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

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

MONITORING REPORT
Version 1 – 24/03/2011

UHE Mascarenhas Power Upgrading Project
Reference number 1232
11/09/2008 - 31/12/2010)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The project activity aims to increase the energy generation of an existing hydro power plant with reservoir, where the project foresees no changes on the volume of the reservoir. The project activity foresees the installation of the fourth generation unit with a nominal capacity of 49.5 MW, at the hydro power plant Mascarenhas. The Hydro Power Plant was constructed between1968 and 1972 by the Espírito Santo Centrais Elétricas S/A-Escelsa, located at the Rio Doce river (South East Brazil), with a total installed power of 131 MW.

The Mascarenhas Hydro Power Plant was initially conceived to supply the energy demand within the project boundary, the state of Espírito Santo. Initially designed with four water intakes at the dam reservoir, the power plant was finally installed with only three Kaplan turbines with three generator of nominal capacity on 45 MW each.

The project activity carried out by Energest/*EDP* will use the existing hydro power scheme and the existing electric infrastructure to increase the amount of generated energy through the installation of a new Kaplan turbine with no environmental impacts at the water reservoir, thus optimizing the water flow that would be otherwise inefficiently released at the reservoir dam.

Under the project activity, the level of the reservoir was not changed (increased or decreased) and the new hydro turbine optimizes 269 m3/s that generated a total amount of 50,141 MWh for 26th May to 10th October 2008.

The Mascarenhas Hydro Power Plant has currently a power density of 43 W/m2 and as stated by the CDM EB the GHG emissions from the reservoir are neglected. The Mascarenhas Hydro Power Plant is placed at the north of the Espírito Santo state, an area with high voltage fluctuation, thus the project activity contributes to avoid a waste of energy due to the reactive energy necessary to compensate such energy instability.

Therefore the most important fact is that the project activity avoids energy transmission from other distant states into the project activity state. Moreover, the project activity promotes an important impact on the environmental sustainability by reducing local air pollution and decreasing the GHGs emissions that would otherwise been emitted under the baseline scenario and also contributed to sustainable development during the construction phase (by hiring local labour), during the operation phase (payment of taxes to the municipality), environmental programs (Energest is highly engaged on environmental education and to assist the local stakeholders on sustainable development plans).

Summarizing, Mascarenhas HPP reduces carbon dioxide emissions through the substitution of grid electricity generation and energy transmission losses from outside of the project boundary where the project activity improves the local supply of electricity based on a clean and a renewable energy source while contributing to the local economic development though increasing environmental activities and economic benefits through real income for the local municipalities.

The project activity increases the amount of capital based on the new generation activities, what may be translated into new and necessary investments on environmental education added to the already on place activities carried out by Energest and the local municipality of Baixo Guandu.

During the monitoring period, 163.547 tCO_2 emissions reductions were achieved.

A.2. Project Participants

Nome of Party involved	Private and/or public entity(ies) project participants	Kindly indicate if the Party involved whishes to be considered as project participant
Brazil (host country)	ENERGEST S.A.	No

A.3. Location of the project activity:

River Rio Doce, Baixo Guandu city, Espirito Santo state (south east Brazil), Brazil.

Physical coordinates: 40° 55’ 06’ W and 19° 30’ 02’ S.

A.4. Technical description of the project

The project activity is placed at the UHE Mascarenhas, a hydro power plant with a total head of 22 meters, being 17.6 meters the net ahead. Each Kaplan turbine is currently processing an average water flow between 230-275 m3/s. The project activity foresees the implementation of the forth genset at he the Mascarenhas power plant with an installed capacity of 55MVA/24MVrar, operating in a permanent operation mode. No changes on the mechanical, operation or control are foreseen within the project activity for the gensets.

The generator will be have an operation/installed capacity of 49.5MW with a 0.9 power factor. Under circumstances of normal operation, the genset will keep the voltage and frequency constant within a range of +/- 0.5% of the output voltage value and =/- 5% for the frequency value. In order to keep the generator within the ranged values, an internal PID controller was installed. The electric unit will be connected directly to the local sub-station (through and internal transformer) with an internal operation voltage of 14.49 – 13.11 kV. The technology for hydro power generation is well known and it has been widely applied in Brazilian energy sector for the last decades.

The hydraulic turbine used is Kaplan turbine from GE hydro, vertical shaft with adjustable blades for pitch in order to optimize the variation of the flow in. It is estimated that the group of generator and hydraulic turbine will have and overall efficiency of 92.12% (98% for the generator).

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

The approved consolidated baseline and monitoring methodology ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 6 (valid from 19 May 06 onwards) was used. The project activity relates to the sectoral scope number 1 “Energy industries (renewable - / non-renewable sources)”.

The project activity has currently a power density of 43 W/m2 and as stated by the CDM EB7 can use the approved ACM0002 baseline methodology and the project emissions from the reservoir may be neglected.

A.6. Registration date of the project activity:

The project was registered on 26/05/2008.

The monitoring period of this monitoring report comprises 11/10/2008 to 31/12/2010.

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

The crediting period of the project is: seven years, renewable two times.

There are no changes to the start date of the crediting period post-registration.

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

Responsible person for the documentation development (technical consulting): Ernesto Cavasin, PricewaterhouseCoopers. Contact: (55 11) 3674-2333.

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

The project activity "*UHE Mascarenhas* power upgrading project" will claim CERs and has already been registered in the UNFCCC Executive Board on 26th May 2008 (reference number 1232). The project activity has already been implemented and is working under Clean Development Mechanism according to the descriptions contained in the PDD[1].

B.2. Revision of the monitoring plan

The approved consolidated baseline and monitoring methodology ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 6 (valid from 19 May 06 onwards) was used.

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

The documents that were stored in paper format will be stored in electronic format, once that kind of storage assures security to the documents. The documents are related to EG_y data.

B.4. Notification or request of approval of changes

There are no notifications or requests of approval of changes.

SECTION C. Description of the monitoring system

The monitoring plan provides a set of procedures for continuous monitoring of the electricity generation of the project activity that is exported to the grid and measured by means of an energy meter. The monitoring methodology schedules a continuous screening of the defined values and the further storage on electronic (excel spreadsheet).

ONS is an entity responsible for coordination and control of the generation and transmission Brazilian power units, under inspection and rules of ANEEL (Brazilian Electricity Regulatory Agency), and is

[1] http://cdm.unfccc.int/UserManagement/FileStorage/BZOQW40ZUPJ33E5VCZS3QAQ0L9YL0O

responsible for installation and sealing of the meters. The meters cannot be violated without ONS' authorization.

The data to be collected for the monitoring reports are updated by the emission factors ($EF_{OM,y}$, $EF_{BM,y}$, EF_y) monthly value of energy generated (EGy). The data of the emission factors will be annually updated with information supplied by the ONS (National Operator of the Electric System).

The monitoring of the 4th Genset will be based on an internal control and data collection from the energy meters (specified in table 1 below), located in the Operation Room of *Mascarenhas* UHE related to the Measurement Department. These procedures will establish the operation routines, pre-synchronization and final synchronization of the genset with the electrical grid. An internal mechanical device will be responsible to switch off the genset from the electrical grid. The process and data will be directly monitored at the specially built interface human-machine.

	Main meter	**Main meter 2**	**Backup meter**
Model	ION7500 – 4Q	ION7500 – 4Q	ION7500 – 4Q
Manufacture	Schneider	Schneider	Schneider
Serial number	PI 0512A153-01	PI 0512A154-01	PI 0603A099-01

Table 1 – Specifications of electricity meters

The further collection, data analysis and records' handling will be managed by the power plant operation staff and the records will be kept on electronic format. The measurement data, in *Mascarenhas* plant, are generate every 5 minutes and recorded in the specific meters of the 4th genset for 35 days. The data is also recorded in the software ION INTERPRISE. The measurement data of energy generated are registered in electronic format and archived in the Operation Room of Measurement Department.

The energy generated is measured by CCEE and net and gross values are registered by CCEE.

According to the sub modules of ONS (National Operator of Electrical System), the CCEE (Chamber of Electrical Energy Commercialization) is responsible to monitor and also register the generated energy daily based on measurement data from the main and the backup meter.

The measurement of the generated energy is totally automated. All measurements data are registered and sent daily to CCEE. In order to guarantee the accuracy of the measurement data, CCEE has also direct access to the meters. CCEE make available to its agent - *Energest*, electronic consultation. For this consultation the measurements data are available separately by turbine hourly, daily, weekly and/or monthly. Therefore the measurement data of energy generated will be cross checked with data generated from CCEE in order to assure the quality of data.

The meters work simultaneously, registering the same data about generation of energy. So, the meters work as back-up, when a meter is in maintenance, and as quality control, once that the meters are compared each minute, avoiding mistakes in data about generated energy.

The meters which register the energy generated by UHE Mascarenhas are online, that way the power measurements are made online. CCEE receives the energy data each 5 minutes and also have an exclusive link with encrypted password to access the UHE Mascarenhas' meters and check the data about energy generated. That way, CCEE can realize an assurance of the energy data any moment. As CCEE is an entity that coordinates the activities relative an energy commercialization, the energy data are monitored and assured constantly by CCEE.

All energy generated by UHE Mascarenhas is informed to the national regulatory authorities. The electric power market is strictly regulated and the existent norms specify the measurement equipments installed and the standard procedures to be followed. The whole documentation is electronically stored, and the operators have direct access in case the information and documentation is needed.

The maintenance structure will be based on the internal O&M (Operation and Maintenance) staff to guarantee the perfect operation of the electricity meters. The maintenance structure will also ensure that the monitoring equipment is perfectly calibrated based on the ANEEL, INMETRO and the equipment manufacturer standards. According to ONS (National Operator of Electrical System) the calibration, has to be made at least every 2 years.

Calibration of the energy meters is performed with ESCELSA calibration equipment (calibration agent) in compliance with ONS, through procedure "Sub-module 12.5 – Certification of work standard", that specifies the rules that have to be followed to meters calibration.

Roles and responsibilities of the monitoring

The project proponent will be responsible for the collection, monitoring, registration (including the development of the registry formats) and quality control of the data related to the amount of energy generation (EGy). The monitoring of this parameters include also the calibration and maintenance of the energy meter, as well as the record of the data for at least two years after the crediting period end.

Also the project proponent will ensure enough human and material resources for the accomplishment of the activities within the monitoring plan. These measurements are guaranteed by *ONS* through the sequence of Submodule 12.1 to 12.6 (ONS, 2008), that define the procedures of measurement in order to issue the invoices. Besides, there is an internal audit procedure, based on *ONS* submodules 12.1 to 12.6, named *Auditoria no Sistema de Medição ION Enterprise* –Measurement System Audit.

The technical team supervises the project activity based on monitoring spreadsheets, checking those parameters that are necessary in order to calculate the necessary data contained on the referred methodology. Furthermore the quality assessment procedures or/and any further technical assurance will be carried out at the project premises by the verification company. The monitoring of the generated energy will be cross-checked with the data measured by the kWh-meter of *CCEE* (*Câmara de Comercialização de Energia Elétrica* - Trade Chamber for Electric Energy).

The person responsible for managing, controlling and maintaining of the operation and attendance to the monitoring procedures established in this document is Mr. Pedro Sirgado (pedro.sirgado@energiasdobrasil.com.br) from *Energias do Brasil*. The maintenance and inspections are predicted under Submodule 12.3 (ONS, 2008). The monitoring processes are defined under Submodule 12.4 (ONS, 2008).

The calibration frequency should be made each two years and the proper procedures for this activity is elaborated by ONS – submodules 12.1, 12.2, 12.3, 12.4, 12.5 and 12.6. The responsible part for the maintenance, operation and meters calibration of the plant is *Energest* – Measurement Department, that must follow specifications for monitoring and calibration by ONS (regulates the energy sector in Brazil).

Calibration procedures for the energy meters were applied on the following occasions, before and after this crediting period:
• 09/07/2006: calibration performed by Escelsa;
• 19/06/2009: calibration performed by Escelsa;
• 14/01/2010: calibration performed by Escelsa;

According to procedures defined by ONS, calibration of energy meters may be delayed taking in consideration site specific historical data on energy generation. Therefore, the period of nearly three years between calibration procedures is in compliance with ONS and ANEEL regulations. As a conservative action, the Project Participant has applied the guidelines for assessing compliance with the calibration frequency requirements, and has deducted the monitored values of energy generation accordingly. More specifically, the monitored values for energy generation were reduced considering

the maximum permissible error of the meters (0.2%, as determined by manufacturer specifications). This procedure was applied for monitored values from 11/10/2008 to 31/12/2010.

SECTION D. Data and parameters

The monitoring plan is based on the approved monitoring methodology ACM0002, version 6, which is applicable to grid-connected renewable power generation project activities such as electricity capacity additions from existing hydro power projects with existing reservoirs where the volume of the reservoir is not increased.

The monitoring will be developed to determine the amount of energy generated and delivered to the grid by the project activity (measured by energy meters), in order to calculate the emission reductions of the project activity in the crediting period considered. The monitoring periods considered in this verification comprises the period from 11/10/2008 to 31/12/2010.

For the monitoring, the parameter **EGy** (MWh) is applied. It represents the electricity generation delivered to grid and is measured hourly by the Measurement Department of *Energest*.

The emission factor (EFy) is calculated based on the combined margin approach, which depends on the operating (EF_OMy) and build (EF_BMy) margin values. For the values for EF_OMy the most recent numbers for the interconnected S-SE-CO system were used for the Brazilian national dispatch center (*ONS*) in the form of daily consolidated reports. For the values for EF_BMy, the Brazilian build margin refers to a baseline based only on the weighted average of fossil fuel-fired units that have been recently built were considered for the ONS.

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
Data / Parameter:	**Area**
Data unit:	m2
Description:	Surface area at full reservoir level
Source of data used:	Online meters
Value(s) :	4,194
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculation
Additional comment:	According to ACM0002

D.2. Data and parameters monitored	
Data / Parameter:	**EF**
Data unit:	**tCO2e/MWh**
Description:	CO2 emission factor of the grid
Measured /Calculated /Default:	0.262
Source of data:	ONS system
Value(s) of monitored parameter:	2008: 0.3112 2009: 0.1635 2010: 0.2790 (will be updated during 2011)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial	ONS system page (www.mct.gov.br)

number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Yearly calculation and electronic storage The value of building margin of 2010 will be updated during 2011 in ONS site. As soon as possible, these values will be updated in the Monitoring Report.

Data / Parameter:	**EF_OMy**
Data unit:	**tCO2e/MWh**
Description:	CO2 operating margin of the grid
Measured /Calculated /Default:	0.413
Source of data:	ONS system
Value(s) of monitored parameter:	2008: 0.4766 2009: 0.2476 2010: 0.4787
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	ONS system page (www.mct.gov.br)
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Yearly calculation and electronic storage

Data / Parameter:	**EF_BMy**
Data unit:	**tCO2e/MWh**
Description:	CO2 building margin of the grid
Measured /Calculated /Default:	0.11
Source of data:	ONS system
Value(s) of monitored parameter:	2008: 0.1458 2009: 0.0794 2010: 0.0794 (will be updated during 2011)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	ONS system page (www.mct.gov.br)

Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Yearly calculation and electronic storage The values of building margin of 2010 and operating margin of December 2010 will be updated during 2011. As soon as possible, these values will be updated in the Monitoring Report.

Data / Parameter:	**EGy**
Data unit:	**MWh**
Description:	Electricity generation delivered to grid
Measured /Calculated /Default:	192,720
Source of data:	Measured by project developer and monitored by ONS
Value(s) of monitored parameter:	11th to 31st October to December 2008: 53,606.040 2009: 345,831.763 2010: 324,011.654
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Monitored by meters has described in section SECTION C. Description of the monitoring system
Measuring/ Reading/ Recording frequency:	Hourly measurement and electronic storage
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Cross check of the meters with ONS system

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

According to ACM0002 version 6, baseline emissions are the product of baseline emissions factor (EFy in tCO2e/MWh) times the electricity supllied to the project activity to the grid (EGy in MWh) minus the baseline electricity supllied to the grid in the case of modified or retrofit facilities (not applicable).

$BE_y = (EG_y – EG_{baseline}) * EF_y$

That way,

EF_y:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$$

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
W_{OM} = Weighting of operating margin emissions factor (%)
W_{BM} = Weighting of build margin emission factor (%)

2008 data (Source: ONS):

Operating Margin (EF_{OM})	January	February	March	April	May	June	
	0.5727	0.6253	0.5794	0.4529	0.4579	0.5180	
	July	August	September	October	November	December	Average
	0.4369	0.4258	0.4102	0.4369	0,3343	0.4686	0.4766

Buid Margin (EF_{BM})	2008
	0.1458

Peso	Default
(W_{om}/W_{bm})	0.5000

Emission Factor - Combined Margin (EF_{CM})	2008
	0.3112

Combined margin emission factor

$EF_{CM} = (EF_{OM} * W_{om}) + EF_{BM} * W_{bm})$

2009 data (Source: ONS):

Operating Margin (EF_{OM})	January	February	March	April	May	June	
	0.2813	0.2531	0.2639	0.2451	0.4051	0.3664	
	July	August	September	October	November	December	Average
	0.2407	0.1988	0.1622	0.1792	0.1810	0.1940	0.2476

Buid Margin (EF_{BM})	2009
	0.0794

Peso	Default
(W_{om}/W_{bm})	0.5000

Emission Factor - Combined Margin (EF_{CM})	2009
	0.1635

Combined margin emission factor

$EF_{CM} = (EF_{OM} * W_{om}) + EF_{BM} * W_{bm})$

2010 data (Source: ONS):

Operating Margin (EF_{OM})	January	February	March	April	May	June	
	0.2111	0.2798	0.2428	0.2379	0.3405	0.4809	
	July	August	September	October	November	December	Average
	0.4347	0.6848	0.7306	0.7320	0.7341	0.6348	0.4787

Buid Margin (EF_{BM})	2009*
	0.0794

Peso	Default
(W_{om}/W_{bm})	0.5000

Emission Factor - Combined Margin (EF_{CM})	2010
	0.2790

Combined margin emission factor

$EF_{CM} = (EF_{OM} * W_{om}) + EF_{BM} * W_{bm})$

* 2010 Build Margin will be updated during 2011

EGy:

2008 data:

2008	EGy (MWh)	Egy (MWh) corrected

11th to 31st October	8.145,268	8.128,977
November	26.774,858	26.721,308
December	18.685,914	18.648,542
Total	53.606,040	53.498,828

2009 data:

2009	EGy (MWh)	Egy (MWh) corrected
January	1.590,848	1.587,666
February	28.561,107	28.503,985
March	30.717,616	30.656,180
April	31.506,556	31.443,543
May	35.145,917	35.075,625
1st to 19th June	20.443,148	20.402,262
19th to 30th June	13.272,196	
July	33.715,344	
August	29.584,098	
Setember	27.937,354	
October	33.376,799	
November	29.733,547	
December	30.247,233	
Total	345.831,763	345.535,833 *

* Total corrected + 19th June until 31 December measured

2010 data:

2010	EGy (MWh)
January	30.048,611
February	30.753,036
March	35.479,534
April	32.987,054
May	33.002,157
June	32.166,541
July	31.134,664
August	13.592,158
Setember	13.004,248
October	10.711,037
November	32.283,773
December	28.848,841
Total	324.011,654

Calculation:

Baseline emission 2008= EF $_{grid,CM.2008}$ * EG2008
Baseline emission 2008 = (0.3112) * (53,498.828)
Baseline emission 2008 = 16,648 tCO2e

Baseline emission 2009= EF $_{grid,CM.2009}$ * EG2009
Baseline emission 2009 = (0.1635) * (345,535.833)
Baseline emission 2009 = 56,489 tCO2e

Baseline emission 2010= EF $_{grid,CM.2010}$ * EG2010

Baseline emission 2010 = (0.2790) * (324,011.654)
Baseline emission 2010 = 90,410 tCO2e

Sum of 2008, 2009 and 2010's baseline emissions:

Baseline emissions total = 16,648 + 56,489 + 90,410
Baseline emissions total = 163,547

E.2. Project emissions calculation

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

According to ACM002, version 6 for hydro power project activities with reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, based on the power density.

The power density is calculated as above:

$$PD = \frac{CAP_{PJ} - CAP_{BL}}{A_{PJ} - A_{BL}}$$

Where:
PD = Power density of the project activity (W/m^2)
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

(a) If the power density of the project activity (*PD*) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_{HP,y} = \frac{EF_{Res} * EG_y}{1000}$$

Where:
$PE_{HP,y}$ = Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res} = Default emission factor for emissions from reservoirs of hydro power plants in year *y* ($kgCO_2e/MWh$) (default value per EB23 is 90kg CO2e/MWh)
EG_y = Electricity produced by the project activity in year *y* (MWh)

(b) If the power density of the project activity (*PD*) is greater than 10 W/m^2:
$PE_{HP,y} = 0$

In UHE Mascarenhas project:

$PE_{HP,y}$ = 180000 W /4,190 m^2 = 42.9 W/m^2

E.3. Leakage calculation

The leakage and the emissions from the project activity are equal to zero. The main emissions giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as

power plant construction, fuel handling (extraction, processing, and transport), and land inundation. No sources of leakage were identified for the project activity.

E.4. Emission reductions calculation / table

According to ACM0002, version 06, the emission reduction *ERy* by the project activity during a given year y is the difference between baseline emissions (*BEy*), project emissions (*PEy*) and emissions due to leakage (*Ly*), as follows:

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2008	0	16,648	0	16,648
2009	0	56,489	0	56,489
2010	0	90.410	0	90.410
Total (tCO_2e)	**0**	**163,547**	**0**	**163,547**

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

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	112,086	163,547

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

The annual estimation of emission reductions in tonnes of CO_2 in the PDD is 50,466. Considering that the 811 days were monitored (11/02/2008 to 31/12/2008) the relative value of the above estimation is 112,086 tonnes of CO_2, while the total emission reductions during the monitoring period are calculated as 163,547 tonnes of CO_2.

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		