



Monitoring report form for CDM project activity
(Version 07.0)

MONITORING REPORT		
Title of the project activity	19.2 MWp Solar Power Project by HZL at Debari and Dariba, Rajasthan	
UNFCCC reference number of the project activity	10496 ¹	
Version number of the PDD applicable to this monitoring report	02	
Version number of this monitoring report	01	
Completion date of this monitoring report	08/09/2020	
Monitoring period number	01	
Duration of this monitoring period	23/07/2019 to 31/08/2020 (Inclusive of both the period)	
Monitoring report number for this monitoring period	01	
Project participants	Hindustan Zinc Limited	
Host Party	India	
Applied methodologies and standardized baselines	ACM0002- Grid-connected electricity generation from renewable sources ² Version 19.0 Standardized Baseline: Not Applicable	
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 tCO ₂ e	29,773 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	26,756 tCO ₂ e	

¹ <https://cdm.unfccc.int/Projects/DB/Plus1562931007.06/view>

² <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

SECTION A Description of project activity

A.1. General description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Hindustan Zinc Ltd (HZL) is the promoter of the project activity. The project activity involves installation of 4.8 MWp (DC) solar power project at Villages: Dariba, Tehsil-Railmagra, Dist- Rajsamand, Rajasthan and 14.4 MWp (DC) Solar power project at Debari, Dist-Udaipur, Rajasthan. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 24,054 tCO_{2e} per year, thereon displacing 24,919 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

The power generated from the project activity will be utilized for captive consumption. The details of the project and the state of installation are mentioned in the table:-

Project Promoters' Name	Capacity in MW	Commissioning Date	Connection with Grid	State	Usage of Electricity
Hindustan Zinc Ltd.	4.8 MWp (DC)	26/03/2017	Indian Grid	Rajasthan	Captive use
	14.4 MWp (DC)	25/03/2017			

The major milestones taken towards implementation of the project activity are as follows:

Sr No.	Particulars	Date
1	Detailed Project Report submitted by third party	15/07/2015
2	Board Decision (=Investment decision date) for the Project activity	30/06/2016
3	Stakeholder Consultation	18/11/2016
4	Contract between HZL and L&T for project development	03/12/16
5	Publication of PDD for Global Stakeholder Consultation	22/12/2017
6	Host Country Approval	15/04/19

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as "*a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity*".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per paragraph 22 of Section 5.2.1 of applied methodology is the following:

If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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, as reflected in the combined margin (CM) calculations described in the “TOOL 07: Tool to calculate the emission factor for an electricity system”.

Hence, pre-project scenario and baseline scenario are the same.

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India³. Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well-being

The project activity provided / provides job opportunity to local people during erection, commissioning and maintenance of the solar project. Frequency of visiting villages and nearby areas by skilled, technical and industrialist increase due to installation /site visit/operation and maintenance work related to solar plant. This directly and indirectly positively effects the economy of villages and nearby area. HZL built the community hall as well as facilities at nearby temple for public use

Environmental well-being

Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment. The project has been installed on the waste land parcel where no other activity can be done eg. Jarosite pond and tailing dam.

Economic well-being

The CDM project activity generates permanent and temporary employment opportunity within the vicinity of the project. The electricity supply in the nearby area improves which directly and indirectly improves the economy and life style of the area.

Technological well-being

The project activity is step forward in harnessing the untapped solar potential and further diffusion of the solar technology in the region. The project activity leads to the promotion and demonstrates the success of solar projects in the region which further motivate more investors to invest in solar power projects. Hence, the project activity leads to technological well-being.

The Host County Approval issued by Indian DNA declaring acceptability of the Sustainable Indicators by the project activity is being submitted to DOE.

Total emission reductions achieved in this monitoring period:

During the reported monitoring period 23/07/2019 to 31/08/2020 (First and last date included) the project activity has supplied 30,855.06 MWh of electricity, and thus contributing to the GHG reductions of 29,773 tCO₂e.

A.2. Location of project activity

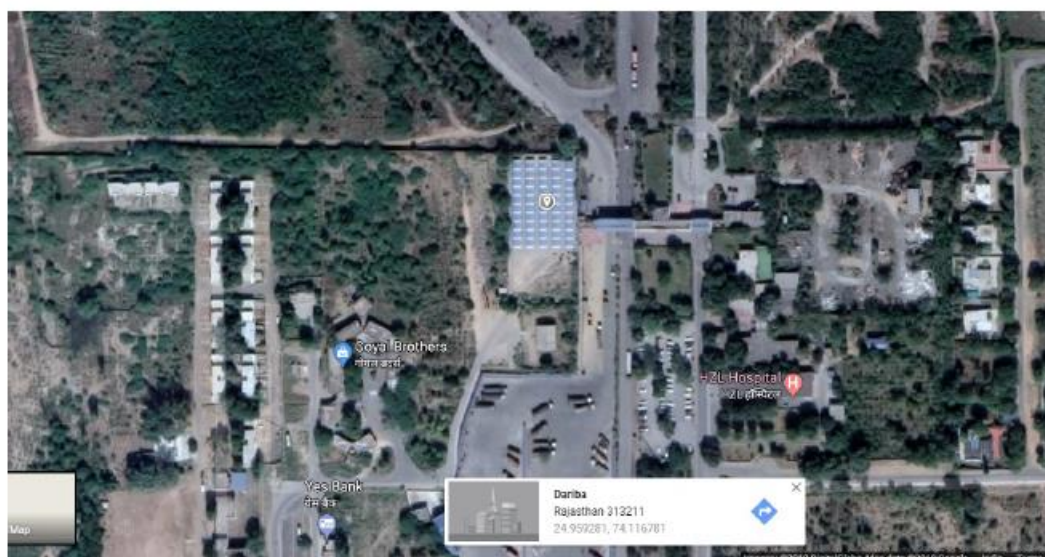
Village- Dariba and Debari
Dist- Rajsamand and Udaipur

³ http://www.cdmindia.gov.in/approval_process.php

State- Rajasthan, India.

Geo coordinates of Dariba site: 24°57'33.4"N 74°07'00.4"E

Geo coordinates of Debari site: 24°35'55.7"N 73°49'16.0"E



Map of the project site is as below:

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Hindustan Zinc Limited (Private Entity)	No

A.4. References to applied methodologies and standardized baselines

Title: Grid-connected electricity generation from renewable sources⁹

Reference: The project activity meets the eligibility criteria of large scale project as it is more than 15MW

Methodology: ACM0002: Grid-connected electricity generation from renewable sources --- Version 19. (EB 100, Annex 6)⁴

Type I : Energy industries (renewable / non-renewable sources)

Category : Approved Consolidated Methodology (ACM0002)

⁴ <https://cdm.unfccc.int/methodologies/DB/V/JI9AX539D9MLOPXN2AY9UR1N4IYGD>

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system- Version 07.0 (EB 100, Annex 04)⁵
- Tool for the demonstration and assessment of additionality⁶- Version 07.0.0 (EB 70, Annex 08)

A.5. Crediting period type and duration

Renewable crediting period of 7 years 00 Months have been opted for the project activity. This is the first crediting period of the project activity.

Type of crediting period	Renewable
Crediting period from	23/07/2019-22/07/2026
Length of the Crediting Period	7 Years
Current Monitoring period number	01
Current Monitoring period from	23/07/2019-31/08/2020 (inclusive of both dates)
Length of the Monitoring Period	406 Days

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

The project activity aims to harness solar energy through installation of PV with total installed capacity of 19.2 MWp.

The technical specifications of project activity of 4.8 MWp by Hindustan Zinc Ltd are as follows⁷:

S.No.	Particulars	Capacity
1	Technology used	4.8 MW DC Polycrystalline
2	Rating of each module	315 Wp
3	Angle from horizontal from which array is installed	20 degree
4	Number of modules	15,240 nos.
5	Make of modules	Phonosolar
6	Number of PCU's installed	4 nos, 1000 KW each
7	Make of PCU	ABB India Ltd.
8	Status of installation	100 % completed
9	Date of commissioning	26th March, 2017
10	Lifetime of project	25 years ⁸

The technical specifications of project activity of 14.4 MWp by Hindustan Zinc Ltd are as follows⁹:

S.No.	Particulars	Capacity
1	Technology used	14.4 MW DC Polycrystalline
2	Rating of each module	315 Wp
3	Angle from horizontal from which array is installed	20 degree
4	Number of modules	45,740 nos.
5	Make of modules	Phonosolar
6	Number of PCU's installed	12 nos, 1000 KW each
7	Make of PCU	ABB India Ltd.
8	Status of installation	100 % completed
9	Date of commissioning	25th March, 2017

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁶ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

⁷ Technical specifications has been sourced from commissioning certificate of the project activity

⁸ As per RRECL Tariff order and as per DPR of the project activity

⁹ Technical specifications has been sourced from commissioning certificate of the project activity

10	Lifetime of project	25 years ¹⁰
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B.2 Post-registration changes

Not Applicable

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

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 the start date of the crediting period

Not Applicable

B.2.4. Inclusion of monitoring plan

Not Applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

Not Applicable

B.2.6. Changes to project design

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

B.2.7. Changes specific to afforestation or reforestation project activity

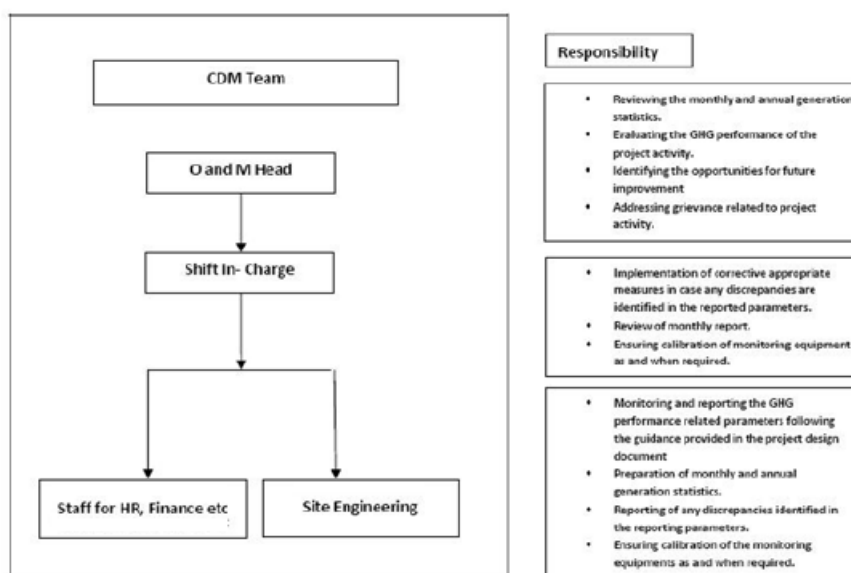
Not Applicable

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 Rajasthan, India. The monitoring plan, which will be 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:

¹⁰ As per RRECL Tariff order and as per DPR of the project activity



Data Measurement

The export and import energy will be measured continuously using meters. Readings of meters shall be taken on monthly basis by authorized officer of EPC contractor in the presence of PP or representative of PP. Based on the Meter Reading Statement to HZL, the electricity being utilized for captive consumption will be evaluated. The metered data can be cross checked with other suitable data source (like daily generation report).

Data collection and archiving

Readings from meters will be collected in the presence of the plant in-charge. Export and Import data would be 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) will be trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

In case of mismatch between billing (JMR) period cycle and monitoring period cycle, the daily generation electricity data will be used to calculate the electricity for specific period.

SECTION D Data and parameters

D.1 Data and parameters fixed ex ante

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 12, May 2017 ¹¹
Value(s) applied	0.9843
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2013-14, 2014-15, & 2015-16. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 12, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data/parameter	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
Source of data	Calculated from CEA database, Version 12, May 2017 ¹²
Value(s) applied	0.9083
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0.0" BM is calculated ex-ante based on the most recent information available at the time of submission of PD and is fixed for the entire crediting period. The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" version 12.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data/parameter	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period.

Data/Parameter	EF _{grid,CM,y}
Unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ¹³
Value(s) applied	0.9653
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: 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 (%) = 75% W _{BM} = Weighting of build margin emissions factor (%) = 25%
Purpose of data/parameter	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 generation supplied by the project plant/unit for captive purpose in year y in MWh
Measured/calculated/default	Measured
Source of data	Monthly joint meter reading reports signed by HZL as well as O&M partner.
Value(s) of monitored parameter	30,855.06

¹¹ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

¹² http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

¹³ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

Monitoring equipment	The electricity exported / supplied by the project activity is measured through meters (ABT Meters) having accuracy class of 0.2s. It is difference of export and import of project activity.
Measuring/reading/recording frequency	Continuous measurement & monthly recording
Calculation method (if applicable)	Net power exported to grid is calculated as a difference of export and import being recorded in monthly JMR reports. $EG_{PJ, y} = EG_{\text{export}} - EG_{\text{import}}$
QA/QC procedures	The frequency of calibration is once in 5 years ¹⁴ . The monthly electricity supplied by the project activity in the JMR report is cross checked with daily generation reports. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later

D.3 Implementation of sampling plan

No Sampling required

SECTION E Calculation of emission reductions or net anthropogenic removals

E.1 Calculation of baseline emissions or baseline net removals

As per the approved consolidated Methodology ACM0002 (Version 19.0, EB 100, Annex 6) para 42:

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

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

$EF_{CO_2, \text{grid}, y}$	=	CO ₂ emission factor of the grid in year y
	=	0.9653 tCO ₂ e/MWh
$EG_{pj,y}$	=	Net electricity delivered to the Indian grid
	=	MWh
BE_y	=	30,855.06 * 0.9653
		29,773 tCO ₂ e

E.2 Calculation of project emissions or actual net removals

As the project activity is the installation of a new Solar PV project and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF,y}$, $PE_{GP,y}$, $PE_{HP,y}$ are equal to zero and thus, $PE_y = 0$.

¹⁴ http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

E.3 Calculation of leakage emissions

No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

E.4 Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	29,773	0	0	0	29,773	29,773

E.5 Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
29,773	26,756

E.5.1 Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

As per the CDM registered PDD, the amount of CERs generated annually is 24,054 tCO₂e.

Therefore, the amount of estimated ex ante for this monitoring period is identified as explained below.

The total number of days in this monitoring period is 406 days.

Hence, the amount of estimated ex ante for this monitoring period = $24,054 * (406 / 365)$
= 26,756 tCO₂e

E.6 Remarks on increase in achieved emission reductions

From E.5 above, we can observe that actual emission reduction for the monitoring is higher than estimated emission reductions by 11%. This is due to high PLF during current monitoring period, which depends on solar radiation and is a natural phenomenon and not in control of PP.

E.7 Remarks on scale of small-scale project activity

Not Applicable

Document information

Version	Date	Description
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; Make editorial improvements.

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
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 (EB 70, 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).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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