



## **Revision of Monitoring Plan**

**Date: 16<sup>th</sup> April 2010**

### **Project Title:**

75MW wind power project in Maharashtra by Essel Mining Industries  
Limited

**Reference No: UNFCCC 1115**

**B.7 Application of monitoring methodology and description of monitoring plan:****B.7.1 Data and Parameters Monitored:**

<b>Data/Parameter:</b>	<b>EG<sub>y</sub></b>
Data Unit	MWh/yr
Description	Net Electricity supplied to MSEB facility
Source of Data to be used	Project site and at EMIL Corporate Office
Value of data applied for the purpose of calculating expected emission reductions in section B.5	125718 MWh/yr
Description of measurement methods and procedures to be applied:	<p><del>Continuous measurement and monthly recording</del> calculated on the basis of continuously measured data and monthly recording. The monitoring of EG<sub>GEN,y</sub> and EG<sub>AUX,y</sub> would be as per the details provided in the Article 11 of the Power Purchase Agreement signed between the MSEB and EMIL, which clearly identifies the following:</p> <p><i>Metering and recording process of power generation and consumption data</i></p> <p><i>Calibration of metering instruments</i></p> <p><i>Validation of data by both the parties</i></p> <p><i>Recording and approval <del>form</del> from <del>authorise</del> authorized personnel</i></p>
QA/QC procedures to be applied:	<p>Uncertainty level of data: Low;</p> <p>This data can be cross referred with the invoices raised to MSEB by EMIL and payment against the invoice.</p>
Any comment:	<p>EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon <del>Windfarm Services</del> Infrastructure Services Limited (Suzlon) who sends daily and monthly performance records<sup>1</sup> to EMIL.</p> <p>Records to be archived for 12years from the start of the crediting period either on paper or in electronic media.</p>

<b>Data/Parameter:</b>	<b>EGGENTOTAL,i</b>
Data Unit	KWh

<sup>1</sup> Daily performance record provides details about gross electricity generation at the controller for each WTG while monthly performance record provides details about net electricity generation (apportioned value) by all the WTGs of the project proponent.



Description	Total Electricity exported to MSEB (MSEDCL) facility by all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder, i.
Source of Data to be used	Monthly Generation Report obtained from Suzlon Infrastructure Services Limited
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording. The measurement is done through the energy meters for each feeder at the grid sub-station. The meters are duly approved, tested and sealed by the electricity board. Monthly readings are taken jointly by the electricity board and the authorized representative of the project proponent. These readings are furnished by the electricity board in the master JMR <sup>2</sup> .
QA/QC procedures to be applied:	Uncertainty level of data: Low; As per the power purchase agreement, the electricity board carries out the calibration and maintenance of meters. Calibration is done annually.
Any comment:	EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon Infrastructure Services Limited who sends monthly performance records to EMIL. Records to be archived for 12 years from the start of the crediting period either on paper or in electronic media.

<b>Data/Parameter:</b>	<b>EGAUXTOTAL<sub>i</sub></b>
Data Unit	KWh
Description	Total Electricity imported from MSEB (MSEDCL) by all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder, i.
Source of Data to be used	Monthly Generation Report obtained from Suzlon Infrastructure Services Limited
Value of data applied for the purpose of calculating expected emission reductions in	-

<sup>2</sup> Master JMR is issued by MSEDCL to Suzlon Energy Limited for the entire windfarm, wherein, monthly energy generation details for all the promoters are mentioned. This report is not under the jurisdiction of the project proponent and available only at the plant site.



section B.5	
Description of measurement methods and procedures to be applied:	<p>Continuous measurement and monthly recording.</p> <p>The measurement is done through the energy meters for each feeder at the grid sub-station. The meters are duly approved, tested and sealed by the electricity board.</p> <p>Monthly readings are taken jointly by the electricity board and the authorized representative of the project proponent. These readings are furnished by the electricity board in the master JMR.</p>
QA/QC procedures to be applied:	<p>Uncertainty level of data: Low;</p> <p>As per the power purchase agreement, the electricity board carries out the calibration and maintenance of meters. Calibration is done annually.</p>
Any comment:	<p>EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon Infrastructure Services Limited who sends monthly performance records to EMIL.</p> <p>Records to be archived for 12 years from the start of the crediting period either on paper or in electronic media.</p>

<b>Data/Parameter:</b>	<b>EGCONTROLLER,i,j</b>
Data Unit	KWh
Description	Electricity generation at the controller of individual WTG, j, of the project proponent connected to feeder, i.
Source of Data to be used	Monthly Generation Report obtained from Suzlon Infrastructure Services Limited
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	<p>Continuous measurement and monthly recording.</p> <p>The measurement is done through the controller at each WTG. Recording of the same is done at the Central Monitoring Station (CMS) in the windfarm. This data is provided to MSEDCL on a monthly basis for computation of electricity generation by individual promoters.</p> <p>All the WTGs in the windfarm are monitored from the CMS.</p>
QA/QC procedures to be applied:	<p>Uncertainty level of data: Low;</p> <p>This data can be cross referred with the JMR issued by MSED (MSEDCL) to EMIL.</p>
Any comment:	<p>EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon Infrastructure Services Limited who sends monthly performance records to EMIL.</p> <p>Records to be archived for 12 years from the start of the</p>



	crediting period either on paper or in electronic media.
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<b>Data/Parameter:</b>	$EG_{CONTROLLERTOTAL,i}$
Data Unit	KWh
Description	Total of electricity generation at the controller of all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder, i).
Source of Data to be used	Monthly Generation Report obtained from Suzlon Infrastructure Services Limited
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	This data is the summation of electricity generation at the controller of all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder, i. Monthly recording of the same is done by Suzlon at the CMS,
QA/QC procedures to be applied:	Uncertainty level of data: Low; This data can be verified with the master JMR for the entire windfarm issued by MSEB (MSEDCL) to Suzlon.
Any comment:	EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon Infrastructure Services Limited who sends monthly performance records to EMIL. Records to be archived for 12 years from the start of the crediting period either on paper or in electronic media.

#### B.7.2 Description of the monitoring plan:

There are WTGs of other promoters as well, connected to the same feeders as that of the project proponent, having a common metering facility. Therefore, net electricity supplied to the MSEB facility by all the WTGs connected to the feeder has to be apportioned between all promoters on the basis of electricity generation of individual WTG at the controller, so as to account for contribution of individual promoters of WTGs. Apportioning of the net electricity supplied to the MSEB (MSEDCL) facility by all the WTGs connected to the feeder between all promoters is done by MSEB (MSEDCL), while Suzlon provides data for the electricity generation of individual WTG at the controller to MSEB (MSEDCL). Apportioning of the net electricity supplied to the MSEB (MSEDCL) facility is done as below.



As per the applied monitoring methodology to the project, the project participants need to monitor the following parameters on continuous basis to ~~measure~~ monitor the net electricity  $EG_y$  supplied from the project activity:

$EG_{GENTOTAL,i}$  = Total Electricity exported to MSEB (MSEDCL) facility by all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder i.

$EG_{AUXTOTAL,i}$  = Total Electricity imported by all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder i from MSEB (MSEDCL).

$EG_{CONTROLLER,i,j}$  = Electricity generation at the controller of individual WTG, j, of the project proponent connected to feeder i.

$EG_{CONTROLLERTOTAL,i}$  = Total electricity generation at the controller of all WTGs (WTGs of project proponent as well as of other promoters) connected to the feeder i.

$EG_{GEN,y,i}$  = Total electricity generation by the WTGs of the project proponent connected to the feeder, i (apportioned) (kWh).

$EG_{AUX,y,i}$  = Auxiliary consumption by the WTGs of the project proponent connected to the feeder, i (apportioned) (kWh).

$EG_{GEN,y}$  = Total electricity generation by all the wind turbines of project proponent (kWh) ~~(MWh/y)~~

$EG_{AUX,y}$  = Auxiliary consumption by all the wind turbines of the project proponent (kWh) ~~power plant (MWh/y)~~

Now,

$$EG_{GEN,y,i} = (\sum EG_{CONTROLLER,i,j} / EG_{CONTROLLERTOTAL,i}) * EG_{GENTOTAL,i}$$

$$EG_{AUX,y,i} = (\sum EG_{CONTROLLER,i,j} / EG_{CONTROLLERTOTAL,i}) * EG_{AUXTOTAL,i}$$

Then,

$$EG_{GEN,y} = \sum EG_{GEN,y,i}$$

$$EG_{AUX,y} = \sum EG_{AUX,y,i}$$

Where,

i - represents the feeders

j - represents the WTGs of the project proponent.

The net electricity supply is ~~measured and/or~~ calculated as

$$EG_y = EG_{GEN,y} - E_{AUX,y}$$



The monitoring of  $EG_{GEN,y}$  and  $EG_{AUX,y}$  would be as per the details provided in the Article 11 of the Power Purchase Agreement signed between the MSEB and EMIL, which clearly identifies the following:

***Metering and recording process of power generation and consumption data***

***Calibration of metering instruments***

***Validation of data***

***Recording and approving authority***

EMIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon ~~Windfarm~~ ~~Services~~ Infrastructure Services Limited who sends daily and monthly performance records to EMIL. All the WTGs at the site are connected to a Central Monitoring Station of Suzlon being operated from Pune wherein data are directly captured through digital system. The captured data are then directly uploaded to the CRM (customer relationship management) system, an Oracle based database. From CRM the daily generation reports are directly sent to EMIL on a daily basis. A CRM manager deputed by Suzlon, is responsible for the monitoring of the WTGs. EMIL has daily communication CRM manager. As regards the data for wind speed, there are anemometer installed for calculating the wind speed at regular basis. Similarly wind-vane is installed for wind direction detection.

The electricity generation reports on joint meter reading are generated by MSEDCL and send to EMIL through Suzlon (O&M service provider) on monthly basis. Upon receipt of reports, EMIL generates invoices on sale of electricity and sends to MSEDCL via Suzlon. Thereafter, MSEDCL makes payments against the invoices within 3 months directly to EMIL.

The EMIL management is overall responsible for storing and archiving the data as well as preparation of monitoring report and communicate with EB of UNFCCC for project performance, registration and verification of the CDM project.

The apportioning of electricity generated by the entire wind farm is entirely under the jurisdiction of the electricity board. The project proponent has no role in computing and furnishing the apportioned electricity generated for themselves or any other promoter. The above calculation for deriving the apportioned electricity generated by the project proponent has been included only to bring clarity to the apportioning and overall monitoring procedure followed by the project proponent for the project activity.

The project proponent hereby wishes to clarify that the ‘proposed revision of the registered monitoring plan’ includes revisions proposed by Project Proponent/DOE during the first verification and it is



intended to introduce clarity and additional checkpoints to cross-verify the data used for calculating emission reductions in accordance with the guidelines of the registered monitoring plan. Therefore it does not include any alteration in the monitoring equipments or in the process of emission reduction computation from that of the registered monitoring plan. Hence, the level of accuracy of the monitoring equipments is not reduced as a result of the proposed revision of the monitoring plan.

Both, the registered monitoring plan and the proposed revision of monitoring plan requires the project proponent to implement metering system in accordance with Article-11 of the Power Purchase Agreement (PPA)<sup>3</sup>, signed between the **project proponent** and Maharashtra State Electricity Distribution Company Ltd (**MSEDCL**). Please refer the table below for a direct comparison between equipments as per registered monitoring plan and proposed monitoring plan:

<b>Metering equipment</b>	<b>Registered Monitoring Plan</b>	<b>Proposed Revision of Monitoring Plan</b>	<b>Remarks</b>
Metering system <sup>4</sup>	As per article 11 of PPA	As per article 11 of PPA	Both, Registered and Proposed Revision of Monitoring Plan refers to Article 11 of the PPA for procedure to be followed for monitoring generation.
<b>Energy meters</b>			Connected with every feeder receiving electricity from all the WTGs connected to it (including WTGs of project proponent and others). These energy meters will be equipped to measure both electricity export as well as electricity import by the WTGs connected to it.
Accuracy	Applicable accuracy class – 0.20 %	Applicable accuracy class – 0.20 %	
Meter type	4 wire, 3 phase	4 wire, 3 phase	
Jurisdiction	Completely under the jurisdiction of MSEDCL	Completely under the jurisdiction of MSEDCL	
<b>Controllers</b>	Microprocessor based multi function relays which are highly accurate	Microprocessor based multi function relays which are highly accurate	Installed at each of the Wind Turbine Generators (WTGs) to monitor the total electricity generated by individual WTGs

<sup>3</sup> There are five PPAs. Two PPAs are dated 31<sup>st</sup> March 2005, one PPA dated 6<sup>th</sup> October 2005 and two PPAs dated 8<sup>th</sup> February 2006.

<sup>4</sup> Please refer page 23 of the registered PDD and page 2 of proposed revision of monitoring plan



It may be noted from the above that:

- The proposed ‘revision of the registered monitoring plan’ includes detail of monitoring equipments – the energy meters (Main and Check Meters) and the controllers which was a requirement of Article 11 of the PPA as mentioned in the registered monitoring plan to ensure additional clarity.
- The proposed ‘revision of the registered monitoring plan’ does not propose any alteration in the procedure for calculation of emission reductions. It only elaborates the procedure for monitoring the parameters required for emission reduction computation to bring further clarity to the apportioning approach, as per the PPA, to calculate the net electricity export to the grid system by the project activity without additional monitoring equipment involvement. Therefore the overall accuracy of emission reduction computation will not be altered with the proposed ‘revision of the registered monitoring plan’. Rather, this will improve the certainty of data accuracy for emission reduction computation by introducing more clarity and additional verification and cross-check mechanisms.