



**Verified Carbon  
Standard**

## 28MW JINKOUBA HYDROPOWER PROJECT

Document Prepared by Hightrack International (Hong Kong) Technology Limited

|                          |                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------|
| <b>Project Title</b>     | 28MW Jinkouba Hydropower Project                                                             |
| <b>Version</b>           | 3.0                                                                                          |
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| <b>Monitoring Period</b> | 27/02/2012 to 31/01/2018                                                                     |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

The 28MW Jinkouba Hydropower Project (hereafter refers to "the project"), a run-of-river hydropower project, is located on Baishuijiang River in Gansu Province, China. The total installed capacity of the project activity is 28MW (2×14MW) and the annual net output is 127,900MWh. The electricity generated by the project activity is supplied to Northwest Region Power Grid ("NWPG") through Gansu Grid, displacing part of electricity generated by NWPG which is dominated by thermal power plants, and thus greenhouse gas (GHG) emission reductions could be achieved.

As a renewable energy project, the project activity produces positive environmental and economic benefits and contributes to the local sustainable development. The implementation of the project achieves CO<sub>2</sub> emission reduction by replacing electricity generated by fossil fuel fired power plants. The estimated annual GHG emission reductions are 108,689 tCO<sub>2</sub>e. The implementation of the project activity was:

| Date                  | Key Events                                                              |
|-----------------------|-------------------------------------------------------------------------|
| 20/11/2005            | Construction activities started                                         |
| 18/02/2009            | Registered as a CDM project                                             |
| 01/02/2008            | The operation starting date                                             |
| 01/02/2008-17/02/2009 | 1 <sup>st</sup> VCS monitoring period                                   |
| 18/02/2009~26/02/2010 | 1 <sup>st</sup> CDM monitoring period                                   |
| 27/02/2010~26/02/2011 | 2 <sup>nd</sup> CDM monitoring period                                   |
| 27/02/2011~26/02/2012 | 3 <sup>rd</sup> CDM monitoring period                                   |
| 27/02/2012~31/01/2018 | 2 <sup>nd</sup> VCS monitoring period ( <b>this monitoring period</b> ) |

During this monitoring period, the net electricity exports by the project is 848,201.534 MWh, and the emission reduction achieved is 720,798tCO<sub>2</sub>e.

## 1.2 Sectoral Scope and Project Type

Sectoral Scope 1: Energy industries (renewable - / nonrenewable sources);

Project type: Hydropower generation project;

The project is not a grouped project.

### 1.3 Project Proponent

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| Organization name | Jintai Hydropower Co. Ltd.                               |
| Contact person    | Zhang Wenwei                                             |
| Title             | Project Manager                                          |
| Address           | No.187,Chengguan Dongbaxing Village,Gansu Province,China |
| Telephone         | +86 15103975225                                          |
| Email             | jt.jkb@163.com                                           |

### 1.4 Other Entities Involved in the Project

|                     |                                                          |
|---------------------|----------------------------------------------------------|
| Organization name   | Hightrack International (Hong Kong) Technology Limited   |
| Role in the Project | Consultancy                                              |
| Contact person      | Zheng Yuwei                                              |
| Title               | Manager                                                  |
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### 1.5 Project Start Date

The project started on 01/02/2008.

### 1.6 Project Crediting Period

The project is registered under VCS scheme in 2010 and completed validation before 19/03/2020. Thus, it remains eligible to apply the crediting period requirements under VCS scheme in 2010 which shall be a maximum of ten years and may be renewed at most twice, so the first renewable VCS crediting period of the project should be updated from 01/02/2008 - 17/02/2009 to 01/02/2008 - 31/01/2018.

### 1.7 Project Location

The project is located on the Baishuijiang River in jinkouba village, Hengdan Township, Wen County, Longnan City, Gansu Province, People's Republic of China. The project activity has

geographical with the north latitude of 32°50'52" and east longitude of 104°53'18" as shown in figure 1.



Figure 1. Location of 28MW Jinkouba Hydropower Project

## 1.8 Title and Reference of Methodology

Methodology:

ACM0002 "Grid-connected electricity generation from renewable sources" (version 06)

Reference:

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

Tools:

Tool to calculate the emission factor for an electricity system

Reference:

<https://cdm.unfccc.int/Reference/tools/index.html>

## 1.9 Participation under other GHG Programs

The project was registered as a Clean Development Mechanism (CDM) project (reference number: 1633) in UNFCCC with 10 years fixed crediting period started from 18/02/2009. Please refer to the following link for details:

<https://cdm.unfccc.int/Projects/DB/RWTUV1204123332.57/view>

GHG emission reductions of 115,814 tCO<sub>2</sub>e, 114,164 tCO<sub>2</sub>e and 106,476 tCO<sub>2</sub>e generated respectively from 18/02/2009 - 26/02/2010, 27/02/2010 - 26/02/2011 and 27/02/2011 - 26/02/2012 by the project has been issued as CER under CDM program.

## 1.10 Other Forms of Credit

The project is a registered CDM project with reference No. 1633. GHG emission reductions from 18/02/2009 to 26/02/2012 by the project has been issued as CERs under CDM program, the detailed information can be found at <https://cdm.unfccc.int/Projects/DB/RWTUV1204123332.57/view>.

All emission reductions during 27/02/2012 to 31/01/2018 have not and will not seek CDM CER issuance. Emission reductions during this monitoring period will only seek issuance under VCS program. The GHG emission reductions of 100,512 tCO<sub>2</sub>e generated from 01/02/2008 to 17/02/2009 by the project has been issued as VCU under VCS program.

## 1.11 Sustainable Development

The contributions of this project to the sustainable development of the host country and project site are summarized as follows:

Because the hydropower plants of the project will generate electricity without GHG emission, the project can help the local areas reduce GHG emissions by replacing some part of the electricity from coal-fired power plants. And the project also helps decrease the local environmental pollution caused by coal burning, which has remarkable environmental benefits. The project has

achieved a GHG emission reduction of 720,798tCO<sub>2</sub>e during this monitoring period. Thus, the project achieved SDG 13 Climate Action<sup>1</sup>.

During this monitoring period, 848,201.534 MWh of electricity from renewable sources has been exported to the power grid. And the project makes good use of the local water resource to solve the difficulties of lack of power and unstable voltage, which help improve local life quality. Thus, the project achieved SDG 7 Affordable and Clean Energy<sup>2</sup>.

During the construction, operation, and maintenance of this project, the project, directly and indirectly, generates more job opportunities, which helps improve local employment and reduce local poverty. Thus, the project achieved SDG 8 Decent Work and Economic Growth<sup>3</sup>.

## 2 SAFEGUARDS

### 2.1 No Net Harm

According to Environmental Protection Law of the People's Republic of China, the project entity must assess the environmental impacts of project activity in China before exploiting natural resources and developing project construction. Therefore, the project entity had entrusted Cold and Arid Region Environmental and Engineering Research Institute, Chinese Academy of Science to assess the environmental impacts of the project activity, finally Gansu Provincial Environmental Protection Agency approved the environmental impact assessment (EIA) of the project activity in form of official document (approved file NO.[2004] 69), that shows the project activity in accordance with the claim to environment protection by the host party.

In view of the common practice of China, the environmental impacts of small scale hydropower plant ( in China installed capacity lower than 25MW be defined and not more than 50MW can refer to) are considered negligible. The direct influenced area of the project activity is Hengdan Township of Wen County, and there no the migration of population and the movement of building in process of the project activity's development, therefore social and environmental influences are direct, partial, short-term and reversible.

#### **Advantageous impacts**

Make best use of waterpower resource on Baishuijiang River and provide clean energy.

Cut flood peak and alleviate accumulation of mud.

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<sup>1</sup> <https://sdgs.un.org/goals/goal13>

<sup>2</sup> <https://sdgs.un.org/goals/goal7>

<sup>3</sup> <https://sdgs.un.org/goals/goal8>

Improve quality of drinking water within the project area.

Afford electricity and water to Natural Forest Protection Project

#### **Disadvantageous impacts**

In constructing stage, Quality of atmosphere declined partially.

In constructing stage, mud and sand content in water flow will increase a little.

In constructing stage, noise area partially beyond stated standard nearby the project site.

In operating stage, amount of water on watercourse will decrease obviously.

In operating stage, reduction of water will bring unapparent impact to vegetation round watercourse.

Construction and operation of the project activity will not result in any significant environmental impacts.

## 2.2 Local Stakeholder Consultation

#### **Local Stakeholder Consultation during the project preparation stage:**

By various formats such as site surveys, distribution of questionnaires and discussion, the advices about the proposed hydropower plant are obtained from the stakeholders.

#### **Formats**

Investigation means include site surveys, distribution of questionnaires and discussion

#### **Investigated stakeholders**

The stakeholders consist of peasants, workers, residents, teachers, students, technicians and government officials. The investigation had taken full account into the public advices of different ages, sexes, occupations and civilizations. The investigation was complied with the principal of representation and randomness in order to reflect the public opinions about the construction of the project activity.

#### **Major investigated issues**

- 1) Whether know the project activity
- 2) Attitude towards the location of the project activity
- 3) Impacts of the project activity on ecological environment
- 4) What is CDM

#### 5) Other special comments

It is the general opinion that the Jinkouba hydropower plant is a feasible project depends on viewpoints from experts and officials. The location of the dam was designed aright based on the character of local environment. When the project activity is put into practice, it will have very positive social, economical and environmental benefits. To minimum the negative impact on ecological ecosystem, water resources and atmospheric environment, the project activity was designed scientifically and managed strictly.

50 questionnaires were distributed in April. 2005 supported by CDM consultants within project assessment area, and 49 questionnaires were returned. From the view of the informants: 100% of them know the project activity; 98% of them consider that the location of the project activity is fit; 98% of them consider that the construction of the project activity has little influence on region ecological environment; 96% of them had known CDM. In general, the local government and residents have a positive attitude on the project activity; most of them consider that the construction of the project activity will promote the economic development in project region.

The special comments concentrate at compensate for the occupied lands, the suggestions including optimize design, enhance management, shorten construction period, protect environment and implement virescence etc.

According to the public research in EIA carried out by the Cold and Arid Region Environmental and Engineering Research Institute, CAS, three persons were selected among the informants as volunteer supervisor, to take charge of the environment protection at the construction and operation stage. Project owners have a positive attitude to gather views and suggestions of local stakeholders, aim at the comments and suggestions list above, the project entity will adopt the flowing measure:

- Give a reasonable financial compensation to farmers for occupying cultivated land;
- Provide employment opportunities to villagers;
- Extend and heighten the breakwater to protect riverain land and avoid submerge;
- Plant trees and grass to reduce soil erosion and protect the local ecological environment;
- Construct a countryside road, two simple bridges and an elementary school to facilitate local people.

#### **Local Stakeholder Consultation during the project implementation stage:**

Communications with Local stakeholders are being carried out at periodic intervals. In this monitoring period, the project owner carried out questionnaire survey for the local stakeholders to collect the relevant comments and suggestions in July 2012, July 2013, August 2014,

September 2015, June 2016 and July 2017. Meanwhile, the local authority has also conducted spot checks on the implementation of the project from time to time as per the request from the local governments' regulations. There are no negative comments received for the project. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

## 2.3 AFOLU-Specific Safeguards

NA.

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

The project activity uses run-of-river hydropower technology which converts mechanical energy available in the water flow into electrical energy using hydro turbines and alternators and with a conservative operation life of 30 years. The main constructions of the project include a sand washing sluice, a flood discharge sluice, a gravity dam, an open ditch, a tunnel, a forebay, a penstock, a powerhouse, a tail water ditch and a booster station etc, a small reservoir is formed by barrage during drawing water from river course to an open ditch.

The powerhouse of the project activity is composed of two 14MW turbines, generated voltage at the alternators terminals is 10.5 KV, which is stepped-up to 110 KV through a booster station to match the nearest Yulei Substation voltage level. Finally the electricity of the project is connected to the Northwest Power Grid (NWPG) via the Yulei Substation. The model of turbines is ZZ660-LH-300, and the model of generators is SF14-28/5100. The details of the equipment can be referred to Table 1 below. After commissioning, the project is operating in good conditions. In this monitoring period, the project was also running orderly without any overhauling and downtimes of equipment. No special events occurred during the monitoring period which may impact the applicability of the methodology.

Table 1. Summary of key equipment in the project

| Turbine     |                       |
|-------------|-----------------------|
| Type        | ZZ660-LH-300          |
| Quantity    | 2                     |
| Rated Head  | 22.0m                 |
| Rated Flow  | 70.4m <sup>3</sup> /s |
| Rated Power | 14,580kW              |

| Generator            |              |
|----------------------|--------------|
| Type                 | SF14-28/5100 |
| Quantity             | 2            |
| Rated Power          | 14,000kW     |
| Rated Voltage        | 10.5kV       |
| Rated Rotation Speed | 214.3r/min   |

## 3.2 Deviations

### 3.2.1 Methodology Deviations

In the registered CDM PDD, there is a deviation on calculation of Build Margin when adopting the methodological tool - "Tool to calculate the emission factor for an electricity system" by the Chinese DNA. The deviation has been approved by the EB Board in a response letter entitled "Request for clarification on use of approved methodology AM0005 for several projects in China" ([http://cdm.unfccc.int/UserManagement/FileStorage/AM\\_CLAR\\_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ](http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ)), thus the same deviation method has been adopted in the crediting period of the project by the Chinese DNA.

This methodology deviation is applied to this monitoring period.

### 3.2.2 Project Description Deviations

The project is registered under VCS scheme in 2010 and completed validation before 19/03/2020, thus it remains eligible to apply the crediting period requirements under VCS scheme in 2010, the first crediting period of the project should be updated from 01/02/2008 - 17/02/2009 to 01/02/2008 - 31/01/2018 (3\*10 years). The deviation for the crediting period is applicable to this monitoring period (27/02/2012 to 31/01/2018) and it has no impacts on the applicability, additionality or baseline of the project. There are no other project description deviations occurred in this monitoring period or a previous monitoring period.

## 3.3 Grouped Projects

NA.

# 4 DATA AND PARAMETERS

#### 4.1 Data and Parameters Available at Validation

|                                                                                              |                                                              |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Data / Parameter                                                                             | EF <sub>y</sub> <sup>4</sup>                                 |
| Data unit                                                                                    | tCO <sub>2</sub> e/MWh                                       |
| Description                                                                                  | The baseline grid emission factor                            |
| Source of data                                                                               | registered VCS PD                                            |
| Value applied                                                                                | 0.8498                                                       |
| Justification of choice of data or description of measurement methods and procedures applied | As per registered CDM PDD                                    |
| Purpose of Data                                                                              | Calculation of baseline emissions                            |
| Comments                                                                                     | Calculated ex ante and fixed for the first crediting period. |

#### 4.2 Data and Parameters Monitored

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter                                                | Electricity Exports (EG <sub>Ex</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data unit                                                       | MWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Description                                                     | Annual electricity supplied to the NWPG by the proposed project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Source of data                                                  | Monthly Meter Records and electricity sales receipts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Description of measurement methods and procedures to be applied | This parameter is monitored through two bi-direction meters (M1 and M2) with accuracy of 0.2s, which are separately installed in Jinkouba station and in Yulei Substation (interconnection facility connecting to the grid). M2 was installed in Yulei Substation works as the main meter of the monitoring system to monitor the net electricity supplied to the grid, which is operated and maintained by the grid. M1 installed in the Booster Station works as backup meter of the main meter M2, which is operated and maintained by the project owner. |
| Frequency of monitoring/recording                               | Measured continuously and recorded monthly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Value monitored                                                 | 848223.876                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

<sup>4</sup> All the parameters listed in the section B.6.2 of the registered CDM PDD are used to calculate EF<sub>y</sub>.

|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          |                  |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------|------------------|------------|
| Monitoring equipment                                                                                                                                                                        | The information of the electricity meters are shown in the following table. The main information of the meters is shown below: |                                                                                                                                                                    |            |          |                  |            |
|                                                                                                                                                                                             | Meter No.                                                                                                                      | Type                                                                                                                                                               | Serial No. | Accuracy | Calibration Date | Valid Date |
|                                                                                                                                                                                             | M2 (main meter)                                                                                                                | SL7000                                                                                                                                                             | 36055681   | 0.2s     | 01/08/2011       | 31/07/2012 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2012       | 21/07/2013 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2013       | 21/07/2014 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2014       | 21/07/2015 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2015       | 21/07/2016 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2016       | 21/07/2017 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 22/07/2017       | 21/07/2018 |
|                                                                                                                                                                                             | M1 (backup meter)                                                                                                              | SL7000                                                                                                                                                             | 36002888   | 0.2s     | 01/08/2011       | 31/07/2012 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2012       | 29/07/2013 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2013       | 29/07/2014 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2014       | 29/07/2015 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2015       | 29/07/2016 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2016       | 29/07/2017 |
|                                                                                                                                                                                             |                                                                                                                                |                                                                                                                                                                    |            |          | 30/07/2017       | 29/07/2018 |
|                                                                                                                                                                                             | QA/QC procedures to be applied                                                                                                 | The electricity meters are calibrated annually by qualified entity according to national standards so that the metering equipments shall have sufficient accuracy. |            |          |                  |            |
| The operational staff of the station were trained before post and can start to operate after achieved certificate so as to ensure the data quality of the electricity supplied to the grid. |                                                                                                                                |                                                                                                                                                                    |            |          |                  |            |
| – Project owner Set up a special VCS project team and developed a VCS manual on the monitoring and management of the project activity.                                                      |                                                                                                                                |                                                                                                                                                                    |            |          |                  |            |
| – Data record and relevant documents will be kept for at least two years after the end of the crediting period of the last issuance of emission reductions.                                 |                                                                                                                                |                                                                                                                                                                    |            |          |                  |            |
| Purpose of the data                                                                                                                                                                         | Calculation of baseline emissions                                                                                              |                                                                                                                                                                    |            |          |                  |            |
|                                                                                                                                                                                             | Measured directly by electricity meters.                                                                                       |                                                                                                                                                                    |            |          |                  |            |

|          |    |
|----------|----|
| Comments | NA |
|----------|----|

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          |                  |            |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------|----------|------------------|------------|
| Data / Parameter                                                | Electricity Imports (EG <sub>Im</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |            |          |                  |            |
| Data unit                                                       | MWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |            |          |                  |            |
| Description                                                     | Annual electricity imported to the project from the NWPG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |            |          |                  |            |
| Source of data                                                  | Monthly Meter Records and electricity sales receipts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |            |          |                  |            |
| Description of measurement methods and procedures to be applied | This parameter is monitored through two bi-direction meters (M1 and M2) with accuracy of 0.2s, which are separately installed in Jinkouba station and in Yulei Substation (interconnection facility connecting to the grid). M2 was installed in Yulei Substation works as the main meter of the monitoring system to monitor the net electricity supplied to the grid, which is operated and maintained by the grid. M1 installed in the Booster Station works as backup meter of the main meter M2, which is operated and maintained by the project owner. |        |            |          |                  |            |
| Frequency of monitoring/recording                               | Measured continuously and recorded monthly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |            |          |                  |            |
| Value monitored                                                 | 22.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |            |          |                  |            |
| Monitoring equipment                                            | The information of the electricity meters are shown in the following table. The main information of the meters is shown below:                                                                                                                                                                                                                                                                                                                                                                                                                               |        |            |          |                  |            |
|                                                                 | Meter No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Type   | Serial No. | Accuracy | Calibration Date | Valid Date |
|                                                                 | M2 (main meter)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SL7000 | 36055681   | 0.2s     | 01/08/2011       | 31/07/2012 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2012       | 21/07/2013 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2013       | 21/07/2014 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2014       | 21/07/2015 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2015       | 21/07/2016 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2016       | 21/07/2017 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 22/07/2017       | 21/07/2018 |
|                                                                 | M1 (backup meter)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SL7000 | 36002888   | 0.2s     | 01/08/2011       | 31/07/2012 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 30/07/2012       | 29/07/2013 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 30/07/2013       | 29/07/2014 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 30/07/2014       | 29/07/2015 |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 30/07/2015       | 29/07/2016 |
| 30/07/2016                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |            |          | 29/07/2017       |            |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |            |            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|------------|------------|
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  | 30/07/2017 | 29/07/2018 |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |            |            |
| QA/QC procedures to be applied | <p>The electricity meters are calibrated annually by qualified entity according to national standards so that the metering equipments shall have sufficient accuracy.</p> <p>The operational staff of the station were trained before post and can start to operate after achieved certificate so as to ensure the data quality of the electricity supplied to the grid.</p> <ul style="list-style-type: none"> <li>– Project owner Set up a special VCS project team and developed a VCS manual on the monitoring and management of the project activity.</li> <li>– Data record and relevant documents will be kept for at least two years after the end of the crediting period of the last issuance of emission reductions.</li> <li>– Measured data is double checked with sales receipts.</li> </ul> |  |  |            |            |
| Purpose of the data            | Calculation of baseline emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |            |            |
| Calculation method             | Measured directly by electricity meters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |            |            |
| Comments                       | NA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |            |            |

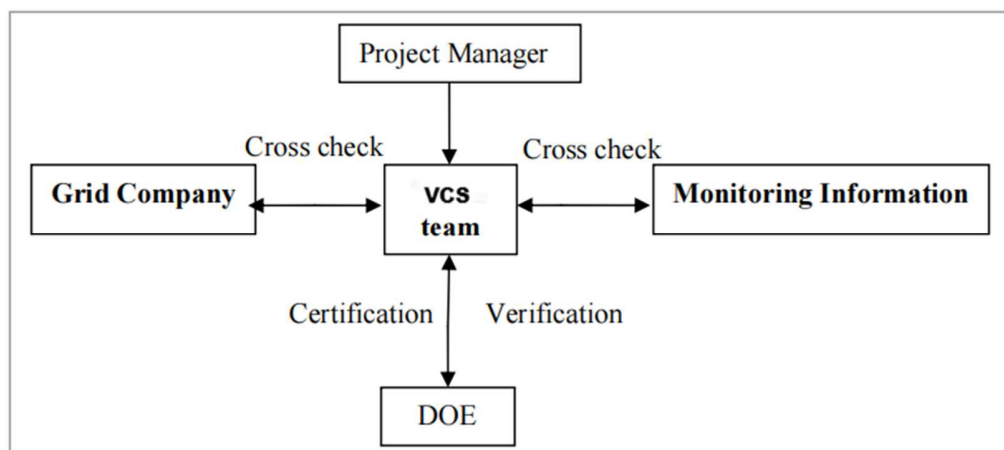
|                                                                 |                                                                                                                    |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Data / Parameter                                                | Net Electricity Exports (EG <sub>y</sub> )                                                                         |
| Data unit                                                       | MWh                                                                                                                |
| Description                                                     | Net electricity supplied to the NWPG by the proposed project in year y                                             |
| Source of data                                                  | Calculated                                                                                                         |
| Description of measurement methods and procedures to be applied | Calculated based on parameters Electricity Exports (EG <sub>Ex</sub> ) and Electricity Imports (EG <sub>Im</sub> ) |

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| Frequency of monitoring/recording | Measured continuously and recorded monthly |
| Value monitored                   | 848201.534                                 |
| Monitoring equipment              | /                                          |
| QA/QC procedures to be applied    | /                                          |
| Purpose of the data               | Calculation of baseline emissions          |
| Calculation method                | $EG_y = EG_{Ex} - EG_{Im}$                 |
| Comments                          | NA                                         |

### 4.3 Monitoring Plan

#### 1. Organizational structure, roles and responsibilities

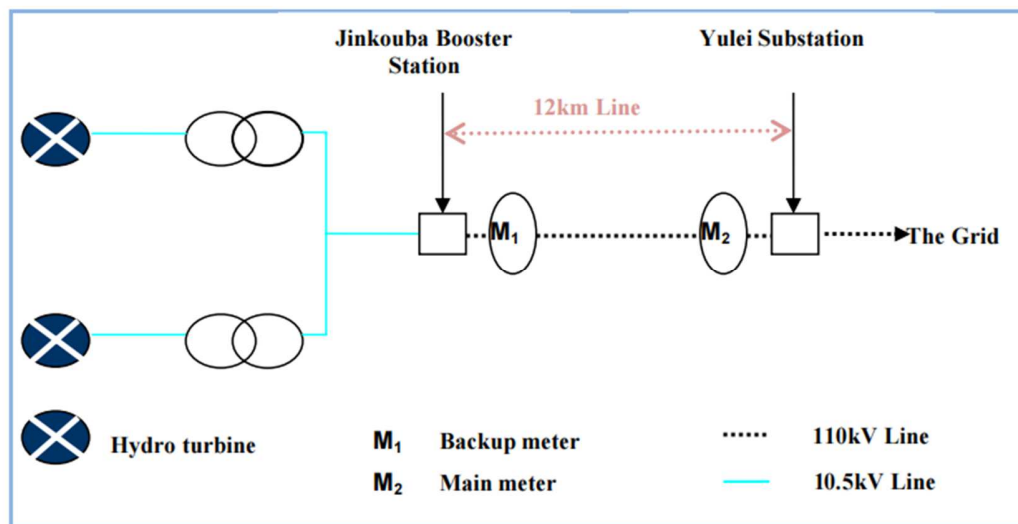
In order to operate and manage the VCS project activities, the project owner - Jintai Hydropower Co. Ltd, the project owner had constituted detailed rules on VCS project management, the special VCS project manager authorized by the project entity is in charge of all the management works, training and the fulfilment of the Monitoring Plan. There set up a VCS project team, the team assigns qualified persons to measure, compile and archive the necessary data of monitoring plan. the project owner's VCS project team:



#### 2. Monitoring system

According to the requirements in metering of Gansu Electric Power Company (GPEPC) and the monitoring requirements of CDM project, two bi-direction meters (M1 and M2) with accuracy of 0.2s are separately installed in Jinkouba station and in Yulei Substation (interconnection facility connecting to the grid). Thereinto, M2 installed in Yulei Substation works as the main meter of the monitoring system to monitor the net electricity supplied to the grid, which is operated and

maintained by GPEPC. M1 installed in the Booster Station works as backup meter of the main meter M2, which is operated and maintained by the project owner. The detailed metering system figure was shown below:



### 3. Data collection procedures

As the emission reduction by the project is determined by the net electricity supplied to the grid, so electricity supplied to the grid ( $EG_{ex}$ ) and electricity imported from the grid ( $EG_{im}$ ) by the project are the key parameters to be monitored. The monthly electricity supplied to the grid and electricity imported from the grid by the project are monitored on the interface between Jinkouba hydropower station and the grid by automatic monitoring equipment by GPEPC and the project entity mutually.

- During this monitoring period, The electricity supplied to the grid by the project and electricity imported from the grid by the project is mainly based on the monitoring data coming from the main meter (M2) installed at Yulei Substation which monitored regularly by Gansu Electric Power Company. The data is measured continuously, record monthly and archived electronically. At the 24:00 of the third last day of each month, the designated staff of Longnan Electric Power Company, a subsidiary company of Gansu Electric Power Company and the project entity jointly record main meter's reading and calculate the monthly electricity. Upon this, the monthly power purchase settlement notice is prepared, which the sales invoice is based on.

- To ensure maximum availability of monitoring data and quality controls of the CDM data, the meter (M1) installed in Jinkouba Booster Station worked as backup meter for the monitoring system and provided useful cross-checks for the main meter. The reading of the backup meter (M1) are recorded electronically once every 15minutes and manually once every 8 hours. Furthermore, the records would be kept in electronic form, and monthly generation data would be printed out for a back up for the improbable event of a computer hazard. When the main meter is found out of action, the readings of the backup meter will serve as the reference for the power purchase settlement notice of the month.

- During this monitoring period, main meter and backup meter were all in good condition.

### 4. Quality Assurance (QA) and Quality Control (QC)

The quality assurance and quality control procedures for reading, maintaining and archiving data are improved as part of this CDM project activity.

- In order to ensure the accuracy and rationality of metering data, the VCS project team is take charge of the audit tasks. All the records (include the electronic files, paper documents, maintenance and calibration data etc.) are reported to the team, so as to judge whether there is bias on plant operation and ensure the on-going process through the defined crediting period in terms of the need for verification on an annual basis.

- Calibrations are carried out annually by Electricity Measurement Centre of Gansu Provincial Power Co., and then lead seals to ensure the accuracy and impartiality of the meters. Calibration tests records have been maintained for verification.

- In addition, the data required for the calculations of reduce emission for verification is mainly based on the data monitored by main meter M2, and secondary to the data monitored by the M1 in power plant. Moreover, the monitoring data by the plant can be cross-checked with the Electricity Sales Invoices issued by Electricity Power Company.

## **5. Emergency procedures for the monitoring system**

In case metering equipment is damaged and no reliable readings can be recorded the project owner will use the following procedure:

- In case main meter (M2) recorded by the grid company are in malfunction, the monitoring data of backup meter (M1) will be used to calculate the data. The electricity exported to the grid ( $EG_{Ex}$ ) monitored by backup meter shall be deducted the maximum value of the monthly line loss among historical data. Meanwhile, the electricity imported from the grid ( $EG_{Im}$ ) shall be added the maximum value of monthly line loss among historical data.

- In case main meter (M2) and backup meter (M1) are both in malfunction, the electricity supplied to the grid ( $EG_{Ex}$ ) used for emission reduction calculation is considered to be zero during the malfunction period, and the electricity imported from the grid ( $EG_{Im}$ ) during the malfunction period will be the maximum value of the monthly electricity imported from the grid among the historical data. The relevant written materials, electronic files will be submitted in a transparent manner to DOE for verification purposes, and DOE will analysis the probably error data according to the conservative principles and requirements of CDM. During this monitoring period, monitoring system works smoothly, main meter and backup meter are both in good conditions.

## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

The emission reduction by the project is calculated according to approved consolidated methodology ACM0002 (Version 06). The equation is showed below:

$$ER_y = BE_y - PE_y$$

Where:

$ER_y$  is the emission reductions in year  $y$  (tCO<sub>2</sub>e/yr)

$BE_y$  is baseline emissions in year  $y$  (tCO<sub>2</sub>e/yr)

$PE_y$  is project emissions in year  $y$  (tCO<sub>2</sub>e/yr)

To calculate  $BE_y$ :

$$BE_y = EG_y \times EF_y$$

Where:

$EG_y$  = Net Electricity Exports (MWh/yr).

$EF_y$  = The baseline grid emission factor (tCO<sub>2</sub>e/MWh).

The emission factor  $EF_y$ , with the value of 0.8498 tCO<sub>2</sub>e/MWh, is calculated ex-ante and is fixed during the crediting period. The details of the net Electricity Exports in this monitoring period (27/02/2012 ~ 31/01/2018) is shown in Table 2.

Table 2. The summarization of emission reductions from 27/02/2012 ~ 31/01/2018<sup>5</sup>.

| Monitoring period |            | Electricity exports (MWh) |                            |                              | Electricity imports (MWh) |                            |                              | Net electricity exports (EGy) | Emission reductions (ERy) |
|-------------------|------------|---------------------------|----------------------------|------------------------------|---------------------------|----------------------------|------------------------------|-------------------------------|---------------------------|
| from              | to         | meter reading records     | electricity sales receipts | Data used for ER calculation | meter reading records     | electricity sales receipts | Data used for ER calculation | (MWh)                         | (tCO2e)                   |
|                   |            | A                         | B                          | C=MIN(A,B)                   | D                         | E                          | F=MAX(D,E)                   | G                             | H                         |
| 27/02/2012        | 27/02/2012 | 172.528                   | 172.528                    | 172.528                      | 0.000                     | 0.000                      | 0.000                        | 172.528                       | 147                       |
| 28/02/2012        | 29/03/2012 | 6137.868                  | 6137.868                   | 6137.868                     | 0.000                     | 0.000                      | 0.000                        | 6137.868                      | 5216                      |
| 30/03/2012        | 28/04/2012 | 9540.828                  | 9540.828                   | 9540.828                     | 0.000                     | 0.000                      | 0.000                        | 9540.828                      | 8108                      |
| 29/04/2012        | 29/05/2012 | 17033.148                 | 17033.148                  | 17033.148                    | 1.113                     | 1.113                      | 1.113                        | 17032.035                     | 14474                     |
| 30/05/2012        | 28/06/2012 | 17446.704                 | 17446.704                  | 17446.704                    | 0.000                     | 0.000                      | 0.000                        | 17446.704                     | 14826                     |
| 29/06/2012        | 29/07/2012 | 18766.572                 | 18766.572                  | 18766.572                    | 0.000                     | 0.000                      | 0.000                        | 18766.572                     | 15948                     |
| 30/07/2012        | 29/08/2012 | 20054.496                 | 20054.496                  | 20054.496                    | 0.000                     | 0.000                      | 0.000                        | 20054.496                     | 17042                     |
| 30/08/2012        | 28/09/2012 | 17857.488                 | 17857.488                  | 17857.488                    | 0.000                     | 0.000                      | 0.000                        | 17857.488                     | 15175                     |
| 29/09/2012        | 29/10/2012 | 18929.988                 | 18929.988                  | 18929.988                    | 0.000                     | 0.000                      | 0.000                        | 18929.988                     | 16087                     |
| 30/10/2012        | 28/11/2012 | 12020.316                 | 12020.316                  | 12020.316                    | 1.336                     | 1.336                      | 1.336                        | 12018.980                     | 10214                     |
| 29/11/2012        | 29/12/2012 | 8823.012                  | 8823.012                   | 8823.012                     | 1.417                     | 1.417                      | 1.417                        | 8821.595                      | 7497                      |
| 30/12/2012        | 31/12/2012 | 258.259                   | 258.259                    | 258.259                      | 0.000                     | 0.000                      | 0.000                        | 258.259                       | 219                       |
| Sub Total         |            | 147041.207                | 147041.207                 | 147041.207                   | 3.866                     | 3.866                      | 3.866                        | 147037.341                    | 124952                    |
| 01/01/2013        | 29/01/2013 | 7227.725                  | 7227.725                   | 7227.725                     | 1.134                     | 1.134                      | 1.134                        | 7226.591                      | 6141                      |

<sup>5</sup> Since the transaction date was the third last day of each month, the amount of electricity exports and imports from the period of 30/12/2012 to 31/12/2012, 30/12/2013 to 31/12/2013, 30/12/2014 to 31/12/2014, 30/12/2015 to 31/12/2015, 30/12/2016 to 31/12/2016, 30/12/2017 to 31/12/2017, 30/01/2018 to 31/01/2018 have been confirmed by the grid company.

|                  |            |                   |                   |                   |              |              |              |                   |               |
|------------------|------------|-------------------|-------------------|-------------------|--------------|--------------|--------------|-------------------|---------------|
| 30/01/2013       | 26/02/2013 | 5372.268          | 5372.268          | 5372.268          | 0.000        | 0.000        | 0.000        | 5372.268          | 4565          |
| 27/02/2013       | 29/03/2013 | 5715.996          | 5715.996          | 5715.996          | 0.000        | 0.000        | 0.000        | 5715.996          | 4857          |
| 30/03/2013       | 28/04/2013 | 6271.320          | 6271.320          | 6271.320          | 0.000        | 0.000        | 0.000        | 6271.320          | 5329          |
| 29/04/2013       | 29/05/2013 | 15046.284         | 15046.284         | 15046.284         | 0.000        | 0.000        | 0.000        | 15046.284         | 12786         |
| 30/05/2013       | 28/06/2013 | 16723.740         | 16723.740         | 16723.740         | 0.000        | 0.000        | 0.000        | 16723.740         | 14212         |
| 29/06/2013       | 29/07/2013 | 19845.936         | 19845.936         | 19845.936         | 0.000        | 0.000        | 0.000        | 19845.936         | 16865         |
| 30/07/2013       | 29/08/2013 | 15697.968         | 15697.968         | 15697.968         | 0.000        | 0.000        | 0.000        | 15697.968         | 13340         |
| 30/08/2013       | 28/09/2013 | 15682.392         | 15682.392         | 15682.392         | 0.000        | 0.000        | 0.000        | 15682.392         | 13327         |
| 29/09/2013       | 29/10/2013 | 12465.816         | 12465.816         | 12465.816         | 0.000        | 0.000        | 0.000        | 12465.816         | 10593         |
| 30/10/2013       | 28/11/2013 | 9336.492          | 9336.492          | 9336.492          | 1.149        | 1.149        | 1.149        | 9335.343          | 7933          |
| 29/11/2013       | 29/12/2013 | 7589.076          | 7589.076          | 7589.076          | 1.621        | 1.621        | 1.621        | 7587.455          | 6448          |
| 30/12/2013       | 31/12/2013 | 401.859           | 401.859           | 401.859           | 0.000        | 0.000        | 0.000        | 401.859           | 341           |
| <b>Sub Total</b> |            | <b>137376.872</b> | <b>137376.872</b> | <b>137376.872</b> | <b>3.904</b> | <b>3.904</b> | <b>3.904</b> | <b>137372.968</b> | <b>116739</b> |
| 01/01/2014       | 29/01/2014 | 5826.957          | 5826.957          | 5826.957          | 0.000        | 0.000        | 0.000        | 5826.957          | 4952          |
| 30/01/2014       | 26/02/2014 | 4879.644          | 4879.644          | 4879.644          | 0.000        | 0.000        | 0.000        | 4879.644          | 4147          |
| 27/02/2014       | 29/03/2014 | 5900.796          | 5900.796          | 5900.796          | 0.000        | 0.000        | 0.000        | 5900.796          | 5014          |
| 30/03/2014       | 28/04/2014 | 11877.624         | 11877.624         | 11877.624         | 0.000        | 0.000        | 0.000        | 11877.624         | 10094         |
| 29/04/2014       | 29/05/2014 | 15294.312         | 15294.312         | 15294.312         | 0.000        | 0.000        | 0.000        | 15294.312         | 12997         |
| 30/05/2014       | 28/06/2014 | 17821.188         | 17821.188         | 17821.188         | 0.000        | 0.000        | 0.000        | 17821.188         | 15144         |
| 29/06/2014       | 29/07/2014 | 15983.352         | 15983.352         | 15983.352         | 0.977        | 0.977        | 0.977        | 15982.375         | 13582         |
| 30/07/2014       | 29/08/2014 | 15792.348         | 15792.348         | 15792.348         | 0.000        | 0.000        | 0.000        | 15792.348         | 13420         |
| 30/08/2014       | 28/09/2014 | 16455.780         | 16455.780         | 16455.780         | 1.117        | 1.117        | 1.117        | 16454.663         | 13983         |

|                  |            |                   |                   |                   |              |              |              |                   |               |
|------------------|------------|-------------------|-------------------|-------------------|--------------|--------------|--------------|-------------------|---------------|
| 29/09/2014       | 29/10/2014 | 18240.024         | 18240.024         | 18240.024         | 0.000        | 0.000        | 0.000        | 18240.024         | 15500         |
| 30/10/2014       | 28/11/2014 | 12820.368         | 12820.368         | 12820.368         | 0.000        | 0.000        | 0.000        | 12820.368         | 10895         |
| 29/11/2014       | 29/12/2014 | 9118.560          | 9118.560          | 9118.560          | 1.312        | 1.312        | 1.312        | 9117.248          | 7748          |
| 30/12/2014       | 31/12/2014 | 518.096           | 518.096           | 518.096           | 0.000        | 0.000        | 0.000        | 518.096           | 440           |
| <b>Sub Total</b> |            | <b>150529.049</b> | <b>150529.049</b> | <b>150529.049</b> | <b>3.406</b> | <b>3.406</b> | <b>3.406</b> | <b>150525.643</b> | <b>127916</b> |
| 01/01/2015       | 29/01/2015 | 7512.388          | 7512.388          | 7512.388          | 0.000        | 0.000        | 0.000        | 7512.388          | 6384          |
| 30/01/2015       | 26/02/2015 | 5765.100          | 5765.100          | 5765.100          | 0.000        | 0.000        | 0.000        | 5765.100          | 4899          |
| 27/02/2015       | 29/03/2015 | 7106.880          | 7106.880          | 7106.880          | 0.000        | 0.000        | 0.000        | 7106.880          | 6039          |
| 30/03/2015       | 28/04/2015 | 9980.916          | 9980.916          | 9980.916          | 0.000        | 0.000        | 0.000        | 9980.916          | 8482          |
| 29/04/2015       | 29/05/2015 | 13022.988         | 13022.988         | 13022.988         | 0.000        | 0.000        | 0.000        | 13022.988         | 11067         |
| 30/05/2015       | 28/06/2015 | 17782.248         | 17782.248         | 17782.248         | 0.000        | 0.000        | 0.000        | 17782.248         | 15111         |
| 29/06/2015       | 29/07/2015 | 19713.804         | 19713.804         | 19713.804         | 0.000        | 0.000        | 0.000        | 19713.804         | 16753         |
| 30/07/2015       | 29/08/2015 | 16114.824         | 16114.824         | 16114.824         | 1.103        | 1.103        | 1.103        | 16113.721         | 13693         |
| 30/08/2015       | 28/09/2015 | 15945.336         | 15945.336         | 15945.336         | 0.000        | 0.000        | 0.000        | 15945.336         | 13550         |
| 29/09/2015       | 29/10/2015 | 17313.384         | 17313.384         | 17313.384         | 0.000        | 0.000        | 0.000        | 17313.384         | 14713         |
| 30/10/2015       | 28/11/2015 | 11625.372         | 11625.372         | 11625.372         | 1.542        | 1.542        | 1.542        | 11623.830         | 9878          |
| 29/11/2015       | 29/12/2015 | 8422.128          | 8422.128          | 8422.128          | 1.089        | 1.089        | 1.089        | 8421.039          | 7156          |
| 30/12/2015       | 31/12/2015 | 550.576           | 550.576           | 550.576           | 0.000        | 0.000        | 0.000        | 550.576           | 468           |
| <b>Sub Total</b> |            | <b>150855.944</b> | <b>150855.944</b> | <b>150855.944</b> | <b>3.734</b> | <b>3.734</b> | <b>3.734</b> | <b>150852.210</b> | <b>128194</b> |
| 01/01/2016       | 29/01/2016 | 7983.356          | 7983.356          | 7983.356          | 0.000        | 0.000        | 0.000        | 7983.356          | 6784          |
| 30/01/2016       | 27/02/2016 | 6037.020          | 6037.020          | 6037.020          | 0.000        | 0.000        | 0.000        | 6037.020          | 5130          |
| 28/02/2016       | 29/03/2016 | 6919.044          | 6919.044          | 6919.044          | 0.000        | 0.000        | 0.000        | 6919.044          | 5880          |
| 30/03/2016       | 28/04/2016 | 10217.460         | 10217.460         | 10217.460         | 0.000        | 0.000        | 0.000        | 10217.460         | 8683          |

|                  |            |                   |                   |                   |              |              |              |                   |               |
|------------------|------------|-------------------|-------------------|-------------------|--------------|--------------|--------------|-------------------|---------------|
| 29/04/2016       | 29/05/2016 | 13140.204         | 13140.204         | 13140.204         | 0.000        | 0.000        | 0.000        | 13140.204         | 11167         |
| 30/05/2016       | 28/06/2016 | 14706.384         | 14706.384         | 14706.384         | 0.000        | 0.000        | 0.000        | 14706.384         | 12497         |
| 29/06/2016       | 29/07/2016 | 15995.496         | 15995.496         | 15995.496         | 1.317        | 1.317        | 1.317        | 15994.179         | 13592         |
| 30/07/2016       | 29/08/2016 | 9843.900          | 9843.900          | 9843.900          | 0.000        | 0.000        | 0.000        | 9843.900          | 8365          |
| 30/08/2016       | 28/09/2016 | 11154.528         | 11154.528         | 11154.528         | 0.000        | 0.000        | 0.000        | 11154.528         | 9479          |
| 29/09/2016       | 29/10/2016 | 16834.884         | 16834.884         | 16834.884         | 0.000        | 0.000        | 0.000        | 16834.884         | 14306         |
| 30/10/2016       | 28/11/2016 | 11979.132         | 11979.132         | 11979.132         | 1.074        | 1.074        | 1.074        | 11978.058         | 10179         |
| 29/11/2016       | 29/12/2016 | 8486.940          | 8486.940          | 8486.940          | 1.189        | 1.189        | 1.189        | 8485.751          | 7211          |
| 30/12/2016       | 31/12/2016 | 459.956           | 459.956           | 459.956           | 0.000        | 0.000        | 0.000        | 459.956           | 391           |
| <b>Sub Total</b> |            | <b>133758.304</b> | <b>133758.304</b> | <b>133758.304</b> | <b>3.580</b> | <b>3.580</b> | <b>3.580</b> | <b>133754.724</b> | <b>113664</b> |
| 01/01/2017       | 29/01/2017 | 6669.364          | 6669.364          | 6669.364          | 0.000        | 0.000        | 0.000        | 6669.364          | 5668          |
| 30/01/2017       | 26/02/2017 | 5116.716          | 5116.716          | 5116.716          | 0.000        | 0.000        | 0.000        | 5116.716          | 4348          |
| 27/02/2017       | 29/03/2017 | 6150.408          | 6150.408          | 6150.408          | 0.000        | 0.000        | 0.000        | 6150.408          | 5227          |
| 30/03/2017       | 28/04/2017 | 9879.540          | 9879.540          | 9879.540          | 0.000        | 0.000        | 0.000        | 9879.540          | 8396          |
| 29/04/2017       | 29/05/2017 | 16222.008         | 16222.008         | 16222.008         | 0.000        | 0.000        | 0.000        | 16222.008         | 13785         |
| 30/05/2017       | 28/06/2017 | 16922.136         | 16922.136         | 16922.136         | 1.161        | 1.161        | 1.161        | 16920.975         | 14379         |
| 29/06/2017       | 29/07/2017 | 14060.640         | 14060.640         | 14060.640         | 0.000        | 0.000        | 0.000        | 14060.640         | 11949         |
| 30/07/2017       | 29/08/2017 | 15757.368         | 15757.368         | 15757.368         | 0.000        | 0.000        | 0.000        | 15757.368         | 13391         |
| 30/08/2017       | 28/09/2017 | 17769.048         | 17769.048         | 17769.048         | 0.000        | 0.000        | 0.000        | 17769.048         | 15100         |
| 29/09/2017       | 29/10/2017 | 5823.180          | 5823.180          | 5823.180          | 0.000        | 0.000        | 0.000        | 5823.180          | 4949          |
| 30/10/2017       | 28/11/2017 | 5767.080          | 5767.080          | 5767.080          | 1.146        | 1.146        | 1.146        | 5765.934          | 4900          |
| 29/11/2017       | 29/12/2017 | 2779.524          | 2779.524          | 2779.524          | 1.408        | 1.408        | 1.408        | 2778.116          | 2361          |

|                  |            |                   |                   |                   |               |               |               |                   |               |
|------------------|------------|-------------------|-------------------|-------------------|---------------|---------------|---------------|-------------------|---------------|
| 30/12/2017       | 31/12/2017 | 361.109           | 361.109           | 361.109           | 0.000         | 0.000         | 0.000         | 361.109           | 307           |
| <b>Sub Total</b> |            | <b>123278.121</b> | <b>123278.121</b> | <b>123278.121</b> | <b>3.715</b>  | <b>3.715</b>  | <b>3.715</b>  | <b>123274.406</b> | <b>104758</b> |
| 01/01/2018       | 29/01/2018 | 5236.087          | 5236.087          | 5236.087          | 0.137         | 0.137         | 0.137         | 5235.950          | 4450          |
| 30/01/2018       | 31/01/2018 | 148.292           | 148.292           | 148.292           | 0.000         | 0.000         | 0.000         | 148.292           | 126           |
| <b>Sub Total</b> |            | <b>5384.379</b>   | <b>5384.379</b>   | <b>5384.379</b>   | <b>0.137</b>  | <b>0.137</b>  | <b>0.137</b>  | <b>5384.242</b>   | <b>4575</b>   |
| <b>total</b>     |            | <b>848223.876</b> | <b>848223.876</b> | <b>848223.876</b> | <b>22.342</b> | <b>22.342</b> | <b>22.342</b> | <b>848201.534</b> | <b>720798</b> |

Thus, the baseline emission during this monitoring period is 720,798 tCO<sub>2</sub>e.

## 5.2 Project Emissions

As per the registered VCS PD and registered CDM PDD, the project activity is a run-of-river hydropower plant with a small reservoir formed by barrage during drawing water from river course to an open ditch. As per the ACM0002 (version 06), for run-of-river hydro power plant, the project emission is 0.

## 5.3 Leakage

According to methodology ACM0002 (version 06), No leakage emissions should be considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use. These emissions sources are neglected.

## 5.4 Net GHG Emission Reductions and Removals

| Year                  | Baseline emissions or removals (tCO <sub>2</sub> e) | Project emissions or removals (tCO <sub>2</sub> e) | Leakage emissions (tCO <sub>2</sub> e) | Net GHG emission reductions or removals (tCO <sub>2</sub> e) |
|-----------------------|-----------------------------------------------------|----------------------------------------------------|----------------------------------------|--------------------------------------------------------------|
| 27/02/2012~31/12/2012 | 124,952                                             | 0                                                  | 0                                      | 124,952                                                      |
| 01/01/2013~31/12/2013 | 116,739                                             | 0                                                  | 0                                      | 116,739                                                      |
| 01/01/2014~31/12/2014 | 127,916                                             | 0                                                  | 0                                      | 127,916                                                      |
| 01/01/2015~31/12/2015 | 128,194                                             | 0                                                  | 0                                      | 128,194                                                      |
| 01/01/2016~31/12/2016 | 113,664                                             | 0                                                  | 0                                      | 113,664                                                      |
| 01/01/2017~31/12/2017 | 104,758                                             | 0                                                  | 0                                      | 104,758                                                      |
| 01/01/2018~31/01/2018 | 4,575                                               | 0                                                  | 0                                      | 4,575                                                        |
| <b>Total</b>          | <b>720,798</b>                                      | <b>0</b>                                           | <b>0</b>                               | <b>720,798</b>                                               |

According to the registered VCS PD, the estimated value of emission reduction during this monitoring period is 108,689 tCO<sub>2</sub>e per year. The total estimated value of the emission reduction of this monitoring period is calculated as:

$$\text{Total Estimated ER}_y = \frac{108,689 \text{ tCO}_2\text{e} \times \text{number of monitored days}}{365}$$

In the monitoring period from 27/02/2012 to 31/01/2018 (2166 days, both days included), the estimated emission reduction is 644,987 tCO<sub>2</sub>e while the actual emission reduction is 720,798 tCO<sub>2</sub>e.

Table 3. The comparison of emission reductions between the estimated and actual value

| Estimated ER <sub>y</sub> during Monitoring Period (tCO <sub>2</sub> e) | Actual ER <sub>y</sub> during Monitoring Period (tCO <sub>2</sub> e) | Difference Percentage (%) |
|-------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------|
| 644,987                                                                 | 720,798                                                              | +11.75                    |

Thus, the actual emission reduction is 11.75% higher than the estimated emission reduction, which is caused by high quality of management, which eliminates most of the uncontrollable factors and guarantees its operation, including:

- Rationally arrange equipment maintenance plans in the dry season, improve the maintenance process, ensure smooth operation of the equipment in the flood season, avoiding the income accident, and increasing the engineering.
- For equipment defects that cannot be handled during the water, thoroughly processed in the dry season, preparing for power generation in wet season.
- during the normal operation of generator units, strengthen the quality of the operator's inspection, increase the patrol frequency, once defects and hidden dangers are identified, handle them immediately.
- Strengthen the dredging and plugging of the river channels to ensure the smooth of water flow. During maintenance period, completely clean the canal landslide, sludge, violating buildings, rock, sediment, etc. to ensure the smooth of water flow. Completely remove the waste in tail water channel to ensure the safe operation of the power station while improving the power generation of the unit.
- Reasonable dispatching the gate and keep the safe economic water level. During wet season, maintains the high water head of the generator unit. Understand the weather forecast in advance and observe the water situation at any time. Reduce the water storage amount before the big flood, reduce abandoning water for power generation.

Through the implementation of the above measures, the project activity has increased the reliability and equipment reliability of the equipment since 2012, and the effectiveness of generator units and power generation have also increased. Furthermore, the measures were taken to improve management levels to guarantee the operation, which is not in relation with design changes of the project activity.

As per registered CDM PDD, the estimated emission reductions achieved from operation start date to the end of this monitoring period (from 01/02/2008 to 31/01/2018, in total 3,653 days) is calculated to be 1,087,873 tCO<sub>2</sub>e. As per the approved VCS MR and CDM MR of previous monitoring periods, the emission reductions achieved of this period is 1,157,764 tCO<sub>2</sub>e, which is 6.43% higher than that estimated.

| Monitoring period                                      | Days         | Actual Emission reductions (tCO <sub>2</sub> e) | Estimated Emission reductions (tCO <sub>2</sub> e) | Comparison between actual and estimated emission reductions |
|--------------------------------------------------------|--------------|-------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|
| 01/02/2008 - 17/02/2009 (VCS)                          | 383          | 100,512                                         | 114,049                                            | -11.87%                                                     |
| 18/02/2009 - 26/02/2010 (CDM)                          | 374          | 115,814                                         | 111,369                                            | 3.99%                                                       |
| 27/02/2010 - 26/02/2011 (CDM)                          | 365          | 114,164                                         | 108,689                                            | 5.04%                                                       |
| 27/02/2011 - 26/02/2012 (CDM)                          | 365          | 106,476                                         | 108,689                                            | -2.04%                                                      |
| 27/02/2012 - 31/01/2018 (VCS) (this monitoring period) | 2,166        | 720,798                                         | 644,987                                            | 11.75%                                                      |
| <b>Total</b>                                           | <b>3,653</b> | <b>1,157,764</b>                                | <b>1,087,783</b>                                   | <b>6.43%</b>                                                |

According to the registered CDM PDD, if the power generation is increased by 8.3%, Financial Internal Return Rate (FIRR) of the project activity will reach the benchmark (8%). Thus, with 6.43% higher, the FIRR of this project is still lower than the benchmark, which retain the additionality of this project.