

LUOFAN 24MW HYDROPOWER PROJECT IN GUIZHOU PROVINCE CHINA

Document Prepared By (Guizhou Honor Carbon Asset Management Co., Ltd.)

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Luofan 24MW Hydropower Project in Guizhou Province China (hereafter referred to as “the project”) is an 24MW hydropower project developed by : Guizhou Zhongshui Eenergy Co., Ltd. (hereafter referred to as “the Project Owner”) and is located in Yanjia Town, Ceheng County, Guizhou Province, People’s Republic of China. The total capacity is 24MW (2×10MW+1×4MW). The estimated annual operation time of the project is 3,601h and the expected annual generated electricity is 86,420MWh with the net electricity of 85,988MWh supplied to the China Southern Power Grid (CSPG) annually. The surface area at the full reservoir level of the project is 298,700m², thus the power density of the project is 80.348W/m².The electricity generated by the proposed project will meet the electricity demand of industrial and agricultural production and local people’s life, and assume the task to adjust the peak in the local grid, finally connected to CSGP. Electricity generated by the project will displace part of the electricity generated by CSGP which is dominated by fossil fuel-fired power plants, and thus greenhouse gas (GHG) emission reductions could be achieved. The estimated annual GHG emission reductions are 55,857 tCO₂e.

The construction of the project started on 13/10/2009. The first water turbine and generator units were started on 05/12/2011. The second and third water turbines and generators units were started on 15/12/2011. Since then project is operation at full capacity. The project was operational during the monitoring period.

The Emission reductions during this monitoring period (05/12/2011-25/08/2013) is 95,624 (tCO₂e).

1.2 Sectoral Scope and Project Type

The project falls into: Sectoral Scope 1: energy industries (renewable sources)

Subclass: hydro power

The Project is not a Grouped project.

1.3 Project Proponent

Organization name	Guizhou Zhongshui Eenergy Co., Ltd.
Contact person	Mr. Wang Fei
Title	/
Address	Address: Shuncheng NO.1 Xixiu district, Anshun city, Guizhou Province.
Telephone	Tel: +86 13984359397
Email	41816524@qq.com.

1.4 Other Entities Involved in the Project

There is no any other Project Participant(s)

1.5 Project Start Date

The three water turbine and generator units were all started on 05/12/2011.

1.6 Project Crediting Period

The crediting period: 05/12/2011-04/12/2021.

Reason to choose this Crediting Period is that the project generated electricity continuously from 05/12/2011.

1.7 Project Location

The project is located in Yanjia Town, Ceheng County, Guizhou Province, People's Republic of China. Longitude: 105°51'E, Latitude: 25°07'N

1.8 Title and Reference of Methodology

Approved baseline and monitoring methodology:

ACM0002: [Grid-connected electricity generation from renewable sources](#) Version 14.0.0

Tools referenced in this methodology:

Tool to calculate the emission factor for an electricity system.

Version 04.0.0

Tool for the demonstration and assessment of additionality

Version 07.0.0

1.9 Other Programs

The project is not included in an emission trading program or any other mechanism that includes GHG allowance trading. The project has not sought or received another form of GHG-related environmental credit. The project is registered under any other GHG programs.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The construction of the project started on 13/10/2009. The first water turbine and generator units were started on 05/12/2011. The second and third water turbines and generators units were started on 15/12/2011. Since then project is operation at full capacity. The project was operational during the monitoring period.

There is no exchange of equipment during the monitoring period. There is no event occurred during this monitoring period, which may have impact on the applicability of the methodology as well as emission reduction.

2.2 Deviations

2.2.1 Methodology Deviations

Not applicable

2.2.2 Project Description Deviations

Not applicable

2.3 Grouped Project

This project is not a grouped project; this section is therefore not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO ₂ /MWh
Description:	The grid CO ₂ emission factor of the CSPG where the Project connected to.
Source of data:	VCS PD
Value applied:	0.6496
Justification of choice of data or description of measurement methods and procedures applied	Data used are from Chinese authorities.
Purpose of the data :	Baseline emission calculation.
Comments:	/

3.2 Data and Parameters Monitored

Data Unit / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project during the period.
Source of data:	Project activity site.
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording. (i) $EG_{out,y}$, The quantity of electricity supplied by the project to the grid; and (ii) $EG_{in,y}$,The quantity of electricity delivered to the project from the grid
Frequency of monitoring/recording:	Continuous measurement and monthly recording.
Value monitored:	147,206.540

Monitoring equipment:	Detail information of meters is listed in table 1 of section 3.3.
QA/QC procedures to be applied:	Cross check measurement results with records for sold electricity
Purpose of the data	Calculation of baseline emissions
Calculation method:	$EG_{\text{facility},y} = EG_{\text{out},y} - EG_{\text{in},y}$
Any comment:	/

Data Unit / Parameter:	Cap _{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data:	Project site.
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on recognized standards
Frequency of monitoring/recording:	Yearly
Value monitored:	24,000,000
Monitoring equipment:	/
QA/QC procedures to be applied:	/
Purpose of the data	Calculation of project emissions
Calculation method:	/
Any comment:	/

Data Unit / Parameter:	A _{PJ}
Data unit:	m ²
Description:	Area of the reservoir measured in the surface of the water, after the Implementation of the project activity, when the reservoir is full.
Source of data:	Measured annually by a qualified third party.

Description of measurement methods and procedures to be applied:	The data will be measured by professional survey method.
Frequency of monitoring/recording:	Yearly
Value monitored:	298,700
Monitoring equipment:	/
QA/QC procedures to be applied:	/
Purpose of the data	Calculation of project emissions
Calculation method:	The data was measured every year by professional design institute is reliable and creditable.
Any comment:	/

3.3 Monitoring Plan

1. Monitoring subject

The main data monitored are the electricity delivered to CSPG by the project and electricity consumed by the project activity from the CSPG. The net electricity delivered to CSPG is the difference of the electricity delivered to CSPG by the project and electricity consumed by the project activity from the CSPG according to the readings of the main meter.

2. Operational and management structure

In order to obtain reliable monitoring data, the project owner established a monitoring management structure prior to the starting of the crediting period. Clear responsibilities were assigned to all staffs involved in the VCS project. A monitoring director is appointed who has the overall responsibilities for the monitoring of the project, other staffs are responsible for the data recording, data collecting, data archiving and emission reductions calculation. The detailed structure is as follows:

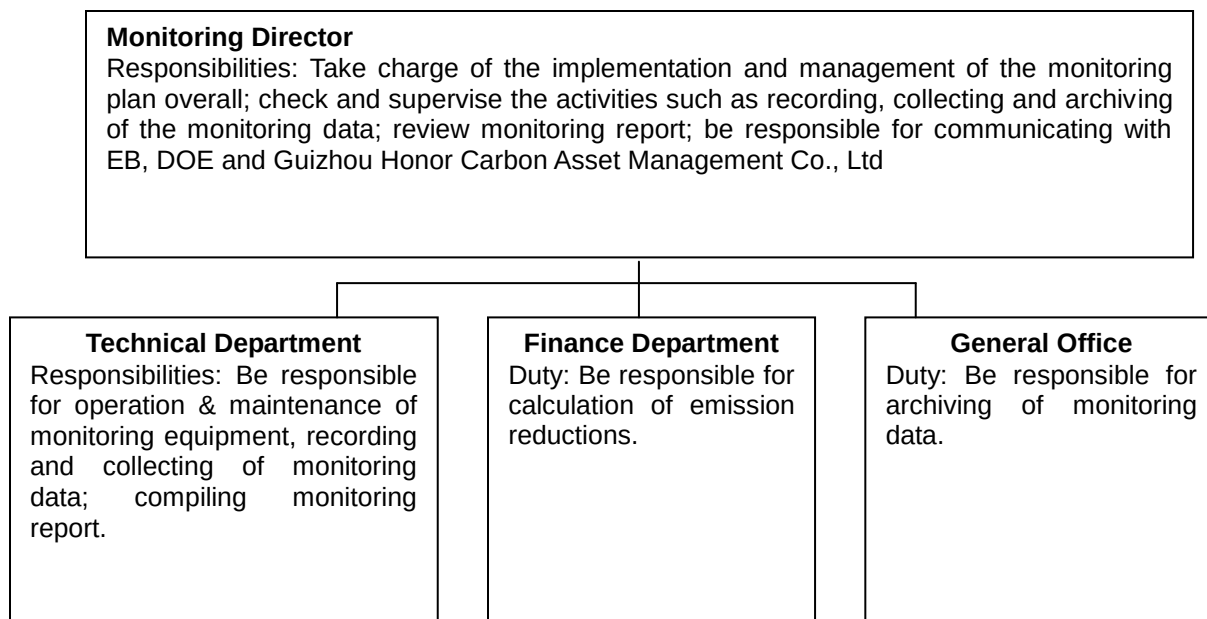


Fig. 4 Operational and Management Structure

3. Monitoring apparatus and installation:

The electricity metering equipment is selected according to the general industrial technical standards, that is in accordance with the requirement of “Technology & Management Regulations for Power Metering Devices” (DL/T448-2000). The accuracy of the meters is 0.2s, and the meters of the project are expected to be calibrated annually to ensure its precision.

Table 1 Information of the meters

	M1	M2
Type	2000-0420	2000-0420
SN	2603141	2603142
Location	In the project station	In the project station
Accuracy	0.2s	0.2s
On-sit Calibration date	10/11/2011	10/11/2011
	09/11/2012	09/11/2012
Validity until	08/11/2013	08/11/2013
The certificate entity	GUIZHOU ELECTRIC POWER TEST AND RESEARCH INSTITUTE	GUIZHOU ELECTRIC POWER TEST AND RESEARCH INSTITUTE

The monitoring system (including a main meter M1 and a back-up meter M2) owned by the

power grid company is installed at the connection point from the booster station of Luofan Plant to 110KV Transformer Substation, which monitors the power exported to the grid and the power imported from the grid.

The electrical connection and monitoring locations of the Bundled Project are shown below:

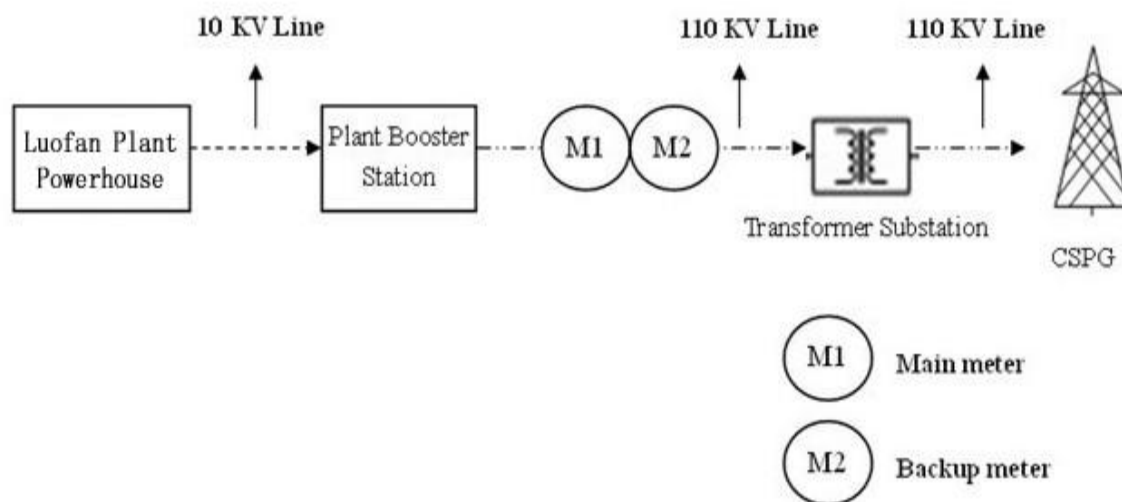


Fig. 5 Line Diagram of Monitoring Equipment

4. Data monitoring

The readings of the main meter are used for calculating the emission reductions when the main meter is in normal operation state. The monitoring processes are as follows:

- (1) In each month, the designated persons from the grid company and the project company record the readings of the meter for the electricity delivered to CSPG and consumed by the project activity from CSPG for last month;
- (2) The project owner provides the power grid company with the copy of the sale record, and preserves the copy of the sale record.

5. Quality control

1) Calibration of meters

The calibration of meters conducted by a qualified organization must comply with "Verification Regulation of Electrical Energy Meters with Electronics" (JJG596-1999) to ensure the accuracy. The main meter and back-up meter at the connection point to the grid is calibrated once per year.

When the main meter or back-up meter have a breakdown, the party finding the breakdown should tell another party and inform the qualified calibration organization to check, calibrate, test

and treat the meter so as to recover the normal monitoring state.

2) Emergency treatment

When the main meter or back-up meter have a breakdown, the electricity generation difference will be treated as follows:

(1) When one of the two meters has a breakdown, the readings of another meter will be adopted;

(2) If both of the main meter and back-up meter have breakdowns, the net electricity supplied to the grid will be determined conservatively after the discussion between the owner and the grid company.

6. Data management

All monitoring data and records are archived electronically and kept at least for 2 years after the end of the last crediting period.

7. Training program

The proposed project developer and Guizhou Honor Carbon Asset Management Co., Ltd. train all the related staffs before on duty and during project operation. The training contains VCS knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the ACM0002 (Version 14.0.0), the baseline emissions (BE_y) is calculated as follows:

$$BE_y = EG_y \times EF_{grid,CM,y} = (EG_{out,y} - EG_{in,y}) \times EF_{grid,CM,y}$$

$$EG_y = EG_{facility,y} = EG_{out,y} - EG_{in,y}$$

Where:

BE_y – Baseline emission in year y (tCO₂/yr)

EG_y – Net electricity supplied to the grid (MWh)

$EF_{grid,CM,y}$ – The emission factor in year y, calculated according to the registered PDD

The emission factor in registered PD has been determined as 0.64960 tCO₂e/MWh.

$EG_{out,y}$ – Electricity exported to the grid by the proposed project (MWh)

$EG_{in,y}$ – Electricity imported by the proposed project bought from the power grid (MWh)

The detailed calculation procedure is described below:

According to the detail data of the two tables below, the BE_y could be calculated as follows:

Table 2 Electricity supplied to the grid

Period	$EG_{out,y}$ (MWh)	ETN (MWh)	Verified $EG_{out,y}$ (MWh)
	A	B	C=MIN(A,B)
05/12/2011--25/12/2011	3,797.332	3,800.000	3,797.332

Subtotal-2011			3,797.332
26/12/2011--25/01/2012	3,652.880	3,650.000	3,650.000
26/01/2012--25/02/2012	4,321.504	4,320.000	4,320.000
26/02/2012--25/03/2012	4,254.712	4,250.000	4,250.000
26/03/2012--25/04/2012	6,344.756	6,340.000	6,340.000
26/04/2012--25/05/2012	7,405.595	7,400.000	7,400.000
26/05/2012--25/06/2012	13,965.688	13,970.000	13,965.688
26/06/2012--25/07/2012	15,029.168	15,030.000	15,029.168
26/07/2012--25/08/2012	15,533.540	15,530.000	15,530.000
26/08/2012--25/09/2012	11,903.408	11,900.000	11,900.000
26/09/2012--25/10/2012	6,785.724	6,780.000	6,780.000
26/10/2012--25/11/2012	3,923.260	3,920.000	3,920.000
26/11/2012--25/12/2012	4,055.963	4,060.000	4,055.963
Subtotal-2012			97,140.82
26/12/2012--25/01/2013	4,015.880	4,020.000	4,015.880
26/01/2013--25/02/2013	4,370.167	4,370.000	4,370.000
26/02/2013--25/03/2013	3,920.884	3,920.000	3,920.000
26/03/2013--25/04/2013	6,273.783	6,270.000	6,080.000
26/04/2013--25/05/2013	6,829.416	6,830.000	6,829.416
26/05/2013--25/06/2013	8,578.900	8,580.000	8,578.900
26/06/2013--25/07/2013	8,019.308	8,020.000	8,019.308
26/07/2013--25/08/2013	4,821.211	4,820.000	4,820.000
Subtotal-2013			46,633.50
Total	147,803.079	147,780.000	147,571.655

Table 3 Electricity import from the grid

Period	EG _{in, y} (MWh)	ETN (MWh)	Verified EG _{in, y} (MWh)
	D	E	F=MAX(D,E)
05/12/2011--25/12/2011	23.496	23.496	23.496
Subtotal-2011			23.496
26/12/2011--25/01/2012	25.344	25.344	25.344
26/01/2012--25/02/2012	22.352	22.352	22.352
26/02/2012--25/03/2012	16.984	16.984	16.984
26/03/2012--25/04/2012	13.157	13.157	13.157
26/04/2012--25/05/2012	13.508	13.508	13.508
26/05/2012--25/06/2012	12.936	12.936	12.936
26/06/2012--25/07/2012	9.417	9.417	9.417
26/07/2012--25/08/2012	9.724	9.724	9.724
26/08/2012--25/09/2012	14.168	14.168	14.168
26/09/2012--25/10/2012	17.336	17.336	17.336
26/10/2012--25/11/2012	23.056	23.056	23.056
26/11/2012--25/12/2012	21.912	21.912	21.912
Subtotal-2012			199.894
26/12/2012--25/01/2013	25.344	25.344	25.344
26/01/2013--25/02/2013	21.032	21.032	21.032
26/02/2013--25/03/2013	24.288	24.288	24.288
26/03/2013--25/04/2013	18.832	18.832	18.832
26/04/2013--25/05/2013	17.116	17.116	17.116
26/05/2013--25/06/2013	13.772	13.772	13.772
26/06/2013--25/07/2013	11.088	11.088	11.088
26/07/2013--25/08/2013	10.253	10.253	10.253

Subtotal-2013			141.725
Total	365.115	365.115	365.115

Table 4 Net Electricity supplied to the Grid

Period	Verified $EG_{out,y}$ (MWh)	Verified $EG_{in,y}$ (MWh)	Verified $EG_{facility,y}$ (MWh)
	C=MIN(A,B)	F=MAX(D,E)	G=C-F
05/12/2011--25/12/2011	3,797.332	23.496	3,773.836
Subtotal-2011			3,773.836
26/12/2011--25/01/2012	3,650.000	25.344	3,624.656
26/01/2012--25/02/2012	4,320.000	22.352	4,297.648
26/02/2012--25/03/2012	4,250.000	16.984	4,233.016
26/03/2012--25/04/2012	6,340.000	13.157	6,326.843
26/04/2012--25/05/2012	7,400.000	13.508	7,386.492
26/05/2012--25/06/2012	13,965.688	12.936	13,952.752
26/06/2012--25/07/2012	15,029.168	9.417	15,019.751
26/07/2012--25/08/2012	15,530.000	9.724	15,520.276
26/08/2012--25/09/2012	11,900.000	14.168	11,885.832
26/09/2012--25/10/2012	6,780.000	17.336	6,762.664
26/10/2012--25/11/2012	3,920.000	23.056	3,896.944
26/11/2012--25/12/2012	4,055.963	21.912	4,034.051
Subtotal-2012			96,940.925
26/12/2012--25/01/2013	4,015.880	25.344	3,990.536
26/01/2013--25/02/2013	4,370.000	21.032	4,348.968
26/02/2013--25/03/2013	3,920.000	24.288	3,895.712
26/03/2013--25/04/2013	6,080.000	18.832	6,061.168
26/04/2013--25/05/2013	6,829.416	17.116	6,812.300
26/05/2013--25/06/2013	8,578.900	13.772	8,565.128
26/06/2013--25/07/2013	8,019.308	11.088	8,008.220
26/07/2013--25/08/2013	4,820.000	10.253	4,809.747
Subtotal-2013			46,491.779
Total	147,571.655	365.115	147,206.540

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = (EG_{out,y} - EG_{in,y}) \times EF_{grid,CM,y}$$

$$= (147,571.655 - 365.115) \text{MWh} \times 0.6496 \text{tCO}_2\text{e/MWh} = 95,624 \text{tCO}_2\text{e}$$

4.2 Project Emissions

The installed capacity of the proposed project is 24MW, and the area of the reservoir is 298,700m², according to the methodology ACM0002 (Version14.0.0) the power density of the proposed project is calculated as the following formula:

$PD = 24,000,000 / 298,700 = 80.348 \text{W/m}^2$ greater than 10 W/m² According to the methodology ACM0002 (version 14.0.0), the project emissions may not be considered during this monitoring period. So

$$PE_y = 0$$

4.3 Leakage

According to ACM0002 (Version14.0.0), there is no need for the proposed project to consider leakage. Besides there is no fossil fuel engine/generator which is in place for emergency purpose during the monitoring period, the leakage from the project is zero.

$$L_y=0$$

4.4 Net GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y - L_y$$

$$BE_y = \text{Baseline Emissions} = 95,624 \text{ (tCO}_2\text{e)}$$

$$PE_y = \text{Project emissions} = 0 \text{ (tCO}_2\text{e)}$$

$$L_y = \text{Leakages} = 0 \text{ (tCO}_2\text{e)}$$

$$ER_y = BE_y = 95,624 \text{ (tCO}_2\text{e)}$$

The total Emission Reductions (ER_y) is calculated as follow:

$$ER_y = BE_y - PE_y - L_y = 95,624 - 0 - 0 = 95,624 \text{ (tCO}_2\text{e)}$$

Emission reductions generated in this monitoring period (05/12/2011-25/08/2013): 95,624 (tCO₂e).

The detailed Emission reductions in each year during this monitoring period are listed as follow:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2011 (05/12/2011--25/12/2011)	2451	0	0	2451
2012 (26/12/2011--25/12/2012)	62972	0	0	62972
2013 (26/12/2012--25/08/2013)	30201	0	0	30201
Total	95624			95624

Additional Information

Item	Values of ex-ante calculation	Actual values reached during the monitoring period
Emission reductions (tCO ₂ e)	55,857(per year); 96,410 (630days)	95,624 (630days);

The annually expected emission reduction of the project is 55,857 tCO₂e. This monitoring period

covers 05/12/2011-25/08/2013 which is 630 days in total. Then the estimated emission reduction for this monitoring period should be: 96,410 tCO₂e

The actual GHG emission reduction of this monitoring period (95,624tCO₂e) is 0.81% less than the estimation (96,410tCO₂e).