Monitoring report form for CDM project activity
(Version 06.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT		
Title of the project activity	Nam Nga 2 Hydropower Project	
UNFCCC reference number of the project activity	10239	
Version number of the PDD applicable to this monitoring report	2.1	
Version number of this monitoring report	1.0	
Completion date of this monitoring report	13/12/2017	
Monitoring period number	1st monitoring period	
Duration of this monitoring period	11/05/2016-25/10/2017 (the first and last days included)	
Monitoring report number for this monitoring report	-	
Project participants	Nam Nga 2 Hydropower Co., Ltd. Swiss Carbon Assets Limited	
Host Party	Lao PDR -	
Sectoral scopes	01 Energy industries (Renewable sources)	
Applied methodologies and standardized baselines	AMS I.D. Grid connected renewable electricity generation (Version 18, EB 81).	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 tCO_2e	53,384 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	51,075 tCO_2e	

SECTION A. Description of project activity

A.1. General description of project activity

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Nam Nga 2 Hydropower project (hereafter referred to as the "the project") is located on main stream of Nam Nga River, about 80 km from powerhouse and dam zone to M. Xai City, Oudom Xai Province, Lao PDR, developed by Nam Nga 2 Hydropower Co., Ltd.

The installed capacity of the project is 14.5 MW, with the annually 62.59 GWh power supplied to the power grid.

To overcome financial weakness, and unfavourable conditions that the project encounters, the project owner decided to seek CDM assistance after the project Feasibility Study Report has been completed by independent design institute on 11/09/2011. In 24/07/2014, the Civil work agreement was signed, it was considered as the starting date of the project. In the 18/02/2014, the prior consideration form was submitted to both the DNA and UNFCCC. In the 11/05/2016, the project has been registered as a CDM project.

The purpose of the report is to calculate the emission reductions generated by Nam Nga 2 Hydropower Project during the first monitoring period (11/05/2016 to 25/10/2017), and to serve as basis for the verification and issuance of corresponding CERs.

Following the Lao PDR's electrification policy, the electricity supply falls in short compared to the increased electricity demand. The project is expected to constantly contribute clean energy to the Lao Power Grid. For the Lao Power Grid is connected with the power grid in Thailand, the power supplied by the project will not only meet domestic electricity demand, but also increase the net power export to Thailand and decrease the net power import from Thailand, where the power grid is dominated by thermal power plants. The baseline scenario of the project is continuation of the present situation, i.e. electricity supplied from the power grid. By displacing part of the power generated by thermal power plants, the project is therefore expected to reduction of CO_2 emissions by an estimated 35,019 t CO_2e per year during the first crediting period.

The project timeline is as follows:

Events	Date
starting date of the project (Civil work agreement was signed)	24/07/2014
CDM Registration Date	11/05/2016
First renewable crediting period	11/05/2016- 10/05/2023
1st Monitoring Period	11/05/2016-25/10/2017

During this monitoring period, no special event occurred which may affect the applicability of the methodology.

A.2. Location of project activity

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The Project site is located at the Nam Nga River, 70 km from the Muang Sai City, Oudom Xai Province, North part of Lao PDR. The approximate coordinates of the project site (overflow weir) is: 20.40°N, 102.017°E.

Figure A.1 Show the location of the project:

Figure A.1. Location of the project

A.3. Parties and project participants

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Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Lao PDR (host Party)	Nam Nga 2 Hydropower Co., Ltd. (Project owner)	No

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Switzerland	Swiss Carbon Assets Limited.	No

A.4. Reference to applied methodologies and standardized baselines

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Baseline methodology:

AMS I.D. Grid connected renewable electricity generation (Version 18, EB 81).

This methodology draws upon the following tools:
Tool for the demonstration and assessment of additionality (Version 7.0.0, EB 70), and
Tool to calculate the emission factor for an electricity system (Version 4.0.0, EB 75)

And the Approved consolidated baseline and monitoring methodology ACM0002 (Version 16, EB 81): Grid-connected electricity generation from renewable sources is also a reference according to AMS I.D.

Please click following link for more information about the methodology and tool:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.5. Crediting period type and duration

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The project employs renewable crediting period, seven years for the first crediting period with the option of the two renewable periods. The first crediting period is from 11/05/2016 to 10/05/2023. The duration for this monitoring period is from 11/05/2016 to 25/10/2017.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project started commissioned since 24/07/2014 and registered as CDM project on 11/05/2016. The actual implementation complies with the registered PDD. Table below indicates the main events for the project:

Events	Date
starting date of the project (Civil work agreement was signed)	24/07/2014
CDM Registration Date	11/05/2016
First renewable crediting period	11/05/2016- 10/05/2023
1st Monitoring Period	11/05/2016-25/10/2017

The total install capacity of the project is 14.5 MW. The construction of the project includes intake, headrace channel, head tank, penstock, powerhouse with 2 units of turbines (2*7.25MW). Refer to the following table for the main equipment's parameters.

Table A.1 main parameters of the equipment

Item		Unit	Value[1]
Turbine	Type	-	HL275-LJ-220
	Unit Capacity	MW	7.25
	Number of unites	-	2
	Rated head	m	26.5
	Rated discharge	m^3/s	31.97
	Rated speed	r/min	187.5
	Rated capacity	-	≥92%
Generator	Type	-	SF7.25-16/4000
	Rated output	MW	7.25
	Rated voltage	kV	6.3
	Power factor	-	0.8
	Rated speed	r/min	187.5
	Rated frequency	Hz	50

During this monitoring period, according to the operational data, the emission reductions over the monitoring period are 53,384 tCO_2e. No serious malfunction happened and the plant was under a normal operation as expected in this monitoring period.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

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There is no temporary deviation from registered monitoring plan or applied methodology.

[1] The final equipment purchase contract has not signed, the parameters' value are derived from the FSR. The actual parameter value should be depended on the equipment purchase contracts.

B.2.2. Corrections

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There is no correction.

B.2.3. Changes to the start date of the crediting period

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There is no change about the start date of the crediting period.

B.2.4. Inclusion of monitoring plan

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There is no post-registration change in the monitoring plan.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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There is no permanent change or deviation in the monitoring plan.

B.2.6. Changes to project design

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There is no change in project design of registered project activity.

SECTION C. Description of monitoring system

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Monitoring organization

The monitoring process will be carried out and responsibility by the project owner. A monitoring panel will be established by the plant managers to be in charge of monitoring the data and information relating to the calculation of emission reductions with the cooperation of the Technical and Financial Department. A CDM manager will be assigned full charge the monitoring works. The operation and management structure is shown below:

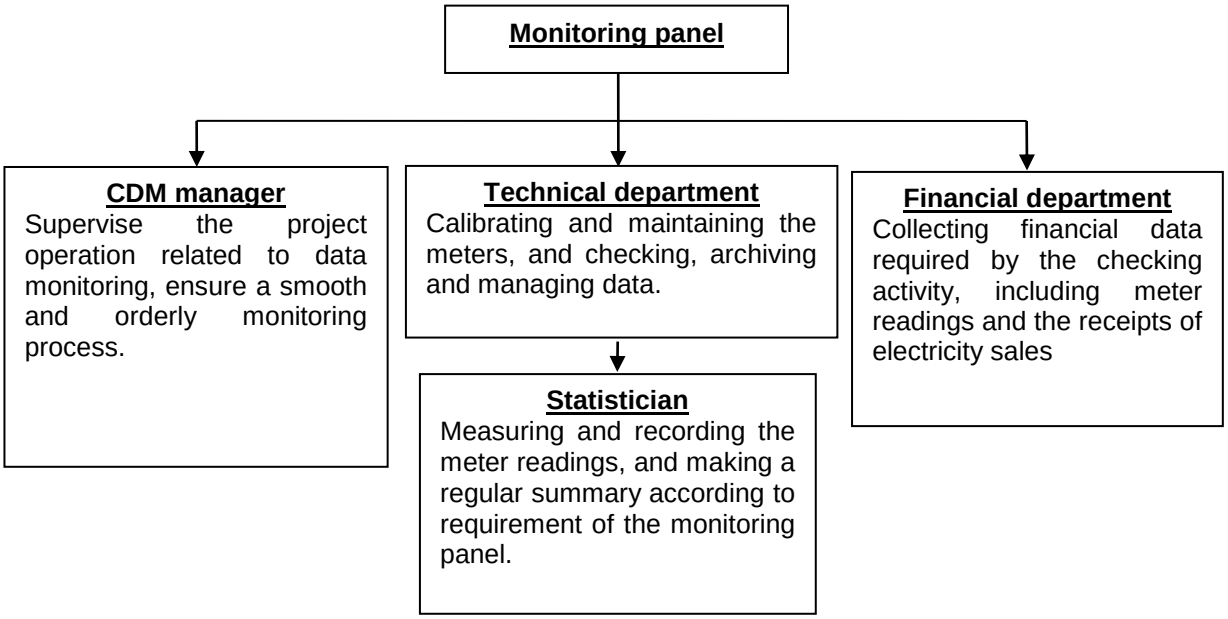

Figure C.1 Organization structure of the monitoring activity

Monitoring apparatus and installation:

The meter(s) will be installed at the project site, to monitoring the input/output electricity at the grid side. The meter(s) will be installed in accordance with relevant national or international standard. As the project is still under construction, the monitoring meters have not been installed yet, therefore the serial numbers of meters are not available. Before the operation of the project, the metering equipment(s) will be clarified and examined by the project owner and the power grid company according to the above regulation.

The diagram for the monitoring meter(s) is shown below:

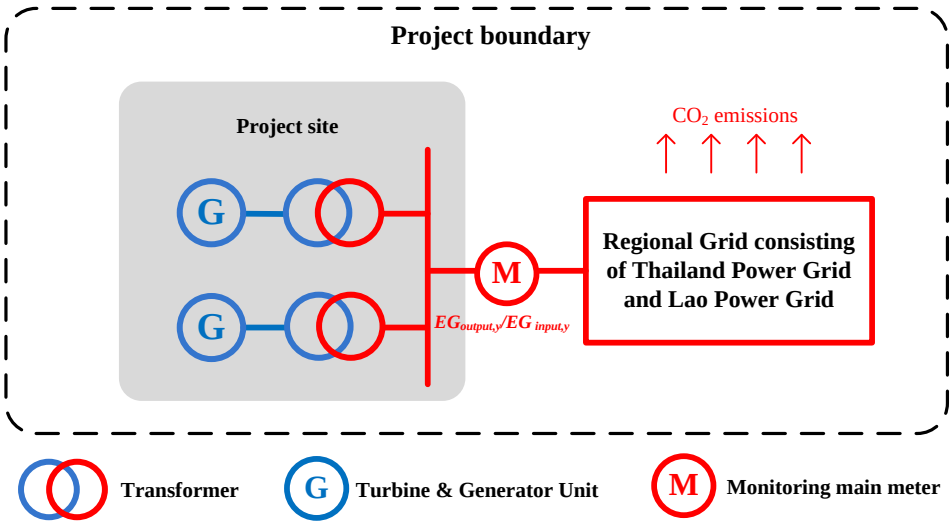

Figure C.2 Diagram of the monitoring meter(s)

Data collection:

The specific steps for data collection and reporting are listed below:

a) During the crediting period, both the grid company and the project owner will record the values displayed by the main meter.
b) Simultaneously to step a), the project owner will both record the values displayed by the backup meters.
c) The meters will be calibrated according to the relevant regulation and request of EDL.
d) The main meter's readings will be cross-checked with record document confirmed by EDL.
e) The project owner and the grid company will record both output and input power readings from the main meter. These data will be used to calculate the amount of net electricity delivered to the grid.
f) The project owner will be responsible of providing copies of record document confirmed by EDL to the DOE for verification.

If the reading of the main meter in a certain month is inaccurate and beyond the allowable error or the meter doesn't work normally, the grid-connected power generation shall be determined by following measures:

g) Read the data of the backup meters.
h) If the backup meter's data is not so accurate as to be accepted, or the practice is not standardized, the project owner and the grid corporation should jointly make a reasonable and conservative estimation method which can be supported by sufficient evidence and proved to be reasonable and conservative when verified by DOE.
i) If the project owner and the grid corporation don't agree on an estimated method, arbitration will be conducted according the procedures set by the agreement to work out an estimation method.

Calibration

The calibration frequency of the monitoring meters will be annually. The accuracy of the monitoring meters will not less than 0.5. Calibration of Meters should be implemented according to relevant standards and rules accepted by the grid company EDL. After the examination, the meters should

be sealed. The lift of the seals requires the presence of both the project owner and the grid company. One party must not lift the seals or fiddle with the meters without the presence of the other party.

All the meters installed shall be tested by a qualified metering verification institution commissioned jointly by the project owner and the grid company within 10 days after:

1) Detection of a difference larger than the allowable error in the readings of both meters;
2) The repair of all or part of meter caused by the failure of one or more parts to operated in accordance with the specifications.

Data management system

Physical document such as the plant electrical wiring diagram will be gathered with this monitoring plan in a single place. In order to facilitate auditors' access to project documents, the project materials and monitoring results will be indexed. All paper-based information will be stored by the technical department of the project owner and all the material will have a copy for backup. All data, including calibration records, will be kept until 2 years after the end of the total crediting period.

Monitoring Report

During the crediting period, at the end of each year, the monitoring officer shall produce a monitoring report covering the past monitoring period. The report shall be transmitted to the General Manager who will check the data and issue a final monitoring report in the name of the projects participants. Once the final report is issued, it will be submitted to the DOE for verification.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

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Data/Parameter	$FC_{i,y}$
Unit	mass or volume unit of the fuel i
Description	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
Source of data	Calculation for the emission factor for electricity generation in Lao PDR, 2010
Value(s) applied	See PDD registered for details
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	$NCV_{i,y}$
Unit	kJ/kg or kJ/m^3
Description	The net calorific value (energy content) per mass or volume unit of fuel i in year y.
Source of data	*Electric Power in Thailand 2010*
Value(s) applied	See PDD registered for details
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	$EF_{CO2, i,y}$
Unit	tCO_2/TJ
Description	The CO_2 emission factor per unit of fuel *i* in year *y*
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Chapter 1 Table 1.4
Value(s) applied	See PDD registered for details
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	EG_y
Unit	MWh
Description	Net electricity generated and delivered to the grid by all power sources serving the system, including low-cost/must-run power plants/units, in year *y*
Source of data	Calculation for the emission factor for electricity generation in Lao PDR, 2010
Value(s) applied	See PDD registered for details

Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	$EG_{import,y}$
Unit	MWh
Description	The electricity(MWh) imported from Malaysia, Vietnam and China Power Grid in year *y*.
Source of data	*Electricity report by EGAT (2010, 2009, 2008)* *EDL Annual Report 2012*
Value(s) applied	See PDD registered for details
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	EF_y
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year *y*
Source of data	Registered PDD
Value(s) applied	0.5595
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	A_{BL}
Unit	m^2
Description	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full
Source of data	Methodology ACM0002 default value
Value(s) applied	0
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of project emissions or actual net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data/Parameter	CAP_{BL}
Unit	MW
Description	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data	Methodology ACM0002

Value(s) applied	0
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of project emissions or actual net GHG removals
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting period.

D.2. Data and parameters monitored

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Data/Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plants/units to the grid
Measured/calculated/ default	Calculated based on monitored data $EG_{input,y}$ & $EG_{output,y}$
Source of data	Measured by main meter
Value(s) of monitored parameter	95,414
Monitoring equipment	-
Measuring/reading/recording frequency	The readings of electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Calculation method (if applicable)	$EG_{facility,y} = EG_{output,y} - EG_{input,y}$
QA/QC procedures	The meters were periodically checked according to the national standard.
Purpose of data/parameter	Calculation of baseline emissions or baseline net GHG removals
Additional comments	No additional comments

Data/parameter:	CAP_{PJ}
Unit	MW
Description	Installed capacity of the Hydropower plant after the implementation of the project activity.
Measured/calculated/default	Measured
Source of data	Project site
Value(s) of monitored parameter	14.5
Monitoring equipment	Determined in accordance with the nameplates on the generator equipment supplied by the manufacturer.
Measuring/reading/recording frequency:	-
Calculation method (if applicable):	Measured from the nameplate of the Generator by qualified entity.
QA/QC procedures:	The measured data was cross-checked with the approved FSR
Purpose of data:	Calculation of project emissions or actual net GHG removals
Additional comments:	No additional comments

D.3. Implementation of sampling plan

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Not applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

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Calculation of baseline emission of the project in this monitoring crediting period (11/05/2016-25/10/2017) as bellow:

Calculation of baseline emissions	Symbol	Amount	Unit	Formula
Quantity of net electricity generation supplied by the project to the grid	$EG_{facility,y}$	95,414	MWh	
Emission factor	EFy	0.5595	tCO_2/MWh	
Total baseline emissions	BEy	53,384	tCO_2e	$BEy=EG_{facility,y}*EFy$

Remarks

1. $EG_{facility,y}$ = quantity of net electricity supplied by the project to grid = electricity export - electricity import
2. EF_y fixed for crediting period.

E.2. Calculation of project emissions or actual net removals

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Calculation of project emissions	Symbol	Amount	Unit	Formula
Total project emissions	PEy	0	tCO_2e	Not applicable

E.3. Calculation of leakage emissions

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There were no leakage emissions in the total project emissions.

E.4. Calculation of emission reductions or net anthropogenic removals

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	Baseline GHG emissions or baseline net GHG removals (tCO_2e)	Project GHG emissions or actual net GHG removals (tCO_2e)	Leakage GHG emissions (tCO_2e)	GHG emission reductions or net anthropogenic GHG removals (tCO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	53,384	0	0	0	53,384	53,384

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

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Amount achieved during this monitoring period ($t CO_2e$)	Amount estimated ex ante ($t CO_2e$)
53,384	51,075

E.6. Remarks on increase in achieved emission reductions

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This table shows that the actual value is larger 4.5% than the estimated emission reduction of the registered CDM PDD during this monitoring period. Because the monitoring period includes rainy seasons, the actual electricity generation supplied by the project to the grid will be larger than estimated electricity generation in registered PDD, thus the actual emission reductions reported in this monitoring period are reasonable and appropriate.