MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version: 01
Date: 08/07/2011
Title of the project: China Tongwan Hydropower Project
Reference number: 1590
The 6th monitoring period: 01/04/2011-30/06/2011 (incl. both dates)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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China Tongwan Hydropower Project (hereinafter referred to as "the project') is a newly built hydropower plant. The purpose of the project is to generate electricity by using water resources to alleviate electricity shortage in Central China. The project will contribute to the reduction of GHG emission by displacing part of the electricity supplied by Central China Power Grid (CCPG), which is dominant of fuel-fired power plants.

The total installed capacity of the project is 180 MW, which is consisted of 4 sets of 45 MW generators. The project construction was started on 22 March 2005. The commissioning dates of 4 generators are 25 December 2007, 31 May 2008, 26 October 2008 and 23 December 2008 respectively.
Total emission reductions achieved in given monitoring period are 144,164 tCO2.

A.2. Project Participants

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Hunan Zhongfang Tongwan Water Resources & Hydropower Development Co., Ltd	No
Sweden	Carbon Asset Management Sweden AB	No
Netherlands	Carbon Asset Management Sweden AB	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.3. Location of the project activity:

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The project is located at Tongwan Town, Zhongfang County, Huaihua City, Hunan Province, P.R.China. The project is 49 km away from Huaihua City. The geographical coordinates of the project are:

110 °17′19″ E
27 °35′02″ N

A.4. Technical description of the project

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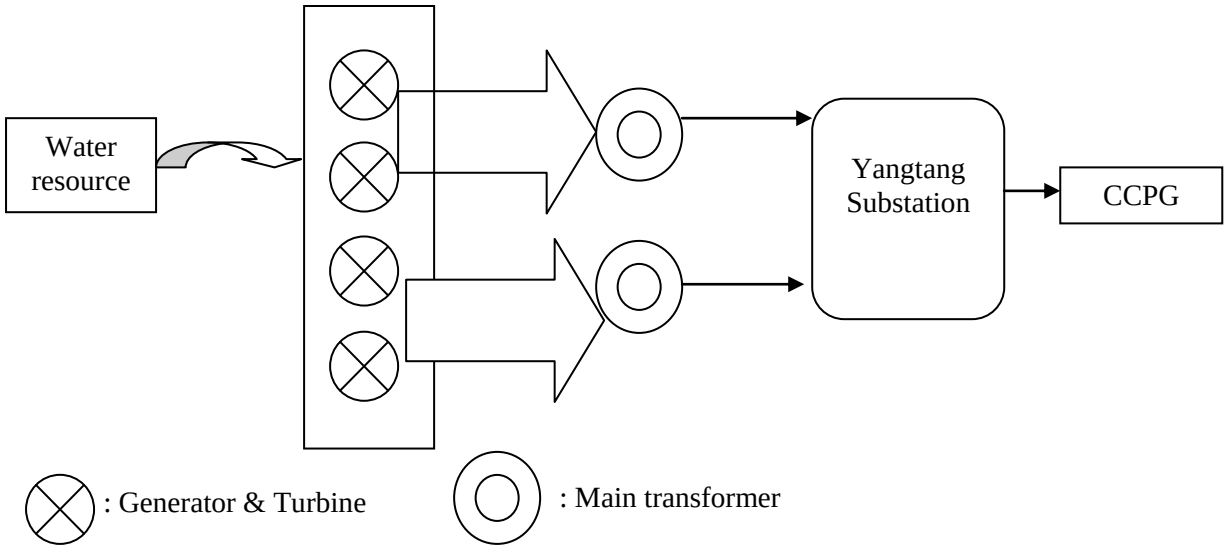
The project is a newly built medium size hydropower plant, the total installed capacity is 180 MW. The project makes use of water resources for electricity generation. The project is connected to Yangtang Substation through 220 kV×30 km transmission line. The generated electricity will be delivered to CCPG. Table below shows the characteristics of the equipments employed.

Turbine	Unit	4
	Model	GZ4BN28B-WP-710
	Manufacturer	Tianjin Alstom Hydro Co., Ltd.
	Rated rotate speed	83.3 r/min
	Rated water head	11 m
	Rated flow rate	459.79 m^3/s
Generator	Unit	Unit: 4
	Model	SFWG45-72/7550
	Manufacturer	Tianjin Alstom Hydro Co., Ltd.
	Single capacity	45 MW
	Rated voltage	10.5 kV

The diagram of technical process is as follow:



A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Title of the approved baseline methodology: ACM0002-Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 06, valid from 18 May 2006 to 13 December 2007)

Title of the approved monitoring methodology: ACM0002-Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources (Version 06, valid from 18 May 2006 to 13 December 2007)

Reference: Tool for the demonstration and assessment of additionality (Version 03, 16 February 2007)

A.6. Registration date of the project activity:

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30/10/2008

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Start date of crediting period: 30/10/2008
Choice of crediting period: renewable crediting period
Length of the first crediting period: 7 years and 0 month

There was no change to the start date of the crediting period post registration has been made.

A.8. Name of responsible person(s)/entity(ies):

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Person and entity responsible for completing the monitoring report form:

Hanson Xu, Carbon Asset Management Sweden AB, E-mail: hanson.xu@tricorona.se, Tel: +86-10-65305930-105

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The implementation and operational status of the project are as follows:

Event	Time
Project construction	22/03/2005
Registration date	30/10/2008
Crediting period	30/10/2008-29/10/2015 (renewable)
Operation of 1st generator	25/12/2007
Operation of 2nd generator	31/05/2008
Operation of 3rd generator	26/10/2008
Operation of 4th generator	23/12/2008
1st monitoring period	30/10/2008-31/01/2009
2nd monitoring period	01/02/2009-31/08/2009
3rd monitoring period	01/09/2009-31/12/2009
4th monitoring period	01/01/2010-30/06/2010
5th monitoring period	01/07/2010-31/03/2011
6th monitoring period	01/04/2011-30/06/2011

There were no special events happened to the project during the monitoring period. The project was operational as normal during the monitoring period. The application of the methodology ACM0002 (Version 06) was not impacted during the monitoring period.

B.2. Revision of the monitoring plan

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No monitoring plan revision has been requested for the project.

B.3. Request for deviation applied to this monitoring period

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No deviation has been requested for the given monitoring period.

B.4. Notification or request of approval of changes

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No notification or request of approval of changes has been made for the project.

SECTION C. Description of the monitoring system

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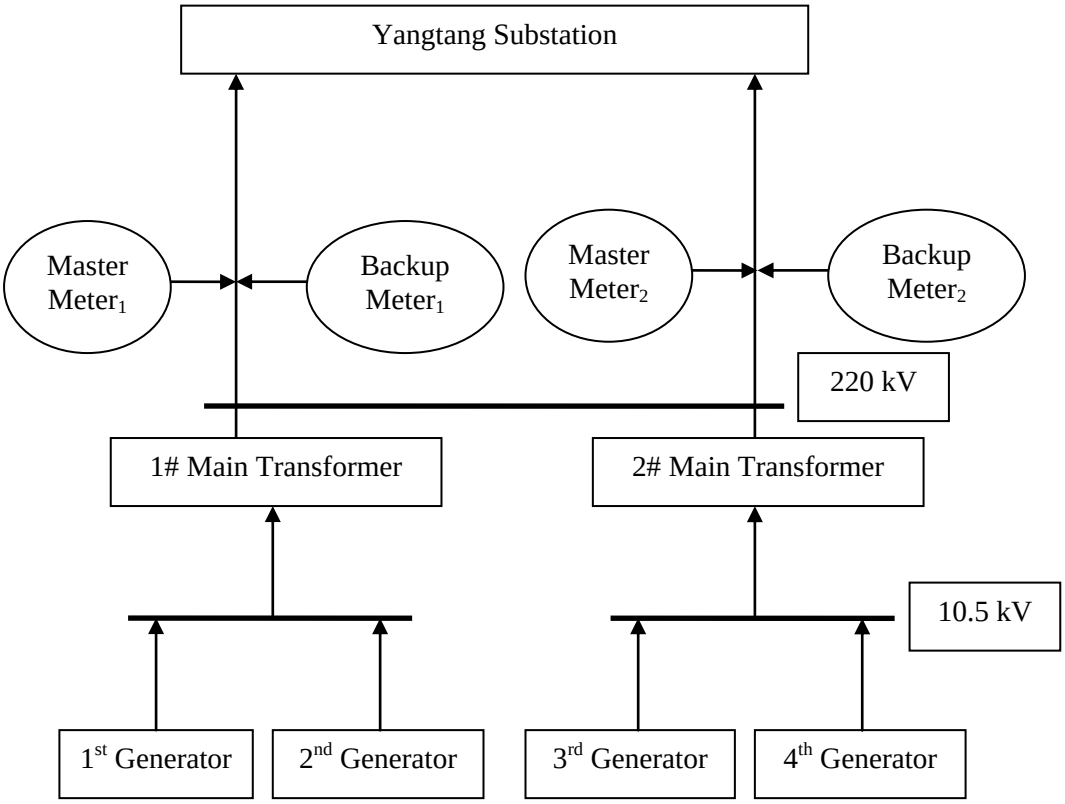
General description of monitoring system:

The generated electricity from 1# generator and 2# generator is transmitted through 10.5 kV line I into 1# main transformer to boost voltage to 220 kV; the generated electricity from 3# generator and 4# generator is transmitted through 10.5 kV line II into 2# main transformer to boost voltage to 220 kV. Then the electricity is delivered through two 220 kV transmission lines to 220 kV Yangtang Substation and then to power grid.

There are two bidirectional electronic meters (Master $Meter_1$ and Master $Meter_2$) are installed at high voltage sides of main transformers to monitor the power exported to power grid and power imported from power grid as per signed Power Purchase Agreement (PPA). Furthermore, there is also a Backup Meter with same accuracy and function for each Master Meter to ensure the monitoring purpose if the Master Meters are found malfunction. The power electric connection diagram is as follow:



The magnification factor of Master Meters is 1,320,000, which is calculated based on voltage ratio of potential transformer (PT) and current ratio of current transformer (CT)

There are totally 6 sets of PT and CT for the project, every 3 sets of PT and CT are for one transmission line. The calibration details of PT and CT are as follows:

Equipment	CT	PT
Serial Number	F2GA F2GB, F2GC, F4GA, F4GB, F4GC	503710, 503708, 503707, 503711, 503709, 503712
Calibration Date	06/12/2007	05/12/2007
Calibration Valid Until	05/12/2017	04/12/2017
Calibration Entity	Testing and Research Institute of Hunan Electric Power Company, which is authorized by Administration of Quality and Technology Supervision of Hunan Province.	

Note: The CT and PT are calibrated as per Verification Regulation of Instrument Transformers in Power System (JJG 1021-2007). As per JJG 1021-2007, the calibration frequency for CT and PT is 10 years.

According to calibration records for PT & CT conducted by Testing and Research Institute of Hunan Electric Power Company on 5th and 6th December 2007:

Rated primary voltage of PT is 220 kV
Rated secondary voltage of PT is 100 V

Then voltage ratio of PT is 2200 (it equals to 220 kV/100 V)

Rated primary current of CT is 600 A
Rated Secondary current of CT is 1 A

Then current ratio of CT is 600 (it equals to 600 A/1 A)

Thus the final magnification factor applied for the meter is:

voltage ratio × current ratio = 2200 × 600 = 1,320,000

Data collection procedures:

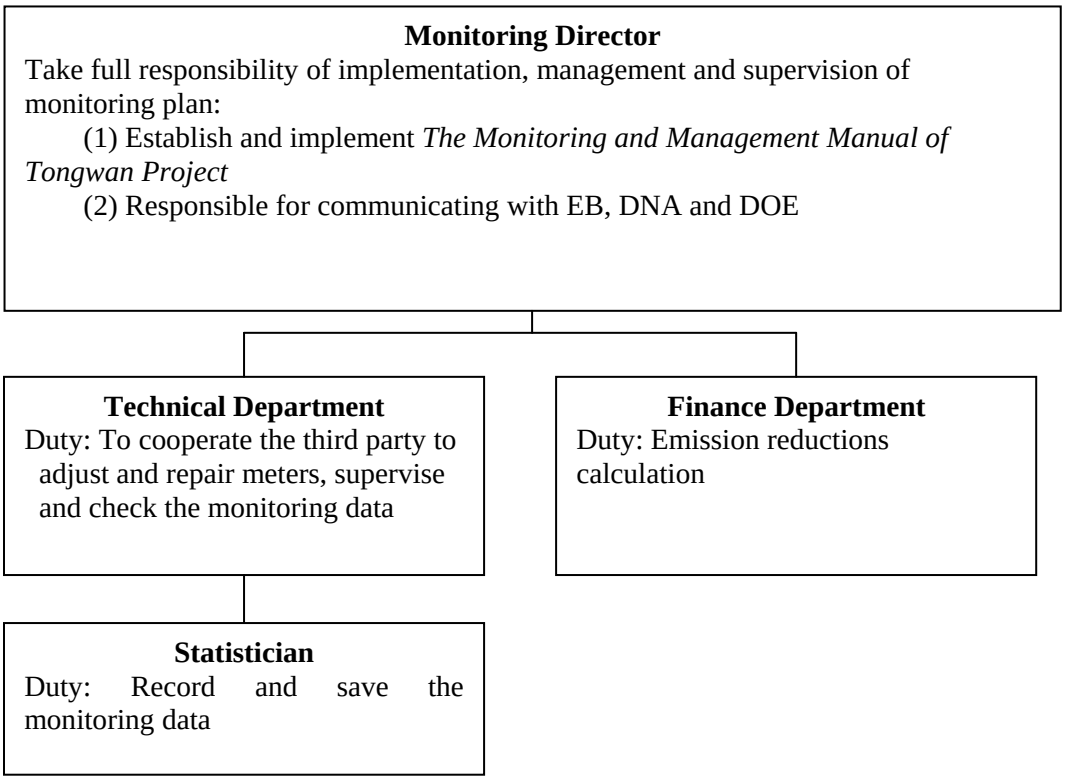
The power imported from power grid and power exported to power grid data were measured continuously by two Master Meters and were recorded by grid company monthly. The meter readings were aggregated on two Master Meters.

For power exported to grid, the meter readings of two Master Meters recorded by grid company were used for CERs calculation. Based on meter readings of two Master Meters provided by grid company, the power grid company provided the electricity transaction notes to project owner in the early of each month. The monitoring director from project entity checked and confirmed the electricity transaction notes based on the project owner's own monitored meter readings (project owner also has access to the two Master Meters). The finance department from project entity issued the electricity sales receipts and then financial manager Mr. He Hua from project entity confirmed the electricity sales receipts. Finally the power grid company paid the money to project owner for electricity transactions.

For power imported from grid, the meter readings of two Master Meters recorded by grid company were used for CERs calculation. Based on meter readings of two Master Meters provided by grid company, the project owner paid the money to the grid company after checking project owner's own monitoring meter readings (project owner also has access to the two Master Meters) and then got the power purchase receipts from grid company.

Organizational structure:

The monitoring organizational structure is as follow:



Roles and responsibilities of personnel:

Monitoring Director: Mr. Liu Changsheng is responsible for the overall management of the monitoring plan and for the internal verification of the monitored data.

Technical Department: It is consisted of operational employees, the group is leaded by the Mr. Li Binbin. The department is responsible for internal regular maintenance of monitoring equipment and DCS system

Statistician: To conduct the monitoring task strictly based on the monitoring manual and registered PDD. The statisticians are responsible for recording required monitored parameters, for reporting the monitoring results and for reporting the abnormal situation of the project. Each shift is responsible for the works.

Finance Department: Mr. He Hua is responsible for the department. The department is responsible for calculating the emission reductions regularly and for preparing the sales receipts of electricity transaction. The internal audit for CERs calculation is conducted by monitoring director.

Training:

The project staffs have been trained respectively regarding operational regulations, quality control, data monitoring & archive and CDM knowledge.

Emergency procedures:

The Backup Meter will be used for monitoring when Master Meter is in malfunction status. During the given monitoring period, the Master Meters were in well functions and Backup Meters were not used for monitoring.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the

monitoring period, including default values and factors

Data / Parameter:	Surface Area
Data unit:	km^2
Description:	Surface area at the full reservoir level
Source of data used:	Water Resources Bureau of Huaihua City
Value(s) :	12
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used for power density calculation. The power density is calculated as 15 W/m^2, thus the project emissions are not needed to be considered. The data was measured by Water Resources Bureau of Huaihua City at the start of the operation of the project. According to ACM0002 (Version 06), the data should only be monitored at start of the project during the crediting period. The data is not needed to be monitored since the data has been verified during 1st verification. The first verification request has been approved by EB on 21st August 2009.
Additional comment:	The data measured by Water Resources Bureau of Huaihua City is reliable and creditable.

Data / Parameter:	EF_y
Data unit:	tCO_2e/MWh
Description:	Baseline emission factor of CCPG
Source of data used:	Chinese DNA's Guideline of emission factors of Chinese grids and registered PDD
Value(s) :	0.97504
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The figure is calculated *ex-ante* and is fixed during the 1st crediting period.
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net generated electricity delivered to CCPG
Measured /Calculated /Default:	Calculated based on difference between power exported to power grid and power imported from power grid.
Source of data:	Meter readings of two Master Meters provided by grid company and confirmed by project owner based on project owner's own logbooks of two Master Meters.
Value(s) of monitored parameter:	Power export: 150803.400 MWh Power import: 0.000 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used for baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The power imported from power grid and power exported to power grid were measured continuously by two bidirectional Master Meters and were recorded monthly. The information of meters are as follows:

Item	**Master Meter$_1$**	**Master Meter$_2$**	**Backup Meter$_1$**	**Backup Meter$_2$**
Type	AINTRAL-X	AINTRAL-X	AINTRAL-X	AINTRAL-X

	Serial Number	03218434	03218457	03218436	03218433
	Accuracy	0.2S	0.2S	0.2S	0.2S

Calibration information:

Meter	Calibration date	Valid until
Master Meter$_1$	05/01/2011	04/04/2011
	03/04/2011	02/07/2011
Master Meter$_2$	05/01/2011	04/04/2011
	03/04/2011	02/07/2011
Backup Meter$_1$	05/01/2011	04/04/2011
	03/04/2011	02/07/2011
Backup Meter$_2$	05/01/2011	04/04/2011
	03/04/2011	02/07/2011
Calibration Frequency	Quarterly	
Calibration Entity	Testing and Research Institute of Hunan Electric Power Company, which is authorized by Administration of Quality and Technology Supervision of Hunan Province	

Note: During the given monitoring period, the Master Meters were in well functions and Backup Meters were not used for monitoring.

Measuring/ Reading/ Recording frequency:	The power imported from power grid and power exported to power grid were measured continuously by two bidirectional Master Meters and were recorded monthly.
Calculation method (if applicable):	The data is calculated based on difference between power exported to power grid and power imported from power grid: EG_y＝Power export－power import
QA/QC procedures applied:	The monitoring data is used for emission reductions calculation. Sales/purchase receipts and electricity transaction notes are used for double check.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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The baseline emission during the monitoring period is:

$$BE_y=EG_y \cdot EF_y$$

Where:

EG_y is electricity supplied by the project activity to the grid in year *y*, in MWh;
EF_y is baseline emission factor in year y, in tCO_2e/MWh.

The monitored data for the project are as follow:

Period	Power export (MWh)	Power import (MWh)	Net power supply (MWh)
01/04/2011-30/04/2011	26060.760	0.000	26060.760
01/05/2011-31/05/2011	47995.200	0.000	47995.200
01/06/2011-30/06/2011	76747.440	0.000	76747.440
Sum	**150803.400**	**0.000**	**150803.400**

Note: All the meter readings in above table are sourced from 2 Master Meters, the meter readings have been confirmed by grid company. The monthly cut-off time for power export and power import data is 24:00 of the last day of each month.

Net power supply data is 150803.400 MWh.

According to Page 26 of registered Tongwan PDD[1]:

The project will involve influencing 3 small hydropower plants, the total installed capacity of the 3 small hydropower plants is 1.35 MW. The 3 small hydropower plants have been compensated by Tongwan project owner. The average annual total power generation of the 3 small hydropower plants is 7000 MWh. In order to be conservative, the 3 small hydropower plants are assumed to operate full year. Thus, the annual power generation of 11826 MWh (1.35 MW×8760 h=11826 MWh) is deducted from power supply by Tongwan (66200－11826=650174 MWh) and the method will always be used to calculate the baseline emission during the whole 3 renewable crediting periods.

The monitoring period is 01/04/2011 to 30/06/2011, totally 91 days.

Thus the power generation to 3 small hydropower power plants during monitoring period is:

$$1.35\ MW \times 8760\ h/365\ d * 91\ d = 2948.400\ MWh$$

$$BE_y = (150803.400-2948.400) * 0.97504\ tCO_2/MWh = 144{,}164\ tCO_2$$

E.2. Project emissions calculation

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The project is a newly built hydropower plant, the power density is 15 W/m^2, greater than 10 W/m^2, PE_y=0

A diesel-based electricity generator exists for back-up purposes. This generator has not been in use during the monitoring period and only been activated during maintenance checks.

According to Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, the CO_2 emissions from diesel combustion are calculated as follows:

$$PE_{diesel} = FC_{diesel} * COEF_{diesel}$$
$$COEF_{diesel} = NCV_{diesel} * EF_{CO2,\ diesel}$$

Where:

PE_{diesel} = Are the CO_2 emissions from diesel combustion during the monitoring period(tCO_2);
FC_{diesel} = Is the quantity of diesel combusted during the monitoring period (mass or volume unit);
$COEF_{diesel}$ = Is the CO_2 emission coefficient of diesel (tCO_2/mass or volume unit);
NCV_{diesel} = Is the weighted average net calorific value of diesel (GJ/mass or volume unit).
EF_{co2} = Is the weighted average CO_2 emission factor of diesel (tCO_2/GJ)

[1] According to explanation document from design institute, the 3 small hydropower plants are located at the 3 different branches of Yuanshui River while Tongwan is located at Yuanshui River. The 3 small hydropower plants are 11 km, 12 km and 29 km away from Tongwan project site respectively. Due to construction of Tongwan project, the water level of the river is increased. The 3 small hydropower plants are affected by the increased water level. However, after modification of the 3 small hydropower plants, these 3 small hydropower plants are operational as before now. In order to be conservative and in line with the registered PDD, we'd like to abide by the calculation method in the registered PDD for Tongwan project.

According to diesel generator operation records, there were only around 6.5 kilograms diesel used during monitoring period. FC_{diesel} = 6.5 kg.
According to China Energy Statistical Yearbook, the weighted average net calorific value of diesel (NCV_{diesel}) is 0.000042652 TJ/kg.
According to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, the default value at the upper limit of the uncertainty at a 95% confidence interval of CO_2 emission factor of diesel (EF_{CO2}) is 74.8 tCO_2/TJ.

Therefore, the CO_2 emissions from diesel combustion are calculated as:

$$PE_{diesel} = FC_{diesel} * NCV_{diesel} * EF_{CO2,\ diesel} = 6.5 * 0.000042652 * 74.8 = 0.021\ tCO_2$$

The emissions from these maintenance checks are far less than 1 tCO_2 i.e. only 0.000015% of the total baseline emission reductions. In any case, in line with ACM0002 version 6 and the VVM, there are no project emissions for hydro power projects need to be considered

E.3. Leakage calculation

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According to ACM0002, $L_y = 0$

E.4. Emission reductions calculation / table

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According to ACM0002, the emission reduction of the project is:

$$ER_y = BE_y - PE_y - L_y$$

Total baseline emissions: 144,164 tCO_2
Total project emissions: 0 tCO_2
Total leakage: 0 tCO_2
Total emission reductions: 144,164 tCO_2

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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The comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD:

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	158,052*	144,164

*The data is average one calculated based on registered PDD. The monitoring period covers 91 days. The annual estimated CERs are 633,945 tCO_2 as per registered PDD.

The actual values of the emission reductions achieved during the monitoring period are 8.79% lower than registered PDD. In order to further substantiate the comparison, the comparison with the full year data is also conducted for the project. The result shows that the actual annual emission reductions (01/07/2010-30/06/2011: 508,429 tCO_2) covering the monitoring period are 19.80% lower than registered PDD (633,945 tCO_2).

E.6. Remarks on difference from estimated value in the PDD

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The comparison result shows that the actual emission reductions during the given monitoring period or full year period are less than the estimation in the registered PDD. The reason is due to the actual water resources during past years are poorer than estimation in Preliminary Design Report of the project.