



**Monitoring report form**  
**(Version 05.1)**

*Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.*

**MONITORING REPORT**

<b>Title of the project activity</b>	Mae Klong Hydropower Project	
<b>UNFCCC reference number of the project activity</b>	9554	
<b>Version number of the monitoring report</b>	Version 08	
<b>Completion date of the monitoring report</b>	01/02/2017	
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring period 01 and duration of this monitoring period is 01/01/2014-31/12/2014 (first and last days included)	
<b>Project participant(s)</b>	Electricity Generating Authority of Thailand	
<b>Host Party</b>	Thailand	
<b>Sectoral scope(s)</b>	Sectoral Scope 1: Energy industries (renewable sources / non-renewable resources)	
<b>Selected methodology(ies)</b>	Methodology AMS-I.D / Version 17 "Grid connected renewable electricity generation"	
<b>Selected standardized baseline(s)</b>	n/a	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	41,741 tCO <sub>2</sub> per year	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	n/a	3,364 tCO <sub>2</sub>

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

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*Mae Klong hydropower project* is a small-scale greenfield run-of-the-river hydroelectric power plant with an installed capacity of 12.35 MW at Mae Klong river. As it is a Greenfield project, therefore prior to implementation of the project activity there are no any hydro power projects at the project site. The project is implemented on the left bank of the existing Mae Klong irrigation dam by using the by-pass water flow channel to generate the electricity. The by-pass water flow channel was specially constructed for the project activity. The proposed project developed by the Electricity Generating Authority of Thailand (herein after as EGAT) would utilise the hydro resource of Mae Klong river in the Kanchanaburi Province of Thailand.

The proposed project includes installation of two generators of 6.176 MW and two turbines of 6.4 MW each to generate 12.35 MW<sup>1</sup> of electricity at 6.6kV which will be stepped up to 22kV to export from the Mae Klong Powerhouse to existing Provincial Electricity Authority (PEA) transmission line. All the net generated electricity will be exported to the PEA. Since the project activity generates electricity by using renewable hydro resources with the total capacity of 12.35 MW, the project activity is fall into type I (Renewable energy project) and small scale project (the installed capacity <15 MW).

The electricity generated from the project activity would reduce GHG emissions produced by the grid which is currently dominated by fossil fuel based power plants. Emission reduction from hydroelectric power projects arise as they replace grid electricity with a zero-emission source of electricity generation. Project activity will reduce greenhouse gas of about 41,741 tCO<sub>2</sub>e annually throughout crediting period of 7 years.

Relevant dates of the project activity shown in table 1 below;

**Table 1: Relevant date for project activity**

Event	Date	Evidence
EGAT signed EPC (Engineering Procurement Construction) contract with EPC contractor	11/12/2008	EPC contract
EGAT started exporting the electricity to the grid	29/01/2014	Photo of exporting date event

Total GHG emission reductions achieved in this monitoring period is 3,364 tCO<sub>2</sub>

### A.2. Location of project activity

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**Host Party:** Kingdom of Thailand

**Region/State/Province:** Kanchanaburi Province

**City/Town/Community etc.:** Ban Muang Chum, Amphor Tha Muang

**Physical/Geographical Location:** The proposed project is located in Ban Muang Chum, Amphor Tha Muang in Kanchanburi province, of Thailand.

The geographical coordinates of the project is latitude of 13° 57' 09.1946" N and longitude of 99° 37'32.453" E. Figure 1 below shows the location of the project.

<sup>1</sup> General Guidelines for SSC CDM Methodologies (Version 18)



Figure 1: Location of the project activity

**A.3. Parties and project participant(s)**

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Thailand (host)	Electricity Generating Authority of Thailand (EGAT)	No

**A.4. Reference of applied methodology and standardized baseline**

&gt;&gt;

The approved baseline and monitoring methodology used for this project activity is AMS-I.D “Grid connected renewable electricity generation”, version 17<sup>2</sup>

Methodology also refers to following tool:

- Tool to calculate the emission factor for an electricity system, version 02.2.1<sup>3</sup>;

Reference: Guidelines on the Demonstration of Additionality of Small-scale project version 09.0 (EB 68, Annex 27)<sup>4</sup>

**A.5. Crediting period of project activity**

&gt;&gt;

**Type of crediting period:** 7 year renewable crediting period

**Starting date of the crediting period:** 01/01/2014

**Length of the crediting period corresponding to this monitoring period:** 7 years and 0 month from 01/01/2014 - 31/12/2020

**A.6. Contact information of responsible persons/entities**

&gt;&gt;

Mr. Sarun Sritammaratch

Mr. Chayaphol Aroontheerawong

Advance Energy Plus Co., Ltd.  
Forum Tower Building, floor 28  
184/177, Ratchadapisek Rd.  
Huay Kwang, Bangkok,  
Thailand. 10310

E-mail: sarun\_s@aep.co.th,  
chayaphol\_a@aep.co.th

The person/entity is not a project participant as indicated in Appendix 1.

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

&gt;&gt;

The project activity was installed and implemented according to the registered PDD. EGAT signed an EPC agreement to implementation/construction of the project on 11/12/2008. The project activity was constructed and installed and then export the electricity to the grid since 29/01/2014.

<sup>2</sup> <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved>

<sup>3</sup> <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf>

<sup>4</sup> [https://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC\\_guid05.pdf](https://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf)

## Description of installed technology

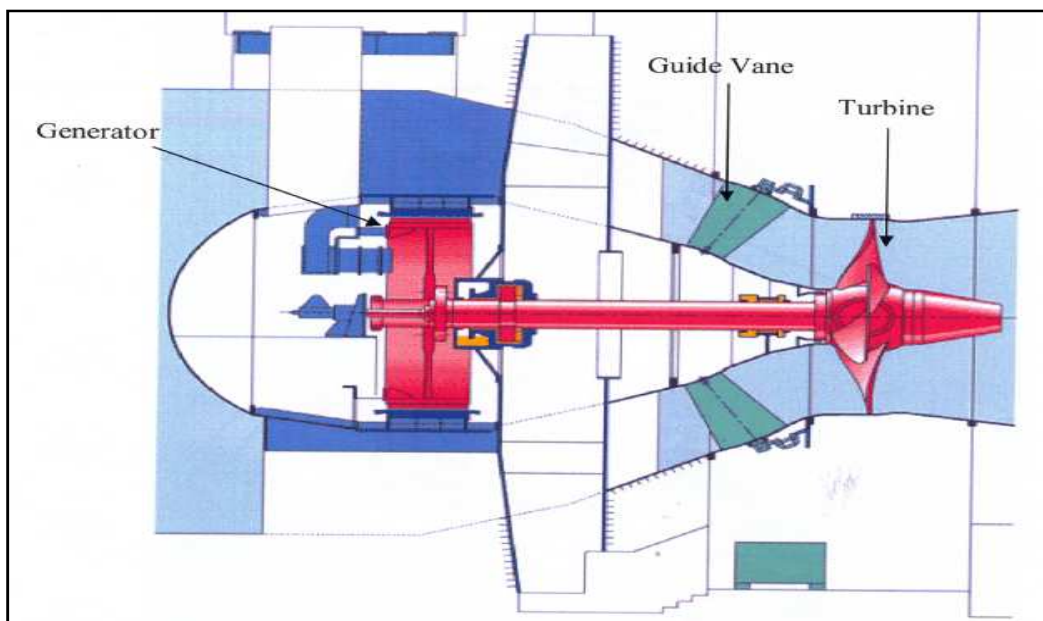
The project involves installation of two turbines of 6.4 MW each to produce electricity at 6.6kV which will be stepped up to 22 kV to export from the Mae Klong Powerhouse to existing PEA transmission line. The powerhouse is situated at a distance of 2.7 km from the existing PEA transmission line. The turbines are horizontal axis type with a design head of 9.20 m and design discharge of 75.56 m<sup>3</sup>/sec. The turbine generator shaft rotates at a speed of 166.7 rpm. Start up electricity for auxiliaries of turbine will be imported from PEA to open a guide vane, which is a part of the turbine controlling the water flow to the turbine. The backup power supply in the event of power plant shut down (in case of emergency and Power plant maintenance) will be grid supply. All the electricity imported from the grid will be monitored.

The general specifications and cross section drawing of the turbine and generator are shown in table 2 and figure 2 respectively:

**Table 2: General specification of turbine and generator**

<b>Turbine</b>	UNIT I	UNIT II
Type	GZC19-WP-315	GZC19-WP-315
Rated Power	6.4MW	6.4MW
Rated Head	9.2m	9.2m
Rated Flow	75.56m <sup>3</sup> /s	75.56m <sup>3</sup> /s
Rated Speed	166.7 r/min	166.7 r/min
Runaway Speed	484.5 r/min	484.5 r/min
Layout Type	Horizontal Axis	Horizontal Axis

<b>Generator</b>	UNIT I	UNIT II
Type	SFWG6176-36/3800	SFWG6176-36/3800
Rated Capacity	7265.9 kVA	7265.9 kVA
Rated Power	6,176kW	6,176kW
Rated Voltage	6,600V	6,600V
Rated Current	635.6A	635.6A
Rated Frequency	50Hz	50Hz



**Figure 2: Bulb turbine and generator**

There are no events or situations that occurred during the monitoring period that may impact the applicability of the applied methodology AMS-I.D version 17.

The monitoring plans of the project activity are changed as described in section B.2. These changes have been submitted to this monitoring report as they are not required prior approval by the Executive Board as per para 5 in Appendix 1 of Project Standard version 09.0.

The monitoring equipments for the project activity are comprised of 4 electricity meters which are 2 main meters (for parameter  $EG_{\text{export},y}$  and  $EG_{\text{import},y}$ ) and 2 back up meters (for parameter  $EG_{\text{export},y}$  and  $EG_{\text{import},y}$ ) as indicated below;

**Table 3**

Monitoring equipment	Accuracy class	Location
1. Electricity meter for unit 1 for parameter $EG_{\text{export},y}$ and $EG_{\text{import},y}$ (Main meter)	0.2S	The electricity meter is located in the control room
2. Electricity meter for unit 2 for parameter $EG_{\text{export},y}$ and $EG_{\text{import},y}$ (Main meter)	0.2S	The electricity meter is located in the control room
3. Electricity meter for unit 1 for parameter $EG_{\text{export},y}$ and $EG_{\text{import},y}$ (Back up meter)	0.2S	The electricity meter is located in the control room
4. Electricity meter for unit 2 for parameter $EG_{\text{export},y}$ and $EG_{\text{import},y}$ (Back up meter)	0.2S	The electricity meter is located in the control room

## **B.2. Post-registration changes**

### **B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

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During this monitoring period, there are no any temporary deviations from registered monitoring plan or applied methodology.

**B.2.2. Corrections**

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During this monitoring period, there is one correction on "Type of Generator unit 1 and this change is submitted with this monitoring report as indicated below.

<b>Generator</b>	<b>As per registered PDD</b>	<b>Post registration change</b>
Type	SFW6176-36/3800	SFWG6176-36/3800

Due to it is typo error on type of generator unit 1 during the validation stage, therefore it has been corrected and consistency with type of generator unit 2

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

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There is no change of crediting period to the project activity.

**B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

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During this monitoring period, there is no any inclusion that was not included at registration.

**B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

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During this monitoring, there are permanent changes from the registered monitoring plan which are submitted with this monitoring report as described below;

These changes were occurred after the project started exporting the electricity to the grid (29/01/2014) or after the registration date (01/02/2013).

The permanent changes are indicated in the revised PDD version 10 (Completion date of the PDD is 26/09/2016) and the PRCV report version 04.1, dated 01/02/2017 in which the DOE assessment opinion is indicated that the post-registration changes meet all relevant UNFCCC requirements.

**EG<sub>export,y</sub> (B.7.1)**

<b>Data</b>	<b>Registered monitoring plan</b>	<b>Permanent changed from registered monitoring plan</b>
Source of data	Energy meter reading from plant records	Measured value from electricity meter
Measurement methods and procedures	There are two meters for two generators (Type code: ZMD 402 CT44 - LANDIS + GYR) with Automated meter reading installed inside EGAT's control room. These meters are two-way meter through which export and import data will be continuously monitored. These data will be printed and recorded on a monthly basis. Additionally, two back up meters will also be installed for each generator.  Moreover, a logbook will be maintained on site to record hourly	Measured continuously by using electricity meter. There are two main electricity meters for two generators installed inside EGAT's control room. Consolidated readings will be recorded in monthly basis.

	readings from the energy meter. The readings will be taken by the shift supervisor. This hourly data will be signed off at the end of every shift by the engineer in charge of the shift and again at the end of each day by the power plant manager.	
QA/QC procedures	Data measured by meters and recorded in logbook will be cross checked by electricity sales receipt. This will act as a check against the electricity export-import meter readings. The energy meter will be calibrated at least once in two year subject to national standards.	The reading data from the electricity meters are recorded in the monthly report and it will be cross checked by the reading export meter report. The reading export meter report is an official document to confirm the quantity of power supplied as indicated in the PPA. These recorded data shall be verified by off-taker party (PEA officer). The verified data shall be countersigned by PEA and EGAT officer. In case of main meter failure, the data from back up meter will be applied in such period. The energy meter will be calibrated at least once in two year subject to national standards.

**EG<sub>import,y</sub> (B.7.1)**

<b>Data</b>	<b>Registered monitoring plan</b>	<b>Permanent changed from registered monitoring plan</b>
Source of data	Energy meter reading from plant records	Measured value from electricity meter
Measurement methods and procedures	There are two meters for two generators (Type code: ZMD 402 CT44 - LANDIS + GYR) with Automated meter reading installed inside EGAT's control room. These meters are two-way meter through which export and import data will be continuously monitored. These data will be printed and recorded on a monthly basis. Additionally, two back up meters will also be installed for each generator.  Moreover, a logbook will be maintained on site to record hourly readings from the energy meter. The readings will be taken by the shift supervisor. This hourly data will be signed off at the end of every shift by the engineer in charge of the shift and again at the end of each day by the power plant manager.	Measured continuously by using electricity meter. There are two electricity meters installed inside EGAT's control room. Consolidated readings are recorded in monthly basis.
QA/QC procedures	Data measured by meters and recorded in logbook will be cross checked against electricity invoice sent by PEA for electricity import.	Data measured by meters and recorded in monthly report will be cross checked against electricity invoice sent by PEA for electricity

	The energy meter will be calibrated at least once in two years subject to national standards.	import. The energy meter will be calibrated at least once in two years subject to national standards.
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**EG<sub>BL,y</sub> (B.7.1)**

<b>Data</b>	<b>Registered monitoring plan</b>	<b>Permanent changed from registered monitoring plan</b>
QA/QC procedures to be applied	This can be cross checked against the electricity invoices. The energy meter will be calibrated at least once in two years subject to national standards	The meters will be calibrated as described in parameter EG <sub>export,y</sub> and EG <sub>import,y</sub>

**Monitoring Procedure (B.7.3)**

<b>Data</b>	<b>Registered monitoring plan</b>	<b>Permanent changed from registered monitoring plan</b>
<b>Monitoring Procedure and Emergency Procedure (B.7.3)</b>	There will be three 8 hour shifts and the readings from energy meters will be taken on an hourly basis by the shift supervisor and recorded in logbooks. This hourly data will be signed off at the end of every shift by the engineer in charge of the shift and again at the end of each day by the power plant manager. The power plant manager will analyze the data every month and report to the head office. The data will be archived electronically every month and invoices of electricity sales will be maintained.	<p>EGAT is well aware of the importance of having a good operational and management team in order to execute a well-defined monitoring plan for the project activity. So, it has an operational and management structure created exclusively for monitoring data. The responsibilities of data monitoring, archiving and analyzing will fall on different members of the monitoring team. This team will be composed of head office, power plant manager and shift supervisor. The shift supervisor will record the monitoring data. The power plant manager will cross-check the monitoring data and system to be properly functional and the head office will analyze the power plant performance through the monitoring data.</p> <p><b><u>Emergency procedure</u></b></p> <p>In case of emergency that the monitoring equipment has a problem, the shift supervisor/plant manager will inform and request EGAT head office to repair or replace as applicable the meter soonest and then inform PEA to verified the repaired/new meter. During emergency situation, monitoring data from backup</p>

		meter will be used for calculation of emission reduction. In case loss of monitoring data from both main and backup meter at the same time, the emission reduction will not be claimed during this period.
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### B.2.6. Changes to project design of registered project activity

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During this monitoring period, there is a change of project design; the Runaway Speed of Turbine of unit I and II has been changed from “463 r/min” to “484.5 r/min” to reflect the actual design as indicated below. This change is submitted with this monitoring report. This change was occurred after completion of the project construction (29/01/2014) or after the registration date (01/02/2013).

Turbine	UNIT I		UNIT II	
	Registered PDD	Correction	Registered PDD	Correction
Type	GZC19-WP-315	GZC19-WP-315	GZC19-WP-315	GZC19-WP-315
Rated Power	6.4MW	6.4MW	6.4MW	6.4MW
Rated Head	9.2m	9.2m	9.2m	9.2m
Rated Flow	75.56m <sup>3</sup> /s	75.56m <sup>3</sup> /s	75.56m <sup>3</sup> /s	75.56m <sup>3</sup> /s
Rated Speed	166.7 r/min	166.7 r/min	166.7 r/min	166.7 r/min
Runaway Speed	463 r/min	484.5 r/min	463 r/min	484.5 r/min
Layout Type	Horizontal Axis	Horizontal Axis	Horizontal Axis	Horizontal Axis

This change of project design does not require prior approval by the Board as it does not adversely impact to a) The applicability and application of the applied methodology and, where applicable, the applied standardized baseline under which the project activity has been registered, b) The additionality of the project activity, c) The scale of the project activity as indicated in Appendix 1 (6) of CDM project standard version 09.0

### B.2.7. Types of changes specific to afforestation or reforestation project activity

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Not applicable

## SECTION C. Description of monitoring system

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The readings data from electricity meters will be recorded in monthly basis by shift supervisor. The reading data will be cross-checked by the power plant manager. The power plant manager will analyze the data every month and report to the head office. The data will be archived electronically every month. The reading export meter report and invoices of electricity purchased will be maintained.

### Emergency procedure

In case of emergency that the monitoring equipment has a problem, the shift supervisor/plant manager will inform and request EGAT head office to repair or replace as applicable the meter soonest and then inform PEA to verified the repaired/new meter. During emergency situation, monitoring data from backup meter will be used for calculation of emission reduction. In case loss of monitoring data from both main and backup meter at the same time, the emission reduction will not be claimed during this period

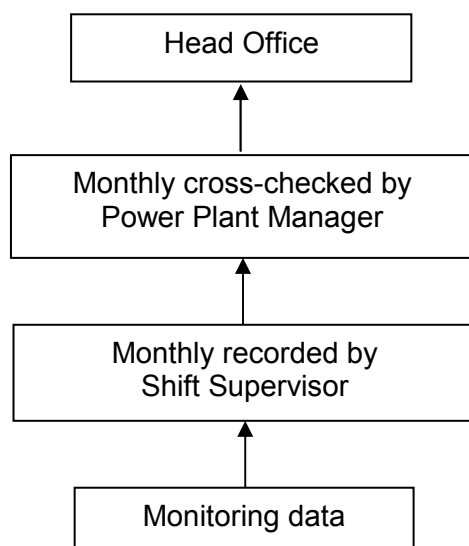


Figure 3: Data flow diagram

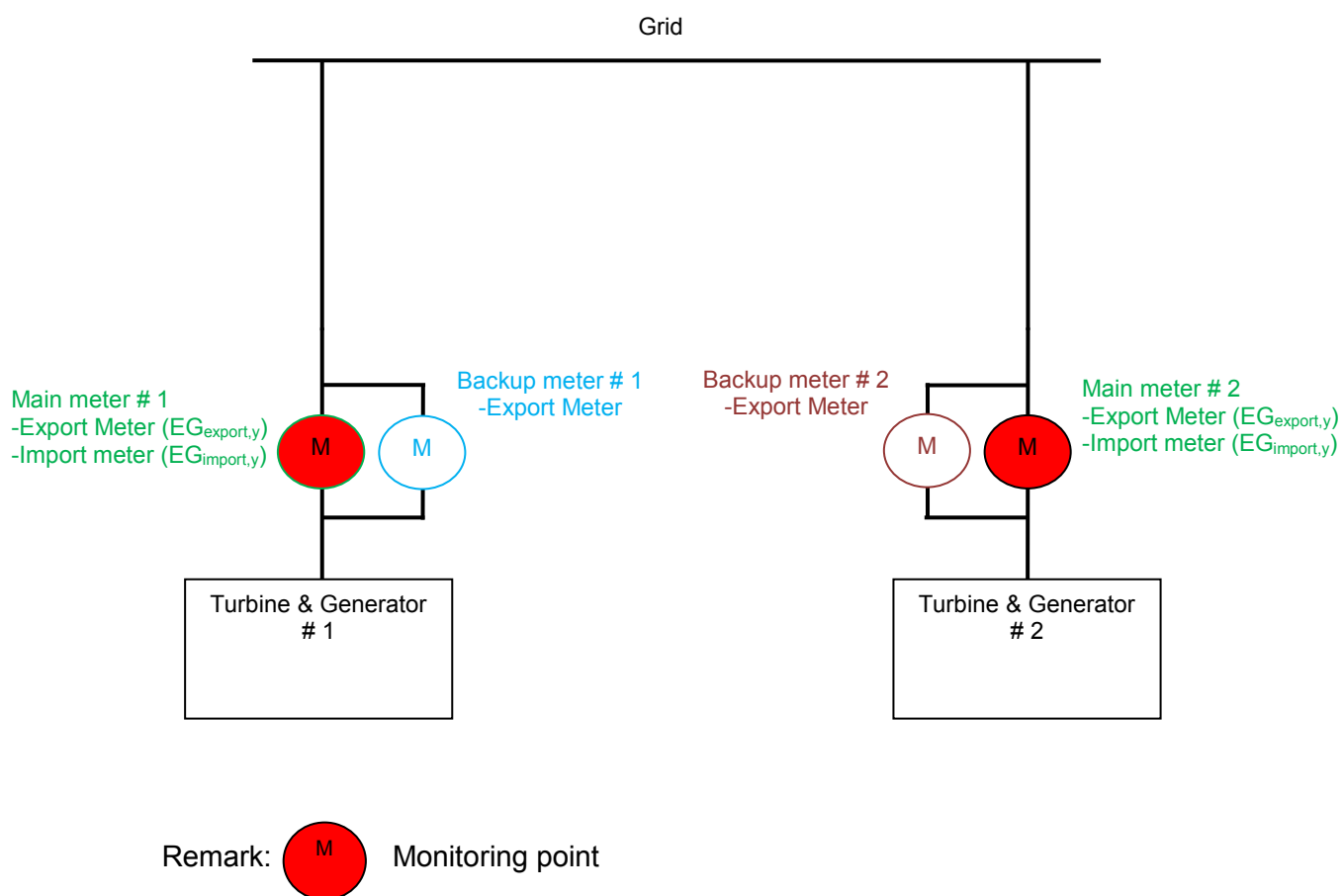


Figure 4: Monitoring diagram

Parameter monitored		
1	$EG_{\text{export},y}$	Power supplied by the project activity to the grid in year y
2	$EG_{\text{import},y}$	Power purchased by the project activity from the Grid in year y

3	EG <sub>BL,y</sub>	Net electricity exported by the project activity in year y
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## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante or at renewal of crediting period

<b>Data/parameter:</b>	<b>EF<sub>grid,OM</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Simple Operating Margin
Source of data	All data used to calculate the emissions factor is publically available and detailed in Appendix 4 of PDD. Data for electricity production and fuel use of power plant in the Thailand Grid is available from the Thailand Department of Alternative Energy Development and Efficiency (DEDE) for the years 2006, 2007 and 2008. Additional information for Small Power Producer (SPP) plants is available from the Thailand Energy Policy and Planning Office, Ministry of Energy.
Value(s) applied)	0.543
Choice of data or measurement methods and procedures	For full details of the choice of data and methods applied refer to Appendix 4 of PDD.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter has been fixed ex-ante for the crediting period

<b>Data/parameter:</b>	<b>EF<sub>grid,BM</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Build Margin
Source of data	All data used to calculate the emissions factor is publically available and detailed in Appendix 4 of PDD. Data for electricity production and fuel use of power plant in the Thailand Grid is available from the Thailand Department of Alternative Energy Development and Efficiency (DEDE) for the years 2006, 2007 and 2008. Additional information for Small Power Producer (SPP) plants is available from the Thailand Energy Policy and Planning Office, Ministry of Energy.
Value(s) applied)	0.569
Choice of data or measurement methods and procedures	For full details of the choice of data and methods applied refer to Appendix 4 of PDD.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter has been fixed ex-ante for the crediting period

<b>Data/parameter:</b>	<b>EF<sub>grid,CM</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Build Margin
Source of data	All data used to calculate the emissions factor is publically available and detailed in Appendix 4 of PDD. Data for electricity production and fuel use of power plant in the Thailand Grid is available from the Thailand Department of Alternative Energy Development and Efficiency (DEDE) for the years 2006, 2007 and 2008. Additional information for Small Power Producer (SPP) plants is available from the Thailand Energy Policy and Planning Office, Ministry of Energy.

Value(s) applied)	0.556
Choice of data or measurement methods and procedures	For full details of the choice of data and methods applied refer to Appendix 4 of PDD.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter has been fixed ex-ante for the crediting period.

## D.2. Data and parameters monitored

Data/parameter:	$EG_{\text{export},y}$
Unit	MWh/yr
Description	Power supplied by the project activity to the grid in year y
Measured/calculated/default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	6,602 MWh

Monitoring equipment	Main meter unit 1	
	<b>Type</b>	Electricity meter
	<b>Manufacturer</b>	EDMI (Mk6E)
	<b>Serial number</b>	211377799 (23/03/2015 - Present) 210270751 (29/01/2014 - 23/03/2015)
	<b>Calibration frequency</b>	At least once in 2 years
	<b>Accuracy</b>	0.2S
	<b>Calibration year 2013</b>	17/10/2013 (s/n 210270751)
	<b>Calibration year 2015</b>	12/02/2015 (s/n 211377799)
	<b>Validity</b>	11/02/2017
	Main meter unit 2	
	<b>Type</b>	Electricity meter
	<b>Manufacturer</b>	EDMI (Mk6E)
	<b>Serial number</b>	212500667 (23/03/2015 - Present) 211377855 (29/01/2014 - 23/03/2015)
	<b>Calibration frequency</b>	At least once in 2 years
	<b>Accuracy</b>	0.2S
	<b>Calibration year 2014</b>	21/01/2014 (s/n 211377855)
	<b>Calibration year 2015</b>	12/02/2015 (s/n 212500667)
	<b>Validity</b>	11/02/2017
	Back up meter unit 1	
	<b>Type</b>	Electricity meter
	<b>Manufacturer</b>	EDMI (Mk6E)
	<b>Serial number</b>	208269615 (23/03/2015 - Present) 206657637 (29/01/2014 - 23/03/2015)
	<b>Calibration frequency</b>	At least once in 2 years
	<b>Accuracy</b>	0.2S
	<b>Calibration year 2013</b>	17/10/2013 (s/n 206657637)
	<b>Calibration year 2015</b>	12/02/2015 (s/n 208269615)
	<b>Validity</b>	11/02/2017
	Back up meter unit 2	
	<b>Type</b>	Electricity meter
	<b>Manufacturer</b>	EDMI (Mk6E)
	<b>Serial number</b>	210161015 (23/03/2015 - Present) 210278026 (29/01/2014 - 23/03/2015)
	<b>Calibration frequency</b>	At least once in 2 years
<b>Accuracy</b>	0.2S	
<b>Calibration year 2014</b>	21/01/2014 (s/n 210278026)	
<b>Calibration year 2015</b>	12/02/2015 (s/n 210161015)	
<b>Validity</b>	11/02/2017	

Measuring/reading/recording frequency:	<b><u>Main meter unit 1 &amp; 2</u></b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly  <b><u>Backup meter unit 1 &amp; 2</u></b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly
Calculation method (if applicable):	-
QA/QC procedures:	<p>The reading data from the electricity meters are recorded in the monthly report and it will be cross checked by the reading export meter report. The reading export meter report is an official document to confirm the quantity of power supplied as indicated in the PPA. These recorded data shall be verified by off-taker party (PEA officer). The verified data shall be countersigned by PEA and EGAT officer.</p> <p>In case of main meter failure, the data from back up meter will be applied in such period.</p> <p>The energy meter will be calibrated at least once in two year subject to national standards.</p>
Purpose of data:	Calculation of baseline emissions or baseline net GHG removes by sinks
Additional comments:	All data will be kept for a minimum of 2 years following issuance of certified emission reductions or the end of the crediting period, whichever is later.

<b>Data/parameter:</b>	<b>EG<sub>import,y</sub></b>
Unit	MWh/yr
Description	Power purchased by the project activity from the Grid in year y
Measured/calculated/default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	551 MWh

Monitoring equipment	Main meter unit 1	
	Type	Electricity meter
	Manufacturer	EDMI (Mk6E)
	Serial number	211377799 (23/03/2015 - Present) 210270751 (29/01/2014 - 23/03/2015)
	Calibration frequency	At least once in 2 years
	Accuracy	0.2S
	Calibration year 2013	17/10/2013 (s/n 210270751)
	Calibration year 2015	12/02/2015 (s/n 211377799)
	Validity	11/02/2017
	Main meter unit 2	
	Type	Electricity meter
	Manufacturer	EDMI (Mk6E)
	Serial number	212500667 (23/03/2015 - Present) 211377855 (29/01/2014 - 23/03/2015)
	Calibration frequency	At least once in 2 years
	Accuracy	0.2S
	Calibration year 2014	21/01/2014 (s/n 211377855)
	Calibration year 2015	12/02/2015 (s/n 212500667)
	Validity	11/02/2017
	Back up meter unit 1	
	Type	Electricity meter
	Manufacturer	EDMI (Mk6E)
	Serial number	208269615 (23/03/2015 - Present) 206657637 (29/01/2014 - 23/03/2015)
	Calibration frequency	At least once in 2 years
	Accuracy	0.2S
	Calibration year 2013	17/10/2013 (s/n 206657637)
	Calibration year 2015	12/02/2015 (s/n 208269615)
	Validity	11/02/2017
	Back up meter unit 2	
	Type	Electricity meter
	Manufacturer	EDMI (Mk6E)
	Serial number	210161015 (23/03/2015 - Present) 210278026 (29/01/2014 - 23/03/2015)
	Calibration frequency	At least once in 2 years
Accuracy	0.2S	
Calibration year 2014	21/01/2014 (s/n 210278026)	
Calibration year 2015	12/02/2015 (s/n 210161015)	
Validity	11/02/2017	

Measuring/reading/recording frequency:	<b>Unit 1</b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly  <b>Unit 2</b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly
Calculation method (if applicable):	-
QA/QC procedures:	Data measured by meters and recorded in monthly report will be cross checked against electricity invoice sent by PEA for electricity import. The energy meter will be calibrated at least once in two years subject to national standards.
Purpose of data:	Calculation of baseline emissions or baseline net GHG removes by sinks
Additional comments:	All data will be kept for a minimum of 2 years following issuance of certified emission reductions or the end of the crediting period, whichever is later.

<b>Data/parameter:</b>	<b>EG<sub>BL,y</sub></b>
Unit	MWh/yr
Description	Net electricity exported by the project activity in year y
Measured/calculated/default	Calculated
Source of data	Electricity meter (referred to the meters of <b>EG<sub>export,y</sub></b> and <b>EG<sub>import,y</sub></b> )
Value(s) of monitored parameter	6,051 MWh
Monitoring equipment	Electricity meter (referred to the meters of <b>EG<sub>export,y</sub></b> and <b>EG<sub>import,y</sub></b> )
Measuring/reading/recording frequency:	<b>EG<sub>export,y</sub></b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly  <b>EG<sub>import,y</sub></b> <b>Measuring</b> – Continuously <b>Reading</b> – Continuously <b>Recording frequency</b> - Monthly
Calculation method (if applicable):	<b>EG<sub>BL,y</sub></b> will be calculated by taking readings from both export and import meters. <b>EG<sub>BL,y</sub></b> is calculated as ( <b>EG<sub>export,y</sub></b> – <b>EG<sub>import,y</sub></b> ). <b>EG<sub>export,y</sub></b> and <b>EG<sub>import,y</sub></b> will be monitored continuously by the meter. This reading (export-import) will act as the basis for calculation of emission reductions.
QA/QC procedures:	The meters will be calibrated as described in parameter <b>EG<sub>export,y</sub></b> and <b>EG<sub>import,y</sub></b>
Purpose of data:	Calculation of baseline emissions or baseline net GHG removes by sinks
Additional comments:	All data will be kept for a minimum of 2 years following issuance of certified emission reductions or the end of the crediting period, whichever is later.

### D.3. Implementation of sampling plan

>>

There are no any data and parameter monitored described in section D.2 are determined by a sampling approach. Then this section is not applicable for this project activity.

**SECTION E. Calculation of emission reductions or GHG removals by sinks****E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

&gt;&gt;

According to registered PDD, *Ex-post* baseline emission has been demonstrated as formula below;

$$BE_y = EG_{BL,y} \times EF_{CO_2,grid,y} = (EG_{export,y} - EG_{import,y}) \times EF_{CO_2,grid,y}$$

Baseline emission for Year 2014:

$BE_y = EG_{BL,y} \times EF_{CO_2,grid,y} = (EG_{export,y} - EG_{import,y}) \times EF_{CO_2,grid,y}$			
Parameter	Description	Value	Source
$BE_y$	Baseline emissions in year 'y' (tCO <sub>2</sub> /yr)	<b>3,364</b>	Calculated
$EG_{BL,y}$	Net electricity exported by the project activity in year y (MWh/yr)	<b>6,051</b>	Calculated
$EF_{CO_2,grid,y}$	Thai grid CO <sub>2</sub> Emission Factor in year y, (tCO <sub>2</sub> /MWh)	<b>0.556</b>	Calculated
$EG_{export,y}$	Power supplied by the project activity to the grid in year y (MWh/yr)	<b>6,602</b>	Electricity meter
$EG_{import,y}$	Power purchased by the project activity from the Grid in year y (MWh/yr)	<b>551</b>	Electricity meter

**Therefore, total baseline emission of year 2014 is 3,364 tCO<sub>2</sub>**

**E.2. Calculation of project emissions or actual net GHG removals by sinks**

&gt;&gt;

Accordingly to the methodology AMS-I.D. version 17 para 20, *for most renewable energy activities, P<sub>Ey</sub> = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM002.*

- *Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)*
- *Emissions from water reservoirs of hydro power plants*

The project activity is a hydro power plant and it has no reservoir, hence, does not result in any project emissions. Project emissions, therefore, are zero.

**E.3. Calculation of leakage**

&gt;&gt;

The methodology AMS-I.D. version 17 para 22, specifies

*If the energy generating equipment is transferred from another activity, leakage is to be considered*

No equipment transfer takes place thus no leakage is considered in the project activity.

**E.4. Summary of calculation of emission reductions or net GHG removals by sinks**

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
<b>Total</b>	3,364	0	0	0	3,364	3,364

**E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD**

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	41,741	3,364

**E.6. Remarks on difference from estimated value in registered PDD**

&gt;&gt;

The actual figures less than estimated in registered PDD because the water in Mae Klong irrigation dam is low, which then lead to much lower of the operating hour and operating day than the expected at 24 hour/day for 365 day/year as well as the plant operation is not run at full capacity of 12.35 MW. Therefore the power supplied by the project activity to the grid ( $EG_{\text{export},y}$ ) is 6,602 MWh which is much lower than the expected at 75,074 MWh and the net electricity exported by the project activity ( $EG_{\text{BL},y}$ ) is 6,051 MWh is much lower than the expected at 75,074 MWh. At the result, the emission reduction in this period is much lower than the expected emission reduction in registered PDD.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	Electricity Generating Authority of Thailand
<b>Street/P.O. Box</b>	53 Moo2, Charansanitwong Road
<b>Building</b>	
<b>City</b>	Bang Kruai, Nonthaburi
<b>State/region</b>	
<b>Postcode</b>	11130
<b>Country</b>	Thailand
<b>Telephone</b>	+66-2-4361140
<b>Fax</b>	+66-2-4361190
<b>E-mail</b>	waraporn.k@egat.co.th
<b>Website</b>	
<b>Contact person</b>	Ms Waraporn Kunawanakit
<b>Title</b>	
<b>Salutation</b>	Ms
<b>Last name</b>	Kunawanakit
<b>Middle name</b>	
<b>First name</b>	Waraporn
<b>Department</b>	
<b>Mobile</b>	
<b>Direct fax</b>	
<b>Direct tel.</b>	
<b>Personal e-mail</b>	

<b>Project participant and/or responsible person/ entity</b>	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
<b>Organization name</b>	Advance Energy Plus, Co., Ltd.
<b>Street/P.O. Box</b>	184/177 Rachadaphisek Rd.,
<b>Building</b>	28th Floor Forum Tower
<b>City</b>	Bangkok
<b>State/Region</b>	-
<b>Postcode</b>	10310
<b>Country</b>	Thailand
<b>Telephone</b>	+662 645 3348
<b>Fax</b>	+662 645 3349
<b>E-mail</b>	sarun_s@aep.co.th
<b>Website</b>	-
<b>Contact person</b>	Mr. Sarun Sritammaratch
<b>Title</b>	Project Manager
<b>Salutation</b>	Mr.
<b>Last name</b>	Sritammaratch
<b>Middle name</b>	-
<b>First name</b>	Sarun
<b>Department</b>	-
<b>Mobile</b>	+6681 979 0599
<b>Direct fax</b>	+662 645 3349
<b>Direct tel.</b>	+662 645 3348
<b>Personal e-mail</b>	-

<b>Project participant and/or responsible person/ entity</b>	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
<b>Organization name</b>	Advance Energy Plus, Co., Ltd.
<b>Street/P.O. Box</b>	184/177 Rachadaphisek Rd.,
<b>Building</b>	28 <sup>th</sup> Floor Forum Tower
<b>City</b>	Bangkok
<b>State/Region</b>	-
<b>Postcode</b>	10310
<b>Country</b>	Thailand
<b>Telephone</b>	+662 645 3348
<b>Fax</b>	+662 645 3349
<b>E-mail</b>	chayaphol_a@aep.co.th

<b>Website</b>	-
<b>Contact person</b>	Mr. Chayaphol Aroontherawong
<b>Title</b>	Assistant Project Manager
<b>Salutation</b>	Mr.
<b>Last name</b>	Aroontherawong
<b>Middle name</b>	-
<b>First name</b>	Chayaphol
<b>Department</b>	-
<b>Mobile</b>	+6681 455 9535
<b>Direct fax</b>	+662 645 3349
<b>Direct tel.</b>	+662 645 3348
<b>Personal e-mail</b>	-

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
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