MONITORING REPORT
Version 1.0 – in effect as of: 22/02/2011
Xiaogushan Hydropower Project in
People's Republic of China
Reference No.: 0378
Monitoring Period #5 (01/01/2010 - 31/12/2010)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The Xiaogushan Hydropower Project ("XHP" or the "project") is a run-of-river hydro project consist of a diversion weir, an intake power tunnel (9.1 km), water fall of 117 m, a powerhouse, line a 110 kV high voltage switchyard and a 24 km of 110 kV transmission lines. The project is the sixth cascading hydropower station in the Heihe hydropower cascading development plan, with a designed installation capacity of 102MW, and annual generation of 394 GWh. Due to the project, additional capacity has been provided to the interconnected Gansu Power Grid, part of the Northwest Power Network in China. In particular, the project is designed to supply reliable power to the Zhang Ye prefecture, of which the capacity was only 94.5MW thus heavily depended on daily import from the Gansu Power Grid. The XHP transmission lines, in addition to going to the Gansu Power Grid, connects the nearby townships and villages in a highly impoverished area dominated (98%) by the Zang (Tibetan) minority.

The station has been fully commissioned since July 2006 and is operating in line with the project description in the registered PDD. The electricity was delivered to the grid per the project design and the specific data of generated electricity were monitored in compliance with the latest monitoring plan, as approved on 17 Aug 2010[1].

The project schedule is shown in the following table:

Table 1 Project milestones

Events	Date
Project commissioning date	09/07/2006
CDM registration	11/08/2006
Current Monitoring Period	01/01/2010 – 31/12/2010

Throughout the monitoring period (01/01/2010 - 31/12/2010), the project has generated 372,460 tCO_2e of emission reductions.

A.2. Project Participants

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)

[1] http://cdm.unfccc.int/UserManagement/FileStorage/WIS3U89O4NG5TKHFL0CQXZDRY621AJ

People's Republic of China (host)	Xiaogushan Hydropower Co. Ltd.	No
Netherlands	International Bank for Reconstruction and Development as trustee of The Prototype Carbon Fund	Yes

A.3. Location of the project activity:

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The project is located in the territory of Sunan Yugu minority autonomous county, Zhangye city, Gansu province.

The map below shows the location of the regional power grids and the proposed project area. The project is located in the Gansu's northwest "panhandle", about 600 km from the provincial capital of Lanzhou. It is in the northwest corner of the province in the Xishui township, near Zhangye City. The Xishui township covers a large area of 894 sq km but is sparsely populated because of the harsh natural conditions. The site is in a highly mountainous, barren region with little vegetation due to the high elevation (1,500-5,000 m). The proposed site of the project's diversion weir is on the Heihe River, with all of its tunnel and dits, dumpsites, surge towers, powerhouse and transmission yard, and road widening improvements within the Xishui Tibetan Autonomous Township. Itinerant herdsmen populate the surrounding area during the summer months on the communal lands nearby the site.

Figure 1 Xiaogushan Hydropower Project (XHP), NWP Network and Gansu Grid

A.4. Technical description of the project

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The project consists of:

· A 102 MW run-of-river hydropower plant,
· Construction of an intermediate substation,
· Extension of 110kV transmission lines up to the 110kV Heihe Switch Yard,
· Building an additional transmission line to the surrounding villages to supply them with more reliable power, and
· Expansion of the Heihe Switchyard to eventually accommodate additional lines from the Xiaogushan Hydropower Company (XHC).

The key technical data for the equipment within the project are summarized in the following table.

Table 2 Summary of key equipment in the project

Parameter	**Unit**	**Amount**	**Comment**
Floodgate length	m	2061.5	
Floodgate height	m	26.5	
Maximum length of construction for stored water	m	93.7	
Floodgate size	m	8*8	
Designed Flood discharge capacity	m^3/s	1750	
Proven flood discharge capacity	m^3/s	2960	
Size of main station building	m	55*18*35.65	Length * Width * Height
Size of substation	m	43.7*18*16.5	Length * Width * Height
Size of Transformer station	m	65*58	Length * Width
Large Turbine Capacity	MW	41.67	2 * Turbines with number HL180－LJ －208 (375 r/min)
Small Turbine capacity	MW	22.92	1 * turbine with number HL180－LJ －154 (500 r/min)

The diagram below illustrates schematic view of Xiaogushan run-of-river power plant.

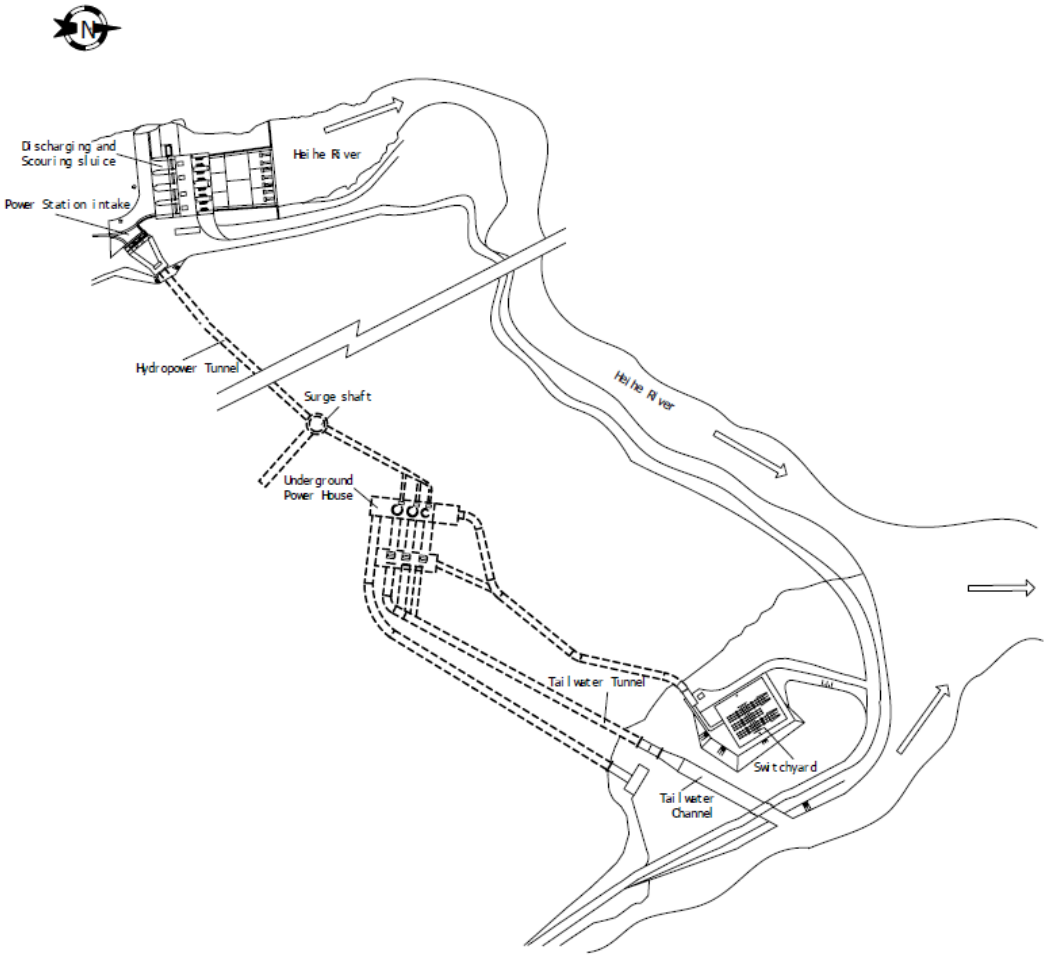

Figure 2 Xiaogushan Hydro Power Plant Schematic Diagram

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Approved consolidated baseline methodology ACM0002-version 5: Consolidated baseline methodology for grid connected electricity generation from renewable sources

Reference: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.6. Registration date of the project activity:

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11/08/2006

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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11/08/2006-10/08/2016

10 years fixed crediting period.

A.8. Name of responsible person(s)/entity(ies):

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Company: Gansu Zhangye Xiaogushan Hydropower Company Ltd.
Contact Person: Jianjun Ding
Title: Deputy General Manager
Tel: +86-936-8216552
Fax: +86-936-8225763
E-mail: djj-118@263.net; djj-118@163.com

Company: S.D.F (Beijing) Consulting Co., Ltd.
Contact Person: Mengde Liu
Title: Deputy Director of Operation Department
Tel: +86-936-8226684
Fax: +86-936-8225763
E-mail: caocao_537@163.com

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The hydropower station has been running smoothly since its commissioning in July 2006 and it functioned normally during the entire monitoring period concerned (01/01/2010 – 31/12/2010).

No special events occurred during the monitoring period which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

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The monitoring plan has been revised for three times.

The latest revised monitoring plan was approved on 17/08/2010 and the present monitoring report has been prepared as per the latest approved monitoring plan. Please refer to http://cdm.unfccc.int/Projects/DB/JCI1145495919.5/view for further details on the approved revision to the monitoring plan.

B.3. Request for deviation applied to this monitoring period

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Not applicable.

B.4. Notification or request of approval of changes

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Not applicable.

SECTION C. Description of the monitoring system

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1. Organization of monitoring activities and roles and responsibilities

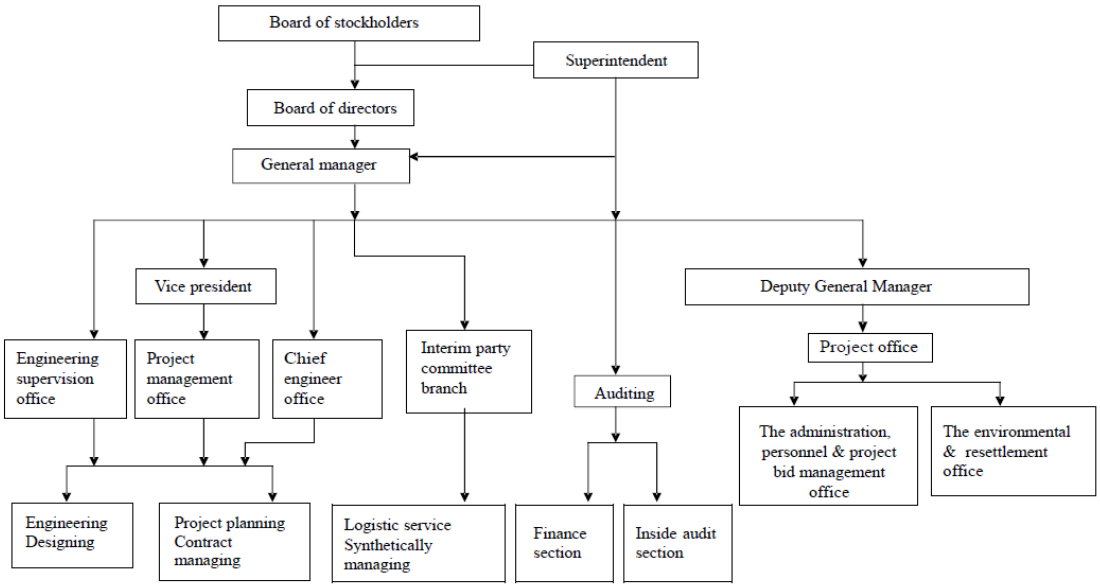

Figure 3 Organizational structure of Xiaogushan Hydropower Plant

Figure 3 illustrates the organization structures of the project entity to implement monitoring activities. Deputy General Manager of Xiaogushan hydropower project, Mr. Ding Jianjun is proposed to be the superintendent responsible for the implementation of monitoring and verification coordination activities. The generation operation department is responsible for the copying of main meter by certain staff; the settlement accountant is responsible for handling the settlement formalities according to finalized generation amount with provincial power company; CDM responsible staff in project office for CDM activities is responsible for the collection and documentation of the references.

The monitoring practice and the reporting procedures are in full compliance with the procedures detailed in the revised CDM manual (version 2) and the third revision of monitoring plan. The allocation of responsibilities is documented in a written form. The necessary procedures for recording the monthly generation amount are also documented in the revised CDM manual (version 2) of XHP including emergency provisions. Necessary training programme has also been implemented as required.

2. Metering points

The spots of monitoring are listed in Figure 4 below:

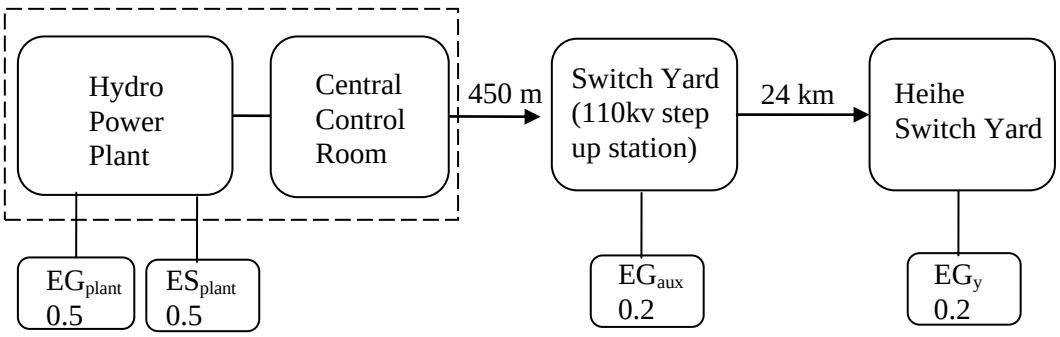

Figure 4 Location of monitoring spots

$EG_{y(PG)}$: Electricity supplied to Gansu Power Grid monitored using main meters at the 110kv Heihe switchyard by the grid company (MWh);

$EG_{y(XH)}$: Electricity supplied to Gansu Power Grid monitored using main meters at the 110kv Heihe switchyard by the project entity (MWh);

EG_{aux}: Electricity generated by the project activity excluding electricity consumptions of the project monitored by auxiliary meter in the 110 kV switch yard at the plant site (MWh);

EG_{plant}: Electricity generated by the project activity monitored by power meters installed in the plant at each shift (MWh);

ES_{plant}: Electricity consumption by the project activity monitored by power meters installed in the plant at each shift (MWh)

3. Metering of generation

- The monthly generation supplied to the Grid (EG_y) from Xiaogushan hydropower station is monitored on the interface between Xiaogushan hydropower station and the grid by both Power Grid Trading Center (PGTC) under Gansu provincial power company (former regulation and communication center under Gansu provincial power bureau) and Xiaogushan hydropower company mutually.
- This will be done at different spots using 2 ways: automatic and manual. PGTC obtains the data using automatic monitoring apparatus while Xiaogushan manually.
- PGTC obtains the generation data ($EG_{y(PG)}$) automatically at the interface between Xiaogushan hydropower station and the grid at 24:00 p.m. on the last day of each month;
- Xiaogushan hydropower company also allocates a special registrar to get to 110kV Heihe switchyard same day and time i.e., at 24:00 p.m. on the last day of each month to register the figure ($EG_{y(XH)}$) on the main meter manually;
- PGTC notifies Xiaogushan hydropower company the available generation data ($EG_{y(PG)}$) in the form of power purchase settlement notice;
- Based on data available from auxiliary meter at Xiaogushan site (EG_{aux}) and main meter in Heihe switchyard ($EG_{y(XH)}$), the comparison will be made and clearance will be given, before the settlement is done based on the notified generation from Gansu grid.
- In addition to that, EG_{plant} and ES_{plant} are monitored in accordance with the latest monitoring plan.

(1) Joint meter reading result by PGTC and XHC

Table 3: The comparison table of data available from main meter monitored separately by PGTC and XHC

Month	$EG_{y(PG)}$ (MWh)	$EG_{y(XH)}$ (MWh)	Differences(MWh)
1	12,966.800	12,966.800	0.000
2	13,177.824	13,177.824	0.000
3	17,546.672	17,546.672	0.000
4	21,132.144	21,132.144	0.000
5	34,241.152	34,241.152	0.000

Month	$EG_{y(PG)}$ (MWh)	$EG_{y(XH)}$ (MWh)	Differences(MWh)
6	49,844.784	49,844.784	0.000
7	75,005.392	75,005.392	0.000
8	69,340.656	69,340.656	0.000
9	61,048.240	61,048.240	0.000
10	42,106.592	42,106.592	0.000
11	21,598.192	21,598.192	0.000
12	14,080.176	14,080.176	0.000
TOTAL	432,088.624	432,088.624	0.000

There are 2 groups of figures which are the same, because the new rules were adopted by PGTC from July 2008. For PGTC, they continued to get the data through remote monitoring system; for XHC and Zhangye branch of Gansu Power Company, the staff also monitors the data from reading the same records on the main meter. That way, there was no time lag and no data difference for this year.

(2) Comparison of main meter and auxiliary meter located in the 110 kV plant switch yard
The monitored data available from Xiaogushan plant side are served as a referential figure to compare with the one from PGTC in case there are any mistakes incurred during the monitoring activities by PGTC, and then we have the opportunity to rectify it. In 2010, there are no mistakes in the metering procedure. According to current way of metering, the differences between 2 groups of data (0.29%) are within the normal range.

Table 4: The Comparison table of EG_{aux} and main meter $EG_{y(PG)}$

Month	EG_{aux} (MWh)	$EG_{y(PG)}$ (MWh)	Differences(MWh)
1	12,995.400	12,966.800	28.600
2	13,206.600	13,177.824	28.776
3	17,590.320	17,546.672	43.648
4	21,188.112	21,132.144	55.968
5	34,340.460	34,241.152	99.308
6	49,994.340	49,844.784	149.556
7	75,228.120	75,005.392	222.728
8	69,554.760	69,340.656	214.104
9	61,240.740	61,048.240	192.500

Month	EG_{aux} (MWh)	$EG_{y(PG)}$ (MWh)	Differences(MWh)
10	42,236.040	42,106.592	129.448
11	21,660.540	21,598.192	62.348
12	14,112.780	14,080.176	32.604
TOTAL	433,348.212	432,088.624	1,259.588

(3) Comparison of Gross Generation EG_{plant} and Main meter $EG_{y(PG)}$
The detailed metering figures are shown below:

Table 5: Comparison table of data between EG_{plant} and main meter $EG_{y(PG)}$

Month	EG_{plant} (MWh)	$EG_{y(PG)}$ (MWh)	Differences (MWh)
1	13,107.000	12,966.800	140.200
2	13,380.000	13,177.824	202.176
3	17,718.000	17,546.672	171.328
4	21,360.000	21,132.144	227.856
5	34,659.000	34,241.152	417.848
6	50,755.000	49,844.784	910.216
7	76,297.000	75,005.392	1,291.608
8	70,602.000	69,340.656	1,261.344
9	62,022.000	61,048.240	973.760
10	42,724.000	42,106.592	617.408
11	21,869.000	21,598.192	270.808
12	14,272.000	14,080.176	191.824
Total	438,765.000	432,088.624	6,676.376

Xiaogushan hydropower project generated 438,765.000 MWh electricity in year 2010. The differences between the figures for the main meter $EG_{y(PG)}$ and the ones that indicate the electricity generated by the units EG_{plant} is 6,676.376 MWh, which is approximately 1.55% of the total generation of the year and is within the normal range.

In addition to that, ES_{plant} data is also monitored in accordance with the latest monitoring plan. ES_{plant} and EG_{plant} values are measured using energy meters installed in the plant at each shift. Every 24 hours, the daily electricity volume (generated and consumed internally) will be

summed up and recorded. At the end of each month, the total monthly volume will also be summed up and recorded (Refer to Table 7 for ES_{plant} and EG_{plant} readings).

Both ES_{plant} and EG_{plant} values are for internal use only and are neither used in the ER calculation nor used as any back up data during any metering failure while EG_y meter readings are used for settlement with the grid company and hence for ER calculation. However, the ES_{plant} and EG_{plant} readings are used to cross check EG_{aux} meters readings for internal reference and EG_{Aux} meters readings are used to cross check EG_y readings in case of EG_y meters' failure.

4. Accuracy and calibration of meters

The detailed information on accuracy and calibration of all the monitoring meters are shown in table 6 below.

Table 6 Monitoring Meter Summary List

Meter	Parameter to monitor	Category*	Accuracy	Calibration Frequency	Replacement Requirement **
Main meters	EG_y	I	0.2 class	Quarterly	Not required
Auxiliary meters	EG_{aux}	III	0.2 class	Annually	Not required
EG_{plant} meters	EG_{plant}	III	0.5 class	Annually	Not required
ES_{plant} meters	ES_{plant}	IV	0.5 class	Every 5 years	Not required

* The categorization is based on the technical administrative code of electric energy metering (DL/T 448-2000).

** If the calibration and inspection results are satisfactory, the meters can continue to be in use and there is no need for replacement.

Calibration of meters is done as per the requirements mentioned in the revised monitoring plan, as approved on 17 Aug 2010.

Calibration of the main meters (EG_y) was conducted 4 times in 2010 and the specific dates are as following: First time: February 28, 2010; Second time: May 29, 2010; Third time: August 28, 2010; and Fourth time: November 27, 2010.

For the auxiliary meters, the last calibration was conducted on September 15, 2010 in accordance with the latest monitoring plan and the rule of PGTC.

As for the EG_{plant} and ES_{plant} meters, both are of 0.5 class and are calibrated as per the requirements. ES_{plant} meters are required to be calibrated once in every 5 years and EG_{plant} once in a year. The calibrations for ES_{plant} meters have been done in 2006 and 2008, more frequently than the requirement and the calibrations for EG_{plant} meters have been done in 2006, 2007, 2008, 2009 and 2010, respectively.

In addition, these meters also undergo regular maintenance as per plant procedures. These metering spots are checked, secured with envelop and sealed by power metering centre under Zhangye Power Grid Company which is recognized by the national metering management authority. Regular inspections on meters are carried out according to the Inspection

Regulations for Power Meter Apparatus (DL460-92)) and the Management Regulations for Power Meter Apparatus (DL448-91). Metering voltage and current transformers are maintained periodically according to the items and periods stipulated in the Preventive Test Code for Electric Power Equipment (DL/T596-1996).
The results of the calibrations fully satisfy the requirements in the PDD monitoring plan and the methodology.

5. Emergency Procedures

Either XHC or PGTC who finds abnormality on electricity metering apparatus or finds trouble impacting the metering of generation amount should inform immediately the other party and metering apparatus inspection organization accepeted by both parties to examine problems together in order to resume normal conditions as soon as possible.

If case of any significant errors between the power purchase settlement notice by PGTC and copied data by XHC, the written clarification will be submitted to PGTC by XHC. If after verification by PGTC, the data and record on main meter was found to be wrong, the data and record on auxiliary meter would be used as backup data for calculation. The data monitored and recorded in auxiliary metering spot will be printed by XHC in fixed format and delivered to PGTC, subject to written confirmation given by PGTC, and then the subsequent process will proceed in compliance with the normal cases.

For other abnormal cases, the generaion during abnormal period will be confirmed based on the record provided by the equipment for voltage missing record and voltage missing timing and on the basis of thorough negotiaion.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating margin emission factor for the grid connected to the Project activity
Source of data used:	Ex-ante calculation (Registered PDD)
Value(s) :	0.982
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used to calculate the baseline emissions from power generation replaced by the project activity.
Additional comment:	--

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build margin emission factor for the grid connected to the Project activity
Source of data used:	Ex-ante calculation (Registered PDD)
Value(s) :	0.742

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used to calculate the baseline emissions from power generation replaced by the project activity.
Additional comment:	--

D.2. Data and parameters monitored

Data / Parameter:	**$EG_{y(PG)}$**
Data unit:	MWh
Description:	Electricity supplied to the Grid by XHP during the whole monitoring period 01/01/10-31/12/10 through PGTC remote monitoring system
Measured /Calculated /Default:	Measured
Source of data:	Power purchase settlement notice sent by the PGTC
Value(s) of monitored parameter:	432,088.624 (Refer Table 7 below)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions from power generation in the absence of the project activity
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power meters Accuracy class: 0.2 Serial numbers: G002076237,G002076239 Calibration frequency: Quarterly Date of last calibration: 27/11/2010 Validity: 26/02/2011 As per the requirements, calibration of the main meters, EG_y, was conducted every three months in 2010 and the specific dates are as following: First time: February 28, 2010; Second time: May 29, 2010; Third time: August 28, 2010; and Fourth time: November 27, 2010.
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Monthly. PGTC obtains the data ($EG_{y(PG)}$) through the automatic monitoring apparatus, which indicate the generation amount at the interface between Xiaogushan hydropower station and the grid at 24:00 p.m. on the last day of each month.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Electricity supplied to the Grid is cross-checked by the meter readings from auxiliary meter in the 110kv plant switch yard.

Data / Parameter:	**$EG_{y(XH)}$**
Data unit:	MWh
Description:	Electricity supplied to the Grid by XHP during the whole monitoring period 01/01/10-31/12/10 monitored at 110kV Heihe switchyard
Measured /Calculated /Default:	Measured
Source of data:	Metering readings at 110kV Heihe switchyard
Value(s) of monitored parameter:	432,088.624 (Refer Table 7 below)

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions from power generation in the absence of the project activity (Data is taken by the XHC manually at the same time the data reading taken by Power Grid Trading Center (PGTC) under Gansu provincial power company and will be used to compare both meter readings which will be ultimately used for calculating) .
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power meters Accuracy class: 0.2 Serial numbers: G002076237,G002076239 Calibration frequency: Quarterly Date of last calibration: 27/11/2010 Validity: 26/02/2011 As per the requirements, calibration of the main meters, $EG_{y(XH)}$, was conducted every three months in 2010 and the specific dates are as following: First time: February 28, 2010; Second time: May 29, 2010; Third time: August 28, 2010; and Fourth time: November 27, 2010.
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Monthly. Xiaogushan hydropower company allocates a special registrar to get to 110kV Heihe switchyard same day and time i.e., at 24:00 p.m. on the last day of each month to register the figure ($EG_{y(XH)}$) on the main meter manually.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Electricity supplied to the Grid is cross-checked by the meter readings from auxiliary meter in the 110kv plant switch yard.

Data / Parameter:	**EG_{aux}**
Data unit:	MWh
Description:	Electricity generated by the project activity (excluding electricity consumptions of the project) monitored by auxiliary meter in the 110 kV switch yard at the plant site
Measured /Calculated /Default:	Measured
Source of data:	Meter readings at the plant switch yard
Value(s) of monitored parameter:	433,348.212 (Refer to Table 7 below)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	EG_{aux} meters readings are used to cross check EG_y readings in case of EG_y meters' failure
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power meters: Accuracy class: 0.2 Serial numbers: 20080761050037, 20080761050038 Calibration frequency: Annually Date of last calibration: 15/09/2010 Validity: 14/09/2011
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Monthly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	

Data / Parameter:	**EG_{plant}**
Data unit:	MWh
Description:	Electricity generated by the project activity monitored by power meters installed in the plant at each shift
Measured /Calculated /Default:	Measured
Source of data:	Meter readings
Value(s) of monitored parameter:	438,765.000 (Refer to Table 7 below.)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	EG_{plant} values are for internal use only and are neither used in the ER calculation nor used as any back up data during any metering failure. However, EG_{plant} readings are used to cross check EG_{aux} meter readings for internal reference.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power meters Accuracy class: 0.5 Serial numbers: 00275326, 00275317, 00275318 Calibration frequency: Annually Date of last calibration: 24/08/2010 Validity: 23/08/2011
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Monthly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	

Data / Parameter:	**ES_{plant}**
Data unit:	MWh
Description:	Electricity consumption by the project activity monitored by power meters installed in the plant at each shift
Measured /Calculated /Default:	Measured
Source of data:	Meter readings
Value(s) of monitored parameter:	1,064.800 (Refer to table 7 below)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	ES_{plant} values are for internal use only and are neither used in the ER calculation nor used as any back up data during any metering failure. However, the ES_{plant} readings are used to cross check EG_{Aux} meters readings for internal reference.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power meters Accuracy class: 0.5 Serial numbers: 00275330, 00275328, 00275324 Calibration frequency: Once every 5 years Date of last calibration: 12/08/2006, 03/09/2008 Validity: 11/08/2011, 02/09/2013 The calibrations of meters ES_{plant} have been done more frequently than the requirement, once in 2006 and once in 2008.
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Monthly

Calculation method (if applicable):	N/A
QA/QC procedures applied:	

Table 7: Readings of all energy meters in the monitoring plan

Month	$EG_{y(PG)}$ (MWh)	$EG_{y(XH)}$ (MWh)	EG_{plant} (MWh)	ES_{plant} (MWh)	EG_{aux} (MWh)
1	12,966.800	12,966.800	13,107.000	83.850	12,995.400
2	13,177.824	13,177.824	13,380.000	110.300	13,206.600
3	17,546.672	17,546.672	17,718.000	87.650	17,590.320
4	21,132.144	21,132.144	21,360.000	107.000	21,188.112
5	34,241.152	34,241.152	34,659.000	114.050	34,340.460
6	49,844.784	49,844.784	50,755.000	62.300	49,994.340
7	75,005.392	75,005.392	76,297.000	85.250	75,228.120
8	69,340.656	69,340.656	70,602.000	77.550	69,554.760
9	61,048.240	61,048.240	62,022.000	83.100	61,240.740
10	42,106.592	42,106.592	42,724.000	84.000	42,236.040
11	21,598.192	21,598.192	21,869.000	70.200	21,660.540
12	14,080.176	14,080.176	14,272.000	99.550	14,112.780
Total	432,088.624	432,088.624	438,765.000	1,064.800	433,348.212

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The baseline emission for the year y is calculated as follows:
$BE_y = (EG_y – EG_{baseline}) \cdot EF_y$

BE_y are total baseline emissions during the year y in tons of CO_2

EG_y are the electricity supplied by the project activity to the grid in MWh

$EG_{baseline}$ are the baseline electricity supplied to the grid in the case of modified or retrofit facilities in MWh

EF_y are the baseline emission factor during the year y in tCO_2/MWh

As a newly constructed hydropower plant, the proposed project does not involve either modification or retrofit, thus, $EG_{baseline} = 0$.

The baseline emission formulae is consequently simplified to:
$BE_y = EG_y \cdot EF_y$

Calculation of the Baseline Emission Factor
The Baseline Emission Factor was calculated as a combined margin (CM), consisting of the simple average of both the Operating Margin (OM) and the Building Margin (BM). (All margins are expressed in tCO_2/MWh).
$CM = 0.5*OM + 0.5*BM$
$CM = 0.5 * (0.982 + 0.742) = 0.862\ tCO_2 / MWh$
Therefore, the resulting Baseline Emission Factor was 0.862 tCO_2 /MWh.

Calculation of the Baseline Emissions Reductions
According to the data monitored during the entire monitoring period, the amount of power supplied to the grid by Xiaogushan hydropower plant is 432,088.624 MWh in total (see table 8 below).

Table 8: Baseline emissions calculation (01/01/2010 to 31/12/2010)

Month	Monthly power sold to the grid $EG_{y(PG)}$(MWh)	Emission factor (tCO_2/MWh)	Baseline Emissions (tCO_2)
1	12,966.800	0.862	11,177.38
2	13,177.824	0.862	11,359.28
3	17,546.672	0.862	15,125.23
4	21,132.144	0.862	18,215.91
5	34,241.152	0.862	29,515.87
6	49,844.784	0.862	42,966.20
7	75,005.392	0.862	64,654.65
8	69,340.656	0.862	59,771.65

Month	Monthly power sold to the grid $EG_{y(PG)}$(MWh)	Emission factor (tCO_2/MWh)	Baseline Emissions (tCO_2)
9	61,048.240	0.862	52,623.58
10	42,106.592	0.862	36,295.88
11	21,598.192	0.862	18,617.64
12	14,080.176	0.862	12,137.11
Total	432,088.624	0.862	372,460

Therefore,

$\boldsymbol{BE_y = EG_y \cdot EF_y}$ =432,088.624 MWh * 0.862 tCO_2/MWh = **372,460 tCO_2**

E.2. Project emissions calculation

Being a run-of-river hydro power project, no emissions from the Project Activity were identified. Therefore, PE_y=0

E.3. Leakage calculation

No leakage is considered, $L_y=0$.

E.4. Emission reductions calculation / table

The emission reductions by the project activity during a given year *y* are calculated as follows:

$$ER_y = BE_y - PE_y - L_y$$

Where:

ER_y are the total emissions reductions during the year *y* in tons of CO_2

BE_y are the baseline emissions for the project activity during the year *y* in tons of CO_2.

PE_y are the project emissions for the project activity during the year *y* in tons of CO_2

L_y Are the leakage for the project activity during the year y in tones of CO_2

Total baseline emissions: 372,460 tCO_2
Total project emissions: 0 tCO_2.
Total leakage: 0 tCO_2

Total emission reductions: 372,460 tCO_2

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	319,277	372,460

E.6. Remarks on difference from estimated value in the PDD

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The annual ER in 2010 is 372,460 tCO_2 and this is 116.6% of the estimated emission reduction (319,277 tCO_2) in the registered PDD. This ER increase is due to increased water flow to the Heihe river.

According to hydrological statistic of Yingluo Gorge station in Gansu Province, the annual runoff monitored at Heihe Yingluo Gorge in 2010 was 1725 million m^3. Average annual runoff during the past 67 years from 1944 to 2010 at the same point is 1586 million m^3. The ratio between the water flow rate in 2010 and the historical average flow rate (67 years) is 1725/1586 = 1.088, which means the flow of the year 2010 is 8.8% greater than the average value of the last 67 years and this explains the 16.6% increase in the annual ER volume in year 2010.

Further, the power generation data (2005-2010) for the two other hydropower plants (Longshou and Xiliushui), which are located in the downstream of Heihe river shows a very consistent pattern with the generation data of the Xiaogushan power plant and the hydrological statistic of the Yingluo Gorge, which is illustrated in Figure 5 below. This proves that the increase in ER volume and power generation is due to the increased water flow.

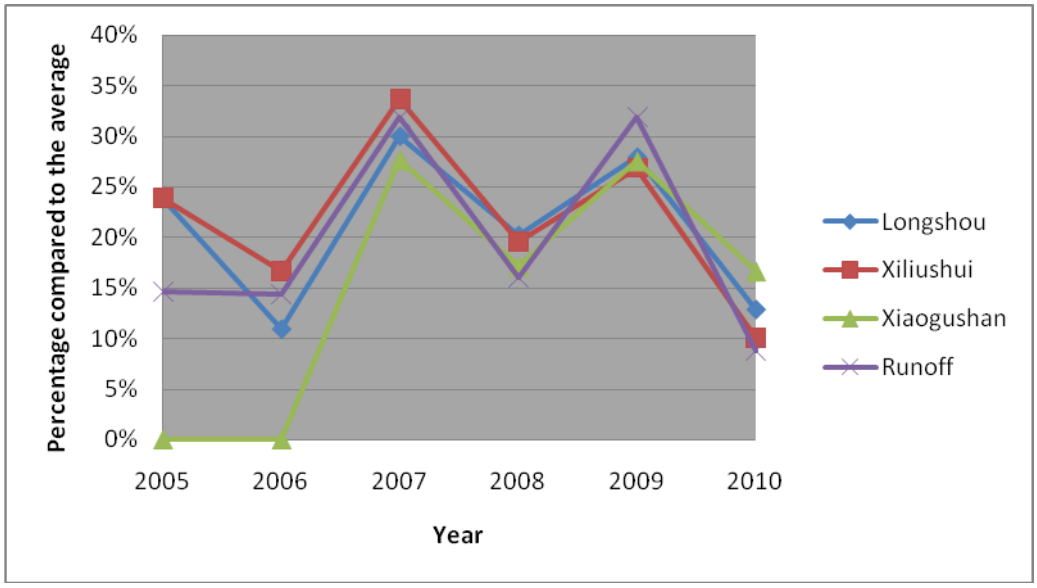

Figure 5 Water Flow of Heihe River and Power Generation Data

Attachments:

1. Power purchase settlement notice to XHP by Gansu Grid

2. Annual runoff and average annual flow statistics of Heihe Yingluo Gorge 2010

Authorized representative:

Zhu Xingjie

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