MONITORING REPORT

48 MW Houqiao Hydropower Project, Yunnan, China

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1 PROJECT DETAILS

1.1 Summary Description of Project

48 MW Houqiao Hydropower Project, Yunnan, China (hereafter referred to as *the project*) is consists of three 16MW, in total 48MW capacity of hydropower generation units developed at Binglang River in Tengchong County, Baoshan City, Yunnan Province, P. R. China. The objective of the project is to utilize water resources of the Binglang River for electricity generation, which was registered on 24th November, 2009 by the VCS board. The project is a grid-connected renewable energy project, the electricity generated replaces the part of electricity generated at the China Southern Power Grid (hereafter referred to as *CSPG*); the project activity contributes to the obvious GHG emission reductions by avoiding CO_2 emissions, as CSPG is dominated with fossil fuel fired power plants.

The monitoring period of this time is from 1 April, 2006 to 30 November, 2011. The total electricity replaced by the project during this monitoring period was 1,082,939.655MWh; therefore the emission reduction is 943,454tCO_2e.

1.2 Sectoral Scope and Project Type

According to the categorization system of CDM, which is the part of green house gas (GHG) program that has been approved by the VCS Board, the project is categorized as:

Sectoral Scope Number: 1
Sectoral Scope: Energy industries (renewable/non-renewable sources)
Project Activity: Grid-connected renewable power generation project activities from hydropower plants with accumulated reservoir.

1.3 Project Proponent

The following organization is the project owner and operator of the project:

Organization:	Yunnan Baoshan Binglang River Hydropower Development Co., Ltd.
Street/P.O.Box:	No.208, Zhengyang North Road, Yongchang Town, Longyang Section
City:	Baoshan City
State/Region:	Yunnan Province
Postfix/ZIP:	678000
Country:	People's Republic of China
Tel:	+ 86 875 5897067
Represented by:	Yibin Liu
Title:	President
Last Name:	Liu
First Name:	Yibin
Mobile:	-

Tel:	-
Personal E-mail:	MXP8448@126.com

1.4 Other Entities Involved in the Project

The following organization is the purchaser of the credits:

Organization:	Tepia Corporation Japan Co., Ltd.
Street/P.O.Box:	1-7-4, Minamihorie, Nishi-ku
City:	Osaka
Postfix/ZIP:	5500015
Country:	Japan
Tel:	+81 6 6533 8018
E-Mail:	info@tepia.co.jp
URL:	http://www.tepia.co.jp
Represented by:	Xuefeng Wen
Title:	General Manager
Saluation:	Mr.
Last Name:	Wen
First Name:	Xuefeng
Department:	Tokyo Branch
FAX:	+81 3 6721 5506
Tel:	+81 3 6721 5505
Personal E-Mail:	wenxf@tepia.co.jp

1.5 Project Start Date

The project started operation from 23rd September, 2005 in fact however, it has to be later than 28th March, 2006 according to VCS Standard (version 1), so that the starting date of the project was set as 1st April, 2006 for the conservative principle.

1.6 Project Crediting Period

The crediting period for the project is selected the renewable crediting period of 10 years which is renewed at most two times, the maximum of 30 years. The starting date of the first crediting period is 1st April, 2006 then it lasts till 31st March, 2016.

1.7 Project Location

Binglang River in Tengchong County, Baoshan City, Yunnan Province, P. R. China

1.8 Title and Reference of Methodology

The approved methodology applied to the project is ACM0002 (ver.10), "*Consolidated methodology for grid-connected electricity generation from renewable sources*".
ACM0002 refers to the following tools:

- *Tool for the demonstration and assessment of additionality (ver.05.2)*
- *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (ver.02)*
- *Tool to calculate the emission factor for an electricity system (ver.01.1)*

For more information regarding the methodology please refer to
"http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L"

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The following table represents the significant milestones as implementing the project. No special events has been occurred which would have some impact on the monitoring of GHG emission reduction of the project after the registration.

Year	Date	Main event	Remarks
2005	23rd September	The first generator was put into operation	Starting date of the power generation
2005	14th October	The second generator was put into operation	-
2005	22nd December	The third generators was put into operation	-
2006	1st April	Starting date of the first Crediting Period	-
2009	15th October	Completion of Validation Report	By JCI
2009	24th November	Project registration	-

2.2 Deviations from the Monitoring Plan

Deviation 1: Chinese standard for the calibration basis
> Registered PD: The main meters are supposed to be calibrated based on the Chinese national standard, JJG597-2005.
> Revision: The main meters are supposed to be calibrated based on the Chinese national standard, JJG596-1999.
> Reason: According to the advice from Yunnan Provincial Bureau of Quality and Technical Supervision, the electric meters installed to the project site are need to be calibrated following to

JJG596-1999, not JJG597-2005; therefore the original monitoring plan is required to be revised accordingly.

2.3 Grouped Project

The project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	EF_y
Data unit:	tCO2e/MWh
Description:	The baseline combined margin CO2 emission factor for grid connected power generation in year y
Source of data:	Registered PD
Value applied:	0.8712
Purpose of the data:	The data is used for calculating the baseline emission
Any comment:	-

3.2 Data and Parameters Monitored

Data Unit / Parameter:	EG_{ex}
Data unit:	kWh
Description:	Electricity delivered to the Grid by the proposed project activity
Source of data:	Directly measured by electric meter at transformer station.
Description of measurement methods and procedures to be applied:	Electricity delivered to the Grid by the project is measured by electricity meter(s) according to the relevant national electric industry standard and regulations.
Frequency of monitoring/recording:	Monthly
Value monitored:	1,097,481,890
Monitoring equipment:	Electric meter
QA/QC procedures to be applied:	The accuracy of the meters are 0.2s. Basically reading on electric meter(s), at the same time checking whether the reading is the same as that is shown on power sales invoice provided by the grid company which the project is connected.
Calculation method:	Directly read on electric meter(s)
Any comment:	The data include the whole amount of electric

	power supplied to the grid from 1st April, 2006 to 31st December, 2011.

Data Unit / Parameter:	EG_{im}
Data unit:	kWh
Description:	Electricity supplied by the grid to project activity
Source of data:	Directly measured by electric meter(s) at transformer station.
Description of measurement methods and procedures to be applied:	Electricity supplied by the grid to project activity will be measured by electricity meter(s) according to the relevant national electric industry standard and regulations.
Frequency of monitoring/recording:	Monthly
Value monitored:	14,542,235
Monitoring equipment:	Electric meter
QA/QC procedures to be applied:	The accuracy of the meters is 0.2s. Basically reading on electric meter(s), at the same time checking whether the reading is the same as that is shown on power sales invoice provided by the grid company which the project is connected.
Calculation method:	Directly read on electric meter(s)
Any comment:	The data include the whole amount of electric power supplied to the grid from 1st April, 2006 to 31st December, 2011.

Data Unit / Parameter:	Cap_{PJ}
Data unit:	MW
Description:	Installed capacity of the hydropower plant after the implementation of the project activity.
Source of data:	Project site.
Description of measurement methods and procedures to be applied:	Verified on site
Frequency of monitoring/recording:	Every on site verification
Value monitored:	48
Monitoring equipment:	-
QA/QC procedures to be applied:	-
Calculation method:	-
Any comment:	-

Data Unit / Parameter:	A_{PJ}
Data unit:	km^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:	Project site
Description of measurement methods and	The data will be measured by professional design

procedures to be applied:	institute yearly.
Frequency of monitoring/recording:	Yearly
Value monitored:	0.17
Monitoring equipment:	-
QA/QC procedures to be applied:	-
Calculation method:	-
Any comment:	-

3.3 Description of the Monitoring Plan

The following description is the monitoring plan outlined in the validated PD. The monitoring plan ensures the accuracy of monitoring activity and its result to acquire the credible amount of emission reductions during the crediting period of the project.

Some of the factors relevant to determining the baseline emission are set ex-ante, which have been validated previously. Those data are listed in the section 3.1 of this document. Therefore the monitoring activity is conducted for measuring the amount of total electricity supplied to the grid from the project activity, installed capacity of the power plant and the area of the reservoir surface when it is full.

The following figure shows the operating and managing structure of the project of the project owner. The daily operation and the recording activity at the power station are carried out by the *Recording team* and the *Operating team*. The data recorded is checked and compiled as the monthly and yearly data by the *Administration* and *Power sales team*, and then the compiled data is passed to the *Power station manager*, who reports the data to the *VCS section manager*. After that, the amount of the emission reduction is calculated by the manager then the result is reported to the *Accounting team* at last.

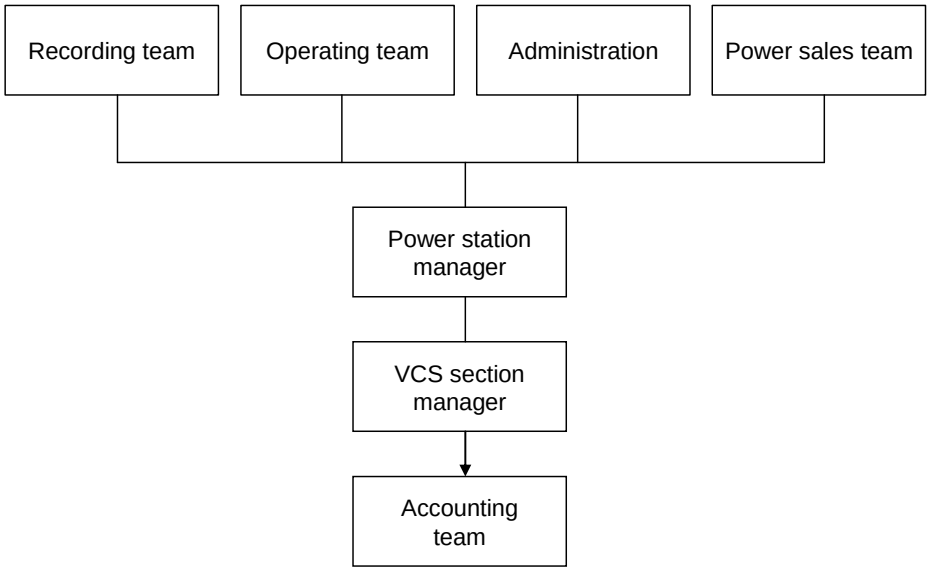

Figure 1 Operating and managing structure

The project is connected to the grid through the first on-site substation which increases the

voltage of the generated electricity to 110kV monitored by meter M3, then transferred to the Guyong transformer substation owned to the grid company. Otherwise, through the second on-site substation, the project is connected to the grid which increases to two 35kV power lines, thereinto one 35kV power line is connected to the simple transformer substation owned to the grid company measured by meter M7, the other 35kV power line is connected to the grid monitored by meter M5.

Main meters M3, M5 and M7 are grid-connected meters; only meter M2 is installed and recorded by the grid company in Guyong substation which used as cross check meter, other meters is installed in the Houqiao Hydropower Station used to measure the amount of power sales. and they are regularly calibrated following to the Chinese standard (JJ596-1999). In case there is some trouble on the 3 main meters, the data sent from the grid company is applied for calculating emission reduction.

The other cross check meters M1a, b, c, M4 and M6 are installed, operated and maintained by the project owner to enable the use of the data as a cross check or back up in the case of a failure of the main meter M3, M5, M7. The cross-check meter data is used in VCS calculation only where accurate main meter data is unavailable.

The distribution of the meters is illustrated in the figure below:

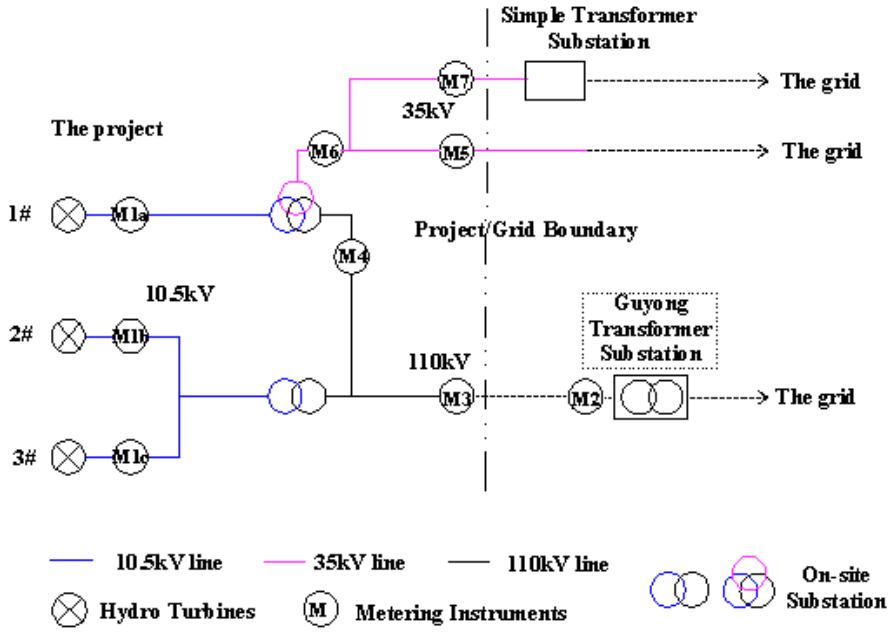

Figure 2. Scheme of grid connection of the Project

Grid-connected meter M3 and M2 are bidirectional meters which can monitor both electricity output generated from the proposed project and electricity input provided by the grid at the substation, on the other hand, other meters aren't bidirectional. The accuracy of all the meters is 0.2s.

Since the baseline emission factor is determined ex-ante, the monitored data is carried out only for determining net electricity supplied to grid by the project (EG_y). EG_y is calculated on a monthly as:

$EG_y = EG_{ex} - EG_{im}$

where:

EG_{ex}	the amount of electricity proposed project supplied to grid
EG_{im}	the amount of electricity get from the grid

So that both amounts of electricity supplied to the grid and imported from the grid are monitored; the amount of electricity supplied to the grid is measured with M3, M5 and M7, on the other hand, the amount of electricity imported from the grid is measured with M3. The formula for calculating the net electricity supplied to the grid is as follows:

$$EG_y = EG_{ex}\,(M3+M5+M7) - EG_{im}\,(M3)$$

M3, M5 and M7 are main meters used for calculating EG_y, and other meters are installed for back-up just in case the main meters have some trouble.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The following table shows the baseline emission during the monitoring period. The emission factor of CSPG (EF_y), 0.8712tCO_2e/MWh is validated at the validation stage.

Table 1. Baseline emission and parameters monitored

Year	Conservative amount of net power supply to CSPG (MWh)	EFy (tCO2e/MWh)	BEy (tCO2e)
2006 (Apr. - Dec.)	135,353.410	0.8712	117,919
2007	217,614.938		189,586
2008	186,840.274		162,775
2009	160,495.335		140,084
2010	205,895.755		179,376
2011	176,439.942		153,714
		Total:	943,454

4.2 Project Emissions

According to the registered PD, the project uses renewable sources and there are no project emissions; therefore there is no project emissions included in this project activity, i.e.

$PE_y = 0$

4.3 Leakage

Considering the ACM0002, no leakage emission is expected in this project activity as the hydropower station is newly built, i.e.

$LE_y = 0$

4.4 Summary of GHG Emission Reductions and Removals

The emission reduction of the project during the monitoring period is calculated as following table:

Table 2. Summary of GHG emission reduction

Year	BEy (tCO_2e)	PEy (tCO_2e)	LEy (tCO_2e)	ER_y (tCO_2e)
2006	117,919	0	0	117,919
2007	189,586	0	0	189,586
2008	162,775	0	0	162,775
2009	140,084	0	0	140,084
2010	179,376	0	0	179,376
2011	153,714	0	0	153,714
			Total:	943,454

5 ADDITIONAL INFORMATION

- The monthly operating record from April 2006 – November 2011

Year	Month	Upload					Download		Net Power Supply*
		a M3 (121#)	b M7 (321#)	c M5 (322#)	d = a+b+c Total Reading Data	e Total Invoice Data	f Reading Data	g Invoice Data	
2006	4	4,277,680	473,058	0	4,750,738	5,843,747	291,582	291,582	
	5	5,014,240	297,741	167,567	5,479,548	5,014,240	271,238	271,238	
	6	26,119,280	67,749	210,838	26,397,867	26,119,280	20,101	20,101	
	7	28,256,632	23,083	179,762	28,459,477	28,256,632	2,025	2,025	
	8	19,106,752	31,274	280,876	19,418,902	19,294,230	0	0	
	9	22,797,760	38,605	337,864	23,174,229	23,174,229	0	0	

	10	14,383,232	0	368,845	14,752,077	14,752,077	36,994	36,994	
	11	7,767,296	0	542,970	8,310,266	8,310,266	238,472	238,472	
	12	5,112,720	0	675,788	5,788,508	5,788,503	317,790	317,790	
	Sub-total:	132,835,592	931,510	2,764,510	136,531,612	136,553,204	1,178,202	1,178,202	**135,353,410**
2007	1	4,063,760	0	733,047	4,796,807	4,796,807	459,572	459,572	
	2	6,713,728	0	532,606	7,246,334	7,246,334	235,072	235,072	
	3	5,051,344	0	692,958	5,744,302	5,744,302	330,864	330,864	
	4	8,821,248	130,116	947,438	9,898,802	9,898,802	390,960	390,960	
	5	16,885,680	166,077	940,027	17,991,784	17,991,784	214,132	214,132	
	6	21,457,968	152,960	1,069,588	22,680,516	22,680,516	99,101	99,101	
	7	29,192,640	182,784	1,122,859	30,498,283	19,014,632	0	0	
	8	32,990,768	71,016	225,561	33,287,345	44,770,996	4,912	4,912	
	9	31,928,000	78,374	304,166	32,310,540	32,310,540	0	0	
	10	24,734,112	82,542	662,950	25,479,604	24,000,000	0	0	
	11	18,155,904	104,549	1,308,878	19,569,331	21,048,935	8,741	8,741	
	12	8,423,936	101,156	1,515,914	10,041,006	10,041,006	186,362	186,362	
	Sub-total:	208,419,088	1,069,574	10,055,992	219,544,654	219,544,654	1,929,716	1,929,716	**217,614,938**
2008	1	5,700,544	111,285	1,756,404	7,568,233	7,568,233	655,362	655,362	
	2	7,790,208	130,443	1,376,972	9,297,623	9,297,623	380,273	380,273	
	3	4,775,328	293,887	1,750,202	6,819,417	6,819,417	740,186	740,186	
	4	4,054,592	256,703	1,876,758	6,188,053	6,188,053	923,309	923,309	
	5	10,125,824	144,327	1,566,526	11,836,677	11,836,677	501,037	501,037	
	6	18,867,200	90,954	1,379,218	20,337,372	20,337,372	189,200	189,200	
	7	29,195,760	51,520	1,077,028	30,324,308	30,324,308	0	0	
	8	30,657,350	50,033	843,370	31,550,753	31,550,753	0	0	
	9	26,568,772	55,862	898,342	27,522,976	27,522,976	0	0	
	10	16,248,480	48,561	992,534	17,289,575	17,289,575	0	0	
	11	15,514,508	46,665	1,216,818	16,777,991	15,638,750	90,322	90,322	
	12	5,308,804	41,021	1,226,070	6,575,895	6,575,895	629,669	629,669	
	Sub-total:	174,807,370	1,321,261	15,960,242	192,088,873	190,949,632	4,109,358	4,109,358	**186,840,274**
2009	1	5,401,160	37,713	1,175,210	6,614,083	6,614,083	503,400	503,400	
	2	4,467,616	22,651	911,602	5,401,869	5,401,869	492,135	492,135	
	3	3,416,952	27,009	1,193,286	4,637,247	4,637,247	679,694	679,694	
	4	6,408,416	48,805	1,319,906	7,777,127	7,777,127	679,146	679,146	
	5	5,657,072	40,863	1,057,064	6,754,999	6,754,999	635,911	635,911	
	6	14,939,968	30,097	1,089,324	16,059,389	16,059,389	178,014	178,014	
	7	27,035,552	30,816	925,152	27,991,520	27,991,520	8,589	8,589	
	8	26,180,368	31,939	924,088	27,136,395	27,020,309	0	0	
	9	23,070,784	31,442	926,648	24,028,874	23,977,379	0	0	
	10	20,608,768	30,779	925,680	21,565,227	21,519,582	0	0	

	11	9,195,872	35,516	1,083,272	10,314,660	10,251,437	227,583	227,583	
	12	5,467,168	41,303	1,141,600	6,650,071	6,650,071	455,204	455,204	
	Sub-total:	151,849,696	408,933	12,672,832	164,931,461	164,655,011	3,859,676	3,859,676	**160,795,335**
2010	1	4,262,176	36,085	1,239,620	5,537,881	5,537,881	775,411	775,411	
	2	3,849,088	23,719	899,284	4,772,091	4,772,091	586,368	586,368	
	3	3,144,000	20,132	874,112	4,038,244	4,038,244	542,218	542,218	
	4	9,098,816	29,192	860,740	9,988,748	9,988,748	373,751	373,751	
	5	10,073,408	29,558	782,308	10,885,274	10,885,274	186,895	186,895	
	6	27,548,672	30,066	553,220	28,131,958	28,131,958	0	0	
	7	32,076,416	28,423	548,684	32,653,523	32,653,523	0	0	
	8	32,804,416	27,812	531,740	33,363,968	31,863,968	351	351	
	9	24,403,328	24,828	491,440	24,919,596	26,419,596	6	6	
	10	25,065,696	29,299	470,548	25,565,543	25,565,543	49	49	
	11	15,670,016	27,782	561,852	16,259,650	16,259,650	2,462	2,462	
	12	11,559,906	38,925	750,836	12,349,667	12,349,667	102,877	102,877	
	Sub-total:	199,555,938	345,821	8,564,384	208,466,143	208,466,143	2,570,388	2,570,388	**205,895,755**
2011	1	5,643,083	28,388	506,296	6,177,767	6,177,767	208,075	208,075	
	2	6,355,395	31,495	397,060	6,783,950	6,783,950	167,620	167,620	
	3	4,595,892	28,018	554,467	5,178,377	5,178,377	226,805	226,805	
	4	6,825,948	27,990	505,413	7,359,351	7,359,351	186,654	186,654	
	5	11,491,354	40,381	419,236	11,950,971	11,950,971	105,469	105,469	
	6	27,283,564	41,202	387,956	27,712,722	27,712,722	0	0	
	7	27,905,636	41,681	369,944	28,317,261	28,317,261	0	0	
	8	29,880,116	56,957	358,128	30,295,201	30,295,201	194	194	
	9	24,196,408	67,389	292,124	24,555,921	24,555,921	78	78	
	10	16,937,808	66,446	364,332	17,368,586	17,368,586	0	0	
	11	11,156,320	103,102	375,308	11,634,730	11,634,730	0	0	
	Sub-total:	172,271,524	533,049	4,530,264	177,334,837	177,334,837	894,895	894,895	**176,439,942**
	Total:	1,039,739,208	4,610,148	54,548,224	1,098,897,580	1,097,503,482	14,542,235	14,542,235	**1,082,939,655**

* * Min. ("*d*" or "*e*") - Max. ("*f*" or "*g*")