

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

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**MONITORING REPORT**  
**Version 1.1 and Date 16/01/2012**

**Title: “Roaring 40’s Wind Farms (Khandke) Private Limited”**

**Project Reference No: 3142**

**Monitoring Period Number: 1**

**Monitoring Period Date – FROM 14/10/2010 TO 31/12/2011 (BOTH DAYS INCLUSIVE)**

**SECTION A. General description of the project activity**

**A.1. Brief description of the project activity: >>**

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CLP Wind Farms (Khandke) Pvt. Ltd. (CLPWFK, formerly known as Roaring 40s wind Farms (Khandke) Pvt. Limited) has developed a 50.4 MW wind farm in the state of Maharashtra, India in 3 phases (Phase-I, II & III). The project activity under consideration is Phase-I of the project consisting of 21 machines of 800kW each, amounting to 16.8 MW.

The Project harnesses renewable resource (wind) in the region, and thereby displacing electricity generation by non-renewable natural resources and hence ultimately leading to sustainable economic and environmental development. Enercon (India) Limited (“Enercon”) is the equipment supplier and the operations and maintenance contractor for the Project. The Project is owned by CLP Wind Farms (Khandke) Private Limited and Enercon is responsible for operation and maintenance of the wind farm. The generated electricity is being supplied to Maharashtra State Electricity Distribution Company Limited (“MSEDCL”) under a long-term power purchase agreement (PPA) for 13 years.

The first machine was commissioned on 27<sup>th</sup> June 2007 and the last machine was commissioned on 19<sup>th</sup> December 2007. The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period (14/10/2010 to 31/12/2011) is **37,117 tCO<sub>2</sub>e**.

**A.2. Project Participants**

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CLP Wind Farms (Khandke) Pvt. Ltd. (formerly known as Roaring 40s wind Farms (Khandke) Pvt. Limited)

**A.3. Location of the project activity:**

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The Project is spread across Ranjani, Ratadgaon, Agadgaon and Bardari villages in Khandke Taluk of Ahmednagar District of Maharashtra state in India.

The Project area extends between latitude 19<sup>0</sup>, 3.5’ to 19<sup>0</sup>, 11’ North and longitude 74<sup>0</sup>, 49’ to 74<sup>0</sup>, 56’ East. The Project is connected to the Enercon (India) Limited (EIL) substation (to be owned by MSETCL) at Village Mehekari (near 33kV Mehekari S/S), Ahmednagar district. The Project activity is located at a distance of 120 km from Pune by road. The nearest major railway station is at Pune.

The details of the physical location of the project activity are presented below:

Project Name	Name of Village	WEC Location No.	Feeder No	Date of Commissioning	Longitude	Latitude	Unique Identification of WECs
CLP Wind Farms	Ranjani	83	02	27-Jun-07	N19 10 19.7	E74 54 21.2	R 40s K-01
		84		27-Jun-07	N19 10 14.8	E74 54 28.9	R 40s K-02

(Khandke) Pvt. Ltd. (formerly known as Roaring 40s wind Farms (Khandke) Pvt. Limited)		85		27-Jun-07	N19 10 09.1	E74 54 36.2	R 40s K-03
		86		27-Jun-07	N19 10 02.9	E74 54 43.8	R 40s K-04
		87		27-Jun-07	N19 09 52.3	E74 54 36.8	R 40s K-05
		88		27-Jun-07	N19 09 44.0	E74 54 37.6	R 40s K-06
		89		27-Jun-07	N19 10 08.5	E74 55 00.0	R 40s K-07
		90		27-Jun-07	N19 10 15.4	E74 54 56.5	R 40s K-08
		91		27-Jun-07	N19 10 23.1	E74 54 51.7	R 40s K-09
	Ratadgoan	17	03	30-Jun-07	N19 07 09.4	E74 49 56.1	R 40s K-10
		18		30-Jun-07	N19 07 19.6	E74 49 52.4	R 40s K-11
		19		30-Jun-07	N19 07 32.6	E74 49 52.5	R 40s K-12
		20		22-Aug-07	N19 07 42.1	E74 49 55.6	R 40s K-13
		112	02	22-Aug-07	N19 08 08.2	E74 52 19.8	R 40s K-14
		113		22-Aug-07	N19 08 00.1	E74 52 24.8	R 40s K-15
		115		19-Dec-07	N19 07 56.6	E74 52 08.5	R 40s K-16
	Agadgoan	92		27-Sep-07	N19 09 55.0	E74 52 56.1	R 40s K-17
		93		27-Sep-07	N19 09 48.6	E74 52 58.7	R 40s K-18
		99		1-Oct-07	N19 09 45.7	E74 52 43.1	R 40s K-19
	Bardari	15	03	12-Oct-07	N19 06 52.7	E74 49 57.7	R 40s K-20
		16		12-Oct-07	N19 06 58.9	E74 49 54.0	R 40s K-21

#### **A.4. Technical description of the project**

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The Project involves 21-wind energy converters (WECs) of Enercon make (800 kW E-48) with internal electrical lines connecting the Project with local evacuation facility. The WECs generate 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The other salient features of the technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.

- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator, which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking Systems.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.



Source: Enercon

#### **Technology transfer:**

No technology transfer from other countries is involved in this project activity

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

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**Title:** Consolidated baseline and monitoring methodology for “Grid-connected electricity generation from renewable sources”

**Reference:** Approved consolidated baseline methodology ACM0002 (Version 10)

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 01
- Tool for the demonstration and assessment of additionality – Version 5.2

#### **A.6. Registration date of the project activity:**

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14/10/2010

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

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As per the registered PDD, the length of the Crediting period of the project activity is 10 years and 0 months (Fixed). The start date of the crediting period is 14/10/2010 and the end date will be 13/10/2020.

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

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Mahesh Makhija

Director – Business Development – Renewables

CLP Wind Farms (Khandke) Private Limited

(formerly known as “Roaring 40s Wind Farms (Khandke) Private Limited”)

Off Western Express Highway, Goregaon (East),

15<sup>th</sup> Floor, Oberoi Commerz,

Mumbai  
Maharashtra.  
400 063  
INDIA

## SECTION B. Implementation of the project activity

### B.1. Implementation status of the project activity

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The first machine was commissioned on 27<sup>th</sup> June 2007 and the last machine was commissioned on 19<sup>th</sup> December 2007. The project activity consists of 21 machines of 800kW each amounting to a total of 16.8 MW.

The commissioning schedule is provided below:

Project Name	Name of Village	Location No.	Date Commissioning	Unique Identification of WECs
Roaring 40s Wind Farms (Khandke) Private Limited	Ranjani	83	27-Jun-07	R 40s K-01
		84	27-Jun-07	R 40s K-02
		85	27-Jun-07	R 40s K-03
		86	27-Jun-07	R 40s K-04
		87	27-Jun-07	R 40s K-05
		88	27-Jun-07	R 40s K-06
		89	27-Jun-07	R 40s K-07
		90	27-Jun-07	R 40s K-08
		91	27-Jun-07	R 40s K-09
	Ratadgoan	17	30-Jun-07	R 40s K-10
		18	30-Jun-07	R 40s K-11
		19	30-Jun-07	R 40s K-12
		20	22-Aug-07	R 40s K-13
		112	22-Aug-07	R 40s K-14
		113	22-Aug-07	R 40s K-15
		115	19-Dec-07	R 40s K-16
	Agadgoan	92	27-Sep-07	R 40s K-17
		93	27-Sep-07	R 40s K-18
		99	1-Oct-07	R 40s K-19
	Bardari	15	12-Oct-07	R 40s K-20
		16	12-Oct-07	R 40s K-21

The project activity has been implemented as per the description in the registered CDM PDD. The Project is owned by CLP Wind Farms (Khandke) Private Limited and Enercon is responsible for operation and maintenance of the wind farm. All the events are recorded in the log book available at the project site. During the monitoring period considered in this report, there was no major / special event for any of the machines that are included in the project activity. As part of regular maintenance, the machines are stopped for annual electrical & mechanical maintenance for 16 to 18 hours and for visual inspection for 3 to 6 hours quarterly.

No event or situation has occurred during this monitoring period, which impacts the applicability of the methodology

<b>B.2. Revision of the monitoring plan</b>
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Not Applicable

<b>B.3. Request for deviation applied to this monitoring period</b>
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Not Applicable

<b>B.4. Notification or request of approval of changes</b>
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Not Applicable

<b>SECTION C. Description of the monitoring system</b>
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Approved monitoring methodology ACM0002 Version 10 Sectoral Scope: 1, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where *ex post* determination of grid emission factor has been chosen

Since the baseline methodology is based on *ex ante* determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required. Further, wind based electricity generation is not associated with any kind of leakages.

The Project is operated and managed by CLPWFK (formerly Roaring 40s). The operational and maintenance contract for the project is with Enercon. 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.

### **Calibration Details**

The metering equipment were inspected & calibrated by state utility. Meter calibration details are given in the table below:-

Metering Point	Meter No.	Meter Type	Accuracy Class	Test 1	Test 1 (Valid till)	Test 2	Test 2 (Valid till)
Feeder No. 2	4880814	Main	0.2	14/7/2010	13/7/2011	2/9/2011	1/9/2012
Feeder No. 3	4880816	Main	0.2	14/7/2010	13/7/2011	2/9/2011	1/9/2012

The crediting period of the project activity extends from 14<sup>th</sup> October 2010 to 31<sup>st</sup> December 2011. The results of all the 3 tests conducted are satisfactory and all the instruments are functioning within the maximum permissible limit. But due to the delay in conducting the tests, the calibration is not applicable for the following periods:

- Between 13/07/2011 and 02/09/2011 for Meter no. 04880814
- Between 13/07/2011 and 02/09/2011 for Meter no. 04880816

As per Annex 60, EB 52 “Guidelines for Assessing Compliance with the Calibration Frequency Requirements” (Version 01), the maximum permissible error of the instrument needs to be applied to the measured values and the error shall be applied for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration. As per guidance, the maximum permissible error has been applied conservatively to the monthly generation data considered for calculating emission reductions.

The line diagram describing the project layout is provided in Appendix 2.

### Monitoring Information

- **Metering:** Electricity supplied to the grid is metered by MSEDCL in the presence of representatives of Enercon (O&M Contractor for the project activity) and MSEDCL.
- **Metering Equipment:** Metering system for the project activity consists of main and check meter. Both the meters are two-way trivector meters capable of recording import and export of electricity and provide output in the form of net electricity supplied to the grid. The metering equipment is maintained in accordance with electricity standards prevalent in Maharashtra.
- **Meter Readings:** The Net electricity supplied to the grid is recorded by taking a Joint Meter Reading (JMR) in the presence of Officials from off-taking Utility and Enercon, O&M contractor, on behalf of project owner. The Joint meter reading contains the value of energy imported and exported and the net export to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of the utility and by Enercon Officials. The procedure for calculating net electricity supplied to the grid is described under B.7.2. The net electricity supplied to the grid can be cross verified from the Energy Breakup Report certified by MSEDCL.

- **Inspection of Energy Meters:** All the 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 for each 33 kV bay. The Main meter will be tested for accuracy, with a portable standard meter, by the MSEDCL's Testing Division; The MSEDCL will carry out the calibration, periodical testing, sealing and maintenance of meters. All the meters will be tested at the Metering Point. The MSEDCL will provide a copy of the test reports. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit, all the meters will be re-tested and calibrated immediately by MSEDCL.

### **Apportioning Procedure Implemented by Enercon and Certified by MSEDCL**

#### **STEP 1: MEASURING ELECTRICITY GENERATION FOR EACH TURBINE**

Electricity generation readings of the LCS meters on each Turbine are recorded on continuous basis and fed to the central monitoring system. Data on generation for each Turbine within the wind farm are accessed and archived electronically in the central monitoring system database.

Electricity generation from the project during a monitoring period connected to feeder 2 ( $EG_{f2, gross, y}$ ) and feeder 3 ( $EG_{f3, gross, y}$ ) is noted from central monitoring system database by Enercon as:

$$N_{f2} \sum_{y=0} EG_{f2, gross, y}$$

$$N_{f3} \sum_{y=0} EG_{f3, gross, y}$$

Where  $N_{f2}$  = number of Turbines comprising the Project activity connected to the feeder 2

Where  $N_{f3}$  = number of Turbines comprising the Project activity connected to the feeder 3

Electricity generation from other Turbines connected to feeder 2 ( $EG_{f2, gross, y}$ ) and feeder 3 ( $EG_{f3, gross, y}$ ) is noted from central monitoring system database by Enercon as:

$$M_{f2} \sum_{y=0} EG_{f2, gross, x}$$

$$M_{f3} \sum_{y=0} EG_{f3, gross, x}$$

Where  $M_{f2}$  = number of Turbines that are not part of the project activity but are connected to the feeder 2.

Where  $M_{f3}$  = number of Turbines that are not part of the project activity but are connected to the feeder 3.

#### **STEP 2: DETERMINING ELECTRICITY EXPORTS FROM THE TURBINES**



## 2.1 MEASURING AGGREGATE ELECTRICITY EXPORTS FROM THE FEEDER

Aggregate electricity exports, to the grid, from the turbines connected to feeder 2 and feeder 3 is measured through the main and check meters installed at the 33kV side of the Substation. There are one set of main and check meter at each feeder. Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&M contractor) & the state electricity utility (MSETCL). The JMR gives both the “export” and “import” of the electricity to/ from the grid, which forms the basis on which the utility makes the payment to the project proponent. Electricity export and import for feeder 2 and feeder 3 is denoted as:

Electricity Export from feeder 2:	$EG_{f2,JMR,export}$
Electricity Import from feeder 2:	$EG_{f2,JMR,import}$
Electricity Export from feeder 3:	$EG_{f3,JMR,export}$
Electricity Import from feeder 3:	$EG_{f3,JMR,import}$

## 2.2 DETERMINING ELECTRICITY EXPORTS FROM PROJECT ACTIVITY

Net electricity exported by individual wind turbines is determined by MSEDCL by apportioning electricity export and electricity import to the project and non-project Turbines in proportion to their generated electricity.

This apportioning activity is carried out by Enercon, the O&M contractor. Operation and maintenance personnel from Enercon prepare a monthly report on generation and consumption. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected to the feeder.

$EG_{f2,export}$  the electricity supplied to the grid by turbines of the project activity connected to feeder 2 is calculated as follows:

$$EG_{f2,export} = \frac{EG_{f2,JMR, export} \times \sum_{y=0}^N EG_{f2,gross, y}}{(\sum_{y=0}^N EG_{f2,gross, y} + \sum_{y=0}^M EG_{f2,gross, y})}$$

$EG_{f2,import}$  the electricity drawn from the grid by turbines of the project activity connected to feeder 2 is calculated as follows:

$$EG_{f2,import} = \frac{EG_{f2,JMR, import} \times \sum_{y=0}^N EG_{f2,gross, y}}{(\sum_{y=0}^N EG_{f2,gross, y} + \sum_{y=0}^M EG_{f2,gross, y})}$$

$EG_{f2,y}$ , the net electricity supplied to the grid by Turbines of the project activity connected to feeder 2, is calculated as follows:

$$EG_{f2,y} = EG_{f2,export} - EG_{f2,import}$$

Similarly for feeder 3,  $EG_{f3,export}$ ,  $EG_{f3,import}$  and  $EG_{f3,y}$ , is calculated as follows:

$EG_{f3,export}$  the electricity supplied to the grid by turbines of the project activity connected to feeder 3 is calculated as follows:

$$EG_{f3,export} = \frac{EG_{f3,JMR, export} \times \sum_{y=0}^N EG_{f3,gross, y}}{(\sum_{y=0}^N EG_{f3,gross, y} + \sum_{y=0}^M EG_{f3,gross, y})}$$

$EG_{f3,import}$  the electricity drawn from the grid by turbines of the project activity connected to feeder 3 is calculated as follows:

$$EG_{f3,import} = \frac{EG_{f3,JMR,import} \times \sum_{y=0}^N EG_{f3,gross,y}}{(\sum_{y=0}^N EG_{f2,gross,y} + \sum_{y=0}^M EG_{f3,gross,y})}$$

$EG_{f3,y}$ , the net electricity supplied to the grid by Turbines of the project activity connected to feeder 3, is calculated as follows:

$$EG_{f3,y} = EG_{f3,export} - EG_{f3,import}$$

Net electricity exported to the grid by the project activity is calculated as:

$$EG_y = EG_{f2,y} + EG_{f3,y}$$

The meter reading from the LCS of each turbine is noted by CMS (Central Monitoring Station) directly in the soft format. The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the Turbines (Turbines). In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report.

Enercon operates 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, 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.

### Mismatch in dates

In case the meter reading dates of the MSEDCL do not match the monitoring period, the data for that period of time (for which a separate MSEDCL statement will not be available) will be on the basis of the daily LCS meter readings taken by Enercon. The procedure for calculating the monthly generation in case such a situation arises will be as follows:

$$EG_{N,fT,export} = \frac{EG_{fT,export} \times \sum_{y=0}^N EG_{LCS,y}}{\sum_{y=0}^M EG_{LCS,y}}$$

Where

N = No. of days in a month upto when generation is considered for emission reduction calculation

M = No. of days in that month

${}^N EG_{LCS,y}$  = LCS meter reading for  $N^{th}$  day

$EG_{fT,export}$  = Electricity exported in that month as per the JMR

$EG_{N,fT,export}$  = Electricity exported in that month upto  $N^{th}$  day

$$EG_{N, \Gamma, import} = \frac{EG_{\Gamma, import} \times \sum^N EG_{LCS, y}}{\sum^M EG_{LCS, y}}$$

Where

N = No. of days in a month upto when generation is considered for emission reduction calculation

M = No. of days in that month

$^N EG_{LCS, y}$  = LCS meter reading for N<sup>th</sup> day

$EG_{\Gamma, export}$  = Electricity imported in that month as per the JMR

$EG_{N, \Gamma, export}$  = Electricity imported in that month upto N<sup>th</sup> day

#### SECTION D. Data and parameters

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##### D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

<b>Data / Parameter:</b>	EF <sub>OM,y</sub>
Data unit:	tCO <sub>2</sub> e/MWh
Description:	Operating Margin Emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	“CO <sub>2</sub> Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	0.99455
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	To calculate Baseline Emission Factor
Additional comment:	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.

<b>Data / Parameter:</b>	EF <sub>BM,y</sub>
Data unit:	tCO <sub>2</sub> e/MWh
Description:	Build Margin Emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	“CO <sub>2</sub> Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	0.77722
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	To calculate Baseline Emission Factor
Additional comment:	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.

<b>Data / Parameter:</b>	EF <sub>y</sub> or EF <sub>CM,y</sub>
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Data unit:	tCO <sub>2</sub> e/MWh
Description:	Combined Margin Emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	Combined Margin Emission Factor (EF <sub>CM,y</sub> ) is calculated as the weighted average of Operating Margin Emission Factor (EF <sub>OM,y</sub> ) and Build Margin Emission Factor (EF <sub>BM,y</sub> ). “CO <sub>2</sub> Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	In case of wind power projects default weights of 0.75 for EF <sub>OM</sub> and 0.25 for EF <sub>BM</sub> are applicable as per ACM0002. Combined Margin Emission Factor (EF <sub>y</sub> or EF <sub>CM,y</sub> ): 0.94022 Refer Section 5.2 for comprehensive calculation of Combined Margin Emission Factor.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	To calculate Baseline Emission Factor
Additional comment:	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.

<b>D.2. Data and parameters monitored</b>	
<b>Data / Parameter:</b>	EG <sub>f2,JMR,export</sub> and EG <sub>f3,JMR,export</sub>
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity exported by all the Turbines connected to feeder 2 and feeder 3 (Turbines included in the project activity and Turbines that are not part of the project activity) at main (04880814-feeder 2 and 04880816- feeder 3) and the check meter (04880815- feeder 2 and 04880817- feeder 3) at 33 kV.
Measured /Calculated /Default:	Measured through 0.2 accuracy class main and check meters installed at the 33kV side of the Substation.
Source of data:	Joint meter reading records
Value(s) of monitored parameter:	Refer to Appendix 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value will not be directly used for estimation of emission reduction.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	0.2 accuracy class main and check meters installed at the 33kV side of the Substation Serial Numbers: Feeder 2 Main Meter: 04880814

	<p>Check Meter: 04880815</p> <p>Feeder 3</p> <p>Main Meter: 04880816</p> <p>Check Meter: 04880817</p>
Measuring/ Reading/ Recording frequency:	Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board).
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	<p>Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&amp;M contractor) &amp; MSEDCL (distribution wing of Maharashtra state electricity board).</p> <p>It can be cross checked against sales invoices raised to state electricity utility.</p> <p>Electricity meters will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.</p>

<b>Data / Parameter:</b>	$EG_{f2,JMR,Import}$ and $EG_{f3,JMR,Import}$
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity imported by all the Turbines (Turbines included in the project activity and Turbines that are not part of the project activity) connected to feeder 2 & feeder 3 at main (04880814-feeder 2 and 04880816- feeder 3) and the check meter (04880815- feeder 2 and 04880817- feeder 3) at 33 kV.
Measured /Calculated /Default:	Measured through 0.2 accuracy class main and check meters installed at the 33kV side of the Substation.
Source of data:	Joint meter reading records
Value(s) of monitored parameter:	Refer to Appendix 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value will not be directly used for estimation of emission reduction.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>Measured through 0.2 accuracy class main and check meters installed at the 33kV side of the Substation</p> <p>Serial Numbers:</p> <p>Feeder 2</p> <p>Main Meter: 04880814</p> <p>Check Meter: 04880815</p> <p>Feeder 3</p> <p>Main Meter: 04880816</p>

	Check Meter: 04880817
Measuring/ Reading/ Recording frequency:	Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board).
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	<p>Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&amp;M contractor) &amp; MSEDCL (distribution wing of Maharashtra state electricity board).</p> <p>It can be cross checked against sales invoices raised to state electricity utility.</p> <p>Electricity meters will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.</p>

<b>Data / Parameter:</b>	$EG_{f2,y}$ and $EG_{f3,y}$
Data unit:	MWh (Mega-watt hour)
Description:	Net Electricity supplied to the grid by the WTGs of the project activity connected to feeder 2 & feeder 3.
Measured /Calculated /Default:	<p>The main and the check meters are connected to the machines of the project activity and other WTGs that are not part of project activity but connected to feeder 2 &amp; feeder 3.</p> <p>The net electricity exported by the project activity is determined by system of apportioning wherein the aggregate electricity exports and imports (recorded by the main or check meter, as applicable) are allocated to project and non-project WECs in proportion to their generated electricity by MSEDCL.</p> <p>The apportioning will be done based on LCS meters readings of all WTGs connected to feeder 2 and 3. The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WECs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report.</p> <p>The project proponent does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL will be directly used for the purpose of calculating the electricity exports to the grid.</p>
Source of data:	This value will be directly applied from <b>Energy Breakup Report</b> certified by MSEDCL
Value(s) of monitored parameter:	Refer to Appendix 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission Calculations

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated from monitored parameters
Measuring/ Reading/ Recording frequency:	Monthly (Calculated)
Calculation method (if applicable):	Refer to Section C.
QA/QC procedures applied:	Not Applicable

<b>Data / Parameter:</b>	EGy
Data unit:	MWh (Mega-watt hour)
Description:	Net electricity supplied to the grid by the WTGs of the project activity
Measured /Calculated /Default:	The net electricity exported by the project activity is determined by apportioning of aggregate electricity exports and imports (recorded by the main or check meter, as applicable). The allocation is done by O&M contractor (Enercon) and apportioned values for energy export and import are certified by the MSEDCL in the Energy Breakup Report.
Source of data:	Net Electricity supplied to the grid is summation of net electricity supplied to the grid by the Turbines of the project activity connected to feeder 2 ( $EG_{f2,y}$ ) and net electricity supplied to the grid by the Turbines of the project activity connected to feeder 3 ( $EG_{f3,y}$ ).
Value(s) of monitored parameter:	39,477.572 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission Calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated from monitored parameters
Measuring/ Reading/ Recording frequency:	Monthly (Calculated)
Calculation method (if applicable):	Refer to Section C.
QA/QC procedures applied:	QA/QC procedures will be as implemented by MSEDCL pursuant to the provisions of the power purchase agreement except or otherwise explicitly stated in the PD.

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

>>

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO<sub>2</sub>e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO<sub>2</sub>e/kWh) as described in registered PDD.

$$BE_y = EG_y * EF_y$$

Where,

**BE** is baseline emissions in year y, tCO<sub>2</sub>e

**EG<sub>y</sub>** is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice. The details of electricity generation during the monitoring period are presented in Appendix 1.

**EF<sub>y</sub>** is the CO<sub>2</sub> emission factor of the grid (940.22 tCO<sub>2</sub>e/GWh fixed ex-ante).

Emission reduction calculation for the period 14/10/2010 to 31/12/2011:

$$\begin{aligned}\text{Emission Reductions (ER)} &= 39,477.572 \text{ (MWh)} * 0.94022 \text{ (tCO}_2\text{/MWh)} \\ &= \mathbf{37,117 \text{ tCO}_2}\end{aligned}$$

#### **E.2. Project emissions calculation**

>>

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

#### **E.3. Leakage calculation**

>>

No leakage is considered from the project activity as per approved methodology ACM0002 (Version 10).

#### **E.4. Emission reductions calculation / table**

>>

$$\mathbf{BE_y = EG_y * EF_y}$$

Where,

**BE** is baseline emissions in year y, tCO<sub>2</sub>e

**EG<sub>y</sub>** is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice. The details of electricity generation during the monitoring period are presented in Appendix 1.

**EF<sub>y</sub>** is the CO<sub>2</sub> emission factor of the grid (940.22 tCO<sub>2</sub>e/GWh fixed ex-ante).

Emission reduction calculation for the period 14/10/2010 to 31/12/2011:

$$\begin{aligned}\text{Emission Reductions (ER)} &= 39,477.572 \text{ (MWh)} * 0.94022 \text{ (tCO}_2\text{/MWh)} \\ &= \mathbf{37,117 \text{ tCO}_2}\end{aligned}$$

The total emission reductions achieved during the monitoring period is 37,117 tCO<sub>2</sub>.

Total baseline emissions: 37,117 tCO<sub>2</sub>

Total project emissions: Zero

Total leakage: Zero

$$\begin{aligned}\text{Total Emission reductions, ER} &= BE_y - PE_y \\ &= \mathbf{37,117 \text{ tCO}_2}\end{aligned}$$

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

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
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<b>Emission reductions (tCO<sub>2</sub>e)</b>	<b>35,451</b> (14 months and 18 days equivalent of annual emission reduction presented in the PDD i.e 29,154)	37,117
---	---	--------

<b>E.6. Remarks on difference from estimated value in the PDD</b>
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>>

There is change of 4.70 % on the higher side than the expected annual emission reductions. The difference in the total CERs is due to higher than estimated wind availability.

## Appendix 1: Net Electricity Exported to Grid (EGy)

			EgF'i,Y	Oct-10			Nov-10			Dec-10		
Location No.	Feeder No.	Commissioning Date	Unique Identification No.	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)
83	2	27-Jun-07	R 40s K-01	340985	282	340703	801116	1727	799389	733555	488	733067
84	2	27-Jun-07	R 40s K-02									
85	2	27-Jun-07	R 40s K-03									
86	2	27-Jun-07	R 40s K-04									
87	2	27-Jun-07	R 40s K-05									
88	2	27-Jun-07	R 40s K-06									
89	2	27-Jun-07	R 40s K-07									
90	2	27-Jun-07	R 40s K-08									
91	2	27-Jun-07	R 40s K-09									
17	3	30-Jun-07	R 40s K-10	125099	326	124773	273928	598	273330	237465	155	237310
18	3	30-Jun-07	R 40s K-11									
19	3	30-Jun-07	R 40s K-12									
20	3	22-Aug-07	R 40s K-13	40522	105	40416	115150	252	114898	105775	69	105706
112	2	22-Aug-07	R 40s K-14	81630	67	81563	174770	377	174393	146238	97	146141
113	2	22-Aug-07	R 40s K-15									
115	2	19-Dec-07	R 40s K-16	37248	31	37217	86775	187	86588	75883	50	75833
92	2	27-Sep-07	R 40s K-17	76546	63	76483	159277	344	158933	138223	92	138131
93	2	27-Sep-07	R 40s K-18									
99	2	1-Oct-07	R 40s K-19	34927	29	34898	76443	165	76278	72594	48	72546
15	3	12-Oct-07	R 40s K-20	83729	219	83510	201570	440	201130	168756	110	168646
16	3	12-Oct-07	R 40s K-21									

			EgF'i,Y	Jan-11			Feb-11			Mar-11		
Location No.	Feeder No.	Commissioning Date	Unique Identification No.	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)
83	2	27-Jun-07	R 40s K-01	514618	509	514109	502998	608	502390	708303	168	708135
84	2	27-Jun-07	R 40s K-02									
85	2	27-Jun-07	R 40s K-03									

86	2	27-Jun-07	R 40s K-04									
87	2	27-Jun-07	R 40s K-05									
88	2	27-Jun-07	R 40s K-06									
89	2	27-Jun-07	R 40s K-07									
90	2	27-Jun-07	R 40s K-08									
91	2	27-Jun-07	R 40s K-09									
17	3	30-Jun-07	R 40s K-10	203324	214	203110	205235	394	204841	318889	150	318739
18	3	30-Jun-07	R 40s K-11									
19	3	30-Jun-07	R 40s K-12									
20	3	22-Aug-07	R 40s K-13	78875	84	78791	75756	145	75611	122563	57	122506
112	2	22-Aug-07	R 40s K-14	111754	111	111643	138166	167	137999	215504	51	215453
113	2	22-Aug-07	R 40s K-15									
115	2	19-Dec-07	R 40s K-16	85123	64	85059	69954	84	69870	123822	29	123793
92	2	27-Sep-07	R 40s K-17	108758	108	108650	105227	127	105100	161018	38	160980
93	2	27-Sep-07	R 40s K-18									
99	2	1-Oct-07	R 40s K-19	56672	56	56616	54659	66	54593	90158	22	90136
15	3	12-Oct-07	R 40s K-20	135132	142	134990	138584	266	138318	217787	102	217685
16	3	12-Oct-07	R 40s K-21									

			EgF'i,Y	Apr-11			May-11			Jun-11		
Location No.	Feeder No.	Commissioning Date	Unique Identification No.	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)
83	2	27-Jun-07	R 40s K-01	771153	359	770794	1700179	198	1699981	3134788	220	3134568
84	2	27-Jun-07	R 40s K-02									
85	2	27-Jun-07	R 40s K-03									
86	2	27-Jun-07	R 40s K-04									
87	2	27-Jun-07	R 40s K-05									
88	2	27-Jun-07	R 40s K-06									
89	2	27-Jun-07	R 40s K-07									
90	2	27-Jun-07	R 40s K-08									
91	2	27-Jun-07	R 40s K-09									
17	3	30-Jun-07	R 40s K-10	240152	226	239926	424067	49	424018	781819	53	781766
18	3	30-Jun-07	R 40s K-11									
19	3	30-Jun-07	R 40s K-12									



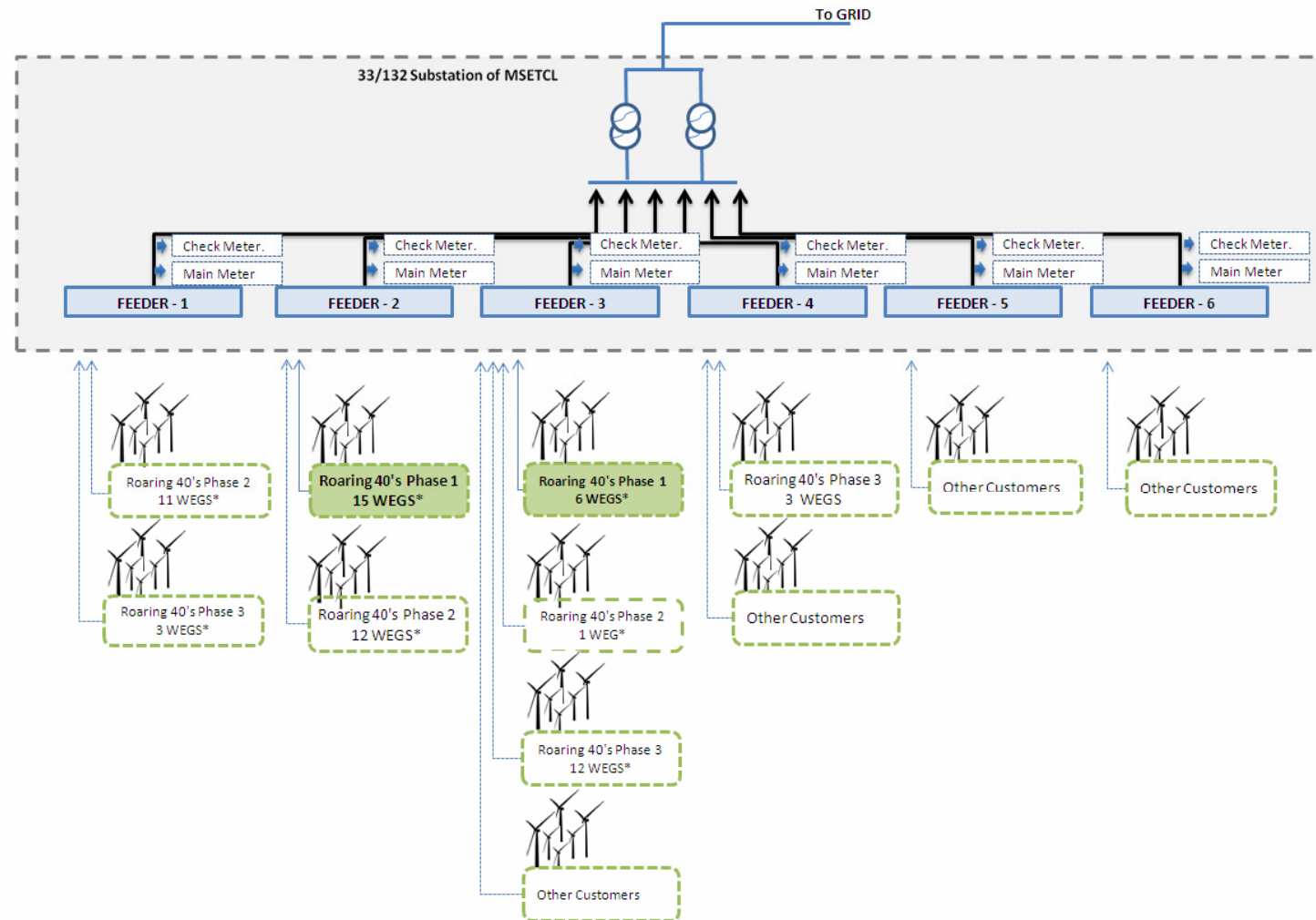
			EgF'i,Y	Oct-11			Nov-11			Dec-11					
Locatio n No.	Feede r No.	Commissionin g Date	Unique Identificatio n No.	Export (kWh)	Impor t (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)	Export (kWh)	Import (kWh)	Net units (kWh)		Total (kWh)	
83	2	27-Jun-07	R 40s K-01	513097	438	512659	557275	123	557152	A.	326	446084		17852356	
84	2	27-Jun-07	R 40s K-02												
85	2	27-Jun-07	R 40s K-03												
86	2	27-Jun-07	R 40s K-04												
87	2	27-Jun-07	R 40s K-05												
88	2	27-Jun-07	R 40s K-06												
89	2	27-Jun-07	R 40s K-07												
90	2	27-Jun-07	R 40s K-08												
91	2	27-Jun-07	R 40s K-09												
17	3	30-Jun-07	R 40s K-10	268771	179	268592	253403	26	253377	169514	156	169358		5051910	
18	3	30-Jun-07	R 40s K-11												
19	3	30-Jun-07	R 40s K-12												
20	3	22-Aug-07	R 40s K-13	94077	63	94014	98467	10	98457	67800	62	67738			1924848
112	2	22-Aug-07	R 40s K-14	162150	139	162011	134281	30	134251	101910	74	101836			3636983
113	2	22-Aug-07	R 40s K-15												
115	2	19-Dec-07	R 40s K-16	75288	64	75224	70991	16	70975	52840	39	52801			1881794
92	2	27-Sep-07	R 40s K-17	122156	104	122052	119047	26	119021	87009	63	86946			3633538
93	2	27-Sep-07	R 40s K-18												
99	2	1-Oct-07	R 40s K-19	62062	53	62009	63279	14	63265	47819	35	47784		1884930	
15	3	12-Oct-07	R 40s K-20	194804	130	194674	183106	19	183087	116814	107	116707		3611213	
16	3	12-Oct-07	R 40s K-21												
													<b>Total</b>	<b>39477572.44</b>	

## MONTHLY GENERATION DATA

Month	*EG <sub>fi,export</sub> (kWh)	*EG <sub>fi,import</sub> (kWh)	*EG <sub>fi,y</sub> (kWh)
Oct-10	820687	1124	819563

Nov-10	1889029	4090	1884939
Dec-10	1678489	1109	1677380
Jan-11	1294256	1288	1292968
Feb-11	1290579	1857	1288722
Mar-11	1958044	617	1957427
Apr-11	1901785	1126	1900659
May-11	3728464	434	3728030
Jun-11	6528620	454	6528166
Jul-11	5053485	338	5043039
Aug-11	5600601	394	5589005
Sep-11	3715603	571	3707600
Oct-11	1492405	1170	1491235
Nov-11	1479849	264	1479585
Dec-11	1090116	862	1089254
		Total Net Generation	<b>39477572</b>

## Appendix 2: Line diagram of the project activity



\*The Roaring 40s project constitutes of 63 machines which are implemented under three phases and are presented in three PDs. This MR is developed for the phase I of the project activity which constitutes 21 machines which are connected to feeder 2 and feeder 3. The feeder 2 connects 15 machines and feeder 3 connects 6 machines of the project

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### History of the document

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