

VGS Monitoring Report

Qielong 1.2MW Hydro Power Project (GS 481)

1st Monitoring Period:

05/04/2010 – 25/03/2013

Version 2

15/04/2014

Climate Bridge Ltd.

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¹ All annexes are confidential.

1. Introduction

The purpose of this report is to calculate the emission reductions and sustainable developments achieved by *Qielong 1.2MW Hydro Power Project* (Gold Standard ID 481) during the first monitoring and crediting period covered by this report, and to serve as basis for the verification and issuance of corresponding GS-VER credits.

1.1 Monitoring and Crediting Period

05/04/2010 – 25/03/2013

1.2 Document Reference

Version: 2

Date: 15/04/2014

2. General description of the project

The *Qielong 1.2MW Hydro Power Project* (hereafter referred to as “the project”) developed at the downstream of Qielong Gully, a branch of Daxia River, Madang Township, Xiahe County, Gannan Tibetan Autonomous Prefecture, Gansu Province, P.R. China. The geographical coordinates of the power house are east longitude 102.8100 and north latitude 35.3278. Figure 2-1 shows the location of the project site.

Developed by Xiahe Xingxin Hydropower Development Co., Ltd, this hydro project involves the construction and operation of run-of-river hydro power plant that utilizes water from Qielong River to generate electricity. The total installed capacity of the project is 1.2 MW including two sets of turbines of 0.4 MW and 0.8 MW respectively to produce 6,050 MWh electricity each year. The annual feed-in electricity is 5,808 MWh. The generated electricity is connected to the nearby Madang Transform Station via a 10 KV power transmission line and finally reaches North West China Power Grid (NWCPG), displacing an equivalent amount of power from NWCPG which is mainly dominated by fossil fuel-fired power plants. According to the registered PDD, it is estimated to achieve annual emission reductions of 4,843 tCO₂e during the first crediting period.

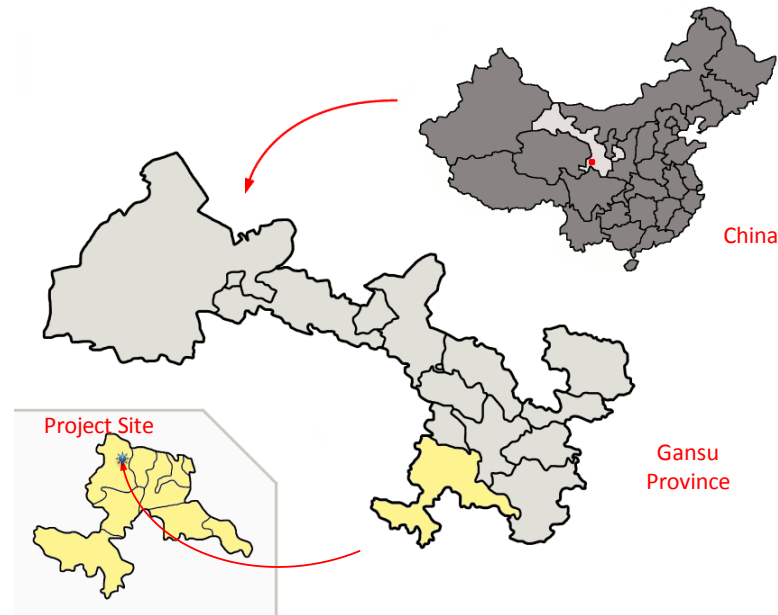


Figure 2-1 Location of the Project Site

The construction of the project commences on 12/09/2007, and its operation starts on 28/12/2009 according to project owner. Registered as a retroactive Gold Standard project on 04/04/2012, the starting date of the first crediting period is 05/04/2010 with 7 years as the chosen crediting period. The emission reductions during this monitoring period from 05/04/2010 to 25/03/2013 are 5,987 tCO₂e.

The project contributes to sustainable development in the ethnical minority area through social, economic and environmental wellbeing. It helps to balancing the power supply and demand in the local area by generating renewable electricity. It not only provides financial return on local entities but also provides direct and indirect employment opportunities, which leads to economic well-being of local residents. The equivalent amount of the electricity that is originally generated through fossil fuel-based power plants is offset, thus helping reduce greenhouse gas emission to the environment. In addition, local vegetation is recovered after construction period to reduce soil and water loss. A path and a bridge are paved and built by the project owner to ease the local transportation, and a water channel is built up for irrigation for the local residents. The sustainable development matrix includes indicators of local environmental sustainability, social sustainability & development, and economic& technological development. Please refer to it for more details.

3. Emission Reduction Monitoring

3.1 Monitoring Plan and data

The baseline and monitoring methodology applies for the project is methodology ACM0002 (Version 12.3.0): “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”. In line with application of the methodology the proposed project adopts the “Tool for the demonstration and assessment of additionality” (Version 05.2) and “Tool to calculate the emission factor for an electricity system” (Version 02.2.1).

Relevant data necessary for determining the baseline of emission by sources of GHGs within the project boundary is list below:

Table 3-1 Data related to determine the baseline of emission reductions

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c) estimated (e)	Recording frequency	Data value	How will the data be archived? (electronic/paper)	Comment
1	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility, y}$)	The difference between the measured quantities of the grid electricity export and the import in year y.	MWh	m	Measured continuously and recorded at least monthly	See details in Annex 1&2	Paper	Meters are calibrated yearly based on national Chinese standard ‘technical norm of the calibration of AC watt-hour meter at place of installation’ (JJG 1055-1997). Cross-check by the receipts of electricity sales and purchase. Please refer to Annex 1 for electricity transmission sheets and Annex 2 for sales receipts. All data will be archived for 2 years after the end of the last crediting period.
2	Installed capacity of the hydro power	Project site	W	m	Once a year	2010 year: 1200 W 2011 year:	Electronic	The installed capacity of the project was measured by checking the nameplates of the generators. The install capacity was

	plant after the implementation of the project activity (CapPJ)					1200 W 2012 year: 1200 W		totally 1200W (400W + 1200W). Please refer to Annex 3 for the generators' nameplates.
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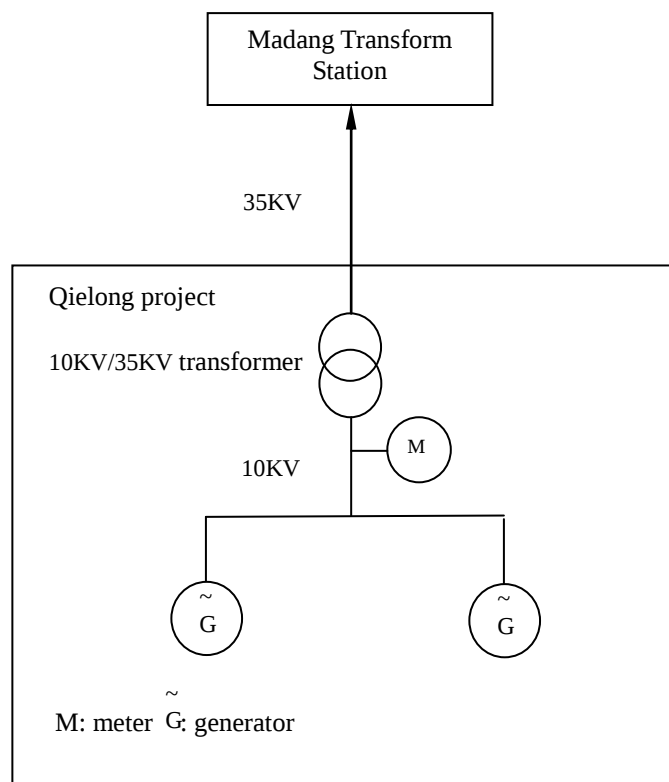


Figure 3-1 Diagram of grid connection

As the diagram of grid connection showed, the electricity generated by two generators combines and transfers to Madang Transform Station via a 10KV transmission line and finally to the NWCPG.

Revenue Meter: A bilateral revenue meter is installed at the outlet of Qielong hydropower station. It measures both the amount of electricity exported to

the grid and the amount of electricity imported from the grid. The accuracy of the revenue meter is 0.5s described in PDD. Calibration has been done by authority in line with the national Chinese standard ‘technical norm of the calibration of AC watt-hour meter at place of installation’ (JJG 1055-1997).

Specifications of the revenue meter are listed below:

Table 3-2 Specifications of the Revenue Meter

Type	Serial Number	Accuracy	Meter Verifier	Calibration Frequency	Calibration Date	Evidence
DSSD331	20080427010051	0.5s	Gannan Power Company Energy Metering Centre	yearly	23/09/2009 15/09/2010 10/09/2011 05/09/2012	Refer to Annex 4 for the photo of revenue meter and Annex 5 for the calibration reports for this monitoring period.

CAP_{PJ}: The installed capacity of the project (CAP_{PJ}) has been verified on site for the nameplates of generators. Please refer to **Annex 3** for the generators’ nameplates.

For this monitoring period, as no malfunction happened to the revenue meter, therefore the source of data to calculate emission reductions is from the revenue meter based on the description of registered PDD.

3.2 Operational and management structure

The monitoring of the emissions reductions is carried out according to the operation and management structure shown in Figure 3-2.

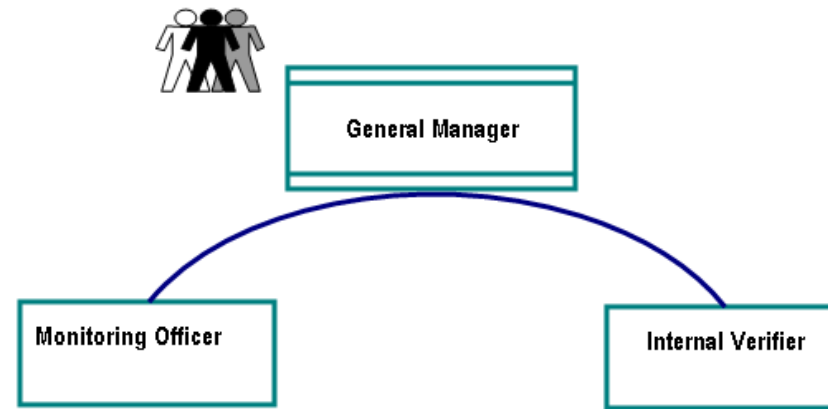


Figure 3-2 Operations and Management Structure

- 1) The general manager, assigned by the project owner, conducts the overall responsibility for the monitoring process.
- 2) Station staff served as the monitoring officer to carry out the measurement of the exports and imports electricity recordings.
- 3) An accountant worked as internal verifier is responsible for internal verification of the measurement, collection of electricity receipts and invoices and the calculation of the emission reductions.

3.3 Quality control (QC) and quality assurance (QA)

Besides data management procedure described above, the project owner also took the following procedures to ensure the operation and accuracy:

- 1) The revenue meter is equipped and calibrated periodically in accordance with the national Chinese standard ‘electricity meter installation technical management code’ (DL/T448-2000) and ‘technical norm of the calibration of AC watt-hour meter at place of installation’ (JJG 1055-1997).
- 2) Data and records are checked by the monitoring officers, the internal verifier and the general manager prior to being recorded and archived to avoid possible errors.
- 3) All relevant staff received training periodically to guarantee the implementation of the monitoring plan. Please refer to **Annex 6** for the training records.
- 4) A monitoring and quality control manual of Qielong hydropower station identifying detailed duties and responsibilities of the relevant parties has been

developed by Climate Bridge Ltd., and is served as a basis of the project monitoring. Please refer to **Annex 7** for the monitoring and quality control manual.

5) In the case of abnormal operation, the project owner and the power company will negotiate to reach an agreement for the misrecorded data and the replacement of the meter. If the negotiation is failed, the data monitored within this certain period shall not be claimed. No abnormal operation happened in this monitoring period.

3.4 Emission reductions Calculation

Baseline Emissions

The baseline emissions were calculated as follows:

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y}$$

Where :

BE_y = Baseline Emissions in year y; (tCO₂e/yr).

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year (MWh/yr). $EG_{facility,y} = EG_{export,y} - EG_{import,y}$

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y (tCO₂e/MWh). According to the registered PDD,
 $EF_{grid,CM,y} = 0.83395$ tCO₂e/MWh

Project Emissions

According to ACM0002 (Version 12.3.0), as a renewable power project, the project emissions is zero. $PE_y = 0$ tCO₂e.

Leakage

According to ACM0002 (Version 12.3.0), no leakage emissions are considered.

Emission Reductions

According to ACM0002 (Version 12.3.0), emission reductions (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where :

ER_y = Emission reductions in year y (tCO₂e/yr)
 BE_y = Baseline emissions in year y (tCO₂e/yr)
 PE_y = Project emissions in year y (tCO₂e/yr)

Detailed amounts of the recorded electricity generated from the project and calculations of emission reductions are listed below:

Table 3-3 Emission reductions from 05/04/2010 to 25/03/2013

Time Period ²	Electricity Exported $EG_{export,y}$ (MWh)	Electricity Imported $EG_{import,y}$ (MWh)	Net Electricity Supplied $EG_{facility,y}$ (MWh)	Baseline Emissions BE_y (tCO ₂ e)	Project Emissions PE_y (tCO ₂ e)	Emission Reductions ER_y (tCO ₂ e)
	Reading Records		$EG_{export,y} - EG_{import,y}$	$EG_{facility,y} \times EF_{grid,CM,y}$	/	$BE_y - PE_y$
2010/04/05-2010/04/25 ³	51.098	0.128	50.970	42.506	0	42.506
2010/04/26-2010/05/25	142.842	0.210	142.632	118.948		118.948
2010/05/26-2010/06/25	305.653	0.210	305.443	254.724		254.724
2010/06/26-2010/07/25	339.123	0.154	338.969	282.684		282.684
2010/07/26-2010/08/25	404.605	0.189	404.416	337.263		337.263
2010/08/26-2010/09/25	441.389	0.126	441.263	367.991		367.991
2010/09/26-2010/10/25	451.953	0.210	451.743	376.731		376.731
2010/10/26-2010/11/25	215.270	0.147	215.123	179.402		179.402
2010/11/26-2010/12/25	73.701	1.869	71.832	59.904		59.904
Subtotal	2,548.952	3.299	2,545.653	2,122.947	0	2,122
2010/12/26-2011/01/25	34.333	0.210	34.123	28.457	0	28.457
2011/01/26-2011/02/25	50.901	0.210	50.691	42.274		42.274
2011/02/26-2011/03/25	87.362	0.672	86.690	72.295		72.295
2011/03/26-2011/04/25	154.869	0.210	154.659	128.978		128.978

² Meter recording is happened at 24:00, 25th of each month.

³ For this month, the electricity exported and imported are calculated based on whole month data as 75.430MWh/31d*21d and 0.189MWh/31d*21d.

2011/04/26-2011/05/25	68.191	0.210	67.981	56.693		56.693
2011/05/26-2011/06/25	106.970	0.084	106.886	89.138		89.138
2011/06/26-2011/07/25	255.664	0.651	255.013	212.668		212.668
2011/07/26-2011/08/25	263.093	0.231	262.862	219.214		219.214
2011/08/26-2011/09/25	396.397	0.231	396.166	330.383		330.383
2011/09/26-2011/10/25	375.231	0.126	375.105	312.819		312.819
2011/10/26-2011/11/25	357.523	0.126	357.397	298.051		298.051
2011/11/26-2011/12/25	100.073	2.016	98.057	81.775		81.775
Subtotal	2,250.607	4.977	2,245.630	1,872.743	0	1,872
2011/12/26-2012/01/25	27.930	0.210	27.720	23.117	0	23.117
2012/01/26-2012/02/25	27.930	0.315	27.615	23.030		23.030
2012/02/26-2012/03/25	118.408	0.441	117.967	98.379		98.379
2012/03/26-2012/04/25	104.709	0.420	104.289	86.972		86.972
2012/04/26-2012/05/25	17.214	4.620	12.594	10.503		10.503
2012/05/26-2012/06/25	161.253	0.105	161.148	134.389		134.389
2012/06/26-2012/07/25	268.280	0.084	268.196	223.662		223.662
2012/07/26-2012/08/25	450.186	0.147	450.039	375.310		375.310
2012/08/26-2012/09/25	380.361	0.063	380.298	317.150		317.150
2012/09/26-2012/10/25	344.014	0.294	343.720	286.645		286.645
2012/10/26-2012/11/25	243.124	0.210	242.914	202.578		202.578
2012/11/26-2012/12/25	67.716	1.890	65.826	54.896		54.896
Subtotal	2,211.125	8.799	2,202.326	1,836.630	0	1,836
2012/12/26-2013/01/25	30.875	4.284	26.591	22.176	0	22.176
2013/01/26-2013/02/25	60.876	0.147	60.729	50.645		50.645
2013/02/26-2013/03/25	102.068	0.840	101.228	84.419		84.419
Subtotal	193.819	5.271	188.548	157.240	0	157
Total	7,204.503	22.346	7,182.157	5,989.560	0	5,987

Emission reductions achieved during this monitoring period are listed as follows:

Emissions reductions in 2010:	2,122tCO₂e
Emissions reductions in 2011:	1,872 tCO₂e
Emissions reductions in 2012:	1,836 tCO₂e
Emissions reductions in 2013:	157 tCO₂e
Emission reductions during this monitoring period	5,987 tCO₂e

3.5 Comparison of the actual emission reductions with the estimates in the PDD

Table 3-4 Comparison of the actual emission reductions with the estimates in the PDD for this monitoring period (05/04/2010 – 25/03/2013)

	Actual emission reductions in this monitoring period (05/04/2010 – 25/03/2013)	Estimated value in the registered PDD (05/04/2010 – 25/03/2013)
Emission reductions for 2010 (tCO ₂ e)	2,122 (for 265 days)	3,516 (for 265days)
Emission reductions for 2011 (tCO ₂ e)	1,872 (for 365 days)	4,843 (for 365 days)
Emission reductions for 2012 (tCO ₂ e)	1,836 (for 366 days)	4,856 (for 366 days)
Emission reductions for 2013 (tCO ₂ e)	157 (for 90 days)	1,194 (for 90 days)
Total emission reductions (tCO ₂ e)	5,987 (for 1086 days)	14,409 (for 1086 days)

According to the registered PDD, the annual emission reductions were 4,843tCO₂e. For the emission reductions of year 2010 (2010/05/05 – 2010/12/25, 265 days), 2012 (2011/12/26-2012/12/25, 365 days) and 2013 (2012/12/26-2013/03/25, 366 days), the estimated emission reductions are calculated as 4,843 tCO₂e/365d×265d=3,516 tCO₂e, 4,843 tCO₂e/365d×366d=4,856 tCO₂e and 4,843 tCO₂e/365d×90d=1,194 tCO₂e. For this monitoring period (from 2010/04/05 to 2013/03/25, total 1086days), the emission reductions are calculated as 4,843 tCO₂e/365d×1086d=14,409 tCO₂e. The actual emission reductions for this monitoring period are all less than the estimated values.

4. Sustainable Development Monitoring

According to the registered PDD, the management team led by the general manager has been established for the project to carry out monitoring and internal verification tasks during the operation period. The table below shows the details of the monitoring performance on the sensitive sustainable development indicators.

Table 4-1 Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators

Sustainable Development Indicator	Data type	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Methods and equipments used	Monitoring Results	Relevant Documents
Water quality and quantity	Local/regional /global environment	Level of management	m	Once when construction completed	The report for acceptance of completed Project & summary report	For construction period, the mitigation measures are implemented in line with the requirement of EIA which is summarized by the project owner through the summary report. In addition, the achievement is confirmed by the report for acceptance of completed project after construction completed.	Please refer to Annex 8 for the summary report. Annex 9 refers to the report for acceptance of completed project.
				Yearly during the operation period	Relevant questionnaire	For operation period, the implementation of the waste water management is yearly checked by the relevant investigation with local stakeholders. Investigation including interview and questionnaire collection. Related villagers and hydropower station staff are invited to participant in this investigation regarding to their thoughts about normal operation, suggestions on environmental protection measures taken during the whole year. After the interview, relevant questionnaire are distributed, collected and archived by person in charge. There are total 10 questionnaires distributed to stakeholders and all collected respectively on 24/09/2010, 9/9/2011 and	Also find the relevant questionnaire received from the Annex 10

						21/08/2012. From their feedbacks, no negative opinion is received.	
Air quality (emissions other than GHGs)	Local/regional /global environment	Level of management	m	Once when construction completed	The report for acceptance of completed Project & summary report	The mitigation measures are implemented in line with the requirement of EIA which is summarized by the project owner through the summary report. In addition, the achievement is confirmed by the report for acceptance of completed project after construction completed.	Please refer to Annex 8 for the summary report. Annex 9 refers to the report for acceptance of completed project.
Other pollutants (Solid Waste)	Local/regional /global environment	Level of management	m	Once when construction completed	The report for acceptance of completed Project & summary report	The mitigation measures are implemented in line with the requirement of EIA which is summarized by the project owner through the summary report. In addition, the achievement is confirmed by the report for acceptance of completed project after construction completed.	Please refer to Annex 8 for the summary report. Annex 9 refers to the report for acceptance of completed project.
Other pollutants (Noise pollution)	Local/regional /global environment	Degree of noise	m	Once when construction completed	The report for acceptance of completed Project & summary report	The mitigation measures are implemented in line with the requirement of EIA which is summarized by the project owner through the summary report. In addition, the achievement is confirmed by the report for acceptance of completed project after construction completed.	Please refer to Annex 8 for the summary report. Annex 9 refers to the report for acceptance of completed project.
Soil condition (quality and quantity)	Local/regional /global environment	Level of management	m	Once when construction completed	The report for acceptance of completed Project & summary report	The mitigation measures are implemented in line with the requirement of EIA which is summarized by the project owner through the summary report. In addition, the achievement is confirmed by the report for acceptance of completed project after	Please refer to Annex 8 for the summary report. Annex 9 refers to the report for acceptance of completed project.

						construction completed.	
Employment	Social sustainability and development	Number	m	Monthly	The payroll is served as additional check for the number of employees	The payroll contains the information about employees' name, gender, nation, education and salary. It can tell from the monthly payroll that there are totally 11 employees working during this monitoring period from 2010/04 to 2013/03. Among them, 2 are females, 4-5 from local Tibetan and 1-2 from local Hui people.	Please refer to Annex 11 for monthly payrolls.
				Yearly	Safety regulations & training provided for new employees	Safety regulations and training provided for new employees is saved for monitoring check. Three new employees are hired by the hydropower station in 01/2012. New training is given to them in 12/2011.	Annex 12 refers to Safety regulations and training provided for new employees. Also find the Annex 6 for training records.
Livelihood of the poor	Social sustainability and development	Number	m	Monthly	The payroll is served as additional check for the number of employees	The payroll from 2010/04 to 2013/03 showed: 1. 11 permanent employees are hired and among which 5-7 employees are from local community. 2. The average annual income for employee is around 16800 RMB for year 2010, 16800 RMB for year 2011 and 17400 RMB (except salary of 350 for part-time job) for year 2012, above the average annual income of farmers and herdsmen: 2689 RMB ⁴ for year 2010, 3106 RMB ⁵ for year 2011 and	Please refer to Annex 11 for monthly payrolls.

⁴ Refer to: <http://www.tjcn.org/plus/view.php?aid=19940&pageno=2>

⁵ Refer to: <http://www.tjcn.org/plus/view.php?aid=24417&pageno=2>

						3610 RMB ⁶ for year 2012 in Gannan Tibetan Autonomous Prefecture.	
				Yearly during the operation period	Photos of use of the path and the water channel	The path and water channel are used by the local villagers after built, and photos are pictured for monitoring check.	Annex 13 refers to the photos of path, bridge and water channel built for local villagers.
Access to energy services	Social sustainability and development	Number	m	Yearly	The monthly power sales receipt received from the local grid company is checked monthly.	The sales receipt and the electricity transmission sheets showed the monthly amount of feed-in electricity from this project to the grid. This released the local power supply shortage in Madang town and reduced the dependence of provincial grid to a certain extent.	Please refer to Annex 1 for the electricity transmission sheets and Annex 2 for sales receipts.
Human and institutional capacity	Social sustainability and development	Number	m	Yearly	The payroll is served as additional check for the number of female employees and their salary packages.	According to the monthly payroll, two women had been hired as full-time staff, and one as part-time staff. The salary for them is the same as other male employees of the equivalent position.	Please refer to Annex 11 for monthly payrolls.
Employment	Economic and technological development	Number	m	Yearly	Number of employment & Training records	Internal training regarding to professional skill and carbon monitoring have been provided to the employees to help them upgrade their skills and knowledge. Evidences including: ● Staff certificate samples are provided. The period of validity is from 13/01/2010 to 13/01/2016 and the	Please refer to Annex 6 for the training records.

⁶ Refer to: <http://www.tjcn.org/plus/view.php?aid=26986&pageno=3>

						latest check is in 01/2012 ● Yearly technical training explanation provided by the PO ● Carbon monitoring training plans and participant lists for year 2010, 2011 and 2012 are provided	
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