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

CONTENTS

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 1.2 and Date 20/01/2012

Title: "Roaring 40's Wind Farms (Khandke) Private Limited – Phase III"
Project Reference No: 3611
Monitoring Period Number: 1
Monitoring Period Date – FROM 18/09/2010 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-III of the project consisting of 18 machines of 800kW each, amounting to 14.4 MW.

The Project harnesses a 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 30th March 2009 and the last machine was commissioned on 12th June 2009.The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period (18/09/2010 to 31/12/2011) is **31,664 tCO2e**.

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 Mathani, Ranjani, Baradari, Sonewadi, Sarolabaddi and Madadgaon villages in Khandke Taluka of Ahmednagar District of Maharashtra state in India.

The Project area extends between latitude 19^o, 6' to 19^o, 11' North and longitude 74^o, 49.5' to 74^o, 57.5 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:

S. No.	Unique Identification of WECs	WEC Loc No.	Commissioning Date	Latitude (dd^0 mm' ss")	Longitude (dd^0 mm' ss")
1	R 40s K-46	137	30. Mar. 2009	N19 04 13.1	E74 51 54.4
2	R 40s K-47	138	31. Mar. 2009	N19 04 04.7	E74 51 57.0
3	R 40s K-48	136	17. Apr. 2009	N19 04 18.5	E74 51 48.0

4	R 40s K-49	139	17. Apr. 2009	N19 03 58.4	E74 52 03.7
5	R 40s K-50	53	28. May. 2009	N19 10 55.5	E74 50 55.8
6	R 40s K-51	54	28. May. 2009	N19 11 04.0	E74 51 18.0
7	R 40s K-52	55	28. May. 2009	N19 11 11.8	E74 51 30.0
8	R 40s K-53	213	28. May. 2009	N19 09 09.4	E74 55 34.6
9	R 40s K-54	214	28. May. 2009	N19 09 00.8	E74 55 37.3
10	R 40s K-55	215	28. May. 2009	N19 08 53.2	E74 55 42.1
11	R 40s K-56	1	3. Jun. 2009	N19 04 50.4	E74 51 00.7
12	R 40s K-57	2	3. Jun. 2009	N19 04 54.8	E74 50 56.1
13	R 40s K-58	133	3. Jun. 2009	N19 04 43.2	E74 51 14.0
14	R 40s K-59	134	3. Jun. 2009	N19 04 34.5	E74 51 28.9
15	R 40s K-60	135	3. Jun. 2009	N19 04 29.2	E74 51 38.1
16	R 40s K-61	140	3. Jun. 2009	N19 04 48.2	E74 51 05.6
17	R 40s K-62	3	12. Jun. 2009	N19 05 02.4	E74 50 56.4
18	R 40s K-63	4	12. Jun. 2009	N19 05 05.2	E74 50 52.8

A.4. Technical description of the project

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The Project involves 18-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 ± 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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18/09/2010

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 18/09/2010 and the end date will be 17/09/2020.

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),
15th 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 30th March 2009 and the last machine was commissioned on 12th June 2009. The project activity consists of 18 machines of 800kW each amounting to a total of 14.4 MW.

The commissioning schedule is provided below:

S. No.	Unique Identification of WECs	WEC Loc No.	Commissioning Date
1	R 40s K-46	137	30. Mar. 2009
2	R 40s K-47	138	31. Mar. 2009
3	R 40s K-48	136	17. Apr. 2009
4	R 40s K-49	139	17. Apr. 2009
5	R 40s K-50	53	28. May. 2009
6	R 40s K-51	54	28. May. 2009
7	R 40s K-52	55	28. May. 2009
8	R 40s K-53	213	28. May. 2009
9	R 40s K-54	214	28. May. 2009
10	R 40s K-55	215	28. May. 2009
11	R 40s K-56	1	3. Jun. 2009
12	R 40s K-57	2	3. Jun. 2009
13	R 40s K-58	133	3. Jun. 2009
14	R 40s K-59	134	3. Jun. 2009
15	R 40s K-60	135	3. Jun. 2009
16	R 40s K-61	140	3. Jun. 2009
17	R 40s K-62	3	12. Jun. 2009
18	R 40s K-63	4	12. Jun. 2009

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.2. Revision of the monitoring plan

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Not Applicable

B.3. Request for deviation applied to this monitoring period

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Not Applicable

B.4. Notification or request of approval of changes

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Not Applicable

SECTION C. Description of the monitoring system

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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.1	488082	Main	0.2	14/7/2010	13/7/2011	2/9/2011	1/9/2012
Feeder No.3	488086	Main	0.2	14/7/2010	13/7/2011	2/9/2011	1/9/2012

Metering Point	Meter No.	Meter Type	Accuracy Class	Test 1	Test 1 (Valid till)	Test 2	Test 2 (Valid till)
Feeder No.4	488088	Main	0.2	14/7/2010	13/7/2011	1/8/2011	31/7/2012

The first monitoring period of the project activity extends from 18th September 2010 to 31st 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. 04880812
- Between 13/07/2011 and 02/09/2011 for Meter no. 04880816
- Between 13/07/2011 and 01/08/2011 for Meter no. 04880818

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 1 ($EG_{f1,gross,\ y}$), feeder 3 ($EG_{f3,gross,\ y}$) and feeder 4 ($EG_{f4,gross,\ y}$) is noted from central monitoring system database by Enercon as:

$$\sum_{y=0}^{N_{f1}} EG_{f1,gross,y}$$

$$\sum_{y=0}^{N_{f2}} EG_{f3,gross,y}$$

$$\sum_{y=0}^{N_{f3}} EG_{f4,gross,y}$$

Where N_{f1} = *number of Turbines comprising the Project activity connected to the feeder 1*

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

Where N_{f4} = *number of Turbiness comprising the Project activity connected to the feeder 4*

Electricity generation from other Turbines connected to feeder 1 ($EG_{f1,gross,y}$) , feeder 3 ($EG_{f3,gross,y}$) and feeder 4 ($EG_{f4,gross,y}$) is noted from central monitoring system database by Enercon as:

$$\sum_{y=0}^{M_{f1}} EG_{f1,gross,x}$$

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

$$\sum_{y=0}^{M_{f4}} EG_{f4,gross,x}$$

Where M_{f1} = *number of Turbines that are not part of the project activity but are connected to the feeder 1.*

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

Where M_{f4} = *number of Turbines that are not part of the project activity but are connected to the feeder 4.*

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 feeder1, feeder 3 and feeder 4 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 1, feeder 3 and feeder 4 is denoted as:

Electricity Export from feeder 1: $EG_{f1,JMR,export}$

Electricity Import from feeder 1: $EG_{f1,JMR,import}$

Electricity Export from feeder 3: $EG_{f3,JMR,export}$

Electricity Import from feeder 3: $EG_{f3,JMR,import}$

Electricity Export from feeder 4: $EG_{f4,JMR,export}$

Electricity Import from feeder 4: $EG_{f4,JMR,import}$

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.

$EG_{f1,export}$ the electricity supplied to the grid by turbines of the project activity connected to feeder 1 is calculated as follows:

$$EG_{f1,export} = \frac{EG_{f1,JMR,export} \times \sum_{y=0}^{N} EG_{f1,gross,y}}{\left(\sum_{y=0}^{N} EG_{f1,gross,y} + \sum_{y=0}^{M} EG_{f1,gross,y}\right)}$$

$EG_{f1,import}$ the electricity drawn from the grid by turbines of the project activity connected to feeder 1 is calculated as follows:

$$EG_{f1,import} = \frac{EG_{f1,JMR,import} \times \sum_{y=0}^{N} EG_{f1,gross,y}}{\left(\sum_{y=0}^{N} EG_{f1,gross,y} + \sum_{y=0}^{M} EG_{f1,gross,y}\right)}$$

$EG_{f1,y}$, the net electricity supplied to the grid by Turbines of the project activity connected to feeder 1, is calculated as follows:

$$EG_{f1,y} = EG_{f1,export} - EG_{f1,import}$$

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:

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

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

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

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

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

Similarly for feeder 4, $EG_{f4,export}$, $EG_{f4,import}$ and $EG_{f4,y}$, is calculated as follows:
$EG_{f4,export}$ the electricity supplied to the grid by turbines of the project activity connected to feeder 4 is calculated as follows:

$$EG_{f4,export} = \frac{EG_{f4,JMR,export} \times \sum_{y=0}^{N} EG_{f4,gross,y}}{\left(\sum_{y=0}^{N} EG_{f4,gross,y} + \sum_{y=0}^{M} EG_{f4,gross,y}\right)}$$

$EG_{f4,import}$ the electricity drawn from the grid by turbines of the project activity connected to feeder 4 is calculated as follows:

$$EG_{f4,import} = \frac{EG_{f4,JMR,import} \times \sum_{y=0}^{N} EG_{f4,gross,y}}{\left(\sum_{y=0}^{N} EG_{f2,gross,y} + \sum_{y=0}^{M} EG_{f4,gross,y}\right)}$$

$EG_{f4,}y$, the net electricity supplied to the grid by Turbines of the project activity connected to feeder 4, is calculated as follows:

$EG_{f4,}y = EG_{f4,export} - EG_{f4,import}$

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

$EGy = EG_{f1,}y + EG_{f3,}y + EG_{f4,}y$

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:

$$EG_{N,f'I',export} = \frac{EG_{f'I',export} \times \sum^{N} EG_{LCS,y}}{\sum^{M} EG_{LCS,y}}$$

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^{th} day

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

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

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

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^{th} day

$EG_{f'I',export}$ = Electricity imported in that month as per the JMR

$EG_{N,f'I',export}$ = Electricity imported in that month upto N^{th} 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	
Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO2e/MWh
Description:	Operating Margin Emission Factor of NEWNE Regional Electricity Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	1.0090
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.

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO2e/MWh
Description:	Build Margin Emission Factor of NEWNE Regional Electricity Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	0.5977
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.

Data / Parameter:	EF_y or $EF_{CM,y}$
Data unit:	tCO2e/MWh
Description:	Combined Margin Emission Factor of NEWNE Regional Electricity Grid (Fixed ex-ante as per the registered CDM PDD)
Source of data used:	Combined Margin Emission Factor ($EF_{CM,y}$) is calculated as the weighted average of Operating Margin Emission Factor ($EF_{OM,y}$) and Build Margin Emission Factor ($EF_{BM,y}$). "CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India.

	The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM} are applicable as per ACM0002. Combined Margin Emission Factor (EFy or $EF_{CM,y}$): 0.90618 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.

D.2. Data and parameters monitored	
Data / Parameter:	$EG_{f1,JMR,export}$,$EG_{f3,JMR,export}$ and $EG_{f4,JMR,export}$
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity exported by all the Turbines connected to feeder1, feeder 3 and feeder 4 (Turbines included in the project activity and Turbines that are not part of the project activity) at main (04880812-feeder 1, 04880816- feeder 3 and 04880818-feeder 4) and the check meter (04880813-feeder 1, 04880817- feeder 3 and 04880819-feeder 4) 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 1 Main Meter: 04880812 Check Meter: 04880813 Feeder 3 Main Meter: 04880816 Check Meter: 04880817

	Feeder 4 Main Meter: 04880818 Check Meter: 04880819\
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:	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). It can be cross checked against sales invoices raised to state electricity utility. Electricity meters will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.

Data / Parameter:	$EG_{f1,JMR,Import}$, $EG_{f3,JMR,Import}$ and $EG_{f4,JMR,Import}$
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 1, feeder 3 & feeder 4 at main (04880812-feeder 1, 04880816- feeder 3 and 04880818-feeder 4) and the check meter (04880813-feeder 1, 04880817- feeder 3 and 04880819- feeder 4) 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)	Measured through 0.2 accuracy class main and check meters installed at the 33kV side of the Substation Serial Numbers: Feeder 1 Main Meter: 04880812 Check Meter: 04880813 Feeder 3 Main Meter: 04880816

	Check Meter: 04880817 Feeder 4 Main Meter: 04880818 Check Meter: 04880819
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:	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). It can be cross checked against sales invoices raised to state electricity utility. Electricity meters will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.

Data / Parameter:	$EG_{f1,y}$, $EG_{f3,y}$ and $EG_{f4,y}$
Data unit:	MWh (Mega-watt hour)
Description:	Net Electricity supplied to the grid by the WTGs of the project activity connected to feeder 1, feeder 3 & feeder 4.
Measured /Calculated /Default:	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 feeder1, feeder 3 & feeder 4. 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. The apportioning will be done based on LCS meters readings of all WTGs connected to feeder 1, 3 and 4. 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. 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.
Source of data:	This value will be directly applied from **Energy Breakup Report** 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

Data / Parameter:	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 1 ($EG_{f1,y}$), net electricity supplied to the grid by the Turbines of the project activity connected to feeder 3 ($EG_{f3,y}$) and net electricity supplied to the grid by the Turbines of the project activity connected to feeder 4 ($EG_{f4,y}$).
Value(s) of monitored parameter:	34,943.285 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 CO2e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO2e/kWh) as described in registered PDD.

$\mathbf{BE_y = EG_y * EF_y}$

Where,

BE is baseline emissions in year y, tCO2e

EGy 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.

EFy *is* the CO2 emission factor of the grid (906.18 tCO_2e/GWh fixed ex-ante).

Emission reduction calculation for the period 18/09/2010 to 31/12/2011:

Emission Reductions (ER) = 34,943.285 (MWh) * 0.90618 (tCO_2/MWh)

= **31,664 tCO_2**

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, tCO2e

EGy 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.

EFy *is* the CO2 emission factor of the grid (906.18 tCO_2e/GWh fixed ex-ante).

Emission reduction calculation for the period 18/09/2010 to 31/12/2011:

Emission Reductions (ER) = 34,943.285 (MWh) * 0.90618 (tCO_2/MWh)

= **31,664 tCO_2**

The total emission reductions achieved during the monitoring period is **32,089** tCO2.

Total baseline emissions: 31,664 tCO2
Total project emissions: Zero
Total leakage: Zero

Total Emission reductions, ER = BEy – Pey
= 31,664 tCO2

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
Emission reductions (tCO_2e)	**31,228** (15 months and 17 days equivalent of annual emission reduction presented in the PDD i.e 24,085)	**31,664**

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

>>

There is change of 0.014 % 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	Sep-10			Oct-10			Nov-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)**
213	1	28-May-09	R 40s K-53	108666	58	108608	191538	216	191322	228367	635	227732
214	1	28-May-09	R 40s K-54									
215	1	28-May-09	R 40s K-55									
137	3	30-Mar-09	R 40s K-46	21424	11	21413	70103	183	69920	82729	181	82548
138	3	31-Mar-09	R 40s K-47	18947	10	18937	53298	139	53159	69001	151	68850
136	3	17-Apr-09	R 40s K-48	44680	23	44656	133311	348	132963	163796	358	163438
139	3	17-Apr-09	R 40s K-49									
133	3	3-Jun-09	R 40s K-58	94807	49	94758	420887	1098	419789	523440	1143	522297
134	3	3-Jun-09	R 40s K-59									
135	3	3-Jun-09	R 40s K-60									
140	3	3-Jun-09	R 40s K-61									
1	3	3-Jun-09	R 40s K-56									
2	3	3-Jun-09	R 40s K-57									
3	3	12-Jun-09	R 40s K-62	56360	29	56330	144789	378	144411	171718	375	171343
4	3	12-Jun-09	R 40s K-63									
53	4	28-May-09	R 40s K-50	111655	25	111630	193013	138	192875	326476	512	325964
54	4	28-May-09	R 40s K-51									
55	4	28-May-09	R 40s K-52									

			EgF'i',Y	Dec-10			Jan-11			Feb-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)**
213	1	28-May-09	R 40s K-53	252890	174	252716	162051	182	161869	186057	91	185966
214	1	28-May-09	R 40s K-54									

215	1	28-May-09	R 40s K-55									
137	3	30-Mar-09	R 40s K-46	79493	52	79441	67255	71	67184	69483	133	69350
138	3	31-Mar-09	R 40s K-47	80467	52	80415	75009	80	74929	72531	139	72392
136	3	17-Apr-09	R 40s K-48	156114	102	156012	136767	144	136623	139558	268	139290
139	3	17-Apr-09	R 40s K-49									
133	3	3-Jun-09	R 40s K-58	489021	319	488702	412334	434	411900	436473	838	435635
134	3	3-Jun-09	R 40s K-59									
135	3	3-Jun-09	R 40s K-60									
140	3	3-Jun-09	R 40s K-61									
1	3	3-Jun-09	R 40s K-56									
2	3	3-Jun-09	R 40s K-57									
3	3	12-Jun-09	R 40s K-62	160553	105	160448	133920	141	133779	145278	279	144999
4	3	12-Jun-09	R 40s K-63									
53	4	28-May-09	R 40s K-50	332404	196	332208	236867	190	236677	188374	194	188180
54	4	28-May-09	R 40s K-51									
55	4	28-May-09	R 40s K-52									

			EgF'i',Y	Mar-11			Apr-11			May-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)**
213	1	28-May-09	R 40s K-53	278292	93	278199	358281	190	358091	554194	47	554147
214	1	28-May-09	R 40s K-54									
215	1	28-May-09	R 40s K-55									
137	3	30-Mar-09	R 40s K-46	113844	53	113791	100050	94	99956	160920	19	160901
138	3	31-Mar-09	R 40s K-47	112708	53	112655	84786	80	84706	150993	17	150976
136	3	17-Apr-09	R 40s K-48	219186	103	219083	182184	171	182013	292107	34	292073
139	3	17-Apr-09	R 40s K-49									
133	3	3-Jun-09	R 40s K-58	730819	342	730477	608673	573	608100	971459	112	971347
134	3	3-Jun-09	R 40s K-59									
135	3	3-Jun-09	R 40s K-60									
140	3	3-Jun-09	R 40s K-61									

1	3	3-Jun-09	R 40s K-56									
2	3	3-Jun-09	R 40s K-57									
3	3	12-Jun-09	R 40s K-62	257226	121	257105	229767	216	229551	342233	40	342193
4	3	12-Jun-09	R 40s K-63									
53	4	28-May-09	R 40s K-50	290385	69	290316	288142	91	288051	568927	74	568853
54	4	28-May-09	R 40s K-51									
55	4	28-May-09	R 40s K-52									

			EgF'i',Y	Jun-11			Jul-11			Aug-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)**
213	1	28-May-09	R 40s K-53	1132127	43	1132084	894626	88	892749	1026282	134	1024095
214	1	28-May-09	R 40s K-54									
215	1	28-May-09	R 40s K-55									
137	3	30-Mar-09	R 40s K-46	265361	18	265343	195755	18	195345	212447	28	211994
138	3	31-Mar-09	R 40s K-47	268723	18	268705	205183	19	204754	209679	27	209233
136	3	17-Apr-09	R 40s K-48	527157	38	527119	371577	35	370799	396871	52	396025
139	3	17-Apr-09	R 40s K-49									
133	3	3-Jun-09	R 40s K-58	1569233	106	1569127	1130288	106	1127921	1249570	163	1246908
134	3	3-Jun-09	R 40s K-59									
135	3	3-Jun-09	R 40s K-60									
140	3	3-Jun-09	R 40s K-61									
1	3	3-Jun-09	R 40s K-56									
2	3	3-Jun-09	R 40s K-57									
3	3	12-Jun-09	R 40s K-62	552002	37	551965	416346	39	415474	434431	57	433505
4	3	12-Jun-09	R 40s K-63									
53	4	28-May-09	R 40s K-50	1022631	53	1022578	828552	52	826843	870095	52	870043
54	4	28-May-09	R 40s K-51									
55	4	28-May-09	R 40s K-52									

			EgF'i',Y	Sep-11	Oct-11	Nov-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)
213	1	28-May-09	R 40s K-53	684437	129	682939	203937	227	203710	195988	44	195944
214	1	28-May-09	R 40s K-54									
215	1	28-May-09	R 40s K-55									
137	3	30-Mar-09	R 40s K-46	142403	19	142099	94039	63	93976	87539	9	87530
138	3	31-Mar-09	R 40s K-47	142072	18	141770	97360	65	97295	91941	9	91932
136	3	17-Apr-09	R 40s K-48	265098	35	264533	180737	120	180617	170945	17	170928
139	3	17-Apr-09	R 40s K-49									
133	3	3-Jun-09	R 40s K-58	847265	110	845460	581935	387	581548	525346	54	525292
134	3	3-Jun-09	R 40s K-59									
135	3	3-Jun-09	R 40s K-60									
140	3	3-Jun-09	R 40s K-61									
1	3	3-Jun-09	R 40s K-56									
2	3	3-Jun-09	R 40s K-57									
3	3	12-Jun-09	R 40s K-62	295070	38	294442	205099	137	204962	179570	18	179552
4	3	12-Jun-09	R 40s K-63									
53	4	28-May-09	R 40s K-50	610856	105	610751	207535	112	207423	235787	55	235732
54	4	28-May-09	R 40s K-51									
55	4	28-May-09	R 40s K-52									

			EgF'i',Y	Dec-11				
Location No.	Feeder No.	Commissioning Date	Unique Identification No.	Export (kWh)	Import (kWh)	Net units (kWh)		Total (kWh)
213	1	28-May-09	R 40s K-53	132265	128	132137		6582308
214	1	28-May-09	R 40s K-54					
215	1	28-May-09	R 40s K-55					
137	3	30-Mar-09	R 40s K-46	56397	52	56345		1817136
138	3	31-Mar-09	R 40s K-47	65301	60	65241		1795948
136	3	17-Apr-09	R 40s K-48	116531	107	116424		3492596
139	3	17-Apr-09	R 40s K-49					

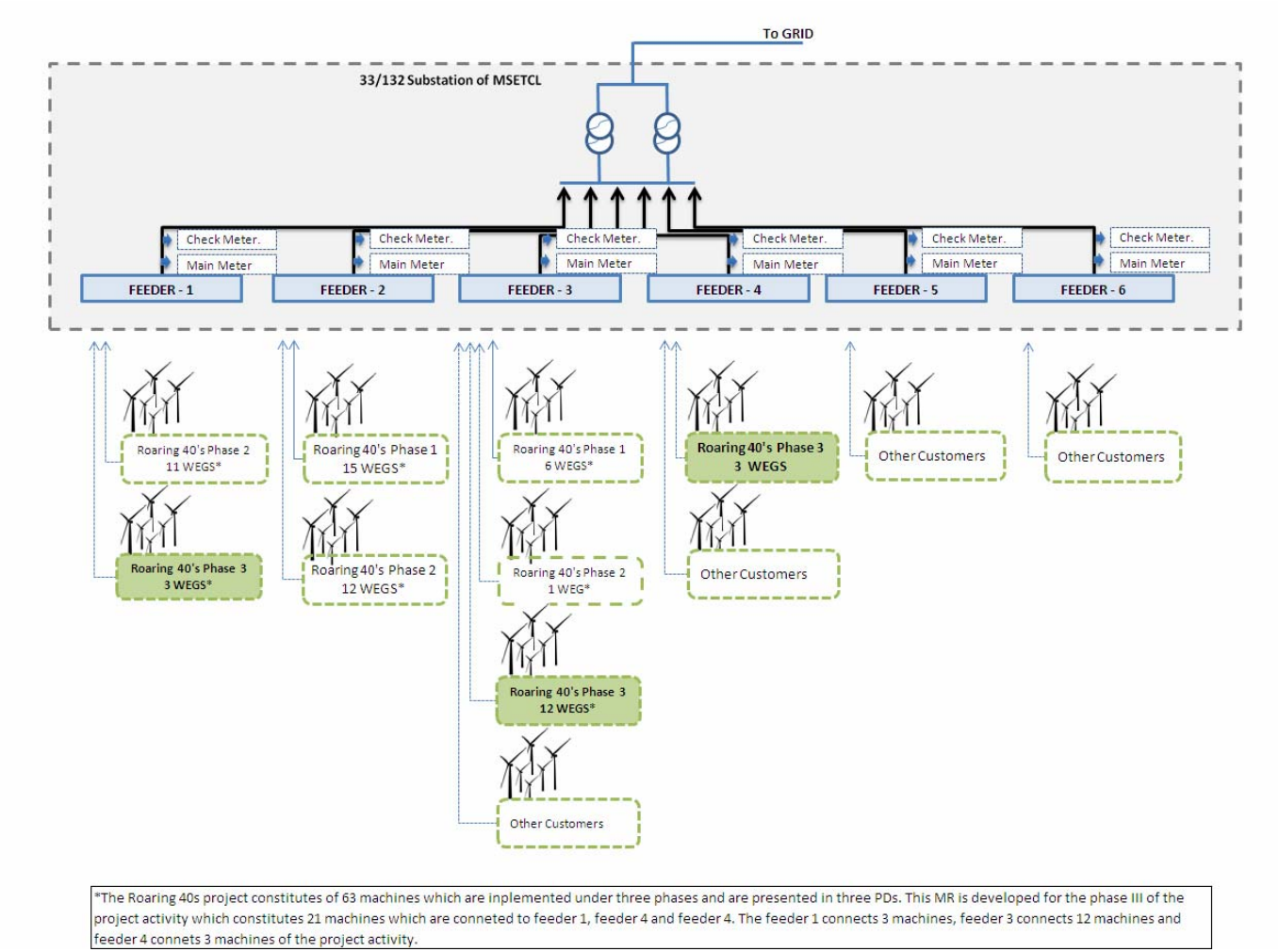
133	3	3-Jun-09	R 40s K-58	362984	333	362651		10941912
134	3	3-Jun-09	R 40s K-59					
135	3	3-Jun-09	R 40s K-60					
140	3	3-Jun-09	R 40s K-61					
1	3	3-Jun-09	R 40s K-56					
2	3	3-Jun-09	R 40s K-57					
3	3	12-Jun-09	R 40s K-62	123281	113	123168		3843227
4	3	12-Jun-09	R 40s K-63					
53	4	28-May-09	R 40s K-50	162114	80	162034		6470158
54	4	28-May-09	R 40s K-51					
55	4	28-May-09	R 40s K-52					
							Total	**34943284.8**

MONTHLY GENERATION DATA

Month	*EG $_{fi,export}$ (kWh)	*EG $_{fi,import}$ (kWh)	*EGfi,y (kWh)
Sep-10	456539	207	456332
Oct-10	1206939	2500	1204439
Nov-10	1565527	3355	1562172
Dec-10	1550942	1000	1549942
Jan-11	1224203	1242	1222961
Feb-11	1237754	1942	1235812
Mar-11	2002460	834	2001626
Apr-11	1851883	1415	1850468
May-11	3040833	343	3040490
Jun-11	5337234	313	5336921
Jul-11	4042327	357	4033885
Aug-11	4399375	513	4391803
Sep-11	2987201	454	2981994
Oct-11	1570642	1111	1569531

Nov-11	1487116	206	1486910
Dec-11	1018873	873	1018000
		Total Net Generation	**34943285**

Appendix 2: Line diagram of the project activity



*The Roaring 40s project constitutes of 63 machines which are inplemented under three phases and are presented in three PDs. This MR is developed for the phase III of the project activity which constitutes 21 machines which are conneted to feeder 1, feeder 4 and feeder 4. The feeder 1 connects 3 machines, feeder 3 connects 12 machines and feeder 4 connets 3 machines of the project activity.

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History of the document

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