

Hubei Hefeng Yanzi Town Baishun Village Taohuashan Hydropower Station

Monitoring Report

Version: 01
Dated: 29/06/2009

CDM Registration Reference Number 1438
Monitoring Period: 18/02/2008 –25/06/2009

1. Introduction

This monitoring report contains the emission reductions of Hubei Hefeng Yanzi Town Baishun Village Taohuashan Hydropower Station (hereinafter referred to as “the project”) during the period: 18/02/2008-25/06/2009.

The project is a run-of-river hydropower station, which is located in Baishun Village of Yanzi Town in Hefeng County of Enshi Tujia-Miao Autonomous Prefecture, Hubei Province, China. The project is developed and operated by Hefeng Taoyuan Hydropower Co., Ltd.

The project employ two turbines with a total installed capacity of 12.6 MW. The electricity generated by the project will be transmitted to the Enshi Tujia-Miao Autonomous Prefecture Grid through Taohuashan 1st level Switching Station, which connects to the Shadao Transformer Substation owned by the grid company. The Enshi Tujia-Miao Autonomous Prefecture Grid connects to the Hubei Grid and finally to the Central China Power Grid.

Two meters are required, of which, the main meter M4 with accuracy of 0.2S (bi-directional) is located at the inlet of the Taohuashan 1st level Switching Station, measures the power supplied to the grid M4a and the power imported to the project by the grid M4b; the meter M5 with accuracy of 0.5S (the backup meter for M4, bi-directional) is located at the exist of the project, also measures the power supplied to the grid M5a and the power imported to the project by the grid M5b. The both meters are verified (*according to the Verification Regulation of Electrical Energy Meters with Electronics JJG 596-1999*) every five years and calibrated every year.

2. General description of the project

2.1 Project Activity

The total installed capacity of the project is 12.6MW. The project employs 2 turbines with a rated capacity of 6.3MW each. The estimated average annual operating hours is 3,492 hours, which corresponds to net annual electricity supplied to the grid of 42,262.8MWh. From 18/02/2008 to 25/06/2009 (one year and five months), the project has a total net power supplied to the grid of 64,154.204 MWh, corresponding with emission reductions of 60,590tCO₂e.

This project utilizes renewable energy to generate electricity without GHG emissions, and improves the generation capability in the Central China Grid. The development of the project is in compliance with the developing objective of the Chinese energy industry, and it will contribute to the sustainable development in the energy sector, especially for the electricity industry. The main contribution includes:

- ✧ Reducing the dependence on exhaustible fossil fuels for power generation;
- ✧ Reducing air pollution by replacing coal-fired power plants with clean, renewable power;
- ✧ Bridging the gab between power supply and demand and reducing the deficiency of the local grid;
- ✧ Reducing the adverse health impacts from air pollution;
- ✧ Reducing the emissions of greenhouse gases, to combat global climate change;
- ✧ Contributing to local economic development through employment creation and improving the local energy generation infrastructure.

The project is consistent with the Chinese government’s objective to reduce reliance on coal and make the energy sector in general and the power sector in particular more sustainable.

The implementation of the proposed project activity contributes to the development of local water resources, the enhancement of electricity supply capacity, and the improvement of power structure. It also promotes investment and consumption as well as employment, thus contributing to economic development.

The project activity aims to effectively utilize hydropower, displacing the new construction of fossil fuel power plants. By reducing the consumption of fossil fuels, it reduces the emissions of CO₂, SO_x and NO_x, thus mitigating the air pollution and its resulted adverse impacts on human health. Reducing fossil fuel consumption is not only favorable in terms of mitigating climate change but also in terms of reducing the country's dependence on exhaustible fossil fuels for power generation. Hydropower generation like the proposed project activity is compatible with the principle of the Chinese government to promote new energy, serving favorably for the sustainable development in China.

2.2 Technical description of the project

Location of the project activity

The proposed project activity's dam site is located on the Jiufengqiao River in Hefeng County, Enshi Tujia-Miao Autonomous Prefecture, Hubei Province, China. The dam is located at the exit of Dachangmei Spring, 12km away from the upper Dongjiaping barrage and 35km away from Hefeng County Seat. The power plant is located on the side of Nandu River, 50km from Hefeng County Seat. The exact coordinates of the dam site are north latitude of 29°58'16'' and east longitude of 110°14'20''. Figure 1 shows the location of the project.



Figure 1 the Location of the project

Grid connection

The project activity employs an on-site transformer station to boost electricity from 6.3kV to 110kV, which are transmitted to the Enshi Tujia-Miao Autonomous Prefecture Grid through Taohuashan 1st level Switching Station, which connects to the Shadao Transformer Substation owned by the grid company. The Enshi Tujia-Miao Autonomous Prefecture Grid connects to the Hubei Grid and finally to the Central China Power Grid.

The detailed power connection is shown in Figure 2.

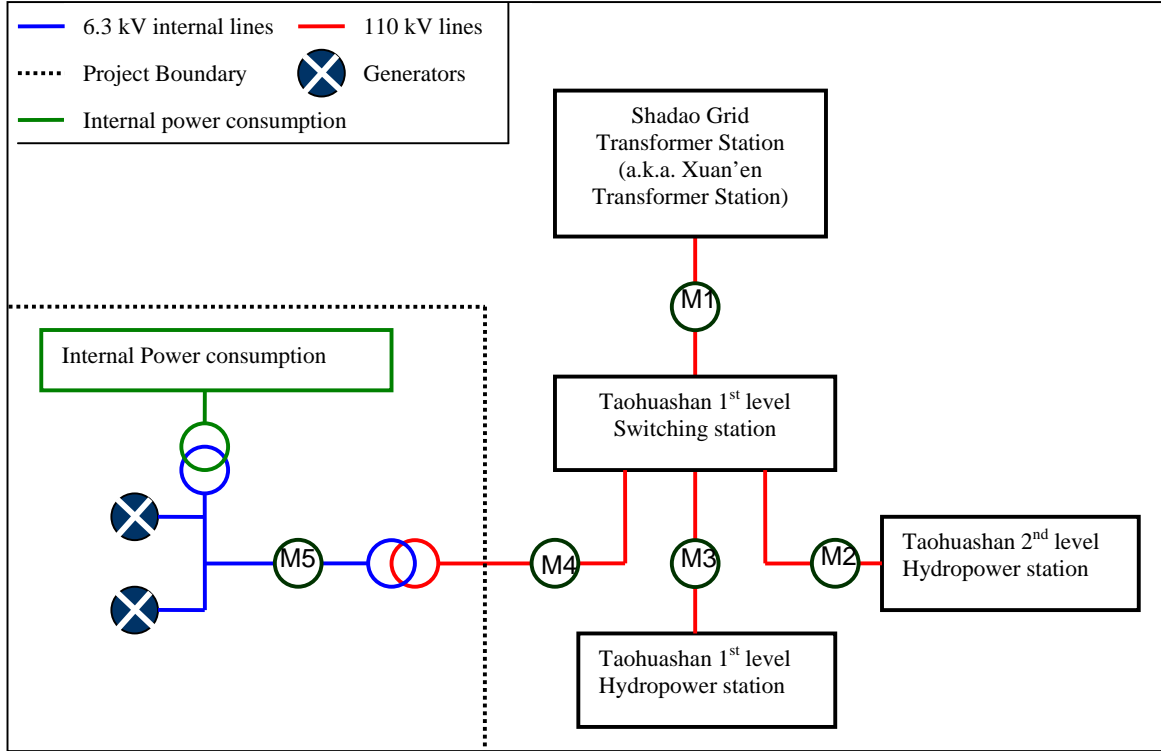


Figure 2 The detailed power connection

Technology employed in the project

The construction of the project mainly consists of a barrage, a tunnel inlet sluice, diversion system (culvert, tunnel), a fore-bay, penstock, and power house. The electricity will be generated by two units of CJA475-L-172/2/2×8.5 turbines which will be matched by two units of SF6300-10/2600 generators. The specific technical data of the turbines / generators is listed in Table 1.

Table 1 Technology employed in the project.

Key Technology Parameter		Value
Turbine	Designation	CJA475-L-172/2×9
	Manufacturer	Chongqing Yunhe Hydropower Equipments Co., Ltd.
	Rated Water Head	651m
	Rated Flow Rate	1.136m ³ /s
	Rated Power	6.528MW
	Rated Rotational Speed	600r/min
	Rated Efficiency	89.8%
Generator	Designation	SF6300-10/2600
	Manufacturer	Chongqing Yunhe Hydropower Equipments Co., Ltd.
	Rated Capacity	6.3MW
	Rated Power Coefficient	0.8 (lagging) - 0.9 (leading)
	Rated Rotational Speed	600r/min

	Rated Voltage	6.3kV
	Rated Electrical Current	721A
Main Transformer	Designation	SF10-16000/110
	Rated Capacity	16,000kVA

3. Monitoring methodology and plan

According the explanation of methodology choices for the project activity, the monitoring methodology is in the baseline methodology. In keeping with the monitoring methodology, the following parameter needs to be monitored for the project:

Table 2 the Data of the Power Supplied to the grid by the Project Monitored ($EG_{supplied,y}$)

Data / Parameter:	$EG_{supplied,y}$
Data unit:	MWh
Description:	Electricity supplied by the project to the grid in the years y
Source of data to be used:	Measured and verified against sale data
Value of data applied for the purpose of calculating expected emission reductions	The actual electricity supplied to the grid by the project is 64,257.936MWh from 18/02/2008 to 25/06/2009
Description of measurement methods and procedures to be applied:	Measured (M4 and M5) continuously and recorded on a monthly basis The main meter M4 with accuracy of 0.2S (bi-directional) is located at the inlet of the Taohuashan 1 st level Switching Station, measures the power supplied to the grid M4a and the power imported to the project by the grid M4b; the backup meter M5 with accuracy of 0.5S (the backup meter for M4, bi-directional) is located at the exist of the project, also measures the power supplied to the grid M5a and the power imported to the project by the grid M5b. The reading time of the two meters is at 0:00 on the 25 th every month. Therefore, the power supplied to the grid is M4a.
QA/QC procedures to be applied:	The two meters (M4 and M5) are verified (<i>according to the Verification Regulation of Electrical Energy Meters with Electronics JJG 596-1999</i>) every five years and calibrated every year. Power supplied to the grid will be measured and double checked with the balance bills and sales invoices. Data record and relevant documents will be archived for a period of 2 years after the crediting period. See detailed in section 4.1
Any comment:	-

Table 3 the Data of the Power Imported to the Project by the Grid Monitored ($EG_{imported,y}$)

Data / Parameter:	$EG_{imported,y}$
Data unit:	MWh
Description:	The power imported to the project by the grid in the years y
Source of data to be used:	Measured and verified against sale data
Value of data applied for the purpose of calculating expected emission reductions	The actual electricity imported to the project by the grid is 103.732MWh from 18/02/2008 to 25/06/2009
Description of measurement methods and procedures to be applied:	Measured (M4 and M5) continuously and recorded on a monthly basis The main meter M4 with accuracy of 0.2S (bi-directional) is

	located at the inlet of the Taohuashan 1 st level Switching Station, measures the power supplied to the grid M4a and the power imported to the project by the grid M4b; the backup meter M5 with accuracy of 0.5S (the backup meter for M4, bi-directional) is located at the exist of the project, also measures the power supplied to the grid M5a and the power imported to the project by the grid M5b. The reading time of the two meters is at 0:00 on the 25 th every month. Therefore, the power imported to the project by the grid is M4b.
QA/QC procedures to be applied:	The two meters (M4 and M5) are verified (<i>according to the Verification Regulation of Electrical Energy Meters with Electronics JJG 596-1999</i>) every five years and calibrated every year. Power supplied to the grid will be measured and double checked with the balance bills and sales invoices. Data record and relevant documents will be archived for a period of 2 years after the crediting period. See detailed in section 4.1
Any comment:	-

Table 4 the Data of the Net Power Supplied to the Grid (EG_y)

Data / Parameter:	EG_y
Data unit:	MWh
Description:	The net power supplied to the grid in the years y
Source of data to be used:	Measured, calculated and verified against sale data
Value of data	The actual net electricity supplied to the grid by the project is 64,154.204MWh from 18/02/2008 to 25/06/2009
Description of measurement methods and procedures to be applied:	Calculated according to $EG_{supplied,y} - EG_{imported,y}$
QA/QC procedures to be applied:	Calculated according to $EG_{supplied,y} - EG_{imported,y}$, no further QA/QC procedures will be applied.
Any comment:	-

The amount of net electricity supplied to the grid is multiplied by a baseline emission factor that has been determined ex-ante and has the value of **0.94445tCO₂e/MWh** (see details in the registered PDD of the project, registered number 1438).

4. Quality Control (QC) and Quality Assurance (QA)

4.1 QA/QC procedures

A summary of the QA/QC procedures is provided above. The detailed procedures for determining the net power supplied to the grid by the project is provided in the registered PDD and summarized below.

The transmission line delivers electricity to the grid can also deliver electricity from the grid to the project in emergency and start up as well. The metering equipment runs in two directions and the project owner records the net electricity supplied to the grid by the project. The Grid Company directly records the readings on the main meter (M4), and double checks the data with the one read from backup meter (M5).

The project sets 2 meters (the other three meters in Figure 2 are not necessary for the project), of which,

- ◇ The meter M4 (bi-directional, 0.2S) located at the entrance of the Taohuashan 1st level Switching Station is the main meter, which can monitor the power supplied to the grid M4a and the power imported to the project by the grid M4b. The meter M2 (bi-direction, 0.5S) is installed at the exit of the project, and used as the backup meter for M1. The two meters are verified (*according to the Verification Regulation of Electrical Energy Meters with Electronics JJG 596-1999*) every five years and calibrated every year. When the main meter is in trouble, the project owner employs the data monitored by the backup meter. Therefore, the net power supplied to the grid by the project is M1a-M1b.
- ◇ The reading time of the two meters is at 0:00 on the 25th every month (except on the 22nd in February 2008 and on the 24th in March 2008 and January 2009) by the grid company or the project owner.
- ◇ The grid company will issue balance bills for power supplied to the grid by the project (M4a) and power imported to the project by the grid (M4b) on the basis of the readings of M4.

The project owner will collect the invoices and balance bills for power supplied to the grid and power imported to the project by the grid as evidence for the readings of meter M4. The net power supplied to the grid (i.e. power supplied to the grid minus power imported to the project by the grid) will be used in the calculations (M4a-M4b). In case of discrepancies between the metering instruments of the grid company and the project owner, the readings of the grid company will prevail.

All records of power delivered to the grid, sales invoices and the results of calibration will be collated in a central place by the project owner. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.

If inaccuracy of the reading data from the main meter M4 exceeds the allowable tolerance in one month, the electricity supplied by the specific project and electricity imported by the grid company shall be followed by:

- i Reading the backup meter (after taking the line losses into consideration, the line losses will adopt the max value of line losses in history for conservative purpose) to ensure electricity is supplied to the grid, unless a test by either party reveals it is inaccurate;
- ii If the backup system is not within acceptable limits of accuracy or performed improperly, the project owner and the Grid Company shall jointly prepare a new agreement of the correct readings;

4.2 Roles and responsibilities

The monitoring of the emissions reductions is carried out according to the scheme shown in Figure 3. The General Manager holds the overall responsibility for the monitoring process, but as indicated below parts of the process are delegated. The first step is the measurement of the electricity supplied to the grid and reported daily, which is carried out by the plant manager.

The project owner has appointed a monitoring officer, who will be responsible for verification of the measurement, collection of balance bills and sales invoices, collection of invoices of the electricity supplied by the grid to the project and the calculation of the emissions reductions. The monitoring officer will prepare operational reports of the project activity, recording the daily operation of the project, including operating periods, equipment defects, etc.

Finally, the monitoring reports will be reviewed and approved by the General Manager.

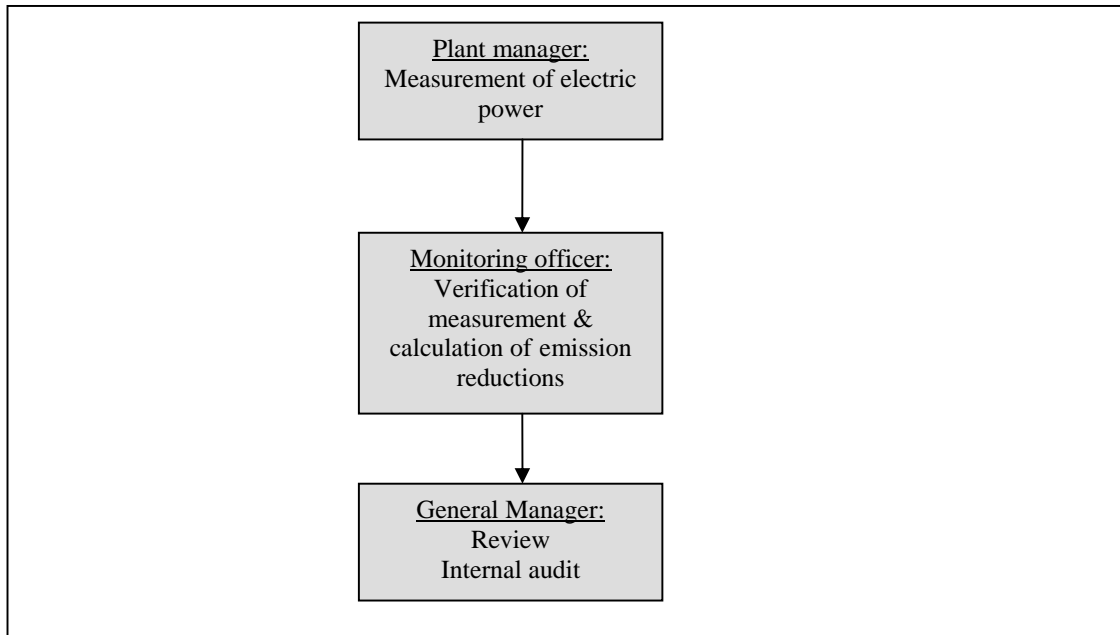


Figure 3 Management structure in order to monitor emission reductions

4.3 Training

The training of monitoring measurement was performed before the project operation. In addition, the monitoring officer received support from Beijing Tianqing Power International CDM Consulting, Co., Ltd. annually through the following actions:

- ✧ Provide the monitoring officer with a calculation template in electronic form for calculation of annual emission reductions, and train the monitoring officer how to use the calculation template;
- ✧ Continuous advice to the monitoring officer on a need basis;
- ✧ Supply newly verification request for the project owner and train them how to refer relevant information;
- ✧ Collect and review invoices, calibration report, electricity report periodically;
- ✧ Review of monthly electricity report and monitoring reports.

5. GHG Calculations

According to AMS. I.D Version 10, the emission reductions ER_y by the project activity during a given year y calculation is as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y : Emission reductions in year y (tCO₂e/yr);

BE_y : Baseline emissions in year y (tCO₂e/yr);

PE_y : Project emissions in year y (tCO₂e/yr);

LE_y : Leakage emissions in year y (tCO₂e/yr).

5.1 Baseline emissions

According to AMS. I .D Version 10, baseline emissions calculated as follows:

$$BE_y = (EG_y - EG_{baseline}) \times EF_y$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr);

$EG_{baseline}$: Baseline electricity supplied to the grid. The project is new, so $EG_{baseline} = 0$;

EF_y : Combined margin CO₂ emission factor for grid connected power generation in year y;

EG_y : Net electricity supplied by the project activity to the grid (MWh).

The emission factor has been determined ex ante as **0.94445**tCO₂e/MWh. Therefore, baseline emission can be calculated with the formula:

$$BE_y = EG_y \times 0.94445$$

The following Table 5 provides the calculation of the baseline emissions during the monitoring period.

Table 5 Baseline emissions during the monitoring period.

Period	Electricity supplied to grid by the project (MWh)	Electricity supplied to the project by the grid (MWh)	Net electricity supplied to the grid by the project (MWh)	$EF_{grid,CM,y}$ (tCO ₂ e/MWh)	Baseline emissions (tCO ₂ e)
18/02/2008-22/02/2008	601.104	0.361	600.743	0.94445	567.37
23/02/2008-24/03/2008	3,065.239	5.280	3,059.959	0.94445	2,889.98
25/03/2008-25/04/2008	4,412.205	4.499	4,407.706	0.94445	4,162.86
26/04/2008-25/05/2008	3,718.287	4.969	3,713.318	0.94445	3,507.04
26/05/2008-25/06/2008	3,716.248	7.425	3,708.823	0.94445	3,502.80
26/06/2008-25/07/2008	5,871.742	4.107	5,867.635	0.94445	5,541.69
26/07/2008-25/08/2008	7,811.806	0.825	7,810.981	0.94445	7,377.08
26/08/2008-25/09/2008	5,120.603	3.414	5,117.189	0.94445	4,832.93
26/09/2008-25/10/2008	2,761.822	7.092	2,754.730	0.94445	2,601.70
26/10/2008-25/11/2008	4,244.525	3.960	4,240.565	0.94445	4,005.00
26/11/2008-25/12/2008	222.724	14.485	208.239	0.94445	196.67
26/12/2008-24/01/2009	1,450.157	12.439	1,437.718	0.94445	1,357.85
25/01/2008-25/02/2009	1,618.831	13.496	1,605.335	0.94445	1,516.16
26/02/2009-25/03/2009	3,131.965	6.929	3,125.036	0.94445	2,951.44
26/03/2009-25/04/2009	4,745.033	6.072	4,738.961	0.94445	4,475.71
26/04/2009-25/05/2009	6,266.396	3.297	6,263.099	0.94445	5,915.18
26/05/2009-25/06/2009	5,499.249	5.082	5,494.167	0.94445	5,188.97
Total	64,257.936	103.732	64,154.204	-	60,590

Data source: all data for electricity supplied to the grid and electricity imported to the project by the grid all come from measurement and cross-checked by balance bills and electricity invoices.

Note: there are no any malfunction occurred on main meters from the operation starting date till now.

5.2 Project activity emissions

PE_y : Project emissions in year y (tCO₂e/yr). The project is a small scale run-of-river hydropower station, therefore, $PE_y=0$

5.3 Leakages

LE_y : Leakage emissions in year y (tCO₂e/yr). According to AMS. I .D Version 10, $LE_y=0$.

5.4 Emission reductions

The emission reductions of the proposed project are identical to the baseline emissions, as both the project emissions and leakage are equal to zero. Therefore, the emission reductions can be found using the following formula:

$$ER_y = BE_y = EG_y \times EF_y = (EG_{s,y} - PR_{g,y}) \times EF_y$$

Therefore, the emission reductions are equal to the baseline emissions, namely,

$$ER_y = BE_y = EG_y \times 0.94445$$

Table 6 provides the calculation of the emission reductions during the monitoring period.

Table 6 Calculation of the emission reductions in the monitoring period

Period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission Reductions (tCO ₂ e)
18/02/2008-22/02/2008	567.37	0	0	567.37
23/02/2008-24/03/2008	2,889.98	0	0	2,889.98
25/03/2008-25/04/2008	4,162.86	0	0	4,162.86
26/04/2008-25/05/2008	3,507.04	0	0	3,507.04
26/05/2008-25/06/2008	3,502.80	0	0	3,502.80
26/06/2008-25/07/2008	5,541.69	0	0	5,541.69
26/07/2008-25/08/2008	7,377.08	0	0	7,377.08
26/08/2008-25/09/2008	4,832.93	0	0	4,832.93
26/09/2008-25/10/2008	2,601.70	0	0	2,601.70
26/10/2008-25/11/2008	4,005.00	0	0	4,005.00
26/11/2008-25/12/2008	196.67	0	0	196.67
26/12/2008-24/01/2009	1,357.85	0	0	1,357.85
25/01/2008-25/02/2009	1,516.16	0	0	1,516.16
26/02/2009-25/03/2009	2,951.44	0	0	2,951.44
26/03/2009-25/04/2009	4,475.71	0	0	4,475.71
26/04/2009-25/05/2009	5,915.18	0	0	5,915.18
26/05/2009-25/06/2009	5,188.97	0	0	5,188.97
Total	60,590	0	0	60,590

Therefore, the total emission reductions in the monitoring period are calculated as 60,590tCO₂e.

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