       |         |       |         |       |       |        |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|---------|-------|---------|-------|---------|-------|-------|--------|
| <b>Data / Parameter:</b>                          | <b>n<sub>old</sub></b>                                                                                                                                                                                                                                                                                                                                                                                                      |         |     |         |       |         |       |         |       |       |        |
| Unit:                                             | -                                                                                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Description:                                      | The total number of the scrapped transformers in <i>in-advance replacements</i> that are actually implemented under CPA-001, CPA-002, CPA-003, CPA-004 respectively                                                                                                                                                                                                                                                         |         |     |         |       |         |       |         |       |       |        |
| Measured/<br>Calculated /<br>Default:             | Calculated                                                                                                                                                                                                                                                                                                                                                                                                                  |         |     |         |       |         |       |         |       |       |        |
| Source of data:                                   | The scrapping agreements                                                                                                                                                                                                                                                                                                                                                                                                    |         |     |         |       |         |       |         |       |       |        |
| Value(s) of<br>monitored<br>parameter:            | <p>The total number (normal replaced transformers used to calculate emission reductions) is 12,250 for the four CPAs, the details for each CPA are listed in the following table:</p> <table border="1"> <tr> <td>CPA-001</td><td>769</td></tr> <tr> <td>CPA-002</td><td>3,209</td></tr> <tr> <td>CPA-003</td><td>6,378</td></tr> <tr> <td>CPA-004</td><td>1,894</td></tr> <tr> <td>Total</td><td>12,250</td></tr> </table> | CPA-001 | 769 | CPA-002 | 3,209 | CPA-003 | 6,378 | CPA-004 | 1,894 | Total | 12,250 |
| CPA-001                                           | 769                                                                                                                                                                                                                                                                                                                                                                                                                         |         |     |         |       |         |       |         |       |       |        |
| CPA-002                                           | 3,209                                                                                                                                                                                                                                                                                                                                                                                                                       |         |     |         |       |         |       |         |       |       |        |
| CPA-003                                           | 6,378                                                                                                                                                                                                                                                                                                                                                                                                                       |         |     |         |       |         |       |         |       |       |        |
| CPA-004                                           | 1,894                                                                                                                                                                                                                                                                                                                                                                                                                       |         |     |         |       |         |       |         |       |       |        |
| Total                                             | 12,250                                                                                                                                                                                                                                                                                                                                                                                                                      |         |     |         |       |         |       |         |       |       |        |
| Monitoring<br>equipment:                          | -                                                                                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Determined according to the MIS System of SGCC DT PoA.                                                                                                                                                                                                                                                                                                                                                                      |         |     |         |       |         |       |         |       |       |        |
| Calculation method<br>(if applicable):            | Count according to data in the scrapping agreement.                                                                                                                                                                                                                                                                                                                                                                         |         |     |         |       |         |       |         |       |       |        |
| QA/QC procedures:                                 | The scrapping agreements have been archived for verification. Meanwhile, the number of the project transformers and the number of the baseline transformers that are in advance replaced in CPA-001 to CPA-004 have been checked before scrapping to ensure that they correspond with each other.                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Purpose of data:                                  | -                                                                                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |
| Additional comment:                               | -                                                                                                                                                                                                                                                                                                                                                                                                                           |         |     |         |       |         |       |         |       |       |        |

### D.3. Implementation of sampling plan

>>

Not applicable.

**SECTION E. Calculation of emission reductions or GHG removals by sinks****E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

&gt;&gt;

According to methodology AMS.II.A. (Version 10), the emissions baseline of each *in-advance replacement* is the baseline energy loss multiplied by an emission factor. Therefore, formulae for the calculation of baseline emissions from CPA-001 to CPA-004 was as following:

$$BE_y = \sum_{z=1}^n BE_{z,y}$$

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

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

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

Where

| Paramter        | Description                                                                                                                            | Unit                   |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| $BE_y$          | The baseline emissions in year y                                                                                                       | tCO <sub>2</sub> e     |
| $BE_{z,y}$      | The baseline emissions in No. z in-advance replacement in year y                                                                       | tCO <sub>2</sub> e     |
| n               | The total number of in-advance replacements included from CPA-001 to CPA-004                                                           | -                      |
| $EL_{BL,z,y}$   | The baseline energy loss in No. z in-advance replacement                                                                               | MWh                    |
| ARR             | The average replacing rate of the provinces covered by CPA-001 to CPA-004                                                              | %                      |
| $EF_{grid,z,y}$ | The grid emission factor corresponding to No. z in-advance replacement                                                                 | tCO <sub>2</sub> e/MWh |
| $NLL_{BL,z,y}$  | The baseline no-load loss value in No. z in-advance replacement in year y                                                              | W                      |
| $H_{z,y}$       | The operating hours of the project transformer in No. z in-advance replacement in year y                                               | h                      |
| $10^6$          | The conversion coefficient from MW to W                                                                                                | W/MW                   |
| $PSL_{z,y}$     | The power supply reliability rate of the provincial grid that covers the project transformer in No. z in-advance replacement in year y | -                      |

The baseline emissions in this monitoring period are calculated as 104,881 tCO<sub>2</sub>e, the details for each CPA are listed in the following table.

| CPA     | Baseline emissions (tCO <sub>2</sub> e) |
|---------|-----------------------------------------|
| CPA-001 | 10,375                                  |
| CPA-002 | 25,605                                  |
| CPA-003 | 51,661                                  |
| CPA-004 | 17,240                                  |
| Total   | 104,881                                 |

Please refer to the emission reduction calculation spreadsheet for more details.

## E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

According to methodology AMS.II.A. (Version 10), project emissions of each *in-advance replacement* are no-load losses of the project transformer multiplied by an emission factor. Therefore, the formulae to calculate emissions caused by no-load losses of project transformers covered by CPA-001 to CPA-004 are as follows:

$$PE_y = \sum_{z=1}^n PE_{z,y}$$

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

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

Where

| Parameter       | Description                                                                                                                            | Unit                   |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| $PE_y$          | The project emissions in year y                                                                                                        | tCO <sub>2</sub> e     |
| $PE_{z,y}$      | The emissions caused by no-load losses of the project transformer in No. z in-advance replacement in year y                            | tCO <sub>2</sub> e     |
| n               | The total number of in-advance replacements included from CPA-001 to CPA-004                                                           | -                      |
| $EF_{grid,z,y}$ | The grid emission factor corresponding to No. z in-advance replacement                                                                 | tCO <sub>2</sub> e/MWh |
| $NLL_{PJ,z,y}$  | The no-load loss value of the project transformer in No. z in-advance replacement in year y                                            | W                      |
| $H_{z,y}$       | The operating hours of the project transformer in No. z in-advance replacement in year y                                               | h                      |
| $10^6$          | The conversion coefficient from MW to W                                                                                                | W/MW                   |
| $PSL_{z,y}$     | The power supply reliability rate of the provincial grid that covers the project transformer in No. z in-advance replacement in year y | -                      |

The project emissions in this monitoring period are calculated as 29,987 tCO<sub>2</sub>e, the details for each CPA are listed in the following table.

| CPA     | Project emissions (tCO <sub>2</sub> e) |
|---------|----------------------------------------|
| CPA-001 | 2,080                                  |
| CPA-002 | 5,208                                  |
| CPA-003 | 16,068                                 |
| CPA-004 | 6,631                                  |
| Total   | 29,987                                 |

Please refer to the emission reduction calculation spreadsheet for more details.

## E.3. Calculation of leakage



&gt;&gt;

According to the registered PoA-DDs, leakage in CPA-001 to CPA-004 is not considered.

#### E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

For the baseline transformer of No. z in-advance replacement, the remaining lifetime for emission reduction calculation is calculated as the time difference between the date when No. z in-advance replacement happens ( $D_{new,z}$ ) and the date when the baseline transformer in No. z in-advance replacement is replaced in the absence of CPA-001 to CPA-004 ( $DATE_{BL,z,Retrofit}$ ). Here

$$DATE_{BL,z,Retrofit} = DATE_{BL,z,produce} + 30y$$

Where:

| Parameter              | Description                                                                                                             | Unit |
|------------------------|-------------------------------------------------------------------------------------------------------------------------|------|
| $DATE_{BL,z,Retrofit}$ | The date when the baseline transformer in No. z in-advance replacement is replaced in the absence of CPA-001 to CPA-004 | -    |
| $DATE_{BL,z,produce}$  | The manufacturing date of the baseline transformer in No. z in-advance replacement.                                     | -    |

The emission reductions from CPA-001 to CPA-004 is calculated as following formula:

$$ER_y = BE_y - PE_y$$

For CPA-001,  $ER_y = 10,375 \text{ tCO}_2\text{e} - 2,080 \text{ tCO}_2\text{e} = 8,295 \text{ tCO}_2\text{e}$

For CPA-002,  $ER_y = 25,605 \text{ tCO}_2\text{e} - 5,208 \text{ tCO}_2\text{e} = 20,397 \text{ tCO}_2\text{e}$

For CPA-003,  $ER_y = 51,661 \text{ tCO}_2\text{e} - 16,068 \text{ tCO}_2\text{e} = 35,593 \text{ tCO}_2\text{e}$

For CPA-004,  $ER_y = 17,240 \text{ tCO}_2\text{e} - 6,631 \text{ tCO}_2\text{e} = 10,609 \text{ tCO}_2\text{e}$

| Item    | Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e) | Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e) | Leakage (tCO <sub>2</sub> e) | Emission reductions or net anthropogenic GHG removals by sinks (tCO <sub>2</sub> e) |
|---------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|
| CPA-001 | 10,375                                                                        | 2,080                                                                      | -                            | 8,295                                                                               |
| CPA-002 | 25,605                                                                        | 5,208                                                                      | -                            | 20,397                                                                              |
| CPA-003 | 51,661                                                                        | 16,068                                                                     | -                            | 35,593                                                                              |
| CPA-004 | 17,240                                                                        | 6,631                                                                      | -                            | 10,609                                                                              |
| Total   | 104,881                                                                       | 29,987                                                                     | -                            | 74,894                                                                              |

#### E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

The estimated emission reductions of each CPAs covered in this monitoring period are calculated as following table.

| CPA | Estimated annual average emission reductions in registered CAP-DDs (tCO <sub>2</sub> e) | Covering days in this monitoring period (day) | Estimated emission reductions in this monitoring period (tCO <sub>2</sub> e) |
|-----|-----------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------|
|     | A                                                                                       | B                                             | C = A/365 × B                                                                |

|         |        |     |         |
|---------|--------|-----|---------|
| CPA-001 | 4,079  | 762 | 8,515   |
| CPA-002 | 29,739 | 579 | 47,175  |
| CPA-003 | 30,640 | 579 | 48,604  |
| CPA-004 | 34,940 | 579 | 55,425  |
| Total   | -      | -   | 159,719 |

The total emission reductions estimated in registered CAP-DDs in this monitoring as stated above are 159,719 tCO<sub>2</sub>e.

| Item                                                                   | Values estimated in ex-ante calculation of registered PDD | Actual values achieved during this monitoring period |
|------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------|
| <b>Emission reductions or GHG removals by sinks (tCO<sub>2</sub>e)</b> | 159,719                                                   | 74,894                                               |

#### E.6. Remarks on difference from estimated value in registered PDD

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For CPA-001, the emission reductions are a little lower than the estimated in the registered CPA-DD. The main reason is that some transformers are not in normal implemented and excluded out of the emissions reductions calculation.

For CPA-002 to CPA-004, the emission reductions are much lower than that estimated in the registered CPA-DDs. The reasons are as follows:

1. In the registered CPA-DDs of CPA-002 to CPA-004, all the transformers are expected to be replaced before the start date of the crediting period. However, in practice, there are some transformers which have not been replaced by the end of the monitoring period.
2. In the register CPA-DDs of CPA-002 to CPA-004, all the transformers are expected to be implemented in normal. However, in practice, some transformers are not in normal operation and excluded from the emissions reductions calculation.

#### E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

| Item                                                                   | Actual values achieved up to 31 December 2012                                                                                                                                                    | Actual values achieved from 1 January 2013 onwards                                                                                                                                                 |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Emission reductions or GHG removals by sinks (tCO<sub>2</sub>e)</b> | Total: 21,313 tCO <sub>2</sub> e, including:<br>CPA-001: 4,321 tCO <sub>2</sub> e<br>CPA-002: 4,974 tCO <sub>2</sub> e<br>CPA-003: 9,045 tCO <sub>2</sub> e<br>CPA-004: 2,973 tCO <sub>2</sub> e | Total: 53,581 tCO <sub>2</sub> e, including:<br>CPA-001: 3,974 tCO <sub>2</sub> e<br>CPA-002: 15,423 tCO <sub>2</sub> e<br>CPA-003: 26,548 tCO <sub>2</sub> e<br>CPA-004: 7,636 tCO <sub>2</sub> e |

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## Document information

| <i>Version</i>                                                                                                                          | <i>Date</i>     | <i>Description</i>                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 03.2                                                                                                                                    | 5 November 2013 | Editorial revision to correct table in page 1.                                                                                                                                                                                   |
| 03.1                                                                                                                                    | 2 January 2013  | Editorial revision to correct table in section E.5.                                                                                                                                                                              |
| 03.0                                                                                                                                    | 3 December 2012 | Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11). |
| 02.0                                                                                                                                    | 13 March 2012   | Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).                                                                                                       |
| 01                                                                                                                                      | 28 May 2010     | EB 54, Annex 34. Initial adoption.                                                                                                                                                                                               |
| Decision Class: Regulatory<br>Document Type: Form<br>Business Function: issuance<br>Keywords: monitoring report, performance monitoring |                 |                                                                                                                                                                                                                                  |