



Monitoring report form
(Version 05.1)

MONITORING REPORT

Title of the project activity	Solar Power Project by Fortum FinnSurya (EKIESL-CDM.February-15-01)	
UNFCCC reference number of the project activity	10288 ¹	
Version number of the monitoring report	01	
Completion date of the monitoring report	25/05/2017	
Monitoring period number and duration of this monitoring period	Monitoring period number: 01 02/05/2016 to 30/04/2017 (both days included)	
Project participant(s)	Fortum FinnSurya Energy Pvt. Ltd.	
Host Party	India	
Sectoral scope(s)	Sectoral Scope: 1 - Energy industries (renewable / non-renewable sources)	
Selected methodology(ies)	Methodology: AMS-I.D "Grid connected renewable electricity generation" (EB 81, Version 18)	
Selected standardized baseline(s)	Not Applicable	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	19,321	
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
	NA	19,917

¹ <http://cdm.unfccc.int/Projects/DB/Plus1460660777.8/view>

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Fortum FinnSurya Energy Pvt. Ltd. is the promoter of the proposed project activity. The project activity involves installation of 12 MWp (10 MW AC) solar power project at Ujjain, Madhya Pradesh. As per registered PDD, the project replaces anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 19,374 tCO₂e per year, thereon displacing 19,831 MWh/year amount of electricity from the generation-mix of power plants connected to the NEWNE regional grid, which is mainly dominated by thermal/fossil fuel based power plant.

The electricity exported by the present project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the North-East-West-North East (NEWNE) Grid which relies predominantly on fossil fuels. Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

Technical details of the project activity are as follows:

Technical Details of Equipment	Remarks
Technology	Thin Film-CdTe modules on Fixed Tilt at 20 degrees
Solar photovoltaic module	95 Wp Modules of make - First Solar- FS395
No. of modules	126360
Total Number of Invertors	15 Units
Transformer	10 Numbers (2 Nos of 125KVA- for Auxiliary- 33kV/415 V, 1 Nos 700 kVA- 380 V/33kV and 7 Nos. 1400 kVA- 380 V/33 kV)
Central inverters of nominal AC power output	680 kVA-CONEXT CORE XC 680, Schneider Make), three phase , 50 Hz.
Technical & Operational Lifetime	25 years

The already operational Solar PV project uses crystalline silicon based solar PV modules. Since the project activity is a Greenfield installation there was no electricity generation at the project site prior to its implementation. The whole installation will have a 25 years design life.

Power evacuation infrastructure has been set up as per the guidelines of Madhya Pradesh Electricity Regulatory Commissions (MPERC), Central Electricity Regulatory Commission (CERC) and the respective Distribution Company (DISCOM). The present project is being connected to the nearby 11/33 kV grid substation. The grid connection unit continuously synchronize the incoming solar power with the available grid for safe and efficient operation. The metering of net electricity generated is undertaken at the grid interconnection point. The technology for the project is environmentally safe and sound. Further, there is no technology transfer associated with the project activity.

The estimation of GHG emission reductions by the present project activity is limited to carbon dioxide (CO₂) only and its primary source is the fossil fuels consumed in the NEWNE grid. The project undergoes continued operation during current monitoring period.

During the current monitoring period the net GHG emission reductions by the project activity are 19,917 tCO₂e. During this monitoring period no major breakdown has taken place and the plant was operational throughout the current monitoring period.

The investors of the project are as follows:

Sl. No.	Project Investor	Capacity (MWp)	Date of Commissioning	Purpose
1	Fortum FinnSurya Energy Pvt. Ltd.	12	31/12/2014	Sale to EB

A.2. Location of project activity

The present 12 MWp solar PV power project is installed in state Madhya Pradesh, India.

Sl. No.	Project Investor	Capacity (MWp)	Village	Tehsil	District	State
1	Fortum FinnSurya Energy Pvt. Ltd.	12	Kapeli	Tarana	Ujjain	Madhya Pradesh

The nearest Airport is Devi Ahilyabai Holkar Airport situated at Indore approximately 188 km away, and well connectivity by Madhya Pradesh State Highway (MP SH 27) by road. It would take approximately 3hrs 30 minutes to reach the site by road.

Project Investor	Capacity (MWp)	Latitude (N)			Longitude (E)		
		Deg°	Min"	Sec'	Deg°	Min"	Sec'
Fortum FinnSurya Energy Pvt. Ltd.	12	23	07	23.0	76	07	14.0

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)
India (host)	Fortum FinnSurya Energy Pvt. Ltd. (Private entity)	No

A.4. Reference of applied methodology and standardized baseline

Title: Grid Connected Renewable Electricity Generation

Reference: AMS I.D. (Version 18, EB 81)

The project also refers to the "Tool to calculate the emission factor for an electricity system" Version 05.0.0².

A.5. Crediting period of project activity

Crediting period (07 years 00 Months)

Type of crediting period	Renewable
Crediting period from	02/05/2016 to 01/05/2023
Length of the Crediting Period	7 Years
Monitoring period from	02/05/2016 to 30/04/2017 (both days included)
Length of the Monitoring Period	364 Days

A.6. Contact information of responsible persons/entities

Mr. Awadhesh Jha

Fortum FinnSurya Energy Pvt. Ltd.

The above entity is a project participant and is only responsible for completing the CDM-MR-FORM. Further, project participant for this project activity is indicated in Appendix 1 below.

² <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The technology employed by the already operational Project Activity includes the usage of poly crystalline based solar PV modules with an aggregate of 12 MWp generation capacity to supply the generated electricity to the Grid. The generation and consumption of the Project Activity is monitored continuously through the energy meters. The data is used for the calculation of exports to the grid and imports from the grid.

The Solar power system has been designed with number of sub main plants, solar PV arrays and inverters of suitable capacity. The detailed description for the technology used has already been mentioned in section A.1.

The commissioning and implementation schedule of each plant has been mentioned in section A.1.

The electricity exported by the present project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the North-East-West-North East (NEWNE) Grid which relies predominantly on fossil fuels. Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

No events or situations happened during the reported monitoring period which can alter the applicability of the applied methodology.

B.2. Post-registration changes

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

There is no request for deviation applied during this monitoring period.

B.2.2. Corrections

There have not been any corrections to project information or parameters fixed at validation during the current monitoring period.

B.2.3. Changes to start date of crediting period

Not Applicable.

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

There has not been any change in the monitoring plan during the current monitoring period.

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

Not Applicable.

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

There has not been any change in the PDD during the current monitoring period.

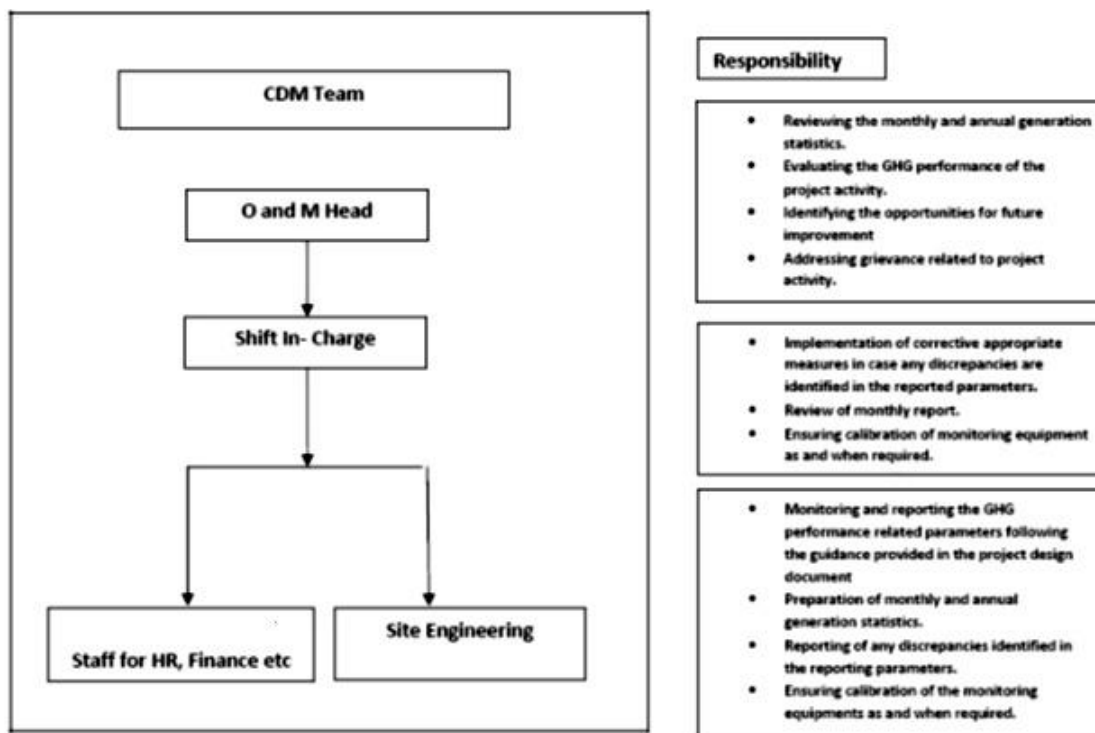
B.2.7. Types of changes specific to afforestation or reforestation project activity

Not Applicable.

SECTION C. Description of monitoring system

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented in Madhya

Pradesh, India. The monitoring plan, which is implemented by the project participant describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving. The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:



Data Measurement

The export and import energy are measured continuously using Main and Check meters located at the substation. The main meter is used for billing purpose and in case of any issues with main meter, check meter will be used. No such event occurred during current monitoring period. Readings of meters shall be taken on monthly basis by authorized officer of MPPKVVCL in the presence of PP or representative of PP. MPPKVVCL then issues the Meter Reading Statement to Fortum FinnSurya Energy Pvt. Ltd. which then issues invoice based on this Meter Reading Statement.

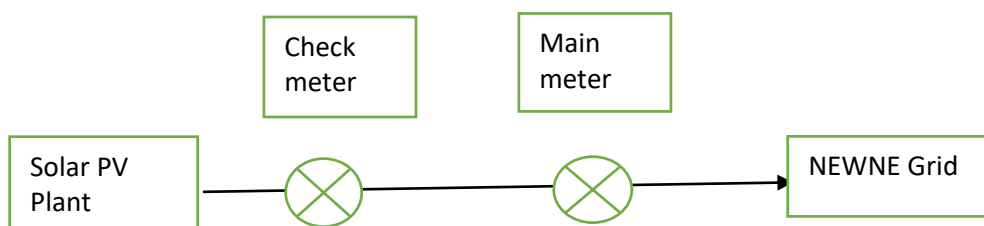
Data collection and archiving

Readings from meters are collected in the presence of the plant in-charge. Export and Import data are recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized. Personnel training In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff (CDM team) is trained. The plant helpers are trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

The schematic line diagram of the project site along with all metering location has been illustrated below:



Calibration Details:

The calibration details of meters involved in the project activity is as below

Location/Type	Meter Serial Number	Make	Accuracy class	Calibration date	Validity
Main Meter	XB581186	Secure Apx 100	0.2s	29/10/2015 28/10/2016	27/10/2021
Check Meter	XB570697	Secure Apx 100	0.2s	28/10/2016	27/10/2021

For current monitoring period, only main meter data is used for monitoring of electricity and invoicing purpose. There is no delay in calibration observed for all main meters. The check meter is just as a back up meter and not used for invoicing purpose, thus no any error factor is applicable due to non-availability of check meter calibration prior to 28/10/2016.

SECTION D. Data and parameters

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

Data/parameter:	EF _{grid, OM, y}
Unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ³
Value(s) applied)	0.9862
Choice of data or measurement methods and procedures	Calculated as per “Tool to calculate the emission factor for an electricity system, version 05.0.0” as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period.

Data/parameter:	EF _{grid, BM, y}
Unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y

³ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Source of data	Calculated from CEA database, Version 10, December 2014 ⁴
Value(s) applied)	0.9495
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" for the year 2013-2014. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period.

Data/parameter:	EF _{grid, y}
Unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ⁵
Value(s) applied)	0.9770
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0". The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period.

D.2. Data and parameters monitored

Data/parameter:	EG _{PJ, y}
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in a year y (MWh).
Measured/calculated/default	Calculated
Source of data	Meter Reading Statement issued by MPPKVVCL which provide input values (EG _{export, y} & EG _{import, y}), used for calculation of EG _{PJ, y} .
Value(s) of monitored parameter	20386.070
Monitoring equipment	Energy Meters of accuracy class 0.2 are used for monitoring Calibration Frequency: once in 5 years Accuracy class of the meters: 0.2s The detailed description of all the meters and calibration schedule used in the current monitoring period has been mentioned in section C of MR.
Measuring/reading/recording frequency:	Measuring Frequency: Continuous Recording Frequency: Monthly

⁴ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

⁵ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Calculation method (if applicable):	<p>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The value electrical units supplied by the project activity to grid and electrical units consumed by the project activity is provided in Meter Reading Statement which is issued monthly by MPPKVVCL. The quantity of net electricity supplied to the grid can be obtained, by following calculations:</p> $EG_{PJ,y} = EG_{export,y} - EG_{import,y}$ <p>Where, $EG_{export,y}$: Electricity exported to the grid by the project activity, $EG_{import,y}$: Electricity imported from the grid by the project activity</p> <p>The calculation is done by MPPKVVCL and the PP has no say in the calculation.</p> <p>The electricity supplied to the grid by the project activity connected to the substation is measured by electronic meters of accuracy class 0.2s. The net electricity supplied is measured continuously using Main and Check meters at the substation. Readings of Main and Check meters shall be taken on monthly basis by authorized officer(s) of MPPKVVCL in the presence of PP or representative of PP.</p> <p>Cross Checking:</p> <p>$EG_{export,y}$: Quantity of electricity exported to the grid can be cross checked from the invoices raised by the project participant to Solar Energy Corporation of India</p> <p>$EG_{import,y}$: Quantity of electricity imported from the grid can be cross checked from electricity bills raised by MPPKVVCL to Fortum FinnSurya Energy Pvt. Ltd.</p> <p>$EG_{PJ,y}$: Calculated value.</p> <p>Data Type: Measured Monitoring equipment: Bi-directional Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p>
QA/QC procedures:	Calibration of all the meters will be undertaken once in 5 years and faulty meters will be duly replaced immediately. For current monitoring period, the calibration frequency is followed within calibration interval. The meters are of accuracy class 0.2.
Purpose of data:	The Data/Parameter is required to calculate baseline emission.
Additional comments:	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

D.3. Implementation of sampling plan

Sampling is not required for the given project activity.

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

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

As the project activity is the installation of a Greenfield power plant, the baseline scenario is the following as per applied methodology: The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The emission factor has been calculated by using option (a) as per the paragraph 12 of AMS.I.D (Version18) i.e. as combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system” Version 5.0.0.

The baseline emission calculation for the project activity is attributable to the CO₂ Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the NEWNE grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

$$BE_y = EG_{PJ,y} \times EF_{grid,y}$$

Where, BE_y = Baseline emissions in year y (t CO₂)

EG_{PJ,y} = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)

EF_{grid,y} = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO₂/MWh)

Same calculation of Baseline Emissions BE_y (As per Equation (1) of AMS.I.D, Version 18) for the current monitoring period has been depicted below:

$$BE_y = EG_{PJ,y} \times EF_{CO_2, grid, y}$$

Where,

$$EG_{PJ,y} = 20,386.070 \text{ MWh}$$

$$EF_{CO_2, grid, y} = 0.9770 \text{ tCO}_2\text{e/MWh}$$

Hence,

$$BE_y = 20,386.070 \text{ MWh} \times 0.9770 \text{ tCO}_2\text{e/MWh} = 19,917 \text{ tCO}_2\text{e}$$

$$PE_y = 0 \text{ (as explained under section E.2)}$$

$$LE_y = 0 \text{ (as explained under section E.3)}$$

Therefore, Emission reduction

$$ER_y = BE_y - PE_y - LE_y$$

$$= 19,917 - 0 - 0 \text{ tCO}_2\text{e}$$

$$= \mathbf{19,917 \text{ tCO}_2\text{e}}$$

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

Since the project activity is a renewable energy project which generates electricity using solar power therefore there are no resulting project emissions.

E.3. Calculation of leakage

No leakage is considered from the project activity as per approved methodology AMS-I.D.

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 ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	19,917	0	0	NA	19,917	19,917

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 ₂ e)	19,321	19,917

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

CER's generated are higher by 3.09% as compared to registered PDD because, in actual case the PLF is on higher side, due to which there is an increase in the electricity generation. The current monitoring period involves high solar radiation availability and this is nature dependent and not in control of PP. It is to be noted that there is no change in design of project activity. Thus there is no any post registration changes applicable.

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

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Fortum FinnSurya Energy Pvt. Ltd.
Street/P.O. Box	1 A, Vandana Building
Building	11, Tolstoy Marg
City	New Delhi
State/region	New Delhi
Postcode	110001
Country	India
Telephone	
Fax	
E-mail	Awadhesh.jha@fortum.com
Website	
Contact person	Mr. Awadhesh Jha
Title	Vice President
Salutation	Mr.
Last name	Jha
Middle name	
First name	Awadhesh
Department	N.A.
Mobile	+91-85276-94527
Direct fax	
Direct tel.	
Personal e-mail	Awadhesh.jha@fortum.com

- - - - -

Document information

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