



MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Renewable Energy Wind Power Project in Karnataka
Reference number of the project activity	4956
Version number of the monitoring report	01
Completion date of the monitoring report	15/10/2012
Registration date of the project activity	04/07/2011
Monitoring period number and duration of this monitoring period	1 st Monitoring period, 20/08/2011-30/09/2012 (Inclusive of first and last day)
Project participant(s)	Vish Wind Infrastructure LLP
Host Party(ies)	Govt. of India (Host)
Sectoral scope(s) and applied methodology(ies)	Sectoral scope-I, Energy Industries (renewable/non-renewable sources). Applied methodology - Grid connected renewable electricity generation (AMS-I.D., Version 16, SC 01, EB 54)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	Average value of CER/ year (or 365 days) as per PDD are 12,284. Current monitoring period (20/08/2011-30/09/2012) covers period of 396 days (11 days of August-2011 are forgone), hence ex-ante estimated of CER's as per the PDD are 13327.
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	12302 (Actual GHG emission reductions under 1 st Monitoring period, Duration: 20/08/2011-30/09/2012 (11 days of August-2011 are forgone, Inclusive of first and last day)

SECTION A. Description of project activity**A.1. Purpose and general description of project activity**

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- (a) *Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;*

The project activity is of capacity 6.4 MW wind energy project comprising eight Wind Energy Converters (WECs) of capacity 800 kw each in Karnataka state of India. Electricity produced with renewable source will be supplied to Karnataka state electricity grid which is part of the Southern grid of India. Thus displacing electricity produced in fossil fuels based power plants. It shall help in mitigating the climate change impact. The project participant (PP) is Vish Wind Infrastructure LLP (VWLLP). PP has entered into agreement with Enercon for operation and maintenance of the project activity.

- (b) *Brief description of the installed technology and equipments;*

The project activity comprises of eight WECs of Enercon's model E-53. The project uses technology that is environmentally clean and safe since there are no GHG emissions associated with the electricity generation from the windmills. Enercon (India) Ltd (EIL) is the turbine supplier and is the operations and maintenance contractor.

- (c) *Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);*

The eight WECs under project activity were commissioned on 30/09/2010. The project activity was registered as CDM project on 04/07/2011. The first monitoring period covers duration from 20/08/2011 to 30/09/2012 (Inclusive of first and last day).

- (d) *Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period.*

The total emission reductions achieved under this monitoring period (20/08/2011 to 30/09/2012) is **12302 tCO₂**.

A.2. Location of project activity

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- (a) *Host Party(ies);*

India

- (b) *Region/State/Province, etc.;*

Karnataka State

- (c) *City/Town/Community, etc.;*

The project is located in Village: Kalasapur, District: Gadag, State: Karnataka

- (d) *Physical/ Geographical location.*

The project activity is situated between latitude 15° 21' & 15° 22' North and longitude 75° 37' & 75° 38' East. The Project activity has eight WEC of type E-53 of Enercon make. Capacity of each WEC is 800 kW. The Substation, which is maintained by Enercon, is located at Harthi village.



WEG S.No.	Capacity (MW)	Village Name	District	State	Latitude (hr, Min, Sec)			Longitude (hr, Min, Sec)		
1	0.8	Kalasapur	Gadag	Karnataka	15	22	22.2	75	38	21.2
2	0.8				15	21	50.8	75	37	52.1
3	0.8				15	21	59.8	75	37	52.4
4	0.8				15	21	43.6	75	38	31
5	0.8				15	21	50.3	75	38	27.3
6	0.8				15	21	42.6	75	37	54.4
7	0.8				15	21	59.2	75	38	31.3
8	0.8				15	21	32.9	75	37	57.8

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 if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Vish Wind Infrastructure LLP	No

A.4. Reference of applied methodology

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Applied methodology - Grid connected renewable electricity generation (AMS-I.D., Version 16, SC 01, EB 54)

A.5. Crediting period of project activity

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Crediting period of the project activity as per registered PDD is from 20/08/2011 to 19/08/2021 (Fixed).

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

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The project activity comprises of eight WECs of Enercon's model E-53. The project uses technology that is environmentally clean and safe since there are no GHG emissions associated with the electricity generation from the windmills.

The WECs generate 3-phase power at 400V, which is stepped up to 33 KV. The project activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%. The average life time of the WEC is around 20 years as per the industry standards. The other salient features of the state-of-art-technology are:

Turbine model	Enercon E- 53
Rated power	800 KW
Rotor diameter	53 m
Hub height	75 m
Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	Independent electromechanical pitch system for each blade.
Cut in wind speed	2.5 m/s
Rated wind speed	12 m/s
Cut out Wind speed	28-34 m/s
Extreme Wind Speed	59.5 m/s
Rated rotational speed	32 rpm
Operating range rot. speed	12-29 rpm
Orientation	Upwind
No of Blades	3
Blade Material	Fibre Glass Epoxy reinforced with integral lightning protection
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor and friction bearing
Tower	74 m concrete

The eight WECs under project activity were commissioned on 30/09/2010.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

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Not Applicable

B.2.2. Corrections

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Not Applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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Not Applicable

B.2.4. Changes to project design of registered project activity

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Not Applicable

B.2.5. Changes to start date of crediting period

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Not Applicable

B.2.6. 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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- **Metering:** Electricity supplied to the grid is metered continuously at the metering point connecting 08 machines of the project activity. The meter reading is taken in the presence of representatives of Enercon (O&M Contractor for the project activity) and KPTCL.
- **Metering Equipment:** Metering system for the project activity consists of main and check meter. Both the meters are two-way trivector meters (accuracy class of 0.2%) capable of recording import and export of electricity. The metering equipment is calibrated annually.
- **Meter Readings:** The electricity exported to the grid is recorded monthly by taking a Joint Meter Reading (JMR) in the presence of Officials from the Utility and Enercon, O&M contractor, on behalf of project owner. The Joint meter reading contains the value of energy imported and exported. These readings become the basis of making Form B. These certified readings are then used by the DISCOM officials to prepare the tariff invoices. Thus the monitoring parameters for the project activity are the electricity import and electricity export to the grid as mentioned in the JMR. The readings are then adjusted for the transmission loss in the Form B, which can be crosschecked with the value mentioned in the invoices.
- **Inspection of Energy Meters:** All main and check energy meters (export and import) and all associated instruments, transformers installed at the project are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the parties and is not to be interfered with by either party except in the presence of the other party or its accredited representatives.
- **Meter Test Checking:** There is a separate check and main meter. The Main and Check Meters are close to each other and will be tested for accuracy, with a standard meter, by the KPTCL's testing Division. The KPTCL will carry out the calibration, periodical testing, sealing and maintenance of meters. The KPTCL will provide a copy of the test reports.

If during the meter test checking,

- the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.

- the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limit of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter.
- If both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to last test.
- If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to last test.
- In case of the failures such as burning of the meter and the erratic display of the metered parameters and when the error found in testing the meters is beyond the permissible limit of error, the meter shall be calibrated immediately and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to last test.

CALCULATION OF DATA:

$$EGy = Gpe - 115\% * Gpi - Li$$

EGy : Net Electricity supplied to grid by the project activity

Gpe : Electricity Export is recorded at the meter(s) connecting 08 machines of the project activity

Gpi : Electricity Import is recorded at the meter(s) connecting 08 machines of the project activity

Li : Transmission loss

Transmission loss is certified by the state utility in JMR:

$$L = \sum_j Gj - N$$

$\sum_j Gj$: Summation of electricity generation data measured at all the feeders connected to substation at Harthi Village (export – Import)

N : Electricity generation data measured at Substation at Harthi Village from the feeders emanating from the pooling station

L : Total transmission loss

$$Li = Gpe * (L / \sum_j Gj)$$

The meter reading will be taken by the representatives of Enercon and the State utility at the meter(s) for the project activity connecting 08 turbines at the project site at 33kV and at the substation located at Harthi Village where bulk metering is done at 220kV. These readings become the basis of making Form B, which is signed by the representatives of Enercon and State Utility. Transmission loss between metering point for the project activity and the metering point at the Substation at Harthi Village is applied to the meter reading taken at the feeder connecting 08 turbines of the project activity.

Transmission losses are applied to the meter readings taken at the metering point of the project activity. Net Electricity exported to the grid is calculated by applying transmission loss to the meter reading taken at the metering point of the project activity connecting 08 turbines.



The Form B contains the following data:-

1. Electricity Export
2. Electricity Import
3. Transmission Loss (Between the metering point for project activity and at the substation where bulk metering is done)
4. Net Electricity exported to the Grid [Electricity Export-115%*Electricity Import-Transmission Loss]

Joint Meter reading is signed by the representatives of Enercon and the state utility. The meter readings (both export and import), transmission loss and net electricity exported to the grid are noted in the Form B. Hence all these values will be reproduced from the JMR at the time of verification. Please refer Annex 4 for details on calibration and QA/QC procedures.

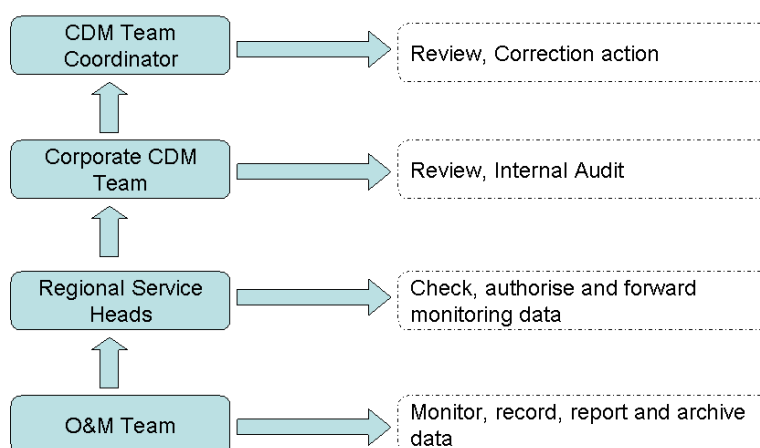
The Project is operated and managed by Vish Wind Infrastructure LLP. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. The project will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the project proponent. The project proponent also maintains the records of daily generation report and joint meter report.

Training and maintenance requirements:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Enercon Training Academy provides need-based training to meet the training requirements of Enercon projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

The operational and management structure implemented is as follows:



Meter Calibration details:

Meter Location	RR Number	Meter Details	Calibration Dates (dd/mm/yyyy)	Calibration Certificate Reference number
VWLLP pooling station/MAIN meter	GDG/DN/WF/HESCO M VWIL/138	Sr. No: 09142236 Accuracy Class: 0.2 Make: L&T	20/06/2011 12/01/2012	Calibration certificate issued by HESCOM, dated as 20/06/2011 Calibration certificate issued by HESCOM, dated as 12/01/2012
VWLLP pooling station/CHECK meter	GDG/DN/WF/HESCO M VWIL/138	Sr. No: 09142599 Accuracy Class: 0.2 Make: L&T	20/06/2011 12/01/2012	Calibration certificate issued by HESCOM, dated as 20/06/2011 Calibration certificate issued by HESCOM, dated as 12/01/2012

The details of the meter calibration for the meters at receiving station at Harthi are provided below:

Meter Details	Meter Serial Number	Calibration Dates	Calibration Certificate Reference number
receiving station	01958995 Accuracy Class: 0.2 Make: L&T	9 th February 2011 6 th March 2012	Calibration certificate issued by KPTCL, dated as 9 th February 2011 Calibration certificate issued by KPTCL, dated as 6 th March 2012

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante or at renewal of crediting period***(Copy this table for each piece of data and parameter.)*

Data/Parameter	$EF_{OM,y}$
Unit	tCO ₂ e/MWh
Description	Operating Margin Emission Factor of Southern Regional Electricity Grid
Source of data	“CO ₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO ₂ Baseline Database for Indian Power Sector” (Version 5) is available at www.cea.nic.in
Value(s) applied	0.98755
Purpose of data	To calculate Baseline Emissions Factor
Additional comment	None

Data/Parameter	$EF_{BM,y}$
Unit	tCO ₂ e/MWh
Description	Build Margin Emission Factor of Southern Regional Electricity Grid
Source of data	“CO ₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO ₂ Baseline Database for Indian Power Sector” (Version 5) is available at www.cea.nic.in
Value(s) applied	0.81792
Purpose of data	To calculate Baseline Emissions Factor
Additional comment	None

Data/Parameter	$EF_{CO_2, grid, y}$
Unit	tCO ₂ e/MWh
Description	Combined Margin Emission Factor of Southern Regional Electricity Grid
Source of data	Calculated
Value(s) applied	0.94515
Purpose of data	To calculate Baseline Emissions
Additional comment	None

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data/Parameter	EGy
Unit	MWh (Mega-watt hour)
Description	Net electricity supplied to the grid by the Project
Measured/Calculated/Default	Electricity supplied to the grid as per the Form B. This is a calculated parameter derived from Energy exported, imported and transmission losses mentioned in Form B.
Source of data	Form B issued by state Utility.
Value(s) of monitored parameter	13022.065
Monitoring equipment	<p>The meter readings will be taken by the representatives of Enercon and the State utility at the meter(s) for the project activity connecting 08 turbines at the project site at 33kV and at the substation located at Harthi Village where bulk metering is done at 220kV. These readings become the basis of making Form B, which is signed by the representatives of Enercon and State Utility. Transmission loss between metering point for the project activity and the metering point at the Substation at Harthi Village is applied to the meter reading taken at the feeder connecting 08 turbines of the project activity.</p> <p>Transmission losses are applied to the meter readings taken at the metering point of the project activity. Net Electricity exported to the grid is calculated by applying transmission loss to the meter reading taken at the metering point of the project activity connecting 08 turbines.</p> <p>The Form B contains the following data:-</p> <ol style="list-style-type: none"> 1. Electricity Export 2. Electricity Import 3. Transmission Loss (Between the metering point for project activity and at the substation where bulk metering is done) 4. Net Electricity exported to the Grid [Electricity Export-115%*Electricity Import-Transmission Loss] <p>Joint Meter reading is signed by the representatives of Enercon and the state utility. The meter readings (both export and import), transmission loss and net electricity exported to the grid are noted in the Form B.</p>
Measuring/Reading/Recording frequency	Monthly: The reading is jointly noted by the representatives of state utility and Enercon. The value of EGy for the project activity is also provided in the JMR (Form B) and is applied directly for calculation of emission reductions.
Calculation method (if applicable)	$EGy = Gpe - 115\% * Gpi - Li$ <p>Refer section C for details.</p>
QA/QC procedures	QA/QC procedures are implemented by state utility pursuant to the provisions of the power purchase agreement. Refer section C of QA/QC procedures.



Purpose of data	To calculate emission reduction.
Additional comment	The data will be archived for crediting period + 2 years.

Data/Parameter	Gpe
Unit	MWh (Mega-watt hour)
Description	Electricity Export is recorded at the meter(s) connecting 08 machines of the project activity.
Measured/Calculated/Default	This is a measured parameter.
Source of data	Electricity exported to the grid as per the Form B.
Value(s) of monitored parameter	13109.85
Monitoring equipment	Please refer section C for the details of monitoring equipment
Measuring/Reading/Recording frequency	Electricity exported to the grid will be recorded by the meter(s) connecting the 08 machines of the project activity feeding the substation of Enercon. Metering will be continuous and recording will be done monthly as Form B.
Calculation method (if applicable)	Not applicable
QA/QC procedures	QA/QC procedures are implemented by state utility pursuant to the provisions of the power purchase agreement. Refer section C of QA/QC procedures.
Purpose of data	To calculate emission reduction.
Additional comment	The data will be archived for crediting period + 2 years.

Data/Parameter	Gpi
Unit	MWh (Mega-watt hour)
Description	Electricity Imported recorded at the meter(s) connecting 08 machines of the project activity.
Measured/Calculated/Default	This is a measured parameter.
Source of data	Electricity imported to the grid as per the Form B.
Value(s) of monitored parameter	7.2
Monitoring equipment	Please refer section C for the details of monitoring equipment
Measuring/Reading/Recording frequency	Electricity imported to the grid will be recorded by the meter(s) connecting the 08 machines of the project activity feeding the substation of Enercon. Metering will be continuous and recording will be done monthly as Form B.
Calculation method (if applicable)	Not applicable
QA/QC procedures	QA/QC procedures are implemented by state utility pursuant to the provisions of the power purchase agreement. Refer section C of QA/QC procedures.
Purpose of data	To calculate emission reduction.
Additional comment	The data will be archived for crediting period + 2 years.

Data/Parameter	Li
Unit	MWh (Mega-watt hour)
Description	Transmission loss between the metering point for the project activity and the metering point at Substation where bulk metering is done.
Measured/Calculated/Default	This is a measured parameter.
Source of data	Transmission Loss will directly applied from the Form B for the project activity.
Value(s) of monitored parameter	79.505
Monitoring equipment	Please refer section C for the details of monitoring equipment
Measuring/Reading/Recording frequency	Transmission loss between metering point (feeder connecting 08 turbines of the project activity) and the metering point at the Substation is applied to the meter reading taken at the feeder connecting 08 turbines of the project activity. Substation is connected to the machines of the project activity and the machines commissioned by the other project developers. The project proponent does not have control over the data of the other project developers. Therefore the project developer has to rely upon the transmission loss applied to the project activity by the state utility as reflected in the JMR (Form B). The JMR is signed by the representatives of Enercon and the state utility. Metering will be continuous and recording will be done monthly as Form B.
Calculation method (if applicable)	Not applicable
QA/QC procedures	QA/QC procedures are implemented by state utility pursuant to the provisions of the power purchase agreement. Refer section C of QA/QC procedures.
Purpose of data	To calculate emission reduction.
Additional comment	The data will be archived for crediting period + 2 years.

D.3. Implementation of sampling plan

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No sampling plan is followed by PP.

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

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

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The baseline emissions are calculated as:

$$BE_y = EG_y * EF_{CO_2, grid, y}$$

Where:

BE_y = Baseline emissions in year y tCO₂.

EG_y = Energy baseline in year y MWh.

$EF_{CO_2, grid, y} = CO_2 \text{ emission factor in year } y, tCO_2/MWh.$

$$BE_y = 13022.065 * 0.94515 tCO_2e/MWh$$

$$= 12302 \text{ (approx.)}$$

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

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The project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

E.3. Calculation of leakage

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No leakage is considered from the project activity.

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

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
20/08/2011 – 30/09/2012	12302	0	0	12302
Total	12302	0	0	12302

E.5. Comparison of actual emission reductions or net anthropogenic 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 (tCO₂e)	Average value of CER/ year (or 365 days) as per PDD are 12,284. Current monitoring period (20/08/2011-30/09/2012) covers period of 396 days (11 days of August-2011 are forgone), hence ex-ante estimation of CER's as per the PDD are 13327.	12302 (Actual GHG emission reductions under 1 st Monitoring period, Duration: 20/08/2011-30/09/2012 (Inclusive of first and last day, 11 days of August-2011 are forgone))

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

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The total emission reductions units for the said monitoring period are 7.69 % lower than emission reductions units as estimated in the PDD. This is due to lower PLF achieved than estimated in PDD.



History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance		