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		
Title of the project activity	Adavikanda, Kuruwita Division Mini Hydro Power Project	
UNFCCC reference number of the project activity	3531	
Version number of the monitoring report	1	
Completion date of the monitoring report	28-04-2016	
Monitoring period number and duration of this monitoring period	Monitoring Period 2, 01 April 2011 to 31 March 2016	
Project participant(s)	Alternative Power Systems (Pvt.) Ltd Mitsubishi UFJ Morgan Stanley Securities Co., Ltd	
Host Party	Sri Lanka	
Sectoral scope(s)	1. Energy industries (renewable / non-renewable sources)	
Selected methodology(ies)	AMS ID version 13	
Selected standardized baseline(s)	NA	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	67,494	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	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
	20,134	41,960

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Alternate Power Systems (Pvt.) Ltd. constructed and operates a run-of-river 6.5 MW mini hydro power plant in Sri Lanka. The project activity involves generation of electricity from the small-scale hydropower plant and supply of the power generated to the Sri Lankan national utility grid, the Ceylon Electricity Board. The project exported 91.82 GWh of electricity to the National grid during the monitoring period.

The project is run of the river; hence minimal storage is required at the weir. The weir is 25 meters long with a maximum height of 2.0 meters and is designed as a concrete gravity structure with dowels provided for added safety against sliding. The Full Supply Level (FSL) of the pond is 370 m. MSL. The intake is a closed reinforced concrete conduit with a flow area of 3.6 meters width and 1.5 meters height. The intake has been designed for a maximum flow of 6.0 cubic meters per second.

The start date of the project activity (the signing date for the penstock clearing, transportation and painting) was 21/01/2008. Project operation began on 06/10/2009(commercial production start date). The project was registered on 24/08/2010. The first verification has performed for the period from 24/08/2010 to 31/03/2011 where 8,324 CERs had already been issued.

The total emission reductions achieved in this second monitoring period (01/04/2011 - 31/03/2016) are 62,094 tCO_2e.

A.2. Location of project activity

The Project site is located along the Kuru Ganga River. This site can be accessed by proceeding approximately 15 km from Kuruwita along the trail road to Sri Pada through the Kuruwita Division of District Ratnapura in Sri Lanka.

The coordinates for the plant site are: N 6^o 49’ 56”, E 80^o 25’ 27”.

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)
Sri Lanka (host)	Alternative Power Systems (Pvt.) Ltd.	No
Japan	Mitsubishi UFJ Morgan Stanley Securities Co., Ltd	No

A.4. Reference of applied methodology and standardized baseline

In accordance with Appendix B of the simplified modalities and procedures for small-scale clean development mechanism project activities (“SSC M&P”), the project falls under the following type and category:

Type I: Renewable Energy Projects
Category D: Grid connected renewable electricity generation (Version 13)
Sectoral Scope: 1 – Energy industries (renewable / non-renewable sources)

A.5. Crediting period of project activity

The chosen crediting period is: 7 years (renewable)
The start date of the crediting period is: 24/08/2010
The period of first verification & issuance is 24/08/2010 to 31/03/2011

A.6. Contact information of responsible persons/entities

Alternate Power Systems (Pvt) Ltd.
27/2 East Tower,
World Trade Center,
Colombo-01,
Sri Lanka.
Tel: +94 112 381111, Fax : +94 112 381115
Email : russell@vallibel.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project was designed to construct as 6.5MW run off the river mini hydro power project utilizing water resource in Kuruganga steam with the total head of 153m and design flow of 6 m^3/S. The project is a medium head project and there are three horizontal shafts Francis type turbines and synchronous generators. The estimated annual power generation of the project is 19.93 GWhs.

1. The starting date of the project activity was 21/01/2008 and commercial operation started on 06/10/2009 following successful testing of the plant.

2. The first monitoring period was from 24/08/2010 to 31/03/2011 (220 days)

3. The second monitoring period is from 01/04/2011 to 31/03/2016 (1,827 days)

4. During the monitoring period, the plant was offline (Machine 1: 1,125 days; Machine 2: 695 days; Machine 3: 718 days) due to non availability of water, grid failure, machine failure and scheduled interruptions.

5. During the monitoring period, the plant has been able to generate 91 778.624 MWhs of electricity and therefore achieved 62,094 CERs

There was no event during the monitoring period that had an impact on the applicability of the methodology.

B.2. Post-registration changes

There have been no changes after registration

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

There has been no revision to the monitoring plan

B.2.2. Corrections

Not applicable

B.2.3. Changes to start date of crediting period

There have been no such changes to the start date of the crediting period

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

Not applicable

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

There have been no such changes

B.2.6. Changes to project design of registered project activity

There have been no such changes to the design of the project

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

Not applicable

SECTION C. Description of monitoring system

Monitoring Organisation

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the DGM of the Company. A team of experienced personnel in various disciplines assists the Shift Engineering Superintendents in plant operation, measurements and management. The primary responsibility of the team is to measure, monitor, and record and report the information on various data items to the Engineer-in-Charge, in accordance with the applicable standards.

The responsibility of review, storage and archiving of information in good condition lies with the DGM. The DGM undertakes periodic verifications and onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions. An internal verification report is prepared for review by the DGM followed by submission for verification by an independent entity (DOE).

The team including the Engineer-in-Charge is appointed by the DGM in advance before the start of project operations. The POM reports to the DGM and seeks guidance in case of conflicts or difficulties in order to maintain the monitoring organisation in good spirit.

Organizational Chart

Jt. Chief Executive Officer

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Deputy General Manager (DGM)

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Plant Operations Manger (POM)

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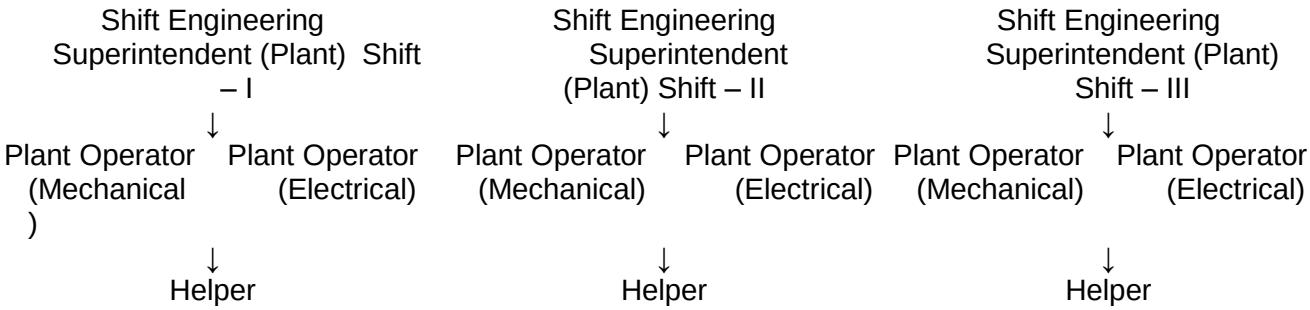


Parameters Requiring Monitoring

This monitoring plan requires monitoring of all parameters indicated in section B7 of the PDD. The necessary documents required for verification of the data are maintained for later archiving. Using the power exported to the grid, the emission reductions are calculated as illustrated in Section B6.3 of the PDD. Emission reductions generated by the project are monitored at regular intervals and are reported to the DGM.

Procedures for training of monitoring personnel

The project employs qualified and experienced persons for plant operation. Basic personnel to deal with monitoring of parameters are Shift Engineering Superintendents. The project maintains standard log sheets and formats to record the monitoring parameters. The personnel are given proper training to maintain the plant records. The POM of the Plant verifies, compiles and archives all the monitored data. The parameters to be monitored during the crediting period are provided in a tabular format. The Shift Engineering Superintendents and the POM of the Plant are provided with necessary training with respect to maintenance of the relevant monitoring records to enable them to deal with the monitoring independently. Training is provided to the monitoring personnel for monitoring of the following parameters:

- Electricity Export
- Electricity Import
- Gross electricity generated
- Periodical calibration of monitoring equipment
- Diesel consumption

Procedures for documentation and storage:

Operations of the hydro power project are overseen by the Shift Engineering Superintendent (ES) of the company. The company has three Shift Engineering Superintendent (ES) for each of the three shifts. The Shift Engineering Superintendent (ES)'s position is occupied by qualified electrical engineers (POM) who have obtained necessary training in plant operations, data monitoring, report generation etc. To maintain the smooth operations of the plant, the company will has two Plant Operators (Mechanical and Electrical) and one helper for each of the three shifts to help the shift Engineering Superintendent.

The Shift Engineering Superintendents record the required parameters every day during the operation of the plant. Since the project is a hydro power project, only the following energy related data are to be monitored:

- Gross electricity generation;
- Energy export and import; and
- Diesel consumption for the diesel generator set

The Energy meter readings are taken at the end of each shift at a designated time every day to ensure a constant recording frequency of parameter. The recorded parameters are documented every day in the standard log books maintained at the plant. The day to day

records are verified, compiled and documented for preparation of internal verification reports by the POM.

The net electricity exported to the grid is recorded from the export meter installed within the premises, jointly with the representatives of Ceylon Electricity Board in the last week of each month. This reading is taken as the basis for raising invoices from the CEB for the payment against net electricity exported to the grid.

The energy imported from the CEB grid is recorded in the import meter installed by the CEB for billing the project activity.

These records are maintained by the project proponent at the project site as well as at their head office.

Internal audits

The company has introduced an internal verification system for documentation and safe storage of data. Internal verification is carried out as per the monitoring plan and whenever necessary. An internal verification report is prepared for review by the Deputy General Manager (DGM). The DGM verifies the records independently with reference to the power exported and imported. Internal verification reports are the basic documents for the monitoring and storage of plant operational data.

The DGM of the company visits the plant once a month and conducts an internal audit of the various monitoring parameters of the project. The DGM reviews all safety installations, operating procedures, monitoring records, etc. and discusses any corrective actions to be taken for the smooth functioning of the plant.

Procedures for Corrective actions

The parameters to be monitored during a crediting period are compiled in an internal verification report in every quarter of each crediting year and submitted to the DGM for review. The parameters include the gross generation, auxiliary consumption, energy export and import and diesel consumption for the diesel generator set. Based on the verification reports submitted by the Shift Engineering Superintendents the POM assesses the performance of plant. The DGM discusses and recommends necessary mechanisms to improve the operational efficiency of the plant and directs the respective personnel to rectify any problems.

QA & QC Procedures

The projects employ such equipment or instruments to measure, record, report, monitor and control the various key parameters of the plant. These monitoring and controls are part of the Control Systems of hydroelectric plant.

For measuring the energy exported / imported a main meter and a check meter have been installed as required. The check meter reading is used to measure electricity export/import in case of failure of the main meter. The CEB officials are able to replace the main meter immediately on request of the PP. Both the meters are calibrated and sealed at least once every year, as per the standards of the CEB. Delivery records are used and kept for checking the consistency of the recorded data.

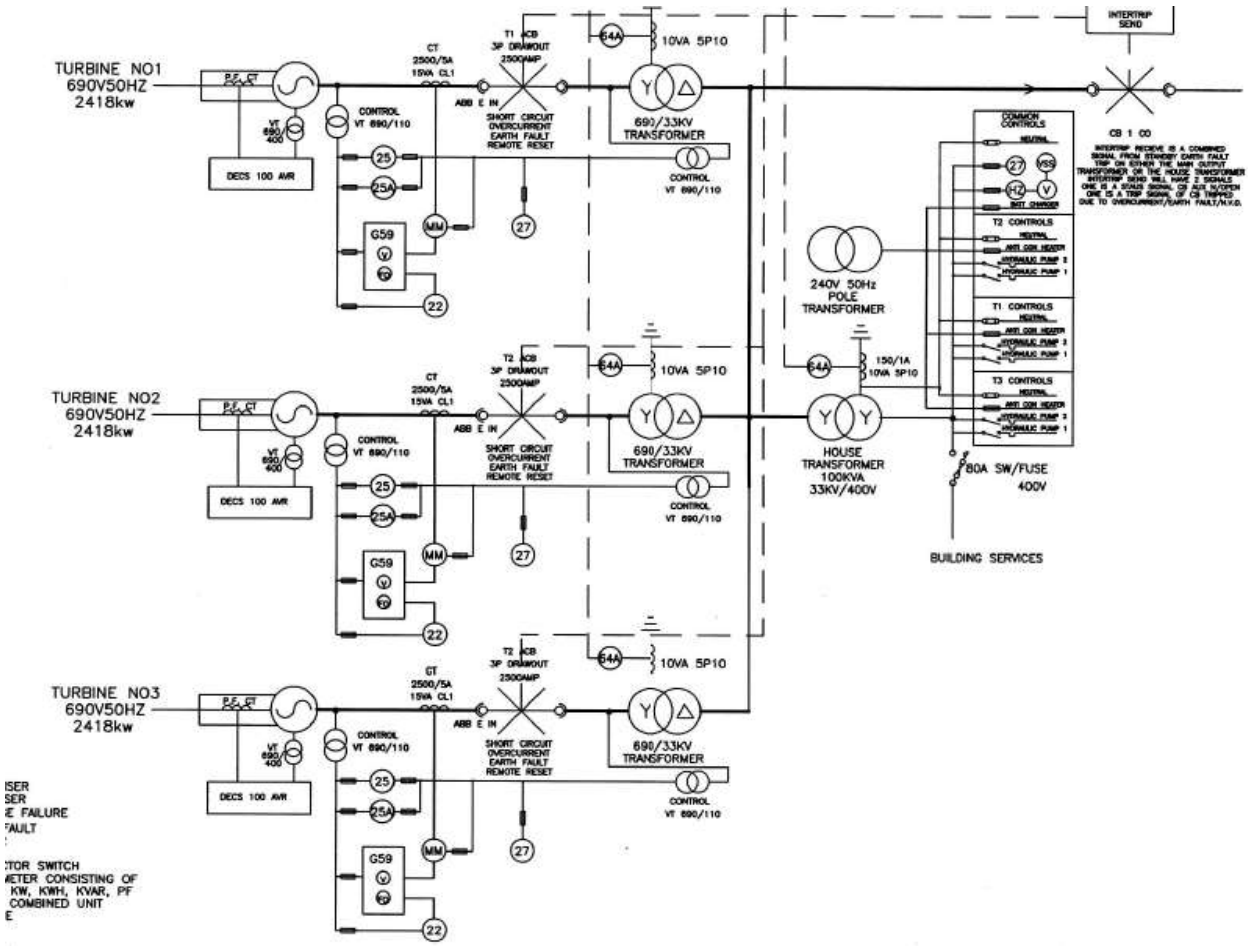
Data Storage & Archiving

All the data items monitored under the monitoring plan are kept for two years after the end of crediting period or the last issuance of CERs, for this project activity, whichever occurs later. The Methodology adopted for determining the base line emission factor is the combined margin of the generation mix in the CEB grid system, which represents the intensity of carbon emissions of the grid system. The baseline emission factor is adopted from the CEB published generation data for the latest available year for the CEB grid at the

time of project validation and the same figure is used for future projections and is reviewed each year based on data published by the CEB. The monitored data is presented to an independent verification agency or DOE to whom verification of emission reductions is assigned.

Maintenance of Equipment

All the equipment used in the project activity undergoes scheduled maintenance as specified in the operational manual of the equipment supplier. The Deputy General Manager is responsible to oversee maintenance activity on a periodic basis.



SECTION D. Data and parameters

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

Data / Parameter:	Density of HSD
Unit	Kg/Liter
Description	Density of diesel used in project activity
Source of data	Sri Lanka Sustainable Energy Authority
Value(s) applied:	0.8460

Choice of data or measurement methods and procedures	
Purpose of data	Project emission calculations
Additional comments	The national default value for Auto Diesel is used. The value is publicly available on the Sri Lanka Sustainable Energy Authority's website at: http://www.energy.gov.lk/spec/fual.php

Data / Parameter:	$NCV_{Diesel,y}$
Unit	GJ/kg
Description	Weighted average Net Calorific Value of diesel
Source of data	IPCC 2006 default values
Value(s) applied:	$43.3 * 10^{-3}$
Choice of data or measurement methods and procedures	
Purpose of data	Project emission calculations
Additional comments	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2, Chapter 1, Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

Data / Parameter:	$EF_{CO2,Diesel,y}$
Unit	tCO_2/GJ
Description	Weighted average CO_2 emission factor of diesel
Source of data	IPCC 2006 default values
Value(s) applied:	$74.8 * 10^{-3}$
Choice of data or measurement methods and procedures	
Purpose of data	Project emission calculations
Additional comments	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4, Chapter 1, Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

Data / Parameter:	$EF_{elec,i,j,y}$
Unit	tCO_2/MWh
Description	CO_2 emission factor for the electricity source *i* (*i* = grid), displaced due to the project activity during year, *y*
Source of data	Calculated
Value(s) applied:	0.6766
Choice of data or measurement methods and procedures	
Purpose of data	Baseline emission calculations
Additional comments	Calculated as per "Tool to calculate the emission factor for an electricity system(Version 01.1)" This parameter will be calculated once for each crediting period

Data / Parameter:	$EF_{OM\,y}$
Unit	tCO_2/MWh
Description	Simple Operating Margin for the CEB grid

Source of data	Calculated based on official data provided by the Ceylon Electricity Board
Value(s) applied:	0.7073
Choice of data or measurement methods and procedures	
Purpose of data	Baseline emission calculations
Additional comments	Calculated according to procedure prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)" This parameter will be calculated once for each crediting period

Data / Parameter:	$EF_{BM\,y}$
Unit	tCO_2/MWh
Description	Build Margin for the Western Grid
Source of data	Calculated based on official data provided by the Ceylon Electricity Board
Value(s) applied:	0.6459
Choice of data or measurement methods and procedures	
Purpose of data	Baseline emission calculations
Additional comments	Calculated according to procedure prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)" This parameter will be calculated once for each crediting period

Data / Parameter:	$EF_{CO2,m,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type, *i* in year, *y*
Source of data	IPCC 2006 Default Values
Value(s) applied:	Naphtha: 69.3 Diesel oil: 72.6 Furnace oil: 75.5
Choice of data or measurement methods and procedures	
Purpose of data	Baseline emission calculations
Additional comments	This parameter is monitored once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)

Data / Parameter:	$\eta_{m,y}$
Unit	-
Description	Average net energy conversion efficiency of power unit, *m* in year, *y*
Source of data	The default values provided in Annex I of "Tool to calculate the emission factor for an electricity system (Version 01.1)"

Value(s) applied:	Oil, Open Cycle: 39.5 %; Oil, Combined Cycle: 46 %
Choice of data or measurement methods and procedures	
Purpose of data	Baseline emission calculations
Additional comments	The default values provided in the Annex I of "Tool to calculate the emission factor for an electricity system (Version 01.1)" is used for the calculation This parameter is monitored once for each crediting period

D.2. Data and parameters monitored

Data / Parameter:	EG_Y
Data unit:	MWh
Description:	Net electricity exported to the grid
Measured /Calculated /Default:	Calculated
Source of data:	Monthly Invoice
Value(s) of monitored parameter:	91,778,624 MWh *Gross Electricity Exported - EI_y* = 91,821,827 kWh – 43,203 kWh = 91,778,624 kWh
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: 3 phase 4 wire Accuracy Class: 1.0 Serial Number: 208196328 (main meter)/ 205017629(check meter) Calibration frequency: Once Every Year Date of last calibration: 15th May 2015 Validity: 1 year
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Measured by the import/export meter (EI_y /EG_y) installed at the project boundary. The net electricity exported is jointly recorded and certified by CEB and the project developer. The data is archived electronically for the entire crediting period. Meter is calibrated as per CEB standards. A check meter is also installed near the main meter to cross check the electricity exported to the CEB grid. The check meter reading is used in case of failure of the main meter.
Purpose of data	Baseline emission calculations
Additional comments	

Data / Parameter:	EI_Y
Data unit:	MWh
Description:	Electricity imported from the grid

Measured /Calculated /Default:	Measured
Source of data:	Monthly bill from CEB
Value(s) of monitored parameter:	43,203 kWh
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: 3 phase 4 wire Accuracy Class: 1.0 Serial Number: 208196328 (main meter)/ 205017629(check meter) Calibration frequency: Once Every Year Date of last calibration: 15th May 2015 Validity: 1 year
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Measured by the import/export meter (EI_y /EG_y) installed by the CEB at the project site for billing the project activity. This CEB bill is used to calculate the project emission. The data will be archived electronically for the entire crediting period. The meter is calibrated as per CEB standards. A check meter is also installed near the main meter to cross check the electricity imported from the CEB grid. The check meter reading is also used in case of failure of the main meter.
Purpose of data	Project emission calculations
Additional comments	

Data / Parameter:	$FC_{Diesel,y}$
Data unit:	Liter
Description:	Quantity of diesel used in the diesel generator sets during the year
Measured /Calculated /Default:	Measured
Source of data:	Stores Record / On-site measurement
Value(s) of monitored parameter:	0 (There is no diesel generator installed at the site)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A (There is no diesel generator installed at the site)
Measuring/ Reading/ Recording frequency:	N/A (There is no diesel generator installed at the site)
Calculation method (if applicable):	N/A (There is no diesel generator installed at the site)
QA/QC procedures applied:	N/A (There is no diesel generator installed at the site)
Purpose of data	Project emission calculations
Additional comments	

D.3. Implementation of sampling plan

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

As per AMS-I.D, the baseline emissions are calculated as the net electricity generated by the project activity, multiplied by the baseline emission factor for the project grid.

The baseline emissions are calculated below:

BE_y = $EG_y \times EF_y$

= 91,779 MWh x 0.6766 tCO_2/MWh

= 62,094 tCO_2e

Where:

BE_y = Baseline emissions in the year, *y* (tCO_2e)

EG_y = Net electricity exported to the grid system during the year *y* (MWh)

EF_y = Emission factor of the grid to which the project exports electricity (tCO_2/MWh)

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

The quantity of diesel consumed in the project activity was monitored during the first monitoring period. No diesel generator set has been installed yet at the project site so the quantity of diesel consumed for emergency situations is zero.

$PE_{Diesel,y}$ = $FC_{Diesel,y} \times Density \times NCV_{Diesel,y} \times EF_{CO2,Diesel,y}$

= 0 liter *x* 0.8460 kg/liter *x* 74.8 GJ/kg *x* 43.3 *x* 10^{-6} tCO_2/GJ

= 0 tCO_2e

Where:

$PE_{Diesel,y}$ = Project emissions due to combustion of diesel for the project activity (tCO_2)

$FC_{Diesel,y}$ = Quantity of diesel combusted during the year (liter)

$COEF_{Diesel,y}$ = CO_2 emission coefficient of Diesel (tCO_2/ liter)

The CO_2 emission coefficient, $COEF_{Diesel,y}$, is calculated based on net calorific value and CO_2 emission factor of diesel, as follows:

$COEF_{Diesel,y}$ = $Density \times NCV_{Diesel,y} \times EF_{CO2,Diesel,y}$

Where:

Density	=	Density of diesel (kg/liter) (http://www.energy.gov.lk/spec/fual.php)
$NCV_{Diesel,y}$	=	Weighted average net calorific value of the fuel type *i* in year *y* (GJ/kg)
$EF_{CO2,Diesel,y}$	=	Weighted average CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)

E.3. Calculation of leakage

As described in AMS-I.D, no leakage calculations are applicable

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_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
2011	10,328	0	0	10,328	0	10,328
2012	9,806	0	0	9,806	0	9,806
2013	14,596	0	0	0	14,596	14,596
2014	13,421	0	0	0	13,421	13,421
2015	13,512	0	0	0	13,512	13,512
2016	431	0	0	0	431	431
TOTAL						62,094

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_2e)	67,494	62,094

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

The actual emission reduction reached for the entire period considered has not been able to meet the estimated CERs amount of the PDD mainly due to Machine 01 failure for first 10 months of 2012.

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

Project participant and/or responsible person/ entity	☒ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Alternate Power systems (Pvt) Ltd
Street/P.O. Box	No 27/02,
Building	Level 27, East Tower, World trade Center,
City	Colombo 01,
State/region	
Postcode	00100
Country	Sri Lanka
Telephone	+94112381111
Fax	+94112381115
E-mail	
Website	
Contact person	Russell De Zilva
Title	Jt CEO
Salutation	Mr
Last name	De Zilva
Middle name	Russell
First name	Anton
Department	
Mobile	+94773635326
Direct fax	+94112381115
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