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

CONTENTS

MONITORING REPORT
Ver 1.0 14/03/2012

Dak Srong 2 Hydropower Project
3389
Monitoring period #1 23/02/2011 – 29/02/2012

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

1. The purpose of the project activity is to generate renewable electricity from a 24 MW run-of-river hydropower plant. Renewable electricity is exported to the Vietnamese national grid system and, in doing so, the project reduces greenhouse gas emissions. This is achieved by displacing generation by more traditional methods that lead to anthropogenic emissions of carbon dioxide and other greenhouse gasses (the baseline scenario).
2. The project activity has a total installed capacity of 24MW, made up of 3 units with an installed capacity of 8MW.
3. The first commercial operation date of the project activity was 30/10/2010.
4. The project generated a total of **85,944 MWh** over the monitoring period, generating a total of **41,613 tCO_2** emission reductions during the monitoring period.

A.2. Project Participants

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)
Socialist Republic of Viet Nam (host)	Private Entity: Hoang Anh Gia Lai Hydropower Joint Stock Company (as the project owner)	No
Switzerland	Private Entity: Bunge Emissions Holdings Sarl	No

Hoang Anh Gia Lai Hydropower J.S.C: a company set up for generating and supplying electricity, based in Pleiku City, Gia Lai province, Viet Nam.

Bunge Emissions Holdings Sarl: Bunge is an integrated, global agribusiness and food company operating in the farm-to-consumer food chain. With respect to carbon emission reductions, Bunge has been active in this sector through is subsidiary Ecoinvest carbon SA for a number of years. Bunge Emissions Holdings Sarl, one of the subsidiaries that act as a buyer of CERs, VERs and ERUs and as financial partner, has been active for more than one year with expertise in more than thirty projects in more than ten countries across three continents.

A.3. Location of the project activity:

The project location is Yang Nam, Ya Ma and Dak Hninh communes, Kong Chro District, Gia Lai Province, Socialist Republic of Viet Nam. The co-ordinates of the site are latitude of 13°41'45"N and longitude of 108°33'30"E.

A.4. Technical description of the project

The project is a run-of-river hydropower plant with a small run-of-river reservoir and consists of a weir, a penstock, a powerhouse (containing turbines and generators) and a tailrace. The main items of equipment such as turbines, generators, governors etc are imported from China. The electricity generated by the project is delivered to the Vietnam national grid via a new single-circle 110 kV transmission line.

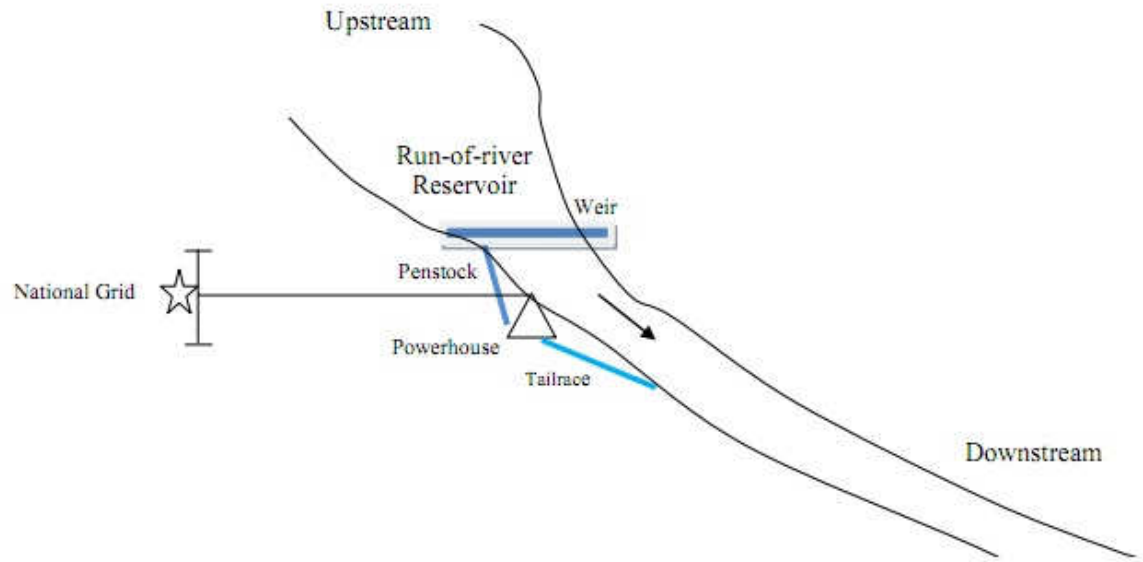

***Figure 1** : Schematic representation of the proposed project activity*

The technologies detailed in Table 1 along with the governors, valves, exciters and associated installation and commissioning services are imported from China.

***Table 1:** Key technologies utilised*

	Item	Specification
Turbines	Quantity	3
	Capacity	8,290.2 kW
	Type	HLA551C-LJ-17
	Design head	37.5
	Rated speed	300 rpm
	Rated efficiency	93.5
	Turbine discharge at design head	24.11 m^3/s
Generators	Quantity	3
	Capacity	8,000 kW

	Type	SF 8,000-20/325
	Cosα	0.8
	Rated speed	300 rpm
	Runaway speed	527.6 rpm
	Rated voltage	6.3 kV
	Rated efficiency	96.50%

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

-

Reference	Version	Title
ACM0002	v11	Consolidated Methodology for Grid Connected Electricity Generation from Renewable Sources
EB35, annex 12	v1.1	Tool to calculate the emission factor for an electricity system
EB39, annex 10	V5.2	Tool for the demonstration and assessment of additionally.

A.6. Registration date of the project activity:

The project was registered on 23/02/2011.

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

The crediting period is 23/02/2011 – 22/02/2018 and is renewable.

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

Michel Buron (CEO), michel.buron@kyotoenergy.net
Kyoto Energy Pte. Ltd., http://www.kyotoenergy.net
No 80 Raffles Place, UOB Plaza 1, level 36-01
048624 Singapore
SINGAPORE

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

1. The starting date of operation of the project activity was 30/10/2010.
2. During the monitoring period, the project has been normally operating.
3. No event that could impact the applicability of the methodology occurred during the monitoring period.

B.2. Revision of the monitoring plan

No revision of the monitoring plan was requested during this period.

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

No request for deviation was applied to this monitoring period.

B.4. Notification or request of approval of changes

No change in the project activity as described in the registered PDD has been identified.

SECTION C. Description of the monitoring system

C.1. Electricity metering system

The system is composed of six energy meters (3 mains and 3 backups) belonging to the grid operator EVN and used as the source of data for the calculation of emission reductions.

There are also three meters (TEG), located after each turbines, which measure the total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads.

The location of each instrument is indicated schematically in the monitoring diagram shown in Fig. 2:

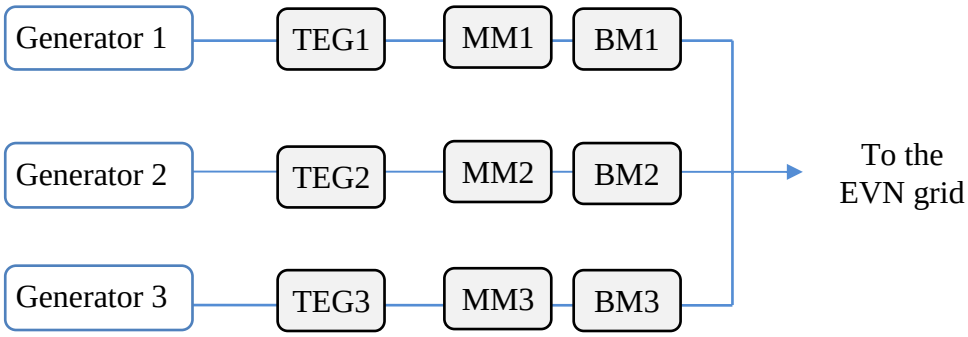

Figure 2: *Meters location on the electric circuit*

- MM1, MM2 and MM3 are the main meters. It measures the electricity generation at the hydropower site while taking into account both export and import from the national grid. The MM are the source of data for the EVN receipts.
- BM1, BM2 and BM3 are the backup meters located at the connection point to the national grid. They are used to compare with the records from the main meter, and used as record source in case the main meter fails (see section C3).
- TEG1, TEG2 and TEG3 are the meters located at after the Generator 1, Generator 2 and Generator 3 respectively, it measures the total electricity generation of each generator. They are used to calculate the project emissions (see section E.2 for details).

C.2. Data treatment and verification

A verification of the data recorded was performed by:

- The spot check of field instruments by staff; and
  The comparison between the main meters and backup meters (the deviation between MM1 and BM1, MM2 and BM2, MM3 and BM3);

No deviation was large enough to require any corrective action request by the electricity purchaser, EVN.

C.3. Non-conformities and emergency procedures

Non conformities are internally defined as any incidents affecting the project's monitoring. (e.g.: calibration delay, data loss, instrument malfunction, change in project implementation, etc.) They feature various severities and some of them may lead to data reconstruction (emergency procedure), request for deviation (see section B.3) or PDD revision (see sections B2 and B4), whereas some others may not require any particular corrective measures.

In the event that the metering system suffers any failure, damage and unexpected problems, or if any errors in the main metering systems are detected during calibration, the electricity exported will be identified as follows.

- Using the results of the backup system
- Should the backup system also suffer a breakdown, the electricity exported is proposed by reconstructing data by means of trend analysis (taking a conservative approach)

C.4. Maintenance and calibration of monitoring instruments

Calibration takes place at least every three years to ensure that the monitoring equipment is properly installed and functioning properly

A manifest of monitoring equipment has been kept updated. It contains information such as:

a) Data / Parameters
b) Instrument tag
c) Manufacturer, Model and Serial number
d) Accuracy
e) Calibration frequency
f) Calibration dates
g) Events during the monitoring period

This instrument manifest is available in annex 1.

The calibration of energy meters is due every three years; hence they are not due for calibration until three years after the project's first date of commercial operation.

C.5. Monitoring team

The CDM monitoring team is composed of the following staff:

Table 2: *CDM Monitoring Team Details*

Report to:	Position	Names
Hoang Anh Gia Lai Hydropower Joint Stock Company	Site manager	Nguyen Le Anh Duy
	Site supervisor	Dinh Duy Khoi
	Operator Head of Shift 1	Nguyen Thanh Hai
	Operator	Pham Minh Dung
	Operator	Nguyen Van Trung
	Operator	Pham Manh Hung
	Operator Head of Shift 2	Do Le Hong Vu
	Operator	Lam Thanh Viet
	Operator	Nguyen Dang Khanh
	Operator	Nguyen Le Anh Khoa
	Operator Head of Shift 3	Tran Ngoc Tan
	Operator	Nguyen Xuan Tin
	Operator	Tran Quoc Tuan
	Operator	Dinh Truong Giang
	Operator Head of Shift 4	Duong Thanh Khue
	Operator	Dang Ngoc Hieu
	Operator	Tran Huy Hoang
	Operator	Tran Luong Thien
Kyoto Energy Pte Ltd	CDM Consultant/ Project manager	David Louis Shaw

Table 3: *Allocation of monitoring responsibilities*

#	Tasks description (and frequency)	Operator	Supervisor	Site manager / Project director	CDM consultant Project manager
Monitoring activity					
1	Recording of manual data	✓[1]			
Quality Assurance & Quality Control					
2	Verification of data monitored (consistency and completeness)		✓		
3	Ensuring adequate training of staff		✓		
4	Ensuring adequate maintenance		✓		
	Ensuring calibration of monitoring instruments		✓		
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup): 2 years after the end of the crediting period			✓	
6	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement		✓		

[1] This is a joint reading with representatives from the power company, as per Power Purchasing Agreement

#	Tasks description (and frequency)	Operator	Supervisor	Site manager / Project director	CDM consultant Project manager
7	Emergency procedures		✓		
8	External audit				✓
Calculation of GHG emission reductions and reporting					
10	Processing of data and calculation of emission reductions			✓	
11	Preparation of the monitoring report			✓	

C.6. Adequate training of staff

The monitoring plan is made available to each member of staff involved in the project's monitoring. A copy is located in the control room at the site.

A training session was organised on 25/03/2011 to introduce the staff to the monitoring plan requirements. Background information was also given about the impacts of the CDM project and the importance of monitoring.

During the training, the staff signed a training attendance list. All training records are retained inclusive of training attendance, and training materials.[2]

Records of training and awareness will be kept for at least 2 years after the crediting period.

C.7. Monitoring plan improvement

No new improvement has been incorporated in the monitoring report for this period.

C.8. Data archiving

The log files are kept for a minimum of 2 years after the end of the crediting years by using paper documents and electronic files.
The log files are stored on various media (CD-ROM and hard disks) at several locations (plant, headquarters and CDM consultant server).
Main Meters

[2] Staff training record is shown in *Annex 2*

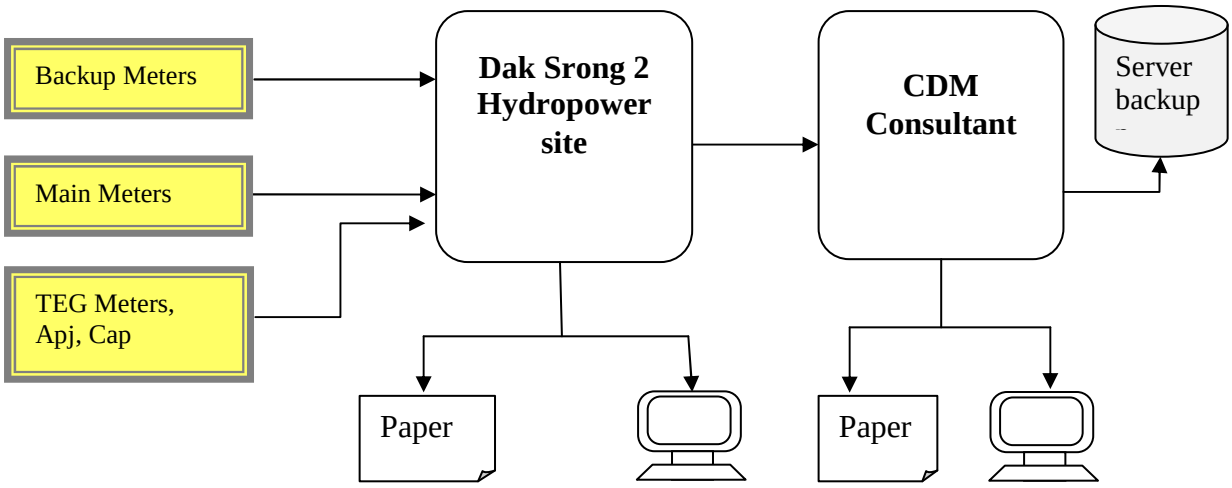

Figure 3: *Monitoring data flow chart*

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:	**$EF_{grid,CM,y}$**
Data unit:	tCO2/MWh
Description:	CO2 emission factor in year y Combined margin CO2 emission factor for grid connected power generation in year y calculated using "Tool to calculate the emission factor for an electricity system" (version 01).
Source of data used:	As per GEF report from Vietnam DNA, No.151/KTTVBĐKH, date 26/03/20103
Value(s) :	0.5764
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for the calculation of baseline emissions
Additional comment:	

Data / Parameter:	**EF_{Res}**
Data unit:	kg CO_2/MWh
Description:	Default emission factor for emission from reservoirs
Source of data used:	Decision by EB 23
Value(s) :	90
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for the calculation of the project emissions from the reservoir
Additional comment:	

[3] http://noccop.org.vn/Data/vbpq/Airvariable_ldoc_vnHe%20so%20phat%20thai.pdf[4]
http://noccop.org.vn/Data/vbpq/Airvariable_ldoc_vnHe%20so%20phat%20thai.pdf

D.2. Data and parameters monitored

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Measured /Calculated /Default:	Measured
Source of data:	MM1, MM2, MM3; BM1,BM2, BM3 in case of the MM failure (see section C3)
Value (s) of monitored parameter:	85,944 **(**Please see the table 4 in section E.4)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for calculation of baseline emissions.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please see Annex 1
Measuring/Reading/Recording frequency:	Continuous measuring Monthly recording
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	Cross check measurement results with records for sold and purchased electricity

Data / Parameter:	TEG_y
Data unit:	MWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y
Measured /Calculated /Default:	Measured individually at energy meters TEG1,TEG2 and TEG3. Total is calculated as the sum of the three values.
Source of data:	TEG1, TEG2, TEG3
Value (s) of monitored parameter:	88,053 (Please see the table 4 in section E.4)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions.
Monitoring equipment (type, accuracy class, serial	Please see Annex 1.

number, calibration frequency, date of last calibration, validity)	
Measuring/Reading/Recording frequency:	Continuous measuring Monthly reading Monthly recording
Calculation method (if applicable):	TEG = TEG1 + TEG2 + TEG3
QA/QC procedures applied:	Calibrated every 3 years.

Data / Parameter:	Cap_{BJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity
Measured /Calculated /Default:	
Source of data:	Project site
Value (s) of monitored parameter:	24,000,000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	

Data / Parameter:	A_{pj}
Data unit:	m^2
Description:	Surface area of the reservoir measured after the implementation of the project activity, when the reservoir is full (m^2).
Measured /Calculated /Default:	Water level measured on site a water level gauge, and surface area is calculated by area to water level chart (made specifically by a third party consultant for the reservoir associated with the project activity).
Source of data:	Project site
Value (s) of monitored parameter:	4,306,000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type,	Water level gauge on the side of the reservoir

accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/Reading/ Recording frequency:	Continuous measuring Daily reading Daily recording
Calculation method (if applicable):	Area calculated based on water level measurements and the area- level chart.
QA/QC procedures applied:	Calculation of A_{pj} is verified by a third party consultant report.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The Baseline emissions are calculated as follows:

$$BE_y = EG_y * EF_{grid,CM,y}$$

Where:	Description	Units	ID/value
BE_y	Baseline Emissions	tCO_{2e}	49,538
EG_y	Net quantity of electricity generated and delivered to the grid by the hydropower in year y	MWh	85,944
$EF_{grid,CM,y}$	CO_2 emission factor in year y	tCO_{2e}/MWh	0.5764 [4]

Refer to the table in section E.4 to get details on the monthly emission reductions.

E.2. Project emissions calculation

As per the methodology and the registered PDD, in order to calculate the power density, the below formula is used:

Power density: $PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$

Where:	Description	Units	ID/value
PD	Power density of the project activity	W/m^2	5.57

[4] http://noccop.org.vn/Data/vbpq/Airvariable_ldoc_vnHe%20so%20phat%20thai.pdf

Cap_{PJ}	Installed capacity of the hydropower plant after the implementation of the project activity	W	24,000,000
Cap_{BL}	Installed capacity of the hydropower plant before the implementation of the project activity (W). For new hydropower plants, this value is zero	W	0
A_{PJ}	Area of the reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoirs are full	m^2	4,306,000
A_{BL}	Area of the reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoirs are full (m^2). For the new reservoir, this value is zero	m^2	0

Because the power density of the project is greater than 4 W/m2 and less than or equal to 10 W/m^2, the project emissions are calculated as follows:

Project emissions: $PE_{HP,y} = \frac{EF_{REs} * TEG_y}{1000}$			
Where:	Description	Units	ID/value
$PE_{HP,y}$	Emission from reservoir expressed as	tCO_{2e}/ year	7,925
EF_{Res}	The default emission factor for emissions from reservoirs	kg CO_{2e}/ MWh	90 [5]
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads in year y	MWh	88,053

E.3. Leakage calculation

[5] The default value as per EB 23

As per the methodology and the registered PDD, the project does not need consider leakage
Therefore: $LE_y = 0$

E.4. Emission reductions calculation / table

The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:	Description	Units	Value
ER_y	Emission reductions in year y	tCO_{2e}	41,613
BE_y	Baseline emissions in year y	tCO_{2e}	49,538
PE_y	Project emissions in year y	tCO_{2e}	7,925

Below are the detailed amounts of Emission reductions generated by the project over the monitoring period.

***Table 4**: Monthly emission reductions*

Year	**Period**	**Net electricity generation**	**Total electricity generated**	**Grid emission factor**	**Emission factor from reservoir**	**Emission Reductions**
		EG	TEG	$GEF_{grid,CM,y}$	EF_{Res}	ERs
		kWh	kWh	tCO_2e/MWh	tCO_{2e}/MWh	tCO_{2e}
		(A)	(B)	(C)	(D)	(E)=A*C-B*D
	23/02/2011-28/02/2011	415,900	422,730	0.5764	0.09	202
	01/03/2011-31/03/2011	1,311,173	1,348,830	0.5764	0.09	634
	01/04/2011-30/04/2011	1,083,503	1,115,100	0.5764	0.09	524
	01/05/2011-31/05/2011	3,238,050	3,344,040	0.5764	0.09	1,565
	01/06/2011-30/06/2011	8,264,644	8,464,680	0.5764	0.09	4,002
	01/07/2011-31/07/2011	5,812,488	5,958,540	0.5764	0.09	2,814
	01/08/2011-31/08/2011	6,523,320	6,685,560	0.5764	0.09	3,158
	01/09/2011-30/09/2011	9,956,569	10,194,030	0.5764	0.09	4,822

Year	Period	Net electricity generation	Total electricity generated	Grid emission factor	Emission factor from reservoir	Emission Reductions
		EG	TEG	$GEF_{grid,CM,y}$	EF_{Res}	ERs
		kWh	kWh	tCO_2e/MWh	tCO_{2e}/MWh	tCO_{2e}
		(A)	(B)	(C)	(D)	(E)=A*C-B*D
	01/10/2011-31/10/2011	16,921,805	17,311,770	0.5764	0.09	8,196
	01/11/2011-30/11/2011	14,364,542	14,701,050	0.5764	0.09	6,957
	01/12/2011-31/12/2011	8,765,209	8,976,240	0.5764	0.09	4,244
	01/01/2012-31/01/2012	6,217,239	6,373,710	0.5764	0.09	3,010
	01/02/2012-29/02/2012	3,069,093	3,156,300	0.5764	0.09	1,485
Total		**85,943,535**	**88,052,580**			**41,613**

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

This section includes a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	44,466	41,613

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

The achieved emission reductions, once averaged over the length of the monitoring period, are lower than the ex-ante value of emission reductions in the registered PDD. Hence there is no excess of emission reductions to report.

Annex 1: Instrument Manifest

Data / Parameter	Tag	Model, Serial number and manufacturer	Accuracy (%)	Date of calibration	Calibration frequency	Event
Main meter	MM1	Manufacturer: Elster Model: A1700 Serial: 10020491	0.2	06/10/2010	3 years	None
Main meter	MM2	Manufacturer: Elster Model: A1700 Serial: 10020492	0.2	06/10/2010	3 years	None
Main meter	MM3	Manufacturer: Elster Model: A1700 Serial: 10020493	0.2	06/10/2010	3 years	None
Backup meter	BM1	Manufacturer: Elster Model: A1700 Serial: 10018220	0.5	06/10/2010	3 years	None
Backup meter	BM2	Manufacturer: Elster Model: A1700 Serial: 10018221	0.5	06/10/2010	3 years	None
Backup meter	BM3	Manufacturer: Elster Model: A1700 Serial: 10018222	0.5	06/10/2010	3 years	None
TEG meter	TEG1	Manufacturer: Wasion Model: DSSD331 Serial: 09090155620006	0.5	10/10/2010	3 years	None
TEG meter	TEG2	Manufacturer: Wasion Model: DSSD331 Serial: 09090155620007	0.5	10/10/2010	3 years	None
TEG meter	TEG3	Manufacturer: Wasion Model: DSSD331 Serial: 09090155620008	0.5	10/10/2010	3 years	None