

# Verification and Certification Report

## First periodic verification

Report for:

GEPIC Darong Electric Power  
Company Ltd

Verification of CDM project for  
Datong River Zhuchaxia Hydropower Station  
(UNFCCC Ref 2845)

Monitoring Period:  
18/12/2009 to 29/05/2010

LRQA Reference	: A20068B version 1.6
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## 1 Executive Summary

Lloyd's Register Quality Assurance Limited has been contracted by GEPIC Darong Electric Power Company Ltd., representing the project participants (PP), to undertake the first periodic verification of the registered project activity "Datong River Zhuchaxia Hydropower Station" project reference number 2845 covering the monitoring period from 18/12/2009 to 29/05/2010. The verification has been performed by document review based on the Monitoring Report Version 01 dated 03/06/2010, on-site assessment and interviews with the stakeholders and resolution of outstanding issues and issuance of the verification report.

The project intends to reduce greenhouse gas (GHG) emissions by the construction of a new hydro project in Tibetan Autonomous County of Tianzhu in Gansu Province of China to generate zero emission electricity for the Northwest China Power Grid (NWCPG). The proposed project will achieve CO<sub>2</sub> emission reductions by replacing a part of the electricity supplied by fossil fuel fired power plants connected to the NWCPG. As per the registered PDD, the total installed capacity of the project is 34MW, consisting of two 13.5MW and one 7 MW turbines.

The fulfilment of the requirements as set forth in the Article 12 of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), the modalities and procedures for a CDM and relevant decisions of the Conference of the Parties serving as meeting of the Parties to the Kyoto Protocol (COP/MOP) and the Executive Board of the CDM (CDM-EB) has been evaluated and the conformance to the verification requirements were confirmed based on the given information. A risk based approach was taken to conduct the verification and corrective action requests (CARs), clarifications (CLs) and forward action requests (FARs) were issued for relevant actions by the PP.

The verification team identified, through the verification process, 4 CARs and 6 CLs. The PP has taken actions and submitted to LRQA the revised monitoring report and supporting evidence. The verification team, through the verification process, confirmed that the emission reductions achieved by the project activity during the monitoring period are correctly calculated in the monitoring report Version 02 dated 04/08/2010 based on the approved monitoring methodology and the monitoring plan of the registered PDD. Therefore LRQA certifies the emission reductions amounting to 24,715 tCO<sub>2</sub>e and requests the CDM-EB to issue the CERs.

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## Abbreviations

BE	Baseline emissions
BM	Build margin
CARs	Corrective action requests
CDM	Clean Development Mechanism
CDM-EB	Executive Board of Clean Development Mechanism
CDM M&P	Modalities and procedures for a clean development mechanism
CER	Certified Emission Reduction
CLs	Clarifications
COP/MOP	Conference of the Parties serving as meeting of the Parties to the Kyoto Protocol
ERs	Emission reductions
FARs	Forward action requests
GHG	Greenhouse gas
IPCC	Intergovernmental panel on climate change
KP	Kyoto Protocol of the United Nations Framework Convention on Climate Change
LE	Leakage emissions
LR	Lloyd's Register
LRQA	Lloyd's Register Quality Assurance Limited
NWCPG	Northwest China Power Grid
OM	Operating margin
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project design document
PE	Project emissions
PP	Project participant
tCO <sub>2</sub> e	Ton of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change

## 2 Introduction

The project participant (PP) represented by GEPIC Darong Electric Power Company Ltd has contracted with Lloyd's Register Quality Assurance Limited (LRQA) to undertake the first periodic verification of the proposed project activity "Datong River Zhuchaxia Hydropower Station" covering the monitoring period from 18/12/2009 to 29/05/2010. This report summarises the findings through the verification process that has been conducted on the verification requirements of the CDM.

The verification has been undertaken by the team formed of the qualified personnel of LRQA as follows.

Michiaki Chiba	LRQA Limited	Team Leader, CDM Lead Verifier, Sector Expert
Xianxin Yan	LRQA China	Team Member, CDM Verifier, Sector Expert
Wei Song	LRQA China	CDM Verifier under training
Andrew Ritchie	LRQA Limited	Technical Reviewer & Decision Maker
Javier Vallejo Drehs	LRQA Limited	Technical Reviewer
Stewart Niu	LRQA China	Sector Expert for Technical Review

Personnel being engaged in a CDM project verification are qualified based on the established procedures of LRQA to assure the resource requirements that satisfy all the requirements of competence criteria of the CDM accreditation standard for operational entities. LRQA is designated as an operational entity and holds the full responsibility on decision-making regarding the verification in accordance with the accreditation requirements of the CDM-EB. The certificate of appointment of the team personnel is attached to this report.

### 2.1 Objective

Through the verification activities, the verification team is to confirm that:

- 1) the project activity has been implemented and operated as described in the validated and registered PDD and that all physical features of the project activity are in place
- 2) the monitoring report (MR) and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements
- 3) actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan (MP) and the approved methodology, and
- 4) the data is recorded and stored as per the monitoring methodology.

The verification follows the requirements of the current version of the CDM validation and verification manual (CDM VVM) to ensure the quality and consistency of the verification work and the report.

### 2.2 Scope

The scope of verification is an independent and objective review of the monitored emission reductions (ERs) against the verification requirements of the CDM M&P.

LRQA follows a risk-based approach in the verification, focusing on the identification of significant risks for implementation of the registered monitoring plan and the resultant emission reductions. A verification statement shall become final subject to the final review by the decision maker of the LRQA Ltd.

## 2.3 GHG Project Description

Project title	Datong River Zhuchaxia Hydropower Station
CDM reference	2845
Date of registration	18/12/2009
Applied methodology	ACM0002 / version 07. Consolidated baseline methodology for grid-connected electricity generation from renewable sources,
Crediting period	18/12/2009 to 17/12/2019 (fixed)
Project location	Dam: 102°35'32" E and 36°52'19" N, Powerhouse: 102°38'14" E and 36°51'12" N. Tibetan Autonomous County of Tianzhu in Gansu province of China
Project participants	Host country participant: GEPIC Darong Electric Power Company Ltd - The People's Republic of China Annex-I country participant: N.V. Nuon Energy Trade & Wholesale - The Netherlands
Monitoring period	18/12/2009 to 29/05/2010

## 3 Methodology

### 3.1 Desk review

The verification is performed primarily based on the review of the monitoring report and the supporting documentation. This process includes:

- 1) review of data and information presented to verify the completeness
- 2) review of the MP and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the QA/QC procedures, and
- 3) evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

The monitoring report Version 01 dated 03/06/2010 was initially reviewed and LRQA requested the PP to present the supporting information and documents and such additional information and documents were also reviewed by LRQA. The documents reviewed by LRQA are listed in the Appendix A.

Through the process of the verification, the revised monitoring report and the supporting documents were evaluated to confirm the actions taken by the PP to the CARs and CLs issued by LRQA. The documents reviewed by LRQA are listed in the Appendix A. LRQA reviewed the final version of the monitoring report Version 02 dated 04/08/2010 to confirm that all changes agreed had been incorporated.

### 3.2 On-site assessment

On-site assessment is conducted as a part of verification activity and involves:

- 1) assessment of the implementation and operation of the CDM project activity as per the registered PDD
- 2) review of information flows for generating, aggregating and reporting of the monitoring parameters
- 3) interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the MP
- 4) a cross-check between information provided in the MR and data from other sources
- 5) a check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the applied methodology
- 6) review of calculations and assumptions made in determining the GHG data and ERs, and
- 7) identification of QA/QC procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Date	Place	Subject
19/06/2010	Datong River Zhuchaxia Hydropower Station Project site	Project implementation Data verification Monitoring systems including calibration Monitoring and reporting procedures QA/QC procedures Staff training Compliance with the monitoring methodology and registered MP
23/06/2010	GEPIC Darong Electric Power Company Ltd	Project implementation Data verification Monitoring and reporting procedures

The list of persons interviewed is shown in the Appendix B.

### 3.3 Background investigation

The verification team made reference to additional data if comparable information is available from the other sources to cross check the MR on the correctness of stated figures. The sources and the data referenced are shown in Appendix A.

### 3.4 Resolution of clarification and corrective action requests

Findings identified in the process are indicated under the titles Corrective Action Requests (CARs), Clarification Requests (CLs) and Forward Action Requests (FARs). CARs and CLs require the PP to take relevant actions. Criteria for judging items as CAR or CL are as follows:

#### Corrective Action Request (CAR):

- 1) Nonconformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is



insufficient

- 2) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions, and/or
- 3) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants

Clarification (CL) Request:

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

FARs are to be raised if the monitoring and reporting requires attention and/or adjustment for the next verification period. FARs do not relate to CDM requirements for issuance of ERs achieved during the subject monitoring period.

CARs and CLs are to be resolved or closed if the PP modifies the MR or provides adequate additional explanations or evidence that satisfies the concerns. If this is not completed, the ERs cannot be certified and recommended for issuance to the CDM Executive Board.

### **3.5 Internal quality control**

The technical review by a qualified person independent from the verification team and a review by an authorised decision maker are conducted before the submission of the verification report to the PP and before requesting the issuance of the verified ERs.

## **4 Verification protocol and conclusions**

This section provides an overview of the verification activities undertaken by LRQA to arrive at the final verification conclusions and opinion. It includes a general discussion of details captured by the verification protocol (which is based on the Clean Development Mechanism Validation and Verification Manual Version 01.2) and conclusions related to CDM requirements. Further detail of each finding is shown in the Verification Findings Log.

The protocol is structured based on the main verification requirements as follows:

- Registration and project implementation
- Monitoring and reporting systems
- Emission reductions
- Management systems
- Environmental and social impacts.

### **4.1 Registration and project implementation**

The registration of the project activity by the CDM-EB after successful validation by a DOE is the prerequisite for the verification, certification and issuance of the CERs for the project activity. The project activity as described in the CDM-PDD Version 02 dated 03/08/2009 was validated by TÜV SÜD Industrie Service GmbH as per the validation report No.1196685 Revision No. 3 dated 03/08/2009 and formally registered by the CDM-EB on 18/12/2009.

The project intends to reduce GHG emissions by producing electricity through construction of a new hydro power station to generate electricity for the NWCPG. The



project composes of a concrete gravity dam, release sluice, channels, powerhouse and switch station. The total installed capacity of the project is 34MW, consisting of two 13.5MW (generator #1 and generator #2) and one 7 MW (generator #3) turbine and generator units. The power is delivered to the Gansu Power Grid (which is a part of the NWCPG) through two 110 kV transmission lines to Dachaigou substation. The project's expected effective operating hours amount to 4,218 hours per year. The verification team confirmed this by checking the actual installation, the feasibility study report, technical specification and the agreement between the PP and the grid company.

The project owner, GEPIC Darong Electric Power Company Ltd is an investment company focusing on power industry investment located in Gansu Province in the Northwest of China.

The electricity generation facilities are produced domestically. The technical specification of the project facilities was checked by reviewing the equipment supply contracts, manufacturer's manuals, and physical observation at the project site.

The status of the implementation of the project activity was confirmed by the verification team as it is described in the monitoring report Version 02 dated 04/08/2010 by the review of project documents, the on-site physical checking of the project's plant and facilities and the review of the operational records. The status was further confirmed as being compliant with the description in the PDD.

The reported ERs of the first monitoring period are 24,715 tCO<sub>2</sub>e. The achieved ERs are lower than the estimated annual ERs of 121,617 tCO<sub>2</sub>e in the registered PDD, due to the fact that this monitoring period is during the dry season in which there is less water available in comparison with other months.

The project plant became operational with the first generator #1 that started operation on 24/03/2008. The generator #2 and generator #3 started operation on 28/04/2008 and 02/06/2008 respectively before the registered date of the project of 18/12/2009. From 18/12/2009 to 29/05/2010 (total 163 days), the project exported a total net electricity of 29,083.398 MWh to the grid, which corresponds to emission reductions of 24,715 tCO<sub>2</sub>e. The average daily electricity generation was calculated as 178.426 MWh/day. Annual electricity generation is calculated as 178.426 MWh/day x 365 days = 65,125 MWh. In comparison with the estimated annual electricity generation in the registered PDD of 143,113 MWh, the actual generation was 45.51% of the estimate (54.49% lower). The annual electricity generation in the registered PDD was taken from the FSR that considered historical average hydraulic data. The PP explained in the MR that the lower rate is because this monitoring period is during the dry season in which there is less water available than in other months.

During the verification, LRQA has not found any significant changes of the project activity compared with the registered PDD. By checking the financial audit report from a qualified third party (Crowe Horwath China Certified Public Accountants Co. Ltd., Gansu Branch), the contracts of the major equipments, construction and service and the actual power sales invoices, the input value of the parameters used in the demonstration of the project's additionality were confirmed. Therefore the verification team confirmed, based on the available information at the time, that there was no change in the project activity from the registered PDD which may impact the additionality of the project activity as defined in the 'Guidelines on assessment of different types of changes from the project activity as described in the registered PDD'.

**CL01**

The technical specification of water turbines and generators actually installed was not exactly the same as that indicated in the FSR. The PP was requested to clarify if the different technical specification changes the project activity from that described in the PDD, especially with regard to the effective output capacity or operational parameters (such as plant load factor). The PP was also requested to clarify the procedures for the monitoring of parameter  $Cap_{PJ}$  following the registered monitoring plan.

The type numbers of the turbines described in the PDD and the ones actually installed are two sets of HLA551c-LJ-230 and one set of HLA551c-LJ-165. But in the FSR, they are two sets of HL(267)-LJ-230 and 1 set of HL(269)-LJ-165. The type numbers of the generators described in the PDD and the ones actually installed are two sets of SF13.5-28/4870 and one set of SF7000-20/3250. But in the FSR, they are 2 sets of SF13.5-28/500 and one set of SF7-20/330.

In resolution of the CL, the PP presented a clarification letter issued by the provider of the FSR. It was confirmed by the design institute that the change of type name of the equipment does not impact the installed capacity, output, annual utilisation and the other important parameters. Procedures and records for monitoring of  $Cap_{PJ}$ , conducted by checking the nameplate of the equipment, were presented and reviewed by the verification team. The CL was closed.

**CL02**

The substation of the grid was indicated as Lijie transformer station in the MR Version 01. But the project activity is supplying electricity to the grid via Dachaigou substation. Clarification was requested.

The typographical error was corrected in the revised MR and the CL was closed.

## 4.2 Monitoring and reporting systems

The Consolidated baseline methodology for grid-connected electricity generation from renewable sources, ACM0002 / Version 07 has been applied to establish the MP that has been validated and registered. The verification team confirmed that no need had been identified to revise the MP as compliance with the applied monitoring methodology was maintained throughout the monitoring period.

According to the MP,  $EG_{out,y}$ ,  $EG_{in,y}$ ,  $EG_y$ ,  $TEG_y$ ,  $Cap_{PJ}$  and  $A_{PJ}$  are to be monitored.  $EG_{out,y}$  and  $EG_{in,y}$  are used for the purpose of the monitoring of the net electricity delivered to the grid by the proposed project ( $EG_y = EG_{out,y} - EG_{in,y}$ ).  $EG_{out,y}$  and  $EG_{in,y}$  are directly measured on a continuous basis and recorded monthly. Figure B.7.2-2 of the registered PDD shows the locations of the meters used for the monitoring of electricity supplied to the grid.  $TEG_y$ , total electricity produced by the project activity, is determined as a sum of continuously and directly measured power generation by 3 generators and is recorded on monthly basis. Installed capacity of the hydro power plant after the implementation of the project activity ( $Cap_{PJ}$ ) is monitored by the PP by checking the nameplate of the equipment on the site every year. The monitoring of the area of the reservoir ( $A_{PJ}$ ) was undertaken by a qualified professional consultant company (Mapping Department of the Northwest Survey and Design Institute of China Hydro Power Consulting Group). Figure C-1 of the monitoring report elaborates on the status of all of the monitoring parameters of the project.

The electricity received by the grid company is continuously measured by the meter installed at Dachagou Substation (Meter M1). A back up meter named M1' is installed at the same location as M1. The raw data is collected by the grid company, the monitored data is reported to the PP on monthly basis and the power generation data is checked and compared by the PP against the data monitored by the meter M2 installed in the outlet of the main transformer of the plant. A meter M2' is installed as the backup meter for M2. The sales invoices are also used for double check purposes. The power meters M1, M1', M2 and M2' are bi-directional and have an accuracy of 0.2s class.

The verification team confirmed through the on-site assessment and the review of evidence that the installation of the measuring devices has been completed and the equipment has been operated and maintained under normal operating condition. During this monitoring period, there have been no emergency situations relating to meters M1, M1', M2 and M2' that have lead to them exceeding the allowable tolerance or otherwise malfunctioning. The reading of M1 was used for the ER calculation throughout the monitoring period. The team also confirmed the uninterrupted operation of the main meters for each month of the monitoring period by reviewing the  $EG_{out}$  and  $EG_{in}$  data.

The appropriateness of the measuring equipment was confirmed with reference to the requirements of the applicable local regulations and by comparison with the application to similar CDM project activities. The verification team physically checked all the measuring equipment used for the project activity and reviewed the calibration records of all the measuring equipment used during the monitoring period. The team confirmed them as meeting the requirements of the registered MP.

#### Detailed information on electricity meters installation and calibration

Meter No.	Type	Accuracy	Serial Number	Calibration Frequency	Date of calibration
M1	SL7000	0.2s	36145166	1 year	20/11/2009 30/03/2010 17/06/2010
M1'	SL7000	0.2s	36145167	1 year	20/11/2009 30/03/2010 17/06/2010
M2	SL7000	0.2s	36145165	3 year	26/03/2009
M2'	SL7000	0.2s	36145164	3 year	26/03/2009
M3	DTSD341	0.5s	20070701070015	3 year	26/03/2009
M4	DSSD331	0.5s	20070724040044	3 year	26/03/2009
M5	DSSD331	0.5s	20070724040070	3 year	26/03/2009

The calibration records and certificates of the electricity meters were provided to LRQA for verification. The records show that the above monitoring equipment was calibrated by Electricity Power Calibration Center of Gansu Province Electricity Company. This Centre was certified by Technical Supervision Bureau of Gansu Province on 05/01/2008 and the certificate is valid until 04/01/2011. The PP has established the monitoring procedures to ensure the calibration of M1 and M1' takes place, as a minimum, on an annual basis to satisfy the requirement of the registered MP. The PPA does not include a clear indication of the required calibration interval, but it does refer

to national guidelines DL/T448-2000 wherein a quarterly calibration is recommended, though it is not a mandatory requirement. The grid company is responsible for ensuring the regular calibration of M1 and M1' according to the PPA and this has been done during the monitoring period. This is why the calibration has been conducted for the meters M1 and M1' more than once a year. The verification team confirmed that regular calibration of M1 and M1' has been maintained to satisfy the requirements of the registered MP, PPA with the grid company and the host county regulations; hence, the situation is judged as acceptable

The monitoring has been implemented by the PP in accordance with the registered MP. Electricity meters are continuously measuring 100% of the data of the electricity exported and imported by the project plant and the monthly record is kept in electronic and hard copy form.. The data is archived on the project site and was available for verification. A double-check by receipt of sales and invoice of purchases was conducted by the PP and the result of this was presented for verification. No deviation to the approved monitoring methodology or the registered MP was proposed by the PP.

#### **CAR 01**

Initially, records of calibration for the power meters M1 and M1' on 25/03/2010 (indicated in the MR Version 01) were not presented for verification. CAR 01 was issued.

In resolution of CAR 01, the PP presented the Onsite Inspection Reports issued by the Electricity Power Calibration Center of Gansu Province Electricity Company dated on 07/05/2008, 26/03/2009, 20/11/2009, 30/03/2010 and 17/06/2010. The team confirmed that the Onsite Inspection Reports comply with the contractual requirements of the PPA, the applicable sector rules of the host country and the registered MP. CAR 01 was closed.

#### **CAR 02**

The team noted that the registered monitoring plan had not recognised the potential for electricity to be imported through a 10kV electricity line previously used for the import of electricity from the grid during the construction of the project plant. A CAR was raised in relation to this..

The PP confirmed in response to the CAR that the 10kV electricity line is not used for the operation of the project plant and presented a declaration letter from the Grid Company demonstrating that the 10 kV line used for the construction purpose of the project had been cut off. According to the applied methodology, emissions related to the power plant construction do not need to be considered as leakage. The team verified on site that the 10kV power line was not connected to the project site and the CAR was closed.

#### **CAR03**

It was found that the monitoring of the parameter  $A_{PJ}$  had not been undertaken in compliance with the registered MP.

The PP commissioned the Mapping Department of the Northwest Survey and Design Institute of China Hydro Power Consulting Group to conduct the monitoring of  $A_{PJ}$  by using a topographical surveys approach. The institute holds a grade A level certificate for hydro survey and design, issued by the Construction Ministry. The report indicated that the area of the reservoir measured on the surface of the water when the reservoir is full is 60,900 m<sup>2</sup>. The PP explained that the value used ex-ante of 45,100 m<sup>2</sup> in the PDD is less accurate as the value was obtained at the stage of preparing the FSR.

The team reviewed the FSR of the project and the report of topographical survey by the third party institute and confirmed that the ex-post measured value of  $A_{PJ}$  is in compliance with the registered MP and considered as credible. The ex-post determined power density is  $558 \text{ W/m}^2$ , which is greater than the  $10 \text{ W/m}^2$  stated in the methodology, whereupon project emissions ( $PE_y$ ) are considered to be zero. Therefore, the CAR was closed.

#### **CL 03**

A CL was raised on the cross-check of the data monitored for the purpose of the calculation of the emission reductions. Reporting of monitored ERs is made on a monthly basis and then it is compiled for the specified monitoring period. But the PP was requested to clarify its monitoring procedures in relation to which dates of a month (from and to) the emission reductions of the month are calculated, cross-checked against the data obtained from M1/M1', M2/M2' and receipt of sales, and subsequently included in the MR. The procedures should ensure that a comparison of data is conducted for the same periods.

The monitoring period of each month was clarified in the dedicated record forms that facilitate cross-comparison of data and aim to prevent the occurrence of any inconsistencies. According to the rules of the grid company, the reading of the power meters in the substation is made on the second last day of each month, and it is this date which is applied to the M1/M1' readings and the sales invoices. The PP now applies the same period for M2/M2' readings and conducts a cross-check by using data for the same periods. The CL was closed.

#### **CL 04**

In Table D.2 of the MR, the source of data used for  $EG_y$  is indicated as the Monitoring Report. But the value is actually calculated from  $EG_{out,y}$  and  $EG_{in,y}$ . The table also incorrectly indicates that the  $TEG_y$  data is used for baseline emission calculations. This parameter is used for the calculation of project emissions, as stated in the applied methodology.

The PP amended the MR and the team confirmed that these revisions were correct. The CL was closed.

### **4.3 Emission reductions**

The MR Version 01 dated 03/06/2010 was initially presented to the verification team. The crediting period for the project has been set as from 18/12/2009 to 17/12/2019 (fixed crediting period). The monitoring period for the first periodic verification is 18/12/2009-29/05/2010.

#### **Project emissions**

According to the applied methodology ACM0002 / Version 07 and the registered PDD, the project emissions of the project activity are considered as zero. The verification team confirmed during the on-site assessment that, other than that related to the generation of electricity, no other on-site energy use related with power generation was taking place. On-site electricity consumption is accounted for in the determination of net electricity delivered to the grid by the project.

Project emissions from the reservoir are zero during the monitoring period as it was confirmed that the power density was greater than  $10 \text{ W/m}^2$  for the monitoring period.

#### **Leakage emissions**



Leakage emissions are not considered as per the applied methodology and the registered PDD. No change from the situation described in the registered PDD was found during the verification that relates to leakage emissions.

### **Baseline emissions**

Baseline emissions are calculated by multiplying together the net electricity supplied to the grid and the baseline emission factor of the NWCPG of 0.8498 tCO<sub>2</sub>e/MWh, which has been determined ex-ante and is fixed during the crediting period.

Based on the monitored data, the baseline emissions are calculated as follows:

Electricity exported to the grid: 29,174,280 kWh

Electricity imported from the grid: 90,882 kWh

Net electricity supplied to the grid: 29,174,280 – 90,882 = 29,083,398 kWh

29,083,398 kWh / 1000 x 0.8498 tCO<sub>2</sub>e/MWh = 24,715 tCO<sub>2</sub>e

### **Emission reductions**

ERs are calculated as follows.

$$ER_y = BE_y - PE_y - LE_y$$

Leakage emissions (LE<sub>y</sub>) are not considered for the project case and project emissions (PE<sub>y</sub>) are considered as zero as mentioned above.

Therefore:

ER<sub>y</sub> = BE<sub>y</sub> = 24,715 tCO<sub>2</sub>e.

Electricity exported to the grid and imported from the grid through the power transmission line is measured by Meter M1, which is located at the substation of the regional grid. Data taken by Meter M2 is used to confirm the accuracy and consistency of the data produced by the M1 meter. Meter M2 is located at the outlet of the main transformer of the project site and shows higher values than Meter M1 due to the transmission line loss between the two locations. The settlement of electricity sales and purchases with the grid company is made based on the values taken by Meter M1 and the use of these values for the calculation of the ERs is considered to be appropriate and more conservative.

For the first month of the crediting period, the monitored data of EG<sub>out,y</sub> and EG<sub>in,y</sub> covers the period of 29/11/2009 to 29/12/2009, which includes data from before the start date of the crediting period of 18/12/2009. The PP determined EG<sub>out,y</sub> in a conservative manner by comparison of

- 1) a calculated value using the average daily generation of the month by meter M1 (29/11/2009 to 29/12/2009),
- 2) a calculated value using the average daily generation of the month by meter M2 (29/11/2009 to 29/12/2009),
- 3) a measured value by meter M2 of 18/12/2009 to 29/12/2009 and
- 4) a measured value by meter M2 of 18/12/2009 to 29/12/2009 adjusted by proportion of the monthly values of the meters M1 and M2 (29/11/2009 to 29/12/2009). Of these, the least value of 1,934.958 MWh [calculated value using the average daily generation of the month by meter M1 (29/11/2009 to 29/12/2009)] has been adopted. For EG<sub>in,y</sub>, the value of the month (29/11/2009 to 29/12/2009) is adopted without correction so that the ERs can be calculated more conservatively.

It was noted that the values of EG<sub>out,y</sub>, based on measurement by the meter M2, were less than those measured by the meter M1 in the months of 30/03/2010 to 28/04/2010 and 29/04/2010 to 29/05/2010. The PP explained that the recording time of the grid

company on meter M1 is not exactly the same as the recording time of the PP on meter M2, which can result in a small variance. The team checked the power generation and the settlement issued by the grid company and confirmed that the power supply to the grid for the months has been confirmed by the grid company and no malfunction was reported on any of the meters M1, M1', M2 and M2' during the monitoring period. The difference of the readings is equivalent to 4.1 and 3.6 hours of electricity generation in the respective months but it is 0.637 hour (approximately 38 minutes) of electricity generation as an average of the reporting period excluding the first month 18/12/2009 to 29/12/2009<sup>1</sup>. It is therefore considered as negligible. According to the registered MP,  $EG_{out,y}$  is determined by direct measurement of the meter M1 that is double checked by receipt of sales. The meter M2 is to serve as an additional quality check in excess of the requirements of the monitoring methodology and with no major disagreement observed from the main monitoring by the meter M1 and the receipt of sales, determination of ERs by measured value of M1 is considered as appropriate.

#### **CAR 04**

The parameters  $EG_{out,y}$  and  $EG_{in,y}$  are to be monitored and reported separately in accordance with the registered MP.

The value for  $EG_{in}$  is indicated as zero through the monitoring period in the MR Version 01, but according to the data of check meter M2, there was electricity import during the monitoring period.

The PP explained that they wrongly used  $EG_y$ , the net electricity exported to the grid by the project, as  $EG_{out,y}$  in MR Version 01. In the revised MR and the spreadsheet, the actual  $EG_y$  is calculated by  $EG_{out,y}$  and  $EG_{in,y}$ . The team checked the report of the monitoring records of  $EG_{out,y}$  and  $EG_{in,y}$  and implemented a cross-check by using the monitoring result of the Meter M2 and M2' installed in the outlet of the plant. This confirmed the consistency of the value as well as the result of  $EG_y$ . The CAR was closed.

The verification team checked the calculation of ERs and confirmed that it is reproducible based on the measured raw data. The emission factor determined ex-ante is correctly applied for calculation. No additional assumption was used that relates to the accuracy of the ER calculation. The verification team therefore confirmed the correctness of the ERs monitored and reported in the MR.

#### **CL06**

The PP was requested to present evidence for the explanation made in the MR relating to the difference between the actual ERs and those estimated in the PDD.

The PP presented relevant documents as the evidence. The FSR showed the river runoff during November to April is lower than the average water runoff for the year, which explained the low emission reductions achieved during this monitoring period (18/12/2009-29/05/2010). The verification team also referenced the seasonal electricity generation trends of similar CDM projects in the same province and noted that it is a general trend in the province, based on the reported data in 2009, that a lower quantity of electricity is produced during February to May in comparison with the annual monthly average. The CL was closed.

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<sup>1</sup> For the first month of the crediting period of the project activity 18/12/2009 to 29/12/2009, a conservative estimation was made to determine  $EG_{out,y}$  based on the meter M1 in order to address the data before start of the crediting period included in the monitored data. This adjustment makes for a conservative calculation of ERs, but results in a greater difference of monitored data by the meters M1 and M2 for the month.



#### **4.4 Management systems**

The management structure has been established in accordance with the registered MP. The verification team, through the on-site assessment, confirmed that the management personnel have been assigned as per the registered PDD. Records of staff training were presented for review and appropriate competence was confirmed by the verification team through interviews during the on-site assessment.

Procedures for calibration of the monitoring equipment have been established in accordance with the registered MP, fulfilling the manufacturer's recommendations and the host country requirements.

Calibration of the monitoring equipment has been conducted by qualified third party institutes. The verification team, by means of desk review and on-site assessment, confirmed that the calibration records for the major monitoring equipment for power supply and consumption monitoring, including M1, M1', M2, M2' M3, M4 and M5, were available for verification.

The monitored data and supporting information are to be archived until the end of crediting period plus 2 years according to the registered MP. Records of double-checks between the monitored data and commercial records conducted by the PP in accordance with the requirement of the MP were available for verification.

Emergency procedures have been defined as a part of the monitoring and reporting procedures. No emergency situation was reported during the monitoring period.

##### **CL05**

According to the registered MP, the Vice General Manager will hold the overall responsibility for the monitoring process and approval of the monitoring report. But no evidence was shown demonstrating that the MR had been approved by the authorised person in accordance with the requirement of the registered MP. CL 05 was issued.

The PP clarified the procedures and confirmed that the signature of the Vice General Manager indicating the approval of the MR is to be placed onto the final version of the MR.

#### **4.5 Environmental and social impacts**

Through the verification process, the verification team physically observed environmental management being applied at the project site.

The environmental impact assessment (EIA) of the project activity has been undertaken and approved by the local government. In accordance with the requirement of local environmental legislation, an environmental clearance and acceptance inspection will be conducted after completion of the project construction and the project plant becomes fully operational. The PP has started to prepare the application of the environmental clearance and acceptance inspection. The Water and Solid Reservation Monitoring Report conducted by a nominated party has been presented with the positive result. The verification did not identify any negative environmental and social impacts resulting from the project activity during the monitoring period.

## **5 Making the monitoring report publicly available**

In accordance with the 'Procedures for making the MR available to the public in accordance with paragraph 62 of the modalities and procedures for the CDM', the MR Version 01 dated 03/06/2010 was made publicly available on the CDM website on 04/06/2010 at:

<http://cdm.unfccc.int/Projects/DB/TUEV-SUED1249311745.95/iProcess/LRQA%20Ltd1275657186.2/view>

Through the verification process, minor changes were made to the MR. The reasons for these changes are outlined in this report. The verification team confirmed the changes from the original MR were appropriate.

## **6 Verification opinion**

LRQA has undertaken the first periodic verification of the proposed project activity "Datong River Zhuchaxia Hydropower Station" covering the monitoring period from 18/12/2009 to 29/05/2010 based on the requirements of CDM as set out in Article 12 of the Kyoto Protocol, the CDM M&P, the present annex, subsequent decisions made by the COP/MOP and CDM-EB, and the other rules applicable to the proposed project activity including the host country's legislation and its specific requirements for sustainable development.

The project intends to reduce greenhouse gas (GHG) emissions through the implementation of a grid-connected 34MW hydro project in the Tibetan Autonomous County of Tianzhu in Gansu Province of China. By supplying the renewable energy based electricity to the connected regional electricity grid, Northwest China Power Grid, the project activity reduces GHG emissions that are produced by fossil fuel fired power plants connected to the grid in the absence of the CDM project activity.

The PP is responsible for monitoring and reporting of the ERs achieved by the project activity during the monitoring period. LRQA is responsible for expressing an independent verification opinion on the reported ERs in the MR.

In order to arrive at the final verification conclusions and opinion, LRQA carried out a desk review, based on the MR Version 01 dated 03/06/2010, initially submitted for verification, together with a review of a subsequent revision, on-site assessment, follow-up interviews, resolution of outstanding issues, independent background research and issuance of the verification report.

Through the verification process, the verification team identified 4 CARs and 6 CLs. The PP took actions on the raised issues and submitted to LRQA the revised MR Version 02 dated 04/08/2010 and other supporting evidence. All CARs and CLs have been appropriately closed prior to the issuance of the verification report.

The verification team is of the opinion that the proposed project activity has been implemented in accordance with the registered PDD, the MP as having been registered complies with the approved monitoring methodology, the monitoring complies with the registered MP and the monitored data and calculation of ERs are assessed and confirmed as correct. Therefore, LRQA hereby certifies and requests the issuance of the reported ERs of "Datong River Zhuchaxia Hydropower Station" during the monitoring period from 18/12/2009 to 29/05/2010 amounting to 24,715 tCO<sub>2</sub>e to the CDM Executive Board.

**Decision Maker**



Andrew Ritchie  
Climate Change Services Manager

## 7 Appendices

### 7.1 Appendix A: List of documents reviewed

#### Category A documents (documents from the PP)

- 1) Monitoring Report for Datong River Zhuchaxia Hydropower Station. Monitoring period from 18/12/2009 to 29/05/2010. Version 01 dated 03/06/2010
- 2) Monitoring Report for Datong River Zhuchaxia Hydropower Station. Monitoring period from 18/12/2009 to 29/05/2010. Version 02 dated 04/08/2010
- 3) Calculation spreadsheet for Datong River Zhuchaxia Hydropower Station. Monitoring period from 18/12/2009 to 29/05/2010.
- 4) Feasibility Study Report of Datong River Zhuchaxia Hydropower Station and its approval
- 5) EIA report of Datong River Zhuchaxia Hydropower Station and its approval
- 6) Daily Operation Log covering the monitoring period from 18/12/2009 to 29/05/2010
- 7) Onsite Inspection Report of the Electricity Meter (for meter M1) Series number 36145166 dated 07/05/2008, 26/03/2009, 20/11/2009, 30/03/2010 and 17/06/2010
- 8) Onsite Inspection Report of the Electricity Meter (for meter M1') Series number 36145167 dated 07/05/2008, 26/03/2009, 20/11/2009, 30/03/2010 and 17/06/2010
- 9) Onsite Inspection Report of the Electricity Meter (for meter M2) Series number 36145165 dated 07/05/2008 and 26/03/2009
- 10) Onsite Inspection Report of the Electricity Meter (for meter M2') Series number 36145164 dated 07/05/2008 and 26/03/2009
- 11) Onsite Inspection Report of the Electricity Meter (for meter M3) Series number 20070701070015 dated 26/03/2009
- 12) Onsite Inspection Report of the Electricity Meter (for meter M4) Series number 20070724040044 dated 26/03/2009
- 13) Onsite Inspection Report of the Electricity Meter (for meter M5) Series number 20070724040070 dated 26/03/2009
- 14) Accreditation Certificate of Electricity Power Calibration Centre of Gansu Electricity Supply Company
- 15) Power sales invoices covering the monitoring period
- 16) Power Quantity Settlement 200912 issued by the Grid Company
- 17) Power Quantity Settlement 201001 issued by the Grid Company
- 18) Power Quantity Settlement 201002 issued by the Grid Company
- 19) Power Quantity Settlement 201003 issued by the Grid Company
- 20) Power Quantity Settlement 201004 issued by the Grid Company
- 21) Power Quantity Settlement 201005 issued by the Grid Company
- 22) Power Quantity Settlement 201006 issued by the Grid Company
- 23) Clarification of the turbine and generator change of Datong River Zhuchaxia Hydropower Station issued by the FSR provider
- 24) Finance Auditing Report of Datong River Zhuchaxia Hydropower Station, 2009 (up to 31/12/2009) conducted by Crowe Horwath China Certified Public Accountants Co. Ltd., Gansu Branch
- 25) CDM Monitoring Manual Version 3
- 26) Survey Report on Surface Area of the Reservoir of Datong River Zhuchaxia Hydropower Station

- 27) Installation Capacity Monitoring Report of Datong River Zhuchaxia Hydropower Station 2010
- 28) Daily monitoring record on the electricity on month end and start (December of 2009 and January, February, March, April, May of 2010)
- 29) Training records on CDM of Datong River Zhuchaxia Hydropower Station
- 30) Water and Solid Reservation Monitoring Report of Datong River Zhuchaxia Hydropower Station

**Category B documents (other documents referenced)**

- 1) CDM-PDD version 03 dated 09/12/2009
- 2) Validation report 1196685 Revision No. 3 dated 03/08/2009 issued by TÜV SÜD Industrie Service GmbH
- 3) Approved consolidated baseline methodology ACM0002 / Version 07 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".
- 4) Baseline emission factor of the grid in China published by Chinese DNA (2008 version)
- 5) Clean Development Mechanism Validation and Verification Manual Version 01.2
- 6) Guidelines on assessment of different types of changes from the project activity as described in the registered PDD
- 7) Procedures for making the monitoring report available to the public in accordance with paragraph 62 of the modalities and procedures for the CDM (Version 01)
- 8) Procedures relating to verification report and certification report/request for issuance of CERs (version 01.1)
- 9) Procedures for modalities of communication between project participants and the executive board Version 01
- 10) Guidelines on completeness check of requests for issuance
- 11) DL/T 448-2000 Technical administrative code of electric energy metering
- 12) Reference to similar project activities
- 13) Procedures for Requests of Issuance of CERs version 01
- 14) Guidelines for Completing the Monitoring Report Form (CDM-MR) (Version 01)
- 15) Guidelines for assessing compliance with the calibration frequency requirements (Version 01)

## **7.2 Appendix B: List of persons interviewed**

**GEPIE Darong Electric Power Company**

- Mr. Qiao Yongcai, Deputy General Manager of Datonghe Branch
- Ms. Bao Huizhen, Deputy General Manager of Datonghe Branch
- Mr. Hu Bo, CDM Monitoring Officer
- Mr. Yang Jianzhong, Department Manager
- Ms. Wu Hanzhen, Lead Operator
- Mr. Jiang Junxiu, Operator

**DHV Company (the consultant)**

- Ms. Jennifer Wang, Project Manager

**Dachaigou Substation of the grid company**

- Mr. Fan Xinsheng
- Mr. Jiang Junxiu

### 7.3 Appendix C: Certificate of Appointment

#### Verification of “Datong River Zhuchaxia Hydropower Station”

We hereby certify that the following personnel have engaged in the verification process that have fully satisfied the competence requirements of the verification of the CDM project activity.

<b>Name of Person</b>	<b>Assigned Roles</b>
Michiaki Chiba	Team Leader, Sector expert
Xianxin Yan	Team Member, Sector expert
Wei Song	Team Member (verifier under training)
Andrew Ritchie	Technical Reviewer & Decision Maker
Javier Vallejo Drehs	LRQA Limited Technical Reviewer
Stewart Niu	Sector Expert for Technical Review

Signed by

#### Decision Maker



Andrew Ritchie  
Climate Change Services Manager

## 7.4 Appendix D: Verification findings log

<b>1. Grade/Reference:</b>	CAR01	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	Calibration				
<b>5. Finding:</b>	Records of calibration for the power meters M1 and M1' on 25/03/2010 (indicated in the MR Version 01) were not presented for verification.				
<b>6. Conclusion:</b>	In resolution of CAR 01, the PP presented the Onsite Inspection Reports issued by the Electricity Power Calibration Centre of Gansu Province Electricity Company dated on 07/05/2008, 26/03/2009, 20/11/2009, 30/03/2010 and 17/06/2010. The team confirmed the Onsite Inspection Reports comply with the sector rules as the calibration and comply with the Guidelines for assessing compliance with the calibration frequency requirements and the MP. CAR 01 was closed.				

<b>1. Grade/Reference:</b>	CAR 02	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	CDM M&P para 56				
<b>5. Finding:</b>	The team raised the CAR in relation to the situation that a 10kV electricity line was used for electricity import from the grid for construction of the project plant but possible electricity import through this line, if it remains connected to the project site, is not addressed in the registered MP.				
<b>6. Conclusion:</b>	The PP confirmed in response to the CAR that the 10kV electricity line is not used for the operation of the project plant and presented a declaration letter from the Grid Company demonstrating that the 10 kV line used for the construction purpose of the project had been cut off. The team verified on site that the 10kV power line is not connected to the project site and the CAR was closed.				

<b>1. Grade/Reference:</b>	CAR 03	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	CDM M&P para 56				
<b>5. Finding:</b>	It was found that the monitoring of the parameter $A_{PJ}$ had not been implemented in compliance with the registered monitoring plan.				
<b>6. Conclusion:</b>	The PP commissioned the Mapping Department of the Northwest Survey and Design Institute of China Hydro Power Consulting Group to conduct the monitoring of $A_{PJ}$ by using a topographical surveys approach. The institute holds grade A level of certificate for hydro survey and design, issued by the Construction Ministry. The report indicated that the area of the reservoir measured in the surface of the water when the reservoir is full 60,900 m <sup>2</sup> . The $A_{PJ}$ value determined by the third party institute is in compliance with the registered MP and considered as credible. The CAR was				



closed.

<b>1. Grade/Reference:</b>	CAR 04	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	CDM M&P para 56, 62 (g)				
<b>5. Finding:</b> The parameters $EG_{out,y}$ and $EG_{in,y}$ are to be monitored and reported separately in accordance with the registered MP. The value for $EG_{in}$ is indicated as zero through the monitoring period in the MR Version 01, but according to the data of check meter M2, there was electricity import during the monitoring period.					
<b>6. Conclusion:</b> The PP explained that they wrongly used $EG_y$ , the net electricity exported to the grid by the project, as $EG_{out,y}$ in MP Version 01. In the revised MR and the spreadsheet, the actual $EG_y$ is calculated by $EG_{out,y}$ and $EG_{in,y}$ . The team checked the report of the monitoring records of $EG_{out,y}$ and $EG_{in,y}$ and implemented a crosscheck by using the monitoring result of the Meter M2 and M2' installed in the outlet of the plant and confirmed the consistent of the value as well as the result of $EG_y$ . The CAR was closed.					

1. Grade/Reference:	CL 01	2. Date:	25 June 2010	3. Status:	Closed
4. Requirement	CDM M&P para 56, 62 (g)				
5. Finding: The technical specification of water turbines and generators actually implemented is not exactly the same as that indicated in FSR. The PP is requested to clarify if the difference of technical specification changes the project activity from that is described in the FSR, especially on the effective output capacity or operational parameters (such as plant load factor). The PP is also requested to clarify the procedures for monitoring of parameter $Cap_{PJ}$ following the registered monitoring plan. Description in the PDD and the actual installed turbine models are two sets of HLA551c-LJ-230 and one set of HLA551c-LJ-165. But in the FSR, they are two sets of HL(267)-LJ-230 and 1 set of HL(269)-LJ-165. Description in the PDD and the actual installed generator models are two sets of SF13.5-28/4870 and one set of SF7000-20/3250. But in the FSR, they are 2 sets of SF13.5-28/500 and one set of SF7-20/330.					
6. Conclusion: In reply to the CL, the PP presented a clarification letter issued by the provider of the FSR. It was confirmed by the design institute that the change of type name of the equipment does not impact the installed capacity, output, annual utilisation and the other important parameters. Procedures and records for monitoring of $Cap_{PJ}$ conducted by checking the nameplate of the equipment are presented and added in the monitoring report. The CL was closed.					

<b>1. Grade/Reference:</b>	CL 02	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
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<b>4. Requirement</b>	CDM M&P para 56
<b>5. Finding:</b>	The substation of the grid was indicated as Lijie transformer station in the MR Version 01. But the project activity is supplying electricity to Dachaigou substation. Clarification was requested.
<b>6. Conclusion:</b>	The typographical error was corrected in the revised MR. The CL was closed.

<b>1. Grade/Reference:</b>	CL 03	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	CDM M&P para 53				
<b>5. Finding:</b>	A CL was raised on the crosscheck of the data. Reporting of monitored ERs is made on a monthly basis and then it is compiled for the specified monitoring period. But the PP is requested to clarify its monitoring procedures relating to which dates of a month (from and to) the emission reductions of the month are calculated, cross-checked among the data obtained from M1/M1', M2/M2' and receipt of sales, and applied for MR. The procedures should ensure a comparison of data to be conducted to the same periods.				
<b>6. Conclusion:</b>	Monitoring period of each month was clarified in the dedicated record forms that facilitate cross-comparison of data and prevent occurrence of an inconsistency. According to the rules of the grid company, the reading on the power meters in the substation is made on the second last day of each month, and is applied to M1/M1' readings and sales invoices. The PP applies the same period for M2/M2' readings and conducts crosscheck by using data of the corresponding period. The CL was closed.				

<b>1. Grade/Reference:</b>	CL 04	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
<b>4. Requirement</b>	CDM M&P para 56				
<b>5. Finding:</b>	In the Table D.2 of the MR, the source of data used for $EG_y$ is indicated as Monitoring report. But the value is calculated by $EG_{out,y}$ and $EG_{in,y}$ . It indicates that the data of $TEG_y$ is used for baseline emission calculations but the parameter is for project emissions calculation according to the applied methodology.				
<b>6. Conclusion:</b>	The PP amended the parts of the MR and the team checked that the relevant parts have been revised accordingly and correctly described in the revised MR. The CL was closed.				

<b>1. Grade/Reference:</b>	CL 05	<b>2. Date:</b>	25 June 2010	<b>3. Status:</b>	Closed
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<b>4. Requirement</b>	CDM M&P para 56
<b>5. Finding:</b> According to the registered MP, the Vice General Manager will hold the overall responsibility for the monitoring process and approval of the monitoring report. But no evidence was shown demonstrating that the MR had been approved by the authorised person in accordance with the requirement of the registered MP. CL 05 was issued.	
<b>6. Conclusion:</b> The PP clarified the procedures and confirmed that the signature of the Vice General Manager indicating the approval of the MR is to be placed onto the final version of the MR.	

1. Grade/Reference:	CL 06	2. Date:	25 June 2010	3. Status:	Closed
4. Requirement	CDM M&P para 56				
5. Finding: The PP is requested to present evidence for the explanation made in the MR on the difference of the actual ER and the estimated ER in the PDD.					
6. Conclusion: The FSR showed the river runoff during November to April is lower than the average water runoff for a year, which explained the low emission reduction achieved during this monitoring period (18/12/2009-29/05/2010). The verification team also referenced the similar CDM projects in the same province on trend of seasonal electricity generation amount and noted that it is a general trend in the province based on the reported data in 2009 that a lower amount of electricity is produced during February to May in comparison with the annual monthly average. The CL was closed.					