VCS MONITORING REPORT

Tadi 16 MW Hydropower Project in Zhejiang Province

Monitoring Periods: Jan. 1st, 2008 to Nov. 22nd, 2009

Version: 02

Date: Aug. 3rd, 2010

INDEX

1. Introduction

This document reports the emission reductions generated by the Tadi 16 MW Hydropower Project in Zhejiang Province (hereafter referred as the Project) in the following monitoring period: **Jan. 1st, 2008 to Nov. 22nd, 2009.** The Project was registered as a CDM project on Nov 23rd, 2009, and the CDM registration reference number is 2744.

2. General description of the project

2.1 Project activity

The Tadi 16 MW Hydropower Project in Zhejiang Province (hereafter referred to as the Project) developed by Quzhou Tadi Hydro Complex Development Co., Ltd is sited on the Qujiang River, downstream from the Quzhou City, Zhejiang Province. The primary purpose of the Project is to utilize the water resources of the Qujiang River to generate clean electricity to deliver to East China Power Grid (ECPG) through the Zhejiang Power Grid (ZJPG) without CO_2 emissions.

The Project is a newly-built hydropower project with the total installed capacity of 16 MW. The increased flooded land area resulting from the Project is 726,400 m^2, therefore the power density is greater than 22.0 W/m^2. The designed average annual electricity generation is 63.14 GWh, and the estimated electricity supplied to the grid would be 57.842 GWh annually considering the effective electricity generation, auxiliary consumption and transmission loss. The Project activity would achieve greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from the business-as-usual scenario, electricity generated by those fossil fuel-fired power plants connected into ECPG. The estimated emission reductions would be 52,324 tCO_2e per year.

2.2 Technical description of the project

Location of the project activity

The Project is sited within Tadi Village, Qujiang Town, Quzhou City, Zhejiang Province, P.R.China. The location of the Project is 6 km from the Quzhou City. The geographical coordinates of the Project site are 28°58′ 54″ N-118°55′ 37″ E in degrees.

Technology employed by the project activity

The Project is a riverbed-type hydropower plant with low hydraulic head and big discharge flow. The rubber dams and the powerhouse drive up the water to form the hydraulic head, and then the water flows into the powerhouse and drives the hydraulic generators to produce electricity.

The Project includes a reservoir, rubber dams, drainage pump rooms, a powerhouse, a booster station, a sand-flushing sluice, a ship lock and a 35 KV transmission line to substation. The Project installed four turbines with a unit capacity of 4.0 MW. Key technical parameters of the hydro turbine and the generator are listed in Table 1.

Table 1. Key technical parameters of the hydro turbine and the generator

Hydro Turbine		Generator	
Turbine Type	GZTF08B-WP-360	Generator Type	SFWG4000-52/4220
Rated head	5.0m	Rated Capacity	4444.4 kVA
Rated power	4210 kW	Rated voltage	6300 V
Rated flow	93.92 m^3/s	Rated current	407.3 A
Rated speed	115.4 r/min	Rated power factor	0.9

Power connection system

The diagram of power connection system with the monitoring point of the Project is specified in figure.1, the monitoring point sets at the inside of the 35kV busbar in the Project site with a bidirectional meter, which can both monitor the electricity supplied to ECPG by the Project and the occasionally electricity import from ECPG to the Project, so the net electricity export of the Project can be acquired to calculate emission reductions when verification.

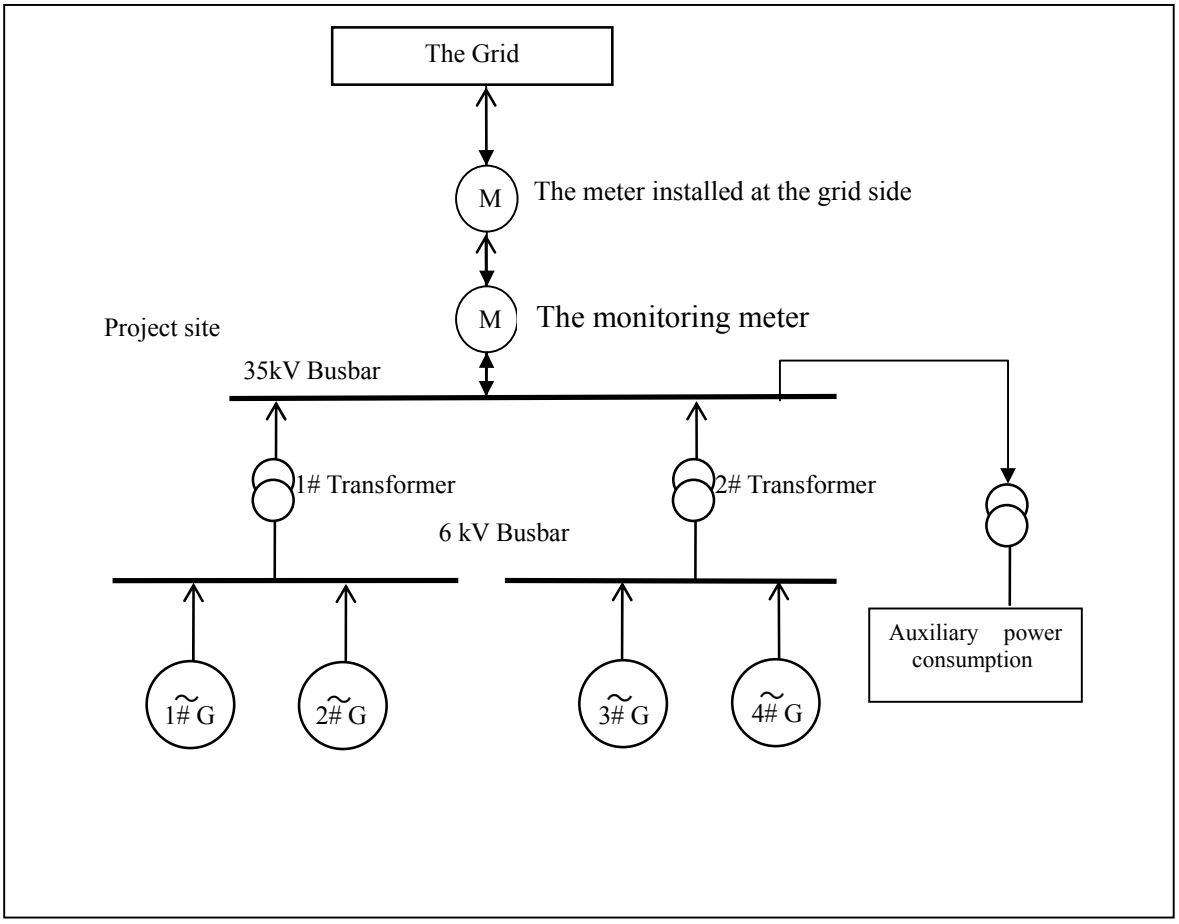

Figure 1.The diagram of power connection system

2.3 Current status

The implementation of the project is consistent with the registered PDD. The Project was put into fully operation in March, 2007 with four units were all grid connected. The #3 unit was trial grid connected on 16/1/2007, #4 unit was trial grid connected on 5/2/2007, #1 unit was trial grid connected on 4/3/2007 and #2 unit was trial grid on 7/3/2007.

On 28/3/2008 the monitoring meter was exchanged, the old meter (serial number: 3060075385) was institute by a new meter (serial number: 00196338) with the same mode (DSSD5 (A)) and accuracy (0.5S). And it would not affect the whole monitoring process.

On March 30, 2008, August 7, 2008, December 25, 2008, January 24, 2009, March 20, 2009, the high-voltage fuses of the measure voltage transformer in the project power

plant blew out. And new fuses were replaced on April 29, 2008, August 19, 2008, December 26, 2008, January 29, 2009 and March 21 2009, respectively. The phenomenon only caused a great error in outlet active power measurement and the recorded electricity amount lower than the realistic, while had no damage to the monitoring meter.

Fuses blew made the data of the monitoring meter incredible in those months. So when the events occurred, the corresponding data of the meter installed at grid side was used for security.

During the monitoring period there have been no other emergencies happened to the monitoring system.

3. Monitoring methodology and plan

3.1 Monitoring methodology

The monitoring methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" (Version 07) is selected for the Project in the registered PDD.

3.2 Parameters monitored

To be in line with the monitoring methodology and the monitoring plan in the registered PDD, the following parameter needs to be monitored for the project:

Data / Parameter:	*EGy*
Data unit:	*MWh*
Description:	*Electricity supplied by the project activity to the grid*
Source of data to be used:	*Measured by meter installed at the Project site.*
Value of data	-
Description of measurement methods and procedures to be applied:	*The electricity supplied to ECPG by the Project was measured continuously through electronic metering instruments at the Project site and recorded by designated staff on a monthly basis.*
QA/QC procedures to be applied:	*The electricity supplied to the grid was periodically reviewed with sales receipts from the Electricity Power Company. Calibration of Meters & Metering should be implemented according to national standards and rules (such as DL/T448-2000 the Technical Management Rules for Electric Power Measuring Installations) annually at least.*
Any comment:	-

Data / Parameter:	CAP_{PJ}
Data unit:	*W*
Description:	*Installed capacity of the hydropower plant after the implementation of the project activity.*
Source of data to be used:	*Project site.*
Value of data	-
Description of measurement methods and procedures to be applied:	*Determine the installed capacity yearly based on recognized standards.*
QA/QC procedures to be applied:	-
Any comment:	-

Data / 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 to be used:	*Project site.*
Value of data	-
Description of measurement methods and procedures to be applied:	*Yearly measured from topographical surveys, maps, satellite pictures, etc.*
QA/QC procedures to be applied:	-
Any comment:	-

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

4.1 QA/QC procedures

The monitoring plan as described in the PDD describes the implementation of the QA and

QC requirements and provides the following QA/QC procedures:

- ✓ The electricity delivered by the project to ECPG was monitored through metering equipment at the project sites. The data should be cross-checked against relevant electricity sales receipts and/or records from the grid for quality control.
- ✓ On duty staff watched the operation status of metering equipments everyday on site. Furthermore, designated staff collected the measured electricity data and completed the corresponding records on a monthly basis. Before being archived, these records were checked by other staffs to ensure the correctness. The data from these records were digested and analyzed and the results were reported to project manager.
- ✓ Calibration of meter was implemented by the independent qualified party at least once per year and all the records were documented and maintained by the project owner for DOE's verification.
- ✓ Problem occurred in monitoring and measurement process was recorded and reported to project manager.
- ✓ In addition, The staff who were responsible for the electricity meter reading and recording and who were responsible for auditing the metered data had been trained according to the CDM monitoring and management manual.

4.2 Roles and responsibilities

Quzhou Tadi Hydro Complex Development Co., Ltd. is responsible for monitoring, measurement and reporting. In the monitoring period, the project is implemented according to the monitoring plan in the registering PDD.

4.3 Calibration

Calibration is performed by authorized and qualified calibration entity. The model of the two monitoring meters is all DSSD5 (A), the first meter's serial number is 3060075385 and the second meter's serial number is 00196338. The accuracy of the monitoring meter is 0.5S. The first monitoring meter was calibrated by Electric Energy Measurement Center of Quzhou Power Supply Bureau of Zhejiang Province on December 17, 2007. The second monitoring meter was calibrated by Electric Energy Measurement Center of

Quzhou Power Supply Bureau of Zhejiang Province on March 28, 2008 and December 10, 2008. The validity period for the calibrations is one year. The calibration entity is accredited by Zhejiang Bureau of Quality and Technical Supervision. The calibration records showed that the meter used for electricity monitoring was qualified.

The model of the meter installed at grid side is DSSD331B, the meter's serial number is H000001981. The accuracy of the meter is 0.5S. The meter was calibrated by Electric Energy Measurement Center of Quzhou Power Supply Bureau of Zhejiang Province on August 13, 2007, May 10, 2008 and April 22, 2009. The validity period for the calibrations is one year. The calibration entity is accredited by Zhejiang Bureau of Quality and Technical Supervision. The calibration records showed that the meter was qualified.

5. GHG calculations

According to the methodology ACM0002: $ER_y = BE_y - PE_y - L_y$

5.1 Project activity emissions

The flooded land area resulting from the Project was measured by Water resource Bureau of Quzhou City after the implementation of the project. The actual measuring result of the surface area at full water level is 726400m^2. The power density of the project is 22W/m^2, which greater than 10W/m^2. According to the methodology ACM0002, the project activity emissions is zero, as PE_y=0 tCO_2e.

5.2 Leakages

According to the methodology ACM0002, the Project takes no account of leakage, as L_y =0 tCO_2e.

5.3 Baseline emissions

Baseline emissions (BE_y in tCO_2e) can be calculated as the electricity supplied by the project activity to the grid (EG_y in MWh) multiplied by the baseline emissions factor (EF_y in tCO_2e/MWh):

$$BE_y = EG_y \times EF_y$$

Where:

EG_y-- Electricity supplied to the grid during the monitoring period (MWh). There are some small differences (about 0.6%) between the records of electricity exported to and imported from the grid in the Electricity Transaction Notes (ETNs) and Monthly Reading Records (MRR). The line loss is the source of the differences, there were about 0.6% electricity loss in transmission process. In order to calculate the emission reductions on conservative basis, the minimum value was used between the records of electricity exported to the grid and the maximum value was used between the records of electricity imported from the grid in the ETNs and MRR. So the net supplied power EG_y is conservative.

EF_y-- Emission factor of the grid (tCO_2e /MWh) (0.9046 tCO_2e /MWh, as calculated ex-ante in the registered PDD:

:

Period		Electricity exported (kWh)	Electricity exported：read from MRR (kWh)	Electricity exported ：read from ETNs (kWh)	Electricity imported (kWh)	Electricity imported：read from MRR (kWh)	Electricity imported：read from ETNs (kWh)	Net supplied power EG (kWh)	EF (tCO_2e /MWh)	BEy (tCO_2e)	PEy (tCO_2e)	Ly (tCO_2e)	ERy (tCO_2e)
From	to	A=min (A1,A2)	A1	A2	B=max (B1,B2)	B1	B2	C=A-B	D	E=C*D	F	G	H=E-F-G
01/01/2008	31/01/2008	2,844,800	2,854,600	2,844,800	11,760	11,200	11,760	2,833,040	0.9046	2,563	0	0	2,563
01/02/2008	29/02/2008	4,339,160	4,354,280	4,339,160	7,000	6,720	7,000	4,332,160	0.9046	3,919	0	0	3,919
01/03/2008	31/03/2008	3,559,080	3,559,080	3,559,080	9,520	9,240	9,520	3,549,560	0.9046	3,211	0	0	3,211
01/04/2008	30/04/2008	6,067,320	6,067,320	6,067,320	2,800	2,800	2,800	6,064,520	0.9046	5,486	0	0	5,486
01/05/2008	31/05/2008	4,479,160	4,494,280	4,479,160	7,840	7,560	7,840	4,471,320	0.9046	4,045	0	0	4,045
01/06/2008	30/06/2008	5,463,080	5,484,360	5,463,080	11,480	10,920	11,480	5,451,600	0.9046	4,932	0	0	4,932
01/07/2008	31/07/2008	4,961,600	4,975,880	4,961,600	10,920	10,640	10,920	4,950,680	0.9046	4,478	0	0	4,478
01/08/2008	31/08/2008	5,042,800	5,042,800	5,042,800	5,880	5,600	5,880	5,036,920	0.9046	4,556	0	0	4,556
01/09/2008	30/09/2008	4,587,800	4,602,080	4,587,800	9,800	9,520	9,800	4,578,000	0.9046	4,141	0	0	4,141
01/10/2008	31/10/2008	3,453,520	3,463,320	3,453,520	11,480	10,920	11,480	3,442,040	0.9046	3,114	0	0	3,114
01/11/2008	30/11/2008	5,854,800	5,873,840	5,854,800	5,600	5,320	5,600	5,849,200	0.9046	5,291	0	0	5,291
01/12/2008	31/12/2008	4,058,040	4,058,040	4,058,040	12,320	11,760	12,320	4,045,720	0.9046	3,660	0	0	3,660
Subtotal in 2008		54,711,160			106,400	102,200	106,400	54,604,760		49,395			49,395
01/01/2009	31/01/2009	1,845,200	1,845,200	1,845,200	20,440	19,600	20,440	1,824,760	0.9046	1,651	0	0	1,651
01/02/2009	28/02/2009	3,167,920	3,176,040	3,167,920	10,360	10,080	10,360	3,157,560	0.9046	2,856	0	0	2,856
01/03/2009	31/03/2009	7,279,440	7,279,440	7,279,440	2,800	2,800	2,800	7,276,640	0.9046	6,582	0	0	6,582
01/04/2009	30/04/2009	6,932,240	6,956,880	6,932,240	4,760	4,760	4,760	6,927,480	0.9046	6,267	0	0	6,267
01/05/2009	31/05/2009	5,435,080	5,454,120	5,435,080	7,280	7,000	7,280	5,427,800	0.9046	4,910	0	0	4,910
01/06/2009	30/06/2009	6,370,280	6,394,080	6,370,280	9,520	9,240	9,520	6,360,760	0.9046	5,754	0	0	5,754
01/07/2009	31/07/2009	5,150,320	5,166,840	5,150,320	12,600	12,040	12,600	5,137,720	0.9046	4,648	0	0	4,648
01/08/2009	31/08/2009	7,168,280	7,190,680	7,168,280	2,800	2,800	2,800	7,165,480	0.9046	6,482	0	0	6,482
01/09/2009	30/09/2009	3,971,520	3,983,560	3,971,520	12,320	12,040	12,320	3,959,200	0.9046	3,581	0	0	3,581

Period		Electricity exported (kWh)	Electricity exported：read from MRR (kWh)	Electricity exported ：read from ETNs (kWh)	Electricity imported (kWh)	Electricity imported：read from MRR (kWh)	Electricity imported：read from ETNs (kWh)	Net supplied power EG (kWh)	EF (tCO_2e /MWh)	BEy (tCO_2e)	PEy (tCO_2e)	Ly (tCO_2e)	ERy (tCO_2e)
01/10/2009	31/10/2009	2,898,560	2,906,120	2,898,560	10,080	9,800	10,080	2,888,480	0.9046	2,613	0	0	2,613
01/11/2009	22/11/2009	3,083,080	3,093,160	3,083,080	6,720	6,440	6,720	3,076,360	0.9046	2,783	0	0	2,783
Subtotal in 2009		53,301,920			99,680	96,600	99,680	53,202,240		48,126			48,126
Total		108,013,080			206,080			107,807,000		97,521	0	0	97,521

5.4 Emission reductions

The net electricity supplied to the grid is 54,604.76MWh and 53,202.24MWh in 2008 and 2009 respectively. The total net electricity supplied to the grid (EG_y) is107,807MWh.

The baseline emission (BE_y) can be calculated by the formula below:

$BE_{2008} = EG_{2008} \times EF_y$ =54,604.76MWh × 0.9046 tCO_2e/MWh =49,395tCO_2e

$BE_{2009} = EG_{2009} \times EF_y$ =53,202.24MWh × 0.9046 tCO_2e/MWh=48,126 tCO_2e

$BE_{2008\text{-}2009} = BE_{2008} + BE_{2009}$=49,395$tCO_2e$ +48,126 tCO_2e =97521 tCO_2e

As the project emission and leakage from the project activity is zero, the emission reduction during the monitoring period (01/01/2008-22/11/2009) is:

$ER_{2008} = BE_{2008} - PE_{2008} - L_{2008}$ = 49,395–0–0 =49,395tCO_2e

$ER_{2009} = BE_{2009} - PE_{2009} - L_{2009}$ = 48,126–0–0 =48,126tCO_2e

$ER_{2008\text{-}2009}=ER_{2008}+ER_{2009}$=49,395+48,126=97521 tCO_2e

The emission reductions are 49,395 tCO_2e in 2008 (01/01/2008-31/12/2008) and 48,126 tCO_2e in 2009 (01/01/2009 – 22/11/2009). The total emission reduction is 97,521 tCO_2e during the monitoring period (01/01/2008-22/11/2009).

6. Entity responsible for this monitoring report

Entity: Cleanergy Investment Service (Beijing) Co., Ltd.

Address: Capital Times Square, 88 Xichang'an Jie, Beijing, China, 100031.

Tel: +86-10-83914567

Fax: +86-10-83914555