



GANSU HUANGHE BINGLING HRDROPOWER STATION PROJECT



Document Prepared by GEPIC Carbon Assets Management Company., Ltd.

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1.1 Summary Description of the Implementation Status of the Project

The Gansu Huanghe Bingling Hydropower Station Project (hereafter referred to as the project) developed by Gansu Diantou Bingling Hydropower Development Co., Ltd. (hereafter referred to as the project proponent) is located at the main stream of the Yellow River at the border of Yongjing County and Jishishan County of Linxia Hui Autonomous Prefecture in Gansu Province, China. The total installed capacity of the project is 240MW, consisting of 5 bulb-type propeller turbines with an individual capacity of 48 MW.

The purpose of the project is to utilize the natural water flow of the Yellow River, limited storage capacity (less than one day) and medium head to generate zero emissions electricity for the Gansu Power Grid, which is an integral part of the Northwest China Power Grid (NWCPG). The electricity currently generated by the NWCPG is relatively carbon intensive. The project is therefore expected to reduce GHG emissions by reducing both the need and the needed capacity expansion of fossil fuel-based generation of the NWCPG. The expected net annual power supply to the grid is 954,088 MWh and the estimated emission reductions of the project are 764,452tCO₂e per year.

The main construction activities of the project started in 11/2004. The project started commissioning on 04/08/2008 and was put into full operation on 07/07/2009.

The project has operated without any accidental or emergency events that might affect the accuracy and/or implementation of the monitoring activities. The net electricity supplied to the grid by the project during this monitoring period (01/01/2013-31/12/2015) is 2,930,927.582 MWh. The total emission reductions claimed in this monitoring period are 2,490,647 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral Scope 1: energy industries (renewable/non-renewable sources)

Project Type: Grid-connected Hydropower Project.

The project is not a grouped project.

1.3 Project Proponent

Organization name	Gansu Diantou Bingling Hydropower Development Co., Ltd.
Contact person	Wang Haimin
Title	Project manager
Address	No.60, Huanghe Road of Liujiaxia Town, Yongjing County, Gansu Province, China.
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1.4 Other Entities Involved in the Project

Organization name	GEPI Carbon Assets Management Company., Ltd
Role in the Project	Consultant

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Title	Project Manager
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1.5 Project Start Date

The project start date was 04/08/2008, the date when the project started commissioning and began reducing GHG emissions.

1.6 Project Crediting Period

The project crediting period is 04/08/2008-03/08/2018 which covers 10 years.

There is a deviation for the project crediting period. For the first monitoring period under the VCS program, the project crediting period requested was 04/08/2008 to 11/02/2009. However, as the project registered as VCS project under VCS2007.1, and completed validation before 19/03/2020, it remains eligible to apply the crediting period requirements under VCS Standard Version 3, according to which the crediting period is applicable to a maximum of 10 years which may be renewed at most twice. Thus, the first renewable crediting period shall be updated from 04/08/2008-11/02/2009 to 04/08/2008-03/08/2018 which covers 10 years.

Since the project crediting period was not renewed within in 2 years after the end of first crediting period, the total VCS crediting period of the project ends on 03/08/2018.

1.7 Project Location

The Gansu Huanghe Bingling Hydropower Station is located at the main stream of the Yellow River at the border of Yongjing County and Jishishan County of Linxia Hui Autonomous prefecture in Gansu Province. The site location's approximate coordinates are east longitude of 102°59'25" and north latitude of 35°49'27". The nearest city is Lanzhou City, the provincial capital, 75 km northeast of the project location.

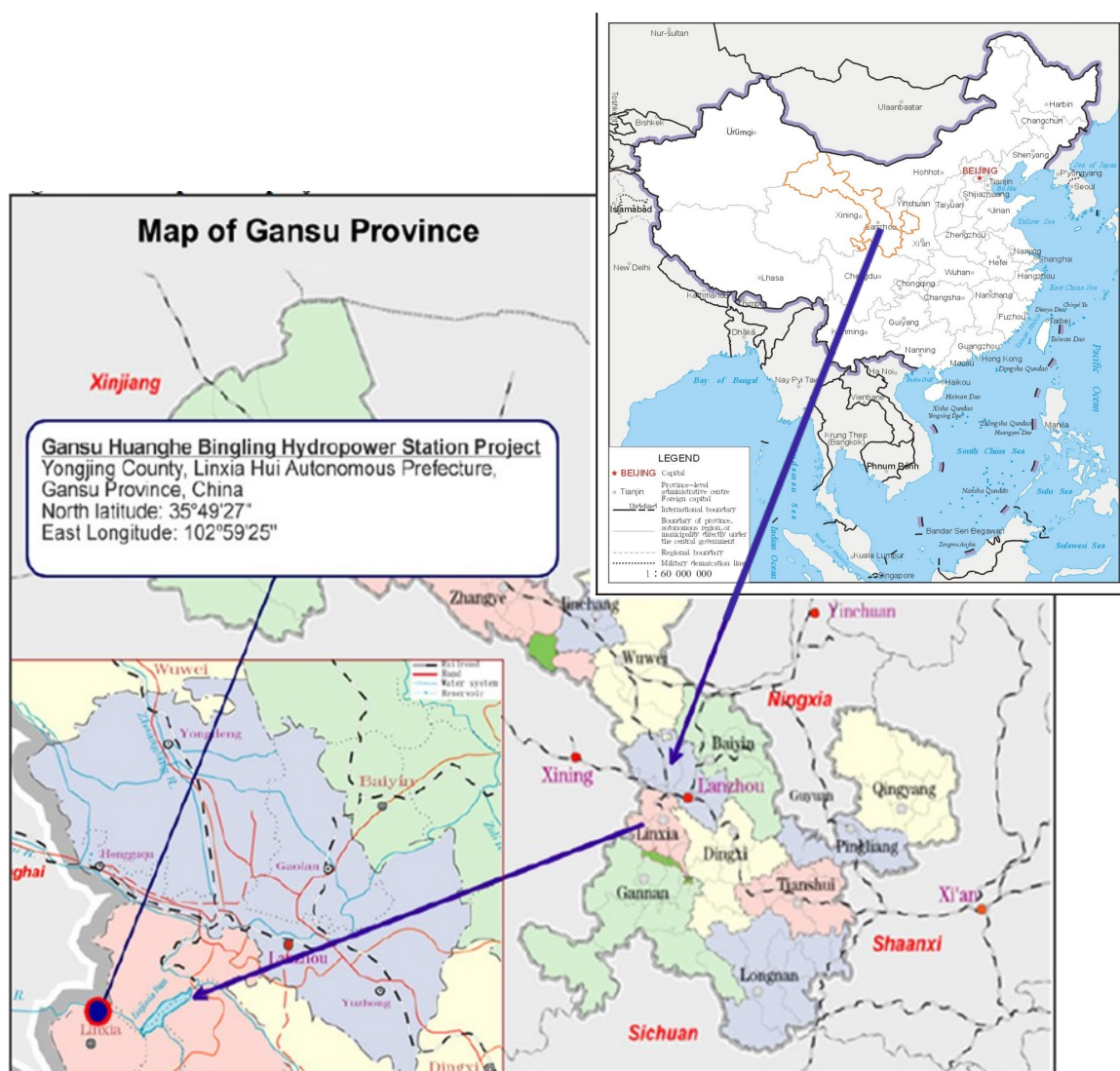


Figure 1.1 The location of the Project

1.8 Title and Reference of Methodology

The applied methodology:

ACM0002 (Version 06) "Consolidated methodology for grid-connected electricity generation from renewable sources"

<https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

The applied tools:

TOOL01 "Tool for the demonstration and assessment of additionality" (Version 05)

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.pdf>

1.9 Participation under other GHG Programs

The project was registered as a UNFCCC CDM project on 12/02/2009 (UNFCCC reference: 1985), with a renewable crediting period starting on 12/02/2009.

A total number of 3,067,359 CERs, corresponding to GHG emission reductions of 3,067,359 tCO₂e, have been issued under the CDM program for six monitoring periods between 12/02/2009 and 31/12/2012, refer to the link below for more detailed information:

<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1217926221.96/view>

Emission reductions during this monitoring period will only apply for issuance under VCS, not under any other mechanisms.

1.10 Other Forms of Credit

- Emission Trading Programs and Other Binding Limits:

China has a national emissions trading scheme only cover the high-emission industries, such as thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO₂e/year, not including renewable project¹.

The project proponent: Gansu Diantou Bingling Hydropower Development Co., Ltd. as an enterprise for renewable energy investment, is not included in the compliance entity list by China national Emission Trading Scheme (ETS). Moreover, the project has not been registered as a CCER (Chinese Certified Emission Reductions) project in China, thus it is not eligible for emission reductions transaction under the China's ETS

Therefore, the project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. The net GHG emission reductions generated during this monitoring period have not been used for compliance under such programs or mechanisms.

Furthermore, a statement on no double counting will be submitted to Verra to confirm the emission reductions generated from the current monitoring period 01/01/2013 to 31/12/2015 have not been and will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions. The emission reductions achieved during this monitoring period will only be used for VCU issuance request under the VCS program.

– Other Forms of Environmental Credit:

The project has NOT sought or received any other forms of GHG-related environmental credits including renewable energy certificates during this monitoring period.

¹ http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

1.11 Sustainable Development Contributions

This project fits with the Chinese government objective to reduce the dependence on exhaustible fossil fuels for power generation, make the energy sector in general and the power sector in particular more sustainable.

The project activity's contributions to sustainable development are:

- The project has generated 2,930,927.582 MWh of grid-connected renewable energy during this monitoring period which contributes to SDG7;
- As contributing to SDG 8 Decent Work and Economic Growth, 227 employees including 169 males and 58 females, are working for the project activity which earns an income higher than the local average level by the end of this monitoring period;
- Prevented the release of 2,490,647 tons of CO₂ into the atmosphere during this monitoring period which contributes to SDG13.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	Volumes of grid-connected electricity generated from renewable sources	Implemented activities to increase	Generated 2,930,927.582 MWh of grid-connected renewable energy during this monitoring period.	An accumulated 3,098,152.512 MWh of electricity from renewable sources has been supplied to the power grid by end of the reporting period
2)	8.5	Numbers of decent job opportunities provided by implementation of the project	Implemented activities to increase	227 people (including 58 females) have been employed by the project as long-term employee which have an income rate higher than the local average level.	227 employees including 58 females have been employed by the project as long-term employee by end of the reporting period.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project has prevented the release of 2,490,647 tCO ₂ e into the atmosphere during the monitoring period.	An accumulated 2,632,747 tCO ₂ e of GHG emission reduction have been achieved by the project by end of the reporting period

2 SAFEGUARDS

2.1 No Net Harm

The project did not and will not result in any significant environmental impacts or any negative socio-economic impact.

Environmental Impacts

The environmental impacts of the project are not considered significant by the Chinese government and the stakeholders. An Environmental Impact Assessment (EIA) was carried out by the North-west Hydroelectric Investigation & Design Institute of the State Power Company and was accepted by the State Environmental Protection Administration of China. The environmental impacts mainly consist of:

- The impact of the construction of the dam on the river's ecological system;
- Pollution due to the production of construction and domestic sewage during the construction period;
- Dust pollution due to soil excavation, explosions, sand & gravel mixture processes, concrete mixture processes and the transportation of construction materials;
- Noise pollution due to the construction of the project;
- Construction and domestic solid waste pollution.

The above-mentioned impacts can be mitigated by taking the following steps:

- Blocking of the river channel by the dam

A fish breeding facility has been established at the reservoir of the Liujiaxia Hydro Power Station which is located downstream of the project. The fish species chosen for breeding has been determined on the basis of fish species affected by the project. After selective breeding, induced breeding and hatching, the juvenile fish has been periodically released

into the river at a point downstream of the dam section. Through these measures, the impact of the project on semi migratory fish species can be minimized.

- Construction and domestic sewage created in the construction and operation period

The production of construction sewage is due to the cleaning of sand and gravel materials which was disposed after first treating the sewage with DH high-efficiency purifying equipment and then used for tree irrigation. Domestic sewage generated during operation period is treated with purifying disposal equipment to ensure the water quality is in accordance with the "Sewage Discharge Standards". After treatment the water is used for tree irrigation purposes. The treated construction and domestic sewage does not cause the pollution in the water resources within the context of the project.

- Water & soil conservation

During the construction phase specific protection measures (such as the erection of soil-retaining walls, water drainage trenches, etc.) were taken in accordance with the land use of the specific sites in order to prevent water & soil losses. After construction, involved land was leveled off and trees were planted to conserve the water & soil.

- Prevention of dusts & exhaust pollution during construction period

A series of prevention and protection measures were taken which include: using wet straw bags to cover explosion areas (prior to explosions), water spraying methods, tree planting, installing exhaust gas filters, etc. Masks were worn by construction staff in order to protect themselves from dust pollution.

- Noise pollution

The following measures have been taken to minimize negative impacts due to noise pollution: application of low-noise equipment during construction, emphasizing proper maintenance of equipment, avoiding explosion at night, limiting driving speed, install warning signs, applying personal protection equipment for construction workers such as helmets and ear plugs. To further prevent negative impacts of noise pollution, the project

entity has planted trees and erected a sound insulating wall at either side of the access road to the local village.

- Solid waste

The project entity established several solid waste collection points, and the collection box was set up in the management station and the dam hub area for collecting all the household garbage during construction and operation period. The floating objects in the reservoir area were regularly salvaged by Gansu Changsheng Clean and Dredging Co., Ltd.; the project entity has signed a garbage disposal agreement with Yongjing Green Home Cleaning Co., Ltd. All the household garbage and floating objects in the reservoir area are collected and regularly transported by the company every month.

Socio-economic impact

Furthermore, the project activity has reduced the dependence on exhaustible fossil fuels for power generation, reduced GHGs emissions by displacing coal-fired power plants with clean, renewable power and contributed to local economic development through employment creation.

In conclusion, no net harm on local environment and social community has been detected for the project.

2.2 Local Stakeholder Consultation

Local stakeholders have been consulted at different stages of the project. The consultation at the preparation and the implementation stage of the project are described as follows.

Local Stakeholder Consultation at the preparation stage

At the preparation stage, the questionnaire and consultation meeting were used for engaging local stakeholders.

Questionnaire surveys before the project construction:

A questionnaire survey which consisted of two separate questionnaires of which one was distributed among public organizations and the other among individuals.

Public organization questionnaire:

The questionnaire survey among public organizations consisted of handing out 100 questionnaires among various government and political departments of which 90 were returned. The consulted organizations included: local government, local forestry bureau, Land Resource Bureau, Planning bureau, Environmental Protection Bureau, Bureau of Agriculture, Water Conservancy Bureau, Western China Development Office and Cultural Center and Hydro Affairs Bureaus of Linxia Prefecture, Jishishan County, Yongjing County and Minhe County.

Individual questionnaire survey:

The questionnaire survey among individuals consisted of handing out 160 questionnaires among involved individuals which included various experts, local residents living in the projected reservoir area and local residents living downstream of the dam. The age distribution of respondents covered all ages and the respondents' professions included local government officer, teacher, farmer and student.

In summary, the results of both questionnaire surveys show that the overall majority of respondents support the project.

CDM stakeholder consultation meeting:

In addition to the above-mentioned questionnaire surveys, the project entity carried out a separate stakeholder consultation in relation to the CDM application to confirm the impacts of the project on the relevant stakeholders. The consultation lasted for one month, from 14/12/2006 to 12/01/2007 and consisted of the following elements:

Establishment of a website:

The website contained information on the project, CDM, the stakeholder consultation process and provided an opportunity to post comments by e-mail or by telephone.

Organization of a stakeholder consultation meeting near project site:

Date / time: 22/12/2006, 9:00-12:00.

Location: Meeting room of the Gansu Huanghe Bingling Hydropower Station, Yongjing county

of Linxia Hui Autonomous Prefecture, Gansu Province.

The inputs received during the stakeholder consultation were mainly positive. The project entity provided explanations on the various investments that the project entity will provide benefits to the local population. No further measures are considered necessary by the project entity.

In order to take due account of all and any input received, the project entity confirmed the its commitment to establish and operate the project according to the relevant laws and regulations. In particular, the project entity will ensure that all environmental protection measures as required by the EIA as implemented properly and establish environmental protection unit to execute environment protection activities.

In conclusion, there was no significant negative comments received in the project preparation stage.

Local Stakeholder Consultation at the implementation stage:

Communications with local stakeholders are being carried out at periodic intervals during the implementation of the project. The project owner has informed the local authority, the neighborhood committee, and local residents of any key implementation schedules and changes of the project through publishing the notice on the bulletin boards set in the local villages. The project owner has aslo set up a suggestion book and published the telephone number of the contact person to collect opinions and suggestions from the stakeholders. And no negative comments nor grievance were received in this monitoring period. The Local authorities also continuously supervised the implementation and operation of the

project activity and no issues were identified by the local authorities during this monitoring period.

In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project consists of 5 bulb-type propeller turbine-generators with an individual capacity of 48 MW, amounting to a total combined installed capacity of 240MW and the technology employed in the project is conventional hydropower design using the natural water flow of the river and medium head. The powerhouse is integrated in the dam with the turbines installed at the base of the dam in the river bed. The surface area at full reservoir level is measured to be 2,871,999.3m² and the designed operation period of the project is 30 years.

Table 3.1 Key technological parameters of equipment installed in the project

Turbine	Type	Type number	Capacity	
	Bulb-type propeller	GZ HK-1RT-WP -620	49MW	
	Nominal water flow	Water head		
		Minimum	Nominal	Maximum
	335 M³/s	11.6m	16.1m	25.7m
	Nominal revolutions		Run-away rotation speed	
	107.1rpm		300rpm	

Generator	Type	Capacity	Type number
	Horizontal Integrated (in turbine Bulb)	48MW	SFG48-56/6700
	Nominal Voltage	Nominal current	Power factor(lag)
	13.8kV	2114A	0.95
	Nominal revolutions	Frequency	
	107.1rpm	50Hz	

The main construction activities of the project started in 11/2004. The project activity started commissioning on 04/08/2008 and was put into full operation on 07/07/2009. During the monitoring period, the project activity was conducted strictly in compliance with the description in the revised CDM PDD (version 3.0 dated 04/11/2009) approved by CDM EB on 15/04/2010. Monitoring of the required parameters, data recording, collection and recording was in line with the approved revised CDM PDD.

During the current monitoring period, previous used old meter M2b with SN.36139068 was replaced with the new meter M2b with SN.0100881150 on 22/07/2014 due to periodical check reason by the grid company and the new meter's accuracy is 0.2S which is the same as the old meter.

During this monitoring period, there were no malfunction, emergencies or special events occurred that may impact the GHG emission reductions or removals and monitoring.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation applied to this monitoring period.

3.2.2 Project Description Deviations

There is a deviation for the project crediting period. For the first monitoring period under the VCS program, the project crediting period requested was 04/08/2008 to 11/02/2009. However, as the project registered as VCS project under VCS 2007.1, and completed validation before 19/03/2020, it remains eligible to apply the crediting period requirements under VCS Standard Version 3, according to which the crediting period is applicable to a maximum of 10 years which may be renewed at most two times. Thus, the first renewable crediting period shall be updated from 04/08/2008-11/02/2009 to 04-08-2008-03/08/2018 which covers 10 years.

Since the project crediting period was not renewed within in 2 years after the end of first 10 years, the total VCS crediting period of the project ends on 03/08/2018.

This deviation of crediting period has no impact on the applicability of the methodology, additionality, and the appropriateness of the baseline scenario.

A revised PDD has been submitted and approved by CDM-EB on 15/04/2010 due to the changes of the main equipment parameters. The validation opinion agreed that the changes have no impact on additionality, the scale or the applicability and application of the methodology under which the project activity has been registered. Therefore, the project activity still meets all appropriate rules and requirements of VCS standard.

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _y
Data unit	tCO ₂ e/MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y
Source of data	The approved revised CDM PDD
Value applied	0.8498
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex ante and fixed for the first crediting period
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	EG _y
Data unit	MWh
Description	Electricity supplied to the grid by the project (net)
Source of data	measured values from the electricity meters M2a, M2b and M4
Description of measurement methods and procedures to be	EG_y is determined as the difference between: net electricity supplied by the project through the main power lines (ES_y) and the electricity delivered to the project through back-up power line (ED_y) ES_y is continuously measured by meters M2a and M2b owned by project

applied	proponent (accuracy class of 0.2S) installed on the two main lines at the project side and it is also measured by meters M3a and M3b owned by grid company (accuracy class of 0.2S) are installed on the two main lines at the grid's side. ED_y is continuously measured by meter M4 owned by project proponent (accuracy class of 0.5) installed on the backup power line at the project side and M5 (accuracy class of 0.5S) owned by grid company installed on the backup power line at the grid's side.						
Frequency of monitoring/recording	Continuously measured, daily recorded and monthly aggregated.						
Value monitored	Accumulated value: 2,930,927.582 MWh during this monitoring period, see Table 5.1 for details.						
Monitoring equipment	Meter	Type	Serial NO.	Accuracy	Calibration frequency	Calibration date	Validity date
	M2a	SL7000	36139071	0.2S	Annually	30/05/2012	29/05/2013
	M3b	SL7000	36139070	0.2S	Annually		27/04/2014
	M4	DTSD341	20070701110015	0.5	Annually	23/03/2014	22/03/2015
	M5	DS862	090106002773	0.5S	Annually	15/02/2015	14/02/2016
	M3a	SL7000	36088323	0.2S	Annually	10/05/2012	09/05/2013
						28/04/2013	27/04/2014
						23/03/2014	22/03/2015
						15/02/2015	14/02/2016
	M2b (old)	SL7000	36139068	0.2S	Annually	30/05/2012	29/05/2013
						28/04/2013	27/04/2014
						23/03/2014	22/03/2015

	<table> <tr> <td>M2b (new)</td> <td>DTZ-110</td> <td>0100881150</td> <td>0.2S</td> <td>Annually</td> <td>22/07/2014 15/02/2015</td> <td>12/07/2015 14/02/2016</td> </tr> </table>	M2b (new)	DTZ-110	0100881150	0.2S	Annually	22/07/2014 15/02/2015	12/07/2015 14/02/2016
M2b (new)	DTZ-110	0100881150	0.2S	Annually	22/07/2014 15/02/2015	12/07/2015 14/02/2016		
QA/QC procedures to be applied	The data were measured through national standard electricity meters which were calibrated annually by authorized third party. Electricity sales records, i.e. sales receipts and billing receipts were crosschecked with measurement records of the project entity. In case of discrepancies the conservative value prevails.							
Purpose of the data	Calculation of baseline emissions							
Calculation method	$EG_y = ES_y - ED_y$ ES_y is the net electricity supplied by the project through the main power lines ED_y is electricity delivered to the project through back-up power line							
Comments	During the current monitoring period, previous used old meter M2b with SN.36139068 was replaced with the new meter M2b with SN of 0100881150 on 22/07/2014 due to periodical check reason by the grid company and the new meter's accuracy is 0.2S which is the same as the old meter.							

Data / Parameter	Surface area reservoir
Data unit	m ²
Description	Surface area at full reservoir level
Source of data	Measured
Description of	The surface area of the reservoir was measured by Gansu

measurement methods and procedures to be applied	Provincial Land Resources Planning and Research Institute, who has an authorization from the State Bureau of Surveying and Mapping.
Frequency of monitoring/recording	Once at the start of the project when the reservoir reaches full capacity.
Value monitored	2,871,999.3m ²
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	Operational hours of emergency back-up diesel generator
Data unit	Hours/year
Description	Annual hours that the emergency back-up diesel generator is running either for the purpose of commissioning/maintenance or actual emergencies
Source of data	Measured
Description of measurement methods and procedures to be	The project entity records the operational hours in the daily operation logs.

applied	
Frequency of monitoring/recording	Recorded and monitored once started.
Value monitored	54
Monitoring equipment	Each operation of the back-up diesel generator is recorded manually in the daily operation logs
QA/QC procedures to be applied	The actual annual emissions associated with the operation of the emergency back-up diesel generator amount to about 0.002% of total emission reductions and were deducted. Further QA/QC procedures are therefore not considered necessary.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	-

4.3 Monitoring Plan

1.Organizational and Monitoring Structure

The monitoring of the emission reductions is carried out according to the scheme shown in Diagram 4.1. The vice general manager held the overall responsibility for the monitoring process, but as indicated below parts of the process are delegated. The first step was the measurement of the electrical energy supplied to the grid and reporting of daily operations, which were carried out by the plant operation staff. A monitoring officer was appointed and was responsible for verification of the measurement, collection of sales receipts for electricity supplied by the project and billing receipts for electricity delivered to the project.

The monitoring officer prepared operational reports of the project activity, recording the daily operation of the hydropower station including operating periods, electricity generation; electricity delivered to the grid, equipment defects, etc. Finally, the monitoring reports was reviewed by the vice general manager. Monitoring organizational structure, roles and responsibilities have been shown as below.

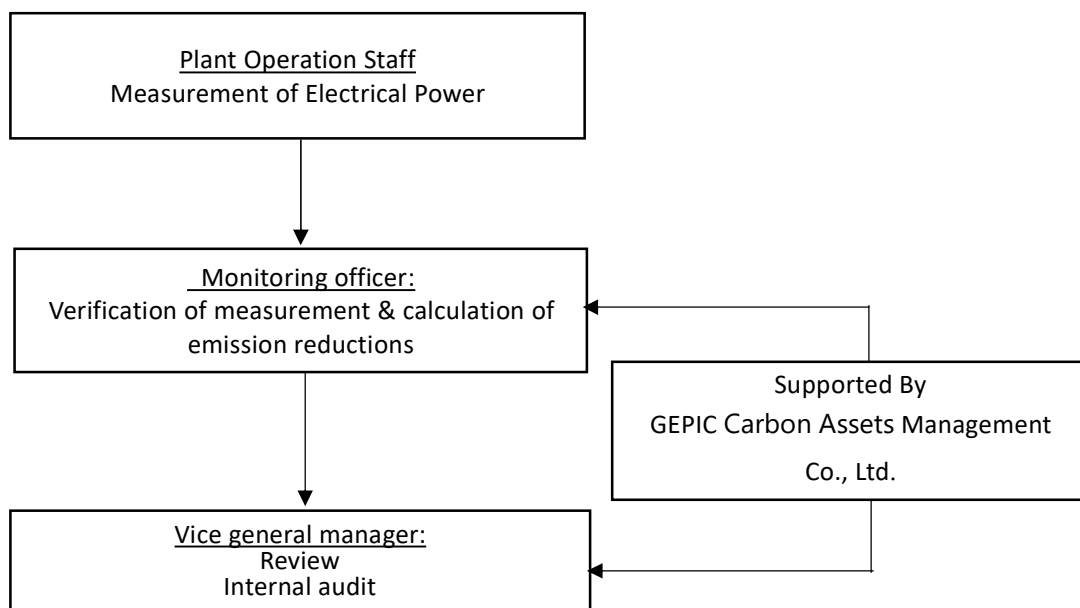


Diagram 4.1. Management structure for monitoring

2. Monitoring System and Data collection

Monitoring of electricity data

The project is connected by a 330kV line to the Liujiaxia 330kV Switching Station and through a 110kV power line to the 110kV Jishishan Transformer Station, both of which are connected to the Northwest China Power Grid. The electricity supplied to the grid by the project (net) was monitored by both the project proponent at project site and Grid Company at the grid side:

The net electricity supplied by the project through the two main power line (ES_y) were continuously measured by the project proponent with two bidirectional meters M2a and

M2b (both with accuracy of 0.2S) installed on the two main lines at the project side. ES_y is also measured by the grid side's two bidirectional meters M3a and M3b (both with accuracy of 0.2S). Besides, the electricity delivered to the project through back-up power line (ED_y) was continuously measured by the project proponent with the meter M4 (with accuracy of 0.5) installed at the project side and by the grid company with the meter M5 (with accuracy of 0.5S) installed at grid's side. The grid Connection Diagram is shown as below:

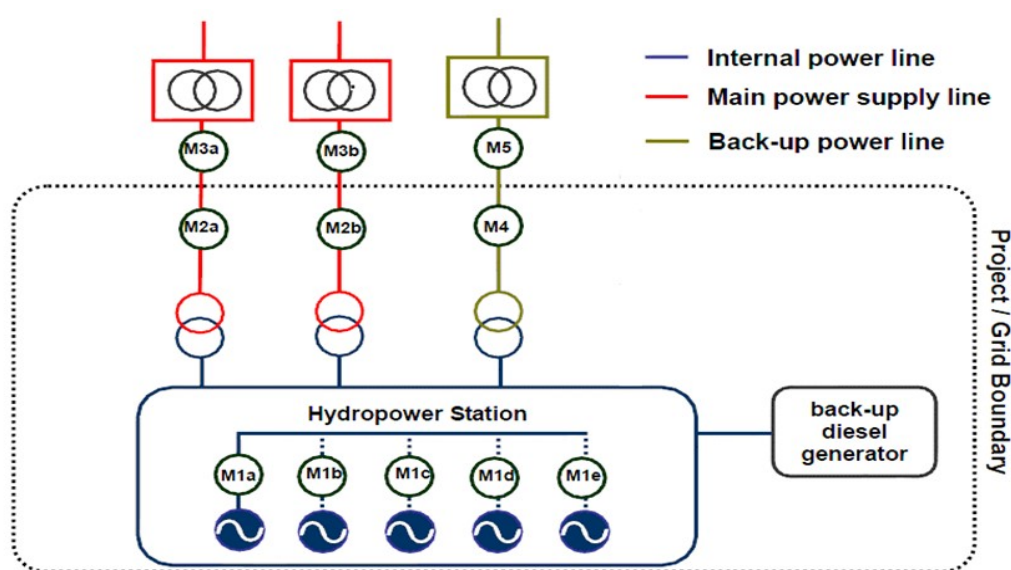


Diagram 4.2: Indicative grid Connection Diagram

ES_y (net electricity supplied by the project through the main power lines) and ED_y (electricity delivered to the project through back-up power line) were measured continuously, recorded daily and aggregated monthly. At the 24:00 of the antepenultimate day of each month, the project proponent recorded the readings ES_y measured by electricity meters M2a and M2b and ED_y measured by M4, and then submitted it to the grid company. After checked with project proponent's readings, the grid company issued sales receipts of ES_y based on readings of M3a and M3b as well as the billing receipts of ED_y based on the readings of M5. The sales receipts are used for cross-check with the

readings of ES_y measured by M2a and M2b while the billing receipts are used to cross-check the readings of ED_y measured by M4. Data and records are archived for a period of 2 years after the crediting period to which the records pertain.

Monitoring of Surface area reservoir

The surface area of the reservoir was measured once at the start of the project when the reservoir reaches full capacity by Gansu Provincial Land Resources Planning and Research Institute, who has an authorization from the State Bureau of Surveying and Mapping. The measurement report has been provided to VVB for verification.

Monitoring of operational hours of back up emergency diesel generator

The emergency back-up diesel generator on site has a capacity of 400kW which is for back emergency use. However, during this period, the diesel generator was only used for regular test operation, of which the operational hours was also monitored and manually logged by the project proponent.

Procedures for handling emergencies

Damages to metering equipment:

In case metering equipment is damaged and no reliable readings can be recorded the project proponent will estimate net supply by the proposed project activity according to the following procedure:

1). In case metering equipment operated by project entity is damaged only:

The metering data logged by the grid company, evidenced by sales receipts will be used as record of net power supplied to the grid for the days for which no record could be recorded.

2). In case metering equipment operated by the grid company is damaged only:

The metering data recorded by the project entity, evidenced by a print out of electronic records, will be used for the calculation of emission reductions.

3). In case both metering equipment operated by project entity and grid company are damaged:

The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

- the background to the damage to metering equipment
- the assumptions used to estimate net supply to the grid for the days for which no record could be recorded
- the estimation of power supplied to the grid The statement will be signed by both a representative of the project entity as well as a representative of the grid company.

The project entity will furthermore document all efforts taken to restore normal monitoring procedures.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions of the project are calculated according to the following formula:

$$BE_y = EG_y \times EF_y = (ES_y - ED_y) \times EF_y$$

With:

BE_y , the baseline emissions in year y ; in tCO_2e ;

EG_y , electricity supplied to the grid by the project (net) in year y , (in MWh);

ES_y , net electricity supplied by the project through the main power lines (in MWh);

ED_y , electricity delivered to the project through back-up power line (in MWh);

EF_y , the baseline emission factor, (in tCO_2e/MWh).

Thus, the baseline emissions during this monitoring period are as follows:

Period	ES_y	ED_y	$EG_y = ES_y - ED_y$	EF_y	$BE_y = EG_y \times EF_y$
	MWh	MWh	MWh	tCO_2e/MWh	tCO_2e
01/01/2013-31/12/2013	1,045,252.010	75.480	1,045,176.530	0.8498	888,191
01/01/2014-31/12/2014	986,968.730	154.500	986,814.230		838,594
01/01/2015-31/12/2015	899,050.482	113.660	898,936.822		763,916
Total	2,931,271.222	343.640	2,930,927.582	-	2,490,701

Detailed monthly electricity data is shown in the tables below:

Net electricity supplied by the Project through the main lines ES_y

Period	Net electricity supplied by the Project through the main lines ES _y (MWh)		
	Values from Meter Readings [(M2a export - M2a import) + (M2b export - M2b import)]	Values from Sales Receipts	Conservative values
	A	B	C=Min(A,B)
01/01/2013-29/01/2013*	86,269.920	-	0
30/01/2013-26/02/2013	64,538.760	64,518.696	64,518.696
27/02/2013-29/03/2013	66,726.000	66,503.360	66,503.360
30/03/2013-28/04/2013	81,810.960	81,586.582	81,586.582
29/04/2013-29/05/2013	100,731.840	100,715.802	100,715.802
30/05/2013-28/06/2013	111,680.580	111,662.452	111,662.452
29/06/2013-29/07/2013	106,769.520	106,742.592	106,742.592
30/07/2013-29/08/2013	124,637.700	124,598.034	124,598.034
30/08/2013-28/09/2013	105,040.320	104,976.520	104,976.520
29/09/2013-29/10/2013	88,967.340	88,928.796	88,928.796
30/10/2013-28/11/2013	105,603.300	105,573.336	105,573.336
29/11/2013-29/12/2013	89,445.840	89,808.818	89,445.840
30/12/2013-31/12/2013*	4,274.820	-	0
Subtotal 2013	-	-	1,045,252.010
01/01/2014-29/01/2014*	83,320.380	-	0.000
30/01/2014-26/02/2014	64,173.120	64,153.804	64,153.804
27/02/2014-29/03/2014	62,272.980	62,226.824	62,226.824

30/03/2014-28/04/2014	48,023.580	48,004.748	48,004.748
29/04/2014-29/05/2014	86,976.120	86,959.906	86,959.906
30/05/2014-28/06/2014	100,206.480	100,168.354	100,168.354
29/06/2014-29/07/2014	116,293.320	116,267.778	116,267.778
30/07/2014-29/08/2014	119,581.440	119,559.418	119,559.418
30/08/2014-28/09/2014	118,143.960	118,118.110	118,118.110
29/09/2014-29/10/2014	90,670.140	90,654.168	90,654.168
30/10/2014-28/11/2014	99,007.260	98,980.706	98,980.706
29/11/2014-29/12/2014	81,894.120	81,874.914	81,874.914
30/12/2014-31/12/2014*	4,786.980	-	0
Subtotal 2014	-	-	986,968.730
01/01/2015-29/01/2015*	67,424.940	-	0
30/01/2015-26/02/2015	59,627.700	59,612.344	59,612.344
27/02/2015-29/03/2015	63,936.180	63,760.268	63,760.268
30/03/2015-28/04/2015	58,023.900	57,984.498	57,984.498
29/04/2015-29/05/2015	82,906.560	82,882.426	82,882.426
30/05/2015-28/06/2015	80,904.780	80,876.114	80,876.114
29/06/2015-29/07/2015	113,052.060	113,021.986	113,021.986
30/07/2015-29/08/2015	108,405.660	108,373.474	108,373.474
30/08/2015-28/09/2015	90,194.280	90,150.874	90,150.874
29/09/2015-29/10/2015	86,006.580	85,971.160	85,971.160
30/10/2015-28/11/2015	84,452.940	84,421.040	84,421.040
29/11/2015-29/12/2015	72,034.380	71,996.298	71,996.298
30/12/2015-31/12/2015*	4,655.640	-	0
Subtotal 2015	-	-	899,050.482

Total	-	-	2,931,271.222
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**Note:*

1. The readings of ED_s for 01-29 Jan. and 30-31 Dec. of each year are sourced from the daily reading records of meters M2a and M2b.

2. Since the cut-off time of ES_y is at 24:00 on the antepenultimate day of each month and the sales receipts are issued monthly, there are no separate sales receipts of ES_y for 01-29 Jan and 30-31 Dec of each year. To be conservative, the ES_y for the period 01-29 Jan. and 30-31 Dec. of each year are considered as 0.

Electricity delivered to the Project through the back-up power line ED_y

Period	Electricity delivered to the Project through the back-up power line ED_y (MWh)		
	Values from Meter Readings of M4	Values from Billing Receipts	Conservative values
	D	E	F=Max(D,E)
01/01/2013-29/01/2013*	2.800	3.540	3.540
30/01/2013-26/02/2013	3.400	4.770	4.770
27/02/2013-29/03/2013	24.400	25.860	25.860
30/03/2013-28/04/2013	3.400	3.600	3.600
29/04/2013-29/05/2013	3.300	4.440	4.440
30/05/2013-28/06/2013	2.200	2.500	2.500
29/06/2013-29/07/2013	4.100	4.600	4.600
30/07/2013-29/08/2013	4.200	5.300	5.300
30/08/2013-28/09/2013	3.700	4.200	4.200

29/09/2013-29/10/2013	2.600	3.400	3.400
30/10/2013-28/11/2013	4.000	5.360	5.360
29/11/2013-29/12/2013	3.600	3.710	3.710
30/12/2013-31/12/2013*	0.300	4.200	4.200
Subtotal 2013	-	-	75.480
01/01/2014-29/01/2014*	3.700	4.200	4.200
30/01/2014-26/02/2014	3.500	3.760	3.760
27/02/2014-29/03/2014	3.100	3.300	3.300
30/03/2014-28/04/2014	3.000	3.200	3.200
29/04/2014-29/05/2014	9.100	10.200	10.200
30/05/2014-28/06/2014	7.200	7.720	7.720
29/06/2014-29/07/2014	3.700	3.900	3.900
30/07/2014-29/08/2014	3.800	4.100	4.100
30/08/2014-28/09/2014	6.600	6.700	6.700
29/09/2014-29/10/2014	95.000	98.040	98.040
30/10/2014-28/11/2014	3.200	3.480	3.480
29/11/2014-29/12/2014	2.300	2.600	2.600
30/12/2014-31/12/2014*	0.200	3.300	3.300
Subtotal 2014	-	-	154.500
01/01/2015-29/01/2015*	3.100	3.300	3.300
30/01/2015-26/02/2015	2.800	3.200	3.200
27/02/2015-29/03/2015	62.000	64.560	64.560
30/03/2015-28/04/2015	2.800	3.200	3.200
29/04/2015-29/05/2015	3.000	3.300	3.300

30/05/2015-28/06/2015	2.900	3.200	3.200
29/06/2015-29/07/2015	4.300	4.500	4.500
30/07/2015-29/08/2015	5.100	6.200	6.200
30/08/2015-28/09/2015	5.100	6.200	6.200
29/09/2015-29/10/2015	4.700	5.100	5.100
30/10/2015-28/11/2015	3.100	4.180	4.180
29/11/2015-29/12/2015	3.400	3.560	3.560
30/12/2015-31/12/2015*	0.200	3.160	3.160
Subtotal 2015	-	-	113.660
Total	-	-	343.640

**Note:*

1.The readings of ED_y for 01-29 Jan. and 30-31 Dec. of each year are sourced from the daily reading records of meter M4.

2.Since the cut-off time of ED_y at 24:00 on the antepenultimate day of each month and the billing receipts are issued monthly, there are no separate billing receipts for 01-29 Jan. and 30-31 Dec. of each year. To be conservative, for the period 01-29 Jan. and 30-31 Dec. of each year, the whole month's (30 Dec.- 29Jan.) values from the billing receipts of ED_y are applied for ER calculations.

5.2 Project Emissions

1.Project emissions from the reservoir

The actual measured surface area at full reservoir level is 2,871,999.3m² and the installed capacity is 240MW= 240,000,000W. Thus, the actual power density is calculated as 240,000,000W/2,871,999.3m²=83.57W/m² which leads to a power density sensibly higher than 10 W/m². Therefore, emissions from the reservoir do not have to be taken into account according to the methodology.

2. Project emissions from the back up diesel generator

The emergency back-up diesel generator on site has a capacity of 400kW and the operation hours during this monitoring period are recorded as 54 hours. According to the approved revised PDD (version 3.0), the emission factor of the diesel generator refers to the AMS-I.D. (version 10) methodology which provides emission factors for diesel generator systems. We apply the highest value listed in the methodology which is 2.4kgCO₂e/kWh (generators below 15 kW), which is conservative considering the size of the generator used on-site.

Therefore, the emissions of the diesel generator (tCO₂e) is calculated as:

Emission of the diesel generator (tCO₂e) = 400kW × 54hours × 2.4 kg CO₂e/kWh/1000 = 54 tCO₂e.

Therefore, the emissions due to diesel generator operation were 54 tCO₂e. Thus, PE_y = 54 tCO₂e.

The project emissions by vintage and the calculation process are shown in the table below.

Period	Installed Capacity of the Diesel Generator	Measured Operation Hours	EF for the Diesel Generator	Emissions of the Diesel Generator
	A	B	C	D=Roundup(A*B*C/1000)
	kW	hour	kg CO ₂ e/kWh	tCO ₂ e
01/01/2013-31/12/2013	400	18	2.4	18
01/01/2014-31/12/2014		18		18
01/01/2015-31/12/2015		18		18
Total	-	54	-	54

5.3 Leakage

According to the baseline and monitoring methodology ACM0002 (Version 06), the project doesn't involve leakage, thus: $L_y=0$ tCO₂e.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2013	888,191	18	0	888,173
2014	838,594	18	0	838,576
2015	763,916	18	0	763,898
Total	2,490,701	54	0	2,490,647

APPENDIX 1: <SUPPORTING EVIDENCE>

Evidence for SDG 7 and SDG 13:

As per MR template v4.1, "the cumulative impact should be calculated by summing the current project contributions with all impacts included in previously approved **VCS** monitoring reports or Sustainable Development Contribution Reports", thus, from project operation date onwards, the net electricity supplied to the grid and corresponding emission reductions in every monitoring period under **VCS** scheme have been listed in below table.

Monitoring Period under VCS		EG _y	ERs	Program
From	To	MWh	tCO ₂ e	
04/08/2008	10/02/2009*	167,224,930	142,100	VCS
01/01/2013	31/12/2015**	2,930,927.582	2,490,647	
Total		3,098,152.512	2,632,747	

* The net electricity supplied to the grid and the emission reductions generated during the first VCS monitoring period (04/08/2008-10/02/2009) have been verified by VVB and approved by Verra: <https://registry.terra.org/app/projectDetail/VCS/453>

**The net electricity supplied to the grid is 2,930,927.582 MWh and the emission reductions generated are 2,490,647 tCO₂e during this monitoring period (01/01/2013-31/12/2015) and the detailed calculation process have been displayed in Section 5 of the MR.

Evidence for SDG 8: The proof of annual income and the number of the employees are shown as below:

Annual Salary Certification of Employees

The Gansu Huanghe Bingling Hydropower Station Project developed by Gansu Diantou Bingling Hydropower Development Co., Ltd., The annual salary of employees from 2013-2015 is as follows:

Year	Number of employees	Female	Male	The annual salary
2013	224	55	169	85,100 yuan
2014	235	58	177	97,100 yuan
2015	227	58	169	84,000 yuan

Gansu Diantou Bingling Hydropower Development Co., Ltd.

