The Gold Standard
Premium quality carbon credits

THE GOLD STANDARD:
Project Design Document for Gold Standard Voluntary Offset projects

(GS-VER-PDD)

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Explanatory information on how to complete the PDD and how to obtain Gold Standard registration can be found in the project developer's manual available on the Gold Standard website.

This template of the PDD is applicable for micro-, small- and large-scale projects. Note that the shaded boxes present information on the Gold Standard VER project development procedures. Project developers should delete these shaded boxes when preparing their PDD.

VOLUNTARY OFFSET PROJECTS

PROJECT DESIGN DOCUMENT FORM (GS-VER-PDD)

Version 01 - in effect as of: January 2006)

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity

>>

Title: Hunan Guanbaodu-Liangjiangkou Small-scale Hydropower Bundle Project

Version: 09

Date: 29/03/2016

A.2. Description of the project activity

>>

The Hunan Guanbaodu-Liangjiangkou Small-scale Hydropower Bundle Project (hereafter referred to as "the bundled project") consists of two hydropower projects, the Guanbaodu hydropower project located in Jingzhou Countyl and the Liangjiangkou hydropower project located in Tongdao County Both of these two counties belong to Huaihua City, Hunan Province, People's Republic of China. The total installed capacity of the bundle project is 5.89 MW with annual expected net electricity generation (electricity supplied to power grid) of 21,612MWh.

Guanbaodu project

The Guanbaodu project is located in a mountainous area which mainly consists of hard rocks. The project owner initially decided to retrofit an old dam to construct the dam for the hydropower station. However, the old dam had been in operation for many years and was considered not solid enough to be considered safe for local residents. Furthermore, as requested by local residents, the dam should be constructed to also act as a bridge for transportation for vehicles. Therefore the project owner finally built a new dam at the near lower reach of the old dam.

According to EIA of the project, the increased water level in the reservoir may lead to a little more flooded area including 5Mu farmland and 6km-long path. To mitigate this impact, before the start of the construction, the project owner held several meetings with the villagers from Guanbaodu Village, Xikou Village and Hongguang Village. They communicated about the construction of the project and sent representatives to the project site for an investigation. Based on the investigation and the negotiation, the project owner and the villagers whose lands might be impacted by the project agreed a compensation agreement. The project owner should compensate for 2.3 hectares of land which involved 30 households and a total amount of 314 thousand RMB should be paid by the project owner. A submerged land compensation agreement was signed between the project owner and the Group 1 & 2 of Hongguang village, Gantang Township, Jinzhou County, on 16th August 2008; and a submerged paddy fields compensation agreement was signed between the project owner and the owners of the submerged paddy fields on 6th July 2008.

The Guanbaodu project is located on Qu River. The installed capacity is 4 MW (1MW×4), and the annual net electricity generation is estimated to be 15,513 MWh. The surface area of the full reservoir is 174,000 m^2, thus the power density of Guanbaodu is 23 W/m^2. The project commenced in August, 2005. The operation of Guanbaodu project will displace equivalent power generated from Central China Power Grid (hereafter referred to as "CCPG") which is mainly dominated by fossil fuel fired power plants. It helps to reduce greenhouse gas (GHG) emissions by an estimated 9,281 tCO_2e per year during the first crediting period. The main construction of Guanbaodu project consists of a dam, a power house and a switch station. The generated electricity will be delivered to the Gantang Substation via a 35kv power transmission line, then delivered to Jingzhou Power Grid, and finally connected to Central China Power Grid (CCPG).

Liangjiangkou project

The Liangjiangkou project locates at a mountainous area which mainly consists of hard rocks. The power plant locates at the intersection point of two small rivers. To fully use the water energy, the project owner initially wanted to construct a dam which

would be two times high as the current situation. However, a higher dam will cause immigrants. To avoid immigrants, the project owner finally decided to construct a much lower dam and no immigrant is cause due to the construction of the project.

According to EIA of the project, the increased water level may lead to a little more flooded area including 30Mu farmland. To mitigate this impact, before the construction of the Liangjiangkou project, the project owner held three meetings with the villagers from Tumen Village, the villagers raised a lot of requirements to the project owner, such as build new bridges, build new roads, etc. For convenience, the project owner asked help from the government to collect the requirements from the villages and summarized to the project owner. With the help from the government, the project owner and the 21 villagers from Tumen Village signed the compensation agreement on 6 June, 2006. The final compensation was 10 times higher than the national compensation standard, which made the total investment higher than the estimation in PDR.

The Liangjiangkou project is located on Tongdao River. The installed capacity is 1.89 MW (0.63MW×3), and the annual net electricity generation is estimated to be 6,099 MWh. The surface area of the full reservoir is 180,000 m^2, thus the power density of Liangjiangkou is 10.5 W/m^2. The project commenced in August, 2006. The operation of Liangjiangkou project will displace equivalent power generated from CCPG which is mainly dominated by fossil fuel fired power plants. It helps to reduce greenhouse gas (GHG) emissions by an estimated 3,649 tCO_2e per year during the first crediting period. The main construction of Liangjiangkou project consists of a dam, a power house, a booster substation and a tail water channel. The generated electricity will be delivered to the Xianxi Substation via a 35kv power transmission line, and finally connected to Central China Power Grid (CCPG).

As renewable hydro power projects, the two hydro power projects will exert positive environmental and economic impacts and contribute to the local sustainable development through following perspectives respectively:

Guanbaodu:

1. Social well being

The Guanbaodu project facilitates the local residents to switch from wood to electricity in their daily cooking and heating, thus relieving electricity shortage and ensure industrial and civil electricity consumption in the local area.

2. Economic well being

The Guanbaodu project triggers new investment in the rural region. As the project is invested by most of the residents living around, it will not only provide financial return to local residents but also provide direct and indirect employment opportunities, which will lead to economic well-being of local residents. 100 jobs at most will be available during the construction period and 16 permanent jobs during the operation period.

3. Environmental well being

The project utilizes hydro power to generate electricity, which will offset the equivalent amount of the electricity that is originally generated through fossil fuel-based power plants, thus helping reduce greenhouse gas emission. In addition, local vegetation will be recovered after construction period to reduce soil and water loss.

Liangjiangkou:

1. Social well being

The Liangjiangkou project facilitates the local residents to switch from wood to electricity in their daily cooking and heating, thus relieving electricity shortage and ensure industrial and civil electricity consumption in the local area. Furthermore, new roads and bridges are built by the project owner, which makes it more convenient for the local residents' transportation.

2. Economic well being

The construction of the Liangjiangkou project promotes new investment in the rural region. It provides direct and indirect employment opportunities, which will lead to economic well-being of local residents. 60 jobs at most will be available during the construction period and 8 permanent jobs during the operation period.

3. Environmental well being

The project utilizes hydro power to generate electricity, which will offset the equivalent amount of the electricity that is originally generated through fossil fuel-based power plants, thus helping reduce greenhouse gas emission. In addition, local vegetation will be recovered after construction period to reduce soil and water loss.

Table A-1: Sustainable Development Indicators Matrix for the Gold Standard

Guanbaodu

Component • Indicators	Score (2 to 2)
Local/regional/global environment	
• Water quality and quantity *	0
• Air quality (emissions other than GHGs)	0
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases) *	0
• Soil condition (quality and quantity) *	0
• Biodiversity (species and habitat conservation) *	0
Sub total	**0**
Social sustainability and development	
• Employment (including job quality, fulfillment of labor standards)*	+1
• Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)*	+2
• Access to energy services*	+1
• Human and institutional capacity (including empowerment, education, involvement, gender)*	+1
Subtotal	**+ 5**
Economic and technological development	
• Employment (numbers)*	+ 1
• Balance of payments (sustainability)	0
• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	0
Sub total	**+1**
TOTAL	**+ 6**

Liangjiangkou

Component • Indicators Local/regional/global environment	Score (2 to 2)
• Water quality and quantity *	0
• Air quality (emissions other than GHGs)	0
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases) *	0
• Soil condition (quality and quantity) *	0
• Biodiversity (species and habitat conservation) *	0
Sub total	0
Social sustainability and development	
• Employment (including job quality, fulfillment of labor standards)*	+1
• Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)*	+1
• Access to energy services*	+1
• Human and institutional capacity (including empowerment, education, involvement, gender)*	+1
Subtotal	+ 4
Economic and technological development	
• Employment (numbers)*	+ 1
• Balance of payments (sustainability)	0
• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	0
Sub total	+1
TOTAL	+ 5

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (host)	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd (project owner of Guanbaodu hydropower project)	No
P.R.China (host)	Tongdao Dong Autonomous County Liangjiangkou Hydropower Station (project owner of Liangjiangkou hydropower project)	No
UK	Climate Bridge Ltd. (buyer)	No

A.4. Technical description of the project activity:

>>

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party(ies):

>>

People's Republic of China

A.4.1.2. Region/State/Province etc.:

>>

Hunan Province

A.4.1.3. City/Town/Community etc:

>>

Guanbaodu:

Guanbaodu Village, Taiyangping Town, Jingzhou Miao & Dong Autonomous County, Huaihua City

Liangjiangkou:

Liangjiangkou Village, Shuangjiang Town, Tongdao Dong Autonomous County, Huaihua City

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

>>

Guanbaodu:

The Guanbaodu project is located on the lower reach of Qushui river. The project is 16 km from Jingzhou County and the geographical coordinates are east longitude 109°44'09" and north latitude 26°40'38". Figure A-1 shows the location of the Guanbaodu project.

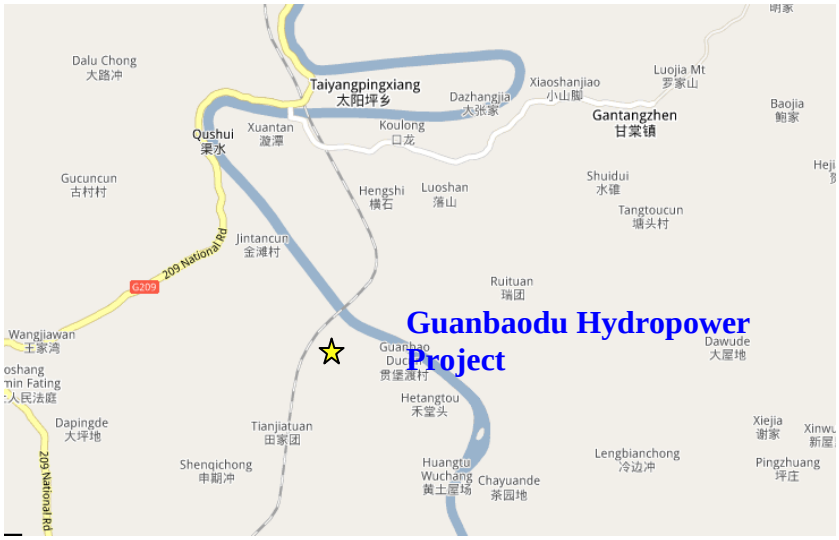

Figure A-1 Map of Guanbaodu Hydropower Project

Liangjiangkou:

The Liangjiangkou project is located on the Tongdao River. The project is 8.5 km away from Tongdao County and the geographical coordinates are east longitude 109°47'45" and north latitude 26°13'11". Figure A-2 shows the location of the Liangjiangkou project.

Figure A-2 Map of Liangjiangkou Hydropower Project

A.4.2. Size of the project:

>>

The estimated annual emission reduction of the bundle project is 12,930 tons CO_2e, which is larger than 5,000 tonnes and smaller than 15,000 tonnes CO_2e per year, and therefore the project is classified as Small-Scale project[1] in accordance with the Gold Standard VER Manual thresholds. Table A-2 shows the technical parameters of the bundled project.

Table A-2 Technical parameters of the two projects

Item	Unit	Parameter	
		Guanbaodu	Liangjiangkou
Turbine			
Quantity	/	4	3
Model	/	GD008-WZ-275	Z003-LH-160
Rated Power	kW	1097	700
Rated water head	m	3.4	6.8
Rotate speed	r/min	133.3	250
Generator			
Quantity	/	4	3
Model	/	SFW1000-10/1430	SF630-24/1730
Rated Power	kW	1000	630
Rated voltage	V	6300	400
Rated current	A	114	113
Rated rotate speed	r/min	600	250
Power factor	/	0.8	0.8

A.4.3. Category(ies) of project activity:

[1] The project was classified as Large-Scale project in the first crediting period, so methodology ACM0002 was applied; although the project is classified as Small-Scale project in the second crediting period due to the updated emission factors, the project proponent still choose to apply ACM0002 in the second crediting period for conservativeness.

>>

The bundle project falls in the category of Renewable Energy, according to Appendix A.1 of Gold Standard VER Project Developer's Manual.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

>>

The renewable energy law of People's Republic of China[2] marks a new stage for the development of renewable energy in China. The government prioritizes the development and utilization of the renewable energy in the energy strategy and encourages grid-connected power generation from renewable sources. Besides the good macro policy environment, Hunan Province itself is abundant in a variety of renewable energy, among which, water resource is widely spread and flexible to be utilized. As a result, the development of hydro power will become an increasingly important energy source in the regional grid for years to come.

Both of the two components of the bundle project utilize water as a clean and renewable resource to generate electricity. It is projected to deliver 21,612 MWh of electricity annually to Huaihua Grid which connects to CCPG, partly replacing fossil fuel consumption in electricity generation and thus reduce CO_2 emissions (refer to Section D for details). The anticipated total reductions would be 90,510 tonnes of CO_2 equivalent over the crediting period of seven years (refer to Section E for detailed calculation). Without the project activity, the thermal plant will be used to satisfy the growing demand of electricity. As shown in Table A-3, utilization of thermal power has dominated in CCPG by the end of 2012, constituting a bigger share of the total generation.

Table A-3 Share of installed capacity of CCPG

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Share
Thermal power	MW	15,050	53,550	21,740	19,060	7,240	14,930	**131,570**	**55.76%**
Hydro power	MW	4,200	3,950	35,950	13,720	6,110	39,640	**103,570**	**43.90%**
Nuclear power	MW							**0**	**0.00%**
Wind power and other	MW	216	150	182	189	50	20	**807**	**0.34%**
Total	MW	19,466	57,650	57,872	32,969	13,400	54,590	**235,947**	**100.00%**
Data source: *China Energy Statistical Yearbook 2013*									

3

However, the concrete, workable incentives, and financing mechanism for small hydropower project are not actualized. As to the proposed project, its relatively poor location, small production and unattractive economic return put it at a disadvantage where investors are reluctant to be involved. Under such a circumstance, the bundle project faces barriers in its implementation. The barriers will be further illustrated in Section B.3. Therefore, without the carbon fund revenues, the proposed project activity is not commercially viable, and GHG emission reduction can not be achieved.

A.4.4.1. Estimated amount of emission reductions over the crediting period:

>>

[2] http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

The ex-ante estimated amount of annual emission reductions over the second crediting period are 12,930 tCO_2e. The renewable crediting period of 7 years × 3 is chosen. In the second crediting period from 1 January 2016 to 31 December 2022 the total emission reductions are estimated to be 90,510 tCO_2e.

Table A-4 Ex-ante estimated amount of emission reductions over the first crediting period

Year	Annual emission reductions (tCO_2e)
2016	12,930
2017	12,930
2018	12,930
2019	12,930
2020	12,930
2021	12,930
2022	12,930
Total emission reductions (tCO_2e)	90,510
The length of the crediting period(years)	7
Annual emission reductions in the crediting period (tCO_2e)	12,930

SECTION B. Application of a baseline methodology

B.1. Title and reference of the approved baseline methodology applied to the project activity:

>>

The project used the approved methodology ACM0002: "Grid-connected electricity generation from renewable sources" (version 16.0).

In line with application of the methodology the project draws on the following tools:

"Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period" (Version 03.0.1);

"Tool to calculate the emission factor for an electricity system" (Version 05.0).

For more information regarding the methodology, please refer to

http://cdm.unfccc.int/methodologies/index.html

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

The methodology ACM0002(version 16.0) is applicable to grid-connected renewable power generation project activities that (a) install a Greenfield power plant; (b) involve a capacity addition to (an) existing plant(s); (c) involve a retrofit of (an) existing operating plants/units; (d) involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plant(s)/unit(s), and the proposed project meets all applicability conditions of baseline methodology ACM0002 as follows:

Guanbaodu:

- The Guanbaodu hydropower project is to install a new hydropower plant at a site where no renewable power plant was operated prior to the implementation of the project activity;
- This project is a grid-connected power generation project by using hydropower resources;
- The installed capacity of this project is 4MW, and during the project activity, a new reservoir is built whose surface area is 174,000m^2, so the power density of the power plant is 23W/m^2, which is greater than 4W/m^2;
- This project activity does not involve switching from fossil fuels to renewable energy sources at the site of the project activity;
- The geographical extent and boundary of the connected electricity system of this project-CCPG can be clearly defined, and the information of this electricity system is available.

Liangjiangkou:

- The Liangjiangkou hydropower project is to install a new hydropower plant at a site where no renewable power plant was operated prior to the implementation of the project activity;
- This project is a grid-connected power generation project by using hydropower resources;
- The installed capacity of this project is 1.89MW, and during the project activity, a new reservoir is built whose surface area is 180,000m^2, so the power density of the power plant is 10.5W/m^2, which is greater than 4W/m^2;
- This project activity does not involve switching from fossil fuels to renewable energy sources at the site of the project activity;
- The geographical extent and boundary of the connected electricity system of this project-CCPG can be clearly defined, and the information of this electricity system is available.

According to the methodology ACM0002, the *Tool to Calculate the Emission Factor for an Electricity System* should be used to

calculate the combined margin (CM) factor of the power grid in the baseline scenario, and the *Tool for the Demonstration and Assessment of Additionality* will be used to demonstrate the additionality of the proposed project.

B.2. Description of how the methodology is applied in the context of the project activity:

>>

The application of methodology ACM0002 (Version 16.0) consists of 5 steps:

Step 1: Checking the applicability

Please see Section B.1.1 for details.

Step 2: Definition of project boundary

According to methodology ACM0002 (Version 16.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the GS VER project power plant is connected to.

Please see Section B.4 for details.

Step 3: Identification of the baseline

In accordance with "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1), the validity of the current baseline is assessed using the following sub-steps:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The current baseline "the electricity produced by the bundle project multiplied by a combined margin (CM) which consists of the combination of operating margin (OM) and build margin (BM) of CCPG" still complies with all relevant mandatory national and sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period, go to step 1.2.

Step 1.2: Assess the impact of circumstances

The current baseline in the registered PDD is "the electricity produced by the bundle project multiplied by a combined margin (CM) which consists of the combination of operating margin (OM) and build margin (BM) of CCPG", which means the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. No changes in market characteristics related to this project are identified at the time of requesting renewal of the crediting period since validation. Hence the current baseline does not need to be updated. Go to *step 1.3*.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

The baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, there's no current baseline equipment or an investment, hence the current baseline does not need to be updated. Go to *step 1.4*.

Step 1.4: Assessment of the validity of the data and parameters

Data and parameters that need to be updated are as follows:

$EF_{grid,CM,y}$: the baseline emission factor that determined once for the first crediting period at the time of validation, hence it shall be updated using the latest version of "Tool to calculate the emission factor for an electricity system". Please refer to section D.2.4 for details.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

As per the analysis in *step 1* above, the current baseline does not need to be updated.

Step 2.2: Update the data and parameters

The updated baseline emission factor for the project ($EF_{grid,CM,y}$) is 0.7230 tCO_2e/MWh.

Identification of baseline scenario:

The project is an installation of a Greenfield wind power plant. As per ACM0002 version 16.0, the baseline scenario of the project is Electricity delivered to the CCPG by the project would have otherwise been generated by the operation of grid-connected power plants in the CCPG and by the addition of new generation sources in the CCPG, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Step 4: Demonstration and assessment of Additionality

Please see Section B.3 for details.

Step 5: Calculation of baseline, project and leakage emissions

The calculations of baseline, project emissions and leakage have been conducted according to formulas proposed by the approved methodologies ACM0002 (Version 16.0).

Please see Section D.2 for details.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered VER project activity:

>>

The project has demonstrated its additionality in the first crediting period and no changes affect the additionality of the project since its registration. As per the CDM Project Standard Version 9.0 para 300, the project participants are not required to reassess the additionality of the project activity and update the section relating to additionality

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

>>

According to methodology ACM0002 (version 16.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the GS VER project power plant is connected to. The electricity generated by the proposed bundled project will be delivered to the CCPG, so the spatial extent of the project boundary encompasses all power plants that physically connect to the CCPG. CCPG includes the grid of Hubei Province, Hunan Province, Chongqing City, Sichuan Province, Jiangxi Province and Henan Province according to the guideline by China DNA[3].

The main emission sources and types of GHGs in the project boundary are listed in Figure B-4 below:

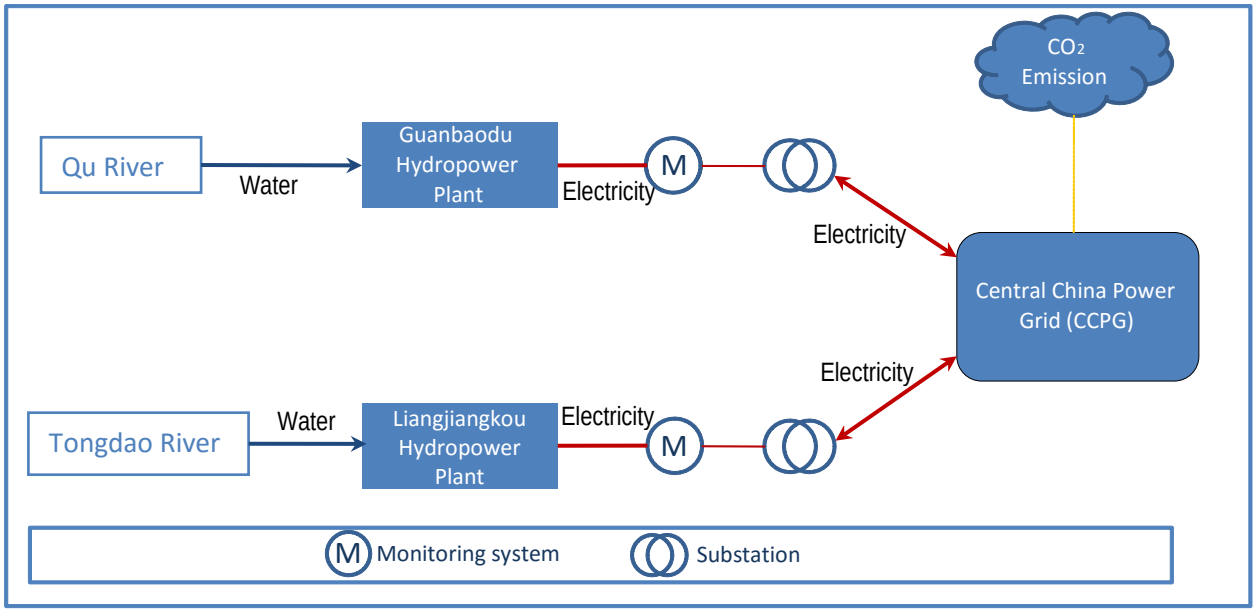

Figure B-4 Boundary of the proposed project

Table B-15 GHG emission sources in the boundary of the proposed project

	Source	Gas	Included?	Justification/Explanation
Baseline	Fuel-fired Power Plants in the CCPG	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	Guanbaodu	CO_2	No	Minor emission source.
		CH_4	No	As the project's power density is greater than 10 W/m^2, CH_4 emission is considered as zero.
		N_2O	No	Minor emission source.

[3] http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161

	Liangjiangkou	CO_2	No	Minor emission source.
		CH_4	No	As the project's power density is greater than 10 W/m^2, CH_4 emission is considered as zero.
		N_2O	No	Minor emission source.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

>>

The baseline study and monitoring methodology of the proposed project was completed on 10/02/2016.

Name of person/entity determining baseline study and monitoring methodology:

Ms. HUANG Shanfeng, Climate Bridge Ltd.

Email: huang.shanfeng@climatebridge.com

Tel: ＋86 21 6246 2036； Fax: ＋86 21 2301 9950

Climate Bridge Ltd. is one of the project participants.

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the project activity:

>>

C.1.1. Starting date of the project activity:

>>

Guanbaodu: 08/08/2005 (Signature of equipment purchase contract)

Liangjiangkou: 02/08/2006 (Signature of construction contract)

C.1.2. Expected operational lifetime of the project activity:

>>

20 years

C.2. Choice of the crediting period and related information:

>>

7 years × 3

C.2.1. Renewable crediting period

>>

C.2.1.1. Starting date of the second crediting period:

>>

01/01/2016

C.2.1.2. Length of the second crediting period:

>>

7 years

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

>>

The approved methodology ACM0002: "Consolidated methodology for grid-connected electricity generation from renewable resources" (Version 16.0) is used for proposed project.

Furthermore the 'Tool to calculate the emission factor for an electricity system' (Version 05.0) is also adopted.

For more information regarding the methodology, please refer to

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

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

Please see B.1.1 for details.

D.2. 1. OPTION 1: Monitoring of the emissions in the project scenario and the baseline scenario

>>

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

>>

Not applicable, as described in Section E no relevant project emissions are expected, i.e. $PE_y=0$ tCO_2e.

D.2.1.2. Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators:

>>

Guanbaodu:

Sustainable Development Indicator	Data type	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Mitigation measures	Methods and equipments used	Who will be in charge of the monitoring and quality control?	Comments
Water quality and quantity	Local/regional /global environment	Level of management	e	Yearly	Please see Annex 4, Sustainable Development Assessment Matrix for details	The waste water during the operation period can be monitored by relevant management.	Local Water Resource Bureau and Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	After taking the mitigation measures described in EIA, the impact of waste water on local water body will not be significant, which has also been confirmed by the outcome of *Report for the Examination and Acceptance of Completed Project*. There is no obvious variation in the water quantity as this project is a run of river hydropower plant with no capacity of conditioning. According to EIA, the amount of daily sanitary wastewater will be about 160 litters per person which will be treated in the septic tank by digestion process and reused as fertilizers.
Solid wastes	Local/regional /global environment	Level of management	m	Yearly	Please see Annex 4, Sustainable Development Assessment Matrix for details	The influence of solid wastes during the construction period can be monitored by local stakeholder's comments. The domestic rubbish treatment during the operation period can be monitored by relevant management.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	During the operation period, domestic rubbish will be transported to the designated wastes deposit plant and then to landfill plant for central disposal. Therefore, the management of the solid wastes severs as the additional check for this indicator.
Biodiversity (species and habitat conservation)	Local/regional /global environment	Degree of Biodiversity	e	yearly	Please see Annex 4, Sustainable Development	This indicator can be monitored by stakeholder's questionnaires.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	According to EIA, there will be no considerable effects on fish and organism species and habitats due to the project activity

					Assessment Matrix for details			and no extinction of any animals will happen. And, the outcome of *Report for the Examination and Acceptance of Completed Project* has also concluded that the measures of ecological conservation have been well implemented.
Employment	Social sustainability and development Economic and technological development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	Basing on the monthly payrolls, the numbers of employees and their income can be checked regularly.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	The payroll contains the information about employees' name, gender and salary. Two aspects are to be under check: * number of employees * income of the employees
Livelihood of the poor	Economic and technological development	Number	c	yearly	Please see Annex 4, Sustainable Development Assessment Matrix for details	By checking the annual revenue of the Guanbaodu project, the shareholders' profit can be calculated according to the ratio of their share.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	As local villagers raised fund and invested in the project, they becomes the shareholders of the project, and will receive their share of the annual profit. Such revenue is the extra income for the villagers and will improve their livelihood.
Access to energy service	Social sustainability and development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	The monthly power sales receipt received from the local grid company can be checked monthly.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	Such receipt shows the amount of electricity the power plant supplies to the grid and releases the local power shortage to a certain extent.

Human and institutional capacity	Social sustainability and development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	Gender information on the monthly payroll can be checked monthly. Training reports regarding operation and maintenance.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	The payroll containing the information about employees' name, gender and salary will be provided by Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd every month. And training opportunities are provided to employees.

Liangjiangkou:

Sustainable Development Indicator	Data type	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Mitigation measures	Methods and equipments used	Who will be in charge of the monitoring and quality control?	Comments
Water quality and quantity	Local/regional /global environment	Level of management	e	Yearly during the operation period	Please see Annex 4, Sustainable Development Assessment Matrix for details	The waste water during the operation period can be monitored by relevant management.	Local Water Resource Bureau and Tongdao Dong Autonomous County Liangjiangkou Hydropower Station	After taking the mitigation measures described in EIA, the impact of waste water on local water body will not be significant, which has also been confirmed by the outcome of *Report for the Examination and Acceptance of Completed Project*. There is no obvious variation in the water quantity as this project is a run of river hydropower plant with no capacity of conditioning According to EIA, the amount of daily sanitary wastewater will be about 1.6 tons which will be treated in the septic tank by digestion process and reused as fertilizers.
Solid wastes	Local/regional /global environment	Level of management	m	Once when construction completed; Yearly during the operation period	Please see Annex 4, Sustainable Development Assessment Matrix for details	The influence of solid wastes during the construction period can be monitored by local stakeholder's comments. The domestic rubbish treatment during the operation period can be monitored by relevant management.	Jingzhou Miao & Dong Autonomous County Guanbaodu Hydropower Co., Ltd	During the operation period, domestic rubbish will be transported to the designated wastes deposit plant and then to landfill plant for central disposal. Therefore, the management of the solid wastes severs as the additional check for this indicator.
Biodiversity (species	Local/regional /global	Degree of Biodiversity	e	yearly	Please see Annex 4, Sustainable	This indicator can be monitored by	Tongdao Dong Autonomous County	According to EIA, there will be no

and habitat conservation)	environment				Development Assessment Matrix for details	stakeholder's questionnaires.	Liangjiangkou Hydropower Station	considerable effects on fish and organism species and habitats due to the project activity. And, the outcome of *Report for the Examination and Acceptance of Completed Project* has also concluded that the measures of ecological conservation have been well implemented.
Employment	Social sustainability and development Economic and technological development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	Basing on the monthly payrolls, the numbers of employees and their income can be checked regularly.	Tongdao Dong Autonomous County Liangjiangkou Hydropower Station	The payroll contains the information about employees' name, gender and salary. Two aspects are to be under check: * number of employees * income of employees
Livelihood of the poor	Social sustainability and development Economic and technological development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	Basing on the monthly payrolls, the numbers of employees and their income can be checked regularly.	Tongdao Dong Autonomous County Liangjiangkou Hydropower Station	The payroll contains the information about employees' name, gender and salary. Improvement of quality of the life is to be under check
Access to energy service	Social sustainability and development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	The monthly power sales receipt received from the local grid company can be checked monthly.	Tongdao Dong Autonomous County Liangjiangkou Hydropower Station	Such receipt shows the amount of electricity the power plant supplies to the grid and releases the local power shortage to a certain extent.

Human and institutional capacity	Social sustainability and development	Number	m	monthly	Please see Annex 4, Sustainable Development Assessment Matrix for details	Gender information on the monthly payroll can be checked monthly. Training reports regarding operation and maintenance.	Tongdao Dong Autonomous County Liangjiangkou Hydropower Station	The payroll containing the information about employees' name, gender and salary will be provided by Tongdao Dong Autonomous County Liangjiangkou Hydropower Station every month. And training opportunities are provided to employees.

D.2.1.3. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equivalent)

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As described in Section E no relevant project emissions are expected.

D.2.1.4. Relevant data necessary for determining the baseline of anthropogenic emission by sources of GHGs within the project boundary and how such data will be collected and archived:

>>

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	Electricity export (EG_{export})	Meter reading	MWh	M	Continuously measurement and monthly recording	100%	Paper/Electronic	Electricity monitored by metering data should be crossed checked by electricity sales receipt. Data will be kept for at least 2 years following the end of the last crediting period.
2	Electricity import (EG_{import})	Meter reading	MWh	M	Continuously measurement and monthly recording	100%	Paper/Electronic	Electricity monitored by electricity sales receipt and double checked by metering data. Data will be kept for at least 2 years following the end of the last crediting period.

D.2.1.5. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equivalent)

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According to ACM0002 (Version 16.0), the methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculateds as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad (1)$$

Where:

BE_y = Baseline emissions in year y (tCO_2/y).

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh).

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system (tCO_2/ MWh)

According to the "Tool to calculate the emission factor for an electricity system" (Version 05.0), the following 6 steps are employed to determine the OM, BM, and CM used for calculating project baseline emissions:

Step 1: Identify the relevant electricitysystem

In accordance with delineations of connected electricity systems by China NRDC[4] (China's DNA), Central China Power Grid (CCPG) is the connected electricity system for the project as it is connected by transmission lines to the project electricity system. CCPG covers the power grids of Henan Province, Hubei Province, Hunan Province, Sichuan Province, Jiangxi Province and Chongqing City according to the delineations published by China's DNA.

Step 2: Choose whether to include off-grid power plants in the project electricity system

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is adopted for calculation for the bundle project.

Step 3: Select a method to determine the operating margin (OM)

The calculation of operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or

(b) Simple adjusted OM; or

(c) Dispatch data analysis OM; or

(d) Average OM.

The bundle project applies method (a) simple OM since low-cost/must-run resources constitute less than 50% of total grid electricity generation of CCPG in the most recent 5 years (2008-2012). According to *China Electric Power Yearbook* (2009-2013 Edition), the amount of low-cost/must-run resources accounts for about 39.27%, 40.85%, 37.63%, 33.84% and 40.75% in year 2008 to 2012 respectively, all less than 50%.

[4] http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161

The Simple OM emission factor can be calculated using either of the two following data vintages:

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of VER-PDD to the DOE for validation, without requirement to monitor and recalculate the emission factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring.

This PDD uses Ex ante Option for $EF_{grid,OM,y}$ calculation to be in accordance with the baseline emissions factor for regional power grids published by China DNA.

Table D-1 Power Generation of CCPG in 2008

Province	Thermal	Hydro	Nuclear	Wind	Others	Total	low-cost/must-run resources
	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	
Jiangxi	40,500	8,900	0	0	0	49,400	
Henan	189,000	8,100	0	20	0	197,120	
Hubei	55,300	119,900	0	20	0	175,220	
Hunan	53,700	31,200	0	0	0	84,900	
Chongqing	28,600	11,600	0	0	0	40,200	
Sichuan	40,100	83,600	0	0	0	123,700	
Total	**407,200**	**263,300**	**0**	**40**	**0**	**670,540**	
Percentage	60.73%	39.27%	0.00%	0.01%	0.00%	100%	**39.27%**
China Electric Power Yearbook 2009							

Table D-2 Power Generation of CCPG in 2009

Province	Thermal	Hydro	Nuclear	Wind	Others	Total	low-cost/must-run resources
	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	
Jiangxi	44,500	7,800	0	110	0	52,410	
Henan	198,500	8,200	0	100	0	206,800	
Hubei	6,300	116,700	0	20	0	123,020	
Hunan	63,400	31,900	0	2	0	95,302	
Chongqing	30,600	12,500	0	10	0	43,110	
Sichuan	50,400	94,500	0	0	0	144,900	

Total	**393,700**	**271,600**	**0**	**242**	**0**	**665,542**	
Percentage	59.15%	40.81%	0.00%	0.04%	0.00%	100%	**40.85%**
China Electric Power Yearbook 2010							

Table D-3 Power Generation of CCPG in 2010

Province	Thermal	Hydro	Nuclear	Wind	Others	Total	low-cost/must-run resources
	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	
Jiangxi	53,700	10,100	0	140	0	63,940	
Henan	219,800	8,500	0	110	0	228,410	
Hubei	77,100	124,600	0	70	1	201,771	
Hunan	72,500	37,500	0	40	0	110,040	
Chongqing	33,100	14,300	0	50	0	47,450	
Sichuan	56,500	113,900	0	0	0	170,400	
Total	**512,700**	**308,900**	**0**	**410**	**1**	**822,011**	
Percentage	62.37%	37.58%	0.00%	0.05%	0.00%	100%	**37.63%**
China Electric Power Yearbook 2011							

Table D-4 Power Generation of CCPG in 2011

Province	Thermal	Hydro	Nuclear	Wind	Others	Total	low-cost/must-run resources
	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	
Jiangxi	66,500	7,500	0	220	4	74,224	
Henan	249,800	9,800	0	170	0	259,770	
Hubei	93,300	116,700	0	150	3	210,153	
Hunan	89,900	30,400	0	50	0	120,350	
Chongqing	38,700	14,600	0	100	0	53,400	

Sichuan	59,600	126,100	0	20	0	185,720	
Total	**597,800**	**305,100**	**0**	**710**	**7**	**903,617**	
Percentage	66.16%	33.76%	0.00%	0.08%	0.00%	100.00%	**33.84%**
China Electric Power Yearbook 2012							

Table D-5 Power Generation of CCPG in 2012

Province	Thermal	Hydro	Nuclear	Wind	Wind	Others	Total	low-cost/must-run resources
	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)	
Jiangxi	61,000	14,600	0	320	10	0	75,930	
Henan	246,500	12,800	0	330	0	0	259,630	
Hubei	86,300	138,000	0	200	10	0	224,510	
Hunan	76,500	44,600	0	270	0	0	121,370	
Chongqing	33,600	21,000	0	80	0	0	54,680	
Sichuan	58,400	154,500	0	40	0	0	212,940	
Total	**562,300**	**385,500**	**0**	**1,240**	**20**	**0**	**949,060**	
Percentage	59.25%	40.62%	0.00%	0.13%	0.00%	0.00%	100.00%	**40.75%**
China Electric Power Yearbook 2013								

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emission per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The following choices can be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

In accordance with the guideline of China's DNA, Option B is used for calculating project OM since the necessary data for Option A is not available as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad (2)$$

Where:

$EF_{grid,OMsimpe,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2e/MWh)

$FC_{i,y}$ = Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)

$EF_{co2,I,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2e/GJ)

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)

i = All fossil fuel types combusted in power sources in the project electricity system in year *y*

y = The three most recent years for which data is available at the time of submission of the VER-PDD to the DOE for validation (ex ante option).

According to the above formulae (2) and statistical information from the last three most recent years (2010-2012) where the data are the latest and available at the time of this PDD submission, the $EF_{grid,OMsimple,y}$ is calculated to be 0.9724 tCO_2e/MWh. Please refer to Annex 3 for detailed calculation.

Step 5: Calculate the build margin emission factor (BM)

In terms of vintage of data, project participants can choose between one of the following two steps:

Option 1. For the first crediting period, calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of VER-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex-ante*, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The PDD choose *Option 1*, which requires the project participant to update the Build Margin Emission Factor ex-ante based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 per cent of AEGtotal (if 20per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET$\geqslant$20 per cent) and determine their annual electricity generation (AEGSET-$\geqslant$20 per cent, in MWh);

(c) From SET5-units and SET$\geqslant$20 per cent select the set of power units that comprises the larger annual electricity generation (SETsample);

Otherwise:

(d) Exclude from SETsample the power units which started to supply electricity to the grid more than10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set (SETsample-CDM) the annual electricity generation (AEGSET-sample-CDM, in MWh);

If the annual electricity generation of that set is comprises at least 20 per cent of the annual electricity generation of the project electricity system (i.e. AEGSET-sample-CDM $\geqslant$ 0.2 $\times$ AEGtotal), then use the sample group SETsample-CDM to calculate the build margin. Ignore steps (e) and (f).

(e) Include in the sample group SETsample-CDM the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set (SETsample-CDM->10yrs).

The build margin emissions factor is the generation-weighted average emission factor (tCO_2e/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (3)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (CO_2e/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2e/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

However, in China it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that were built most recently. Due to the fact that the no plant specific generation and fuel consumption is currently available in China, BM calculation adopts the following deviation[5] in methodology application:

First, calculate the newly added installed capacity and the various components of power generation technologies, then calculation of the weight of newly added installed capacity of each power generation technology. Finally the commercial and efficient level of each power generation technology is adopted to calculate BM emission factor.

Since the generating capacity of coal-fired, oil-fired and gas-fired technologies can not be separated from the existing statistical data, the BM calculation in this PDD adopts the following method:

Firstly, based on the available data in the energy balance tables of the latest year, determine the ratio of CO_2 emissions from coal, oil and gas fuels consumption for power generation to total CO_2 emissions;

Secondly, take the ratio as the weight, based on the emission factors in terms of optimal efficiency and commercial technologies, calculate the emission factor of the thermal power in each grid;

Thirdly, this thermal emission factor is multiplied by the portion of thermal power added capacity in the newly additional 20% capacity. The result is the BM emission factor of grid.

Concrete steps and the formula for BM calculation are as follows:

Sub-Step 1: Calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total CO_2 emissions.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (4)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (5)$$

[5] http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (6)$$

Where:

$F_{i,j,y}$ = The amount of fuel *i* (in a mass or volume unit) consumed by power plants in province *j* in year *y*

$NCV_{i,y}$ = The net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)

$EF_{co2,i,j,y}$ = CO_2 emission factor of fossil fuel type *i* in province *j* in year *y*

Coal, Oil and Gas is the feet for solid fuels, liquid fuels and gaseous fuels.

Sub-Step 2: Calculate the emission factor of thermal power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (7)$$

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ are the emission factors of the optimal efficient and commercial coal-fired, oil-fired and gas-fired generation technologies, respectively.

Sub-Step 3: Calculation of BM in the grid

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (8)$$

Where:

$CAP_{thermal,y}$ = The capacity addition of thermal power generation sources (MW) in year *y*

$CAP_{total,y}$ = The total capacity addition of all types of power generation sources (MW) in year *y* which is close to but less than 20% of the existing installed capacity

$EF_{Thermal,y}$ = The emission factor of thermal power plants in year *y*

According to the latest and available data at the time of this submission of the request for renewal of the crediting period to the DOE, $EF_{grid,BM,y}$ is calculated to be 0.4737 tCO_2e/MWh. Please refer to Annex 3 for the details of calculation.

Step 6: Calculate the combined margin emission factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{OM,y} + \omega_{BM} \times EF_{BM,y} \quad (9)$$

Where:

ω_{OM} = Weighting of operating margin emission factor (%)

ω_{BM} = Weighting of build margin emission factor (%)

For hydro power projects, the weight ω_{OM} and ω_{BM}, by default, are 25% and 75% respectively in the second crediting period.

Therefore, the combined baseline emission factor of CCPG is:

$EF_{grid,CM,y}$ = 0.9724 × 25% + 0.4737× 75% = 0.5983 tCO_2e/MWh

The calculation of $EG_{PJ,y}$ is different for Greenfield plants, capacity additions, retrofits, rehabilitations, and replacements. According to the methodology, If the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y} \quad (10)$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh).

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

D. 2.2. OPTION 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

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Not applicable.

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

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Not applicable.

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equivalent):

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According to ACM0002, project emissions can be calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (11)$$

Where:

PE_y = Project emissions in year y (tCO_2e/yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

According to ACM0002, for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected, so $PE_{FF,y} = 0$.

The project is not a geothermal power plant, thus $PE_{GP,y} = 0$.

Therefore, $PE_y = PE_{HP,y}$

The proposed hydropower project is a new project and results in a new reservoir, and its power density of is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad (12)$$

Where:

PD = Power density of the project activity (W/m^2)
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

For the bundled two projects, for Guanbaoodu:

Cap_{BL} = 0, A_{BL} = 0, Cap_{PJ} = 4MW, and A_{PJ} = 327,000 m^2, therefore PD=12.23 W/m^2, which is greater than 10W/m^2; and for Liangjiangkou,

Cap_{BL} = 0, A_{BL} = 0, Cap_{PJ} = 1.89MW, and A_{PJ} = 177,500 m^2, therefore PD=10.65 W/m^2, which is greater than 10W/m^2.

Therefore, according to ACM0002, $PE_{HP,y}$ = 0, so PE_y = $PE_{HP,y}$ = 0.

D.2.3. Treatment of leakage in the monitoring plan

>>

According to ACM0002, no leakage emissions are considered.

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

>>

According to ACM0002, no leakage emissions are considered.

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equivalent)

>>

According to ACM0002, no leakage emissions are considered.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equivalent)

>>

According to methodology ACM0002, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (13)$$

Where:

$ER_{,y}$ = Emission reductions in year *y* (tCO_2e/yr)

$BE_{,y}$ = Baseline emissions in year *y* (tCO_2e/yr)

$PE_{,y}$ = Project emissions in year *y* (tCO_2e/yr)

:

(10)

D.3.	Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

>>

Guanbaodu:

The data requires monitoring for the project is the amount of electricity exported to the grid by the project and the amount of electricity imported from the grid by the project (refer to Section D.2.1.4). A connection diagram with installed meters is shown in Figure D-1 as below:

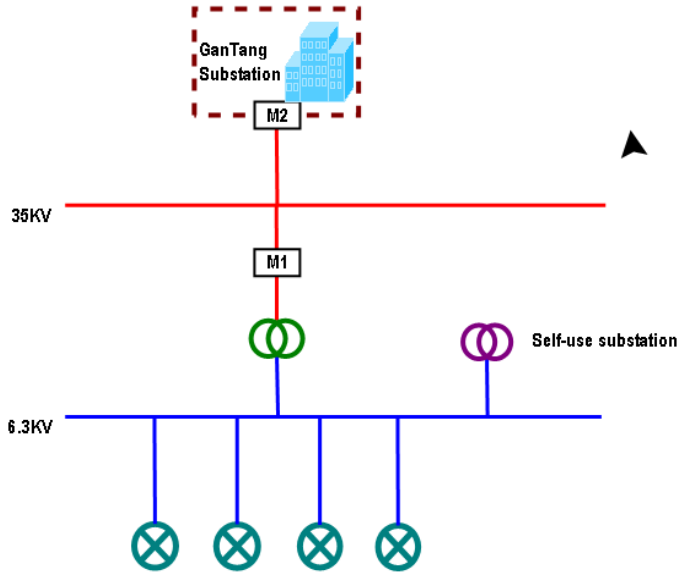

Figure D-1 Electricity Connection Diagram

The electricity generated by four generators will be combined and connected to the grid through an on-site booster station which will increase the voltage of the generated electricity to 35KV, then transferred to Gantang Transformer Station, finally to the Jingzhou Power Grid. The grid company will use a bidirectional gateway meter (M2) which is installed at the Gantang Transformer Station to measure and record the amount of electricity exported to the grid and the amount of electricity imported from the grid. This meter (M2) will be calibrated periodically according to relevant national and industrial standards by a qualified entity regularly. The accuracy of this meter will be no less than 0.5 during the whole crediting period. The project owner also installed a bidirectional meter (back-up meter, M1) at the power station to monitor the amount of electricity exported to and imported from the grid, which can also be used for cross check for the data derived from the gateway meter (M2). The accuracy of this meter (M1) will be no less than 0.5 during the whole crediting period.

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

3-1	Low	$EG_{export,y}$: The data of exported electricity can be accurately measured by the gateway meter (M2) installed at Gantang Transformer Station continuously and recorded on a monthly basis. This data will also be measured by the back-up meter (M1) installed at the power station for cross check with the data derived from the gateway meter. All data will be archived for at least 2 years after the end of the last crediting period. The sum of monthly exported electricity and the relevant electricity receipts are served as additional check for quality control. The record of sales electricity to the grid and other relevant records are used to ensure consistency. Meter M1 and M2 will be calibrated periodically based on the relevant national and industrial standards by a qualified entity. In case malfunction occurs with the gateway meter (M2), the emission reduction will be conservatively calculated by the readings of back-up meter (M1), and the faulty meter will be repaired or replaced by the accredited equipment testing organization as soon as possible.
3-2	Low	$EG_{import,y}$: The data of imported electricity can be accurately measured by the gateway meter (M2) installed at Gantang Transformer Station continuously and recorded on a monthly basis. This data will also be measured by the back-up meter (M1) installed at the power station, and can be cross checked by power sales receipts. All data will be archived for at least 2 years after the end of the last crediting period. The sum of monthly imported electricity and the relevant electricity invoices are served as additional check for quality control. The record of purchase electricity from the grid and other relevant records are used to ensure consistency. Meter M1 and M2 will be calibrated periodically based on the relevant national and industrial standards by a qualified entity. In case malfunction occurs with the gateway meter (M2), the emission reduction will be conservatively calculated by the readings of back-up meter (M1), and the faulty meter will be repaired or replaced by the accredited equipment testing organization as soon as possible.

Liangjiangkou:

The data requires monitoring for the project is the amount of electricity exported to the grid by the project and the amount of electricity imported from the grid by the project (refer to Section D.2.1.4). A connection diagram with installed meters is shown in Figure D-2 as below:

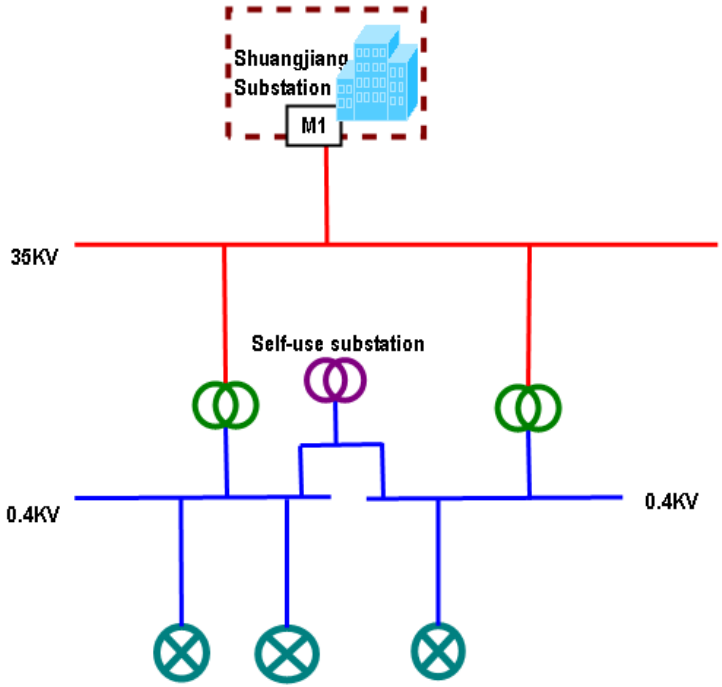

Figure D-2 Electricity Connection Diagram

The electricity generated by three generators will be combined and connected to the grid through an on-site booster station which will increase the voltage of the generated electricity to 35KV, then transferred to Shuangjiang Transformer Station, finally to the Tongdao Power Grid. The grid company will use the bidirectional gateway meter (M1) which is installed at the Shuangjiang Transformer Station to measure and record the amount of electricity exported to the grid and the amount of electricity imported from the grid. This meter (M1) will be calibrated periodically according to relevant national and industrial standards by a qualified entity regularly. The accuracy of this meter (M1) will be no less than 0.5 during the whole crediting period.

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
3-1	Low	$\underline{EG_{export,y}}$: The data of exported electricity can be accurately measured by the gateway meter (M1) installed at Shuangjiang Transformer Station continuously and recorded on a monthly basis. This data can be cross checked by the sum of monthly exported electricity and the relevant electricity receipts. All data will be archived for at least 2 years after the end of the last crediting period. The record of sales electricity to the grid and other relevant records are used to ensure consistency. The gateway meter (M1) will be calibrated periodically based on the relevant national and industrial standards by a qualified entity. In case malfunction occurs with the gateway meter (M1), the project owner and power grid company should make a reasonable and conservative agreement to estimate the correct reading together, and the meters should be repaired by an eligible third party who will also be responsible to prepare the corrective action record.
3-2	Low	$\underline{EG_{import,y}}$: The data of imported electricity can be accurately measured by the gateway meter (M1) installed at Shuangjiang Transformer Station continuously and recorded on a monthly basis. All data will be archived for at least 2 years after the end of the last crediting period. The sum of monthly imported electricity and the relevant electricity invoices are served as additional check for quality control. The record of purchase electricity from the grid and other relevant records are used to ensure consistency. The gateway meter (M1) will be calibrated periodically based on the relevant national and industrial standards by a qualified entity. In case malfunction occurs with the gateway meter, the project owner and power grid company should make a reasonable and conservative agreement to estimate the correct reading together, and the meters should be repaired by an eligible third party who will also be responsible to prepare the corrective action record.

D.4. Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

>>

The monitoring of the emissions reductions of all the two components are basically the same as each other. The monitoring process will be carried out according to the operation and management structure shown in Figure D-4:

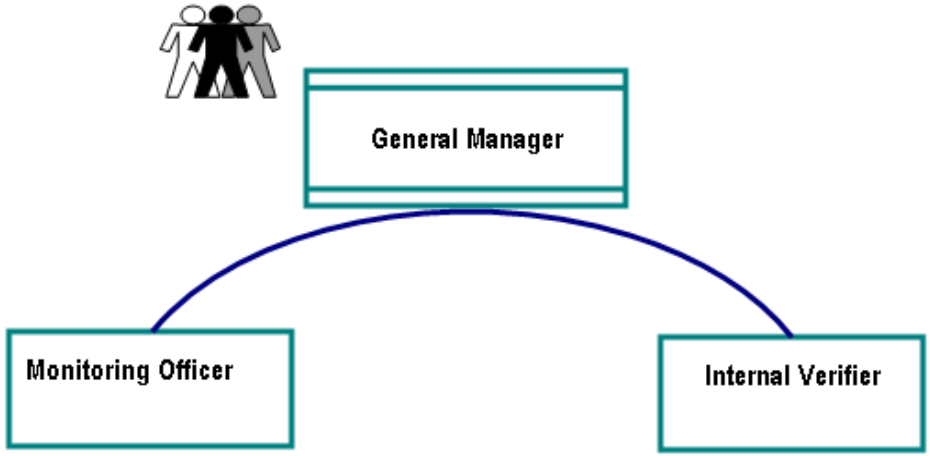

Figure D-4 Operations and Management Structure

The overall responsibility for the monitoring process will be conducted by the General Manager. The measurement of the electricity exports and imports will be carried out by a monitoring officer. In addition, the project developer will designate an internal verifier who will be responsible for internal verification of the measurement, collection of electricity receipts and invoices and the calculation of the emission reductions. A monitoring and management manual identifying detailed duties and responsibilities of the relevant parties has been developed by Climate Bridge Ltd., and will be served as a basis of the project monitoring.

D.5. Name of person/entity determining the monitoring methodology:

>>

The monitoring methodology of the proposed project was completed on 11/01/2016.

Name of person/entity determining baseline study and monitoring methodology:

Ms. HUANG Shanfeng, Climate Bridge Ltd.

Email: huang.shanfeng@climatebridge.com

Tel: ＋86 21 6246 2036； Fax: ＋86 21 2301 9950

Climate Bridge Ltd. is one of the project participants.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>>

Project Emissions:

Since both of the two hydropower projects involved in the bundle project activity are newly built hydro power stations with a power density larger than 10W/m^2, the project CO_2 emissions are zero, i.e. PE_y=0 tCO_2e.

E.2. Estimated leakage:

>>

Leakage:

According to ACM0002 (Version 16.0), no leakage emissions are considered.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

>>

The sum of project emissions and leakage is zero.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

>>

According to Section D.4, the emission factor of the project is $EF_{grid,CM,y}$=0.5983tCO_2/MWh. The annual amount of electricity to be delivered to the grid from Guanbaodu and Liangjiangkou are 15,513MWh and 6,099MWh, respectively. The whole net electricity delivered to the grid by the bundle project is then $EG_{facility,y}$=21,612 MWh. The baseline emissions (BE_y) for the three components and the bundle project are calculated as following:

Guanbaodu: $BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 15{,}513 \times 0.5983 = 9{,}281\ tCO_2e$

Liangjiangkou: $BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 6{,}099 \times 0.5983 = 3{,}649\ tCO_2e$

Bundle: $BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 21{,}612 \times 0.5983 = 12{,}930\ tCO_2e$

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

>>

$ER_y = BE_y - PE_y$

Guanbaodu: $ER_y = 9{,}281\ tCO_2e - 0 = 9{,}281\ tCO_2e$

Liangjiangkou: $ER_y = 3{,}649\ tCO_2e - 0 = 3{,}649\ tCO_2e$

Bundle: $ER_y = 12{,}930\ tCO_2e - 0 = 12{,}930\ tCO_2e$

E.6. Table providing values obtained when applying formulae above:

>>

The renewable crediting period of 7 years × 3 has been chosen. The ex-ante estimated amount of annual emission reductions over the first crediting period are 12,930 tCO_2e. In the second crediting period from 1 January 2016 to 31 December 2022, the total emission reductions are estimated to be 90,510 tCO_2e.

Table E-1 Ex-ante estimated amount of emission reductions over the first crediting period

Year	Estimation of project activity emissions (tonnes CO_2 e)	Estimation of baseline emissions (tonnes CO_2 e)	Estimation of leakage (tonnes CO_2 e)	Estimation of emission reductions (tonnes CO_2 e)
2016	0	12,930	0	12,930
2017	0	12,930	0	12,930
2018	0	12,930	0	12,930
2019	0	12,930	0	12,930
2020	0	12,930	0	12,930
2021	0	12,930	0	12,930
2022	0	12,930	0	12,930
Total	0	90,510	0	90,510

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Guanbaodu:

The project owner retained a third party, Huaihua Environmental Protection Science Research Institute, to conduct the Environmental Impact Assessment (EIA) on Guanbaodu Hydropower Project. The EIA report was completed on 19th October 2005 and was approved by Environmental Protection Bureau of Jingzhou Miao & Dong Autonomous County on 20th November 2005.

The environmental impacts of the Guanbaodu project are summarized as follows in the period of construction and operation.

1. Construction Phase

1.1Waste water

Wastewater in the construction period mainly consists of industrial wastewater and domestic wastewater. The main contents of pollutants are SS, COD and Oil. Industrial wastewater from concrete mixing and machine washing should be processed in the sedimentation tank before discharged. Domestic wastewater can be used for mountain greening and agriculture irrigation. The treated sanitary sewage will be used for road sprinkle. After taking these measures, the impact of waste water will not be significant.

1.2 Noise pollution

Noise mainly comes from the construction machines, concrete casting and transportation vehicles. Low noise equipments will be adopted. Transportations and machine operations will be avoided in the evening. Also earplugs will be provided for construction workers and isolation boots will be set up for operators. The noise pollution is intermittent and will not have considerable effects on environment. Emission of noise should satisfy “the Standard of Noise Limits on Construction Site” (GB12523-90).

1.3 Waste gas

Main air contamination comes from rock exploration and transportation vehicles. Proper measures will be employed: 1. construction sites should be equipped with road sprinklers. 2. Construction workers should wear dust masks. The negative impacts on the atmosphere last for a short period and will stop at the end of construction period. Therefore the pollution to the atmosphere is not serious.

1.4 Solid wastes

Solid waste includes construction waste as well as domestic rubbish from on-site workers. Construction waste will be reused as construction materials in the spoil ground. Domestic rubbish will be regularly transported to Guanbaodu Landfill for central disposal.

1.5 Impact on water and soil loss

Water and solid loss will come along with the construction of the project because of excavation and solid waste dumping. Proper measures will be conducted to mitigate the water and solid loss. Rehabilitation of vegetation in the affected places will be conducted right after the completion of the construction work. As a result, it is anticipated that the water and soil condition in the surrounding area will not be damaged.

1.6 Land requisition

All compensation will be provided to villagers who will be suffering from farmland loss.

1.7 Displacements of people

No displacement of people was involved in the project.

As mentioned above, the negative impact of the proposed project during the construction period lasts for a relatively short period, and appropriate mitigation measures are to be taken to minimize the adverse environmental impacts.

2. Operation Phase

The proposed project is a renewable energy project. Electricity will be applied to the production and daily life. The operation of the proposed project won't have negative impacts on the ecosystem and hydrophilic biology community. Therefore, the environmental impact during the operation period is minor.

In conclusion, the Guanbaodu project can reduce greenhouse gas emissions and the environmental pollution caused by coal consumption. It won't have significant negative impact on the environment.

Liangjiangkou:

The project owner conducted the Environmental Impact Assessment (EIA) on Liangjiangkou Hydropower Project by themselves. The EIA report was completed on 5th July 2006 and was approved by Environmental Protection Bureau of Tongdao Dong Autonomous County on 12th July 2006.

The environmental impacts possibly caused by the Liangjiangkou project and the measures taken by the project owner are summarized as follows.

1. Construction Phase

1.1Waste water

Wastewater is generated by construction and living activities during the construction period. Wastewater resulting from construction mainly contains the washing water of equipments and materials. It will be discharged and after treated in with sedimentation tank. Wastewater resulting from living activities mainly contains BOD, NH_4-N, SS and COD. It can be used for mountain greening and agriculture irrigation. The wastewater won't be discharged before treatment. After taking these measures, the impact of waste water will not be significant.

1.2 Noise pollution

Noise is mainly resulting from construction machines, concrete casting and transportation vehicles. Appropriate measures should be taken to mitigate the noise impact and protect the onsite workers. 1. Adopt vibration-reducing equipments to reduce noise; 2. Avoid exploration and transportation at night; 3. Provide proof measures to protect the construction workers.

1.3 Waste gas

Exhausted gases emitted by vehicles and dust from construction machines will bring temporary impacts on the local air environment during the construction period. Relevant measures will be employed to reduce the impact: 1. Exploration work should be conducted at the site where the impact is small; 2. Road sprinkles will water the project site several times during the construction period; 3. Construction workers should wear dust masks. The negative impacts will disappear once the construction work is finished.

1.4 Solid wastes

Solid waste includes construction waste as well as domestic rubbish from on-site workers. Construction waste will be reused as construction materials in the spoil ground. Domestic rubbish will be regularly transported to the nearby Landfill for central disposal.

1.5 Impact on water and soil loss

Water and solid loss will come along with the construction of the project because of excavation and solid waste dumping. Proper measures will be conducted to mitigate the water and solid loss. Rehabilitation of vegetation in the affected places will be conducted right after the completion of the construction work. As a result, it is anticipated that the water and soil condition in the surrounding area will not be damaged.

1.6 Land requisition

All compensation will be provided to villagers who will be suffering from farmland loss.

1.7 Displacements of people

No displacement of people was involved in the project.

As mentioned above, the negative impact of the proposed project during the construction period lasts for a relatively short period, and appropriate mitigation measures are to be taken to minimize the adverse environmental impacts.

2. Operation Phase

The proposed project is a renewable energy project. Electricity will be applied to the production and daily life. The operation of the proposed project won't have negative impacts on the ecosystem and hydrophilic biology community. Therefore, the environmental impact during the operation period is minor.

In conclusion, as a small clean renewable energy project, the Liangjiangkou project can reduce greenhouse gas emissions and the environmental pollution caused by coal consumption. It won't have significant negative impact on the environment.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Not applicable

SECTION G. Stakeholders' comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The project has conducted the local stakeholder consultation (LSC) by holding the consultation meeting in 2008 before requesting GS registration, and all the comments received have been seriously taken into account. During the following verification, all the necessary data and information required by ER and SD monitoring plan have been fully monitored and record by project owner, and verified by DOE during each site-visit.

According to the registered monitoring plan, some of the SD indicators were monitored by stakeholders' questionnaires. Based on the previous verification for the first crediting period, the monitoring result of SD indicators are all positive and the situation is very likely to be continued, and no additional comments were raised by stakeholders, so there is no need to conduct a complementary stakeholder consultation for the renewal of the crediting period.

G.2. Summary of the comments received:

>>

N/A.

G.3. Report on how due account was taken of any comments received:

>>

N/A.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

BASELINE INFORMATION

The baseline information for calculation of *OM*, *BM* and *CM* emission factors of Central China Power Grid is shown in the Report on 2014 Baseline Emission Factors for Regional Power Grids by China DNA at http://cdm.ccchina.gov.cn released on 11th May, 2015. The concrete processes are shown in the following tables.

Calculation of the Operating Margin emission factor ($EF_{OM,y}$)

The low calorific value, CO_2 emission factor and oxidation factor of fuels are listed in Table1 below.

Table 1 Low calorific values, CO_2 emission factor and oxidation factor of fuels

Fuel type	Default Carbon Content	OXID	IPCC CO2 Emission Factor (the Lower Limits of the 95% Confidence Intervals)	Low Calorific Value
	（tc/TJ）	（%）		（MJ/t,km3）
	H	I	($kgCO_2/TJ$)	
Raw Coal	25.8	100	87,300	20908
Cleaned Coal	25.8	100	87,300	26344
Other Washed Coal	25.8	100	87,300	8363
Briquette	26.6	100	87,300	20908
Coke	29.2	100	95,700	28435
Coke Oven Gas	12.1	100	37,300	16726
Other Gas	12.1	100	37,300	5227
Crude Oil	20	100	71,100	41816
Gasoline	18.9	100	67,500	43070
Diesel Oil	20.2	100	72,600	42652
Fuel Oil	21.1	100	75,500	41816
LPG	17.2	100	61,600	50179
Refinery Gas	15.7	100	48,200	46055
Natural Gas	15.3	100	54,300	38931
Other Petroleum Products	20	100	75,500	41816
Other Coke Oven Products	25.8	100	95,700	28435
Other Energies	0	0	0	0

Data Source： The emission factors and oxidation factors are form *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.3,1.4, page 1.21-1.24, chapter 1Volume 2 Energy*. The net calorific values are quoted from *China Energy Statistical Yearbook 2013*

1. Calculation of Simple *OM* Emission Factor of CCPG for Year 2010

Table 2 CO_2 Emission Data of Data of CCPG in Year 2010

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	CO_2 Emission Factor	Low Calorific Value	CO_2 Emission (tCO_2e)
									($kgCO_2/TJ$)	($MJ/t,km^3$)	L=F×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+B+C +D+E+F	J	K	L= F×I×J /10000 (volume unit)
Raw Coal	10^4t	2648.31	9,926	3474.75	3318.57	1542.19	2667.82	23577.37	87,300	20,908	430,350,284
Cleaned Coal	10^4t		331					331.4	87,300	26,344	7,621,641
Other Washed Coal	10^4t		205.66			145.37	116.96	467.99	87,300	8,363	3,416,748
Briquette	10^4t				1.82			1.82	87,300	20,908	33,220
Coke	10^4t							0	95,700	28,435	0
Coal Gangue	10^4t	48.8	256.37	78.86	36.85	237.58		658.46	87,300	8,363	4,807,350
Coke Oven Gas	10^8m^3	0.3	3.76	0.07	0.19	1.12		5.44	37,300	16,726	339,391
Blast Furnace Gas	10^8m^3	45.81	61.58	131.21	46.32	7.19		292.11	219,000	3,763	24,072,697
Converter Gas	10^8m^3	1.49			4.42	0.18		6.09	145,000	7,945	701,583
Other Gas	10^8m^3		0.02		0.13			0.15	37,300	5,227	2,925
Crude Oil	10^4t		0.08					0.08	71,100	41,816	2,378
Gasoline	10^4t					0.01		0.01	67,500	43,070	291
Diesel Oil	10^4t	0.65	31.41	1.2	0.91	1.12		35.29	72,600	42,652	1,092,767
Fuel Oil	10^4t	0.06	1.14	0.27	1.86	0.05	1.51	4.89	75,500	41,816	154,383
Petrol Coke	10^4t		5.82					5.82	82,900	31,947	154,137
Refinery Gas	10^4t	0.15	1.45	1.05	1.11			3.76	48,200	46,055	83,466
Natural Gas	10^8m^3		13.76	0.15		0.05	11.97	25.93	54,300	38,931	5,481,481
Other Petroleum Products	10^4t				2.75			2.75	72,200	41,816	83,026
Other Coke Oven Products	10^4t							0	95,700	28,435	0
Other Energies	10^4tce	41.43	266.07		8.12	2.4		318	0	0	0
Total											478,397,767

Data source: *China Energy Statistical Yearbook 2011*

Table 3 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2010

	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8kWh)	(%)	(MWh)
Jiangxi	537	6	50,478,000
Henan	2,198	6.23	206,106,460
Hubei	771	6.3	72,242,700
Sichuan	725	6.27	67,954,250
Chongqing	331		33,100,000
Hunan	565	7.52	52,251,200
Total			**482,132,610**

Data source: China Electric Power Yearbook 2011

2010		
CCPG imported from NWPG	MWh	12,386,810
NWPG simple OM	tCO_2e/ MWh	0.9853
CCPG imported from NCPG	MWh	2,684,680
NCPG simple OM	tCO_2e/ MWh	1.0333
Total CO2 Emission	tCO_2e	493,376,571
Total Supplied Electricity	MWh	497,204,100
Simple OM Emission Factor	tCO_2e/ MWh	**0.9923**

2. Calculation of Simple OM Emission Factor of the CCPG for Year 2011

Table 4 CO_2 Emission Data of Data of CCPG in Year 2011

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	CO_2 Emission Factor	Low Calorific Value	CO_2 Emission (tCO_2e)
									($kgCO_2$/TJ)	(MJ/t,km^3)	L=F×I×J/10000 0 (mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	J	K	L= F×I×J /10000 (volume unit)
Raw Coal	10^4t	3080.51	12081.67	4076.95	4204.7	1780.22	2783.89	28007.94	87,300	20,908	511,220,078

Cleaned Coal	10^4t		30.51					30.51	87,300	26,344	701,678
Other Washed Coal	10^4t		129.5			154.05	118.68	402.23	87,300	8,363	2,936,641
Briquette	10^4t							0	87,300	20,908	0
Coke	10^4t							0	95,700	28,435	0
Coal Gangue	10^4t	40.79	299.59	54.56	57.15	255.32	79.66	787.07	87,300	8,363	5,746,319
Other Coke Oven Products	10^4t							0	95,700	28,435	0
Subtotal											**520,604,716**
Crude Oil	10^4t		0.04					0.04	71,100	41,816	1,189
Gasoline	10^4t							0	67,500	43,070	0
Diesel Oil	10^4t	0.5	1.67	1.04	0.78	0.69	1.01	5.69	72,600	42,652	176,193
Fuel Oil	10^4t		1.82	0.22	0.91			2.95	75,500	41,816	93,135
Petrol Coke	10^4t		5.58					5.58	82,900	31,947	147,781
Other Petroleum Products	10^4t				5.01			5.01	72,200	41,816	151,258
Subtotal											**569,556**
Natural Gas	10^8m^3	0.38	13.93	1.75		0.02	0.71	16.79	54,300	38,931	3,549,328
Coke Oven Gas	10^8m^3	0.55	6.08	0.02	0.15	1.38	5.11	13.29	37,300	16,726	829,136
Blast Furnace Gas	10^8m^3	11.89	29.6	147.59	53.35	42.53	50.76	335.72	219,000	3,763	27,666,584
Converter Gas	10^8m^3	1.82			2.98	0.33	6.85	11.98	145,000	7,945	1,380,126
Other Gas	10^8m^3		0.06					0.06	37,300	5,227	1,170
LPG	10^4t							0	61,600	50,179	0
Refinery Gas	10^4t		1.15	0.88	0.77			2.8	48,200	46,055	62,156
Subtotal											**33,488,500**
Other Energies	10^4tce		69.79		47.07	16.14	2.08	135.08	0	0	0
								0		Total	**554,662,771**

Data source: China Energy Statistical Yearbook 2012

Table 5 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2011

	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8kWh)	(%)	(MWh)
Jiangxi	665	5.6	62,776,000
Henan	2,498	5.9	235,061,800
Hubei	933	5.8	87,888,600
Sichuan	899	6	84,506,000
Chongqing	387		38,700,000
Hunan	596	7.3	55,249,200
Total			**564,181,600**

Data source: China Electric Power Yearbook 2012

2011		
CCPG imported from NWPG	MWh	15,526,260
NWPG simple OM	tCO_2e/ MWh	0.9404
CCPG imported from NCPG	MWh	4,154,580
NCPG simple OM	tCO_2e/ MWh	1.0798
Total CO2 Emission	tCO_2e	573,749,782
Total Supplied Electricity	MWh	583,862,440
Simple OM Emission Factor	tCO_2e/ MWh	**0.9827**

3. Calculation of Simple OM Emission Factor of the CCPG for Year 2012

Table 6 CO_2 Emission Data of Data of CCPG in Year 2012

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	CO_2 Emission Factor	Low Calorific Value	CO_2 Emission (tCO_2e)
									($kgCO_2/TJ$)	($MJ/t,km^3$)	L=F×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	J	K	L= F×I×J /10000 (volume unit)
Raw Coal	10^4t	2,649.47	11,393.35	3,454.97	3,233.93	1,408.27	2549.04	24689.03	87,300	20,908	450,641,063
Cleaned Coal	10^4t	0	22.71	0	0	0	0	22.71	87,300	26,344	522,292
Other Washed Coal	10^4t	0	126.80	0	0	138.05	93.58	358.43	87,300	8,363	2,616,861

Briquette	10^4t	0	0	0	0	0	0	0	87,300	20,908	0
Coal Gangue	10^4t	66.29	234.49	60.51	85.62	215.65	207	869.79	87,300	8,363	6,350,249
Coke	10^4t	0	0	0.49	0	0	0	0.49	95,700	28,435	13,334
Other Coke Oven Products	10^4t	0	0	0	0	0	0	0	95,700	28,435	0
Subtotal											**460,143,799**
Crude Oil	10^4t	0	0.03	0	0	0	0	0.03	71,100	41,816	892
Gasoline	10^4t	0	0	0	0	0	0	0	67,500	43,070	0
Kerosene		0	0	0	0	0	0	0			
Diesel Oil	10^4t	0.33	1.35	0.85	0.63	0.85	1.59	5.6	72,600	42,652	173,406
Fuel Oil	10^4t	0	0.82	0.25	1.03	0	0	2.1	75,500	41,816	66,299
Petrol Coke	10^4t	0	5.71	0	2.22	0	0	7.93	82,900	31,947	210,019
Other Petroleum Products	10^4t	0	0	0	0	0	0	0	72,200	41,816	0
Subtotal											**450,616**
Natural Gas	10^8m^3	0.11	10.01	1.71	0	0.05	0.21	12.09	54,300	38,931	2,555,770
LNG	10^4t	0.00	0.00	0	0	0	0	0	54,300	51,434	0
Coke Oven Gas	10^8m^3	0.37	4.23	0.03	0.15	1.59	4.57	10.94	37,300	16,726	682,525
Blast Furnace Gas	10^8m^3	17.39	72.19	124.33	65.88	61.12	52.07	392.98	219,000	3,763	32,385,364
Converter Gas	10^8m^3	2.58	1.51	0	3.19	0.71	8.38	16.37	145,000	7,945	1,885,865
Other Gas	10^8m^3	0	0.11	0	0	0.32	0	0.43	37,300	5,227	8,384
LPG	10^4t	0	0.00	0	0	0	0	0	61,600	50,179	0
Refinery Gas	10^4t	0	0.74	0.85	0.34	0	0	1.93	48,200	46,055	42,843
Subtotal											**37,560,750**
Other Energies	10^4tce		135.21	182.66	0.17	26.28	0	344.32	0	0	0
								0		Total	**498,155,164**

Data source: China Energy Statistical Yearbook 2013

Table 7 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2012

	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8kWh)	(%)	(MWh)
Jiangxi	610	5.4	57,706,000
Henan	2,465	6	231,710,000
Hubei	863	5.4	81,639,800
Hunan	765	6	71,910,000
Chongqing	336	8	30,912,000
Sichuan	584	6	54,896,000
Total			**528,773,800**

Data source: China Electric Power Yearbook 2013

2012		
CCPG imported from NWPG	MWh	15,965,910
NWPG simple OM	tCO_2e/ MWh	0.9546
CCPG imported from NCPG	MWh	5,673,710
NCPG simple OM	tCO_2e/ MWh	1.0583
Total CO2 Emission	tCO_2e	519,400,709
Total Supplied Electricity	MWh	550,413,420
Simple OM Emission Factor	tCO_2e/ MWh	**0.9437**

4. Calculation of Simple OM Emission Factor of the CCPG

Table 8 Calculation of Simple *OM* Emission Factor of CCPG

	Total Power Supply (MWh)	CO2 emission (tCO_2)	*OM* Emission Factor (tCO_2/MWh)
2010	497,204,100	493,376,571	0.9923
2011	583,862,440	573,749,782	0.9827
2012	550,413,420	519,400,709	0.9437
The weighted average *OM* Emission Factor (tCO_2/MWh)			0.9724

The Operating Margin (*OM*) emission factor is the weighted average emission factors of year 2010-2012, as follows: EF_{OM} = 0.9724 tCO_2/MWh

Calculation of the Build Margin emission factor ($EF_{BM,y}$)

1. Calculation of percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Table 9 Percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	CO_2 Emission Factor	Low Calorific Value	CO_2 Emission (tCO_2e)
									($kgCO_2/TJ$)	($MJ/t,km^3$)	L=F×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	J	K	L= F×I×J /10000 (volume unit)
Raw Coal	10^4t	2,649.47	11,393.35	3,454.97	3,233.93	1,408.27	2549.04	24689.03	87,300	20,908	450,641,063
Cleaned Coal	10^4t	0	22.71	0	0	0	0	22.71	87,300	26,344	522,292
Other Washed Coal	10^4t	0	126.80	0	0	138.05	93.58	358.43	87,300	8,363	2,616,861
Briquette	10^4t	0	0	0	0	0	0	0	87,300	20,908	0
Coal Gangue	10^4t	66.29	234.49	60.51	85.62	215.65	207	869.79	87,300	8,363	6,350,249
Coke	10^4t	0	0	0.49	0	0	0	0.49	95,700	28,435	13,334
Other Coke Oven Products	10^4t	0	0	0	0	0	0	0	95,700	28,435	0
Subtotal											460,143,799
Crude Oil	10^4t	0	0.03	0	0	0	0	0.03	71,100	41,816	892
Gasoline	10^4t	0	0	0	0	0	0	0	67,500	43,070	0
Kerosene		0	0	0	0	0	0	0			
Diesel Oil	10^4t	0.33	1.35	0.85	0.63	0.85	1.59	5.6	72,600	42,652	173,406
Fuel Oil	10^4t	0	0.82	0.25	1.03	0	0	2.1	75,500	41,816	66,299
Petrol Coke	10^4t	0	5.71	0	2.22	0	0	7.93	82,900	31,947	210,019
Other Petroleum Products	10^4t	0	0	0	0	0	0	0	72,200	41,816	0
Subtotal											450,616
Natural Gas	10^7m^3	1.10	100.10	17.1	0	0.5	2.1	120.9	54,300	38,931	2,555,770

LNG	10^4t	0.00	0.00	0	0	0	0	0	54,300	51,434	0
Coke Oven Gas	10^7m^3	3.70	42.30	0.3	1.5	15.9	45.7	109.4	37,300	16,726	682,525
Blast Furnace Gas	10^7m^3	173.90	721.90	1243.3	658.8	611.2	520.7	3929.8	219,000	3,763	32,385,364
Converter Gas	10^7m^3	25.80	15.10	0	31.9	7.1	83.8	163.7	145,000	7,945	1,885,865
Other Gas	10^7m^3	0	1.10	0	0	3.2	0	4.3	37,300	5,227	8,384
LPG	10^4t	0	0.00	0	0	0	0	0	61,600	50,179	0
Refinery Gas	10^4t	0	0.74	0.85	0.34	0	0	1.93	48,200	46,055	42,843
Subtotal											37,560,750
Other Energies	10^4tce		135.21	182.66	0.17	26.28	0	344.32	0	0	0
								0		Total	498,155,164

Data source: China Energy Statistical Yearbook 2013

According to Table 9 and formula (3), (4), (5) in section B.6.1, the percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions are calculated as:

$$\lambda_{Coal,y} = 92.37\%,\ \lambda_{Oil,y} = 0.09\%,\ \lambda_{Gas,y} = 7.54\%$$

2. Calculating the fuel-fired emission factor ($EF_{Thermal}$)

Table 10 Parameters used for calculating fuel-fired emission factor

	Parameter	Efficiency of Power Supply	Emission Factor of Fuel	Oxidation Factor	Emission Factor	λ
		(%)	($kgCO_2$/TJ)		(tCO_2/MWh)	(%)
		A	B	C	D=3.6/A/10000*B*C	
Coal-fired Power Plant	$EF_{Coal,Adv,y}$	40.03	87,300	1	0.7851	92.37%
Oil-fired Power Plant	$EF_{Oil,Adv,y}$	52.9	75,500	1	0.5138	0.09%
Gas-fired Power Plant	$EF_{Gas,Adv,y}$	52.9	54,300	1	0.3695	7.54%
$EF_{Thermal,y}$					0.75353	

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.75353\ tCO_2e/MWh$$

3: Calculating the Build Margin (*BM*) emission factor ($EF_{BM,y}$)

Table 11 Installed Capacity data of CCPG in Year 2012

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	15,050	53,550	21,740	19,060	7,240	14,930	131,570
Hydro power	MW	4,200	3,950	35,950	13,720	6,110	39,640	103,570
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	216	150	182	189	50	20	807
Total	MW	19,466	57,650	57,872	32,969	13,400	54,590	235,947

Data source: *China Energy Statistical Yearbook 2013*

Table 12 Installed Capacity data of CCPG in Year 2011

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	13,820	49,190	19,180	17,650	6,940	14,440	121,220
Hydro power	MW	4110	3,950	33,860	13,370	5980	33,420	94,690
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	137	110	103	106	50	20	526
Total	MW	18,067	53,250	53,143	31,126	12,970	47,880	216,436

Data source: *China Energy Statistical Yearbook 2012*

Table 13 Installed Capacity data of CCPG in Year 2010

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	12,940	46,870	18,150	16,090	6,740	12,580	113,370
Hydro power	MW	4040	3,650	30,850	12,990	4880	30,700	87,110
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	82	50	63	38	50	0	283
Total	MW	17,062	50,570	49,063	29,118	11,670	43,280	200,763

Data source: *China Energy Statistical Yearbook 2011*

Table 14 Installed Capacity data of CCPG in Year 2009

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	11,500	43,100	15,670	15,900	6,800	12,270	105,240
Hydro power	MW	3770	3,650	30,010	11,460	4530	25,810	79,230
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	60	50	10	2	10	0	132
Total	MW	15,330	46,800	45,690	27,362	11,340	38,080	184,602

Data source: *China Energy Statistical Yearbook 2010*

Table 15 Retired thermal/hydro power of CCPG

		Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Retired thermal power	2007-2010	MW	1,200	8,550	1,120	1,270	250	1,670	14,060
	2008-2010	MW	1,080	5,710	690	770	100	950	9,300
	2009-2010	MW	689	1,856.5	441	546.5	76	373.5	3,982.5
	2011	MW	667	1,944	56	82	144	480	3,373
	2012	MW	362	74	9	52		542	1,039
Retired thermal/hydro power	2008-2010	MW	-600	-600	-900	-600	-600	-900	-4,200
	2009-2010	MW	-600	-600	-900	-600	-600	-900	-4,200
	2011	MW							-300

Table 16 Calculation of *BM* Emission Factor of CCPG

	Installed capacity in 2009	Installed capacity in 2010	Installed capacity in 2011	Installed capacity in 2012	Newly added capacity from 2009 to 2012[1]	Newly added capacity from 2010 to 2012[2]	Share in total capacity additions
	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	
	A	B	C	D	E=D-A	E=D-B	
Thermal power	105,240	113,370	121,220	131,570	34,725	22,612	62.86%
Hydro power	79,230	87,110	94,690	103,570	19,840	16,160	35.92%
Nuclear power	0	0	0	0	0	0	0.00%
Wind power and Other	132	283	526	807	675	524	1.22%
Total	184,602	200,763	216,436	235,947	55,240	39,296	100.00%
Share in total installed capacity of 2012					23.41%	16.65%	

1、 caculation after condidering the installed capacity and shut down unit capacity

$EF_{BM,y}$ =0.75353×62.86%=0.4737 tCO_2/MWh

$EF_{grid,OM,y}$ is calculated as 0.9724 tCO2e/MWh, the $EF_{grid,BM,y}$ is calculated as 0.4737 tCO2e/MWh. And the baseline emission factor equal to the combined margin with equally weighted average of the operating margin emission factor and the build margin emission factor.

According to "Tool to calculate the emission factor for an electricity system" (Version 02), the default weight of hydropower in the second crediting period is: w_{OM} = 25%, w_{BM} = 75%,

So the Baseline Emissions Factor ($EF_{grid,CM,y}$) is 0.5983tCO2e/MWh.

ANNEX 3

MONITORING PLAN

Please see Section D for relevant details.

Annex 4

SUSTAINABLE DEFELOPMENT ASSESSMENT MATRIX

As described in Section B.2, the current baseline is still valid in the second crediting period and does not need to be updated; and according to the previous verification, all the necessary data and information required by SD monitoring plan have been fully monitored and record by project owner, and verified by DOE during each site-visit, and the monitoring results of the SD indicators are all positive and the situation is very likely to be continued, therefore, there is no revision in the scores of the 12 SD indicators. The monitoring results of the SD indicators are shown in Annex 9.

The detailed scores of the SD indicators during the second period are listed as below, which is the same as the first crediting period.

Guanbaodu:

Component • Indicators	Score (-2 to +2)	Reasons
Local/regional/global environment		
• Water quality and quantity*	0	Water quality (0) During the construction period, washing wastewater was treated in sediment tank before discharged to the river; wastewater with oil was treated through filtration; Sanitary sewage was treated in the septic tank by digestion process and reused as fertilizers. During the operational period, oil in the wastewater is absorbed by oil absorption paper and wood residues. The paper and wood residues with oil is burned afterwards to prevent potential pollutions. Sanitary sewage is treated as the same measure used during the construction period (EIA p25). After taking these measures, the impact of waste water on local water body will not be significant. Therefore, this indicator scores “0”. Water quantity (0) There is no obvious variation of water quantity because this project is a run of river hydropower plant with no capacity of conditioning (EIA p4-5).Therefore, this indicator scores “0”.
• Air quality (emissions other than GHGs)	0	The air pollution mainly comes from project construction. Proper measures are employed to mitigate the potential impacts: 1) Construction sites are equipped with road sprinklers; 2) construction workers wear dust masks; 3) quantity of dynamite and speed of vehicles shall be controlled (EIA p25). The pollution from earthwork blast, drudging and transportation will not have significant impact on atmosphere. During the operation period, the electricity generated by the project partially replaces electricity generation from other conventional sources of energy, and directly reducing emissions other than GHG such as SO_x and NO_x (N_2O excluded), which contributes to the

		air quality improvement to a certain extent. However, such contribution is difficult to qualify or measure, therefore, this indicator scores "0".
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases) *	0	Noise Pollution (0) Noise mainly comes from the construction machines, concrete casting and transportation vehicles. Low noise equipments were adopted. Transportations and machine operations were avoided at night (EIA p20-21). The noise pollution is intermittent and has no considerable effect on environment. Solid waste (0) Domestic waste is regularly transported to the landfill for central disposal and the soil excavated has been rehabilitated once the construction completed (EIA p25-26).
• Soil condition (quality and quantity) *	0	Soil quality and quantity (0) The Water and Soil Conservation Plan is strictly enforced during and after the construction period to mitigate the impact on local environment. The earthworks are filled in the project site for replanting; rehabilitation of vegetation in the affected places such as construction site and reservoir is conducted right after the completion of the construction work. Walls will be constructed along the shore of the river to keep the soil (EIA p26); an acceptance meeting with governmental agencies has been held to prove that and the project passed the completion check. Therefore, there will be no significant impact on soil quality and quantity, this indicator scores "0".
• Biodiversity (species and habitat conservation) *	0	There are no considerable effects on fish and organism species and habitats due to the project activity for following three reasons: 1) as explained for water quantity, there will be no water reduction area, so the aquatic organisms and fish in the downstream generally will not be disturbed; 2) during the high flow period, the water heads of upper stream and downstream of the proposed project are quite close so that fish and aquatic organisms can swim up and down; 3) The grids installed at the power house entrance can prevent the aquatic organisms and fish from entering the turbines. On the other hand, the amount of some terrestrial animals such as birds, snakes and rats will decrease to some extent due to the increasing of water level. However, the project site is modified from a pumping station. The dam is heightened from 3.5m to 4.3m, which leads to the a little increasing of reservoir area so that more inlets and discharges will be formed, and then the species of some aquatic organisms, fish, and water-loving birds and frogs will increase. No extinction of any animals will happen (EIA p24). Therefore this indicator scores as zero.
Sub total	0	
Social sustainability and development		

• Employment* (including job quality, fulfillment of labor standards)	+ 1	During the construction and operation phases, some job opportunities are provided to local people. Some basic trainings are provided to relevant staff which will help them upgrade their skills and knowledge. Additionally, comprehensive insurance has been provided to every permanent employee (Proof of insurance as shown in Annex 7). Therefore this indicator scores as "+1"
• Livelihood of the poor* (including poverty alleviation, distributional equity, and access to essential services)	+ 2	Some employment opportunities during the construction and operation period increase the income of local people. The income for permanent employees is in the range from 1100 to 3,773 RMB/month (Payroll as shown in Annex 5), higher than the average level of 838 RMB/month in rural area of Hunan Province (http://www.hntj.gov.cn/tjgb/hntjgb/201503/t20150320_115537.htm). In addition, local residents earn more as being a worker in the hydro power plant than being a farmer. The local villagers also invested in the project. The village committee made the investment on behalf of them. When the project operation started, they received their share of the annual profit in return.
• Access to energy services*	+ 1	The electricity from the project activity will be delivered to Jingzhou County Grid, thus alleviating the power shortage in the county, at the meantime, increasing the use and diversity of natural resources.
• Human and institutional capacity (including empowerment, education, involvement, gender)*	+ 1	There was a stakeholder consultation carried out regarding the proposed project (Stakeholder Consultation Report). Local people were actively involved in expressing their opinions and comments. Therefore, the consultation meeting helps to incorporate local opinions in the development of the project, thus improves the local democracy to some extent. In addition, the project was first initiated by the local residents who also have been engaged in the fund raising and project management process for the project. This project offered 2 permanent job opportunities for local women (as shown in Annex 5) who enjoy the basic right and holiday for female employees. This project also provided some training opportunities for employees periodically, including technical, management and safety knowledge, and the related employees have to pass the examination to ensure the safety working environment (Training records as shown in Annex 8).
Subtotal	+ 5	
Economic and technological development		
• Employment (numbers)*	+ 1	Some temporary jobs were offered during the construction period, and 16 permanent jobs are created during the operation period. Most employees are local residents (Payroll as shown in Annex 5) Considering the employment scale, this sustainable indicator scores a "+1".
• Balance of payments (sustainability)	0	Net foreign currency savings will also be very difficult to proof and monitor, therefore this indicator scores a zero as well.

• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	0	No change regarding technology self-reliance is expected through the project activity since it uses domestically produced equipment.
Sub total	+ 1	
TOTAL	+ 6	

The indicators with the asterisk will be monitored according to the monitoring plan.

Liangjiangkou:

Component • Indicators	Score (-2 to +2)	Reasons
Local/regional/global environment		
• Water quality and quantity*	0	Water quality (0) During the construction period, washing wastewater was treated in a sediment tank before discharged to the river and then the impact of waste water on local water body was not significant. During the operational period, oil in the wastewater is absorbed by oil absorption paper and wood residues. The paper and wood residues with oil is burned afterwards to prevent potential pollutions. Sanitary sewage is treated in the septic tank by digestion process and reused as fertilizers (EIA p15). Therefore, this indicator scores "0" Water quantity (0) There is no obvious variation of water quantity because this project is a run of river hydropower plant with no capacity of conditioning (EIA p12). Therefore, this indicator scores "0".
• Air quality (emissions other than GHGs)	0	The air pollution mainly comes from project construction. Proper measures are employed to mitigate the potential impacts: 1) Construction sites are equipped with road sprinklers; 2) construction workers wear dust masks; 3) quantity of dynamite and speed of vehicles shall be controlled (EIA p10). During the operation period, the electricity generated by the project partially replaces electricity generation from other conventional sources of energy, and directly reducing emissions other than GHG such as SO_x and NO_x (N_2O excluded), which contributes to the air quality improvement to a certain extent. However, such contribution is difficult to qualify or measure, therefore, this indicator scores "0".
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases) *	0	Noise Pollution (0) Noise mainly comes from the construction machines, concrete casting and transportation vehicles. Low noise equipments were adopted. Transportations and machine operations were avoided at night (EIA p11). The noise pollution during operation period is intermittent and has no considerable effect on environment (EIA p14). Solid waste (0) Domestic waste is regularly transported to the landfill for central disposal and the soil excavated has been rehabilitated once the construction completed (EIA p11).

• Soil condition (quality and quantity) *	0	Soil quality and quantity (0) The Water and Soil Conservation Plan is strictly enforced during and after the construction period to mitigate the impact on local environment. Temporary occupied sites and dredged sites were treated in time and replanting was carried out on the sites afterwards; retaining walls was set up to prevent the water and soil loss (EIA 15). Therefore, there is no significant impact on soil quality and quantity, this indicator scores as zero.
• Biodiversity (species and habitat conservation) *	0	As explained for water quantity, there is no water reduction area, so the aquatic organisms and fish in the down stream generally will not be disturbed. For the fish in the reservoir, the grids installed at the power house entrance can prevent the aquatic organisms and fish from entering the turbines. In addition, as the reservoir has been contracted with a company for fish culture, there will be benefits for the development of this industry and thus increase the fish species (EIA p12-14). Thus, the indicator scores as zero.
Sub total	0	
Social sustainability and development		
• Employment* (including job quality, fulfillment of labor standards)	+ 1	During the construction and operation phases, some job opportunities are provided to local people. Some essential training opportunities are provided to relevant staff which will help them upgrade their skills and knowledge. Additionally, accident insurance has been provided to every permanent employee (Proof of insurance as shown in Annex 7).
• Livelihood of the poor* (including poverty alleviation, distributional equity, and access to essential services)	+ 1	Some employment opportunities during the construction and operation period increase the income of local people. The income for permanent employees is in the range from 1200 to 2000 RMB/ (Payroll as shown in Annex 5), higher than the average level of 838 RMB/month in rural area of Hunan Province (http://www.hntj.gov.cn/tjgb/hntjgb/201503/t20150320_115537.htm). Besides energy service, the project activity also brings other essential services to local community: 1) three bridges have been built; 2) pumping pipelines for local resident have been established; 3) some small docks have been built for daily life. Totally, the project developer has contributed 351,000RMB for local services (Proof of contribution as shown in Annex 6).
• Access to energy services*	+ 1	The electricity from the project activity will be delivered to Tongdao County Grid, thus alleviating the power shortage in the county, at the meantime, increasing the use and diversity of natural resources. Therefore this indicator scores as "+1".
• Human and institutional capacity (including empowerment, education, involvement, gender)*	+ 1	There was a stakeholder consultation carried out regarding the proposed project (Stakeholder Consultation Report). Local people were actively involved in expressing their opinions and comments. Therefore, the consultation meeting helps to incorporate local opinions in the development of the project, thus improves the local democracy to some extent. Two part-time job opportunities are provided to females for financing work. Their salary is the same as the male part-time

		employees (Payroll as shown in Annex 5). This project also provided some training opportunities for employees periodically, including technical, management and safety knowledge, and the related employees have to pass the examination to ensure the safety working environment (Training records as shown in Annex 8).
Subtotal	+ 4	
Economic and technological development		
• Employment (numbers) *	+ 1	The project activity creates local and regional employment both during the construction phase and operational phase. 10 permanent and 2 part-time jobs are created during the operation period (Payroll as shown in Annex 5). Most permanent employees are local residents.
• Balance of payments (sustainability)	0	Net foreign currency savings will also be very difficult to proof and monitor, therefore this indicator scores a zero as well.
• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	0	No change regarding technology self-reliance is expected through the project activity since it uses domestically produced equipment. Therefore the indicator scores as zero.
Sub total	+ 1	
TOTAL	+ 5	

The indicators with the asterisk will be monitored according to the monitoring plan.

Annex 5

COPIES OF PAYROLL

2015年12月工资发放表

	基本工资	性别	职务补贴	工龄	全勤	绩效系数	绩效工资系数	系数总和	当月上网电量	效益工资总额	个人效益工资额	应发工资总额	奖励	违纪	扣款		实发工资	领款人签名
															医保	养老金		
向乾军	1210	男	1030	80								2320				194.1	2125.90	
陈晓蓉	1100	女										1100					1100.00	
肖 辉	1123	男	300	80	50	1	1.6	12.4	2094225	14660	1891.61	3444.61		70	37.7	194.1	3142.81	
郑来平	1123	男		20	50	0.93	1.5	12.4	2094225	14660	1649.25	2842.25		60	37.7	194.1	2550.45	
刘小立	1123	男	150	30	50	0.86	1.6	12.4	2094225	14660	1626.78	2979.78		170	37.7	194.1	2577.98	
苏 勇	1123	男	150	80	50	0.93	1.6	12.4	2094225	14660	1759.20	3162.20		175	37.7	194.1	2755.40	
苏海平	1123	男	150	20	50	1	1.6	12.4	2094225	14660	1891.61	3234.61		20	37.7	194.1	2982.81	
杨荷森	1123	男		60	50	0.96	1.5	12.4	2094225	14660	1702.45	2935.45		20	37.7	194.1	2683.65	
苏 靖	1123	男		10	50	1	1.5	12.4	2094225	14660	1773.38	2956.38					2956.38	
苏镜恺	1123	男		20	50	1	1.5	12.4	2094225	14660	1773.38	2966.38	60		37.7	194.1	2794.58	
达世魁	1130	男	1220	30	50	0.98	1.6					2430.00	108	20	37.7	194.1	2286.20	
向田静	1130	男	1630	80	50	0.98	1.8					2890.00	60	20	37.7	194.1	2698.20	
李 竞	1210	男	1870	80								3160.00			37.7	194.1	2928.20	
李永华	1210	男	1690	80								2980.00					2980.00	
合计	15974		8190	670	500		12.4			14660	14067.66	39401.66	228	555	377	2135.1	36562.56	

审批:

制表:

2015年12月工资发放表

姓 名	性 别	金 额	应发工资	实发工资	领款人签名	备 注
李万秀	女	1100	1100	1100	李万秀	
苏仁兴	男	1700	1700	1700	苏仁兴	
合计				2800		

审批:

制表:

二〇一五年十二月工资发放表

西江口水电站　　单位：元

姓 名	金 额	账　号	备　注
吴友荣	1,200.00	92121390005181814011	
卢平富	1,000.00	92121390000425080011	
龙开发	1,000.00	92121390004017551011	
杨智钦	1,000.00	92121390003156662011	
石庆春	1,000.00	92121390005170684011	
唐晓群	800.00	92121390003023971011	
吴林英	800.00	92121390003984537011	
尹涌江	500.00	92121390000788119011	
杨鸣放	1,800.00	92121390003115025011	
欧国金	1,800.00	92121390000569898011	
龙开良	1,800.00	92121390003459064011	
欧柳桥	1,800.00	92121390003459359011	
合计	14,500.00		

Annex 6

PROOF OF CONTRIBUTION

证　　明

通道侗族自治县两江口水电站在我下乡乡应当地村民要求为本地修桥、修路及抗旱等做了大量工作，现统计如下：

两江组：

新修大桥一座　　耗资 40 万元

新修公路 3.5 公里（新大桥至白洋冲）耗资 8 万元

新开拓耕道 2 公里（新大桥至冲罗）　耗资 3 万元

拓宽老公路 3 公里（老大桥到茶溪）　耗资 3 万元

合资硬化公路 1.5 公里（两江至电站）耗资 3 万元

新建便民生活码头 4 个　　耗资 1.6 万元

21 户农村用电改造　　耗资 3 万元

修保坎抬高公路 0.6 公里　　耗资 12 万元

土门组：

购买抗旱抽水设备二套
架设抗旱抽水线路二条　　耗资 4.5 万元

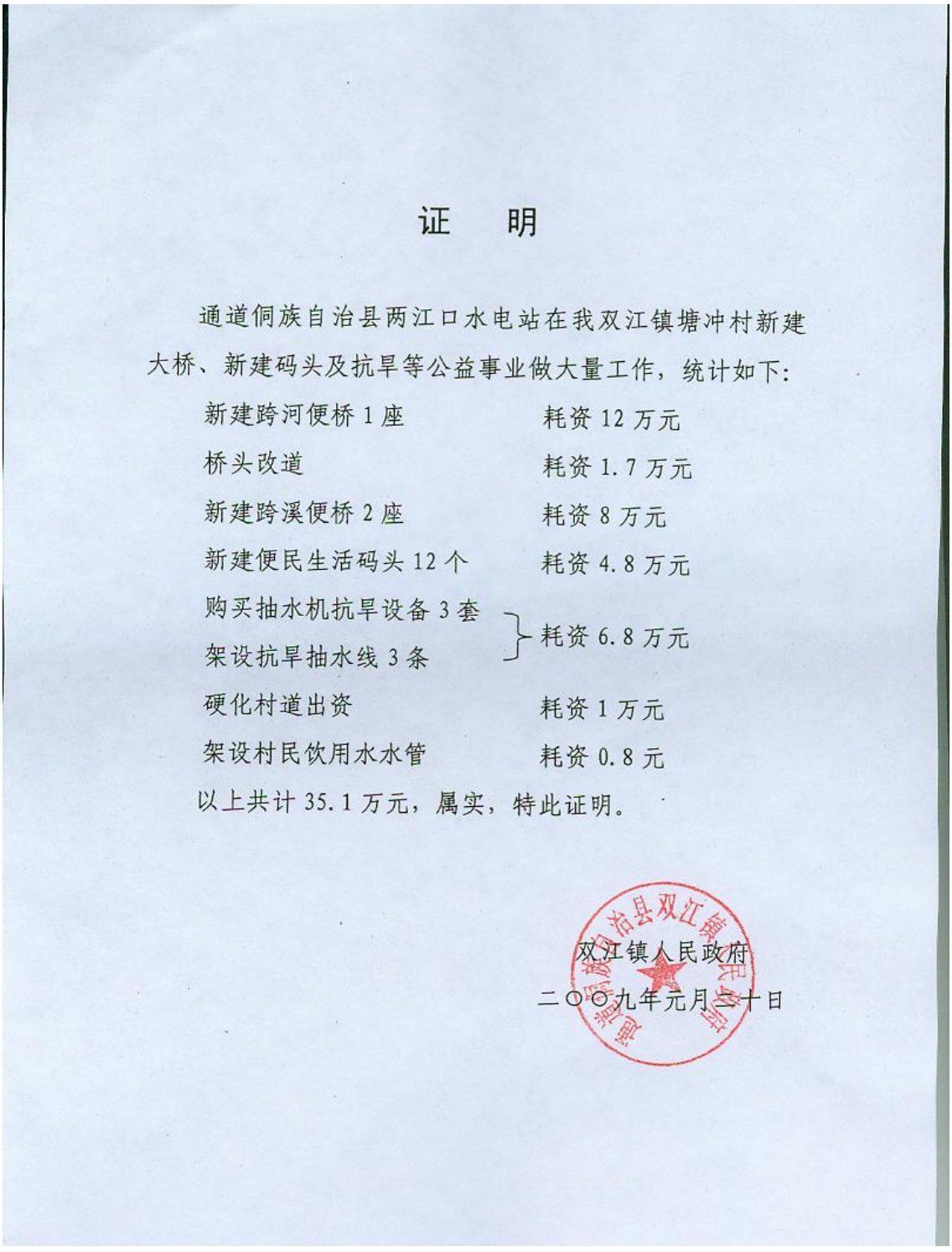
新建便民生活码头二个　　耗资 0.8 万元

应村民要求计划在 2009 年渡改桥 1 座出资 20 万元

以上合计已出资 78.9 万元，计划出资 20 万元，属实，特此证明。

下乡乡人民政府

二〇〇九年元月二十日



证　明

通道侗族自治县两江口水电站在我双江镇塘冲村新建大桥、新建码头及抗旱等公益事业做大量工作，统计如下：

新建跨河便桥 1 座	耗资 12 万元
桥头改道	耗资 1.7 万元
新建跨溪便桥 2 座	耗资 8 万元
新建便民生活码头 12 个	耗资 4.8 万元
购买抽水机抗旱设备 3 套 架设抗旱抽水线 3 条	耗资 6.8 万元
硬化村道出资	耗资 1 万元
架设村民饮用水水管	耗资 0.8 元

以上共计 35.1 万元，属实，特此证明。

双江镇人民政府

二〇〇九年元月二十日

Annex 7

PROOF OF INSURANCE

团体农发无忧综合保障计划（A）保险计划被保险人人名清单

投保单位：靖州苗族侗族自治县贯宝渡水力发电有限责任公司　　保险单号：881844336323

保险责任名称：责任1:团体意外医疗保险责任　责任2:意外伤害住院津贴保险责任　责任3:重症病房意外住院津贴保险责任　责任7:轮船意外伤害身故和残疾保险责任
责任4:团体人身意外伤害保险　责任5:航空意外伤害身故和残疾保险责任　责任6:火车意外伤害身故和残疾保险责任

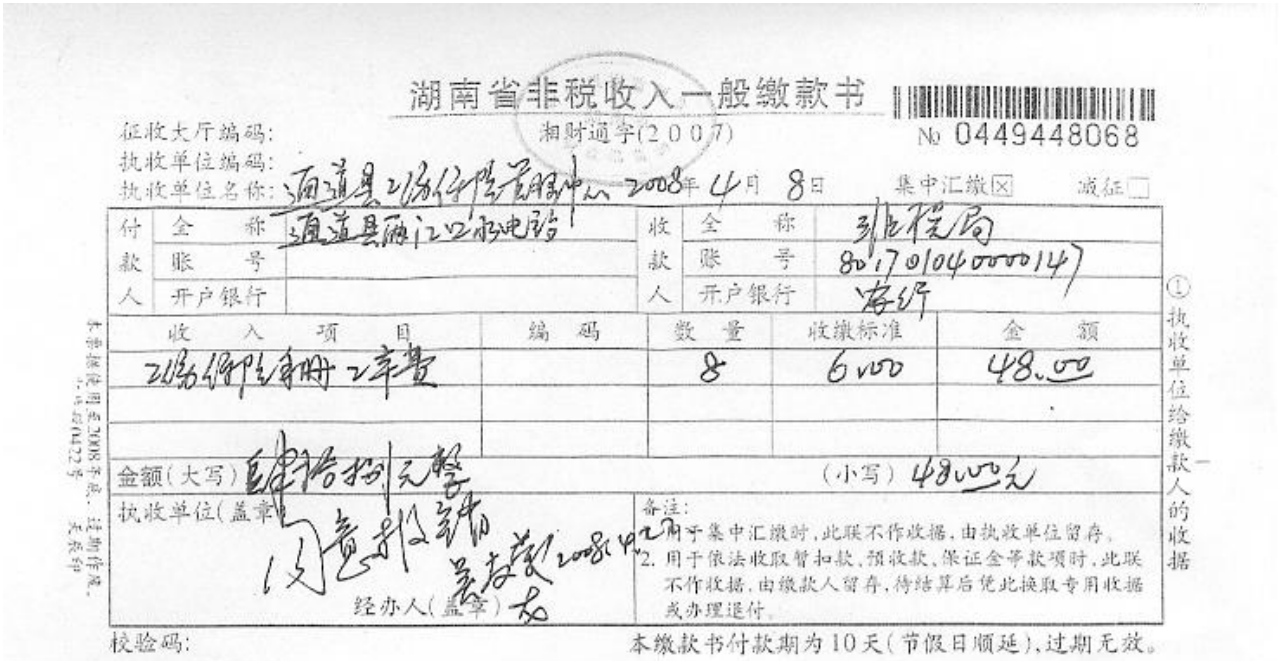
序号	被保险人 身份证号码	职业 性别	受益人	责任1保额 责任1保费	责任2保额 责任2保费	责任3保额 责任3保费	责任4保额 责任4保费	责任5保额 责任5保费	责任6保额 责任6保费	责任7保额 责任7保费	备注
1	李永华 433030195403260418	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
2	刘亚华 433030198106100032	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
3	邹高翔 430527198706240035	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
4	王德怀 433030197101050035	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
5	苏勇 431229198601210419	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
6	詹文超 431229198510270213	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	
7	肖辉 433030198108180056	一类 男	法定	10000.00 60.00	1800.00 8.00	600.00 2.00	100000.00 90.00	200000.00 20.00	200000.00 10.00	200000.00 10.00	

本页小计:人数:7　保费:1400.00　责任1保费:420.00　责任2保费:56.00　责任3保费:14.00　责任4保费:630.00　责任5保费:140.00　责任6保费:70.00　责任7保费:70.00

合同生效日期：2008年11月30日　　保单制作日期：2008-12-01

保单签发地：怀化市迎丰中路639号农业局综合楼一、二楼　　服 务 电 话：95567

第 1 页



湖南省非税收入一般缴款书

湘财通字(2007)

№ 0449448068

征收大厅编码:
执收单位编码:
执收单位名称: 通道县2级仔管理站 2008年 4月 8日 集中汇缴☒ 减征☐

付款人	全称	通道县雨汪2级电站	收款人	全称	非税局
	账号			账号	80170104000014?
	开户银行			开户银行	农行

收入项目	编码	数量	收缴标准	金额
2级维护手册工本费		8	6.00	48.00

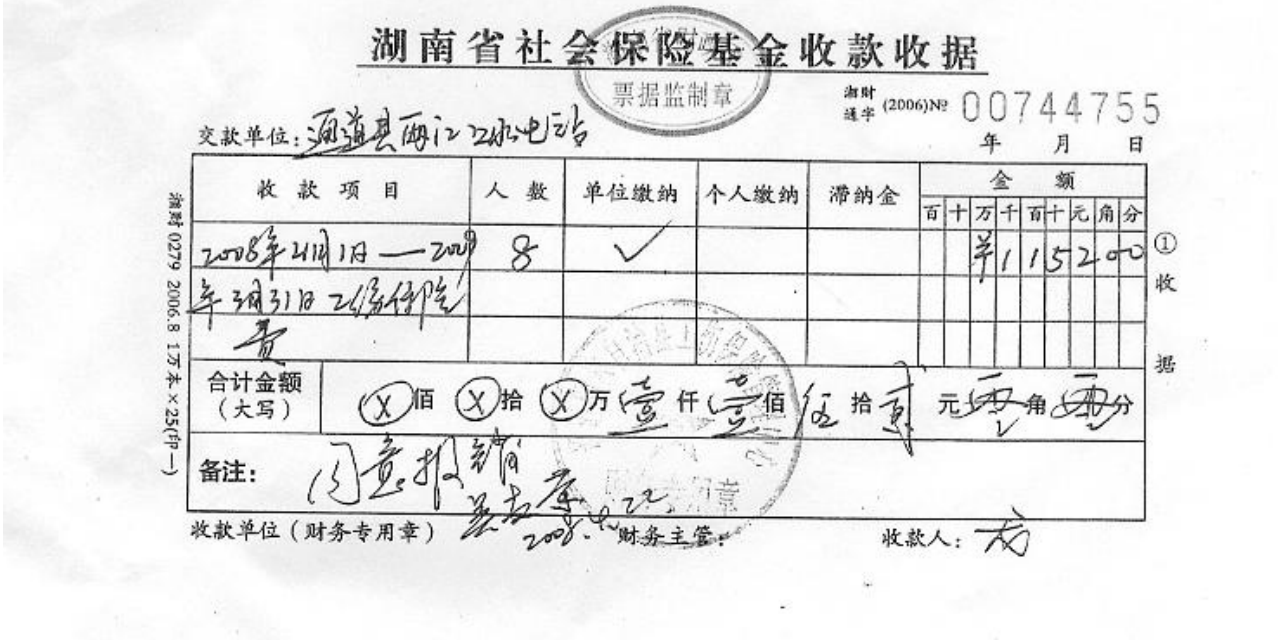
金额(大写) 壹佰肆拾捌元整 (小写) 48.00元

执收单位(盖章) 经办人(盖章)

备注:
1. 用于集中汇缴时,此联不作收据,由执收单位留存。
2. 用于依法收取暂扣款、预收款、保证金等款项时,此联不作收据,由缴款人留存,待结算后凭此换取专用收据或办理退付。

校验码: 本缴款书付款期为10天(节假日顺延),过期无效。

①执收单位给缴款人的收据



湖南省社会保险基金收款收据

票据监制章

湘财通字(2006)№ 00744755

年 月 日

交款单位: 通道县雨汪2级电站

收款项目	人数	单位缴纳	个人缴纳	滞纳金	金额 百	十	万	千	百	十	元	角	分
2008年4月1日—2009年3月31日2级维护费	8	✓					¥	1	1	5	2	0	0

合计金额(大写) ⊗佰⊗拾⊗万壹仟壹佰伍拾贰元整 ¥1152.00

备注: 收讫报销 2008.4.22

收款单位(财务专用章) 财务主管: 收款人:

湘财0279 2006.8 1万本×25(中一)

①收据

Annex 8

TRAINING RECORDS

安全教育记录

教育类型：工人教育　　2015 年 3 月 8 日

主讲单位	项目部	主讲人	李竞
受教育工种	水轮机电气运行工	地 点	电站办公室

教育内容：

1、 进入施工现场必须佩戴安全帽，并系好帽带；

2、 不准赤脚光背进入施工现场，上班期间不得穿拖鞋；

3、 不准带小孩进入施工现场；

4、 严禁私拉乱接电线，施工临时用电必须由电工完成拉设；

5、 严禁酒后、病后作业，严禁偷盗、严禁打架斗殴，严禁随地大小便；

6、建立完整的安全管理机构，必须熟悉《电业安全工作规程》；

7、健全各项安全规程，并严格执行。比如：倒闸操作，停电检修，带电操作必须有专人监护，定期检查所有设备的绝缘电阻，知道人身和带电体的安全距离。

8、严格遵循设计，安装规范，加强运行维护和检修试验工作。

9、按规定使用电气绝缘安全用具和防护安全用具。绝缘安全用具有基本安全用具和辅助安全用具两种。

基本安全用具如：绝缘钳，绝缘杆，试电笔等。

负载安全用具如：绝缘手套，绝缘鞋，绝缘台垫，临时接地线等。

安全防护用具如：安全带，安全帽，防毒面具，护目眼镜，标示牌和临时遮拦等。

10、一定要采用安全电压和符合安全要求的电器。

11、装拆电气设备，电线等必须做到装的安全，拆的彻底。

12、熔丝或熔体熔断后，不得随意加大规格或者用铜丝，铁丝等代替。

13、移动电具（特别是金属外壳类）的插座，必须可靠接地。

14、不得跨越遮拦，障碍靠近供电设备，不得变配电设备构架。

15、不用湿手触摸电气设备，防止触电。

16、遇到高压电线落地，不可走近，应离开 8——10 米的距离，采用单脚跳。

17、必须掌握触电的急救方法。

参加人员：　肖辉　向田静　苏勇　刘小立　杨荷森　郑來平　苏静恺　苏海平　达士魁　苏靖

会议内容

2015年9月6日 星期 NO.

会议时间	点 分开会 点 分闭会	会议地址	电站办公室	主持人 记录人	吴方荣
会议内容	学习县政府"关于安全生产培训会议"文件。落实在岗人员培训。				
出席人	吴方荣、胡开发、卢开富、石伏春、杨智能。				

议程：

一、清点人数：

会议应到人数5人，实到人数5人。

二、学习政府"安全生产"文件（略）

三、讨论培训计划：杨智能

1、十月份派胡开发、~~胡柳柏~~到县里参加在岗人员培训。

2、2016年3月份派胡开发、胡柳柏参加市里岗位培训。

3、所有培训人员来回车费、住宿费补2项，伙食费每天补助30元计算。

四、年终(检查)岗位制度检查、~~上~~岗人员培训证检查。

西江水电站
二〇一五年九月六日

2015.9.6.

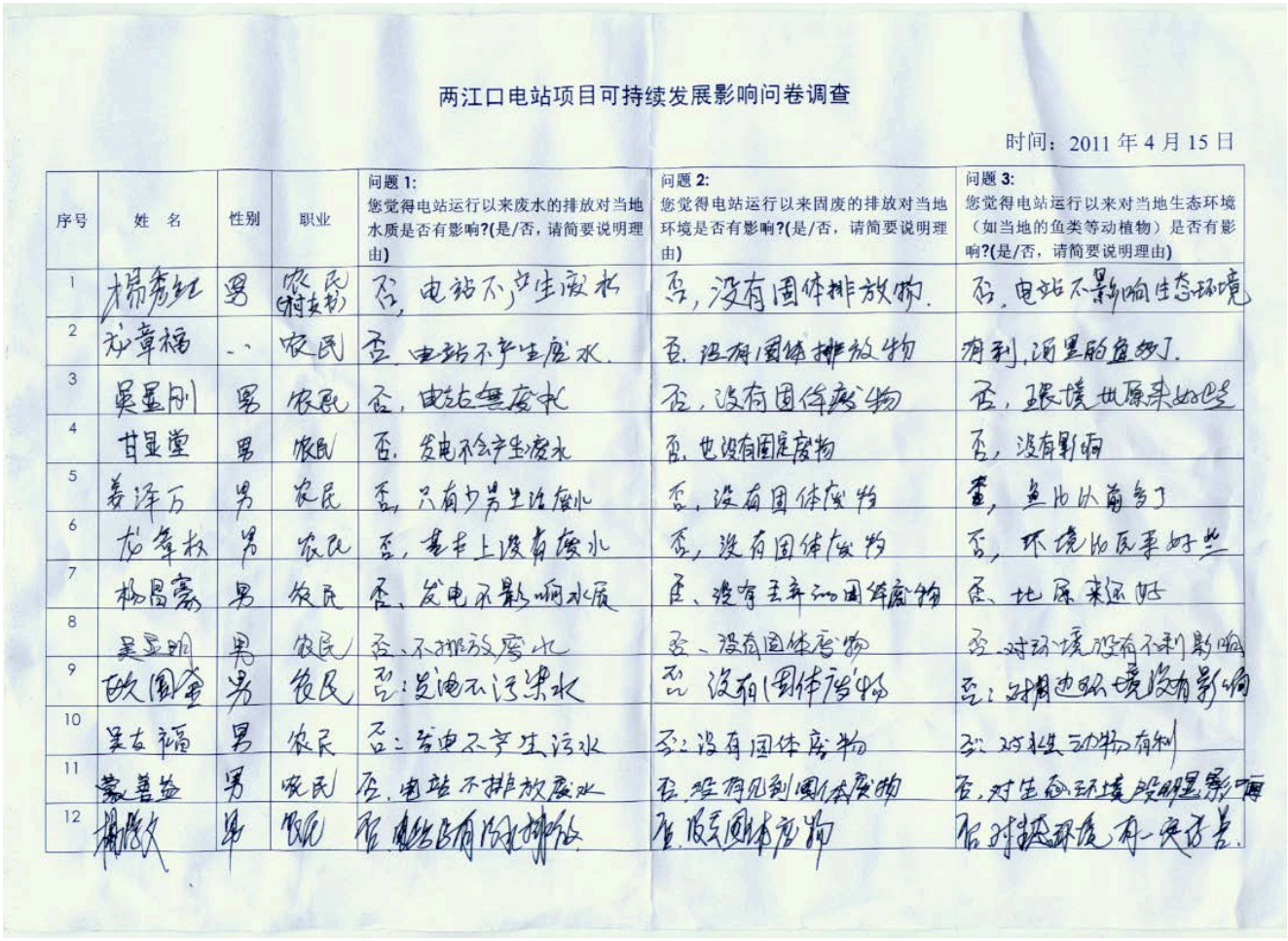
Annex 9

MONITORING RESULTS OF SD INDICATORS FROM PREVIOUS CREDITING PERIOD

贯宝渡电站项目可持续发展影响问卷调查

时间：2011 年 4 月 15 日

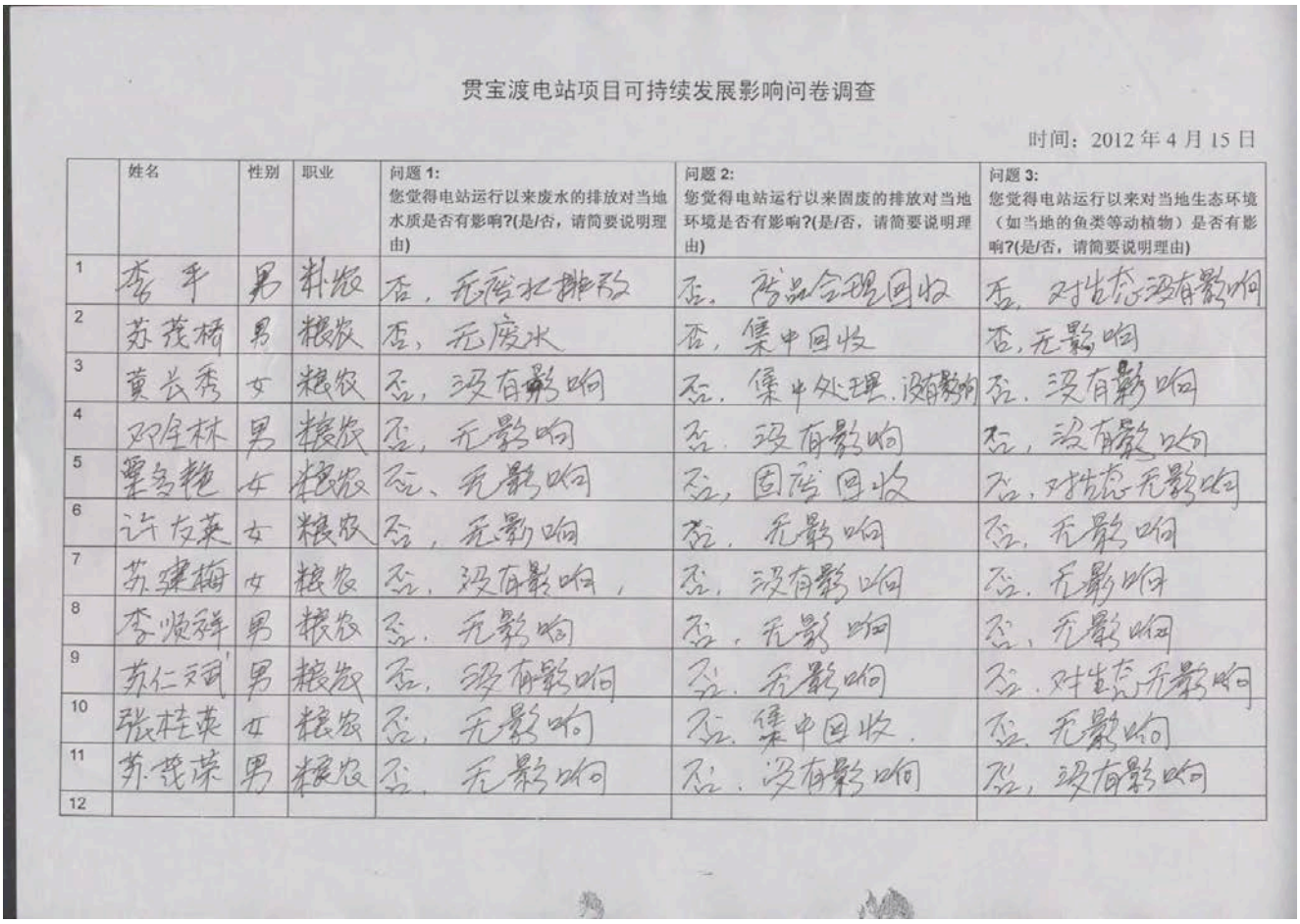
	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响?(是/否，请简要说明理由)
1	[illegible]	女	粮农	否 废水排放达标	否. 废品全部回收.	否. 对生态没有影响.
2	谭胜权	男	粮农	否 无废水排放	否 固废集中处理 没有影响.	否 没有影响.
3	李新平	男	粮农	否 无废水	否 没有影响	否 没有影响.
4	常翠凤	女	粮农	否. 无影响	否 无影响	否. 生态无影响.
5	陈泽家.	男	粮农	否. 无废水.	否. 固废集中回收. 无影响.	否. 没有影响.
6	李 珍	女	粮农	否. 没有影响	否. 没有影响	否. 没有影响
7	龙圆圆	女	粮农	否. 没有影响	否. 没有影响	否. 没有影响
8	苏 艺.	男	粮农.	否. 无废水. 没有影响.	否. 固废回收.	否. 对生态. 无影响.
9	杨林.	男	粮农.	否. 无影响.	否. 集中回收.	否. 无影响.
10	苗仁秀	女	粮农	否 无影响	否 集中回收	否 无影响
11	苗延龙	男	粮农	否 无影响	否. 集中回收	否 无影响.
12	苗仁友	男	粮农	否. 无废水排放.	否. 固废回收. 无影响.	否. 无影响.



两江口电站项目可持续发展影响问卷调查

时间：2011 年 4 月 15 日

序号	姓 名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响?(是/否，请简要说明理由)
1	杨秀红	男	农民(村支书)	否，电站不产生废水	否，没有固体排放物.	否，电站不影响生态环境
2	张章福	〃	农民	否，电站不产生废水.	否，没有固体排放物	有利，河里的鱼多了.
3	吴星刚	男	农民	否，电站无废水	否，没有固体废物	否，环境也原来如此
4	甘显堂	男	农民	否，发电不会产生废水	否，也没有固废物	否，没有影响
5	姜泽万	男	农民	否，只有少量生活废水	否，没有固体废物	有，鱼比以前多了
6	龙章权	男	农民	否，基本上没有废水	否，没有固体废物	否，环境比原来好些
7	杨昌富	男	农民	否，发电不影响水质	否，没有生产和固体废物	否，比原来还好
8	吴星明	男	农民	否，不排放废水	否，没有固体废物	否，对环境没有不利影响
9	欧国奎	男	农民	否：发电不污染水	否：没有固体废物	否：对周边环境没有影响
10	吴友福	男	农民	否：发电不产生污水	否：没有固体废物	否：对牲畜动物有利
11	袁善益	男	农民	否，电站不排放废水	否，没有见到固体废物	否，对生态环境没明显影响
12	杨隆文	男	农民	否，电站没有污染排放	否，没有固体废物	否，对环境有一定改善.



贯宝渡电站项目可持续发展影响问卷调查

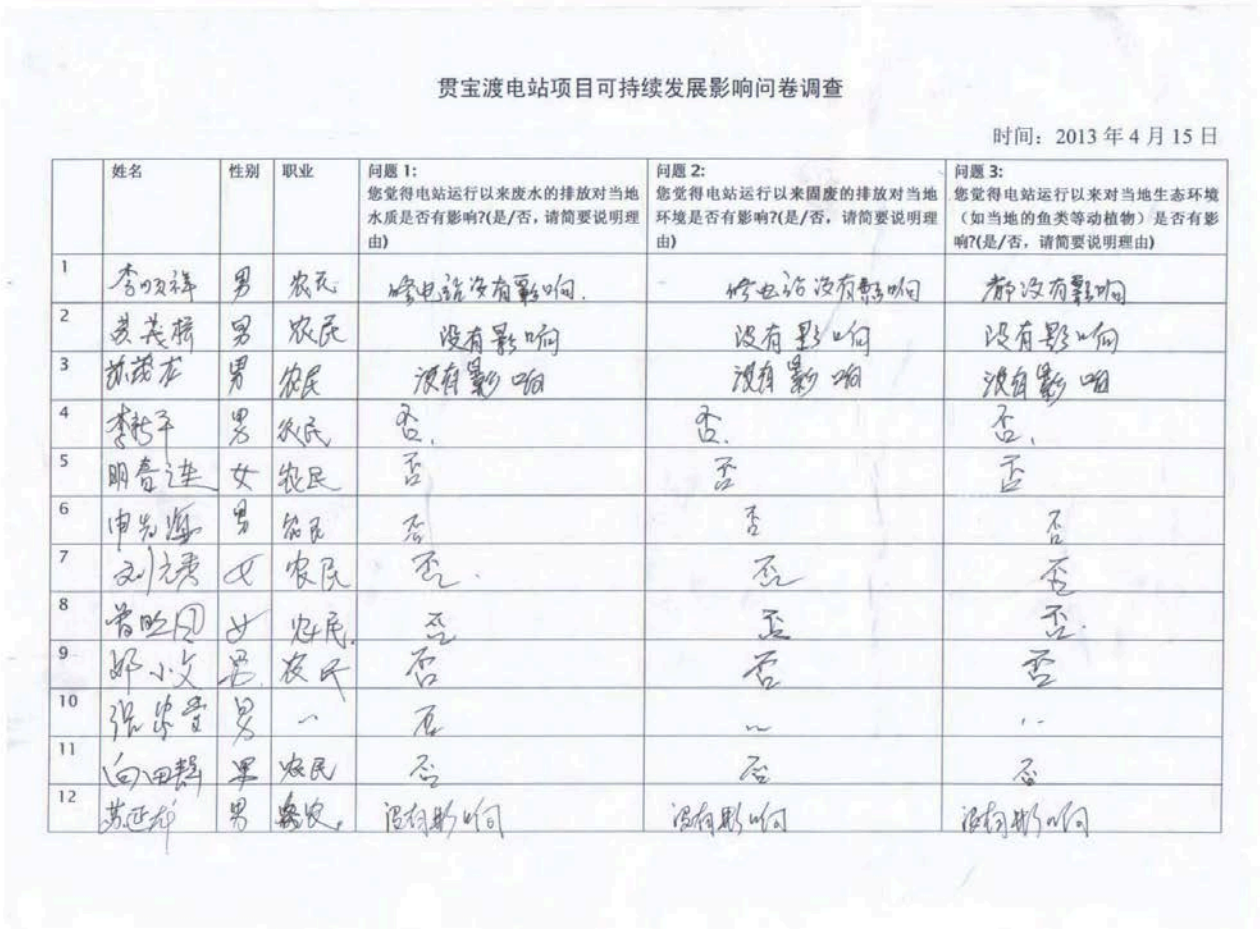
时间：2012 年 4 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响?(是/否，请简要说明理由)
1	李平	男	种农	否，无废水排放	否，产品会现回收	否，对生态没有影响
2	苏茂桥	男	粮农	否，无废水	否，集中回收	否，无影响
3	黄长秀	女	粮农	否，没有影响	否，集中处理，没有影响	否，没有影响
4	邓生林	男	粮农	否，无影响	否，没有影响	否，没有影响
5	覃多艳	女	粮农	否，无影响	否，固废回收	否，对生态无影响
6	许友英	女	粮农	否，无影响	否，无影响	否，无影响
7	苏建梅	女	粮农	否，没有影响，	否，没有影响	否，无影响
8	李顺祥	男	粮农	否，无影响	否，无影响	否，无影响
9	苏仁斌	男	粮农	否，没有影响	否，无影响	否，对生态无影响
10	张桂英	女	粮农	否，无影响	否，集中回收	否，无影响
11	苏茂荣	男	粮农	否，无影响	否，没有影响	否，没有影响
12						

两江口电站项目可持续发展影响问卷调查

时间：2012 年 4 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有不利影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有不利影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有不利影响?(是/否，请简要说明理由)
1	杨秀洪	男	农民	否，电站没有废水排放	否，电站运行没有废渣产生	否，鱼比以前还多了
2	杨昌金	男	农民	否.电站仅有生活废水不影响当地水质	否.电站运行后.不产生固体废渣	否.蓄水对鱼类生活繁殖有利
3	龙章福	男	农民	否.电站没有排废水入河里	否.电站仅在建设期间有一些渣土.现都处理好了.	否.当地网箱养鱼方便多了
4	龙开良	男	农民	否，电站运行后不见水质有变化	否，电站大坝挡住一些上游带来的废渣，涨水时又冲走了.	否，库区鱼多了，还出现了不少水鸟.
5	蒙善益	男	农民	否 不见电站排放有污染废水	否 电站有清理出一些废弃物，但都有回收利用	否. 对鱼有利
6	龙生来	男	〃〃	否：水电站运行没有废水排放.	否.水电站运行没有固体废物排放过.	否：蓄水后大鱼特别多.
7	吴显刚	男	农民	否：电站没有废水排放	否. 电站每年将坝下河道中石头挖到河边，但不影响环境	否：鱼和鸟影响少。
8	姜运武	男	农民	否：这几年还没见电站排放废水，不影响当地水体.	否：没见电站排放固废物.	否：有利于鱼类生长
9	杨迎合	女	农民	否、电站下游水质很干净，不会影响	否.不见固体废物	否：养鱼的人多了
10	邹永东	男	农民	否，电站没有排放废水，不会影响环境	否.电站运行不产生固废.	否，电站蓄水后对当地生态环境利大于弊.
11	姜泽万	男	农民	电站运行没有废水排放.没见过.	我也没有见过固体废物	否.现在钓鱼一次可以钓好几斤.
12						



贯宝渡电站项目可持续发展影响问卷调查

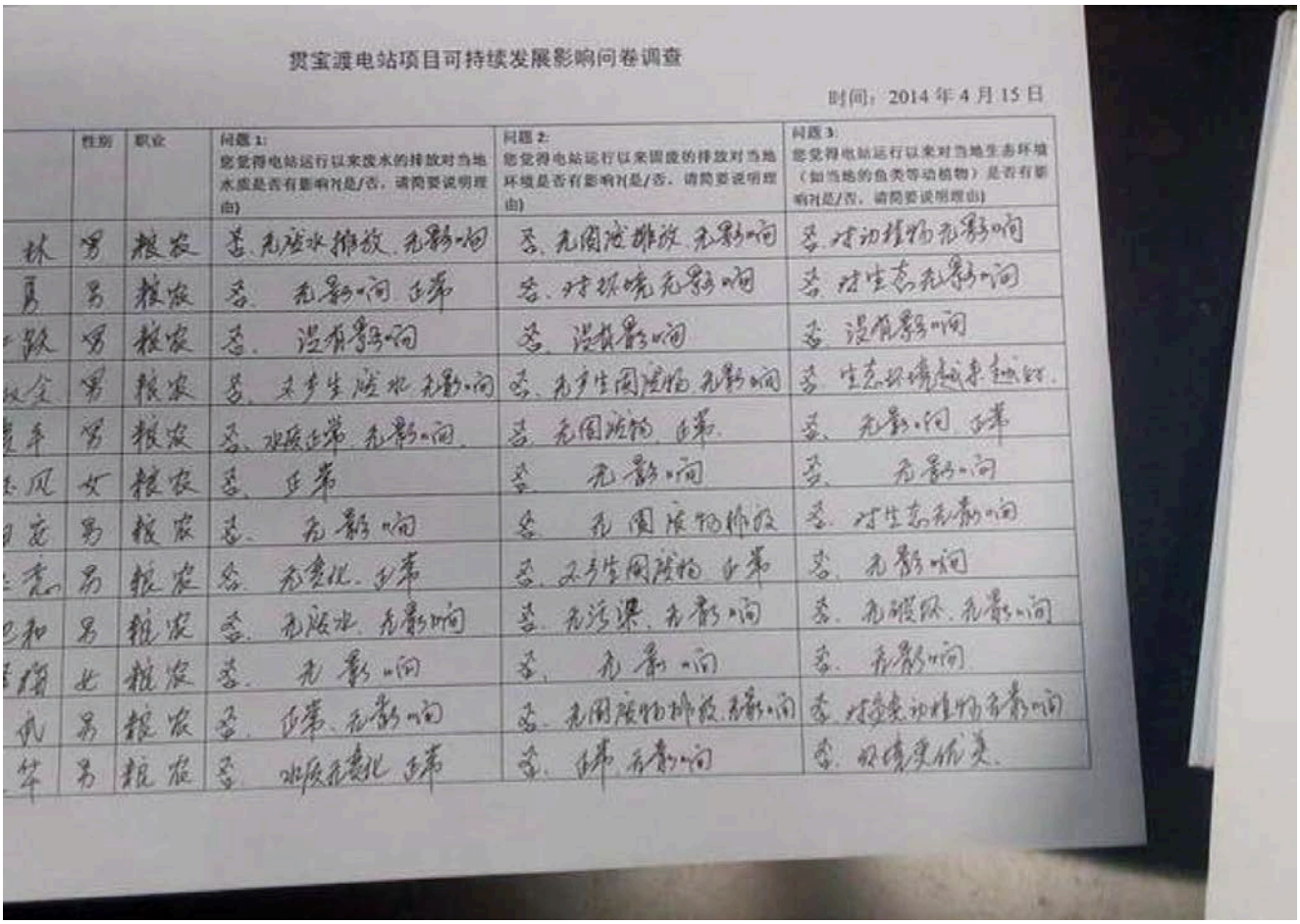
时间：2013 年 4 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响?(是/否，请简要说明理由)
1	李明祥	男	农民	修电站没有影响.	修电站没有影响	都没有影响
2	龚美林	男	农民	没有影响	没有影响	没有影响
3	杨锦龙	男	农民	没有影响	没有影响	没有影响
4	李秋平	男	农民	否.	否.	否.
5	明春进	女	农民	否	否	否
6	申为海	男	农民	否	否	否
7	刘秀	女	农民	否.	否	否
8	普明凤	女	农民.	否	否	否.
9	郭小文	男	农民	否	否	否
10	张荣贵	男	一	否	一	一
11	向田辉	男	农民	否	否	否
12	苏正和	男	农民.	没有影响	没有影响	没有影响

两江口电站项目可持续发展影响问卷调查

时间：2013 年 4 月 15 日

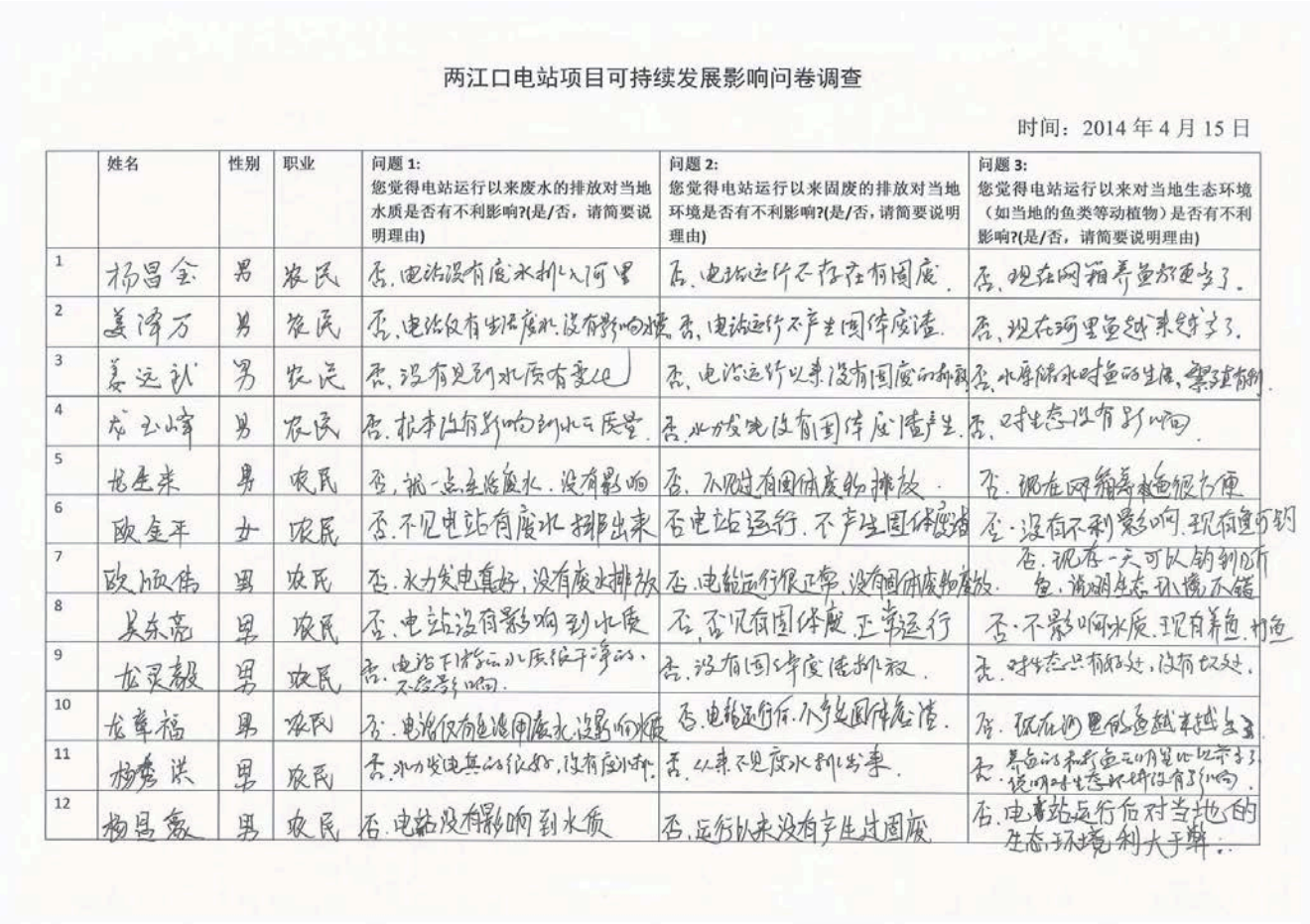
	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有不利影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有不利影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有不利影响?(是/否，请简要说明理由)
1	龙章福	男	农民	否：电站仅有少量生活用废水，没有影响水质。	否：电站运行后，不产生固体废渣。	否：对生态环境没有影响，现在河里的鱼越来越多了。
2	龙玉峰	男	农民	否：没有见到水质有什么变化。	否：电站发电不存在固体废渣的。	否：水库蓄水对鱼的生存、繁殖有利的。
3	杨昌金	男	农民	否：电站没有废水排进河里。	否：电站仅在建设期间有一点渣土，现在早已经处理好了的。	否：现在网箱养鱼很方便。
4	杨秀洪	男	农民	否：电站根本没有废水排放	否：电站运行以来，一直没有废渣	否：鱼比过去多了，环境也好了。
5	姜锦万	男	农民	否：没有见过电站里排出废水。	否：没见过有固体废物排放。	否：没有不利影响。
6	吴显刚	男	农民	否，电站没有渣、废水排放	否，电站没有对环境造成影响	否：水清了，鱼多了，老百姓都很快乐。
7	龙生丰	男	农民	否就一点生活废水没有影响。	否 电站正常流通废水，便于排洪，不存在什么固体废渣	否：砍了几棵树木，但是对环境根本没有影响
8	姜运武	男	农民	否：没有影响到水的质量	否：水力发电不存在固体废渣。	是，对生态没有影响，就是有一定的好处。
9	龙义益	男	农民	否：没见电站有废水排出来。	否：电站去年维修过，有一点固体废物，现在早已处理好了。	否：对生态环境只有好处，没有坏处。
10	杨昌豪	男	农民	否电站没有影响到水质	否运行以来没有产生过固废	否，电站运行后对当地生态有好处，鱼类增加了，打鱼的比以前多了。但我有一块菜地不能种了。
11	杨昭志	女	农民	否，电站下游的水质很干净的，不会影响	否，没见过有固体废物排放	
12	欧顺伟	男	农民	否：水力发电真好，没有废水排放	否：电站运行很正常，没有固体废物，对当地环境没有不利影响	否：库区范围内生态环境好了很多，现在一天都能钓到几斤鱼。



贯宝渡电站项目可持续发展影响问卷调查

时间：2014 年 4 月 15 日

	性别	职业	问题 1：您觉得电站运行以来废水的排放对当地水质是否有影响？是/否，请简要说明理由）	问题 2：您觉得电站运行以来固废的排放对当地环境是否有影响？是/否，请简要说明理由）	问题 3：您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响？是/否，请简要说明理由）
林	男	农民	否，无废水排放，无影响	否，无固废排放，无影响	否，对动植物无影响
勇	男	农民	否，无影响，正常	否，对环境无影响	否，对生态无影响
跃	男	农民	否，没有影响	否，没有影响	否，没有影响
文	男	农民	否，无生活废水，无影响	否，无生活固废物，无影响	否，生态环境越来越好。
平	男	农民	否，水质正常，无影响	否，无固废物，正常	否，无影响，正常
凤	女	农民	否，正常	否，无影响	否，无影响
龙	男	农民	否，无影响	否，无固废物排放	否，对生态无影响
龙	男	农民	否，无变化，正常	否，无生活固废物，正常	否，无影响
和	男	农民	否，无废水，无影响	否，无污染，无影响	否，无破坏，无影响
强	女	农民	否，无影响	否，无影响	否，无影响
凡	男	农民	否，正常，无影响	否，无固废物排放，无影响	否，对鱼类动植物无影响
华	男	农民	否，水质无变化，正常	否，正常，无影响	否，环境变优美。



两江口电站项目可持续发展影响问卷调查

时间：2014 年 4 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有不利影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有不利影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有不利影响?(是/否，请简要说明理由)
1	杨昌金	男	农民	否.电站没有废水排入河里	否.电站运行不存在有固废.	否.现在网箱养鱼都更多了.
2	姜泽万	男	农民	否.电站仅有生活废水.没有影响	否.电站运行不产生固体废渣.	否.现在河里鱼越来越多了.
3	姜远秋	男	农民	否.没有见到水质有变化	否.电站运行以来没有固废而和	否.水库保水时鱼的生活.繁殖都
4	龙玉峰	男	农民	否.根本没有影响到水质量.	否.水发电没有固体废渣产生.	否.对生态没有影响.
5	龙生来	男	农民	否.就一点生活废水.没有影响	否.不见过有固体废物排放.	否.现在网箱养鱼很方便
6	欧金平	女	农民	否.不见电站有废水排出来	否电站运行.不产生固体废渣	否.没有不利影响.现有鱼可钓
7	欧加伟	男	农民	否.水力发电真好.没有废水排放	否.电站运行很正常.没有固体废物产生	否.现在一天可以钓到好几斤鱼.消防生态环境不错
8	吴东亮	男	农民	否.电站没有影响到水质	否.否见有固体废正常运行	否.不影响水质.现有养鱼.钓鱼
9	龙灵毅	男	农民	否.电站下游的水质很干净的.不会影响的.	否.没有固体废渣排放.	否.对生态只有好处.没有坏处.
10	龙章福	男	农民	否.电站仅有生活用废水.没影响水质	否.电站运行后.不产生固体废渣.	否.现在的鱼越来越多了.
11	杨秀洪	男	农民	否.水力发电无污染的.没有危害.	否.从来不见废水到出来.	否.养鱼对水质无污染比以来多了.没对生态环境没有影响.
12	杨昌鑫	男	农民	否.电站没有影响到水质	否.运行以来没有产生过固废	否.电站运行后对当地的生态环境利大于弊.

贯宝渡电站项目可持续发展影响问卷调查

时间：2015 年12 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有影响?(是/否，请简要说明理由)
1	朱仁友	男	农民	否、没有产生废水排放正常	否、无固废物排放、无影响	否、动植物生长正常
2	申先渊	男	农民	否、无废水排放、无影响	否、没有固废物产生、无影响	否、对生态环境无影响
3	李 武	男	农民	否、水质正常无影响	否、环境更加优美	否、生态环境越来越好
4	曾昌凤	女	农民	否、正常无影响	否、无固废物排放	否、没有影响
5	朱延康	男	农民	否、无废水、正常	否、无固废物 正常	否、无影响 正常
6	朱仁跃	男	农民	否、无影响	否、无影响	否 无影响
7	唐子华	男	农民	否、无废水排放正常	否、无固废物排放	否 对动植物无影响
8	孙建忠	男	农民	否、对水质无影响	否 对环境无影响	否 对动植物无影响
9	陈春梅	女	农民	否、水质正常	否、环境正常	否 动植物生长环境正常
10	杨 林	男	农民	否、无影响、正常	否 无影响、正常	否 无影响、有利生长
11	陈少兰	男	农民	否、对水质无影响	否、对环境无影响	否 对生态无影响
12	黄真贵	男	农民	否、无影响正常	否 环境更好	否 生态正常

两江口电站项目可持续发展影响问卷调查

时间：2015 年 4 月 15 日

	姓名	性别	职业	问题 1: 您觉得电站运行以来废水的排放对当地水质是否有不利影响?(是/否，请简要说明理由)	问题 2: 您觉得电站运行以来固废的排放对当地环境是否有不利影响?(是/否，请简要说明理由)	问题 3: 您觉得电站运行以来对当地生态环境（如当地的鱼类等动植物）是否有不利影响?(是/否，请简要说明理由)
1	两江口电站	和谐	水电			
2	张国金	男	职工	否。水力无污染。	否。没有污染。	否。不但无害，而且稳定供
3	张柳林	男	职工	否。〃〃	否〃〃	否。
4	吴新民	男	农民	否〃〃	否〃〃	否
5	吴永泉	男	农民	否。〃〃	否〃〃	否。
6	吴志刚	男	个体商	否〃〃	否〃〃	否。
7	吴古福	男	退休干部	否。水电站有利无害	否无害	否。
8	龙富福	男	村干部	否。无害。	否。无影响	否。无害。
9	杨昌富	男	农电员	否。无害。有利	否。无影响	否。有利无害。
10	吴古平	男	个体户	否无害。	否。无意见。	否。无害。
11	吴昌礼	男	村支员	否。	否。	否。
12	吴进刚	男	农民	否。	否。	否。