

YANGCUN HYDROPOWER STATION PROJECT



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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The proposed project activity is a run-of-river hydropower station, which is located in Sichuan Province. The installed capacity of the hydropower station is 66 MW (3 x 22 MW), and the utilization time of the generating equipments reaches 4,600 hours. On 8 August 2002, the first electric generator started trial run. Since 28 March 2003, all generator units started operation and generating power. The proposed project uses local hydropower resources to generate electricity and 258,060 MWh electricity will be delivered to Central China Power Grid (CCPG).

1.2 Sectoral Scope and Project Type

Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)

Project Type (i): Renewable energy projects

The project is not a grouped project.

1.3 Project Proponent

Organization name	Sichuan Daduhe Power Co.,Ltd.
Contact person	Mr. Gan Youhua
Title	Chairman of the Board
Address	No.21, Pingan Road, Shaping Township, E'bian Yi People Autonomous County, Leshan City, Sichuan Province, 614300
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Organization name	South Pole Carbon Asset Management Ltd.
Contact person	Mr. Marco Hirsbrunner
Title	Principal China
Address	Technoparkstrasse 1,Zurich,Switzerland
Telephone	+ 41 78 708 11 13
Email	m.hirsbrunner@southpolecarbon.com

1.4 Other Entities Involved in the Project

No any other entities are involved in the project.

1.5 Project Start Date

The Project Start Date is 9 August 2002.

1.6 Project Crediting Period

The starting date of the crediting period of the project activity is 1 January 2004 and the end date is 31 December 2013. The total number of years: 10 years.

It is a renewable crediting period and can be renewed twice.

1.7 Project Location

The project is located on Guanliao river, within the territory of Yangcun Town, Ebian Yi Minority Autonomous County, Leshan City. The project site is 16 km far away from the county seat of Ebian County. The exact location is 103°08'55" E, 29°11'37" N.

Guanliao river is a first-grade tributary on the right bank of Dadu river, which originating from the boundary between the 3 counties Ebian, Meigu and Ganluo. The total river length is 92 m.

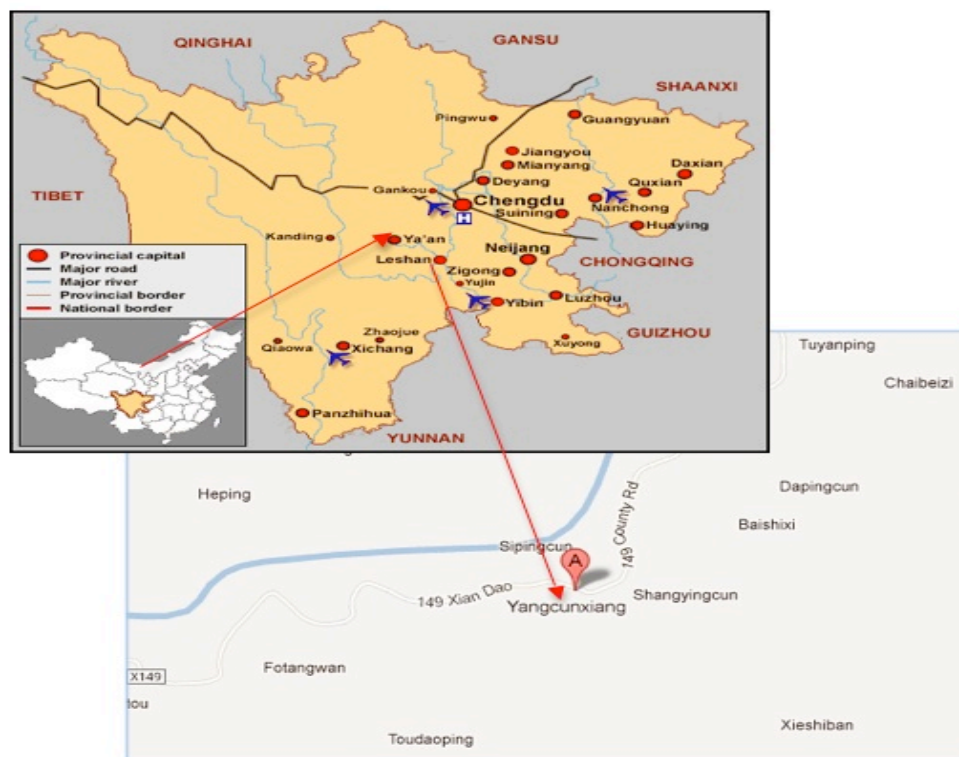


Figure 1 Location of the site of Yangcun Hydropower Station Project

1.8 Title and Reference of Methodology

The approved CDM methodology ACM0002 (Version 06) "Consolidated baseline methodology for grid connected electricity generation from renewable sources" was employed.

1.9 Other Programs

No any other programs are involved in the proposed project.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity is a diversion type hydropower station with 27 m water retaining dam, 2.29 million m³ of reservoir capacity. The designed installed capacity of the hydropower station is 66 MW. The project employs 3 units of HLA630-LJ-152 turbines, and 3 units of SF22-12/3480 generators. Details are provided in the following table below:

Table 2-1 Key technical parameters employed for the project

Turbines	Model	HLA630-LJ-152	/
	Manufacturer	Haerbin Small-Scale hydropower Development Co., Ltd.	/
	Units	3	/
	Maximal Water Head	132.9	m
	Rated Water Head	119	m
	Minimal Water Head	115.8	m
	Rated Flow Rate	20.52	m ³ /s
	Rotor Diameter	1.52	m
	Rated Power	22.68	MW
	Rated Rotating Speed	500	r/min
	Runaway Speed	950	r/min
	Serial No.	HDX002-1/2/3	/
Generators	Model	SF22-12/3480	/
	Manufacturer	Haerbin Small-Scale hydropower Development Co., Ltd.	/
	Units	3	/
	Rated Capacity	22	MW
	Rated Voltage	10500	V
	Rated Electrical Current	1423	A

	Rated Power Coefficient	0.85	/
	Rated Frequency	50	Hz
	Isolation Class	F	/
	Load	175	T
	Serial No.	HDX002-1/2/3	/

During this monitoring period (26-12-2012 to 25-11-2013), the project is operating normally and the implementation status is stable. No overhaul or equipment exchange or downtimes happened during the monitoring period. No events or situations that occurred during the monitoring period, which may impact the GHG emission reductions or removals and monitoring.

2.2 Deviations

2.2.1 Methodology Deviations

No methodology deviation from the Monitoring Plan.

2.2.2 Project Description Deviations

During the verification (for monitoring period 26 May 2008 to 25 May 2009), a revision of the monitoring plan was requested and validated by the verification body SGS, which was approved.

2.3 Grouped Project

The project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _y
Data unit	tCO ₂ e/MWh
Description	Combined Baseline Emission Factor of the Central China Power Grid
Source of data	Clean Development Mechanism in China: Bulletin on Baseline Emission Factors of Regional Grids in China – Calculation of Combined baseline emission factor of China's Regional Grids
Value applied:	0.94445 tCO ₂ e/MWh
Justification of choice of data or description of measurement methods and procedures applied	Default value published by Chinese Designated National Authority.
Purpose of the data	Used for baseline emission calculations
Comments	-

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{export, YangE, y}$								
Data unit	kWh								
Description	Electricity exported via 110 kV transmission line through YangE line to the grid in year y (kWh)								
Source of data	The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided by the grid company.								
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.								
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis								
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>266032184</td></tr></table>			Year	No. of Months	Total electricity exported (kWh)	2013	11	266032184
Year	No. of Months	Total electricity exported (kWh)							
2013	11	266032184							
Monitoring equipment	The electricity meter with serial number of No. 200106287A0317 reaches an accuracy of 1.0 (active).								
QA/QC procedures to be applied	- Exported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity export data from the kilowatt meter; Meters will be calibrated periodically according to relevant national standards.								
Purpose of the data	Calculation of baseline emission								

Calculation method	N/A
Comments	-

Data / Parameter	EG _{import, YangE, y}								
Data unit	kWh								
Description	Electricity imported via 110 kV transmission line through YangE line from the grid in year y (kWh)								
Source of data	The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided by the grid company.								
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.								
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis								
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity imported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>20944</td></tr></table>			Year	No. of Months	Total electricity imported (kWh)	2013	11	20944
Year	No. of Months	Total electricity imported (kWh)							
2013	11	20944							
Monitoring equipment	The electricity meter with serial number of No. 200106287A0317 reaches an accuracy of 1.0 (active).								
QA/QC procedures to be applied	- Imported electricity from the grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity import data from the kilowatt								

	meter; ▪ Meters will be calibrated periodically according to relevant national standards.
Purpose of the data	Calculation of baseline emission
Calculation method	N/A
Comments	-

Data / Parameter	$EG_{export,HongYang,y}$								
Data unit	kWh								
Description	Electricity exported via HongYang line in year y (kWh), which indicates electricity imported via 110 kV transmission line through HongYang line from the grid in year y (kWh)								
Source of data	The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are by the grid company.								
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.								
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis								
Value monitored:	<table><tr><td>Year</td><td>No. of Months</td><td>Total electricity exported (kWh)</td></tr><tr><td>2013</td><td>11</td><td>7744</td></tr></table>			Year	No. of Months	Total electricity exported (kWh)	2013	11	7744
Year	No. of Months	Total electricity exported (kWh)							
2013	11	7744							
Monitoring equipment	Measured by electricity meter with serial number of No.								

	200106287A0301 reaches an accuracy of 1.0 (active).
QA/QC procedures to be applied	- Import electricity from the 110 kV grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; - Meters will be calibrated periodically according to relevant national standards.
Purpose of the data	Calculation of baseline emission
Calculation method	N/A
Comments	-

Data / Parameter	$EG_{import, HongYang, y}$
Data unit	kWh
Description	Electricity imported from HongYang line in year y (kWh), which indicates electricity exported via 110 kV transmission line through HongYang line to the grid in year y (kWh).
Source of data	The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided by the grid company.
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis
Value monitored:	

	Year	No. of Months	Total electricity exported (kWh)
	2013	11	278930784
Monitoring equipment	Measured by electricity meter with serial number of No. 200106287A0301 reaches an accuracy of 1.0 (active).		
QA/QC procedures to be applied	- Exported electricity to the 110 kV grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity export data from the kilowatt meter; - Meters will be calibrated periodically according to relevant national standards.		
Purpose of the data	Calculation of baseline emission		
Calculation method	N/A		
Comments	-		

Data / Parameter	$EG_{import, YangYu, y}$
Data unit	kWh
Description	Electricity imported from YangYu line in year y (kWh), which indicates electricity exported by YangYu line via 110 kV transmission line through YangE line and HongYang line to the grid in year y (kWh)
Source of data	The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided by the grid company.
Description of measurement	Measured continuously by an electricity meter and

methods and procedures to be applied	recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.								
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis								
Value monitored:	<table><tr><td>Year</td><td>No. of Months</td><td>Total electricity exported (kWh)</td></tr><tr><td>2013</td><td>11</td><td>256157968</td></tr></table>			Year	No. of Months	Total electricity exported (kWh)	2013	11	256157968
Year	No. of Months	Total electricity exported (kWh)							
2013	11	256157968							
Monitoring equipment	Measured by electricity meter with serial number of No. 200106287A0431 reaches an accuracy of 1.0 (active).								
QA/QC procedures to be applied	- imported electricity from the grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; - Meters will be calibrated periodically according to relevant national standards.								
Purpose of the data	Calculation of baseline emission								
Calculation method	N/A								
Comments	-								

Data / Parameter	$EG_{YangCi,y}$
Data unit	kWh
Description	Power generation of Cizhu hydropower station (YangCi line) in year y (kWh), which indicates electricity input from YangCi line to grid via 110 kV transmission line through YangE line and HongYang line in year y, when transformer station on 35 kV transmission line is in

	maintenance or malfunction.						
Source of data	Measured by electricity meter with serial number of No. 200104265A0255. The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided by the grid company.						
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.						
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis						
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>40192250</td></tr></table>	Year	No. of Months	Total electricity exported (kWh)	2013	11	40192250
Year	No. of Months	Total electricity exported (kWh)					
2013	11	40192250					
Monitoring equipment	Measured by electricity meter with serial number of No. 200104265A0255 reaches an accuracy of 1.0 (active).						
QA/QC procedures to be applied	▪ Exported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; ▪ Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; ▪ Meters will be calibrated periodically according to relevant national standards.						
Purpose of the data	Calculation of baseline emission						
Calculation method	N/A						
Comments	-						

Data / Parameter	$EG_{YangLiang,y}$						
Data unit	kWh						
Description	Power generation of Lianghekou hydropower station (YangLiang line) in year y (kWh), which indicates electricity input from YangLiang line to grid via 110 kV transmission line through YangE line and HongYang line in year y, when transformer station on 35 kV transmission line is in maintenance or malfunction.						
Source of data	Measured by electricity meter with serial number of No. 200106287A0478. The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided in balance sheets by the grid company.						
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.						
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis						
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>54597774</td></tr></table>	Year	No. of Months	Total electricity exported (kWh)	2013	11	54597774
Year	No. of Months	Total electricity exported (kWh)					
2013	11	54597774					
Monitoring equipment	Measured by electricity meter with serial number of No. 200106287A0478 reaches an accuracy of 1.0 (active).						
QA/QC procedures to be applied	- Exported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter;						

	Meters will be calibrated periodically according to relevant national standards.
Purpose of the data	Calculation of baseline emission
Calculation method	N/A
Comments	-

Data / Parameter	$EG_{import, YangDa, y}$
Data unit	kWh
Description	Power generation of Dabao hydropower station (YangDa line) in year y (kWh), which indicates electricity input from YangDa line to grid via 110 kV transmission line through YangE line and HongYang line in year y, when transformer station on 35 kV transmission line is in maintenance or malfunction.
Source of data	Measured by electricity meter with serial number No. 200104265A0313. The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided in balance sheets by the grid company.
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis
Value monitored:	

	Year	No. of Months	Total electricity imported (kWh)
	2013	11	19316192
Monitoring equipment	Measured by electricity meter with serial number No. 200104265A0313 reaches an accuracy of 1.0 (active).		
QA/QC procedures to be applied	- Exported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; - Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; - Meters will be calibrated periodically according to relevant national standards.		
Purpose of the data	Calculation of baseline emission		
Calculation method	N/A		
Comments	-		

Data / Parameter	$EG_{import, YangHe, y}$
Data unit	kWh
Description	Electricity imported from YangHe line in year y (kWh)
Source of data	Measured by electricity meter with serial number of No. 200106287A0422. The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided in balance sheets by the grid company.
Description of measurement	Measured continuously by an electricity meter and

methods and procedures to be applied	recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.								
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis								
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>4256</td></tr></table>			Year	No. of Months	Total electricity exported (kWh)	2013	11	4256
Year	No. of Months	Total electricity exported (kWh)							
2013	11	4256							
Monitoring equipment	Measured by electricity meter with serial number of No. 200106287A0422 reaches a accuracy of 1.0 (active)								
QA/QC procedures to be applied	▪ Imported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; ▪ Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; ▪ Meters will be calibrated periodically according to relevant national standards.								
Purpose of the data	Calculation of baseline emission								
Calculation method	N/A								
Comments	-								

Data / Parameter	$EG_{export, YangHe, y}$
Data unit	kWh
Description	Electricity exported via Hetaoping substation (YangHe line) in year y (kWh)
Source of data	Measured by electricity meter with serial number of No. 200106287A0422. The calculation of emission

	reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source. These values are provided in balance sheets by the grid company.						
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.						
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis						
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>113081080</td></tr></table>	Year	No. of Months	Total electricity exported (kWh)	2013	11	113081080
Year	No. of Months	Total electricity exported (kWh)					
2013	11	113081080					
Monitoring equipment	Measured by electricity meter with serial number of No. 200106287A0422 reaches a accuracy of 1.0 (active)						
QA/QC procedures to be applied	▪ Exported electricity to the grid is measured by electricity meters, which are managed and maintained by the project owner; ▪ Trained and qualified staff is responsible for recording electricity import data from the kilowatt meter; ▪ Meters will be calibrated periodically according to relevant national standards.						
Purpose of the data	Calculation of baseline emission						
Calculation method	N/A						
Comments	-						

Parameters monitored and recorded for crosscheck/backup purpose:

Data / Parameter	$EG_{i,Yangcun,y}$						
Data unit	kWh						
Description	Electricity generation by generator i ($i = 1,2,3$) at Yangcun hydropower station in year y						
Source of data	Measured by electricity meters. The calculation of emission reductions in the monitoring protocols shall be based on the measured electricity meter values as main data source.						
Description of measurement methods and procedures to be applied	Measured continuously by an electricity meter and recorded on a monthly basis by monitoring personnel. Meter reading time is 24:00 of 25 th each month.						
Frequency of monitoring/recording	Measured continuously and recorded on a monthly basis						
Value monitored:	<table><tr><th>Year</th><th>No. of Months</th><th>Total electricity exported (kWh)</th></tr><tr><td>2013</td><td>11</td><td>291,262,320</td></tr></table>	Year	No. of Months	Total electricity exported (kWh)	2013	11	291,262,320
Year	No. of Months	Total electricity exported (kWh)					
2013	11	291,262,320					
Monitoring equipment	Measured by electricity meters reaches a accuracy of 0.5 (active)						
QA/QC procedures to be applied	- Electricity generated from the generators is measured by electricity meters, which are controlled by the project owner; - Trained and qualified staff is responsible for recording electricity export data from the kilowatt meter; - Meters will be calibrated periodically according to relevant national standards.						
Purpose of the data	Crosscheck the baseline emission						

Calculation method	N/A
Comments	-

3.3 Monitoring Plan

1. Monitoring Objective

The parameters to be monitored are the amount of electricity transported through YangE line, HongYang line to the grid, and the bypass power from YangYu line and the 35 kV transmission line.

2. Monitoring Organization

A chief monitoring officer, who is the station master of the proposed project station, appointed by the project owner, is responsible for operation, maintenance and management of monitoring meters, for supervision and verification of meters and records, and for data collections, statistics and management. The operators on duty are responsible for operating the electric meters and recording the electricity data. And the class monitor is responsible for management for electric meters and data. The personnel from the operation and finance departments of the project owner's company are responsible for submitting and reporting the statistical data of electricity to, and conducting account settlement for electricity charges with the grid company. The detail refer to the Fig.3-1

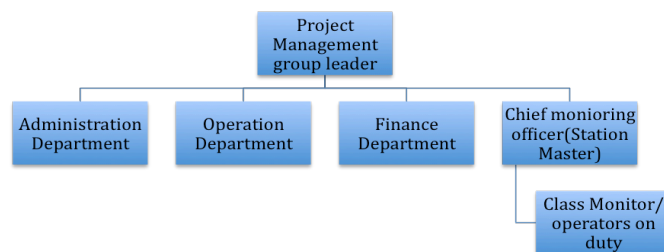


Fig.3-1 The detail monitoring organization

The monitoring officer will receive support from South Pole Carbon Asset Management and its partners.

3. Monitoring Equipment and program

Following is the Main Electric Connection Diagram displayed on the interface of the computer-based monitoring system. Power generated by the project is exported to grid via the 110 kV transmission line through YangE line and HongYang line (top-left of the diagram). YangYu Line is also exporting power via 110 kV transmission line through YangE line and HongYang line to the grid at present, so this part of bypass power is deducted from ER calculation. The 220 kV transmission line (top-middle of the diagram) is another optional path of power export, which was planned during construction but never used in operation. On the top-right of the diagram there is a 35 kV transmission line, to which a transformer station and three power stations are connected (the yellow lines).

Under normal conditions, 35 kV transmission line is disconnected with Yangcun hydropower station. When transformer station on 35 kV transmission line is in maintenance or malfunction, these three hydropower stations connected will export power via Yangcun hydropower station and the 110 kV transmission line through YangE line and HongYang line to the grid. This amount of bypass power is regarded as “electricity imported from grid” of Yangcun station during monitoring and is deducted from ER calculation.

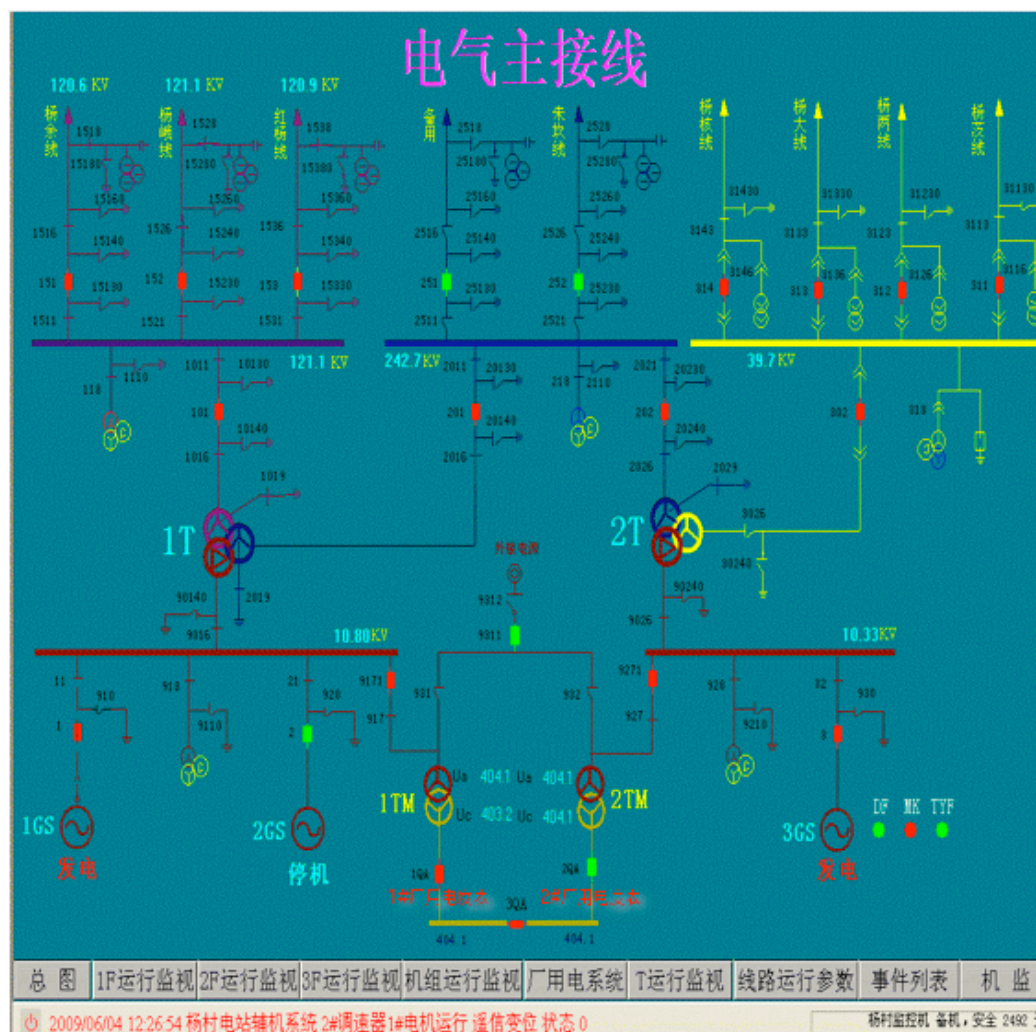


Fig.3-2 Main Electric Connection Diagram

A clear and simplified diagram is provided below in Fig.3-3 with monitoring meters indicated.

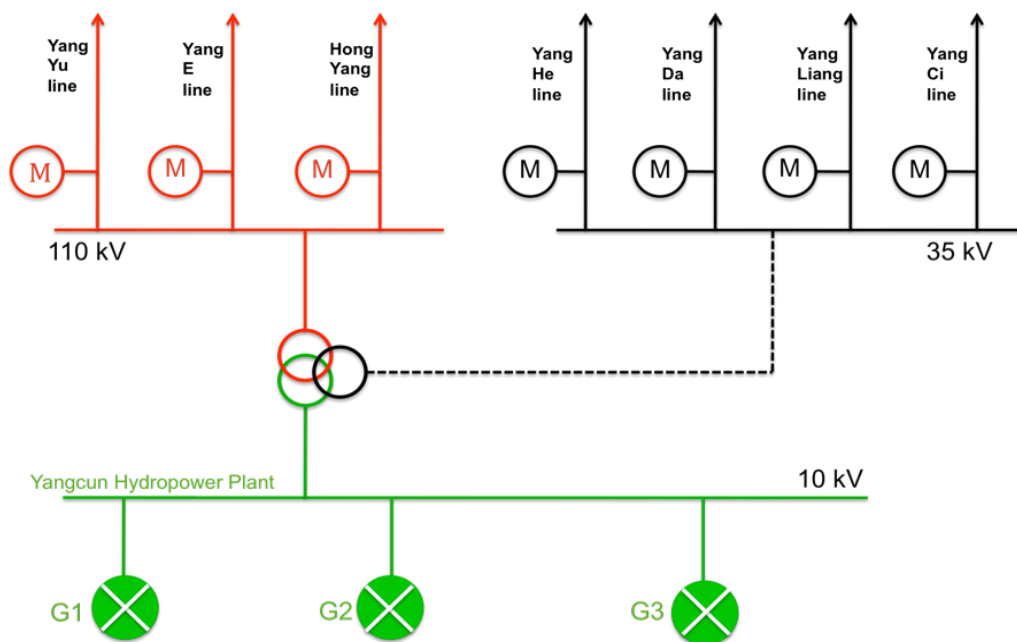


Fig.3-3 A Simplified Diagram of Main Electric Connection Diagram

Position	YangE Line	YangHe Line	YangDa Line	YangYu Line	YangLiang Line	YangCi Line	HongYang Line	Generator 1	Generator 2	Generator 3
Meter No.	317	422	313	431	478	255	301	0066	0093	0105
Monitored Parameters	$EG_{export, YangE, y}$	$EG_{import, YangHe, y}$	$EG_{import, YangDa, y}$	$EG_{import, YangYu, y}$	$EG_{YangLiang, y}$	$EG_{YangCi, y}$	$EG_{import, HongYang, y}$	$EG_{i, Yangcun, y}$	$EG_{i, Yangcun, y}$	$EG_{i, Yangcun, y}$
	$EG_{import, YangE, y}$	$EG_{export, YangHe, y}$					$EG_{export, HongYang, y}$			
Model	DSSD331-1	DSSD331-1	DSSD331-1	DSSD331-1	DSSD331-1	DSSD331-1	DSSD331-1	DSSD331-2	DSSD331-2	DSSD331-2
Accuracy grade										
(Active)	1	1	1	1	1	1	1	0.5	0.5	0.5
Serial No.	200106287A0317	200106287A0422	200104265A0313	200106287A0431	200106287A0478	200104265A0255	200106287A0301	200107071D0066	200107071D0093	200107071D0105
Calibration Valid Period	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013	27.7.2012 to 26.7.2013
Certificate No.	E2012072703	E2012072708	E2012072709	E2012072707	E2012072701	E2012072702	E2012072710	E2012072704	E2012072705	E2012072706
Calibration Valid Period	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014	26.7.2013 to 25.7.2014
Certificate No.	E2013072603	E2013072608	E2013072609	E2013072607	E2013072601	E2013072602	E2013072610	E2013072604	E2013072605	E2013072606
Certified by	Ebian Measurement and Examination Station									
Manufacturer	Changsha Wasion Meters Co., Ltd.									
Meter reading time	24:00, 25 th of each month									

The Net Electricity Export amount is calculated based on the Total Electricity Export multiplied by a default Transmission Loss Factor, which is further explained in Section 5 below.

$$EG_{Yangcun,net,y} = EG_{Yangcun,total,y} \times (1 - TLF)$$

Where

$EG_{Yangcun,net,y}$	Net electricity export of Yangcun hydropower station to the grid, accounting for transmission losses, in year y (kWh);
$EG_{Yangcun,total,y}$	Total electricity generation of Yangcun hydropower station exported to the grid in year y (kWh);
TLF	Transmission Loss Factor (%)

Based on diagram above, calculation of the Total Electricity Export of Yangcun hydropower station will be calculated as follows:

$$EG_{Yangcun,total,y} = Elec_{export,110kV,y} - Elec_{import,110kV,y} - Elec_{import,35kV,y} \quad (1)$$

Where

$EG_{Yangcun,total,y}$	Total electricity generation of Yangcun hydropower station exported to the grid in year y (kWh);
$Elec_{export,110kV,y}$	Electricity exported via 110 kV transmission line through YangE line and HongYang line to the grid in year y (kWh);
$Elec_{import,110kV,y}$	Electricity imported via 110 kV transmission line through YangE line, HongYang line and YangYu line from the grid in year y (kWh);
$Elec_{import,35kV,y}$	Electricity imported from 35 kV transmission line in year y (kWh), which indicates electricity input from 35 transmission line to the grid via 110 kV

transmission line through YangE line and HongYang line in year y (kWh).

Electricity exported via 110 kV transmission line through YangE line and HongYang line to the grid is calculated as following:

$$Elec_{export,110kV,y} = EG_{export,YangE,y} + EG_{import,HongYang,y} \quad (2)$$

Where:

- $EG_{export,YangE,y}$ Electricity exported via 110 kV transmission line through YangE line to the grid in year y (kWh);
- $EG_{import,HongYang,y}$ Electricity imported from HongYang line in year y (kWh), which indicates electricity exported via 110 kV transmission line through HongYang line to the grid in year y (kWh);

Electricity imported from YangE line, HongYang line and YangYu line is calculated as following:

$$Elec_{import,110kV,y} = EG_{import,YangYu,y} + EG_{import,YangE,y} + EG_{export,HongYang,y} \quad (3)$$

Where:

- $EG_{import,YangYu,y}$ Electricity imported from YangYu line in year y (kWh), which indicates electricity exported by YangYu line via 110 kV transmission line through YangE line and HongYang line to the grid in year y (kWh);
- $EG_{import,YangE,y}$ Electricity imported via 110 kV transmission line through YangE line from the grid in year y (kWh);
- $EG_{export,HongYang,y}$ Electricity exported via HongYang line in year y (kWh), which indicates electricity imported via 110 kV transmission line through HongYang line from the grid in year y (kWh);

Electricity input from 35 kV transmission line to the grid via 110 kV transmission line through YangE line and HongYang line is calculated as following:

$$Elec_{import,35kV,y} = EG_{import,YangDa,y} + EG_{YangLiang,y} + EG_{YangCi,y} - EG_{export,YangHe,y} + EG_{import,YangHe,y} \quad (4)$$

Where:

$EG_{import,YangDa,y}$ Electricity imported from YangDa line in year y (kWh), which indicates electricity input from YangDa line to the grid via 110 kV transmission line through YangE line and HongYang line in year y (kWh);

$EG_{YangLiang,y}$ Electricity exported via YangLiang line in year y (kWh), which indicates electricity input from YangLiang line to the grid via 110 kV transmission line through YangE line and HongYang line in year y (kWh);

$EG_{YangCi,y}$ Electricity exported via YangCi line in year y (kWh), which indicates electricity input from YangCi line to the grid via 110 kV transmission line through YangE line and HongYang line in year y (kWh);

$EG_{export,YangHe,y}$ Electricity exported via YangHe line in year y (kWh).

$EG_{import,YangHe,y}$ Electricity imported from YangHe line in year y (kWh).

4. Date collection

The project owner is responsible for operation of the electric energy meter, and guarantees that the measuring equipments are in good operation and completely sealed.

The electricity recorded by the electric energy meter will suffice for the purpose of billing and emission reduction verification. The monitoring process is as follows:

- i. The project owner reads and checks the electric energy meter and records the data periodically as the firsthand record of the supplied electricity to the grid;

- ii. The project owner compiles the recorded data of the supplied electricity to the grid monthly and provides the monthly balance sheet of electricity sales to the grid company;
- iii. The grid company confirms the amount of electricity exported by the project owner after the verification, confirmation and acceptance of the electricity data offered by the project owner;
- iv. The project owner provides an electricity sales invoice to the grid company according to actual amount of electricity delivery reflected by the grid company's confirmation. A copy of the invoice is kept by the project owner;
- v. The project owner properly keeps the balance sheet of electricity sales to the grid company. The periodical records of the electricity meter's data readings are archived electronically and on paper.

If either the project owner or the grid company detects any distortion or mal-function of the electric energy meter resulting in inaccuracy of the metered data, it promptly informs the other party as well as a qualified metrical institute co-authorized by the project owner and the grid company to jointly investigate and solve the problems.

Under the above-mentioned unusual circumstances, the parties, based on mutual agreement, determine the amount of supplied electricity to the grid during the period of the occurred distortion or mal-function of the electric energy meter by means of referring to voltage and current data in accordance with relevant rules.

The meter reading will be readily accessible for the verification entity. Calibration test records will be maintained for verification.

5. Calibration

The verification of the electric energy metering equipment is periodically carried out by a metrical institute authorized by the Administration of Standard Measurement according to relevant National electric industry standards and regulations. After every meter verification process, the electricity metering equipment is sealed, stamped and closed with other measures. Either party shall not unseal, change the structure, layout and connecting wires of the electric metering equipment nor manipulate the electricity meter.

Beyond the stipulated verification period, either party of the project owner or the grid company can request a calibration or verification of the electric energy metering equipment at any time. The calibration or verification have been carried out by a metrical institute authorized

by the Administration of Standard Measurement and co-authorized by the project owner and the Grid Company.

6. Data Management

The project owner properly keeps the electronic spreadsheets and printout of the monthly records of the amount of supplied electricity to the grid as well as the firsthand record of the electricity supplied to the grid. Besides that, the project owner collects sales receipts for the power delivered to the grid as a cross-check. At the end of each crediting year, a monitoring report is compiled by the project owner. Physical documentation of relevance for the monitoring process, such as paper-based maps and diagrams, are collected in a central place, together with the monitoring plan. In order to facilitate the auditor's reference, monitoring results are indexed. All paper-based information are stored by the project owner.

All data records will be kept for a period of 2 years following the end of the crediting period.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to methodology ACM0002 (Version 06), the baseline is the electricity produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as: (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

$$BE_y = EG_y \cdot EF_{CM}$$

where

BE_y : Baseline emissions in the year y (in t CO₂e/year)

EG_y : Electricity exported to the grid by the project activity in the year y (MWh/year)

EF_{CM} : Combined margin baseline emission factor of regional electricity grid (tCO₂e/MWh)

EG_y is calculated equal to the value of $EG_{Yangcun,net,y}$, the detailed calculation method please refer to Section3.

Combined margin baseline emission factor was calculated in PDD to be 0.94445 tCO₂e/MWh. This grid emission factor is determined ex-ante and fixed during the crediting period. According to the PDD, the expected annual electricity export to the grid is 258,060 MWh/year, BE_y is calculated as followed:

$$BE_y = EG_y * EF_y = 258,060 \text{ MWh/year} * 0.94445 \text{ tCO}_2\text{e/MWh} = 243,725 \text{ tCO}_2\text{e/year}$$

In this monitoring period (26-12-2012 to 25-11-2013), 248,725tCO₂e emission reductions are generated in total.

4.2 Project Emissions

According to ACM0002 (Version 06), greenhouse gas emissions from hydropower projects without reservoir (or with a power density of more than 10 W/m² of flooded area) are considered to be zero. This project has no reservoir. Hence, the project activity emissions are considered to be zero: Project Emissions = 0.

4.3 Leakage

According to CDM methodology ACM0002 (Version 06) no leakage calculation is required (provided that generating equipment is not transferred from another project activity). Hence, leakage emissions are considered to be zero.

4.4 Net GHG Emission Reductions and Removals

The calculated emission reductions achieved by the project activity within the covered monitoring period amount to 248,725tCO₂e in total. A summary of monitoring data and emission reductions based on aggregated data on a yearly basis are provided in the tables below.

Table 4-1 Emission Reduction in 2013

Month	Total Electricity exported (kWh)	Transmission Losses (kWh)	Net electricity exported (kWh)	Emission Reductions (tCO ₂ e)
January	9,725,249	800,388	8,924,861	8,429
February	9,339,766	768,663	8,571,103	8,095
March	7,915,329	651,432	7,263,897	6,860
April	28,629,216	2,356,184	26,273,032	24,814
May	28,696,272	2,361,703	26,334,569	24,872
June	32,264,232	2,655,346	29,608,886	27,964
July	41,933,144	3,451,098	38,482,046	36,344
August	34,945,974	2,876,054	32,069,920	30,288
September	41,128,736	3,384,895	37,743,841	35,647
October	27,150,200	2,234,461	24,915,739	23,532
November	25,244,560	2,077,627	23,166,933	21,880
December				
	286,972,678	23,617,851	263,354,827	248,725

The calculated ER from values above is 248,725tCO₂e.

Table 4-2 Summary of the Emission Reduction

	Total Electricity exported (kWh)	Transmission Losses (kWh)	Net electricity exported (kWh)	Emission Reductions (tCO ₂ e)
2013	286,972,678	23,617,851	263,354,827	248,725
Total	286,972,678	23,617,851	263,354,827	248,725

Comparison of the actual emission reduction claimed in this monitoring period (from 26/12/2012 to 25/11/2013) with the estimation in the registered PDD:

Monitoring Period: From 26/12/2012 to 25/11/2013	Total Electricity exported (MWh)	Net Electricity Supplied to grid (MWh)	Emission Reductions (tCO ₂ e)
Monitoring Report (Monitoring Data spreadsheet)	286,973	263,355	248,725
Registered PDD	278,300	236,555	223,415
Difference Comparison between actual data in MR and estimation in PDD	3.12%	11.33%	11.33%

From the above table, it can be clearly seen that there are only minor increase from the estimated values of net electricity supplied in PDD to the actual values in this monitoring report. Due to the fact that the rich water resources during the monitoring period, the value is reasonable.

APPENDIX X: Crosscheck

Three types of evidences have been collected in order to crosscheck the amount of net electricity supplied to the grid:

- A. Electricity meter readings from meters installed right after generators
- B. Reservoir Area Fund Declaration Document verified by E'bian County Tax Authority
- C. Electricity data from both sales receipts and internal invoices

An overview of values derived from all three approaches listed above is provided in the table below. More details about each data source are provided further below

Data Source	Monitoring Report	Crosscheck approach A	Crosscheck approach B	Crosscheck approach C	
	MR calculations	Electricity generated by generators, from onsite meters readings	Effective Electricity data from Reservoir Area Fund¹ Declaration Forms issued by local Tax Authority	Electricity data from Sales Receipts of Provincial power grid + internal invoices²	Most Conservative Value
Monitoring Period	Electricity exported (kWh)	Gross generation (kWh)	Net supply to grid (kWh)	Net supply to grid (kWh)	
2012-12-26 to 2013-11-25	286,972,678	291,262,320	287,031,518	291,262,325	MR calculations

¹ Data according to official submission to Reservoir Area Fund as per requirements of local tax authorities.

² The internal invoices were prepared for cross-checking the part of electricity generated by Yangcun hydropower plant and supplied to the local power grid. These invoices are financial documents for internal electricity sales transaction within the project owner's company system

Information on different approaches applied in the table above:

A) Electricity meter readings from meters installed right after generators

Meter readings of the onsite power generators are used. The data of these meter readings are all from the Electricity Monthly Reports, which have been already provided to DOE.

B) Reservoir Area Fund Declaration Document

The reservoir of Yangcun Hydropower Plant falls within the category of large or medium-sized reservoirs. According to the official document "Chuanbanfa [2008] No. 34" issued by the local government in Sichuan province, the local tax authority of E'bian County shall verify the monthly effective electricity supplied by the Yangcun Hydropower plant, starting from January 2009, in order to collect the "reservoir fund" tax, which is proportional to the electricity supplied to the grid. The verified Electricity Declaration Forms from December 2012 to November 2013 are available for cross check purposes. It should be noted that the project owner is liable for any wrong information provided to tax authorities. Furthermore, there is no incentive whatsoever for the project owner to report overestimated figures to tax authorities since this would result in higher taxes. Hence, this documentation can be regarded as a plausible and credible data source for crosschecking purposes.

Data Summary of the Declaration Forms:

The year of 2013			
Month	Reservoir Area Fund(RMB)	Effective Electricity (kwh)	
January	80,838.75	10,104,844	0.008
February	75,567.58	9,445,948	
March	63,577.21	7,947,151	
April	228,952.45	28,619,056	
May	228,933.63	28,616,704	
June	257,905.98	32,238,248	
July	333,237.17	41,654,646	
August	279,455.31	34,931,914	
September	328,932.28	41,116,535	
October	217,079.04	27,134,880	
November	201,772.74	25,221,593	
Sum of Effective Electricity		287,031,518	

The effective electricity figures from the table above are in line with the monitoring data provided by the project owner. Furthermore, the revised calculations in the latest version of the monitoring report are more conservative than the values listed above.

C) Electricity data according to sales receipts and internal invoices

The electricity exported by the project activity is sub-divided in electricity exported to the Central China Power Grid, which can be crosschecked by sales receipts, and electricity supplied to the local grid, which is owned and managed by the same entity that owns the Yangcun Hydropower Plant.

Given the fact that both the power generator and the grid company are the same, the amount of electricity exported to the grid can be crosschecked by using internal invoices from the power plant to the grid company. Since the electricity generation data and the data for crosschecking purposes are ultimately from the same company and the fact that there are no clear regulations for issuing invoices (see also comments below), we feel that the other alternatives described above, are more reliable and sufficient.

4.5 Transmission Losses

The meter readings used for determination of the electricity supply to the grid are one level below sub-station level, which would be the ideal point for verification of the net amount of electricity supplied to the grid. Even though the amount of net electricity supplied at sub-station level to the Central China Power Grid can be crosschecked through the available sales receipts (which are based on meters owned by the Sichuan Power Grid Company at sub-station level), there is still some level of uncertainty related to the share of electricity supplied to the local grid since there are no third party sales receipts for this portion of the electricity supply.

Project participants propose to apply the most conservative transmission loss value according to relevant literature. For the sake of simplification and conservativeness, the discount factor is applied over the entire electricity generation amount, even though the uncertainty to be addressed is only related to electricity exports to the local grid.

A list of potential values according to the China Electric Power Yearbooks, indicate a value of 8.23% as the highest value and therefore the most conservative choice. Project participants would like to point out that the values provided below refer to transmission losses for the entire power grid covering very large distances, whereas the uncertainty to be addressed in the verification report relates to transmission losses between the seven main meters used as primary data source and the sub-station where the electricity is actually transferred to the grid. It is clear that these losses are typically lower than 8.23% (due to shorter line as compared to the grid system), which is also confirmed by the crosscheck calculations described above. By adopting this value, project participants are applying a very high penalty to account for uncertainties in the monitoring procedures, which result in a significantly lower value of net electricity supply to the grid (and ultimately emission reductions) as compared to official documents used for confirmation of the net electricity supply figures (documents used under Approaches B and C described above).

Source: China Electric Power Yearbooks (2011, 2012, 2013):

Yearbook	Which Year's Data	National Power Grid Transmission Loss Rate
2011	2010	5.98%
2012	2011	6.53%
2013	2012	6.73%

Yearbook	Which Year's Data	National Power Grid Transmission Loss Rate
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2011	2010	5.98%
2012	2011	6.53%
2013	2012	6.73%