

# VERIFICATION REPORT

The Carbon Finance Unit  
The World Bank

5<sup>th</sup> Verification of  
**Xiaogushan Hydropower Project in  
People's Republic of China**

CDM Reference No. 0378

Report No. GR11W0003D

21 December, 2011

JACO CDM

## 5<sup>th</sup> Verification Report

Date of first issue: 12 May, 2011	
Approved by: Yasunori SHIMOI CEO & President, JACO CDM	Project No.: UNFCCC ref. No. 0378
Client: Carbon Finance Unit, The World Bank	Client ref.:

Summary:

JACO CDM has performed a verification of the CDM project "Xiaogushan Hydropower Project in People's Republic of China". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

The management of Xiaogushan Hydropower Company Limited is responsible for the preparation of the GHG emission data and the reported GHG emissions reductions of the "Xiaogushan Hydropower Project in People's Republic of China" on the basis set out within the project Monitoring and Verification Plan indicated in the registered PDD version 2 dated 10 February 2006 and the latest Monitoring Plan (3rd revision, which is complying with the consolidated methodology ACM0002 and approved by UNFCCC on Aug 17, 2010). The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the project.

The verifier assesses that the project is operated as planned and described in the validated and registered PDD. Installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions.

The verifier assesses that the monitoring was done in accordance the monitoring plan and the GHG emission reduction in the Monitoring Report version 1.1 is calculated without material misstatements. We pointed out 5 CLs and 2 FARS.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated, we will confirm the following statement after resolution of all CLs. :

Reporting period: From 01-01-2010 to 31-12-2010

Verified emission in the above reporting period:

Baseline emissions:	372,460 tCO <sub>2</sub> equivalents
Project emissions:	0 tCO <sub>2</sub> equivalents
Emission reductions:	372,460 tCO <sub>2</sub> equivalents

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Report title: Verification report (Draft) 5 <sup>th</sup> Verification of Xiaogushan Hydropower Project in People's Republic of China			
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## Abbreviations

CAR	Corrective Action Request
CDM	Clean Develop Mechanism
CER	Certified Emission Reduction
CFB	The Carbon Finance Business
CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reduction
FAR	Forward Action Request
GHG	Green House Gas
GPBRCC	Gansu Provincial Power Bureau Regulation and Communication Center
GPG	Gansu Power Grid
IETA	International Emissions Trading Association
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
MP	Monitoring Plan
MW	Megawatt
PDD	Project Design Document
PGC	Power Grid Company
PGTC	Grid Power Trading Center under Gansu Provincial Power Company
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention for Climate Change
VVM	Validation and Verification Manual
WB	The World Bank
XHC	Xiaogushan Hydropower Company
XHP	Xiaogushan Hydropower Project
ZHWRCB	Zhangye Hydrologic and Water Resource Conservancy Bureau

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### 1. INTRODUCTION

#### 1.1 Objective

The Carbon Finance Unit (ENVCF) of the World Bank has commissioned an independent verification by JACO CDM., Ltd of its CDM project “Xiaogushan Hydropower Project in People’s Republic of China”.

The objective of the verification work is to comply with the requirements of paragraph 62 of the CDM modalities and procedures.

This assessment shall:

- (a) Ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- (b) Ensure that the monitoring report and other supporting documents provided are complete in accordance with latest applicable version of the completeness checklist for requests for issuance of CERs and verifiable and in accordance with applicable CDM requirements. The CDM Executive Board provided a standardized format for monitoring report to improve consistency in reporting of the implementation and monitoring of the project activity by project participants;
- (c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology;
- (d) Evaluate the data recorded and stored as per the monitoring methodology.

#### 1.2 Scope

Verification scope is defined as an independent and objective review and ex post determination by the Designated Operating Entity of the monitored reduction in GHG emissions. The verification is based on the submitted monitoring report, the validated project design document including its monitoring plan and validation report, previous verification reports, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and EB and any other information and references relevant to the project activity’s resulting emission reductions. These documents are reviewed against Kyoto Protocol requirements, UNFCCC rules, approved methodology ACM0002, ver.5 and associated interpretations. JACO CDM, based on the recommendations in the Validation and Verification Manual, employs a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of CERs. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification shall consider both quantitative and qualitative information on emission reductions. Quantitative data comprises the monitoring report submitted to the verifier by the project entity. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

The verification team has been provided with a Monitoring Report version 1.0 on 7 March, 2011, covering the period 01 January, 2010 to 31 December, 2010 which was made publicly available on the UNFCCC web site on 26 March, 2011 ([http://cdm.unfccc.int/Issuance/Monitoring Reports](http://cdm.unfccc.int/Issuance/Monitoring%20Reports)) and serves as the basis for the assessment presented herewith. (/1/)

Based on this Monitoring report dated 22 February, 2011, a document review and a fact finding mission in the form of an on-site assessment has taken place.

JACO CDM conducted the 5<sup>th</sup> verification for the CDM project “Xiaogushan Hydropower Project in People’s Republic of China” based on the Kyoto Protocol requirements, modalities as agreed in

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Marrakech Accords and decisions of UNFCCC CDM EB, using the Validation and Verification Manual (VVM) version 01.2.

### 1.3 Verification team

The verification team for the verification was made considering the need of knowledge for the team members in the following aspects:

- Knowledge of the Kyoto Protocol and the Marrakech Accords
- Environmental and Social Impact Assessment
- Skills in environmental auditing
- Quality assurance
- Technical aspects of hydropower
- Monitoring concepts
- Political, economical and technical conditions in host country

According to these requirements JACO CDM has composed following verification team in accordance with the appointment rules of the JACO CDM QC Manual. The results of verification team activity were reviewed by the internal verifiers.

#### Verification team

Teruo FUKUDA	JACO CDM Team Leader
Yukio TAKANO	JACO CDM Team Member

#### Internal verifiers

Akihide MADENOKOJI General Manager of JACO CDM

#### Duration of verification

Document Review: From 7 March, 2011 to 28 April, 2011

On-site Assessment: From 13 April, 2011 to 14 April, 2011

Reporting: From 18 April, 2011 to 02 May, 2011

### 1.4 GHG Project Description

The Xiaogushan Hydropower Project ("XHP" or the "Project") is a run-of-river hydropower project consist of a diversion weir, an intake power tunnel (9.1 km), a rated water head of 117 m, a powerhouse, a 110 kV high voltage switchyard and 24 km of 110 kV transmission lines. It is located on the Heihe River in the Sunan Yugu Autonomous County of Zhangye City, Gansu province, China. The original engineering design proposed the project has an installed capacity of 98MW with expected output of 380 gigawatt-hours per year and a net supply of 357 gigawatt-hours per year to Gansu grid in long-term average.<sup>1</sup>

Based on refined study on hydrological conditions of the river, the Xiaogushan Hydropower Company (XHC) upgraded the generation capacity to 102 MW, resulting in an increased output of 394 gigawatt-hours per year, and a net supply of 370 gigawatt-hours per year to the Gansu grid in long-term average terms.

The 102 MW Project will provide additional capacity to the interconnected Gansu Power Grid, which is part of the Northwest Power Network in China. XHC will be supplying reliable power to the Zhangye prefecture, which the current capacity is only 94.5MW thus heavily depends on daily import from the Gansu Power Grid. The XHP transmission lines, in addition to going to the

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<sup>1</sup> Source: Xiaogushan Preliminary Engineering Design, Page 10, The Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute

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Gansu Power Grid, will connect the nearby townships and villages in a highly impoverished area dominated (98%) by the Zhang (Tibetan) minority.

The XHP will reduce emissions of greenhouse gases (GHGs) by avoiding operation of existing thermal power plant and future capacity expansion of fossil fuel-based generation by the regional Gansu Power Grid in Northwest China. The privately owned hydropower plant will sell electricity to the grid as well as supplying reliable power to nearby villages. The proposed XHP project is considered under the CDM modalities as a renewable energy project.

The XHP is one of China's first proposed CDM activities given its combination of positive environmental, economic, and sustainable development benefits. Given this combination of socio-economic and environmental benefits, the Xiaogushan Hydropower Project is the first-ever renewable energy power loan provided for the Northwest region of China from the Asian Development Bank (ADB). In terms of environmental and power benefits, the Project supports China's policy of harnessing zero-impact renewable energy resources and avoiding investment in high-GHG emission coal power plants.

The 10 years non renewable crediting period of the project started August 11, 2006, when the project was registered.

## 2. METHODOLOGY

The proposed assessment aims at being a risk based approach and is based on the methodology developed in the Validation and Verification Manual (for further information, see [http://cdm.unfccc.int/Reference/Manuals/accr\\_man01.pdf](http://cdm.unfccc.int/Reference/Manuals/accr_man01.pdf)), an initiative for all Applicant Entities, which aims to harmonize the approach, and quality of all such assessments.

In order to ensure transparency, a verification checklist was customized for the project, according to the Validation and Verification Manual. The checklist shows, in a transparent manner, criteria (requirements), means of verification and the results. The verification checklist serves the following purposes:

- It organizes, details and clarifies the requirements a CDM/JI project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been proved and the result of verification.

The verification checklist consists of 5 tables. The different columns in these tables are described in Figure 1. The completed checklist is enclosed in Appendix 1 to this report.

**Figure 1. Verification Checklist Tables**

Table I: Implementation Status Checklist			
OBJECTIVE	Ref.	COMMENTS	Concl. (incl. FARs/CARS)
The requirements the project must meet	Gives reference to the legislation or agreement where the requirement is found	Description of circumstances and further commendation to the conclusion	<p>This is either acceptable based on evidence provided (<b>OK</b>), or a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements.</p> <p>The corrective action requests are numbered and presented to the client in the Verification report. The Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further verifications.</p>

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Table II-1: Data Management System/Controls		
Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	<p>A score is assigned as follows:</p> <p><b>Full</b> all best-practice expectations are implemented.</p> <p><b>Partial</b> a proportion of the best practice expectations is implemented</p> <p><b>Limited</b> this should be given if little or none of the system component is in place.</p>	Description of circumstances and further commendation to the conclusion. This is either acceptable based on evidence provided ( <b>OK</b> ), or a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report. The Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further verifications.

Table II-2: GHG calculation procedures and management control testing		
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Identification of potential reporting risks based on an assessment of the emission estimation procedures.</p> <p>Identification of key source data. Focus on those risks that impact the accuracy, completeness and consistency of the reported data.</p>	<p>Identification of the key controls for each area with potential reporting risks. Assessment of adequacy of the key controls and eventually test that the key controls are actually in operation.</p> <p>Internal controls include, Understanding of responsibilities and roles, Reporting, reviewing and formal management approval of data, Procedures for ensuring data completeness, conformance with reporting guidelines, maintenance of data trails etc.</p>	<p>Identification of areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks</p> <p>Areas where data accuracy, completeness and consistency could be improved are highlighted.</p>

Table II-3: Detailed audit testing of residual risk areas and random testing		
Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including FARs)
List of residual areas of risks of Verification Checklist Table	The additional verification testing performed is described.	Having investigated the residual risks, the

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<p>II-2 where detailed audit testing is necessary.</p> <p>In addition, other material areas may be selected for detailed audit testing.</p>	<p>Testing may include:</p> <ul style="list-style-type: none"> <li>• Sampling cross checking of manual transfers of data</li> <li>• Recalculation</li> <li>• Spread sheet 'walk throughs' to check links and equations</li> <li>• Inspection of calibration and maintenance records for key equipment</li> <li>• Check sampling analysis results</li> <li>• Discussion with process engineers who have detailed knowledge of process uncertainty/error bands</li> </ul>	<p>conclusions are noted here. Errors and uncertainties are highlighted.</p>
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Table III : Resolution of Corrective Action and Forward Action Requests			
<b>Draft report clarifications and corrective action requests by verification team</b>	<b>Ref. to checklist question at table I, II-1, 2, 3</b>	<b>Summary of project owner response</b>	<b>Verification team conclusion</b>
Detailed FAR, CL and/or CAR pointed at previous table.	Item at the table where FAR/CL/CAR were found.	Answer of the project owner	Analysis and conclusion of the verification team

### 2.1 Review of Documentation

The monitoring report submitted by the client and additional background documents related to the project performance was reviewed. A complete list of all documents reviewed is shown in References (chapter 6 of this report).

### 2.2 On-site inspections

Verification team visited PGTC provincial office in Lanzhou city, XHC office in Zhangye city and project site on 12 April, 2011 – 14 April, 2011. Interviewed organizations and topics are summarized in table 1 below.

Table 1 Interviewed Organization and Topics at 5<sup>th</sup> Verification

<b>Interviewed organizations/ visited sites</b>	<b>Interview topics/ Inspected items</b>
XHC Office in Zhangye city	<p>Monitoring plan</p> <p>Monitoring Report and relevant documents</p> <p>GHG calculation and reporting procedures</p> <p>Environment and socio-economic impacts</p> <p>Stakeholders comments</p> <p>Compliance with National laws and regulations</p>
XHC Power Station	<p>Operation of facilities</p> <p>Monitoring equipment</p>

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	Observation of operators Stakeholder comments from local stakeholders (Bajiaowan Village)
GPG Heihe Switch Yard	Main meters observation Transmission line relevant to XHP
PGTC <sup>2</sup> office in Lanzhou city	Original documents for the Power Purchase Settlement Notice (the Notice). Calibration frequency of main meter

### 2.3 Resolution of Corrective and Forward Action Requests

The objective of this phase of the verification was to resolve the requests for corrective actions and any other outstanding issues which needed to be clarified for JACO CDM's positive conclusion on the GHG emission reduction calculation.

Findings established during the past verifications can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

**Corrective Action Requests (CAR)** is raised, where:

- i) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions
- iii) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants

**Clarification Request (CL)** is raised, where:

- iv) If information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

**Forward Action Requests (FAR)** are raised, where:

- v) During verification for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

To guarantee the transparency of the verification process, the concerns raised and responses that have been given are summarized in chapter 3 below and documented in more detail in the verification checklist in Appendix 1.

### 2.4 Internal Quality Control

As final step of verification, the final documentation including the verification report and the checklist have to undergo an internal quality control by JACO CDM's Certification Determination Committee (CDC) to ensure that all procedures have been followed and all conclusions are justified. After the documents have been satisfactorily approved, then only the request for issuance is submitted to the CDM-EB with the relevant documents. Two-third of the CDC members are selected from outside of JACO CDM.

## 3. VERIFICATION FINDINGS

The verification team assessed and verified the followings in line with the 5<sup>th</sup> Verification Checklist as Appendix 1.

### 3.1 Remaining Issues, CARS, FARs from previous Validation or Verification

<sup>2</sup>PGTC: Grid Power Trading Center under Gansu Provincial Power Company

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There are no remaining issues from previous validation and verification.

### 3.2 Project Implementation

#### 3.2.1 Discussion

Position and role of each person in the GHG data management process is clearly defined in the monitoring report and XHP CDM Manual which comply with the 3rd revision of the monitoring plan and implemented, from raw data generation to submission of the final data. Accountability of senior management was also demonstrated.

Verification team confirmed by site visit (observation of equipment, name plates and drawings) and document review (name plates and drawings) that all the Hydropower generating facilities and relevant facilities to supply the electricity to the grid are the same rating as described in the PDD, and the monitoring equipment are implemented as indicated in the 3rd revision of the monitoring plan.

Specific monitoring and reporting tasks and responsibilities are included in the 2<sup>nd</sup> version of CDM Manual for Zhangye Xiaogushan Hydropower Plant ("XHP CDM Manual"). The manual was provided to the verification team. There is no major change in the XHP CDM Manual 2nd Version. (/10/)

Monitoring and reporting procedures are assessed by observing the daily operation record at project site and interviews at site and the head office of the XHC. (CL 1)

The training records conducted in 2010 were provided. (/14/)

#### 3.2.2 Findings

##### Clarification request No.1

About the metering of generation (Section C of the monitoring report), XHC explained about the justification procedures for the monthly electricity supply to the grid and double check procedures. Please explain the actual justification procedures and changes from the last verification period, if any.

##### Response

There is no change in the procedures of monitoring of EGy(XH). The monitoring is conducted by the registered person in POD office and CDM office of XHC who can access to the PGTC monitored data.

#### 3.2.3 Conclusion

CL 1 was clarified.

The project complies with the requirements.

### 3.3 Completeness of Monitoring

#### 3.3.1 Discussion

The 3rd Revision of Monitoring Plan is complying with the consolidated methodology ACM0002 was approved by UNFCCC on August 17, 2010 as below. (/33/)

Table 2 shows the dates of calibration of each meter conducted in 2010.

Table 2: Date of calibration of each meter in 2010

Meter	Calibration interval requirements	Calibration date				Last calibration date of 4th verification
EGy	Quarterly	28/02/10	29/05/10	28/08/10	27/11/10	1/12/09
EGaux	Annually	15/09/10				16/09/09
EGplant	Annually	24/08/10				25/08/09
ESplant	Every 5 years	na				3/09/08

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All the parameters required in the 3rd Revision of Monitoring Plan, that is, EGy, EGplant, ESplant and EGaux are monitored and reported in the monitoring report.

### 3.3.2 Findings

#### **Clarification Request 2**

- (1) As for the calibration frequency of EGy meter, the 1st calibration in 2010 was 28 February, 2010 and the 2nd calibration was 29 May, 2010. It is to be confirmed that this calibration frequency complies with the Chinese regulation of DL/T 448-2000.
- (2) There is an indication "the validity is 2013/6/6" on the seal attached to the main meter in the Heihe Switch yard.  
The meaning of this "validity" and the relation of the calibration frequency specified in DL/T 448-2000 are to be confirmed to PGTC.
- (3) The description about the "date of last calibration" in the monitoring report is confusing. Please clearly show that the calibration of each meter is valid throughout the year of 2010.
- (4) According to the calibration report of ESplant, the date of last calibration is 3/09/2008 for all 3 ESplant meters. Please confirm the date of the monitoring report.

#### **Response**

- (1) XHC confirmed the opinion of PGTC about the practice about the frequency of on-site inspection "at least once every 3 months for type I watt-hour meter" stipulated in DL/T 448-2000. It was confirmed by PGTC that the following case is complying to the DL/T 448-2000.  
1<sup>st</sup> inspection date: 28 February, 2010  
2<sup>nd</sup> inspection date: 29 May, 2010
- (2) XHC confirmed the PGTC's practice as below.  
The calibration date on the side seal indicates that the meter has been calibrated on the test bed. The test bed calibration is one method for meter calibration. After the electronic energy meter has been put into use, PGTC will implement the site calibration periodically. Even if the test bed calibration date is past due, it won't influence the normal operation use of meter. It is unnecessary to take down the meter for test bed calibration if the site calibration is regularly conducted. As long as the periodic site calibration result is satisfactory, the meter can be used continuously till its design lifetime. In addition, the frequency of the site calibration is four times a year which is far higher than the test bed calibration (once per 5 years).
- (3) The description of the monitoring report was revised.
- (4) The description of the monitoring report was revised to 3/09/2008 for all 3 ESplant meters based on the calibration report.

### 3.3.3 Conclusion

**CL 2:** The verification team confirmed by the calibration records of each meter and the response to CL 2 that the calibration of each meter was conducted in accordance with the 3<sup>rd</sup> revision of monitoring plan. (/1/)(/33/) The verification team confirmed that the monitoring report was revised properly.

The project complies with the requirements.

## 3.4 Accuracy of Emission Reduction Calculations

### 3.4.1 Discussion

The methods used to determine GHG emissions for 2010 described in the monitoring report section E (/1/) complies with the 3rd revision of the monitoring plan.

Along with the monitoring report, the power purchase settlement notice of PGTC (/2/), invoice of XHC to PGTC (/3/) and monthly electricity production report (/4/) including the EGaux data, EGplant data & ESplant data were reviewed.

Water flow statistics in Heihe Yingluo Gorge for 2010 and recent years monitored by Zhangye Hydrologic and Water Resource Conservancy Bureau (ZHWRCB) were provided. Also, monthly

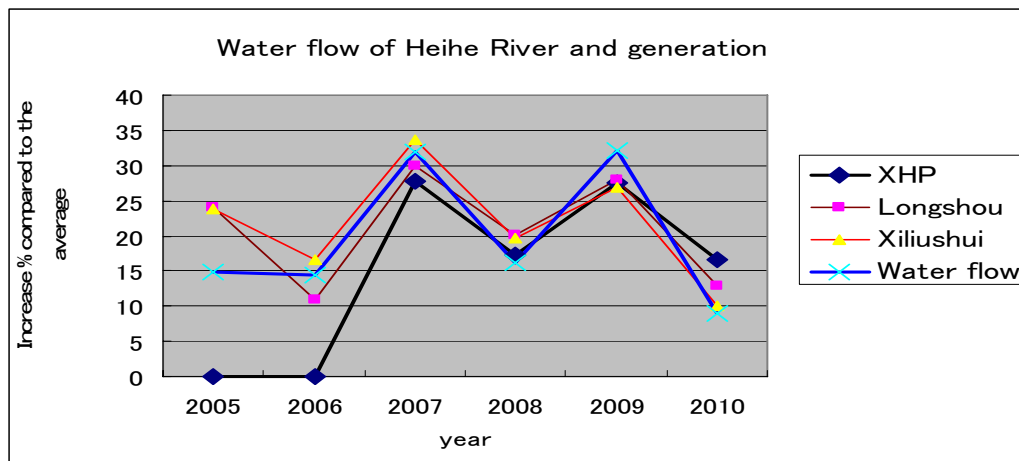
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electricity production data for 2010 of other plants near and downstream of the XHP were also indicated in the monitoring report for comparison. (Longshou and Xiliushui hydropower plants)

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<sup>3</sup>. Average annual runoff during the past 67 years from 1944 to 2010 at the same point is 1586 million m<sup>3</sup>. 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 electrical supply to the grid 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 2 below. (/17/) This proves that the increase in annual electrical supply to the grid and power generation is due to the increased water flow.

**Figure 2: Water flow of Heihe River and generation**



### 3.4.2 Findings

#### Clarification Request 3

- (1) Is there any case that XHC imported the electricity from the grid?
- (2) Invoice of XHC to PGTC and Evidences of EGaux for the line 1117 & 1118 and EGplant are to be provided.
- (3) The electricity generation increase in 2010 is 16.6% of the PDD against the river water flow rate increase of 8.8%. On the other hand, the electricity generation increase in 2009 is 27.6% against the river water flow rate increase of 32.1% and these data are nearly proportionate.

The electricity increase is considerably bigger than the increase of the flow rate increase in 2010 and not proportional. The reason of this result and the difference between 2009 and 2010 are to be explained.

#### Response

- (1) There is no case that XHC imported electricity from the PGTC in 2010.
- (2) Following data were provided.

EGy: Power purchase settlement notice, Invoice of XHC to PGTC  
Record of EGy meter reading by XHC (monthly data for the line of 1117, 1118 & total) (/4/)

EGplant: Record of XHC (monthly data and daily data for each generator) (/4/)

ESplant: Record of XHC (monthly data) (/5/)

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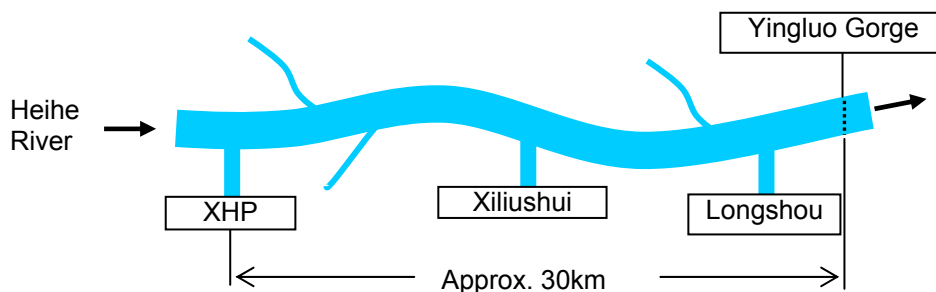
EGaux: Record of XHC (monthly data for the line of 1117, 1118 & total) (/4/)

(3) The reason of the generation increase of 16.6% against the river water flow rate increase of 8.8% is explained below.

(3-1) The river water flow rate at Yingluo Gorge and water for generation for Xiaogushan hydropower plant:

(i) The river water flow rate increased by 8.8% compared with the long time statistics of flow rate monitored at Yingluo Gorge. (/12a/) The water flow rate statistics used for FSR and also used for the estimate of electricity generation in the PDD is the data at Yingluo Gorge. The Yingluo Gorge is in the Heihe river and located at approximately 30km down-stream of the Xiaogushan hydropower plant and several branch rivers are flowing into the main stram of Heihe river between the Xiaogushan hydropower plant and the Gorge as shown in fig.3 below. The water flow rate at the Xiaogushan hydropower plant is not the same as the water flow rate at Yingluo Gorge.

**Fig.3: Location of Hydropower station and Yingluo Gorge (flow rate monitoring point)**



(ii) The river water overflows the dam especially in high-water season. Such portion of overflowed water is not used for electricity generation. Portion of such water not used for electricity generation changes year by year.

As shown above, the electricity generation in Xiaogushan hydropower plant is not always proportional to the water flow rate of Yingluo Gorge.

(3-2) The difference between 2009 and 2010

The monitoring data of the river water flow rate at Xiaogushan hydropower plant and the water used for electricity generation are available only for recent 2 years (2009 and 2010).

In this situation, the difference between the water for XHP generation, water flow rate at Yingluo Gorge and eletricity generation at Xiaogushan hydropower plant in 2009 and 2010 was studied.

The relation of the water used for generation in Xiaogushan hydropower plant and the water flow rate at Yingluo Gorge in recent 2 years are shown as below.

**Table 3: Water for generation and water flow rate at Yingluo Gorge in 2009 & 2010**

Year	Amount of water (x10 <sup>8</sup> m <sup>3</sup> /year)		
	Water for XHP generation	Overflow <sup>(*)1</sup>	Water at Yingluo Gorge
2009	15.0 <sup>(*)2</sup> (72%)	5.9 <sup>(*)2</sup> (28%)	20.9 <sup>(*)2</sup> (100%)
2010	13.7 <sup>(*)3</sup> ~ 14.2 <sup>(*)2</sup> (79 ~ 82%)	3.1 <sup>(*)2</sup> (18%)	17.3 <sup>(*)2</sup> (100%)

(\*)1: Overflow = [Water flow rate at Yingluo Gorge] – [Water for XHP generation]

(\*)2: Data by ZHWRCB (/12b/),

(\*)3: Data by Xiaogushan hydropower company (available only for 2010) (/12c/)

This result indicates that the water at Yigluo Gorge in 2010 is 17.3x10<sup>8</sup> m<sup>3</sup> and 83% of 2009. However, the water used for electricity generation at Xiaogushan hydropower plant in 2010 is

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13.7 ~ 14.2x10<sup>8</sup> m<sup>3</sup> and approximately 91 ~ 95% of 2009. On the other hand, the electricity generation in 2010 is 438.8 GWh and this is 91% of 479.6 GWh, electricity generation of 2009. In other words, the water flow rate of 2010 at Yingluo Gorge was reduced to 83% of 2009 but the water used for electricity generation at Xiaogushan hydropower plant and electricity generation were not reduced to that extent of 83% but remained approximately 91% of 2009.

Based on above consideration, it is considered that the electricity generation increase of 16.6% against 8.8% water flow rate increase at Yingluo Gorge in 2010 is reasonable

### 3.4.3 Conclusion

#### CL 3

(1) The verification team confirmed in PGTC provincial office in Lanzhou that there is no case that XHC imported electricity from the PGTC in 2010.

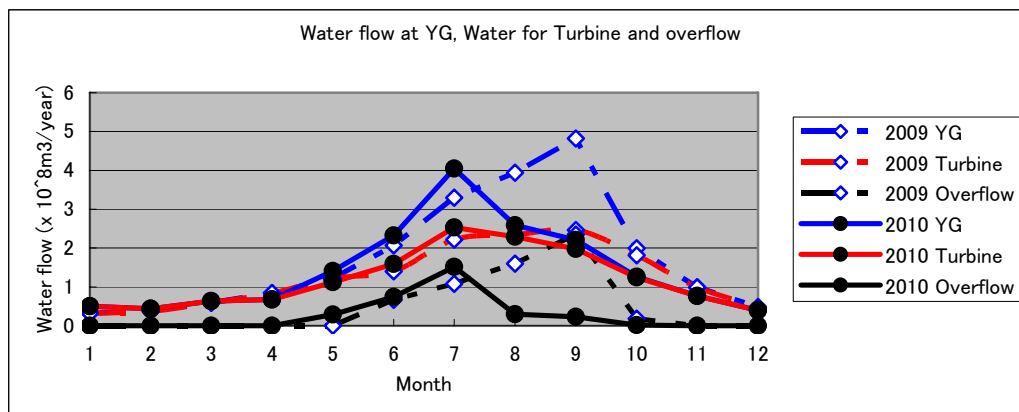
(2) The verification team confirmed that the data of EGy, EGplant, ESplant and EGaux in the Monitoring report are identical with their evidences. (/2/, /3/, /4/)

In addition to that, the verification team visited PGTC provincial office in Lanzhou and confirmed that the EGy data of above Power purchase settlement notices are identical with the original data of PGTC. (/51/)

(3) The generation increase in 2010

The generation increase of 16.6% against the river water flow rate increase of 8.8% in 2010 is due to the increase of water flow in the Heihe river and favorable water flow condition available for the Xiaogushan hydropower plant in 2010. Figure 4 shows water flow at Yingluo Gorge, water flow for turbine (used for electricity generation) and overflow in 2009 & 2010.

**Figure 4: Water flow at Yingluo Gorge (YG), Water for turbine and overflow in 2009 & 2010**



As indicated in figure 4 and table 3 of PP response, the over flow ([Water flow rate at Yingluo Gorge] – [Water for XHP generation]) in 2010 is 3.1 x 10<sup>8</sup> m<sup>3</sup>, which is 18% of the water flow rate at Yingluo gorge. On the other hand, the over flow in 2009 is 5.9 x 10<sup>8</sup> m<sup>3</sup> which is 28% of the water flow rate at Yingluo Gorge. This shows that the overflow in 2010 is far smaller than that of 2009.

Above explanation and figure 4 indicate that the river water flow condition at Xiaogushan hydropower plant in 2010 is considerably favorable and well utilized compared to 2009. The verification team considered that the response of PP is reasonable.

Based on above (1) ~ (3), the verification team confirmed that the EGy (Monthly power sold to the grid) data in the monitoring report is correct and the amount of emission reductions are correctly calculated. Also, the verification team confirmed that the explanation of the monitoring report about the generation increase in 2010 is appropriate.

The project complies with the requirements.

### **3.5 Quality of Evidence to Determine Emission reductions**

#### **3.5.1 Discussion**

There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.

An information/process flow diagram, describing the entire process from raw data to reported totals is developed.

Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.

Requirements for documented data trails are defined and implemented and all documentation are physically available.

#### **3.5.2 Findings**

None

#### **3.5.3 Conclusion**

The project complies with the requirements.

### **3.6 Management System and Quality Assurance**

#### **3.6.1 Discussion**

Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.

Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.

Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.

Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).

IT systems used for GHG monitoring and reporting should be tested and documented.

#### **3.6.2 Findings**

##### **Clarification Request 4**

(1) Organization change is to be explained, if applicable. Actual procedures taken in 5th verification are to be explained.

(2) Internal verification: To be clarified.

(3) Internal validation: To be clarified.

(4) Data protection: To be clarified.

##### **Response**

(1) There is no change in organization.

(2) EGy(XH), data is collected by the Production and Operation Department.(POD, Ms. Shao & Mr. Wang) (/44/,/47/)

EGaux, EGplant, ESplant: Operation staff of the power plant sends monitored record at the end of each month to the Production and Operation Department. (/44/, /46/)

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POD makes a comparison of these data. The data (EGy(XH)) is sent to PGTC for their checking. (/44/, /47/)

(3) Mr. Wang Li Dong, director of POD, validates the EGy(XH) based on above data from relevant department of XHC. (/44/, /47/)

(4) The access to EGy is restricted to the registered staff. (Mr. Wang and Ms. Shao) (/44/, /47/)

### **Clarification Request 5**

Are there any changes in the IT system?

#### **Response**

There was no change in IT system.

### **Forward Action Request 1**

The archiving and storing of the CDM documents are to be improved.

#### **Response**

According to specifications of <Archives Law of the People's Republic of China> XHC will furtherly strengthen the archiving and storing of the CDM documents on the original basis since 2011, setting special CDM filing cabinet, dominating special archivist to classify and manage all CDM documents systematically and normalizedly.

### **Forward Action Request 2**

Internal audit and management review procedures should be included in the XHP CDM Manual.

#### **Response**

According to the requirements of CDM mannual, XHC will record and review all the power generation data and materials of each day, each month and each year to ensure the accuracy and completeness of the record. The monthly production data for CER is confirmed in the monthly managers meeting and recorded in the minutes.

### **3.6.3 Conclusion**

CL4: Clarified

CL 5: By the desk review and visiting project site & office the verification team confirmed that there is no Change in IT system.

CL5 were clarified.

FAR 1 and FAR 2 will be reviewed in the next verification.

## 3.7 RESPONSE TO REQUEST FOR REVIEW OF “XIAOGUSHAN HYDROPOWER PROJECT IN PEOPLE’S REPUBLIC OF CHINA” (0378)

### 3.7.1 Response by Project participant

In response to the request for review of “Xiaogushan Hydropower Project in People’s Republic of China” (0378), we bring to your kind attention the following clarifications and responses.

- (1) The financial analysis demonstrated at the time of registration remains valid and sound. The reasons for increase of PLF or the increase of power generation were not within the control of the project participant to anticipate at the time of project design and investment decision.**

The reasons for the increase in PLF post implementation of this project activity are not within control of the project participant and difficult to predict at the investment decision making time and hence following Section 5(d) of the “Guidelines on assessment of different types of changes from the project activity as described in the registered PDD” (Annex 67, EB 48), such changes would not fall into the category of changes that may impact the additionality of the project activity. The detailed reasoning is as follows.

*a) The water flow estimation at the time of design stage followed the national design codes and industry practices based on best available information*

The estimation of electricity generation potential during the project design was based on the historical water flow data of 1944-2000 from Yingluo Gorge Hydrological Observation Station. The accredited (Class A) design institute<sup>3</sup>, Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute, following the standard industry practices, used this time series historical data and estimated the best possible water flow availability for the project and hence the electricity generation potential<sup>4</sup>.

The design calculations including the water flow and electricity generation were estimated based on the best available information and the procedures complied with the procedures prescribed in relevant industry standards – Design code for hydropower projects (SL76-94) and Hydroelectric power station hydrological calculation specification (SL77-94) and industry common practice<sup>5</sup>. As per the standard procedures outlined in the standard codes and specifications, the design institute collected the historical time series data on water flow for 57 years and then ranked the available inflow years and selected the representative years for the hydro-energy potential calculations for the project. Furthermore, the Feasibility Study Report for Xiaogushan Hydropower Plant was approved by both Gansu Province Development and Reform Commission and China Hydropower Engineering Consulting Co., Ltd along with the Asia Development Bank that provided financing to the project activity. This confirms that the energy generation potential was estimated based on the best available information available during the design stage and following the applicable industry standards. (/18a/)

*b) The period from 2005 to 2010 falls in a wet period in term of water flow in Heihe River. It was the first wet period since the start of the historic water record in 1944 and thus was not predictable at the time of project design when the Heihe River had been historically at its normal or dry periods in the previous 57 years (1944-2000).*

<sup>3</sup> Accreditation Certificate by the national Ministry of Construction

<sup>4</sup> Source: Statement from Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute

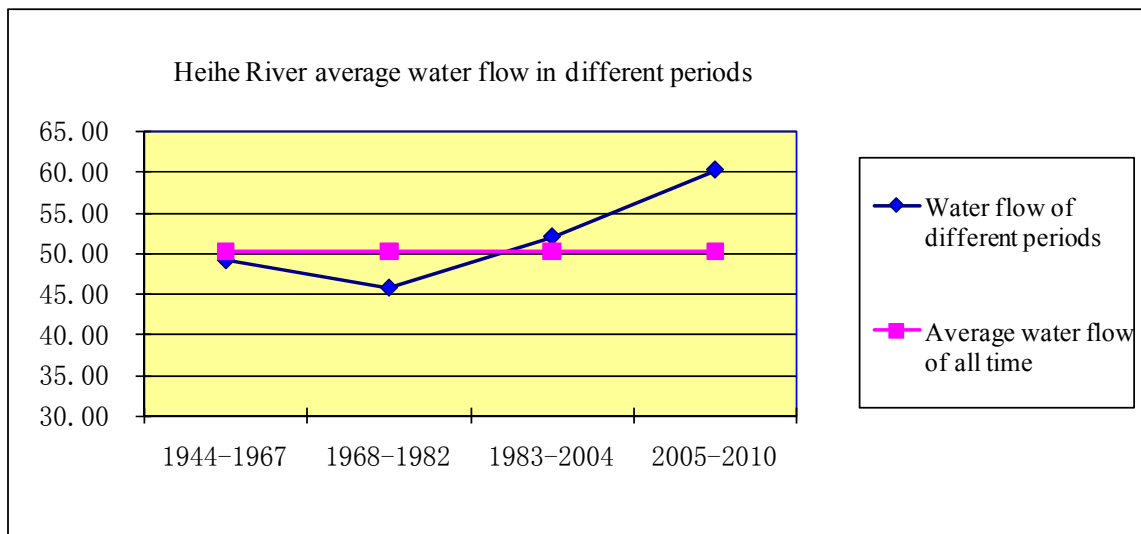
<sup>5</sup> Source: Xiaogushan Preliminary Engineering Design, Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute

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The increase of PLF is due to the increase of electricity generation given that the installed capacity remains unchanged. This increase is mainly due to the unforeseeable increase of the water flow in the Heihe River as compared to the best possible estimate of water flow based on the time series of historical annual water flow for 57 years (1944-2000) during the project design stage.

During the period of 57 years (1944-2000), the Heihe River was statistically at its normal and dry periods in term of its water flow. The average annual runoff from 1944 to 2000 is  $1.58 \times 10^9 \text{ m}^3$  and the annual water flow is  $50.2 \text{ m}^3/\text{s}$ . And the average annual water flow during the period of year 2005-2010 is  $60.1 \text{ m}^3/\text{s}$  and exceeds the 57-year average value by 19.7%.

According to the recorded hydrological data the annual average water flow of the Heihe River increased significantly during the period of year 2005 and year 2010 compared to the average water flow during past 57 years. Most of the period prior to 2005 either be considered as normal (1944-1967, 1983-2004) or dry (1968-1982)<sup>6</sup> when compared with the historical average water availability. But the period from between 2005 and 2010 falls in a wet period, the first wet period since the water survey bureau started monitoring water flow, where the average water flow rates are considerably higher than historical average due to high precipitation and heavy snow melting. Consequently, the electricity generation has been higher than the volume estimated in the project design during the concerned period. This pattern of increase in water flow and power generation was not at all anticipated at the time of project design. (/18b/)



**Figure 1** Historic annual average water flow for Heihe River<sup>7</sup>

*c) Heavy precipitation and snow melting has resulted in high water flow rates in the river. The increase in water flow and power generation is a phenomenon consistent across the Heihe River and surrounding area. This pattern is not within the control of the project participant.*

The precipitation has increased significantly and ice-melting phenomenon from upstream has also accelerated due to warmer weather in recent years, according to Heihe River water flow statistics performed by Zhangye City Hydrology and Water Resource Survey Bureau. Consequently, the annual runoff and annual average water flow keep increasing. As a result, the average annual water flow during the period of year 2005-2010 exceeds the 57-year average value by 19.7%.

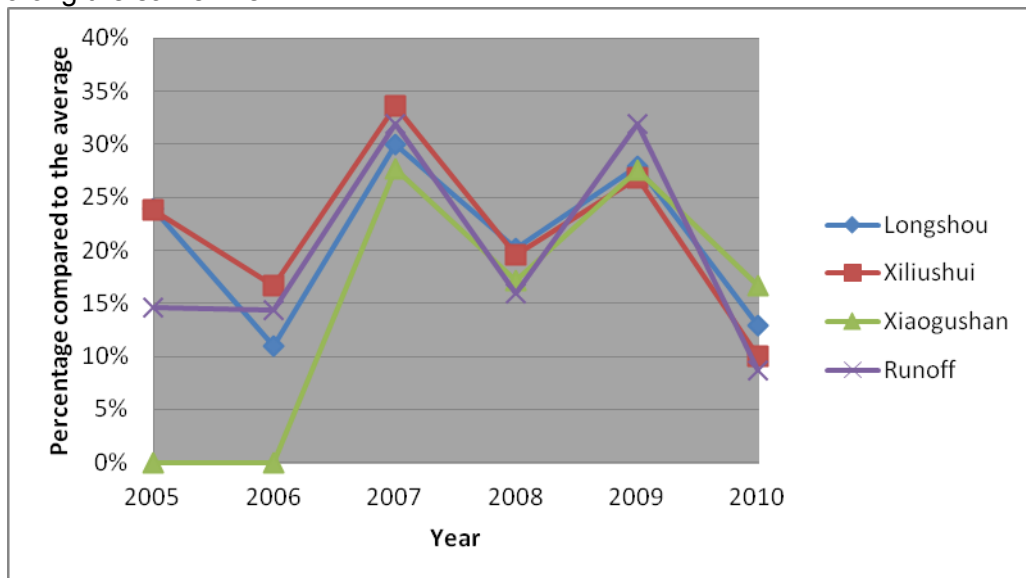
<sup>6</sup> Source: Heihe River water flow statistics by Zhangye City Hydrology and Water Resource Survey Bureau

<sup>7</sup> Source: Heihe River water flow statistics by Zhangye City Hydrology and Water Resource Survey Bureau

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During the period of 1994-2004, the ranges of annual precipitation in deep and shallow mountain areas were 400-500mm and 250-450mm, respectively. During the period of 2005-2010, these figures have increased to 460-560 mm and 300-500mm, respectively. This increase in precipitation is a major cause of the increase of the runoff. In addition to this, more even distribution of the runoff throughout the year was observed as a result of combination of increased precipitation and increased snow melting. Monitoring of temperature data in the region shows that the temperature in Qilian Mountains region (origin of Heihe River) only rose 0.1 °C between 1960s and 1980s. In 2005, the increase of the temperature reached 1.17 °C. A study from the Chinese Academy of Sciences also shows that due to climate change, glaciers in Qilian Mountains (source of the Heihe River) has melt 6 meters in recent years, the volume of melting ice and snow each year is about 1 billion cubic meters<sup>8</sup>. This phenomenon is likely to continue in near future and hence expected more water flow availability to the hydro projects on the river.

Xiaogushan Hydropower project is not an exceptional case in term of increase in power generation due to greater water flow. As a matter of fact, 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 statistics of the Yingluo Gorge, which is illustrated in Figure 2 below. The increased water flow has been consistently the case for all power plants along the same river.



**Figure 2** Analysis of neighboring hydropower plants' Electricity Generation

This phenomenon is not only common in the Heihe River area, but also consistent across the region. Besides the Heihe River, there are other rivers in the surrounding areas which experienced the same pattern of increased water flow and runoff during the concerned period of time. For example, the Taolai River shows very similar water flow statistics according to the Bureau of Water Resources in Gansu Province<sup>9</sup>: the annual average water flow in 2005-2010 is 32.5% higher than the annual average during the period of 1991-2004. (/19/)

Based on the above, it can be concluded that the design calculations were done based on the best available information according to the national design codes and industry practice. The increase in the PLF and power generation was not anticipated at the time of project design nor

<sup>8</sup> <http://news.cn.yahoo.com/newspic/news/13762/4/>, [http://www.xinhuanet.com/chinanews/2010-07/20/content\\_20383860.htm](http://www.xinhuanet.com/chinanews/2010-07/20/content_20383860.htm),  
Xinhua News Agency, 22/4/2011

<http://news.cn.yahoo.com/newspic/news/13762/4/>, Xinhua News Agency, 20/7/2010

<sup>9</sup> Source: Taolai River water flow statistics provided by Bureau of Water Resources in Gansu Province

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within the control of the project participant. The investment decision was thus made in accordance with the outcome of the financial analysis using the best available information available and barrier analysis demonstrated in the registered PDD, which remain entirely valid and sound.

### **(2) Several prohibitive barriers remained significant to prevent the project activity from being implemented without the CDM.**

A number of barriers identified in the registered PDD were prominent at the time of investment decision regardless of the financial (benchmark) analysis.

#### **a. Financing Barrier**

Access to Financing is one of the most significant barriers the project participant faced at the time of decision making. In fact, the project participant, Heihe Hydro Development Shareholding Co., Ltd did not qualified for domestic bank's loan<sup>10</sup> due to the limited assets of 108 million CNY prior to the ADB's involvement. When the project participant was negotiating with ADB for the loan in 2002, as the project guarantee agency, Gansu Finance Bureau perceived high project risk and required US dollar-denominated CDM fund to be seriously sought as a way to mitigate the high project risk and insisted on this as the condition to approve and provided guarantee to the proposed ADB loan<sup>11</sup>. This soundly demonstrates that CDM is a decisive factor enabling the breakthrough of the prohibitive financing barrier the project faced.

#### **b. Other perceived high project risks**

Several project risks were clearly identified (i.e. capital cost overrun, regulatory risk for tariff, significant foreign exchange risk, etc). Notably, the regulatory risk for tariff has materialized as the provincial Price Bureau published the new tariff (0.24778 CNY/kWh) on December 12, 2006<sup>12</sup>, which is much lower than the one used in the financial analysis (0.29 CNY/kWh). All these project risks are out of project participant's control and could put the project unviable.

**In summary, the additionality of the project is not affected by the increase in PLF because:**

- 1) the financial analysis has remained valid and sound and the increase in PLF was unanticipated at the time of project design and beyond the project participant's control and**
- 2) the barriers to the project activity were significant and could prevent the project from being implemented.**

Furthermore, in the context of this project activity, the increase in PLF does not trigger notifying or requesting approval of changes from the registered PDD as the value change of this operational parameter is NOT within the control of the project participant following para 5(d) of the "Guidelines on assessment of different type of changes from the project activity as described in the registered PDD" (EB 48, Annex 67). As demonstrated above, increase in PLF is beyond the project participant's control, not possible to predict during the design stage and therefore falls out of the category of changes that may impact the additionality. The project has been implemented, operated and monitored as described in the registered PDD and monitoring plan.

Besides, the project activity is still meeting all the applicability criteria of the selected methodology and the scale of the project remains the same.

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<sup>10</sup> Loan application letter to Agricultural Bank of China and Bank of China, the two major financier in Gansu Province, registered PDD, page 23

<sup>11</sup> The minutes of the meeting held on Dec 2, 2002 in Lanzhou Feitian Hotel, registered PDD, page 23

<sup>12</sup> Gansu Province Price Bureau "Notice on feed-in tariff for hydropower plants in Gansu", December 12, 2006

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Therefore, the procedures for notifying and requesting approval of changes from the project activity as described in the registered PDD do not apply.

### 3.7.2 Validation opinion to PP Response by JACO CDM

**PP response 1: “The financial analysis demonstrated at the time of registration remains valid and sound. The reasons for increase of PLF or the increase of power generation were not within the control of the project participant to anticipate at the time of project design and investment decision.”**

#### **JACO CDM comments:**

During the actual operation, as mentioned in the verification report, JACO CDM observed that the electricity generated during the 5th monitoring period (01/01/2010 – 31/12/2010) was 16.6% higher than the estimate in the PDD and there is an average increase in PLF of 22.3% compared to the PDD estimate during the last four full year monitoring periods<sup>13</sup> (2007: 27.7%, 2008: 17.2%, 2009: 27.6%, 2010: 16.6%).

Regarding this increased electricity generation (and PLF), JACO CDM validated the PP response based on the “Guidelines on assessment of different types of changes from the project activity as described in the registered PDD”. (EB48 Annex 67)

JACO CDM confirms that there are no changes that are within the control of the project participant which may impact the validity of additionality analysis established at the time of project registration as concluded below.

1. There have not been any changes in the installed capacity, increased number of units and technologies described in the registered PDD since the start of the project operation in May – July, 2006. Also, there have not been any additions of components and extension of technology. Further, the project does not have multiple sites. (EB48 Annex 67 Section 5(a),(b),(c))
2. The increase in electricity generation and thus PLF is due to the water flow increase in the Heihe River since 2005. Such increase could not be predicted at the project design stage and was not observed in the historic time series flow data; hence the reasons of the increase of PLF and electricity generation were not within the control of the project participants as explained in the PP response.  
Therefore, the changes do not fall in the category of changes as per the Section 5(d) of EB48 Annex 67.
3. The assumptions underlying the original data/information are correct. (EB48 Annex 67 Section 7)

#### Explanations for the above item 1-3.

1. Throughout the verification period for 2006 to 2010, JACO CDM confirmed that the changes corresponding to EB48 Annex 67 Section 5 (a) and (b) are not found. The project always has one site, so no concern exists related to Section 5 (c).
2. Different values of actual operational parameters: Not within the control of the PP

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<sup>13</sup>The generation in year 2006 was a not a full year. Given the variability and seasonality of the water flow by month, the prorated value does not represent the overall pattern.

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(1) The FSR of the project had been carried out from August, 2001 by the design institute, Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute which is the class A design institute accredited by the national Ministry of Construction.

The FSR is based on the best available information available during the feasibility study stage applying the national design codes for hydropower projects (SL76-94) and Hydroelectric power station hydrological calculation specification (SL77-94).

The FSR was approved by the Gansu Province Development and Reform Commission on 4<sup>th</sup> April, 2002. The FSR was also approved China Hydropower Engineering Consulting Co., Ltd. along with the Asia Development Bank that provided financing to the project activity.

In the FSR, following the guidelines in the design codes documents, the design institute used the historical data of water flow statistics of the Heihe River for 57 years (1944-2000) from Yingluo Gorge Hydrological Observation Station which is located approximately 30km down stream of the Xiaogushan Hydropower Plant and this is also the base of the registered PDD.

The water statistics of FSR is up to 2000 and in the time series period considered for evaluation, there is no indication of the water flow increase observed from year 2005. Moreover, the calculation and estimation of water flow availability and hence the electricity generation potential follows the standard industry practice. (/18a/)

(2) The PDD version 1 was made in June, 2005 and the validation had been conducted to the PDD based on the above FSR. The project was registered on 11 August, 2006 (Request for registration in April, 2006).

As seen in the Heihe River water flow statistics up to 2004, the best available data at the time of validation, the water flow of the Heihe River does not indicate any pattern of significant increase. The increase in water flow of the Heihe River took place after 2005 and this increase was not possible to predict during the project design and validation stage in 2005-1<sup>st</sup> quarter of 2006.

(3) The water flow increase after 2005 is due to climate change such as increase of precipitation and increased snow melting in Qilian Mountain region (origin of Heihe River) as explained in PP response. In the verification for the period of 2009, JACO CDM confirmed by the interview with the Zhangye City Hydrologic and Water Resource Survey Bureau that the water flow is caused by the similar phenomena such as (a) rain fall in the watershed (b) undercurrent water which is affected by rainfall (c) melting of glaciers of Qilian Mountain. (/18b/)

The power generation data (2005-2010) for the two other hydropower plants (Longshou and Xiliushui), which are located in the down stream of Heihe River shows a very consistent pattern with the generation data of Xiaogushan power plant and the hydrological statistics of the Yingluo Gorge as shown in the PP response and the verification report for 2010 monitoring period. (/19/)

By above (1)-(3), it is concluded that the reasons of the increase of PLF and power generation were not anticipated at the time of project design nor within the control of the project participants

### 3. Correctness of the assumptions underlying the original data/information:

The essential document and data for electricity generation are FSR and the water flow statistics in the Heihe river. The FSR are made by class A design institute and approved as described above. The water flow statistics of Yingluo Gorge is an official data provided by Zhangye City Hydrologic and Water Resource Survey Bureau.

It is confirmed that:

(1) The water flow data in the FSR is based on the water flow statistics of the Yingluo Gorge of the Heihe River for 57 years (1944 to 2000).

(2) The description of the PDD is consistent to the description of the FSR. Also, it is not possible to foresee the water flow increase after 2005 at the validation stage.

Therefore, it is concluded that the assumptions underlying the original data/information are correct.

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### PP response 2: Several prohibitive barriers remained significant to prevent the project activity from being implemented without the CDM.

#### JACO CDM comments:

##### a. Financial barrier

The project site is located in Xishui, one of the poorest townships of Zhangye Prefecture in Gansu province which is the second poorest province in China and the access to financing was one of the most significant barriers at the time of decision making as stated in the PDD and the PP response.

##### b. Other perceived high project risks

As explained in the registered PDD (p23-25), the project envisaged several barriers, including regulatory risk for tariff, capital cost overrun, and significant foreign exchange risk. The reduction in tariff was one of the risks perceived at the time of investment decision, which could prevent the project from being implemented and the actual situation proves that the risk has materialized.

In the financial analysis, the tariff of 0.29 CNY/kWh from the PPA was applied (PDD p21). However, the actual tariffs decided by the Gansu Price Bureau superseded it. During the monitoring periods of 2007 -2010, the actual tariffs were much lower than this value, as shown in table 1 below. The average tariff of the 4 years (2007 – 2010) is 0.245 CNY/kWh, which is 15.5% lower than the tariff applied in the investment analysis (0.29 CNY/kWh).

Also, similar to the increased water flow and power generation, the decreased tariff was out of the project participant's control while it negatively impacts the project investment return.

Table 1: Actual average tariff for year 2007-2010

Year	2007	2008	2009	2010	Average of 4 years
Tariff (CNY/kWh)	0.24778	0.24778	0.237*	0.2478	0.245
Electricity to the grid (MWh)	472,849.7	433,920.2	472,444.2	432,088.6	452,825

\* The tariff in 2009 was slightly further decreased due to temporary adjustment based on the policy issued by the provincial price bureau. This value is the total revenue in 2009 divided by the total electricity delivered to the grid in 2009. (111,951,845 CNY/ 472,444,264 kWh=0.237)

Note: These data are taken from the power purchase settlement notices of Gansu Power Grid for each year submitted along with the monitoring report available in the UNFCCC web site.

### Conclusion

Based on above assessment to PP response 1 and 2,

- (1) JACO CDM confirms that the increase of water flow could not be predicted and was not observed in the historic time data series at the project design stage; hence the reasons of the increase in PLF and power generation were not within the control of the project participants and do not fall in the category of changes as per the Section 5(d) of EB48 Annex 67 and hence there is no requirement for reevaluating the investment analysis and the additionality argument.
- (2) JACO CDM also confirms that there were significant barriers such as financial barriers and other project barriers (such as tariff) that could pose high risk to the project.

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Therefore, JACO CDM confirms that the increase in PLF does not affect the additionality of the project activity.

### 4. PROJECT SCORE CARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Calculated Emission Reductions	
<b>Completeness</b>	Source coverage/ boundary definition			✓	All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.
<b>Accuracy</b>	Physical Measurement and Analysis	✓	✓	✓	Meters used for measuring power are calibrated.
	Data calculations	✓	✓	✓	Emission reductions are calculated correctly
	Data management & reporting	✓	✓	✓	Data management system is in place PP prepares education & training program.
<b>Consistency</b>	Changes in the project	✓	✓	✓	There is no change in the project.

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## 5. VERIFICATION STATEMENT

JACO CDM has performed a verification of the CDM project "Xiaogushan Hydropower Project in People's Republic of China". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

The management of Xiaogushan Hydropower Company Limited is responsible for the preparation of the GHG emission data and the reported GHG emissions reductions of the "Xiaogushan Hydropower Project in People's Republic of China" on the basis set out within the project Monitoring and Verification Plan indicated in the registered PDD version 2 dated 10 February 2006 and the 3<sup>rd</sup> revised monitoring plan which is complying with the consolidated methodology ACM0002 and approved on August 17, 2010 by the CDM EB. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the project.

The verifier assesses that the project is operated as planned and described in the validated and registered PDD. Installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions.

The verifier assesses that the monitoring was done in accordance the monitoring plan and the GHG emission reduction in the Monitoring Report version 1.1 is calculated without material misstatements.

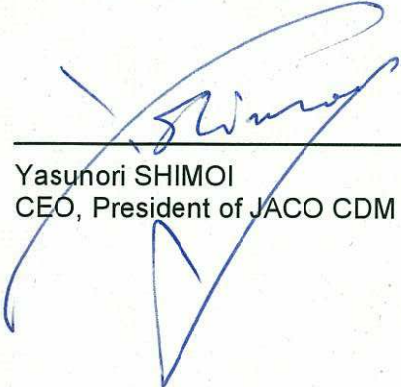
Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated, we will confirm the following statement:

Reporting period: From 01-01-2010 to 31-12-2010

Verified emission in the above reporting period:

Baseline emissions:	372,460 tCO <sub>2</sub> equivalents
Project emissions:	0 tCO <sub>2</sub> equivalents
Emission reductions:	372,460 tCO <sub>2</sub> equivalents

Date: 21 December, 2011



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Yasunori SHIMOI  
CEO, President of JACO CDM

## 5<sup>th</sup> Verification Report

### 6. References

#### Category 1 Documents:

*List documents provided by the Client that relate directly to the GHG components of the project. These should have been used as direct sources of evidence for the verification conclusions, and are usually further checked through interviews with key personnel.*

- /1a/ Monitoring Report, version 1.0 (for January 01,2010 to December 31,2010), dated 22 February, 2011
- /1b/ Monitoring Report, version 1.1 (for January 01,2010 to December 31,2010), dated 21 April, 2011
- /2a/ Power purchase Settlement Notice by Gansu Grid (Chinese Original)
- /2b/ Power purchase Settlement Notice by Gansu Grid (Translation)
- /3/ Invoice of electric Power supplied to PGTC by XHC
- /4/ XHC 2010 monthly production report
- /5/ XHC 2010 monthly station supply record
- /6a/ Calibration Report of main watt-hour meters (for line 1117 & 1118, dated 28 Feb 2010, 29 May 2010, 28 Aug 2010, 27 Nov 2010)
- /6b/ Explanation on the calibration date for electronic energy meter and validity on the seal of meters) 18 April, 2011, by Power Measurement Center of Gansu Province Electric Power Company
- /7/ Calibration Report of auxiliary watt-hour meters (for line 1117 & 1118, 15 Sep 2010)
- /8/ Calibration report of ESplant watt-hour meters (for 2006, 2008)
- /9/ Calibration report of EGplant watt-hour meters (for 2009)
- /10a/ CDM manual of Zhangye Xiaogushan Hydropower Plant
- /10b/ CDM manual of Zhangye Xiaogushan Hydropower Plant 2<sup>nd</sup> Version
- /11/ Power Purchase Agreement (signed by GPGC and XHC)
- /12a/ Water flow statistics in Heihe Yingluo Gorge for 1944 – 2009 by Zhangye Hydrologic and Water Resource Conservancy Bureau
- /12b/ Water flow record in Heihe Yingluo Gorge for 2009 and 2010 including water flow to XHP by Zhangye Hydrologic and Water Resource Conservancy Bureau
- /12c/ Record of water flow to XHP in 2010, measured by XHC
- /13/ Application Report on Completion Environmental Protection Acceptance of the Constructed Project by State Environmental Protection Administration, 1 Dec, 2009
- /14/ 2010 training record in XHC
- /15/ PGTC clarification for watt hour meter replacement and calibration
- /16/ PGTC report “Site detection report on status of Power Measurement Devices at XHP”
- /17/ Power generation data (2005-2009) for the two other hydropower plants (Longshou and Xiliushui)
- /18a/ Explanation on the Adapting Hydrological Data of Preliminary Design Report of Xiaogushan Hydropower Plant by Gansu Province Water Conservancy & Hydraulic Power Survey Design Institute, 9 December, 2011
- /18b/ Explanation about Increasing Annual flow of Heihe River in Recent Years by Zhangye Hydrology and Water Resources Bureau in Gansu Province, 8 December, 2011
- /19/ Explanation on annual runoff increase of Taolai River in recent years by Taolai River Basin hydraulic Management Bureau of Department of Water Resources of Gansu Province, 18 March, 2011

#### Category 2 Documents:

*List background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents should have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.*

- /21/ Schematic View of Xiaogushan run-of river power plant
- /22/ Drawings of the power house and ratings of major electric equipments
- /23/ Executive summary of Environmental Impact Assessment
- /24/ Technical Management Standard for Watt-hour meter (DL/T 448-2000)

## 5<sup>th</sup> Verification Report

- /25/ Standard GB17883-1999-T0.2S 0.5S (Alternating current static watt-hour meters for active energy (class 0.2S and 0.5S)
- /26/ DL 460-92: Inspection regulations for power meter apparatus
- /27/ DL 448-91: Management regulations for power meter apparatus
- /28/ DL/T 596-1996: Preventive test code for electric power equipment
- /29/ Approved methodology ACM0002, ver.5
- /30/ Registered PDD, version 2, 10 February, 2006
- /31/ Validation Report (by JCI)
- /32/ 2<sup>nd</sup> Revision of monitoring plan
- /33/ 3<sup>rd</sup> Revision of monitoring plan
- /34/ VVM version 01.2

### **Persons interviewed:**

*List persons interviewed during the verification, or persons contributed with other information that are not included in the documents listed above.*

- /41/ XHC, Mr. Zhu Xingji, Chairman of the Board
- /42/ XHC, Mr. Xu Qing Nian, Deputy General Manager
- /43/ XHC, Mr. Ding Jianjun, Deputy General Manager
- /44/ XHC, Mr. Liu Meng De , XHP project manager
- /45/ XHC, Mr. Zhang Jie, General Manager of Xiaogushan Hydropower plant
- /46/ XHC, Mr. Zhu Lei, Maintenance Department, Chief
- /47/ XHC, Ms. Shao Yan Yun
- /48/ XHC, Ms. Zhou Xuan
- /49/ XHC, Ms. Yang Yang
- /50/ XHC, Ms. Tingting Yang
- /51/ PGTC, Mr. Wang Feng, Trading Settlement Center
- /52/ PGTC, Mr. Guo Xiaojun, Power Energy Measuring Center
- /53/ PGTC, Ms. He Shuyun, Deputy Director of Mechanical & Power Control Station of Zhangye
- /54/ Bajiaowan Village, Mr. Chang Xing Ming, Village Master
- /55/ Bajiaowan Village, Mr. Qin Wang Dong
- /56/ Zhangye City, Mr. Kang Qing, Deputy Mayor

# Appendix 1

## 1 TABLE I. IMPLEMENTATION STATUS & OPERATION CHECKLIST

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
<b>A. Opening Session</b>				
<b>A.1. Introduction to audits</b>	1 2 42~ 50	In the opening meeting, the verification team explained to XHC about the purpose, scope and process of the 5th verification in the meeting room of XHC hydropower plant on 13 April, 2011. Participants: Verification team: Mr. Teruo FUKUDA, JACO CDM verification team leader Mr. Yukio TAKANO, JACO CDM verification team member XHC Mr. Xu Qing nian, Deputy General Manager Mr. Ding Jianjun, Vice General Manager Mr. Zhu Lei, Inspection Department, Chief Mr. Liu Meng De, Project Manager Ms. Xuan Zhou, Project Assistant Ms. Yang Tingting, Project Assistant	—	—
<b>A.2. Clarification of access to data archives, records, plans, drawings etc.</b>	42- 50	Access for relevant data, archives, record, plans and drawings was fully provided to the verification team.	OK	OK
<b>A.3. Contractors for equipment and installation works</b> Who has installed the equipment? Who was contracted for planning etc.?	1,2 41- 50	Generator and turbine: Lanzhou Electric export & import Co. Main transformer: XI'AN XIBIAN Zhongte Electric Co., China Monitoring Equipment: Ref. C.4.	OK	OK
<b>A.4. Commissioned date</b>	41-	No.3: Commissioned on May 12, 2006.	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
Project should be commissioned before the time of 1 <sup>st</sup> verification in so far as the project should be ready to generate emission reductions afterwards.	44	No.1: Commissioned on July 9, 2006 No.2: Commissioned on July 29, 2006		
<b>B. Open issues indicated in validation report</b>				
<b>B.1. Open issues in validation report</b>	30, 31	Based on the validation report, the verification team identified no missing steps.  The project has been registered under the CDM reference number 0378, on August 11, 2006.	OK	OK
<b>C. Implementation Status of the project</b> This part is covering the checks during the on-site inspection at the project's site				
<b>C.1. Physical components</b> Check the installation of all required facilities and equipment as described by the PDD.	21, 22, 30, 33	The project is a run-of-river hydropower project which consists of diversion weir, intake power tunnel, power house, 110kV high voltage switchyard and 24km of 110kV transmission lines. The generating plant in the power house has the total installed capacity of 102MW which consist of 2 units of 40MW and 1 unit of 22MW.  The verification team identified that all required facilities are installed as defined in PDD and the 3 <sup>rd</sup> revision of the monitoring plan.		
<b>C.2. Project boundaries</b> Check whether the project boundaries are still in compliance with the ones indicated by the PDD.	1,30	The verification team visited the Xiaogushan hydropower project site and the PGTC Heihe switch yard which is the interface between XHC and the power grid and confirmed that there is no change in the project boundary.	OK	OK
<b>C.3. Monitoring and metering systems</b> Check whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.	1, 6~ 11, 24, 30, 31, 33	Two sealed watt-hour meters called "Main meter" which are used as revenue meters, are installed in the Heihe Switchyard, at the end of 110kV transmission lines "Heihe-Xiaogushan No.1117 line & No.1118 line".  The main meters are monitored by the data acquisition system of PGTC <sup>15</sup>  The main meters are ELSTER (USA) make and 0.2 class accuracy.  In addition to the Main meters, two sealed watt-hour meters called "Auxiliary meters" are installed in the Xiaogushan Power Station, at the end	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.																				
	41-53	<p>of 110kV transmission lines “Heihe-Xiaogushan No.1117 line &amp; 1118 line”. The auxiliary meters are used to justify the main meter data.</p> <p>The auxiliary meters are Changsha Weisheng Electronics Co., LTD. make watt-hour meter with 0.2 class accuracy. Originally they were 0.5 class but they were upgraded to 0.2 class in October 2008 to harmonize with the accuracy of the main meters. In this connection, the monitoring plan of the project was revised and approved on 17 August 2010 as the 3<sup>rd</sup> revision of the monitoring plan. These auxiliary meters are the part of the monitoring and control system of the Xiaogushan generation plant. The total monitoring and control system is supplied by NARI (Nanjing Automation Research Institute).</p> <p>Both main meters and auxiliary meters are digitalized and electronically monitored.</p> <p>The monitoring and the metering systems are appropriate.</p>																						
<b>C.4. Data uncertainty</b> How will data uncertainty be determined for later calculations of emission reductions? Is this in compliance with monitoring and metering equipment?	1, 6~11, 24, 30~33 41-53	<ul style="list-style-type: none"> <li>The electricity power transaction is based on the joint meter reading of the main meters at 24:00 Hrs on the last day of every month.</li> <li>The qualified staff of XHC will compare and justify the monthly generation data in the PGTC web site with the data available from Zhangye grid company and also the XHC’s auxiliary meter reading.</li> <li>The verification team checked the data in the monitoring report with the “Power Purchase Settlement Notice” (the Notice) of each month provided by provincial PGTC, the invoice of XHC to PGTC and the monthly production record by XHC.</li> <li>The procedures are indicated in the XHP CDM Manual.</li> </ul>	OK	OK																				
<b>C.5. Calibration and quality assurance</b> Check how monitoring and metering systems are subject to calibration and quality assurance routines a) with installation b) during future operation	1, 6~11, 24, 30~33 41-53	<p>According to the 3<sup>rd</sup> revision of the monitoring plan, the calibration of the meters is conducted as below. The category and the frequency are based on the “Technical administration cord of electric energy metering” (DL/T 448-2000).</p> <table border="1"> <thead> <tr> <th>Meters</th> <th>Category</th> <th>Accuracy</th> <th>Calibration frequency</th> </tr> </thead> <tbody> <tr> <td>EG<sub>y</sub></td> <td>I</td> <td>0.2 class</td> <td>Quarterly</td> </tr> <tr> <td>EG<sub>aux</sub></td> <td>II</td> <td>0.2 class</td> <td>Annually</td> </tr> <tr> <td>EG<sub>plant</sub></td> <td>III</td> <td>0.5 class</td> <td>Annually</td> </tr> <tr> <td>ES<sub>plant</sub></td> <td>IV</td> <td>0.5 class</td> <td>Every 5 years</td> </tr> </tbody> </table> <p>Calibration work of EG<sub>y</sub> and EG<sub>aux</sub> is done by Power Metering Centre of Gansu Provincial Power Science Research Institute.</p>	Meters	Category	Accuracy	Calibration frequency	EG <sub>y</sub>	I	0.2 class	Quarterly	EG <sub>aux</sub>	II	0.2 class	Annually	EG <sub>plant</sub>	III	0.5 class	Annually	ES <sub>plant</sub>	IV	0.5 class	Every 5 years	OK	OK
Meters	Category	Accuracy	Calibration frequency																					
EG <sub>y</sub>	I	0.2 class	Quarterly																					
EG <sub>aux</sub>	II	0.2 class	Annually																					
EG <sub>plant</sub>	III	0.5 class	Annually																					
ES <sub>plant</sub>	IV	0.5 class	Every 5 years																					

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
<b>C.6. Data acquisition and data processing systems</b> Check the eligibility of used systems.	1, 10, 30~ 33 41- 53	<p>Data acquisition systems for the main meters have been installed at PGTC as shown in C.4 above.</p> <p>Data acquisition system for auxiliary meters is installed in the Xiaogushan Hydro Power Station and has been put into operation since the beginning of August, 2006. In October 2008, the location of the EGaux meters were moved from the central control room to the 110kV step up station of the power plant to improve the accuracy of measurement.</p> <p>Both systems (Main and Auxiliary) include two sets of an identical computer system which are mutual back-up system. When one set is working, the other set is tracking.</p>	OK	OK
<b>C.7. Reporting procedures</b> Check how reports with relevance for the later determination of emission reductions will be generated	1, 10, 30~ 33 41- 53	<p>According to the 2<sup>nd</sup> version of the XHP CDM Manual, the reporting procedures are as below.</p> <ul style="list-style-type: none"> <li>The electricity power transaction is based on the joint meter reading of the main meters at 24:00 Hrs on the last day of every month.</li> <li>The joint meter reading is conducted as following;  XHC's qualified staff records main meter reading of 24:00 on the last day of each month and the recorded data will be sent to PGTC by e-mail or fax. PGTC will compare and justify the data by their remote monitoring system. After finalization, PGTC will provide the data on PGTC website in the form of the "Power Purchase Settlement Notice" (the Notice).</li> <li>The qualified staff of XHC (Production Operation department (POD)) will verifies the correctness of the Notice and the Notice will be submitted to monthly manager meeting of XHC and if approved the finance section of XHC will give an invoice to PGTC.</li> <li>After one year's operation, project office of XHC will sum up the annual generation sold and calculate annual CERs.</li> </ul> <p>The procedures are indicated in the XHP CDM Manual 2<sup>nd</sup> Version.</p> <p><b><u>Clarification request No.1</u></b></p> <p>About the metering of generation (Section C of the monitoring report), XHC explained about the justification procedures for the monthly electricity supply to the grid and double check procedures. Please explain the actual justification procedures and changes from the last verification period if any.</p>	CL 1	
<b>C.8. Documented instructions</b>	1,	XHC has developed XHP CDM manual which is stated in the PDD annex 4	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions have access and knowledge of documented instructions, forming a part of the project's management system.	10, 30~ 33 41- 53	"Monitoring Plan".  Verification team confirmed that the XHP CDM Manual contains the items indicated in the Annex 4 of the PDD.		
<b>C.9. Qualification and training</b> Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions has the appropriate competences, capabilities and qualifications to ensure the required data quality.	1, 10, 14, 30~ 33 41- 53	The personnel performing tasks has the appropriate competence and capability for executing the monitoring with sensitivity.  (1) As for the operators working in the control room, training program regarding the hydropower plants equipment and operation.  (2) As for the training of the personnel in charge of the emission reduction of CDM project, training program regarding the CDM rules and procedures are conducted.	OK	OK
<b>C.10. Responsibilities</b> Check whether all tasks required to gather data and prepare a monitoring report with the necessary quality have been allocated to responsible employees.	1, 10, 30~ 33 41- 53	It is indicated in the XHP CDM Manual as follows:  XHC production operation department is responsible for generation amount monitoring, XHC finance department is responsible for generation amount calculation and the monitoring report is written by XHC project office.	OK	OK
<b>C.11. Trouble shooting procedures</b> Check whether there are possibilities of redundant data monitoring in case of having problems with the used monitoring equipment. Such procedures may reduce risks for the buyers of emission reductions (e.g. the Client)	1, 10, 30~ 33 41- 53	The regular inspection and maintenance of metering system are carried out properly according to the regulation to avoid the trouble. If a trouble occurs in the main metering system, the monitoring data by the auxiliary metering system can be utilized.  The procedure is shown in the XHP CDM Manual.  Verification team identified that the procedure for back-up is appropriate.	OK	OK
<b>C.12. Request of notification or request for approval of changes</b> Any approval of the necessary request of notification or request for approval of changes from the project activity as described in the registered PDD or the last revision of the monitoring plan.	1, 10, 30~ 33 41- 53	The verification team confirmed that there is no necessity of request of notification or request for approval of changes from the project activity as described in the registered PDD or the 3 <sup>rd</sup> revision of the monitoring plan.	OK	OK
<b>D. Internal Data</b> Identifying the internal GHG data sources and				

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
ways in which the data have been collected, calculated, processed, aggregated and stored should be part of verification to assess accuracy and reliability of the internal GHG data.				
<b>D.1. Type and sources of internal data</b> Acquire information on type and source of internal GHG data, which is used in calculations of emission reductions. E.g., “continuous direct measurements”, “site-specific correlations”, “periodic direct measurements”, “use of models” and/or “use of default emissions factors”.	1, 3 10, 30~ 33 41- 53	The electricity supply to the grid, continuously measured by the calibrated main meters, is only the parameter which is used for the calculation of the emission reduction according to the monitoring plan.  For GHG calculation, normally the data of the Notice by PGTC which is used for electricity transaction between XHC and PGTC is applied. (Ref.: C.4.)  In case of an abnormal condition such as main meter trouble, XHC’s internal data by auxiliary meters will be used as mentioned in C.4. & C.12.	OK	OK
<b>D.2. Data collection</b> How is data collected and processed? What are the means of quantifying emissions from the different data sources?	1, 3 10, 30~ 33 41- 53	The data is collected and processed by digital data acquisition system mentioned in C.4 to C.8.	OK	OK
<b>D.3. Quality assurance</b> Does internal data collection underlie sufficient quality assurance routines?	1, 3 10, 30~ 33 41- 53	It is confirmed that QA procedures are in place in normal operation and also in abnormal condition as shown in C.4 to C.8 and C.12.	OK	OK
<b>D.4. Significance and reporting risks</b> Assess the significance and reporting risks related to the different internal data sources. Potential reporting risks may be related to the calculation methods, accuracy of data sources and data collection and/or the information systems from which data is obtained. The significance of and risks associated with the data source indicate the level of verification effort required at a later stage.	1, 3 10, 30~ 33 41- 53	The emission reduction is based on the electricity supplied to the grid since the project is the run-of –river hydropower plant with no other emission of GHG. The electricity quantity supplied to the grid is monitored and reported with sufficient accuracy and reliability as mentioned in C.4 to C.8.	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
<b>E. External Data</b> Especially for data of baseline emissions there might be the necessity to include external data sources. The access to such data and a proof of data quality should be part of verification. If it is deemed to be necessary, an entity delivering such data should be audited.				
<b>E.1. Type and sources of external data</b> Acquire information on type and source of external data, which is used in calculations of emission reductions	1, 2 10, 11, 30~ 33 41- 53	Monthly generation amount sold to the grid The monthly report of the monthly sold power indicated in the Notice which is received from PGTC is used for GHG calculation as mentioned in C.8.	OK	OK
<b>E.2. Access to external data</b> How is data transferred? How can reproducibility of data set be ensured?	1, 2 10, 11,30 ~ 33 41-53	The monthly report of the generation and monthly sold power is stored in the project office of XHC in Zhangye city.	OK	OK
<b>E.3. Quality assurance</b> Does external data underlie any quality assurance routines?	1, 2 10, 11,30 ~ 33 41-53	Refer to C.5 and C.6.	OK	OK
<b>E.4. Data uncertainty</b> Is it possible to assess the data uncertainty of external data? Are such routines included in reporting procedures?	1,2 10,11 30~ 33 41-53	Refer to C.5 and C.6. The routine is mentioned in the XHP CDM Manual.	OK	OK
<b>E.5. Emergency procedures</b> Are there any procedures which will be applicable if there is no access to relevant external data?	1, 2 10, 11, 30~ 33	Emergency procedure is implemented as mentioned in C.12 of the XHP CDM Manual.	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
	41-53			
<b>F. Environmental and Social Indicators</b> A Monitoring Plan may comprise environmental and/or social indicators which could be necessary to monitor for the success of the project activity.				
<b>F.1. Implementation of measures</b> A project activity may demand for the installation of measures (e.g. filtering systems or compensation areas), which are exceeding the local legal requirements. A check of the implementation or realization of such measures should be part of the verification.	1,13, 30~33 41-53	Based on the Environmental Protection Law of the People's Republic of China and the relevant World Bank guidelines, Environmental Management and Monitoring Plan were documented in May, 2004.  The monitoring after the commissioning of the power plant has been properly made and the quarterly reports of monitoring results have been submitted.	OK	OK
<b>F.2. Monitoring equipment</b> Check where necessary whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.	1,13, 30~33 41-53	Environmental monitoring has been carried out according to the Environmental Impact Assessment Manual.  The items are water, atmosphere, noise, and ecology and peoples health, covering pre-construction, during construction and operation / maintenance stage.	OK	OK
<b>F.3. Quality assurance procedures</b> What quality assurance procedures will be applied for such data?	1,13, 30~33 41-53	The Environmental Monitoring Station, qualified by Gansu Provincial Technology Bureau is in charge of the environmental monitoring.	OK	OK
<b>F.4. External data</b> Check the quality, reproducibility and uncertainty of external data.	1,13	On 1st December 2009, Gansu Provincial Environmental Protection Department and Zhangye Environmental Protection Bureau have approved the the report made by the "Environment protection acceptance board" report for the completed XHP that the project passed the acceptance inspection.  The report states that after the project has been put into operation, it will improve the structure of power grid and mitigate the power shortage for local place, play a positive role in local economy development and play a local ecology environment protection. Also, it states that the project has	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
		met all the requirements of the relevant regulations and laws on environment protection of national and local place.		
<b>G. Management and Operational System</b> In order to ensure a successful operation of a Client project and the credibility and verifiability of the ERs achieved, the project must have a well defined management and operational system.				
<b>G.1. Documentation</b> The system should be documented by manuals and instructions for all procedures and routines with relevance to the quality of emission reductions. The accessibility of such documentations to persons working on the project has to be secured.	1,10 14, 30~ 33 41- 53	XHC has developed XHP CDM Manual which is stated in the PDD annex 4 as mentioned in C.8. of this checklist.  The XHP CDM Manual is stored in the project office in Zhangye city and controlled by a person of the project office. It was confirmed that the accessibility to persons working on the project is secured.  However, it was found that some documents related to the XHP CDM project are stored at site and some are in the project office.  <b><u>Forward Action Request No.1</u></b> The archiving and storing of the CDM documents are to be improved.	FAR 1	FAR 1
<b>G.2. Qualification and training</b> The system should describe the requirements on qualification and the need of training programs for all persons working on the emission reduction project. Performed training programs and certificates should be archived by the system.	1,10 14, 30~ 33 41- 53	Training for the plant operation is mentioned in C.10 of this checklist.	OK	OK
<b>G.3. Allocation of responsibilities</b> The allocation of responsibilities should be documented in written manner.	1,10, 30~ 33 41- 53	It is clearly written in the XHP CDM Manual.	OK	OK
<b>G.4. Emergency procedures</b> The system should contain procedures which provide emergency concepts in case of unexpected problems with data access and/or	1,10, 30~ 33 41-	It is clearly written in the XHP CDM Manual.	OK	OK

OBJECTIVE	Ref.	COMMENTS	Draft Concl.	Final Concl.
data quality.	53			
<b>G.5. Data archiving</b> The system should provide routines for the archiving of all data which is required for verifying the project's performance in the context of consecutive verifications.	1,10, 30~ 33 41- 53	<u>(FAR 1 of G.1 above)</u>	(FAR 1)	(FAR 1)
<b>G.6. Monitoring report</b> The system includes procedures for the calculation of emission reductions and the preparation of the monitoring report.	1,10, 30~ 33 41- 53	It is clearly written in the XHP CDM Manual.	OK	OK
<b>G.7. Internal audits and management review</b> The system includes internal control procedures, which allow the identification and solution of problems at an early stage.	1,10, 30~ 33 41- 53	<u>Forward Action Request No.2</u> The monthly production data is sent to monthly manager meeting and confirmed. The confirmation in the monthly manager meeting should be recorded in the minutes of the monthly manager meeting.	FAR 2	FAR2

## TABLE II: GHG DATA MANAGEMENT & CALCULATION

**Table II-1: Data Management System/Controls**

The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table. A score is assigned as follows:

- Full - all best-practice expectations are implemented.
- Partial - a proportion of the best practice expectations is implemented
- Limited - this should be given if little or none of the system component is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
<b>1. Defined organisational structure, responsibilities and competencies</b>		
<b>1.1. Position and roles</b> Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.	Pending	It was confirmed that there is no change in organization. Position and role of each person in the GHG data management process from raw data generation to submission of the final data were explained.  Please refer to CL 1 of C.8.
<b>1.2. Responsibilities</b> Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.	Full	Specific monitoring & reporting tasks and responsibilities are included in the XHP CDM manual.
<b>1.3. Competencies needed</b> Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.	Full	Training program and the record in 2010 was explained. (1) Hydropower plant operation staff: every month for all staff (2) CDM office staff: 2 times/ year in 2010 (new CDM employee is one in 2010.
<b>2. Conformance with monitoring plan</b>		
<b>2.1. Reporting procedures</b> Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.	Full	IT was confirmed that there reporting procedures are the same as previous year.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
<b>2.2. Necessary Changes</b> Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.	Full	NA
<b>3. Application of GHG determination methods</b>		
<b>3.1. Methods used</b> There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.	Partial	<p>The methods used to determine GHG emissions for 2010 described in the monitoring report section E (/1/) complies with the 3rd revision of the monitoring plan.</p> <p>Along with the monitoring report, the power purchase settlement notice of PGTC (/2/), Invoice of XHC to PGTC (/3/) and monthly electricity production report (/4/) including the EGaux data, EGplant data &amp; ESplant data were provided.</p> <p>Water flow statistics in Heihe Yingluo Gorge for 2010 and recent years monitored by ZHWRCB were provided. Also, monthly electricity production data for 2010 of other plants near XHP were also provided. (Longshou and Xiliushui Plant))</p> <p><b><u>Clarification Request 3</u></b></p> <p>(1) Is there any case that XHC imported the electricity from the grid?</p> <p>(2) Invoice of XHC to PGTC and Evidences of EGaux for the line 1117 &amp; 1118 and EGplant are to be provided.</p> <p>(3) The electricity generation increase in 2010 is 16.6% of the PDD against the river water flow rate increase of 8.8%. On the other hand, the electricity generation increase in 2009 is 27.6% against the river water flow rate increase of 32.1% and the data are nearly proportional.</p> <p>The electricity increase is considerably bigger than the increase of the flow rate increase in 2010. The reason of this result and the difference between 2009 and 2010 are to be explained.</p>
<b>3.2. Information/process flow</b> An information/process flow diagram, describing the entire process from raw data to reported totals is developed.	Full	There is no change in the information/process flow in 2010.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
<b>3.3. Data transfer</b> Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.	Partial	The power purchase settlement notice is given by PGTC. Refer to CL 1 of C.8 above. EGaux, EGplant and ESPlant are recorded automatically by computer system in the XHC hydropower plant.
<b>3.4. Data trails</b> Requirements for documented data trails are defined and implemented and all documentation are physically available.	Partial	Necessary procedures and data format have been defined in the XHP CDM Manual. Actual procedures: Refer to CL 1 of C.8 above.
<b>4. Identification and maintenance of key process parameters</b>		
<b>4.1. Identification of key parameters</b> The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.	Full	The critical parameters for the determination of GHG emissions are the produced amount of electricity, which is measured by a calibrated meter.

Expectations for GHG data management system/controls		Score	Verifiers Comments (including <i>Forward Action Requests</i> )																																						
<b>4.2. Calibration/maintenance</b> Appropriate calibration/maintenance requirements are determined.			According to the calibration reports of each meter, the calibration interval, actual calibration date in 2010 and last calibration date of each meter are as below.																																						
	<table border="1"> <thead> <tr> <th>Meter</th><th>Calibration interval requirements</th><th colspan="4">Calibration date</th><th>Last calibration date of 4th verification</th></tr> </thead> <tbody> <tr> <td>EGy</td><td>Quarterly</td><td>28/02/10</td><td>29/05/10</td><td>28/08/10</td><td>27/11/10</td><td>1/12/09</td></tr> <tr> <td>EGaux</td><td>Annually</td><td colspan="4">15/09/10</td><td>16/09/09</td></tr> <tr> <td>EGplant</td><td>Annually</td><td colspan="4">24/08/10</td><td>25/08/09</td></tr> <tr> <td>ESplant</td><td>Every 5 years</td><td colspan="4">na</td><td>3/09/08</td></tr> </tbody> </table>	Meter	Calibration interval requirements	Calibration date				Last calibration date of 4th verification	EGy	Quarterly	28/02/10	29/05/10	28/08/10	27/11/10	1/12/09	EGaux	Annually	15/09/10				16/09/09	EGplant	Annually	24/08/10				25/08/09	ESplant	Every 5 years	na				3/09/08		<b>Clarification Request 2</b> (1) As for the calibration frequency of EGy meter, the 1st calibration in 2010 was 28 February, 2010 and the 2nd calibration was 29 May, 2010. It is to be confirmed that this calibration frequency complies with the Chinese regulation of DL/T 448-2000. (2) There is an indication "the validity is 2013/6/6" on the seal attached to the main meter in the Heihe Switch yard. The meaning of this "validity" and the relation of the calibration frequency specified in DL/T 448-2000 are to be confirmed to PGTC. (3) The description about the "date of last calibration" in the monitoring report is confusing. Please clearly show that the calibration of each meter is valid throughout the year of 2010. (4) According to the calibration report of ESplant, the date of last calibration is 3/09/2008 for all 3 Esplant meters. Please confirm the date of the monitoring report.			
Meter	Calibration interval requirements	Calibration date				Last calibration date of 4th verification																																			
EGy	Quarterly	28/02/10	29/05/10	28/08/10	27/11/10	1/12/09																																			
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ESplant	Every 5 years	na				3/09/08																																			
<b>5. GHG Calculations</b>																																									
<b>5.1. Use of estimates and default data</b> Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.		Full	The carbon emission factor is calculated in accordance with the procedure of ACM0002 as indicated in the PDD and confirmed during validation of the project.																																						

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
<b>5.2. Guidance on checks and reviews</b> Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.	Partial	The Guidance is provided in the XHP CDM Manual. <b><u>Clarification Request 4</u></b> (1) Organization change, if applicable and actual procedures taken in 5th verification are to be explained.
<b>5.3. Internal verification</b> Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.	Partial	<b><u>Clarification Request 4</u></b> (2) Internal verification record: To be clarified.
<b>5.4. Internal validation</b> Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.	Partial	<b><u>Clarification Request 4</u></b> (3) Internal validation: To be clarified.
<b>5.5. Data protection measures</b> Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).	Partial	<b><u>Clarification Request 4</u></b> (4) Data protection: To be clarified.
<b>5.6. IT systems</b> IT systems used for GHG monitoring and reporting should be tested and documented.	Partial	<b><u>Clarification Request 5</u></b> Are there any changes in the IT system?

**Table II-2: GHG calculation procedures and management control testing**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
1. Potential reporting risks based on an assessment of the emission estimation procedures can be expected to occur in the following field of action.  Raw data collection Reports/ database from which data is obtained Calculation methods	1. Regarding the potential risks identified in the left column, following mitigation measures are observed during the document review and the on-site assessment. As the project is hydro power based, the amount of electricity exported to the grid remains to be the only parameters to be obtained for the GHG calculation. Key source data for this parameter are: Joint meter reading Power purchase settlement notice	No areas of residual risks anticipated.

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Key source data applicable to the project assessed are hereby:</p> <p>Metering records (for electricity production)</p> <p>Accounting records (from invoices raised for electricity export)</p> <p>Correct use of data determined in validation</p> <p>Appropriate calibration and maintenance of equipment resulting in a high accuracy of data supplied should be in place.</p> <p>It is hereby needed to focus on those risks that impact the accuracy, completeness and consistency of the reported data.</p> <p>Risks are weakness in the GHG calculation systems and may includes:</p> <p>Manual transfer of data</p> <p>Unclear origins of data</p> <p>Accuracy due to technological limitations</p>	<p>Invoices</p> <p>The main meters are installed at the interface in the Heihe Switchyard of the Gansu Grid Company. The switchyard is connected to the Xiaogushan Power Station with 24km 110kV transmission lines and the auxiliary consumption during operation is excluded from the GHG emission reductions.</p> <p>The main meters are world-widely used ELSTER of USA make with sufficient accuracy class (0.2) and installed in the sealed metal enclosure. They are calibrated every 3 months according to the Chinese National regulations. Each main meter is sealed properly. The calibration frequency is to be checked in accordance with EB 52 Annex 60.</p> <p>The necessary procedures have been defined in the power purchase agreement and additional internal documents relevant for the determination of the electricity exported to the grid.</p> <p>In PGTC, the monitoring of the main meter is carried out by the Dispatching Centre using remote sensing facilities and the data are checked by Settlement Centre of the PGTC before sending to XHC.</p> <p>The allocation of responsibilities for the project in XHC is documented in the XHP CDM Manual.</p>	

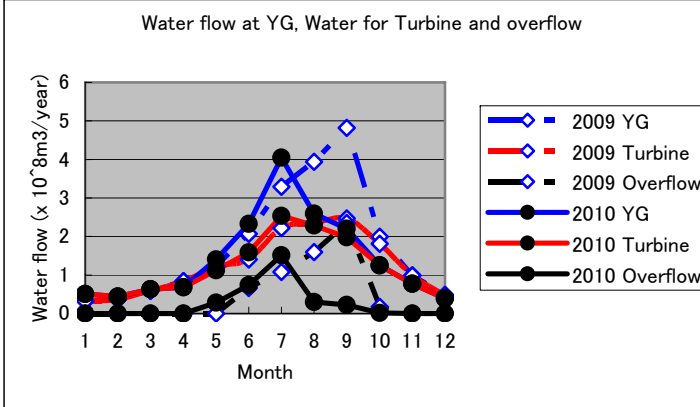
**Table II-3: Detailed audit testing of residual risk areas and random testing**

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i> )
<p>1. C.8. Reporting procedures</p> <p>2. G.1. Documentation G.5. Data archiving</p> <p>3. G.7. Internal audits and management review</p>	<p>1. Internal validation and verification.</p> <p>2. During the site visit, it was found that some documents related to the XHP CDM project are stored at site and some are in the project office in Zhangye.</p> <p>3. internal audits</p>	<p>Refer to CL4</p> <p><b>FAR 1</b> The archiving and storing of the CDM documents are to be improved.</p> <p><b>FAR 2</b> Internal audit and management review procedures should be included in the XHP CDM Manual.</p>

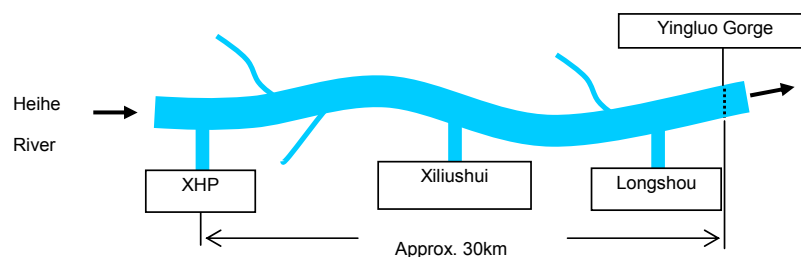
**Table III Resolution of Corrective Action and Forward Action requests**

Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion
<p><b><u>Clarification request No.1</u></b>            About the metering of generation (Section C of the monitoring report), XHC explained about the justification procedures for the monthly electricity supply to the grid and double check procedures. However, the explanation is not clear. Please explain the actual justification procedures in comparison with the process of XHP CDM manual.</p> <p><b><u>Clarification Request 2</u></b>            (1) As for the calibration frequency of EGy meter, the 1st calibration in 2010 was 28 February, 2010 and the 2nd calibration was 29 May, 2010. It is to be confirmed that this calibration frequency complies with the Chinese regulation of DL/T 448-2000.            (2) There is an indication "the validity is 2013/6/6" on the seal attached to the main meter in the Heihe Switch yard.            The meaning of this "validity" and the relation of the calibration frequency specified in DL/T 448-2000 are to be confirmed to PGTC.</p>	<p><b>I-C.7</b></p> <p><b>II-4.2</b></p>	<p><b>CL.1</b>            There is no change in the procedures of monitoring of EGy(XH). The monitoring is conducted by the registered person in POD office and CDM office of XHC who can access to the PGTC monitored data.</p> <p><b>CL. 2</b>            (1) XHC confirmed the opinion of PGTC about the practice about the frequency of on-site inspection "at least once every 3 months for type I watt-hour meter" stipulated in DL/T 448-2000.            It was confirmed by PGTC that the following case is complying to the DL/T 448-2000.                1<sup>st</sup> inspection date: 28 February, 2010                2<sup>nd</sup> inspection date: 29 May, 2010            (2) XHC confirmed the PGTC's practice as below.            The calibration date on the side seal indicates that the meter has been calibrated on the test bed. The test bed calibration is one method for meter calibration. After the electronic energy meter has been put into use, PGTC will implement the site calibration periodically. Even if the test bed calibration date is past due, it won't influence the normal operation use of meter. It is unnecessary to take down the meter for test bed calibration if the site calibration is regularly conducted. As long as the periodic site calibration result is satisfactory, the meter can be used continuously till its design lifetime. In addition, the frequency of the site calibration is four times a year which is far higher than</p>	<p><b>CL.1 OK</b></p> <p><b>CL.2</b>            (1) OK            The verification team considers that the explanation of PGTC is reasonable. The monitoring frequency of main meters for the period of 2010 complies with the requirements of Chinese regulation DL/T448-2000.</p> <p>(2) OK</p>

Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion
<p>(3) The description about “the date of last calibration” in the monitoring report is confusing. Please clearly show that the calibration of each meter is valid throughout the year of 2010.</p> <p>(4) According to the calibration report of ESplant, the date of last calibration is 3/09/2008 for all 3 ESplant meters. Please confirm the date of the monitoring report.</p> <p><b>Clarification Request 3</b> (Table 1, 3.1)</p> <p>(1) Is there any case that XHC imported the electricity from the grid?</p> <p>(2) Invoice of XHC to PGTC and Evidences of EGaux for the line 1117 &amp; 1118 and EGplant are to be provided.</p> <p>(3) The electricity generation increase in 2010 is 16.6% of the PDD against the river water flow rate increase of 8.8%. On the other hand, the electricity generation increase in 2009 is 27.6% against the river water flow rate increase of 32.1% and these data are nearly proportional.</p> <p>The electricity increase is considerably bigger than the increase of the flow rate increase in 2010 and not proportional. The reason of this result and the difference between 2009 and 2010 are to be explained.</p>	<p>II-3.1</p>	<p>the test bed calibration (once per 5 years).</p> <p>(3) The description of the monitoring report was revised.</p> <p>(4) The description of the monitoring report was revised to 3/09/2008 for all 3 ESplant meters based on the calibration report.</p> <p><b>CL.3</b></p> <p>(1) There is no case that XHC imported electricity from the PGTC in 2010.</p> <p>(2) Following data were provided.</p> <p>EGy: Power purchase settlement notice, Invoice of XHC to PGTC Record of EGy meter reading by XHC (monthly data for the line of 1117, 1118 &amp; total) (/4/)</p> <p>EGplant: Record of XHC (monthly data and daily data for each generator) (/4/)</p> <p>ESplant: Record of XHC (monthly data) (/5/)</p> <p>EGaux: Record of XHC (monthly data for the line of 1117, 1118 &amp; total) (/4/)</p> <p>(3) The reason of the generation increase of 16.6% against the river water flow rate increase of 8.8% is explained below.</p> <p>(3-1) The river water flow rate at Yingluo Gorge and water for generation for Xiaogushan hydropower plant:</p> <p>(i) The river water flow rate increased by 8.8% compared with the long time statistics of flow rate monitored at Yingluo Gorge. (/12a/) The water flow rate</p>	<p>(3), (4) OK</p> <p>The verification team confirmed by the calibration records of each meter and the response to CL 2 that the calibration of each meter was conducted in accordance with the 3<sup>rd</sup> revision of monitoring plan. (/1/)(/33/)</p> <p>The verification team confirmed that the monitoring report was revised properly.</p> <p><b>CL.3</b></p> <p>(1) OK, The verification team confirmed in PGTC provincial office and XHC that there is no case that XHC imported electricity from the PGTC in 2010.</p> <p>(2) OK, The verification team confirmed that the data of EGy, EGplant, ESplant and EGaux in the Monitoring report are identical with their evidences. (/2/, /3/, /4/,/5/)</p> <p>In addition to that, the verification team visited PGTC provincial office in Lanzhou and confirmed that the EGy data of above Power purchase settlement notices are identical with the original data of PGTC. (/51/)</p> <p>(3) OK, The generation increase of 16.6% against the river water flow rate increase of 8.8% in 2010 is due to the increase of water flow in the Heihe river and favorable water flow condition available for the Xiaogushan hydropower plant in 2010. Figure 4 shows water flow at Yingluo Gorge, water flow for turbine (used for electricity generation) and overflow in 2009 &amp; 2010.</p>

Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion
		<p>statistics used for FSR and also used for the estimate of electricity generation in the PDD is the data at Yingluo Gorge.</p> <p>The Yingluo Gorge is in the Heihe river and located at approximately 30km down-stream of the Xiaogushan hydropower plant and several branch rivers are flowing into the main stram of Heihe river between the Xiaogushan hydropower plant and the Gorge as shown in fig.3 below.</p>	<p>Fig.4: Water flow at Yingluo Gorge (YG), Water for turbine and overflow in 2009 &amp; 2010</p>  <p>As indicated in figure 4 and table 3 of PP response, the over flow ([Water flow rate at Yingluo Gorge] – [Water for XHP generation]) in 2010 is <math>3.1 \times 10^8</math> m<sup>3</sup>, which is 18% of the water flow rate at Yingluo gorge. On the other hand, the over flow in 2009 is <math>5.9 \times 10^8</math> m<sup>3</sup> which is 28% of the water flow rate at Yingluo Gorge. This shows that the overflow in 2010 is far smaller than that of 2009.</p> <p>Above explanation and figure 4 indicate that the river water flow condition at Xiaogushan hydropower plant in 2010 is considerably favorable and well utilized compared to 2009. The verification team considered that the response of PP is reasonable.</p>
		<p>The water flow rate at the Xiaogushan hydropower plant is not the same as the water flow rate at Yingluo Gorge.</p> <p>(ii) The river water overflows the dam especially in high-water season. Such portion of over-flowed water is not used for electricity generation. Portion of such water not used for electricity generation changes</p>	

**Fig.3: Location of Hydropower station and Yingluo Gorge (flow rate monitoring point)**



Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion												
		<p>year by year.</p> <p>As shown above, the electricity generation in Xiaogushan hydropower plant is not always proportional to the water flow rate of Yingluo Gorge.</p> <p>(3-2) The difference between 2009 and 2010</p> <p>The monitoring data of the river water flow rate at Xiaogushan hydropower plant and the water used for electricity generation are available only for recent 2 years (2009 and 2010).</p> <p>In this situation, the difference between the water for XHP generation, water flow rate at Yingluo Gorge and electricity generation at Xiaogushan hydropower plant in 2009 and 2010 was studied.</p>													
<p><b>Table 3: Water for generation and water flow rate at Yingluo Gorge in 2009 &amp; 2010</b></p> <p>Amount of water (<math>\times 10^8 \text{ m}^3/\text{year}</math>)</p> <table> <tr> <th>Year</th><th>Water for XHP generation</th><th>Overflow<sup>(*)1</sup></th><th>Water at Yingluo Gorge</th></tr> <tr> <td>2009</td><td>15.0<sup>(*)2</sup> (72%)</td><td>5.9<sup>(*)2</sup> (28%)</td><td>20.9<sup>(*)2</sup> (100%)</td></tr> <tr> <td>2010</td><td>13.7<sup>(*)3</sup> ~ 14.2<sup>(*)2</sup> (79 ~ 82%)</td><td>3.1<sup>(*)2</sup> (18%)</td><td>17.3<sup>(*)2</sup> (100%)</td></tr> </table> <p>(*)1: Overflow = [Water flow rate at Yingluo Gorge] – [Water for XHP generation]  (*)2: Data by ZHWRCB (/12b/),  (*)3: Data by Xiaogushan hydropower company (available only for 2010) (/12c/)</p>				Year	Water for XHP generation	Overflow <sup>(*)1</sup>	Water at Yingluo Gorge	2009	15.0 <sup>(*)2</sup> (72%)	5.9 <sup>(*)2</sup> (28%)	20.9 <sup>(*)2</sup> (100%)	2010	13.7 <sup>(*)3</sup> ~ 14.2 <sup>(*)2</sup> (79 ~ 82%)	3.1 <sup>(*)2</sup> (18%)	17.3 <sup>(*)2</sup> (100%)
Year	Water for XHP generation	Overflow <sup>(*)1</sup>	Water at Yingluo Gorge												
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2010	13.7 <sup>(*)3</sup> ~ 14.2 <sup>(*)2</sup> (79 ~ 82%)	3.1 <sup>(*)2</sup> (18%)	17.3 <sup>(*)2</sup> (100%)												
		<p>This result indicates that the water at Yigluo Gorge in 2010 is <math>17.3 \times 10^8 \text{ m}^3</math> and 83% of 2009. However, the water used for electricity generation at Xiaogushan hydropower plant in 2010 is <math>13.7 \sim 14.2 \times 10^8 \text{ m}^3</math> and approximately 91 ~ 95% of 2009. On the other hand, the electricity generation in 2010 is 438.8 GWh and this is</p>													

Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion
<p><b><u>Clarification Request 4</u></b></p> <p>(1) Organization change is to be explained, if applicable.  (2) Internal verification record: To be clarified.  (3) Internal validation: To be clarified.  (4) Data protection and store: To be clarified.</p>	<p>II-5.2-5.5</p>	<p>91% of 479.6 GWh, electricity generation of 2009. In other words, the water flow rate of 2010 at Yingluo Gorge was reduced to 83% of 2009 but the water used for electricity generation at Xiaogushan hydropower plant and electricity generation were not reduced to that extent of 83% but remained approximately 91% of 2009.</p> <p>Based on above consideration, it is considered that the electricity generation increase of 16.6% against 8.8% water flow rate increase at Yingluo Gorge in 2010 is reasonable</p> <p>CL4  (1) There is no change in organization.  (2) EGy(XH), data is collected by the Production and Operation Department. (/44/, /47/)  EGaux, EGplant, ESplant: Operation staff of the power plant sends monitored record at the end of each month to the Production and Operation Department. (/44/, /46/)  POD makes a comparison of these data. The data (EGy(XH)) is sent to PGTC for their checking. (/44/, /47/)  (3) Director of POD, validates the EGy(XH) based on above data from relevant department of XHC. (/44/, /47/)  (4) The access to EGy is restricted to the registered staff. (/44/, /47/)</p>	<p>CL 4  (1) ~ (3): OK  (2)  (3)</p> <p>(4) The verification team observed the protection and storing condition at site, CDM office and POD office in Zhangye.</p> <p>Refer to G.1  Refer to FAR 1 of G.1.</p>
<p><b><u>Clarification Request 5</u></b></p> <p>Are there any changes in the IT system?</p>	<p>II-5.6</p>	<p>CL.5:  Therere was no change in IT system.</p>	<p>CL 5: OK</p>

Draft report clarifications and forward action request by audit team	Ref. to checklist Table I, II – 1 to 3	Summary of project owner response	Audit team conclusion
<p><b><u>Forward Action Request 1</u></b> The archiving and storing of the CDM documents are to be improved.</p> <p><b><u>Forward Action Request 2</u></b> The monthly production data is sent to monthly manager meeting and confirmed. The confirmation in the monthly manager meeting should be recorded in the minutes of the monthly manager meeting.</p>	<p>I-G.1</p> <p>I-G.7</p>		