



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	La Venta II	
UNFCCC reference number of the project activity	0846	
Version number of the PDD applicable to this monitoring report	11 (20/03/2014)	
Version number of this monitoring report	2	
Completion date of this monitoring report	22/06/2018	
Monitoring period number	Monitoring Period: 8	
Duration of this monitoring period	01/01/2016 – 31/12/2016	
Monitoring report number for this monitoring report	1	
Project participants	Mexico: Comisión Federal de Electricidad; International Bank for Reconstruction and Development (IBRD) as the Trustee of the Spanish Carbon Fund (SCF) Kingdom of Spain: Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness ; AZULIBER 1, S.L. ; Comercial De Materiales De Construcción, S.L. (COMAC) ; Compania Espanola De Petroleos, S.A. (CEPSA) ; Endesa Generacion, S.A. ; Viesgo Generacion, S.L. ; Viesgo Generacion, S.L.; Gas Natural SDG, S.A. ; Hidroelectrica Del Cantabrico, S.A. ; IBERDROLA Generacion S.A.U ; Repsol S.A. ; Zeroemissions Carbon Trust, S.A. ; Cementos Portland Valderrivas S.A.; International Bank for Reconstruction and Development (IBRD) as Trustee of the Spanish Carbon Fund (SCF)	
Host Party	Mexico	
Sectoral scopes	1: Energy industries (renewable - / non- renewable sources)	
Applied methodologies and standardized baselines	ACM0002 ver. 14 - Grid-connected electricity generation from 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	98,417 tCO ₂ e

Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	164,634 tCO ₂ e
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SECTION A. Description of project activity

A.1. General description of project activity

La Venta II wind power plant (La Venta II) consists of 98 wind turbine-generator engines (WTGs) each of 0.85 MW capacity, adding up to a total installed capacity of 83.3 MW. The WTGs are distributed in 4 rows approximately 600 meters away from each other. The WTGs are approximately 130 meters away from each other; the height of the WTGs is 44 meters. The maximum estimated generation per year is 307,728 MWh.

The spatial extent of the project boundary is the IMNG. The project is connected to the IMNG through La Venta II substation of the IMNG, which belongs to the Comisión Federal de Electricidad ("CFE"). The generated electricity is dispatched to the grid and commercialized by CFE, which is the developer operator and owner of the project. The project has obtained all applicable permissions/authorizations required for its construction and operation, and complies with all environmental requirements mandated by SEMARNAT (Mexican Environmental Authority and Designated National Authority).

The project was fully commissioned on January 5, 2007, and has been in continuous operation since then. Total emission reductions for this monitoring period are 98,417 tCO₂e.

A.2. Location of project activity

- (a) Mexico
- (b) Southern State of Oaxaca
- (c) Ejido La Venta, Juchitan de Zaragoza Municipality
- (d) Latitude 16.59 and Longitude -94.819722

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mexico (host Party)	<u>Public entity</u> Comisión Federal de Electricidad	No
IBRD	<u>Public entity</u> International Bank for Reconstruction and Development (IBRD) as the Trustee of the Spanish Carbon Fund (SCF)	No
Spain	Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness ; AZULIBER 1, S.L. ; Comercial De Materiales De Construcción, S.L. (COMAC) ; Compania Espanola De Petroleos, S.A. (CEPSA) ; Endesa Generacion, S.A. ; Viesgo Generacion, S.L. ; E.ON Generacion S.L ; Gas Natural SDG, S.A. ; Hidroelectrica Del Cantabrico, S.A. ; IBERDROLA Generacion S.A.U ; Repsol YPF S.A. ; Zeroemissions Carbon Trust, S.A. ; Cementos Portland Valderrivas S.A.	Yes

A.4. Reference to applied methodologies and standardized baselines

ACM0002 ver. 14 - Grid-connected electricity generation from renewable sources.

A.5. Crediting period type and duration

Type: Renewable crediting period

Starting date: 01/07/2014

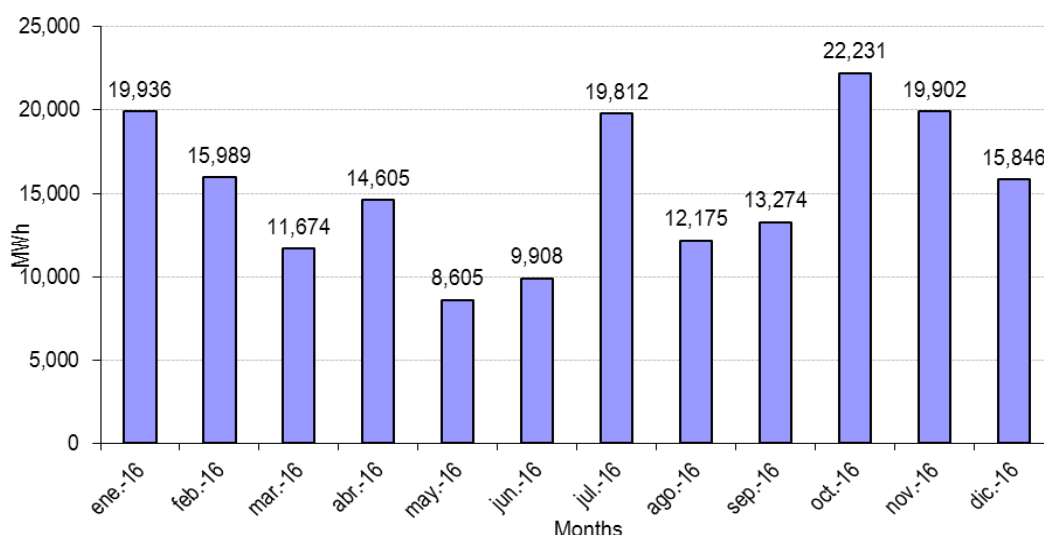
Duration: 7 years 0 months

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

Implementation Status

La Venta II was commissioned on January 5, 2007, and it has been in continuous operation since then. During this monitoring period, La Venta II net generation registered at 34.5 kV was 183,958 MWh. The chart below shows the monthly generation, which varied mainly due to the variability of the wind regimes.



There were no events that occurred during the current monitoring period that would impact the applicability of the methodology.

The most important causes determining the above-mentioned variability in monthly generation are linked to:

- Regular maintenance of equipment.
- Damage suffered by the components of the wind generators due to breakdowns.
- Wind regime outside the operating margin of the wind turbine (4 – 25 m/s).

These events lead to the breakdown of plant unavailability, as shown in the table below¹ (source: CFE). The ER calculations reflect these events.

¹ Detailed information has been provided to the DOE during site visit.

Table 1 La Venta II plant unavailability (% of total hours)					
	Breakdowns	Maintenance	External conditions	No productive wind	Plant availability
2015	9	22	2	27	40
Jan. 2016	8.34	16.47	1.01	29.52	44.66
Feb. 2016	8.69	17.18	1.01	29.72	43.4
Mar. 2016	8.83	17.7	1.01	28.9	43.56
Apr. 2016	8.89	18.57	1.05	29.08	42.4
May. 2016	8.93	19.11	1.67	28.49	41.81
Jun. 2016	8.78	20.35	1.7	27.98	41.18
Jul. 2016	8.68	20.78	1.72	27.36	41.46
Aug. 2016	8.67	21.02	1.86	26.14	42.3
Sep. 2016	8.61	21.24	2.1	26.44	41.62
Oct. 2016	8.55	21.37	2.24	26.43	41.4
Nov. 2016	8.51	21.82	2.22	25.95	41.5
Dec. 2016	8.47	22.06	2.2	27.01	40.25
2016	8.7	19.8	1.6	27.8	42.1

The Table 1 above shows how breakdowns have been diminishing since 2015, hence reducing the downtime of the plant. At the same time, external conditions factors have decreased which led to a better plant availability and higher energy production.

Description of the Installed Technology

La Venta II has a total installed capacity of 83.3 MW and consists of 98 Gamesa G52 wind turbines with 850 kW of rated capacity installed in towers of 44 meters high. Each rotor has a diameter of 52 meters with 3 blades of 25.3 meters long each. The WTGs are distributed in 4 rows about 600 meters away from each other and each WTG is approximately 130 meters away from the adjacent ones.

The cut-in and cut-out wind speeds for these wind turbines are 4 m/s and 25 m/s respectively. The output voltage of each generator is 690 V. The voltage is raised up from 690 V to 34.5 kV through a transformer located in each of the towers of the wind turbines before sending the electricity to the substation. The wind farm is integrated by 5 electric circuits which collect the electricity generated by the 98 WTGs and sends it to La Venta II substation. The total generated electricity is delivered to the grid and commercialized by CFE, which is the project developer, operator and owner of La Venta II. La Venta II's minimum expected plant operating life is 21 years.

B.2. Post-registration changes

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

N/A

B.2.2. Corrections

N/A

B.2.3. Changes to the start date of the crediting period

N/A

B.2.4. Inclusion of monitoring plan

N/A

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

N/A

B.2.6. Changes to project design

N/A

SECTION C. Description of monitoring system

As per the registered PDD, the only parameter to be monitored for the ERs calculation is La Venta II's electricity generation.

The PDD specifies that Centro Nacional de Control de Energia (CENACE, the system operator) will be the solely provider of La Venta II's generation data.

It needs to be noted that in 2014, the energy reform entered into force in Mexico and many changes have been occurred since then. The law of the Electricity Industry (LIE), which is still at its implementation phase, establishes the creation of a wholesale electricity market (MEM) and indicated that CENACE must be an independent entity to operate and monitor the market. Although the changes in the structure of the electricity market in Mexico due to the energy reform are going to be implemented gradually and are not affecting the current monitoring period, they are shown for reference proposes in Figure 3 below.

At the time of writing, CENACE's measurement system is still in operation but it is being updated and adapted to the new regulations of the electric market.

As far as La Venta II is concerned, the hourly measurements of the generated electricity are still recording by CFE. As stated and subsequently verified in the monitoring report for the 7th verification, on November 8, 2015, the ION 8500 meter serial number PQ-0604A002-03 was replaced by the meter ION 8650 serial number MW-1407A459-01, which is currently in use (see Figure 2).

Fig.2. One line diagram and monitoring point

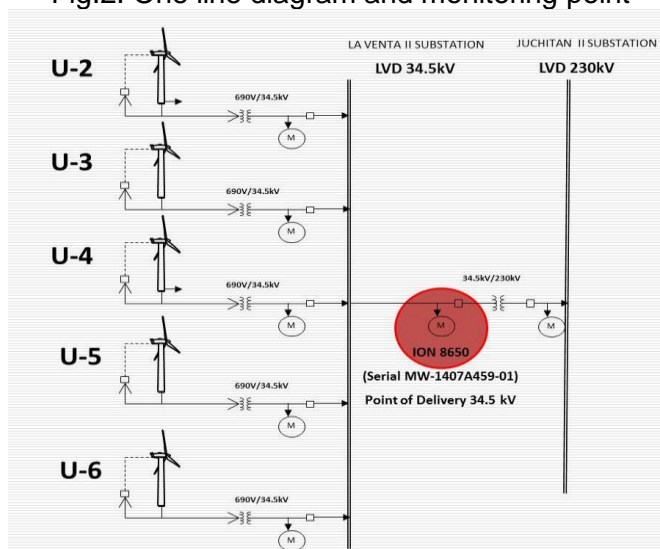
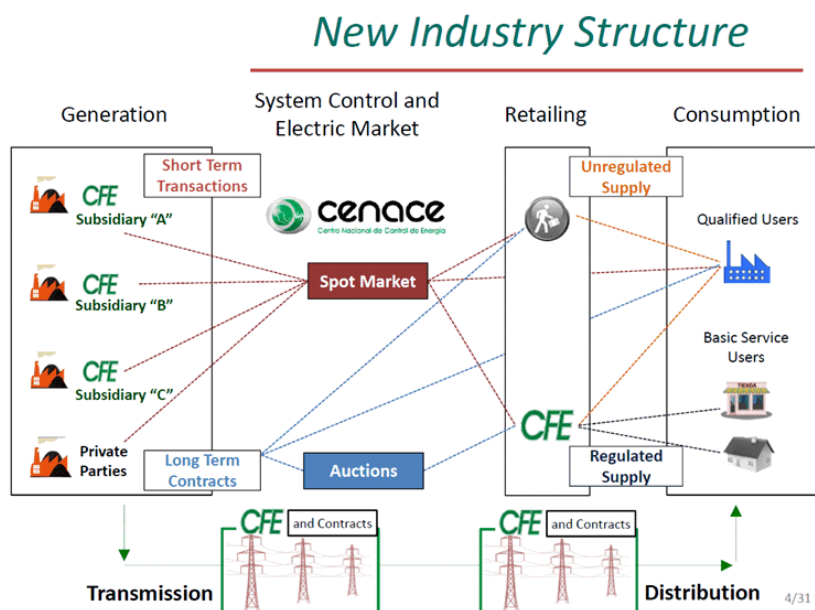


Fig.3. General Structure of the new electric industry in Mexico.



The ION 8650 meter is subjected to regular maintenance and testing regime, which includes:

- Daily monitoring by Internet, and in real time, of the power, electric tension and other variables;
- Processing per month the historical record of the generation measured by the meter;
- A monthly energy balance per installation;
- Cleaning of the meter and turning of the screws further if they needed to.

With these checks it is possible to detect any errors that the meters may be presenting.

All monitored data will be archived for at least two years after the end of the crediting period of the project.

At this time, it is possible to use the historical record at 34.5 kV of the meter to calculate the ER's for this period.

Data Crosschecking

According to CFE, there are no receipts of sales of the energy generated by La Venta II delivered to the next recipient of this energy: CFE Transmission Area. Thus, receipt of sales cannot be used for cross-checking of La Venta's II generation.

However, the CFE Transmission and CFE Generation Areas conciliate in a monthly basis the energy delivered by La Venta II (format 03) at 230 kV. This conciliation consists of an agreement for the energy delivered from the Generation Area to the Transmission Area. Every month (since 2016), both parties are signing an official internal document named "**Cédula de Conciliación de Entrega-Recepción de Energía (format 03)**" that specifies the amount of electricity delivered. This is the official document used in the cross-checking process and is equivalent to "Cédula de Registro de Lecturas Mensual" indicated in the PDD.

Furthermore, CFE Generation and CENACE started to elaborate the document "**Formato de Formalización por punto de Medición**" to conciliate the energy delivered and received, respectfully. It is no clear if it will be continued once the regulations of electric market are established completely. This document is complementing the cross-checking process in current

operations considering that due to the electrical reform in México, CFE Generation area is in transition to adopt the new regulations to operate accordingly.

This conciliation consists of an agreement for the energy delivered from Generation Area to Transmission Area. Every month, both parties sign an official internal document named "Cédula de Registro de Lecturas Mensual" that specifies the amount of delivered. This is the official document used in the cross-checking process.

Roles and Responsibilities

As per the registered PDD, CFE has an Emissions Reduction Calculation Procedure (ERCP) with a defined organizational structure for La Venta II Project. This also includes a Quality Assurance and Control procedures in line with CDM requirements.

Fig.4. ERCP Organizational Structure

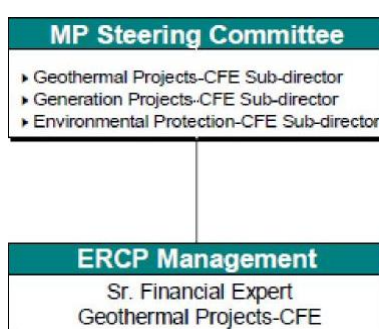


Fig.4. QA /QC procedures

Data	<ul style="list-style-type: none"> ► The project generation data. ► Make coordination with CENACE to be able to implement this document. ► Check calibration of electricity meters, periodically.
Quality of Data Collection	<ul style="list-style-type: none"> ► Which data comes? The above ► By what means does it come? By E-mail/ CD ► How does it come? In Excel ► How frequently does it come? Yearly ► From whom does it come? From CENACE ► To whom does it comes? ERCP Manager
Quality of Data Processing	<ul style="list-style-type: none"> ► Original Data ► Organized Data ► Entered Data ► Processed Data ► Result
Quality of Data Storage	<ul style="list-style-type: none"> ► Prevent Excel versioning problem, by keeping "a new" Excel software package. ► Keep all data for 2 years after the first crediting period (9 years). ► Save the ERCP file with the last date in which an alteration was made. ► Keep all written documentation in a folder.
Quality of Data Delivery	<ul style="list-style-type: none"> ► Provide to the verifier e-mails /CD through which the data provider (CENACE) delivered the original data ► Provide to the verifier receipt of sales to final clients ► Provide to the verifier all calculations made (all steps of data processing) by showing all preliminary versions of spreadsheets saved in disk

Roles and responsibilities for the monitoring and reporting activities are divided among the different areas of CFE, as follows:

CFE Generation Area at La Venta II

- General operation of the plant.
- Preparation of the "Cédula de Registro de Lecturas Mensual".

CFE Transmission Area at La Venta II Substation

- Calibration and maintenance of the meters.
- Validation of the information in the “Cédula de Registro de Lecturas Mensual” (Data Cross-Checking process for the energy delivered to the grid).

CENACE

- Operation and maintenance of SIME system, and implementing regulations of the electric market.

CFE Geothermal Projects Area

- Data gathering from CFE Generation and CFE Transmission Areas.
- Quality control of the information provided.
- Calculation of the project GHG emission reductions.
- Data processing and preparation of the Monitoring Report.

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante**

Data/Parameter	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ 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”
Source of data	Revised 2006 IPCC and Electricity Sector Outlooks publications: 2013-2027, 2012-2026, 2010-2025, 2009-2016, 2008-2017, 2007-2016. 23. Information on net electricity generation in 2012 was taken from CFE report named “Generation 2012”
Value(s) applied	0.535
Choice of data or measurement methods and procedures	Calculated according to the “Tool to calculate the emission factor for an electricity system” Version 04.0.0.
Purpose of data/parameter	Baseline emissions
Additional comments	This value is fixed for the crediting period.

Other parameters determined as fixed ex-ante in the PDD ($NCV_{i,y}$, $EF_{CO2,i,y}$, EG_y , $EG_{m,y}$, $n_{m,y}$, $FC_{i,y}$) are not monitored. As a matter of fact, all they were used to calculate $EF_{grid,CM,y}$, as validated in the PDD and that is why they are not included in this section.

D.2. Data and parameters monitored

Data/Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Measured/calculated/default	Measured by bi-directional electricity meters
Source of data	Measured on site at La Venta II substation and also automatically transmitted to CENACE.

Value(s) of monitored parameter	183,958.13
Monitoring equipment	Name: power meter Type: ION 8650 Accuracy Class: 0.2 Serial Number: MW-1407A459-01 Calibration Frequency: Once a year
Measuring/reading/recording frequency	Continuous
Calculation method (if applicable)	Not applicable
QA/QC procedures	The metering is properly calibrated by CFE at least once every two years. Calculated from energy exported by the project to the grid and energy imported by the project from the grid, directly obtained from the metering equipment. Therefore, according to methodology ACM0002 the following parameters are measured: i) The quantity of electricity supplied by the project plant to the grid. ii) The quantity of electricity delivered to the project plant from the grid. CFE owns the main billing meter and as such it is the entity maintaining, testing and calibrating the equipment. The electricity meters have an accuracy class of 0.2 as required by the CFE official procedure "Procedimiento para la Elaboración del Balance de Energía Eléctrica". Calibration will be conducted at least once every two years. Since there are no receipts of sales of the energy generated by La Venta II, measured electricity is crosschecked with data from "Cédula de Registro de Lecturas Mensual" (Official Monthly Registry Agreement), which is the official document signed by CFE Transmission and Generation Areas every month to conciliate the energy provided by the plant to the national grid which is equivalent to a sales receipt for the energy delivered by the plant.
Purpose of data/parameter	Calculation of baseline emissions.
Additional comments	Not applicable

D.3. Implementation of sampling plan

N/A. The PDD does not contain a sampling plan.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

Baseline emissions for the Project are calculated by using the formula:

$$BE_y = EG_y \times EF_{GRID} = 183,958 \text{ MWh} \times 0.535 \text{ tCO}_2\text{e/MWh} = 98,417 \text{ tCO}_2\text{e}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

$EG_y = EG_{\text{facility},y}$ = Electricity generation delivered to grid, net of internal consumptions at La Venta II (MWh)

$EF_{GRID} = EF_{\text{grid,CM},y}$ = Grid emission factor (tCO₂/MWh).

E.2. Calculation of project emissions or actual net removals

There are no project emissions (PE_y) for the project activity as per the registered PDD.

E.3. Calculation of leakage emissions

There are no leakage emissions (LE_y) for the project activity as per the registered PDD.

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	98,417	0	0	0	98,417	98,417

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 (t CO ₂ e)
98,417	164,634

E.6. Remarks on increase in achieved emission reductions

The total emission reductions for the period are lower than the ex-ante calculations as per the registered PDD due to lower energy productions during the monitored period.

This was mainly due to the variability of the wind (i.e., wind outside the operating margin of 4 – 25 m/s) and to the recorded downtime hours (please refer to Section B1) related to the following:

- Regular maintenance.
- Damage suffered by the components of the wind generators due to breakdowns.
- Disconnection from the grid due to harmonic and resonant phenomenon during generation periods.

Document information

<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.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		