Validation Opinion for Post Registration Changes

Report for:

M/s CLP Wind Farms (Khandke) Private Limited

CDM project for

"Roaring 40s Wind Farms (Khandke) Private Limited - Phase II"
(UNFCCC ref: 3298)

LRQA Reference	: CDM-MUM-0061834
Date	: 24/01/2013

Verification Team

Name	Competences
Archak Pattanaik	Team Leader/Technical Expert
B.Rampradap	Team Member/Technical Expert
Arnab Deb	Team Member

Technical Reviewer : Javier Vallejo Drehs

LRQA
Business Assurance

Validation opinion

Lloyd's Register Quality Assurance Limited (LRQA) has been contracted by M/s CLP Wind Farms (Khandke) Private Limited, the project participant (PP), to undertake the first periodic verification of the registered project activity "Roaring 40s Wind Farms (Khandke) Private Limited - Phase II", project reference number 3298 registered as a CDM project activity on 04/12/2010.

LRQA conducted an independent third party assessment of the Post Registration Changes from the project activity as described in the registered PDD following the VVS, section 9.5 and the PS section 12.8 for Post Registration Changes.

LRQA confirms that the permanent changes from the registered monitoring plan reflect the application of the approved guidance of the EB regarding the deviation from the provisions of the MP.

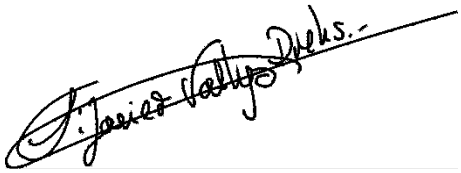
LRQA, by means of an on-site inspection and a review of the revised PDD, specifically the revised Monitoring Plan, can confirm that:

(a) the proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions
(b) the proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity
(c) the proposed revision does not impact the conservativeness of the monitoring and verification process, including the related emission reductions calculations.

In summary, the changes to the project design consist of change in monitoring plan which the verification team identified during the first periodic verification for the monitoring period 04/12/2010 to 31/12/2011 (both days included). The monitoring plan does not reflect the actual monitoring activity based on the registered PDD, the PP has proposed the revision to the monitoring plan in the registered PDD Version 3 dated 15/06/2010, which is validated. LRQA, by means of an on-site visit and review of the submitted revised PDD version 4.0 dated 23/05/2012 can confirm that these changes do not adversely affect the conclusion of the validation report with regard to:

1. Additionality of the project activity
2. Scale of the project activity
3. Applicability and application of approved baseline methodology

LRQA therefore requests the approval, by the CDM EB, of the post registration changes of the project activity as described above, in accordance to the guidance of the EB in the PCP.



Javier Vallejo Drehs
CDM Quality Manager
28/01/2013

Lloyd's Register Quality Assurance Ltd
Hiramford
Middlemarch Office Village
Siskin Drive
Coventry CV3 4FJ, United Kingdom

Registered office:
Lloyd's Register
71 Fenchurch Street
London EC3M 4BS
United Kingdom

Abbreviations

CDM	Clean Development Mechanism
CDM EB	Clean Development Mechanism Executive Board
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
CEA	Central Electricity Authority
CLPWFK	CLP Wind Farms (Khandke) Private Limited
LR	Lloyd's Register
LRQA	Lloyd's Register Quality Assurance Limited
MP	Monitoring Plan
MSEDCL	Maharashtra State Electricity Distribution Company Limited
LoA	Letter of Approval
PDD	Project Design Document
PP	Project participant
PPA	Power Purchase Agreement
PCP	Project Cycle Procedure
QA/QC	Quality Assurance/Quality Control
WEC	Wind Energy Converter

Findings

1. Description of the permanent changes from the registered MP.

During the verification process for the monitoring period of 04/12/2010 to 31/12/2011, the verification team identified that the registered monitoring plan was not followed in actual practice. As per the registered monitoring plan described in the registered PDD (Version 03 dated 15/06/2010) the net electricity supplied by the project activity (EG_y) to the grid will be measured by main meters (export and import). However during site visit the verification team noted that the net electricity generated from the project activity is calculated by adding the apportioned net electricity supplied by the Wind Energy Converters (WECs) are connected to the corresponding common feeder lines at the substation. The apportioning method is applied based on the meter readings from the respective WECs and the main meter readings of the feeder lines, which are common to the WECs other than the project activity. This metering arrangement is not in accordance with the monitoring plan in the registered PDD. The monitoring plan of the registered PDD states that the source of the parameter EG_y is tariff invoices raised to Maharashtra State Electricity Distribution Co. Ltd (MSEDCL). But in actual practice the monitoring data for the parameter is sourced from energy break up report which is certified by MSEDCL.

The energy break up report is based on the export and import data of respective WECs and a method of calculation applied to get the apportioned net electricity supplied to the grid. The parameter 'Net electricity supplied to the grid by the WECs of the project activity' connected to feeder 1, feeder 2 & feeder 3 ($EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$) is being used for calculation of total net electricity (EG_y) supplied by the project activity to the grid. But such calculation has not been described in the monitoring plan of the registered PDD.

The data is taken at generation end for each WEC that is different from the monitoring point of $EG_{f1,JMR,export}$,$EG_{f2,JMR,export}$ & $EG_{f3,JMR,export}$ and $EG_{f1,JMR,Import}$, $EG_{f2,JMR,Import}$ & $EG_{f3,JMR,Import}$. Both parameters (i.e. Export & Import) are being monitored at the connecting substation. However the export and import parameters were not included in section B.7.1 of the registered PDD.

The section B.7.2 of the registered PDD indicates the title of the methodology as "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", however the title as per the methodology is "Consolidated baseline methodology for grid-connected electricity generation from renewable sources". Thus, the PP has proposed to change the title of methodology in the revised monitoring plan in line with the methodology ACM0002 Version 09. The validation team confirms that the change proposed by the PP is acceptable as the title of methodology in the revised monitoring plan is now consistent with the methodology ACM0002 Version 09.

The section B.7.2 of the registered PDD indicates the name of the Project Participant as M/s Roaring 40s Wind Farms (Khandke) Pvt. Limited, however the PP had undergone a name change as M/s CLP Wind Farms (Khandke) Private Limited (CLPWFK). Thus the PP has proposed to change the name in the revised monitoring plan. PP has submitted a copy of fresh certificate of incorporation in the new name i.e. "M/s CLP Wind Farms (Khandke) Private Limited" Further a revised letter of approval (LoA) is issued to project participant with the new name by the host country DNA. A copy of the same has been submitted by the PP. Thus the verification team confirms the change in name of PP is acceptable and appropriate.

Further in section B.7.2 a line diagram and apportioning procedure is included in the revised monitoring plan for clarity and transparency. Based on site assessment and verification of documents, the team confirms that the provided line diagram and the apportioning procedure reflects the actual monitoring practices and procedures. The organisation structure, roles and responsibility related to monitoring of the project activity, is further elaborated in the section B.7.2 of the proposed revised monitoring plan. The proposed change brings clarity and also reflects actual situation and hence acceptable to the verification team.

The annex-4 of the registered PDD indicates the accuracy class of the main meter and check meter as 0.5%, however during on site assessment it was found that the PP has installed energy meters (both main and check meters) with an accuracy of 0.2s. The verification team confirms that the 0.2s accuracy of the main and check meter are acceptable as the CEA Metering Regulation 2006 of the host country electricity governing authority prescribes the energy meter accuracy class as 0.2s. Also the validation team confirms that the accuracy class of 0.2s is more accurate than 0.5%, therefore change proposed by PP for the accuracy class of the main meter and check meter is conservative.

2. Validation findings for permanent changes from the registered Monitoring Plan and/or monitoring methodology

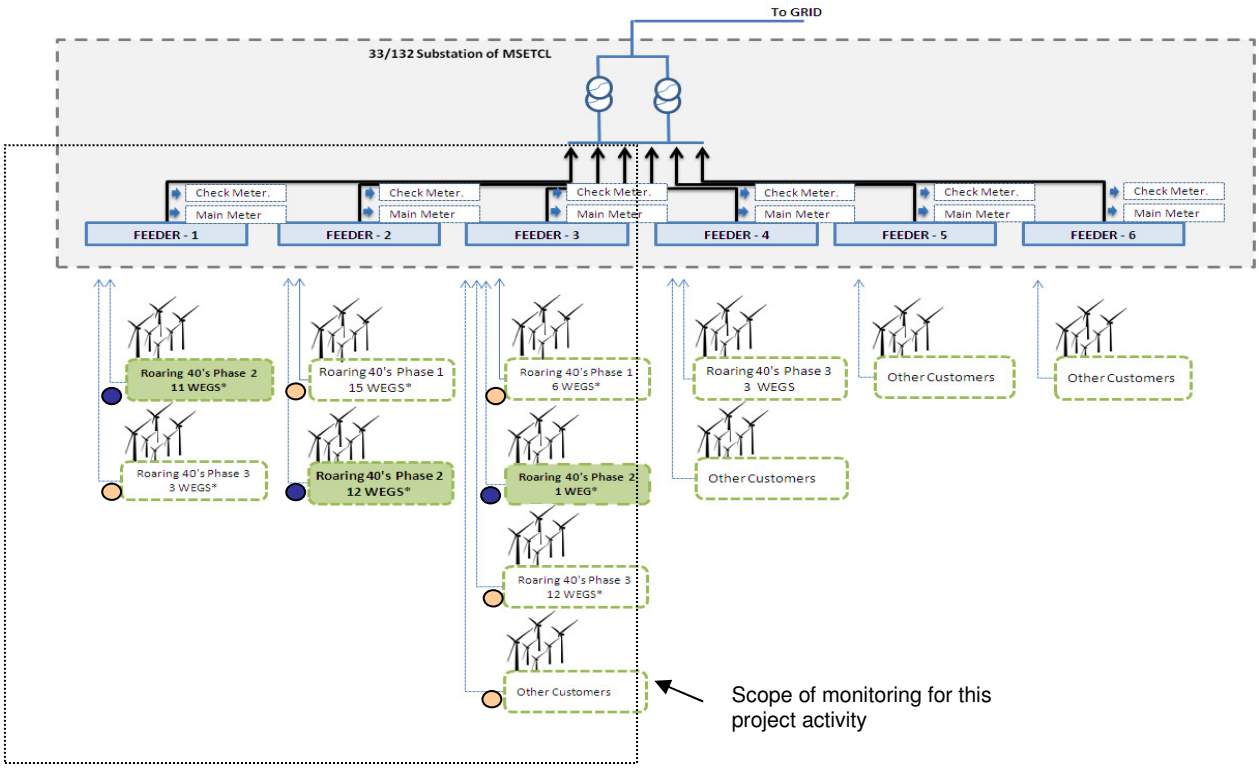
2.1 Level of accuracy and completeness

The revised monitoring plan includes monitoring of the following parameters listed in the below table:

Data/Parameter	Description
(i) $EG_{f1,JMR,export}$, $EG_{f2,JMR,export}$ and $EG_{f3,JMR,export}$	Electricity exported by all the WECs (WECs of the project activity and WECs that are not part of the project activity) connected to feeder 1, feeder 2 & feeder 3
(ii) $EG_{f1,JMR,Import}$, $EG_{f2,JMR,Import}$ and $EG_{f3,JMR,Import}$	Electricity imported by all the WECs (WECs included in the project activity and WECs that are not part of the project activity) connected to feeder 1, feeder 2 & feeder 3.
(iii) $EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$	Net electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 2 & feeder 3.
(iv)EG_y	Net electricity supplied to the grid by the project activity.

The actual monitoring mechanism is explained as follows[1];

[1] The project activity (Phase II) consists of 24 machines which are connected to feeder 1, feeder 2 and feeder 3. The feeder 1 connects 11 machines, feeder 2 connects 12 machines and feeder 3 connects 1 machine of the project activity



LCS meter for each WEC within project activity

LCS meter for each WEC other than the project activity

LRQA verified that the $EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$'Net electricity supplied by the WECs to the feeder 1, 2 & 3 are calculated based on applying the following two measured values in the apportioning procedures.

(i) Electricity exported by all the Wind Energy Converters (WECs) connected to feeder1, feeder 2 and feeder 3 - $EG_{f1,JMR,export}$, $EG_{f2,JMR,export}$ and $EG_{f3,JMR,export}$

(ii) Electricity imported by all the Wind Energy Converters (WECs) connected to feeder1, feeder 2 and feeder 3 - $EG_{f1,JMR,import}$, $EG_{f2,JMR,\ import}$ and $EG_{f3,JMR,\ import}$

Further LRQA verified that the EG_y 'Net electricity supplied by the project activity is the summation of the net electricity supplied by the WECs to the feeder 1, 2 & 3 ($EG_{f1,y}$, $EG_{f3,y}$ and $EG_{f4,y}$) to the grid by the WECs of the project activity connected to feeder 1, 2 & 3.

The electricity export to the grid and import from the grid, from the WECs connected to feeder1, feeder 2 and feeder 3 is measured through the main and check meters installed at the 33kV side of the Substation. The above line diagram indicates the location of the feeders at the substation and the local control system (LCS) meters at the WECs. Joint Meter Readings (JMR) of the main and check meter is carried out on a monthly basis in presence of the representatives of the Enercon (the O&M contractor) & the state electricity utility (MSEDCL). 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 2 and feeder 3 is denoted as follows;

Electricity Export from feeder 1, 2, 3 : $EG_{f1,JMR,export}$, $EG_{f2,JMR,export}$ and $EG_{f3,JMR,export}$

Electricity Import from feeder 1, 2, 3 : $EG_{f1,JMR,Import}$, $EG_{f2,JMR,Import}$ and $EG_{f3,JMR,Import}$

The electricity exported to grid from the common feeders 1, 2 & 3 and electricity imported from grid through the common feeder 1, 2 & 3 is measured by a common main and a check meter for the feeder 1, 2 & 3 located at the 33kV voltage side of the substation transformer. The Joint Meter Reading (JMR) of the main and check meter is carried out by MSEDCL (distribution wing of Maharashtra state electricity board) in presence of the representatives of the Enercon (the O&M contractor) on a monthly basis. The meters are electronic tri-vector bi-directional meters of accuracy class 0.2s for both main and check meters. The meters are tested for accuracy in line with the requirements of the Power Purchase Agreement (PPA). The meters are tested using a portable standard meter by the MSEDCL's meter testing division. The frequency of the meter testing/calibration is on annual basis. The calibration frequency as proposed in the revised monitoring plan is deemed appropriate considering the following:

- Clause 11.02 (b) of the Power Purchase Agreement (PPA) requires testing frequency of the energy meters on annual basis. Clause 11.02 (c) of the Power Purchase Agreement states that if during testing both main meter and check meter are found to be within the permissible limits of error (ie.0.2s) there will be no calibration and beyond the permissible limits of error.

- Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years".

- The host country regulation requires the energy meters to have been certified and calibrated as per Central Electricity Authority, Government of India notification regarding 'Regulations on installation and operation of meters' published by Central Electricity Authority, Government of India on March 17, 2006 The paragraph 18 (b) of the regulation states that "All interface meters shall be tested at least once in five years " In case calibration is not conducted at the frequency specified in the revised monitoring plan, PP shall apply the 'Guidelines for assessing compliance with the

(iii) Net electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 2 & feeder 3 ($EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$)

The main and the check meters are connected to the WECs of the project activity and other WECs that are not part of project activity but connected to feeder 1, feeder 2 & feeder 3.

The net electricity exported by the feeder 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.

Apportioning Procedure implemented is described as follows:

The apportioning procedure described in the revised monitoring plan includes two steps for the calculation of the Net electricity supplied by the WECs to the feeder 1, 2 & 3 ($EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y)}$).

Step 1: Measuring Electricity Generation for Each WEC

Electricity generation from each WEC connected feeder1, feeder2 and feeder3 during a monitoring period are measured and recorded by the LCS meter.

The electricity generation from the each WEC's involved in the project connected to feeder 1 ($EG_{f1,gross,\ y}$), feeder 2 ($EG_{f2,gross,\ y}$) and feeder 3 ($EG_{f3,gross,\ y}$) are determined from the three parameters monitored from central monitoring system database by the service provider (Enercon) are mentioned below;

$$\sum_{y=0}^{N_{f1}} EG_{f1,gross,y} \qquad \sum_{y=0}^{N_{f2}} EG_{f2,gross,y} \qquad \sum_{y=0}^{N_{f3}} EG_{f3,gross,y}$$

Where N_{f1} *= number of WECs comprising the Project activity connected to the feeder 1*
Where N_{f2} *= number of WECs comprising the Project activity connected to the feeder 2*
Where N_{f3} *= number of WECs comprising the Project activity connected to the feeder 3*

The electricity generation from the other WEC's connected to feeder 1 ($EG_{f1,gross,\ y}$), feeder 2 ($EG_{f2,gross,\ y}$) and feeder 3 ($EG_{f3,gross,\ y}$) are determined from the three parameters monitored from central monitoring system database by Enercon are mentioned below;

$$\sum_{y=0}^{M_{f1}} EG_{f1,gross,y} \qquad \sum_{y=0}^{M_{f2}} EG_{f2,gross,y} \qquad \sum_{y=0}^{M_{f3}} EG_{f3,gross,y}$$

Where M_{f1} *= number of WECs that are not part of the project activity but are connected to the feeder 1.*
Where M_{f2} *= number of WECs that are not part of the project activity but are connected to the feeder 2.*
Where M_{f3} *= number of WECs that are not part of the project activity but are connected to the feeder 3.*

All the WEC's are connected to the feeder 1, 2 & 3 and the electricity generation are monitored through the Central Monitoring System (CMS). The electricity monitored by the CMS is stored as soft copies in the database maintained by the service provider (Enercon). The LCS meter is capable of measuring the electricity on a continuous basis. The revised monitoring plan states that 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.

The validation team confirms the statement of the LCS meter as appropriate based on the review of the information provided in the written declaration from the service provider.

Step 2: Determining electricity exports from the WECs

2.1 Measuring aggregate electricity exports from the feeder to the grid

The measured aggregate electricity exports and imports were taken from the JMR issued by the MSEDCL. The two values taken from the JMR are mentioned below;

(i) Electricity exported by all the Wind Energy Converters (WECs) connected to feeder1, feeder 2 and feeder 3 respectively - $EG_{f1,JMR,export}$,$EG_{f2,JMR,export}$ and $EG_{f3,JMR,export}$
(ii) Electricity imported by all the Wind Energy Converters (WECs) connected to feeder1, feeder 2 and feeder 3 respectively - $EG_{f1,JMR,import}$,$EG_{f2,JMR,\ import}$ and $EG_{f3,JMR,\ import}$

The description and measurement methods of the two measured values are described above on the page 5 of this validation opinion.

2.2 Determining electricity exports from the project activity

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

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

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

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

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

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

Similarly for feeder 2, $EG_{f2,export}$, $EG_{f2,import}$ and $EG_{f2,}y$, is calculated as follows:

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

$$EG_{f2,export} = \frac{EG_{f2,JMR,\ export} \times \sum_{y=0}^{N_{f2}} EG_{f2,gross,\ y}}{\left(\sum_{y=0}^{N_{f2}} EG_{f2,gross,\ y} + \sum_{y=0}^{M_{f2}} EG_{f2,gross,\ y}\right)}$$

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

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

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

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

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 WECs of the project activity connected to feeder 3 is calculated as follows:

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

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

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

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

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

(iv) Net electricity exported to the grid by the project activity (EG_y) is calculated as:

The net electricity exported to the grid by the project activity EGy is calculated by the summation of the apportioned net electricity $EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$ supplied by the WECs involved in the project activity to the feeder 1, 2 & 3.

$EG_y = EG_{f1,y} + EG_{f2,y} + EG_{f3,y}$

The energy break-up report issued by the MSEDCL is the source for the apportioned net electricity ($EG_{f1,y}$, $EG_{f2,y}$ and $EG_{f3,y}$) supplied by the WEC's involved in the project activity. Further the PP raises the invoice to MSEDCL for the net electricity exported to the grid by the project activity (EGy).The net electricity exported to the grid EG_y will be the basis for the calculation of emission reductions.

The verification team confirms that the apportioning procedure proposed by the PP in the revised monitoring is the actual procedure applied by the service provider & certified by the MSEDCL. Based on the above substantiation the verification team concludes that the measured parameters ($EG_{f1,JMR,export}$,$EG_{f2,JMR,export}$ & $EG_{f3,JMR,export}$ and $EG_{f1,JMR,import}$,$EG_{f2,JMR,import}$ and $EG_{f3,JMR,import}$) and apportioning procedure applied by the service provider & MSEDCL provides completeness of the monitoring plan and reflect the actual monitoring practices and procedure implemented at project site.

2.2 Conformance to approved monitoring methodology

The proposed revised monitoring plan is in accordance to the data and parameters monitored listed in the Clause III of the applied methodology i.e. ACM0002 version 9 which requires "Monitoring shall consist of metering the electricity generated by the renewable technology".

The net electricity supplied by the project activity is a calculated figure based on measured meter readings from energy meters installed at feeder 1, feeder 2 and feeder 3 and the LCS meter readings installed at each WECs connected to feeder 1, feeder 2 and feeder3.

2.3 Findings of previous verification reports related to the changes (if any)

Not Applicable, as this revision in monitoring plan is being sought during the 1st periodic verification.

3. Appendix

Appendix 1: List of documents reviewed related to the new Monitoring Plan

1. Monitoring report for the project "Roaring 40s Wind Farms (Khandke) Private Limited - Phase II" for monitoring period 04/12/2010 to 31/12/2011 Version 1.2
2. Emission reduction calculation sheet, Version 1.2
3. Registered Project Design Document, Version 03 dated 15/06/2010
4. Validation Report Version 02, dated 29/06/2010
5. ACM0002 Version 09: Consolidated baseline methodology for grid connected electricity generation from renewable sources
6. Clean Development Mechanism Validation and Verification Manual Version 01.2
7. Clean Development Mechanism Validation and Verification standard Version 3.0
8. Procedures for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM
9. Procedures for notifying and requesting approval of changes from the project activity as described in the registered project design document

10. Guidelines on assessment of different types of changes from the project activity as described in the registered PDD
11. Joint meter reading reports for sale of electricity to grid during the monitoring period
12. Invoices raised by CLPWFK for sale of electricity during the monitoring period
13. Declaration from Enercon for LCS meter calibration dated 02/05/2012
14. Revised LoA form Host country DNA, ref no. 4/12/2008-CCC dated 11/01/2012
15. Fresh certificate of Incorporation consequent upon change of name issued by register of Companies, Govt. of India. w.e.f 11/01/2010

Appendix 2: List of persons interviewed

M/s CLP Wind Farms (Khandke) Private Limited

Mr. Dipjay Sanchania	Deputy Manager
Mr. Amit Gandhi	Assistant Manager
Mr. Shivaji Chate	Employee

Enercon India Limited

Mr. Prashaul Patil	Deputy Manager
Mr. Swaminathan	Assistant Manager

Maharashtra State Electricity Distribution Company Limited

Mr. A.S. Kurle	Joint Technician

PricewaterhouseCoopers Private Limited

Mr. Ankit Gupta	Consultant